

CP Crane Station Combustion Turbine Repowering Project

Application for Certificate of Public
Convenience and Necessity

Environmental Review Document



CP CRANE, LLC
Baltimore, Maryland

May 2018
ECT No. 170604-0300

Table of Contents

<u>Section</u>	<u>Page</u>
1.0 Introduction and Summary	1-1
1.1 Purposes of the ERD	1-1
1.2 Project Purpose and Overview	1-4
1.3 Summary of Permits and Approvals	1-5
2.0 Description of the Site and Adjacent Areas	2-1
2.1 Project Site Location and Description	2-2
2.2 Biophysical Environment	2-9
2.2.1 Meteorology and Ambient Air Quality	2-9
2.2.1.1 Climatology/Meteorology	2-9
2.2.1.2 Ambient Air Quality	2-12
2.2.2 Geohydrology	2-20
2.2.3 Surficial Hydrology	2-24
2.2.4 Ecology	2-26
2.2.5 Existing Acoustical Environment	2-34
2.3 Archaeological, Architectural, and Historical Sites	2-39
2.4 Land Use	2-39
2.4.1 Regional Setting	2-39
2.4.2 Comprehensive Land Use	2-39
2.4.3 Existing and Approved Land Uses	2-40
2.4.4 Agricultural Resources	2-40
2.4.5 Open Space Areas	2-40
2.4.6 Chesapeake Bay Critical Area	2-43
2.4.7 Visual Quality	2-43
3.0 Project Description	3-1
3.1 General Description	3-2
3.2 Project Design and Operational Features	3-4

Table of Contents (Continued, Page 2 of 4)

<u>Section</u>	<u>Page</u>
3.2.1 Major Components and Process Descriptions	3-4
3.2.2 Site Layout	3-9
3.2.3 Fuel Characteristics	3-14
3.2.4 Air Emissions and Controls	3-14
3.2.4.1 Air Emissions Types and Sources	3-14
3.2.4.2 Air Emissions Controls	3-17
3.2.4.3 New Source Review Applicability Determination	3-17
3.2.5 Water Use and Wastewater Effluents	3-20
3.2.6 Onsite Drainage and SWM	3-20
3.2.6.1 SWM Requirements	3-20
3.2.6.2 Construction Stormwater Runoff Control	3-22
3.2.6.3 SWM Operations	3-23
3.2.6.4 Runoff Management/Stormwater Conveyance	3-24
3.2.7 Solid and Hazardous Wastes	3-25
3.3 Rationale for Site Selection and Project Conceptual Design	3-26
3.3.1 Site Selection Alternatives	3-26
3.3.2 Facility Conceptual Design Alternatives	3-27
3.4 Impact on State Economics	3-29
3.5 Project Effect on Electric System Stability and Reliability	3-29
3.6 Features of Required Electric System Upgrades	3-30
3.7 Project Schedule and Construction Plans	3-31
3.7.1 Major Schedule Milestones	3-31
3.7.2 Construction Plans	3-31
4.0 Effects of Site Preparation and Project Construction	4-1
4.1 Impacts on Air Quality	4-1
4.2 Impacts on Groundwater	4-3
4.3 Impacts on Surface Water	4-4

Table of Contents (Continued, Page 3 of 4)

<u>Section</u>	<u>Page</u>
4.4 Ecological Impacts	4-5
4.5 Noise Impacts	4-7
4.6 Socioeconomic and Land Use Impacts	4-9
4.6.1 Socioeconomic Impacts	4-9
4.6.2 Land Use Impacts	4-10
4.6.3 Public Services and Facilities	4-10
4.6.4 Cultural Resources	4-11
4.6.5 CBCA	4-11
 5.0 Effects of Project Operation	 5-1
5.1 Impacts on Air Quality	5-1
5.1.1 Introduction	5-1
5.1.2 NSR Applicability and Overview of Impact Analyses	5-2
5.1.3 Analytical Approach	5-2
5.1.3.1 Air Quality Model	5-2
5.1.3.2 Meteorological Data	5-2
5.1.3.3 Emissions Source Input Data	5-2
5.1.4 Summary of Air Quality Impacts	5-3
5.2 Impacts on Groundwater	5-4
5.3 Impacts on Surface Waters	5-5
5.4 Ecological Impacts	5-5
5.5 Noise Impacts	5-7
5.5.1 Introduction	5-7
5.5.2 State Noise Regulations	5-7
5.5.3 Summary of Noise Attenuation Measures	5-7
5.5.4 Demonstration of Compliance with State Noise Regulations	5-8

Table of Contents (Continued, Page 4 of 4)

<u>Section</u>	<u>Page</u>
5.6 Socioeconomic and Land Use Impacts	5-8
5.6.1 Socioeconomic Impacts	5-9
5.6.2 Land Use Impacts	5-9
5.6.3 Public Services and Facilities	5-9
5.6.4 Cultural Resources	5-10

Appendices

Appendix A—Agency Communications
Appendix B—Information and Data
Appendix C—Air Construction Permit Application

List of Tables

<u>Table</u>	<u>Page</u>
1.1-1 Applicable CPCN Information Filing Requirements for Construction or Modification of Generating Stations	1-2
1.3-1 Summary of State, Federal, and Local Permits and Approvals Expected to Be Required for the CP Crane CT Repowering Project	1-6
2.2-1 National and Maryland AAQS	2-15
2.2-2 Physiographic Description of the Site	2-23
2.2-3 General Geologic Units, Thickness, and Lithology of East Baltimore Area	2-24
2.2-4 Subjective Effect of Changes in Sound Pressure Levels	2-34
2.2-5 Typical Sound Levels and Human Response	2-36
2.2-6 Ambient Sound Survey Results (January 17 and April 5, 2018)	2-36
3.2-1 GE LM6000 Emissions Rates (per CT)	3-15
3.2-2 Maximum Post-Project Potential Annualized Emissions Rates	3-16
3.2-3 Summary of Air Emissions Controls	3-17
3.2-4 Proposed Project Emissions and Comparison to the SER	3-18
3.2-5 Contemporaneous Project Emissions	3-19
3.2-6 Netting Analysis	3-19
4.5-1 Estimated Sound Levels at the Closest Residential Receptor by Construction Phase	4-8
5.1-1 Facility Maximum Modeled Concentrations Compared to NAAQS	5-4

List of Figures

<u>Figure</u>	<u>Page</u>
2.1-1 Site Location Map	2-3
2.1-2 Project Site and Surrounding Area Communities and Highways	2-4
2.1-3 Project Site and Local Area Roads and Other Features	2-5
2.1-4 Topographic Features of the Site and Vicinity	2-6
2.1-5 Aerial Photograph of the Site and Vicinity	2-7
2.1-6 Crane Generating Station Existing Layout	2-8
2.2-1 5-Year Annual Windrose for BWI (2012 to 2016)	2-10
2.2-2 5-Year Seasonal Windrose for BWI (2012 to 2016)	2-11
2.2-3 Maryland Ozone (8-Hour) Nonattainment Areas	2-13
2.2-4 Maryland SO ₂ Nonattainment Areas	2-14
2.2-5 AQI Charts for Baltimore County, PM _{2.5} —2015 through 2017	2-17
2.2-6 AQI Charts for Baltimore County, SO ₂ —2015 through 2017	2-18
2.2-7 AQI Charts for Baltimore County, Ozone—2015 through 2017	2-19
2.2-8 The Coastal Plain of Maryland	2-21
2.2-9 Physiographic Map	2-22
2.2-10 Location of Flood Plains in Site Vicinity	2-25
2.2-11 MDNR Wetlands in Site Vicinity	2-28
2.2-12 NWI Wetlands in Site Vicinity	2-29
2.2-13 Sensitive Species Review Areas in Site Vicinity	2-30
2.2-14 Forest Interior-dwelling Species (Potential Habitat) in Site Vicinity	2-31
2.2-15 Green Infrastructure in Site Vicinity	2-32

List of Figures (Continued, Page 2 of 2)

<u>Figure</u>	<u>Page</u>
2.2-16 Submerged Aquatic Vegetation in Site Vicinity	2-33
2.2-17 Ambient Sound Survey Locations	2-37
2.3-1 Presence of Cultural Resources	2-38
2.4-1 Land Use and Land Cover	2-41
2.4-2 Parks and Conservation Areas	2-42
2.4-3 Chesapeake Bay Critical Area in Site Vicinity	2-44
3.2-1 Simplified Flow Diagram of a Basic Simple-cycle Power System	3-7
3.2-2 Rendering of an LM6000 CT Unit	3-10
3.2-3 Photograph of an LM6000 CT Unit	3-11
3.2-4 General Layout of Existing Power Plant and Proposed Project	3-12
3.2-5 Detailed Project Equipment Arrangement	3-13
3.2-6 Conceptual Water Balance	3-21

List of Acronyms and Abbreviations

°F	degree Fahrenheit
µg/m ³	microgram per cubic meter
AAQS	ambient air quality standard
ACM	Annotated Code of Maryland
AERMOD	AMS/EPA regulatory model
AMS	American Meteorological Society
AQI	air quality index
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
BGE	Baltimore Gas & Electric Company
BMP	best management practice
BWI	Baltimore/Washington International Thurgood Marshall Airport
CBCA	Chesapeake Bay Critical Area
CFR	Code of Federal Regulations
CO	carbon monoxide
CO ₂ e	carbon dioxide equivalent
COMAR	Code of Maryland Regulations
CP Crane	CP Crane, LLC
CPCN	certificate of public convenience and necessity
Crane Station	Charles P. Crane Generating Station
CT	combustion turbine
CWA	Clean Water Act
dBA	A-weighted decibel
EPA	U.S. Environmental Protection Agency
ERD	environmental review document
FIDS	forest interior-dwelling species
ft	foot
GE	General Electric
GHG	greenhouse gas
gpm	gallon per minute
gr S/100 scf	grain of sulfur per 100 standard cubic feet

List of Acronyms and Abbreviations (Continued, Page 2 of 3)

H ₂ SO ₄	sulfuric acid
HAA	Healthy Air Act
hr/yr	hour per year
Hz	hertz
IPaC	Information for Planning and Consultation
ISO	International Organization for Standardization
kV	kilovolt
lb/hr	pound per hour
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MHT	Maryland Historical Trust
MMBtu/hr	million British thermal units per hour
MMscf/hr	million standard cubic feet per hour
mph	mile per hour
MRP	Middle River Power, LLC
MW	megawatt
NAAQS	national ambient air quality standards
NCDC	National Climatic Data Center
NERC	North American Electric Reliability Council
NNSR	nonattainment new source review
NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	NOAA National Marine Fisheries Service
NO _x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NSR	new source review
NWI	National Wetlands Inventory
NWS	National Weather Service
PAC	powdered activated carbon
PJM	PJM Interconnection LLC
PM	particulate matter
PM ₁₀	particulate matter 10 micrometers or less in diameter
PM _{2.5}	particulate matter 2.5 micrometers or less in diameter

List of Acronyms and Abbreviations (Continued, Page 3 of 3)

ppb	part per billion
ppm	part per million
ppmw	part per million by weight
Project	CP Crane CT Repowering Project
PSC	Public Service Commission
PSD	prevention of significant deterioration
Repowering Project	CP Crane CT Repowering Project
RLA	rural legacy area
SAV	submerged aquatic vegetation
SER	significant emissions rate
SNCR	selective noncatalytic reduction
SO ₂	sulfur dioxide
SPCC	spill prevention, control, and countermeasure
SPRINT®	SPray INTercooling®
SWM	stormwater management
tpy	ton per year
ULSD	ultra-low-sulfur diesel
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WBAN	Weather-Bureau-Army-Navy

1.0 Introduction and Summary

CP Crane, LLC, is applying for a certificate of public convenience and necessity (CPCN) to modify the Charles P. Crane Generating Station (Crane Station). This chapter of the application's environmental review document (ERD) explains the purposes of the ERD, provides an overview of the proposed modifications to the generating station, describes the various permits and approvals required, and highlights the consultations that CP Crane engaged in prior to filing this application.

1.1 Purposes of the ERD

CP Crane proposes to repower Crane Station by retiring its existing coal-fired units and adding combustion turbines (CTs) fired primarily with natural gas: the CP Crane CT Repowering Project (hereinafter referred to as the Repowering Project or Project). The purposes of this ERD are to identify and assess potential environmental, ecological, socioeconomic, and land use impacts associated with construction and operation of the Project, consistent with the requirements of Title 20, Subtitle 79, Code of Maryland Regulations (COMAR).

COMAR 20.79.01.01 states these regulations apply to “[a] person applying for a Certificate of Public Convenience and Necessity for the construction of a generating station or modification to an existing electric generating station.” Accordingly, the Maryland Public Service Commission (PSC) is required to consider, as a prerequisite to issuing a CPCN to construct or modify a generating station, the effect of the proposed facility on air and water pollution and several other aspects of the environment. COMAR 20.79 requires an applicant for a CPCN include in its application comprehensive environmental analyses, in addition to other information about a proposed project, such as economic impacts. Table 1.1-1 summarizes these CPCN filing requirements and where in this document the information and impact analyses can be found.

Table 1.1-1. Applicable CPCN Information Filing Requirements for Construction or Modification of Generating Stations

Filing Requirements	ERD Section(s)
<p>COMAR 20.79.01.04 (Application Filing Requirements)</p> <p>Except for an application for exemption under Regulation .03, an application for a CPCN for the construction of a generating station or an overhead transmission line, or an application for modification to an existing electric generating station or transmission line, shall include the following information:</p> <ul style="list-style-type: none"> A. The name of the applicant; B. The address of the principal business office of the applicant; C. The name, title, and address of the person authorized to receive notices and communications with respect to the application; D. The location or locations at which the public may inspect a copy of the application; E. A list of each local, state, or federal government agency having authority to approve or disapprove the construction or operation of the facility and containing a statement: <ul style="list-style-type: none"> (1) Indicating whether the necessary approval from each agency has been obtained, with a copy of each approval or disapproval attached; (2) If necessary approval has not been obtained, the reason why; and (3) Indicating whether any waiver or variance has been granted or requested with a copy of each attached. F. The information described under COMAR 20.79.04.01 for transmission lines; G. A general description of the generating station or generating station modification under COMAR 20.79.03.01, or the transmission line or the modification to an existing transmission line under COMAR 20.79.04.02 and .03; H. An implementation schedule for the project; and I. The environmental information required under COMAR 20.79.03.02 for generating stations or COMAR 20.79.04.04 for transmission lines. 	<p>See Application</p> <p>Section 1.3 and Application</p> <p>Not applicable Section 1.2 and Chapter 3.0</p> <p>Chapter 3.0 Refer to following items</p>
<p>COMAR 20.79.03.01 (Description of Generating Station)</p> <p>The description of the generating station, including linear facilities, or the generating station modification shall include:</p> <ul style="list-style-type: none"> A. Location; B. Design features; C. Operational features, including the expected capacity factor; D. The schedule for engineering, construction, and operation; E. A statement of the reasons for the selection of the design and the site of the generating station, including linear facilities, or generating station modification; F. A description of the impact of the project on the economics of the State; G. A description of the impact of the project on the stability and reliability of the electric system, or, if the impact is not known at the time of application, an explanation of the steps undertaken by the applicant to determine the impact, including the expected date for submission of the impact description; and H. To the extent feasible, the location and major design features of any required major electric system upgrade, including any associated transmission line, as a result of the project. 	<p>Section 1.2 and Chapter 3.0</p>
<p>COMAR 20.79.03.02 (Environmental Information)</p> <ul style="list-style-type: none"> A. The purpose of this regulation is to require the applicant to demonstrate that the application complies with applicable environmental restrictions. B. The environmental information shall include: <ul style="list-style-type: none"> (1) The following general information: <ul style="list-style-type: none"> (a) A general description of the physical, biological, aesthetic, and cultural features, and conditions of the site and adjacent areas; 	<p>Chapter 2.0</p>

Table 1.1-1. Applicable CPCN Information Filing Requirements for Construction or Modification of Generating Stations (Continued, Page 2 of 2)

Filing Requirements	ERD Section(s)
<ul style="list-style-type: none"> (b) A summary of the environmental and socioeconomic effects of the construction and operation of the project, including a description of the unavoidable impact and recommended mitigation; (c) A copy of all studies of the environmental impact of the proposed project prepared by the applicant; and (d) A statement of the ability to conform to applicable environmental standards; 	<p>Chapters 4.0 and 5.0</p> <p>Herein</p> <p>Herein and Application</p>
<p>(2) A description of the effect on air quality, including the:</p> <ul style="list-style-type: none"> (a) Ability of the generating station to comply with: <ul style="list-style-type: none"> (i) Federal or State ambient air quality standards; (ii) Federal or State emissions standards; (iii) Federal new source performance standards; (iv) Federal emissions standards for hazardous air pollutants; (v) Prevention of significant deterioration and new source review provisions; and (vi) Any requirement to obtain emissions offsets, allowances, and reduction credits. (b) Impact on prevention of significant deterioration areas and existing nonattainment areas; and (c) Information and forms required by Department of the Environment regulations relating to permits to construct and operating permits under COMAR 26.11; 	<p>Section 5.1 and Appendix C</p> <p>Appendix C</p>
<p>(3) A description of the effect on water quality and appropriation, including:</p> <ul style="list-style-type: none"> (a) An analysis of the availability of surface water and groundwater for the proposed generating station; (b) The identification of affected streams and aquifers; (c) The impact on other water users; (d) The mitigation and minimization techniques evaluated; and (e) The information and forms required by Department of the Environment regulations relating to water use and appropriation under COMAR 26.17.06.07 and 26.17.07, if applicable; 	<p>Chapters 4.0 and 5.0</p>
<p>(4) A description of the effect on State or private wetlands, including:</p> <ul style="list-style-type: none"> (a) Public health and welfare; (b) Marine fisheries; (c) Shell fisheries; (d) Wildlife; (e) Protection of life and property from flood, hurricane, or other natural disaster; (f) The evaluation of mitigation and minimization techniques, including proposals related to replacement lands; and (g) The information and forms required by Department of the Environment regulations relating to a license for use of State tidal wetlands or nontidal wetlands under COMAR 26.23 and 26.24; and 	<p>Section 4.4</p>
<p>(5) A discussion of the economics and availability of means for the disposal of plant-generated wastes.</p>	<p>Subsection 3.2.7</p>

Source: ECT, 2018.

1.2 Project Purpose and Overview

The applicant, CP Crane, LLC, is a wholly owned subsidiary of Middle River Power, LLC (MRP). MRP, with headquarters in the Chicago suburbs, is a private equity-sponsored investment and asset management company focused on power generation assets located in the United States. MRP currently has a combined 1,800 megawatts (MW) of power generation assets in operation or development. In addition to the 400-MW Crane Station, MRP owns:

- High Desert, an 830-MW, natural gas-fired, combined-cycle plant in San Bernardino County, California.
- Big Sandy, a 300-MW, natural gas-fired, simple-cycle plant located in Kenova, West Virginia.
- Wolf Hills, a 250-MW, natural gas-fired, simple-cycle plant located in Bristol, Virginia.

The main electrical generating units at Crane Station, located in eastern Baltimore County, are two coal-fired units: Unit 1, nominally rated at 190 MW and began operating in 1961; and Unit 2, nominally rated at 209 MW and began operating in 1963. Coal is delivered to the site by rail and stored in a coal pile. The boilers for both units are cyclone-type. Each unit is equipped with a baghouse for control of particulate matter (PM) emissions. Bottom ash and flyash are disposed offsite. Each unit is also equipped with a selective noncatalytic reduction (SNCR) system to control nitrogen oxides (NO_x) emissions and a powdered activated carbon (PAC) system for control of mercury emissions. The SNCR and PAC systems were installed in 2008 and 2009, respectively, to achieve compliance with the 2006 Maryland Healthy Air Act (HAA) and Clean Power Regulations. These requirements established emissions caps applicable to Maryland's largest coal-fired electric power plants, including Crane Station.

CP Crane now proposes to modify, or repower, Crane Station. The purpose of the Repowering Project is to provide clean, quick-start, dependable, and efficient generating capacity, energy, and ancillary services at the CP Crane location. The Project will repurpose existing electrical and natural gas interconnections and other infrastructure at the site to provide electricity and related services during times of peak load or system outages. To provide dependable energy if that natural gas is not available, which typically occurs during periods of extremely cold weather, and in support of PJM Interconnection LLC's (PJM's) capacity performance requirements, the

Repowering Project will also have the ability to produce electricity using ultra-low-sulfur diesel (ULSD) fuel oil and will store enough ULSD fuel onsite to operate Project CTs at full load continuously for 72 hours.

The Repowering Project involves retiring the two coal-fired units and adding three General Electric (GE) LM6000 CTs. The CTs will be configured for simple-cycle operation and fired primarily with natural gas, which will be backed up by ULSD fuel oil. CP Crane has completed conceptual engineering of the Project's principal system components and features at a level of detail sufficient to characterize the environmental impacts that may result from construction and operation, as presented herein. Project construction is planned to begin in the second quarter of 2019. CP Crane has targeted December 2019 for start of commercial operations.

1.3 Summary of Permits and Approvals

Prior to beginning construction of the modifications at Crane Station, CP Crane will obtain several licenses, permits, and approvals. The key approval for the modifications will be the CPCN from the Maryland PSC.

In addition to the CPCN, CP Crane will obtain other permits and approvals related to the Repowering Project. Some of these permits and approvals will be required before construction of the plant modifications can commence. Table 1.3-1 lists the other federal, state, and local permits and approvals required for the proposed Project.

As noted previously, the proposed plant repowering involves permanently shutting down the two existing coal-fired units and replacing them with CTs fueled primarily with natural gas. This modification to Crane Station will significantly reduce emissions of air pollutants from the power plant. In addition, while construction and operation of the new generating units will have some other associated environmental impacts, these impacts can be characterized as minimal and do not trigger any federal permit requirements. For example, construction activities are expected to occur within the previously impacted, active areas of the existing plant, and no construction is anticipated to occur within or close to any sensitive environmental or land use features (e.g., an area of special or sensitive habitat or land use).

Table 1.3-1. Summary of State, Federal, and Local Permits and Approvals Expected to Be Required for the CP Crane CT Repowering Project

Permit/Approval	Regulatory Citation(s)	Responsible Agency(ies)	Potentially Required for:		Status (If Applicable)			Waiver or Variance Requested?		Comments
			Construction	Operation	Application Contained	Application to be Filed	Permit/Approval Obtained	Yes	No	
State										
CPCN	COMAR 20.79	Maryland PSC, MDNR, MDE	✓		✓				✓	
Permit to construct	COMAR 26.11.02.02	Maryland PSC, MDNR, MDE	✓		✓				✓	Application forms included in Appendix C.
State discharge permit (stormwater)	COMAR 26.08.04, CWA Section 401, 40 CFR 122	MDE		✓		✓			✓	
Chemical operations—SPCC plan	COMAR 26.13, 40 CFR 112	MDE		✓		✓			✓	Applicable to new oil storage tank. Application will be prepared and submitted at the appropriate future time.
Local										
See comments	Baltimore County Regulations (including Articles 32 and 33)	Baltimore County	✓			✓			✓	Requirements under local ordinances, including building permit, grading permit, CBCA, and to be addressed as applicable.
Sediment and erosion control (grading permit)	Baltimore County Regulations (Article 33), COMAR 26.17.01	Baltimore County	✓			✓			✓	

Note: CBCA = Chesapeake Bay Critical Area.
CFR = Code of Federal Regulations.
COMAR = Code of Maryland Regulations.
CPCN = certificate of public convenience and necessity.

CWA = Clean Water Act.
MDE = Maryland Department of the Environment.

MDNR = Maryland Department of Natural Resources.
PSC = Public Service Commission.
SPCC = spill prevention, control, and countermeasure.

Source: ECT, 2018.

Therefore, given: (a) the Repowering Project's location at and within an existing power plant site, (b) the reductions in emissions of air pollutants that will result from implementing the modifications, and (c) the minimal potential to negatively impact most environmental resource areas initially as a result of the nature of the Project and its layout and design, the data collection and impact studies in this document are less expansive than would be expected for other power plant modifications regulated under the Maryland PSC law. Nonetheless, this ERD addresses each of the required subject areas at some level, commensurate with relevance to the Project.

2.0 Description of the Site and Adjacent Areas

This chapter describes the CP Crane Station site and surrounding area and their environmental features and contains the following sections in compliance with the regulatory requirement that the environmental information include “[a] general description of the physical, biological, aesthetic, and cultural features and conditions of the site and adjacent areas,” per COMAR 20.79.03.02.B.(1)(a):

- 2.1—Project Site Location and Description
- 2.2—Biophysical Environment, including
 - Meteorology and ambient air quality
 - Geohydrology
 - Surficial hydrology
 - Ecology
 - Noise
- 2.3—Cultural Resources
- 2.4—Land Use

The material provided in this chapter was developed primarily from information and data found in literature and other publicly available sources. This chapter serves as the baseline from which the impacts of the planned plant modifications are evaluated. Given the nature of this Repowering Project and its limited potential to impact environmental resources, relatively brief information is provided in some of the subsections to describe the Project site’s existing conditions.

2.1 Project Site Location and Description

The CP Crane site is in eastern Baltimore County. Figure 2.1-1 illustrates the general location of the site within the state of Maryland. Figures 2.1-2 and 2.1-3 show the plant site superimposed on highway and street maps. Figure 2.1-4 shows the Crane Station site boundaries superimposed on U.S. Geological Survey (USGS) topographical map. Figure 2.1-5 shows the site on an aerial photograph (dated 2014). The Crane Station property and other selected features of the area have been highlighted on the various maps.

As shown, Crane Station occupies the end of a small peninsula into Gunpowder River and Chesapeake Bay. Saltpeter Creek lies to the north, while Seneca Creek is to the south. Carroll Island, most of which is associated with Aberdeen Proving Ground, lies directly to the east and connects to the peninsula by Carroll Island Road and a bridge. Seneca Park Beach and Bowleys Quarters are the nearest neighborhoods or communities to the site. Seneca Park Beach, immediately west of the plant, has waterfront homes and a boat yard. The Bowleys Quarters neighborhood is located approximately 1 mile west.

Crane Station occupies 157 acres. The topography of the plant property is flat, with elevations just a few feet above sea level. In addition, portions of the plant property are within the floodplain and the designated Chesapeake Bay Critical Area (CBCA), as discussed subsequently in this chapter.

Figure 2.1-6 shows the current plant layout and key features. As indicated previously, the main generating units at the plant are the two coal-fired units that are planned to be retired. There is also a small (14-MW) No. 2 distillate oil-fired CT generating unit and two small auxiliary boilers at the plant. Other prominent features of the plant include railcar facilities, a coal storage pile, and coal handling equipment. On September 17, 2005, Crane Station received CPCN approval to modify the plant to allow for delivery of coal to the plant via barge.

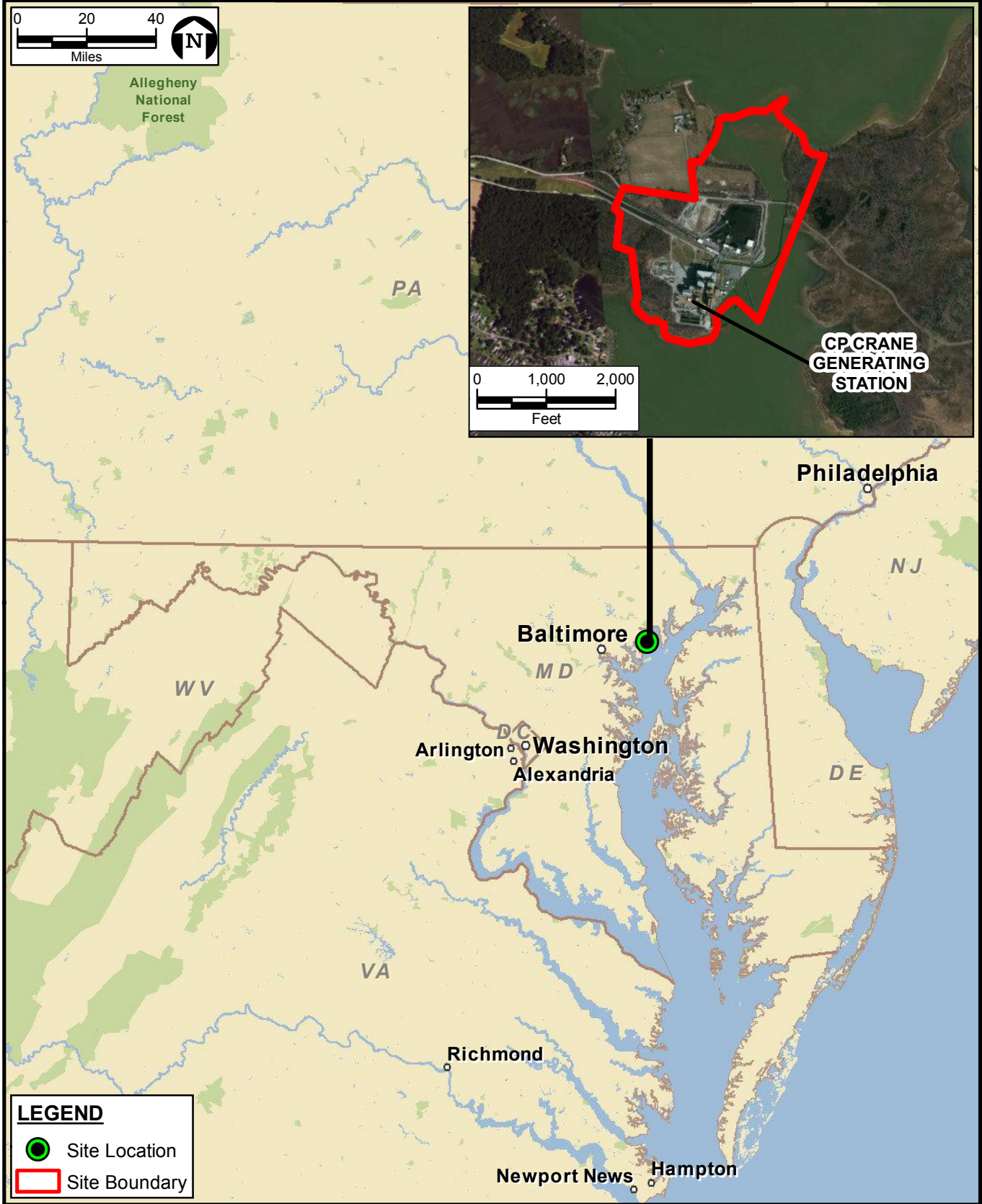


FIGURE 2.1-1.

SITE LOCATION MAP

Sources: MDE, 2014; ESRI, 2016; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

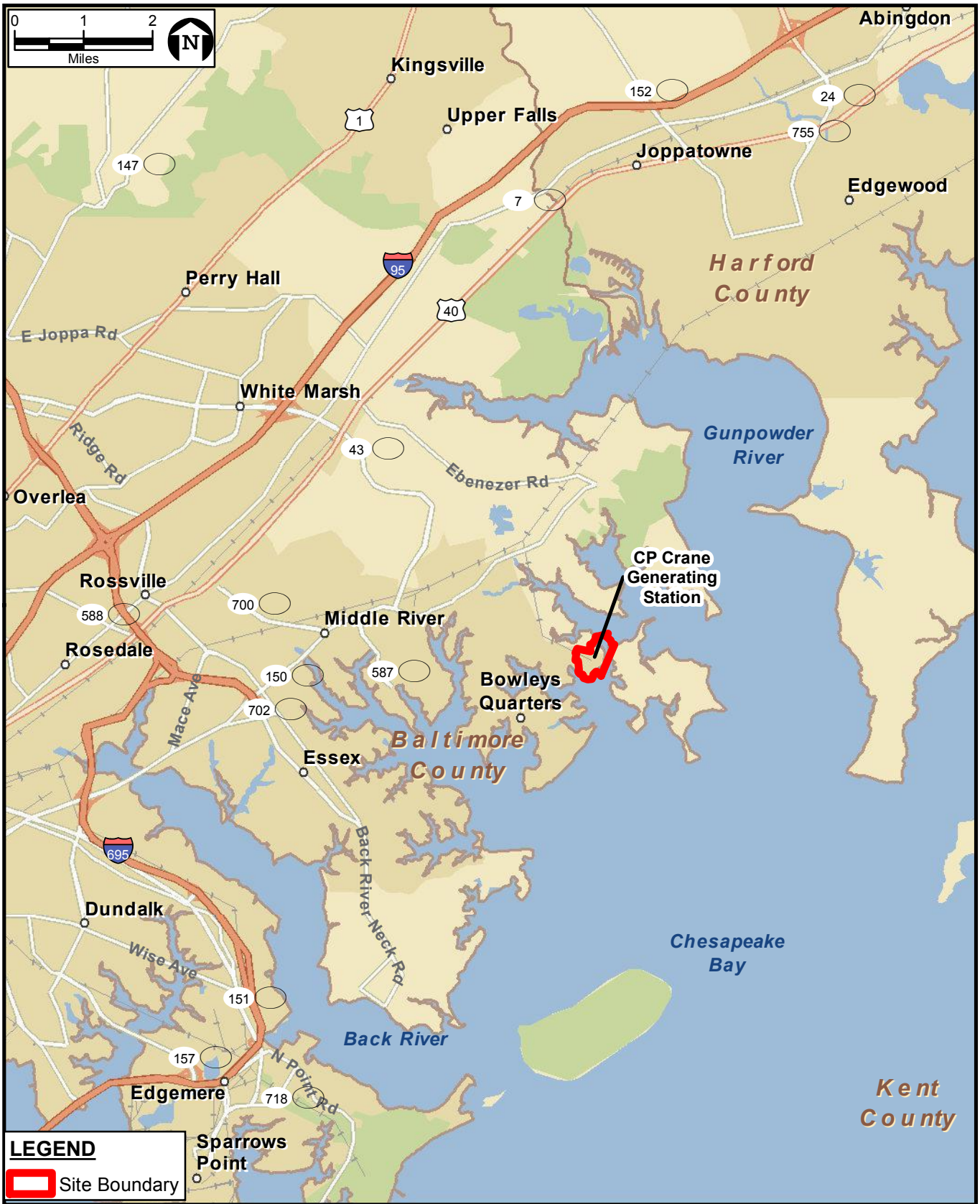


FIGURE 2.1-2.

PROJECT SITE AND SURROUNDING AREA COMMUNITIES
AND HIGHWAYS

Sources: ESRI, 2016; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

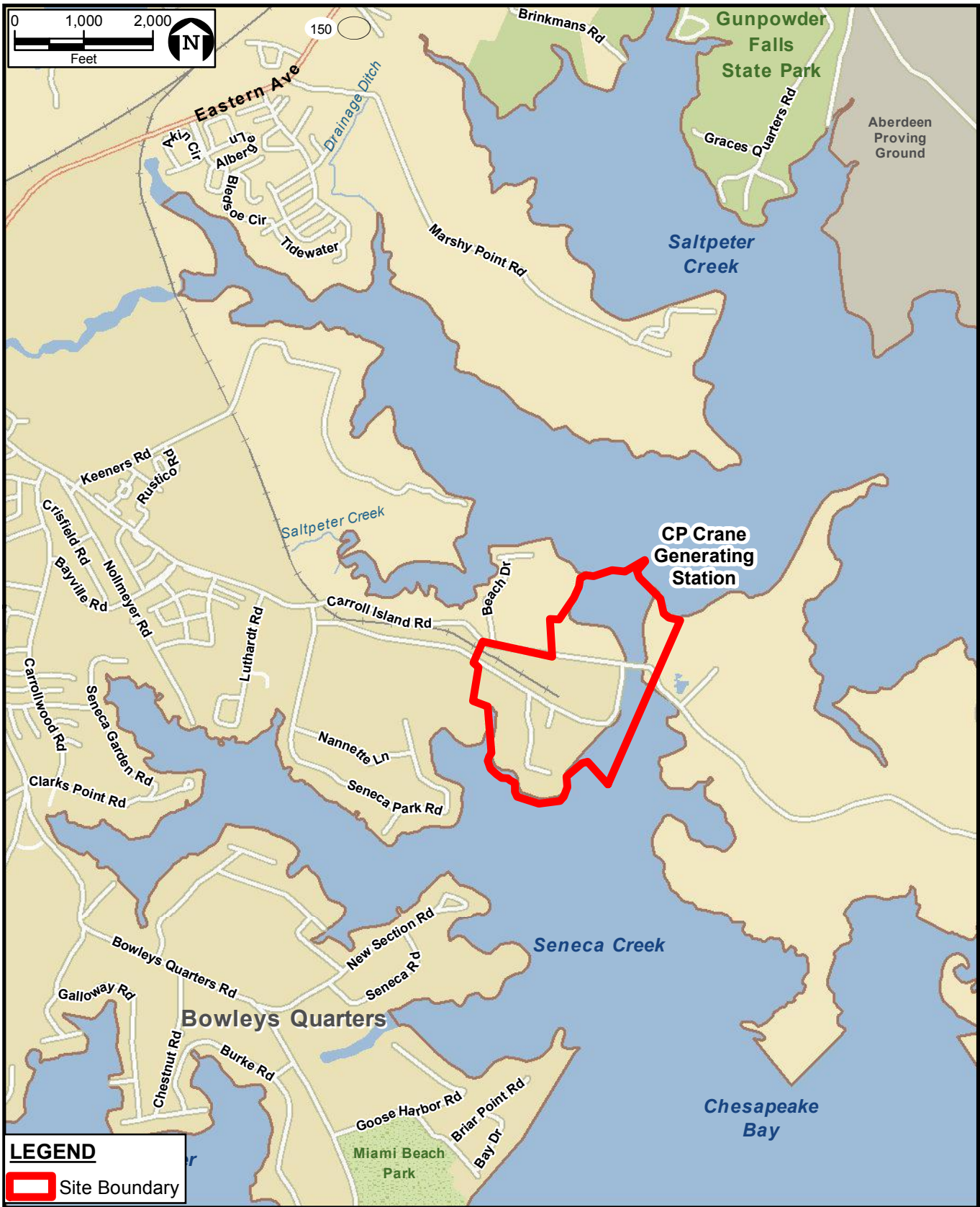


FIGURE 2.1-3.

PROJECT SITE AND LOCAL AREA ROADS
AND OTHER FEATURES

Sources: ESRI, 2016; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

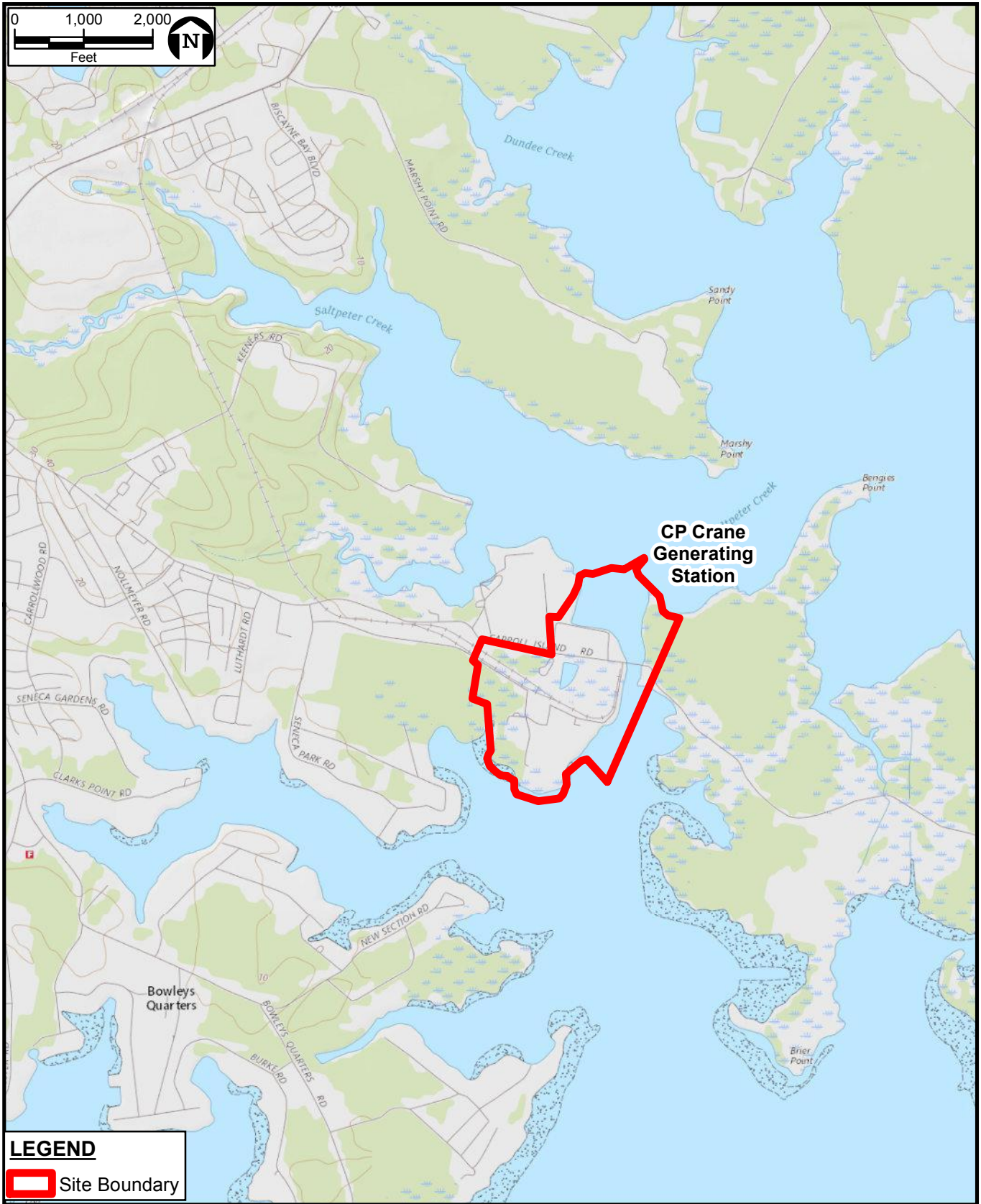


FIGURE 2.1-4.

TOPOGRAPHIC FEATURES OF THE SITE AND VICINITY

Sources: USGS, Gunpowder Neck and Middle River Quads, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.



FIGURE 2.1-5.

AERIAL PHOTOGRAPH OF THE SITE AND VICINITY

Sources: USGS, 2014; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.



Source: Constellation Power Source Generation, 2000.

2.2 Biophysical Environment

2.2.1 Meteorology and Ambient Air Quality

2.2.1.1 Climatology/Meteorology

The climate in north-central Maryland is classified as temperate with maritime influences from the Atlantic Ocean and Chesapeake Bay. Summers are warm and relatively humid, while winters are generally mild because of the warming influence of the Gulf Stream.

A summary of monthly mean and extreme temperatures based on National Weather Service (NWS) data collected at Baltimore/Washington International Thurgood Marshall Airport (BWI) can be used to describe the Project site's basic climatic characteristics (National Climatic Data Center [NCDC], 2002 and 2016). This NWS station is approximately 22 miles southeast of the site area. Based on these data for the years 1981 through 2010, January exhibits the lowest mean minimum temperature (approximately 24.4 degrees Fahrenheit [°F]) and lowest normal mean monthly temperature (32.9°F). The highest mean daily maximum temperature (87.2°F) and maximum mean monthly temperature (77.0°F) occur in July.

The same data summary indicates normal annual precipitation is approximately 42 inches. Summer rainfall is generally derived from local showers or thunderstorms. The highest normal monthly rainfall is 4 inches in both July and September, while February is the driest month, with average total precipitation of less than 3 inches.

March has the highest mean monthly windspeed of 11 miles per hour (mph). The lowest mean monthly windspeed of 7.9 mph occurs in both July and August. The annual average windspeed is 9.3 mph.

Figure 2.2-1 presents a 5-year annual windrose (2012 to 2016) based on surface wind direction and windspeed observed at BWI. Figure 2.2-2 presents 5-year seasonal windroses for the same station and period of record. The values presented in the figures represent the percent of the time the wind blows from a particular direction at a given speed. The predominant wind directions during the 5-year period were from the west and north-northwest. The wind blew from the west approximately 15 percent of the time.

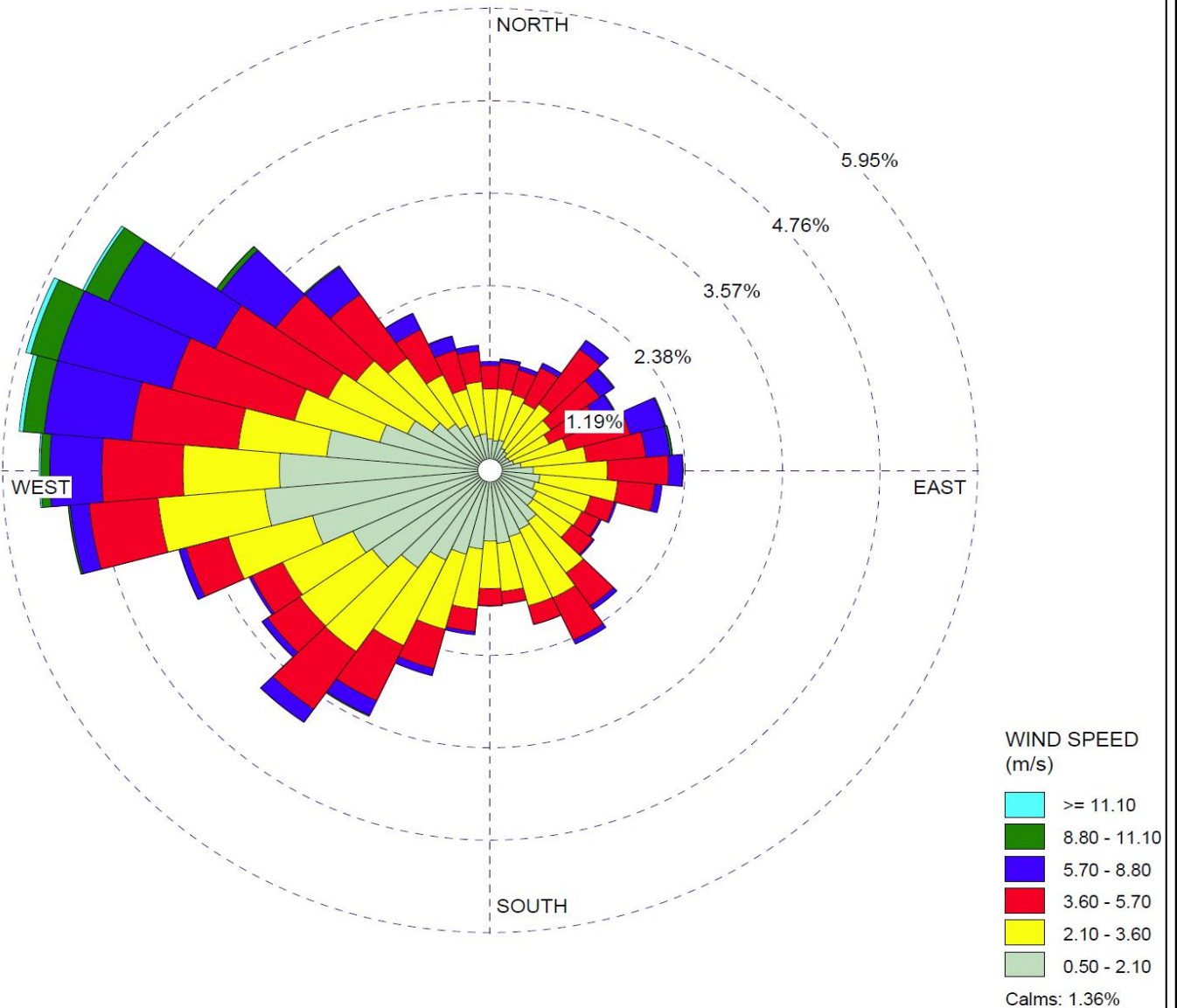


FIGURE 2.2-1.

5-YEAR ANNUAL WINDROSE FOR BWI
(2012 TO 2016)

Sources: MDE, 2018. ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

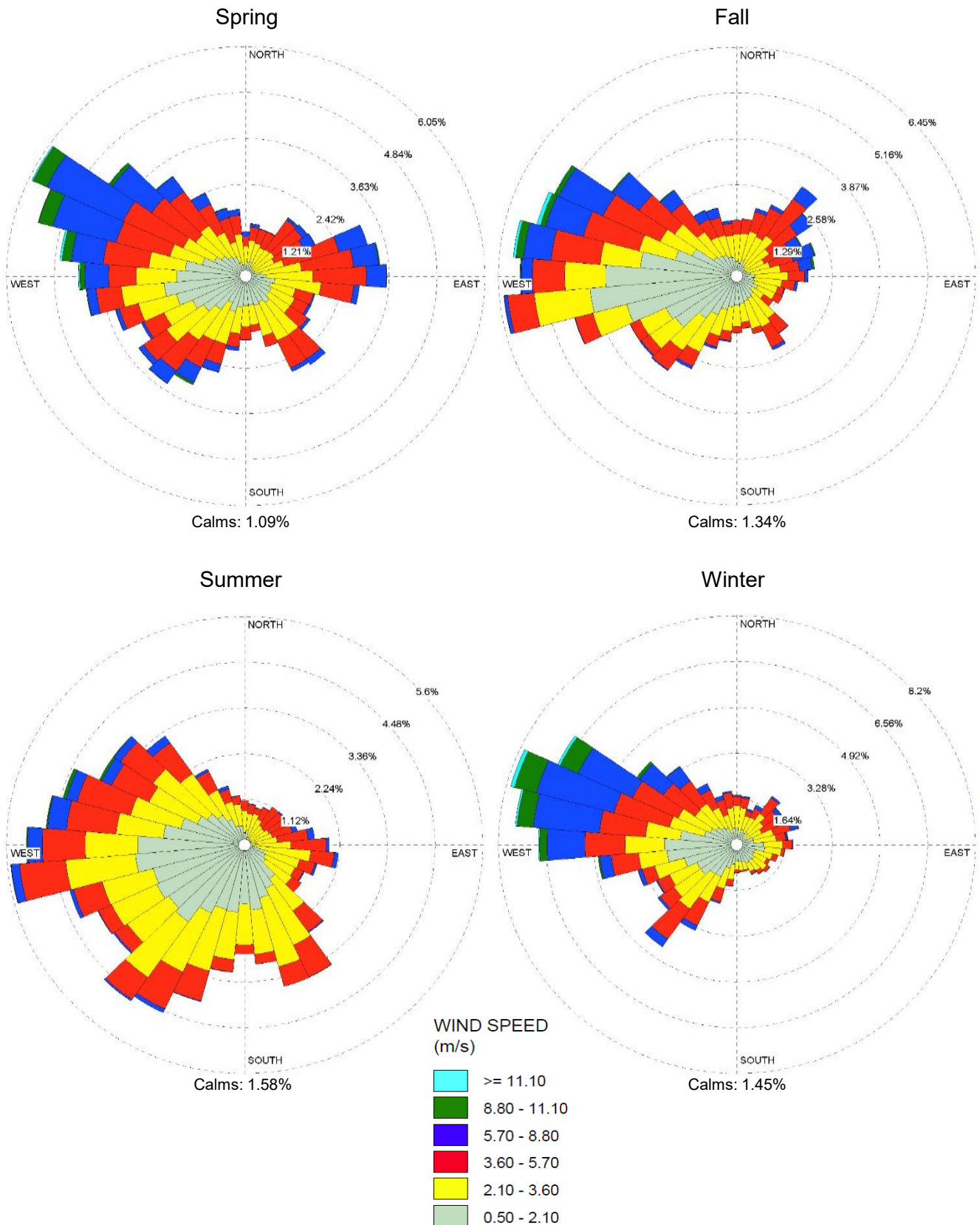


FIGURE 2.2-2.

5-YEAR SEASONAL WINDROSE FOR BWI
(2012 TO 2016)

Sources: MDE, 2018. ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

Thunderstorms are the most common severe weather in the area, occurring on an average of 28 days each year. Hurricanes and tornadoes are types of severe weather that may occur in the area. The possibility of a hurricane-strength tropical storm (winds greater than 73 mph) crossing the area is approximately 2 percent in any given year.

2.2.1.2 Ambient Air Quality

Crane Station is in an area the Maryland Department of the Environment (MDE) has designated as *attainment* for most air pollutants and averaging times. This means the area meets those state and federal ambient air quality standards (AAQS) provided in Table 2.2-1. However, the area is designated *nonattainment* for the pollutants ozone and sulfur dioxide (SO₂), as shown in Figures 2.2-3 and 2.2-4. Much of the northeastern United States is classified as nonattainment for ozone, which is a regional issue, as opposed to issues attributable to specific point sources of pollutants. Ozone is formed in the atmosphere in warm, sunny conditions, and its precursor pollutants are NO_x and volatile organic compounds (VOCs). Portions of Baltimore and Ann Arundel Counties were designated nonattainment for SO₂ in 2016.

Local and regional ambient air monitoring data are available with which to generally characterize the existing air quality conditions in site vicinity. Using the available data, the U.S. Environmental Protection Agency (EPA) has developed a descriptor of air quality that can be used to characterize the air quality in each county. This descriptor is called the air quality index (AQI). Air quality is described over a range from *good* to *hazardous* based on a calculated numerical value, as follows (<http://www.airnow.gov/index.cfm?action=static.aqi>):

AQI Values	Levels of Health Concern	Colors
When the AQI is in this range:	...air quality conditions are:	...as symbolized by this color:
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for sensitive groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very unhealthy	Purple
301 to 500	Hazardous	Maroon

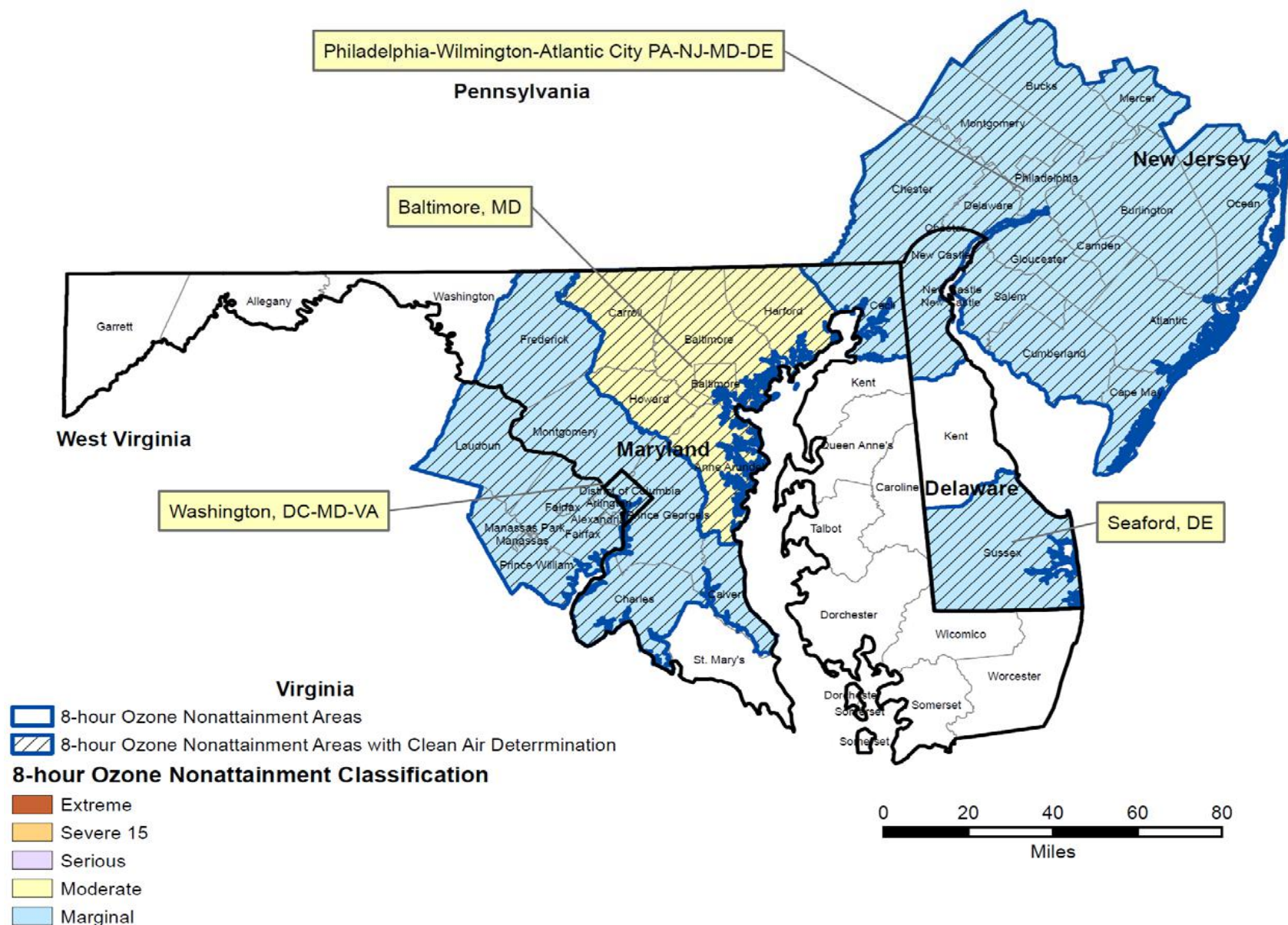


FIGURE 2.2-3.

MARYLAND OZONE (8-HOUR) NONATTAINMENT AREAS

Source: EPA (https://www3.epa.gov/airquality/greenbook/map/mddcvade8_2008.pdf), 2008.

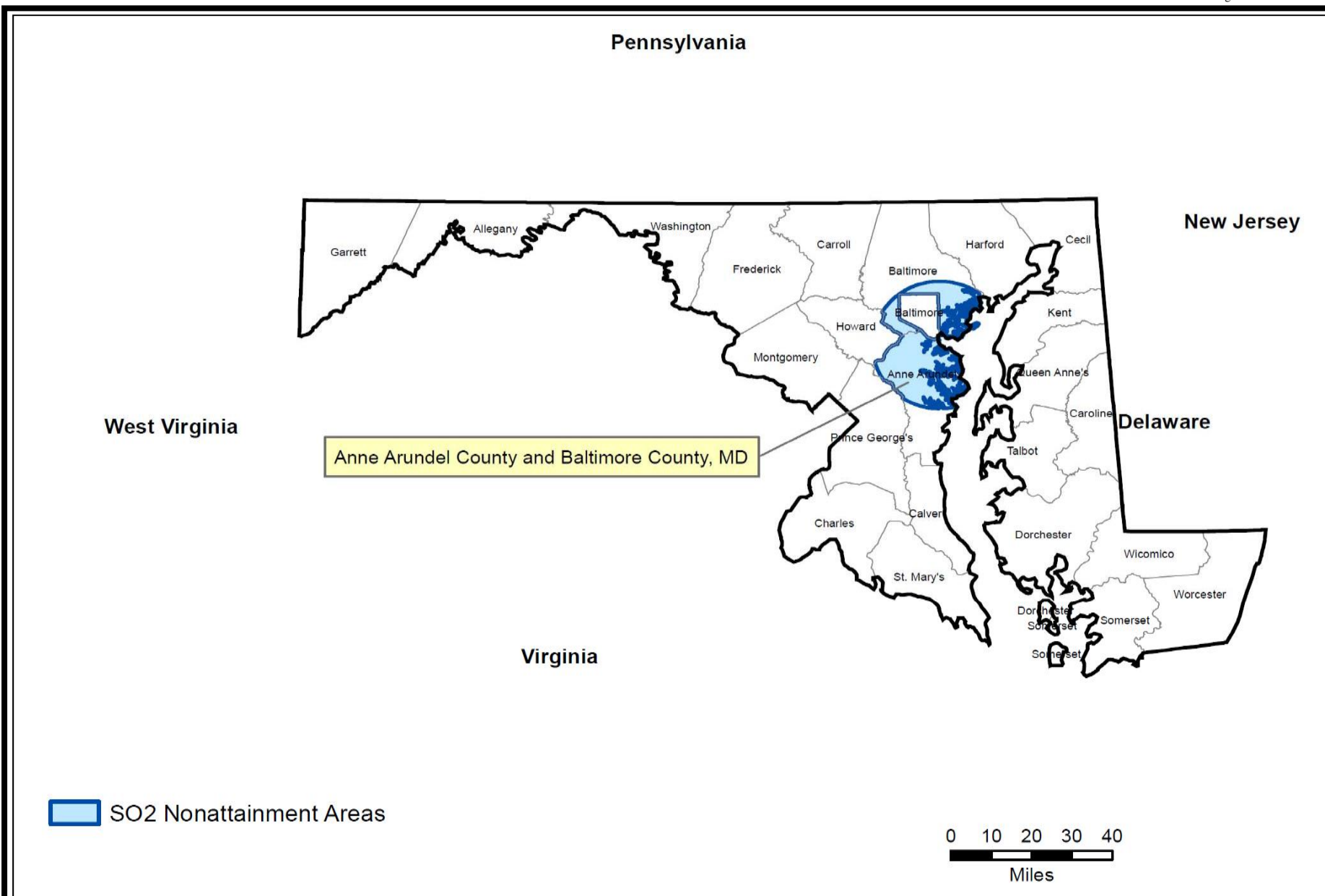


FIGURE 2.2-4.

MARYLAND SO₂ NONATTAINMENT AREASSource: EPA (https://www3.epa.gov/airquality/greenbook/map/mdso2_2010.pdf), 2010.

Table 2.2-1. National and Maryland AAQS

Pollutant	Averaging Period	AAQS ($\mu\text{g}/\text{m}^3$)*	
		Primary	Secondary
SO ₂	Annual †	80	— ‡
	24-hour †	365	— ‡
	1-hour §	196	— ‡
	3-hour ¥	— ‡	1,300
PM ₁₀	24-hour £	150	150
PM _{2.5}	Annual **	12	15
	24-hour ¥	35	35
CO	8-hour ¥	10,000	— ‡
	1-hour ¥	40,000	— ‡
Ozone	8-hour ‡‡	0.070 ppm	0.070 ppm
NO ₂	Annual	53 ppb	53 ppb
	1-hour §§	100 ppb	— ‡
Lead	3-month ¥¥	0.15	— ‡

Note: $\mu\text{g}/\text{m}^3$ = microgram per cubic meter.

CO = carbon monoxide.

NO₂ = nitrogen dioxide.

PM₁₀ = particulate matter 10 micrometers or less in diameter.

PM_{2.5} = particulate matter 2.5 micrometers or less in diameter.

ppb = part per billion.

ppm = part per million.

SO₂ = sulfur dioxide.

*Standards expressed in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) unless otherwise noted.

†Final rule signed June 2, 2010. The 1971 annual and 24-hour SO₂ standards were revoked in this rulemaking. However, these standards remain in effect until 1 year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

‡No ambient standard for this pollutant and/or averaging period.

§99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

¥Not to be exceeded more than once per year.

£Not to be exceeded more than once per year on average over 3 years.

**Annual mean, averaged over 3 years.

††98th percentile, averaged over 3 years.

‡‡Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.

§§98th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

¥¥The rule signed October 15, 2008, finalized a new lead standard. The 1978 lead standard of 1.5 $\mu\text{g}/\text{m}^3$ as a quarterly average remains in effect until one year after an area is designated for the 2008 standard, except in areas designated nonattainment for the 1978 standard, where, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

Sources: 40 CFR 50.

COMAR 26.11.04.

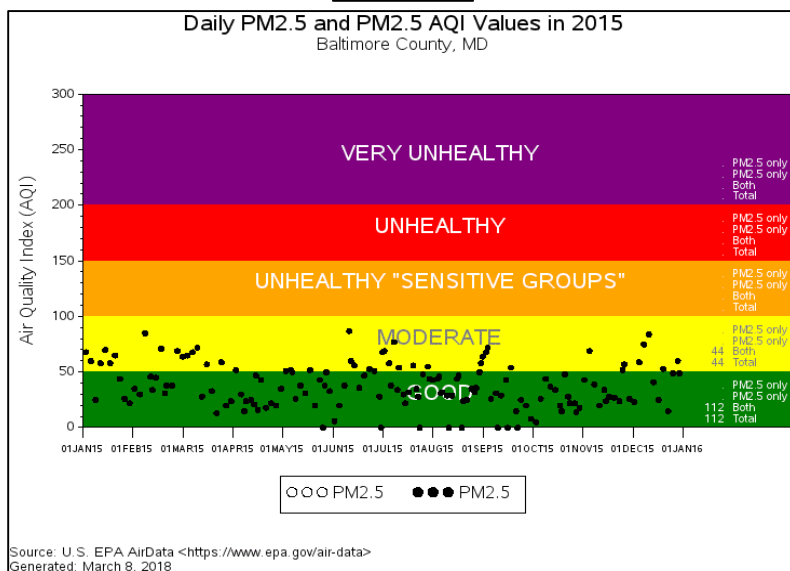
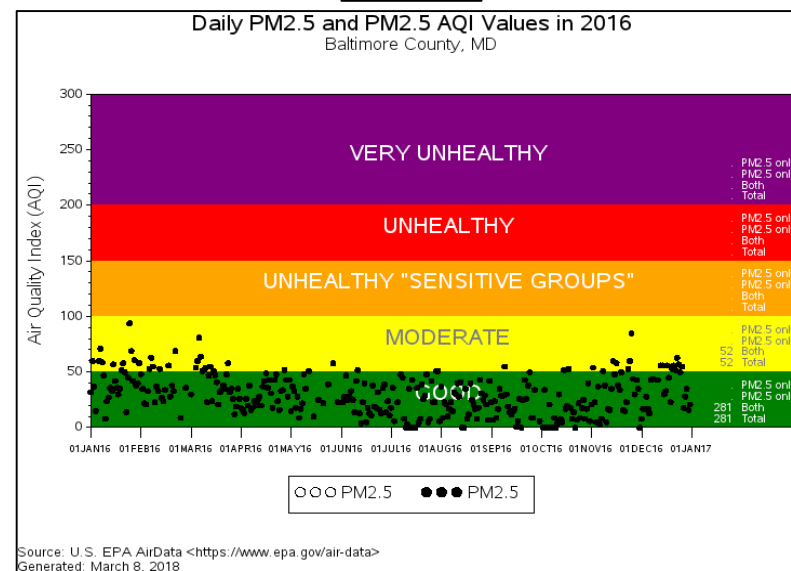
Each category corresponds to one of six levels of health concern:

- **Good**—AQI is 0 to 50. Air quality is considered satisfactory, and air pollution poses little or no risk.
- **Moderate**—AQI is 51 to 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **Unhealthy for Sensitive Groups**—AQI is 101 to 150. Although general public is not likely to be affected at this AQI range, people with lung disease, older adults, and children are at a greater risk from exposure to ozone, whereas persons with heart and lung disease, older adults, and children are at greater risk from the presence of particles in the air.
- **Unhealthy**—AQI is 151 to 200. Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects.
- **Very Unhealthy**—AQI is 201 to 300. This would trigger a health alert signifying that everyone may experience more serious health effects.
- **Hazardous**—AQI greater than 300. This would trigger a health warnings of emergency conditions. The entire population is more likely to be affected.

The higher the AQI value, the greater the level of air pollution, and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value of more than 300 represents hazardous air quality.

An AQI value of 100 generally corresponds to the national ambient air quality standards (NAAQS) for the pollutant, which is the level EPA has set to protect public health. AQI values below 100 are generally thought of as satisfactory. As AQI values go above 100, air quality is considered unhealthy, at first for certain sensitive groups of people and then for everyone as AQI values get higher.

Figures 2.2-5 through 2.2-7 provide AQI charts for Baltimore County for fine particulate matter (particulate matter 2.5 micrometers or less in diameter [PM_{2.5}]), SO₂, and ozone. (Baltimore County was, at one time, designated nonattainment for PM_{2.5}.) Charts for each pollutant are provided for the three most recent years: 2015, 2016, and 2017.

2015**2016**

Daily PM2.5 and PM2.5 AQI Values in 2017
Baltimore County, MD

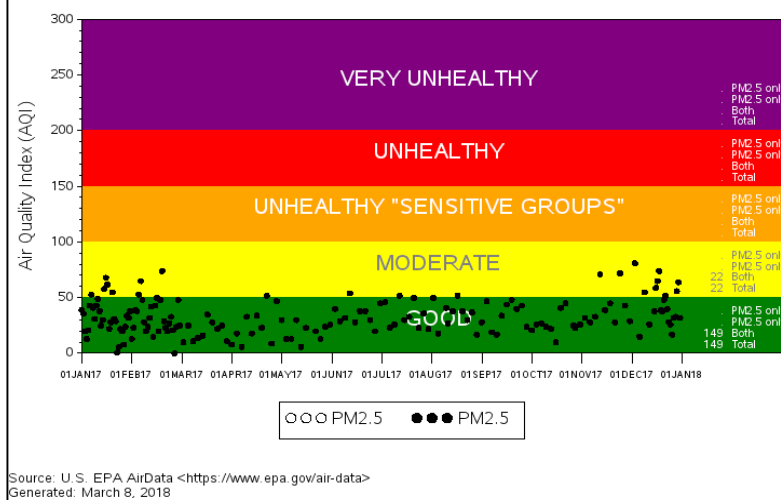
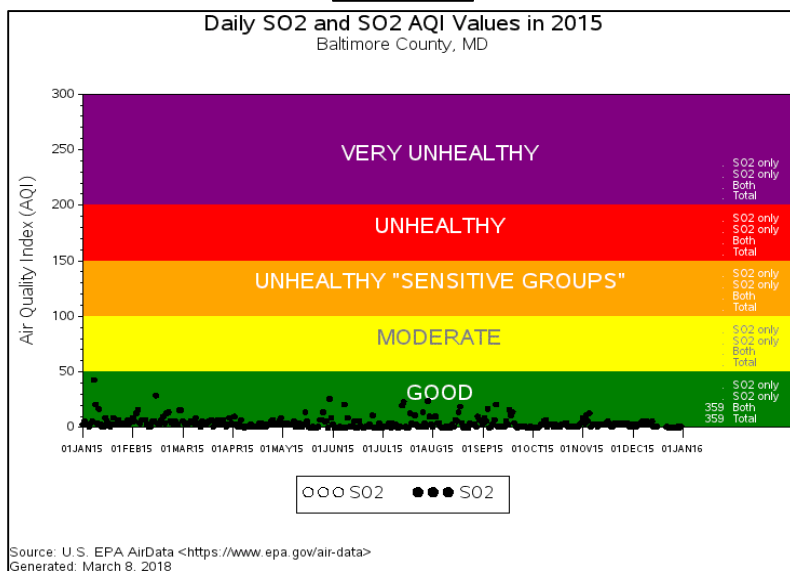
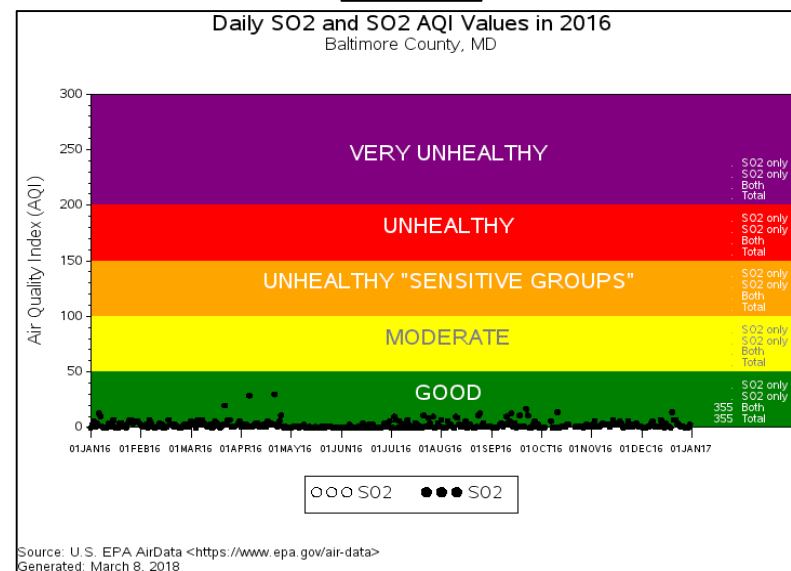
**2017**

FIGURE 2.2-5.

AQI CHARTS FOR BALTIMORE COUNTY

PM_{2.5}—2015 THROUGH 2017Source: EPA (https://www3.epa.gov/airquality/greenbook/map/mdso2_2010.pdf), 2010.

2015**2016**

Daily SO₂ and SO₂ AQI Values in 2017
Baltimore County, MD

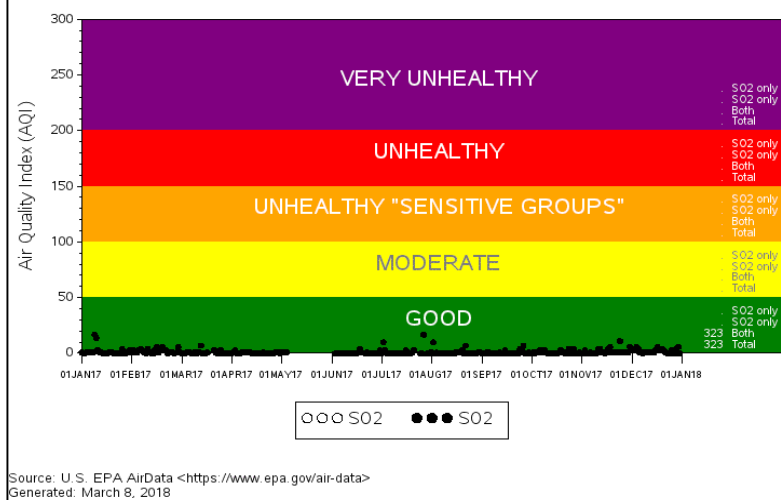
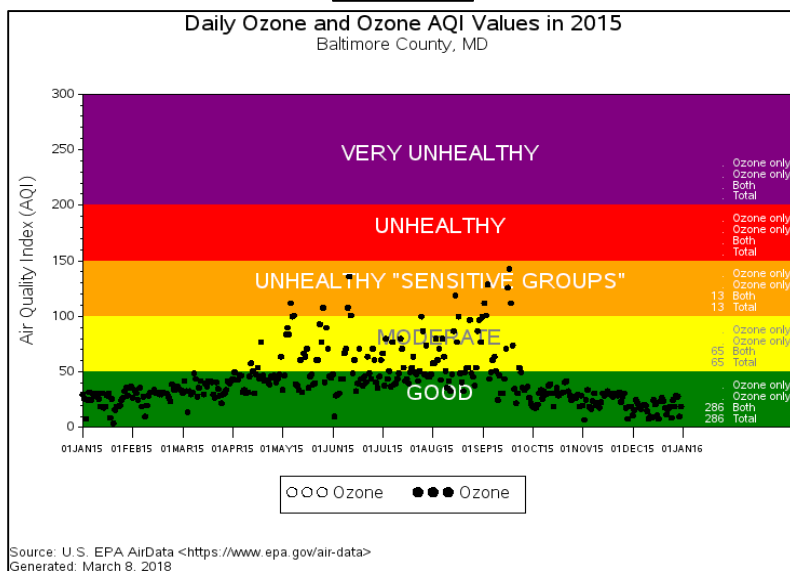
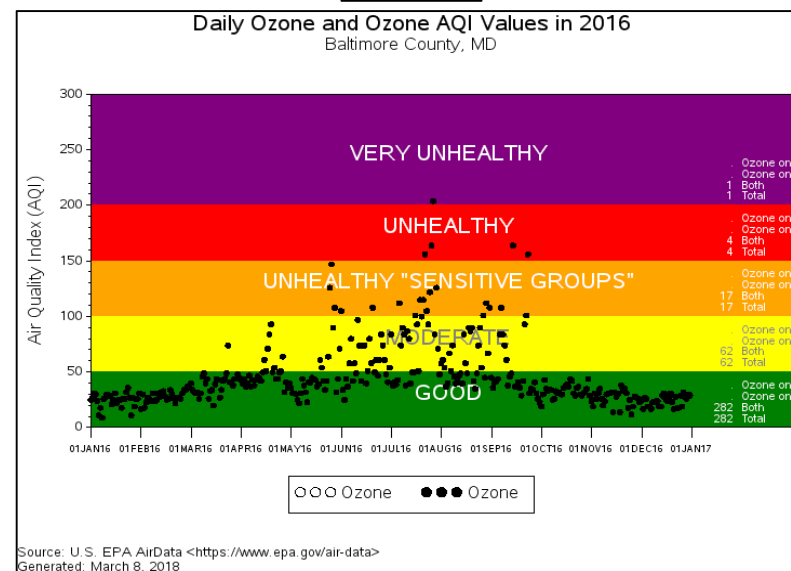
**2017**

FIGURE 2.2-6.

AQI CHARTS FOR BALTIMORE COUNTY
SO₂—2015 THROUGH 2017

Source: EPA (https://www3.epa.gov/airquality/greenbook/map/mdso2_2010.pdf), 2010.

ECT Environmental
Consulting &
Technology, Inc.

2015**2016**

Daily Ozone and Ozone AQI Values in 2017
Baltimore County, MD

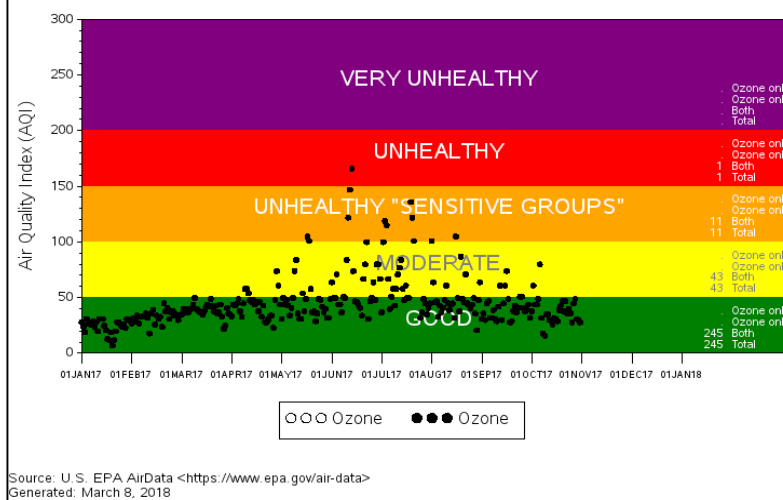
**2017**

FIGURE 2.2-7.

AQI CHARTS FOR BALTIMORE COUNTY OZONE—2015 THROUGH 2017

Source: EPA (https://www3.epa.gov/airquality/greenbook/map/mdso2_2010.pdf), 2010.

As the charts for PM_{2.5} show, the AQI has remained below 100, consistent with having attained the standards. The AQI for SO₂ has consistently been good.

Turning to ozone, the issues common to urban areas in the northeast United States during warm weather conditions are apparent. In 2015 Baltimore County experienced 13 air quality days that were *unhealthy for sensitive groups*. In 2016 there were 17 days that were *unhealthy for sensitive groups*, 4 *unhealthy* days, and 1 day considered *hazardous* or *very unhealthy* due to ozone levels. In 2017 there were 11 days considered *unhealthy for sensitive groups* and 1 *unhealthy* day due to ozone levels.

Overall, based on these charts, air quality in Baltimore County is generally *good to moderate*. The pollutant primarily affecting air quality in Baltimore County is ozone. As shown in Figure 2.2-7, days having the highest AQI values occur mostly in the spring and summer months.

2.2.2 Geohydrology

The site is located within the Coastal Plain Province, east of Baltimore (Figure 2.2-8); it is more specifically within the Western Shore Lowlands Region of this province. Figure 2.2-9 provides the physiography of the site area; the corresponding Table 2.2-2 provides details pertinent to the site. The geology of the site is provided in Table 2.2-3. The surficial geology of the site and surrounding area is classified as quaternary alluvium (Map Designation Q1). The alluvium consists of gravel, sand, silt, and clay; it varies in thickness from 0 to 150 feet [ft] (Southwick and Owens, 1968).

There are 10 major aquifers in the Coastal Plain region of Maryland. These include (in descending order) the surficial (Columbia Group), upper and lower Chesapeake Formation, Piney Point, Aquia, Magothy, Patapsco, and Patuxent (Wheeler and Wilde, 1989).

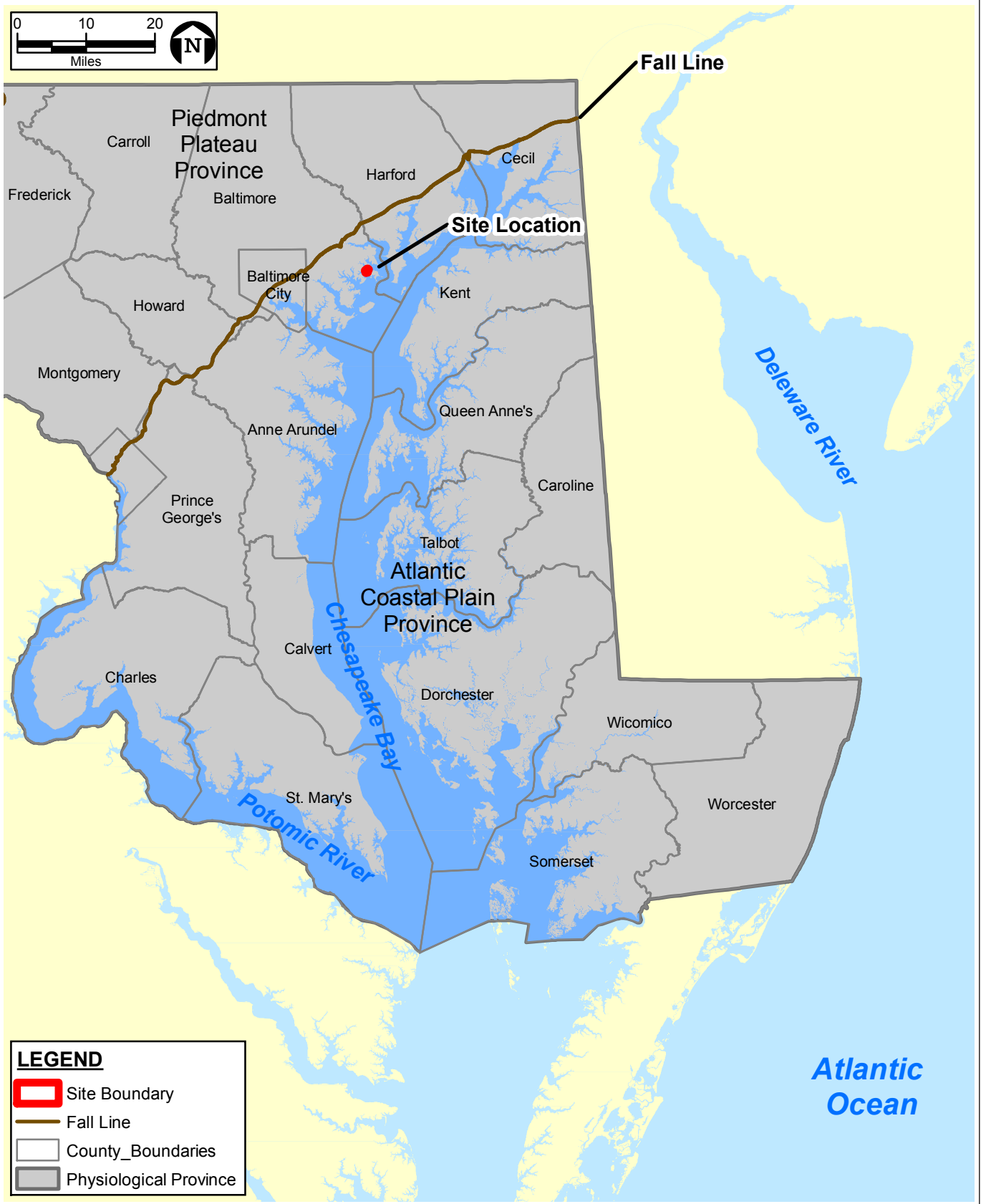


FIGURE 2.2-8.

THE COASTAL PLAIN OF MARYLAND

Sources: MDE, 2017; ECT, 2018.

ECT Environmental Consulting & Technology, Inc.



FIGURE 2.2-9.

PHYSIOGRAPHIC MAP

Sources: MDE, 2017; ECT, 2018.

ECT Environmental Consulting & Technology, Inc.

Table 2.2-2. Physiographic Description of the Site

ID No.	Province	Section	Region	District	Boundaries	Lithologies	Geologic Structure	Landform Description	Maximum - Minimum Elevation = Relief (ft)	Typical Local Relief (ft)	Drainage Pattern
512100	Atlantic Coastal Plain	Embayed	Western Shore Lowlands	Aberdeen Estuaries and Lowlands	District approximately 2 miles wide at northern boundary with Fall Zone near the Susquehanna and Northeast rivers; approximately 8 miles wide at southern boundary with Middle River Lowland, where boundary is the break between two low terraces at approximately 40- to 50-ft elevation	Fine to medium sand, often micaceous, and gravel; lesser amounts of silt and clay (mostly Kent Island formation, formerly Talbot formation); gabbro and granite boulders (to 8 ft) occur near Stump Point and Mill Creek south and east of Perryville	Essentially flat-lying sedimentary beds	Relatively featureless lowland (mostly less than 50-ft elevation) along the northwest shore of Chesapeake Bay; district has an irregular coastline indented by the flooded mouths of several rivers (Bush, Bird, Middle, Back, etc.).	~100 - 0 = ~100	20 to 60	Dendritic (estuarine)

Source: MDNR, 2008.

Table 2.2-3. General Geologic Units, Thickness, and Lithology of East Baltimore Area

Map Symbol	System	Group	Geologic Unit	Thickness (ft)	Hydrogeologic Unit	Description
Ql	Quaternary		Lowland deposits	0 to 100	Surficial if present	Gravel, sand silt and clay, often reworked
Kp	Cretaceous	Potomac Group	Raritan and Patapsco formations	300	Patapsco Aquifer	Sand, fine to medium, interbedded with silt or clay
			Arundel Formation	150	Confining Bed	Clay, thick, interbedded with sand
			Patuxent Formation	225	Patuxent Aquifer	Sand and gravel with clay and silt
Bgb	Paleozoic and Precambrian		Baltimore Gabbro Complex	Unknown	Used for groundwater west of the fall line only	Igneous and meta-morphic rocks
pCbg	Precambrian		Baltimore Gneiss	Unknown	West of fall line only	Igneous and meta-morphic rocks

Sources: Southwick and Owens, 1968.
Achmad, 1991.

Fleck and Vroblesky, 1996.
Chapelle, 1985.

2.2.3 Surficial Hydrology

The Crane site is located within the Chesapeake Bay Watershed and the Gunpowder River Area (Sub-Basin 02-13-08). As shown in Figures 2.1-3 and 2.1-4, the site is also bordered by Seneca and Saltpeter creeks, both of which drain into Gunpowder River. According to COMAR 26.08.02.07 and -.08, Gunpowder River, like all Maryland surface waters, is designated for Use I (water contact recreation, fishing, and protection of aquatic life and wildlife). In addition, waters near the Crane Station site are designated Class II, indicating shellfish harvesting, shallows waters with submerged aquatic vegetation (SAV), and/or spawning and nursery for migratory fish. Portions of the mouth of Gunpowder River Oligohaline (designated GUNOH1, immediately north of the site) and the Middle River Oligohaline (MIDOH, immediately south) are designated Class II for multiple uses.

Each of these waters, GUNOH1 and MIDOH, is impaired for several water quality parameters (see Appendix B). Each is listed as impaired for the nutrients nitrogen and phosphorous and for sediments (total suspended solids). Portions of both waters are also listed for polychlorinated biphenyls in fish tissue.

Some of Crane is within the flood plain, as shown in Figure 2.2-10.



FIGURE 2.2-10.

LOCATION OF FLOOD PLAINS IN SITE VICINITY

Sources: FEMA, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

2.2.4 Ecology

As with geohydrology and surficial hydrology, the planned Project has minimal potential to negatively impact ecological resources. To the extent there are impacts, those impacts will be positive, in that air pollutant emissions will decrease by significant amounts because of the shutting down of the coal-fired units. There is little potential for the proposed modification to negatively impact either wetlands or terrestrial and aquatic resources; therefore, no baseline monitoring of ecological resources was conducted.

Existing information was assembled from online sources (e.g., MERLIN Online; see Appendix B). The key findings supported by MERLIN data were as follows:

- Both the Maryland Department of Natural Resources (MDNR) and National Wetlands Inventory (NWI) maps indicated the presence of wetlands in the site area.
- No wetlands of special state concern were shown to be present anywhere in the vicinity.
- No natural heritage areas, agricultural preservation lands, or forest legacy lands were shown to be present anywhere in the vicinity.
- The presence of sensitive species review areas was indicated near the site, as was habitat suitable for forest interior-dwelling species (FIDS), green infrastructure, and SAV.

In addition to MERLIN, the U.S. Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool was queried for records of species and other resources such as critical habitat under the USFWS's jurisdiction that are known or expected to be within a 1-mile radius of the Crane Station site. The IPaC report (USFWS, 2018) is provided in full in Appendix B. No federally threatened or endangered species (under the Endangered Species Act of 1973) were identified. Under the Migratory Bird Treaty Act of 1981, 31 avian species listed as birds of conservation concern by USFWS were identified; these are species that are of concern throughout their range anywhere within the United States. Additionally, the bald eagle and golden eagle were identified to occur within 1 mile of the Project site. Eagles receive protection under the Bald and Golden Eagle Protection Act of 1940. Sixteen additional avian species that are potentially susceptible in offshore areas to certain types of development or activities (e.g., offshore energy development or longline fishing) were identified to occur within a 1-mile radius of the site.

No National Wildlife Refuge lands are within 1 mile of the site, nor are any fish hatcheries. Critical habitat under the jurisdiction of National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) was queried to identify any anadromous or marine species that may exist near the site. The closest designated critical habitat (for Maryland darter, *Etheostoma sellare*) is approximately 18 miles northeast of the site (NOAA Fisheries, 2018).

Crane Station is located within the Maryland Piedmont Plateau Province (see Figure 2.2-8). Characteristically, the landscape in the site region is typified by rolling hills with incised stream valleys. This area of Maryland is included within the Southeastern Mixed Forest Ecological Province as defined by the U.S. Forest Service. Typical vegetation is deciduous and mixed pine-oak forests.

MDNR and NWI wetland maps were obtained from MDNR's Geospatial Data Web site. Figures 2.2-11 and 2.2-12 show these maps overlaying an aerial photograph.

The MDNR data site was also used to obtain the more detailed information regarding sensitive species review areas as delineated by the Wildlife and Heritage Service. Figure 2.2-13 presents the resulting data. The highlighted areas indicate the presence or possible presence of listed species. The areas closest to the plant site are classified as either Group 2, 3, or 4. Group 2 relates to state-listed species; Group 3 relates to species or natural communities of concern to MDNR, but with no official status; and Group 4 indicates buffered locations of bald eagle nests. The MDNR data also provided some information regarding potential habitat for FIDS and areas designated as green infrastructure. Figures 2.2-14 and 2.2-15 present this information.

Gunpowder River, including Seneca Creek, is an estuary with tidal characteristics. The average tidal range is approximately 1.4 ft with slightly higher spring tides. Estuarine systems consist of deep-water tidal wetlands and adjacent tidal wetlands. SAV is also established within this estuarine system (see Figure 2.2-16).



FIGURE 2.2-11.

MDNR WETLANDS IN SITE VICINITY

Sources: USDA, 2015; MDNR, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.



FIGURE 2.2-12.

NWI WETLANDS IN SITE VICINITY

Sources: USDA, 2015; USFWS, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

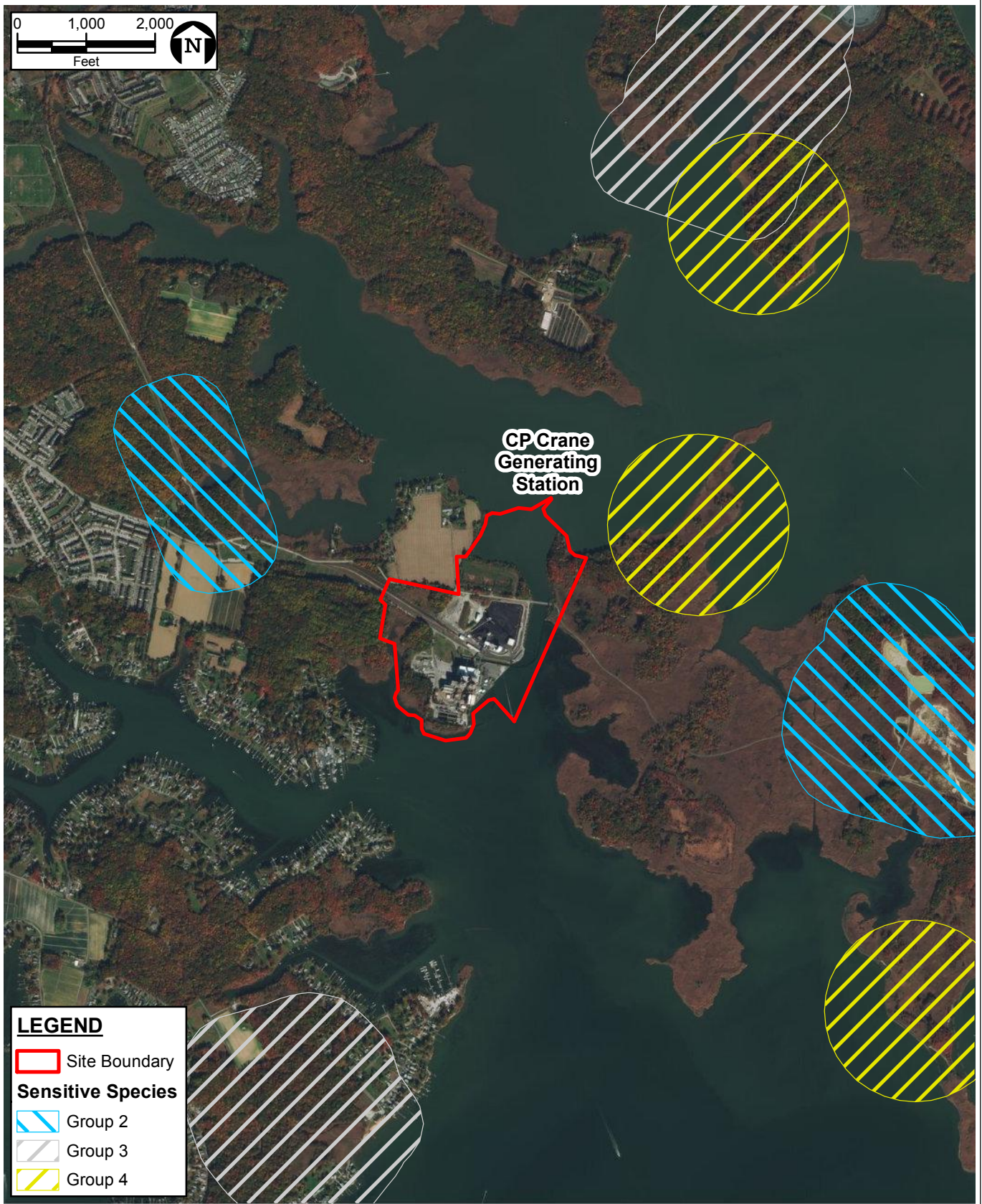


FIGURE 2.2-13.

SENSITIVE SPECIES REVIEW AREAS IN SITE VICINITY

Sources: USDA, 2015; MDNR, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

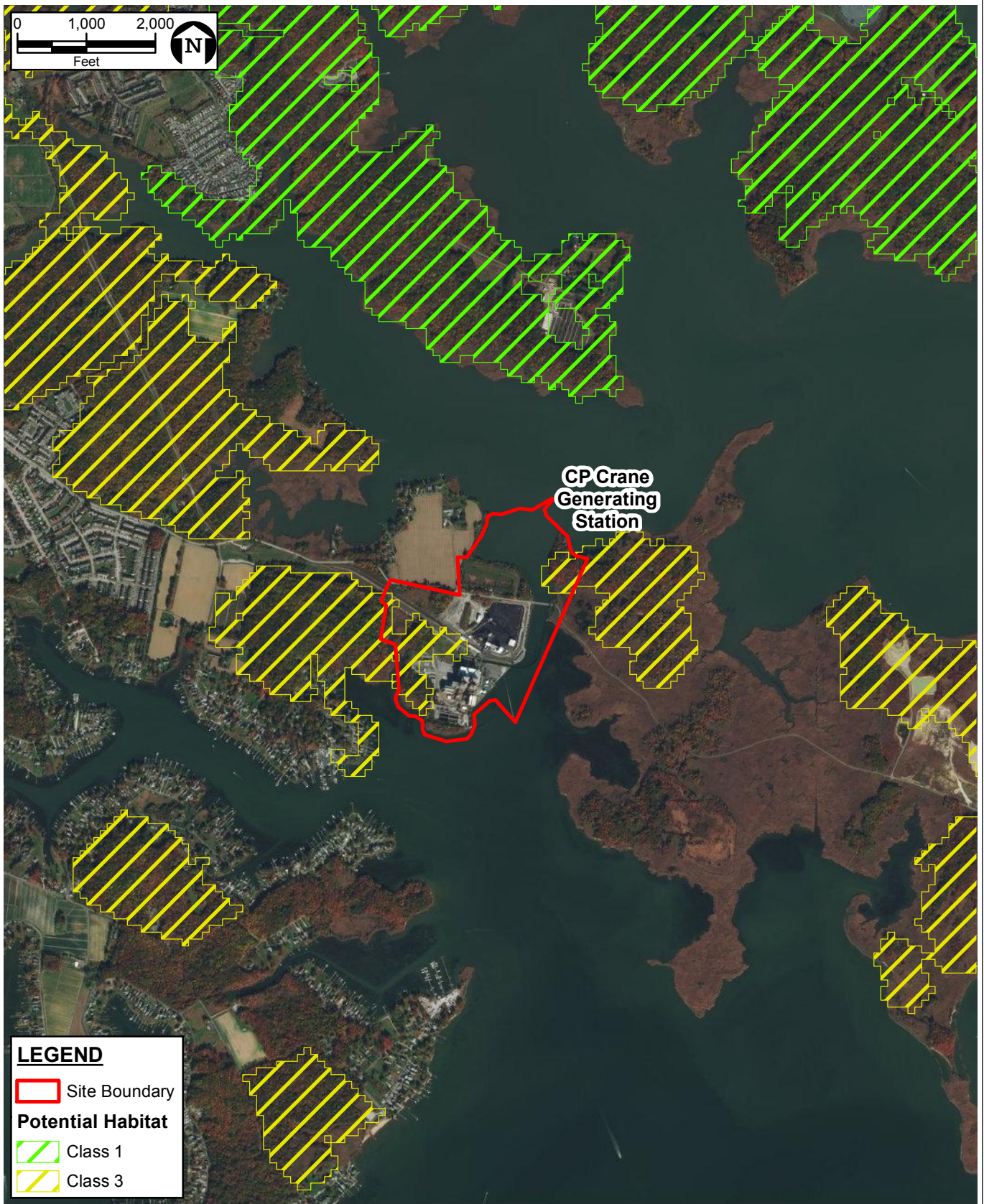


FIGURE 2.2-14.

FOREST INTERIOR-DWELLING SPECIES (POTENTIAL HABITAT) IN SITE VICINITY

Sources: USDA, 2015; MDNR, 2017; ECT, 2018.

ECT Environmental Consulting & Technology, Inc.

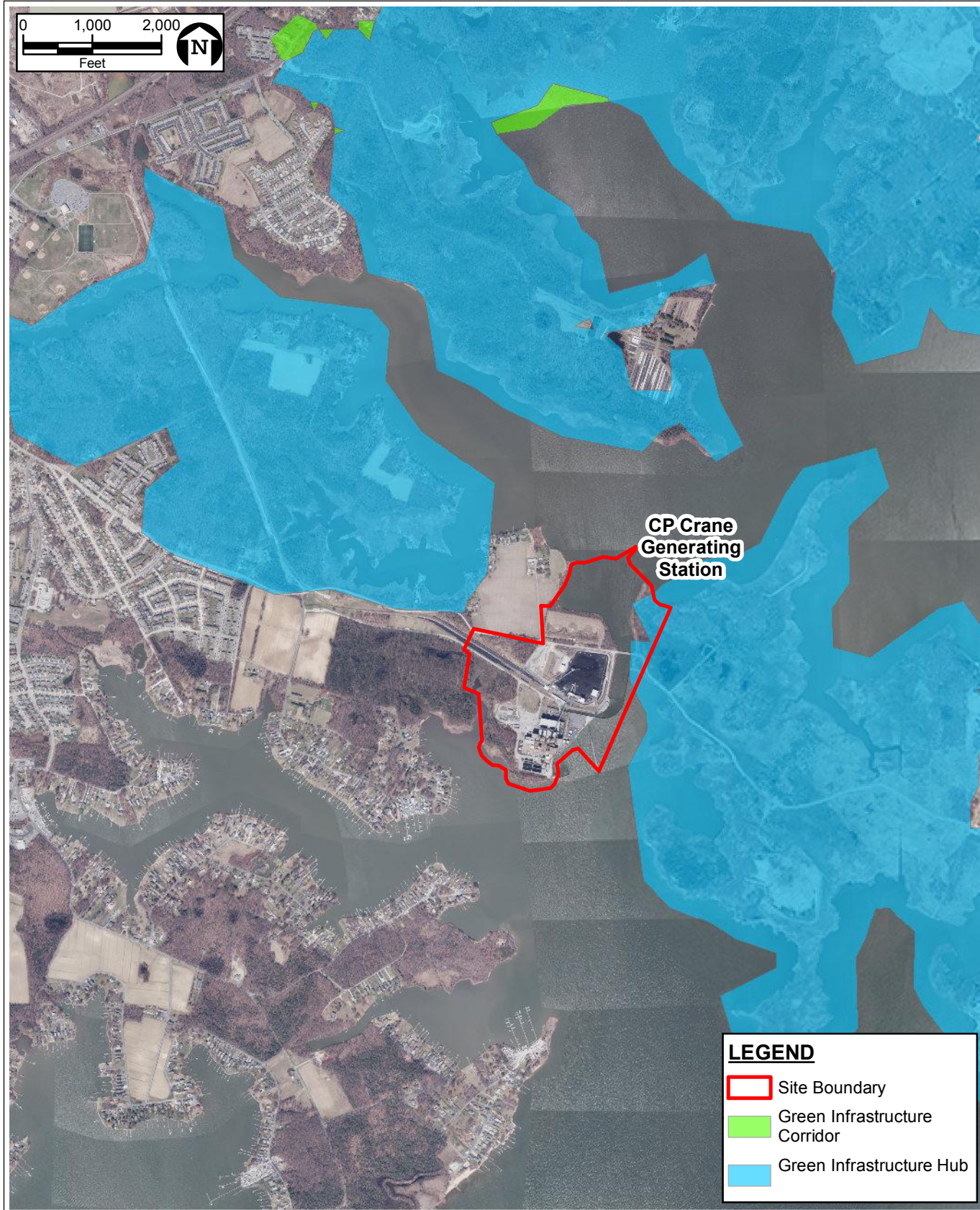


FIGURE 2.2-15.

GREEN INFRASTRUCTURE IN SITE VICINITY

Sources: MDE, 2018; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

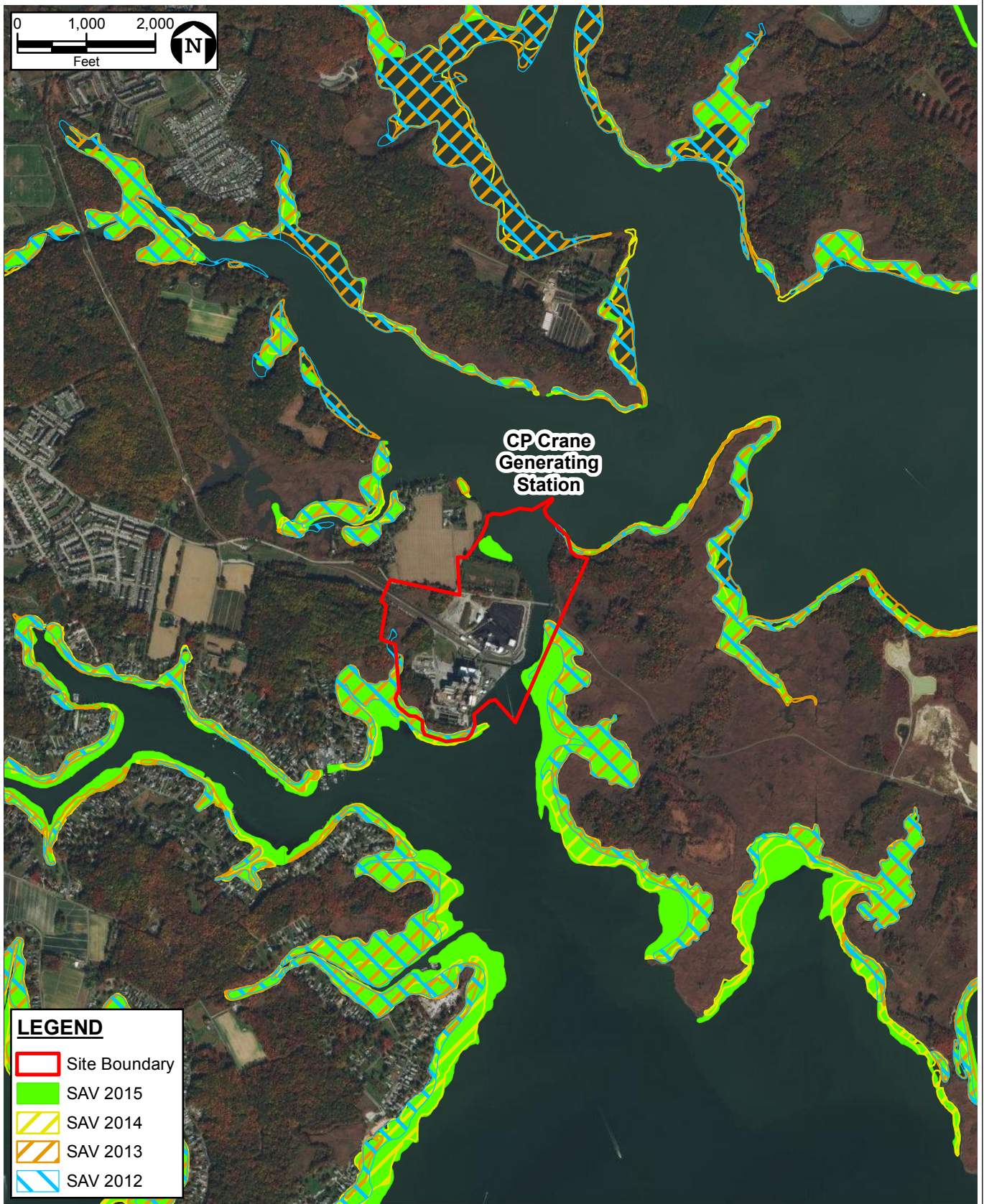


FIGURE 2.2-16.

SUBMERGED AQUATIC VEGETATION IN SITE VICINITY

Sources: USDA, 2015; MDNR, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

The estuary supports numerous terrestrial and aquatic species. Terrestrial species include birds adapted to urban environments, year-round and migratory fowl, raptors, mammals, reptiles, and amphibians. Aquatic species include zooplankton communities, benthic macroinvertebrates, and fish. For the latter, the Gunpowder River basin supports spawning and nursery areas for sport and commercial fish species.

2.2.5 Existing Acoustical Environment

Noise metrics are used to quantify sound pressure levels and describe a sound's loudness, duration, and tonal character. A commonly used descriptor is the A-weighted decibel (dBA). The A-weighting scale approximates the human ear's sensitivity to certain frequencies by emphasizing the middle frequencies and deemphasizing the lower and higher frequency sounds. The decibel is a logarithmic unit measure of sound. A 10-decibel change in the sound level means a 10-fold change in sound pressure, which roughly corresponds to a doubling or halving of perceived loudness. A 3-dBA change in the noise level is generally defined as being just perceptible to the human ear. Table 2.2-4 provides the subjective effect of different changes in sound levels.

Table 2.2-4. Subjective Effect of Changes in Sound Pressure Levels

Change in Sound Level	Apparent Change in Loudness
3 dBA	Just perceptible
5 dBA	Noticeable
10 dBA	Twice (or half) as loud

Source: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE), Handbook—Fundamentals, Atlanta, 1989.

Sound level measurements sometimes include the analysis and breakdown of the sound spectrum into its various frequency components to determine tonal characteristics. The unit of frequency is the hertz (Hz), measuring the cycles per second of sound waves, and typically the audible frequency range from 16 to 16,000 Hz is broken down into 11 (full octave) or 33 (half-octave) bands. A source is said to create a pure tone, also called a prominent discrete tone in MDE noise regulations, if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands

by 5 dBA for center frequencies of 500 Hz and above, by 8 dBA for center frequencies between 160 and 400 Hz, and by 15 dBA for center frequencies less than or equal to 125 Hz (COMAR 26.02.03.01.R). Examples of pure tone sounds are a backup alarm on a large motor vehicle, siren on an emergency vehicle, or squeaky ventilation fan.

When pure tones are present in a noise spectrum, the dBA level is not adequate to predict human response because pure tones, especially at higher frequencies, are much more annoying than a broadband noise of the same level. Therefore, sound level measurements typically include the analysis and breakdown of the sound spectrum into its various frequency components to determine tonal characteristics.

The acoustic environment in an area such as Crane Station results from numerous sources in the vicinity of the site. The primary sources of noise in the area certainly include the existing operations at Crane Station, automotive traffic, boating traffic, and natural sounds. Table 2.2-5 presents typical peak sound levels associated with various activities and environments.

To gauge the combined impacts of the likely noise sources, background sound levels were measured for brief periods at locations on or in the immediate vicinity of Crane Station. These data, collected at locations shown in Figure 2.2-17, are presented in Table 2.2-6.

On January 17, one of the Crane coal-fired units was operating. The equivalent continuous sound level (L_{eq}) was approximately 60 dBA on the plant property and approximately 10 dBA less at the two offsite locations. Noise from the plant was the predominant source at all four locations. On April 5, neither unit was in operation, but noise from one or more plant blowers or fans was apparent and constituted the predominant noise source at the two onsite locations. At the two offsite locations, the plant fans or blowers were faint but still discernable. Other sources also contributed to measured sound levels on April 5. These include birds and aircraft operations at Martin State Airport.

Table 2.2-5. Typical Sound Levels and Human Response

Activity	dBA	Effect
Jet engine	140	Painfully loud
Jackhammer	130	Threshold of pain
Auto horn (3 ft)	120	Maximum vocal effort
Loud rock band	110	Extremely loud
Firecrackers, chain saw	100	Very loud
Heavy truck (50 ft), lawnmower	90	Very annoying, hearing damage (8 hours)
Hair dryer, busy street	80	Annoying
Noisy restaurant, busy traffic	70	Telephone use difficult
Normal conversation, dishwasher	60	
Normal suburban area	50	Quiet
Quiet suburban area, quiet office	40	
Rural area, library	30	Very quiet
Wilderness area	25	
Just audible	10	
Threshold of audibility	0	

Sources: Noise Pollution Clearinghouse (<http://www.nonoise.org>), 2008.

American Speech-Language-Hearing Assoc. (<http://www.asha.org/public/hearing/disorders/noise.htm>), 2008.

Table 2.2-6. Ambient Sound Survey Results (January 17 and April 5, 2018)

Location	Date	Time	Duration (minutes)	Range of Noise Levels (dBA)	L _{eq} (dBA)
1	01/17/18	10:30	46	57.2 to 66.6	60.4
	04/05/18	15:15	45	44.3 to 85.6*	47.9
2	01/17/18	11:25	41	57.2 to 71.8	60.3
	04/05/18	16:10	32	48.1 to 61.6	54.4
3	01/17/18	12:30	47	44.4 to 62.8	48.1
		17:10	28	43.7 to 69.6*	49.1
	04/05/18	17:40	46	34.6 to 64.6	44.1
4	01/17/18	13:30	59	46.3 to 64.7	52.6
		17:50	24	46.7 to 66.9	51.3
	04/05/18	17:00	31	43.2 to 59.3	50.2

*Maximum level anomalous.

Source: ECT, 2018.

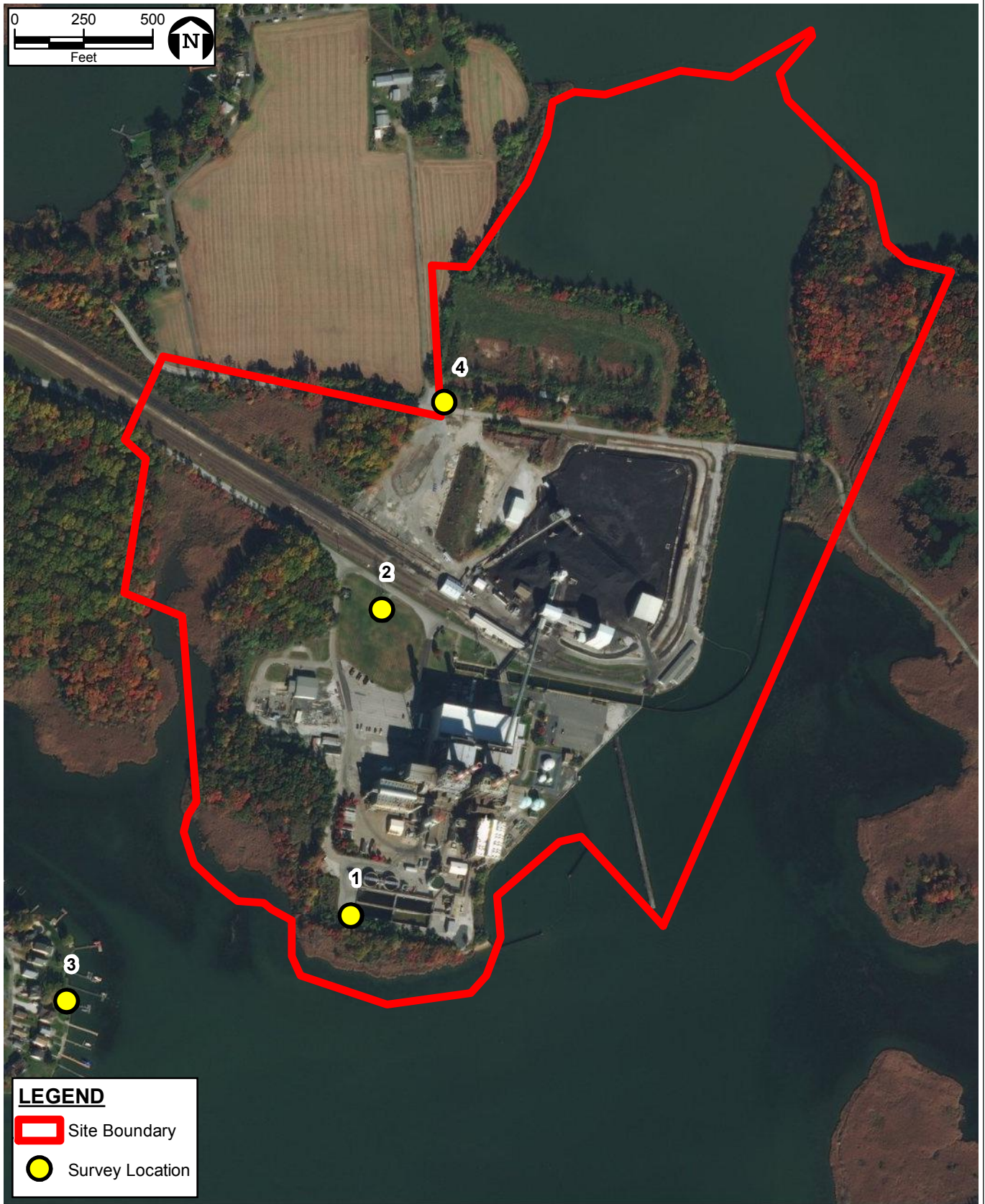


FIGURE 2.2-17.

AMBIENT SOUND SURVEY LOCATIONS

Sources: Digital Globe 2016; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

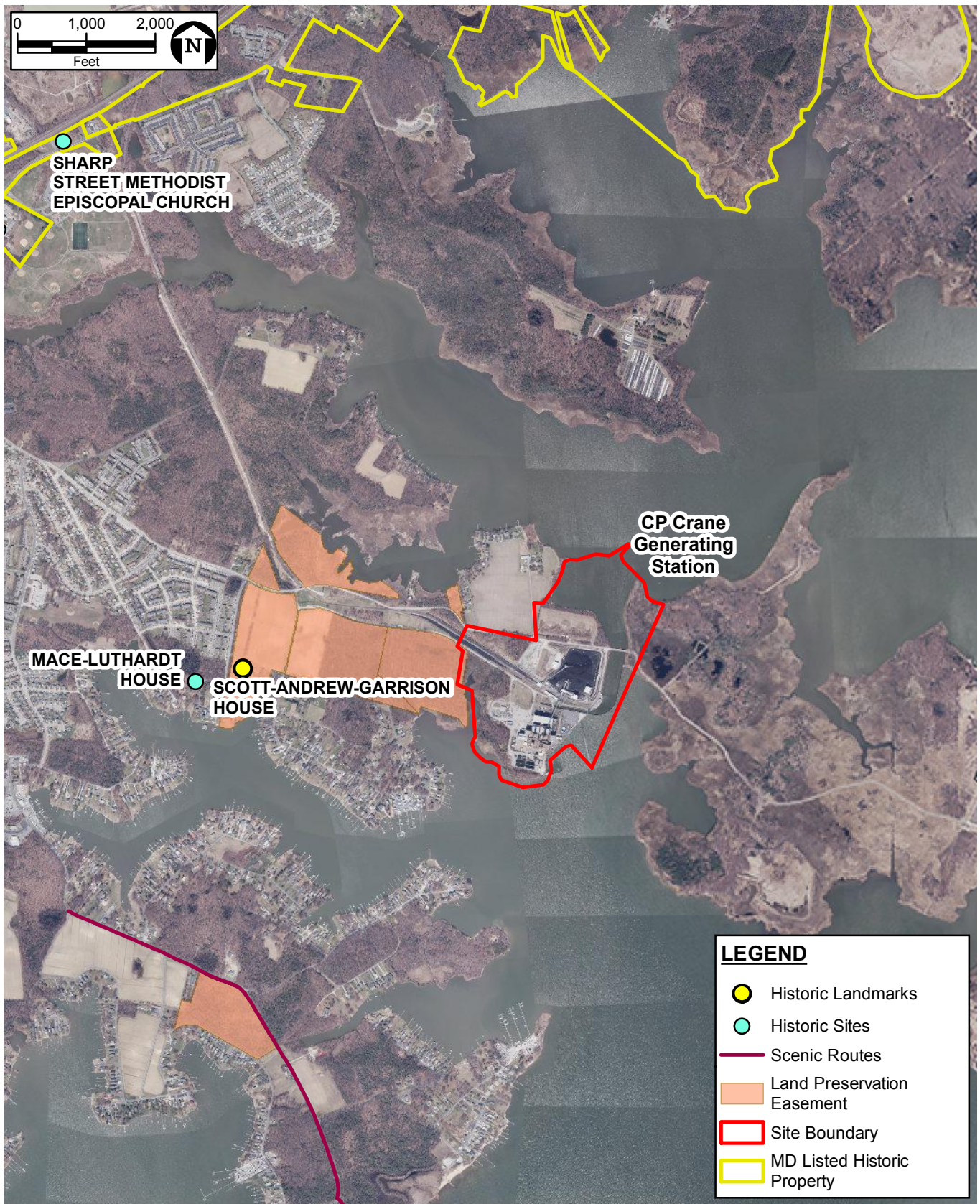


FIGURE 2.3-1.

PRESENCE OF CULTURAL RESOURCES

Sources: MDE, 2014; Baltimore County, 2017; National Register of Historic Places, 2017; MD Historic Trust, 2018; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

2.3 Archaeological, Architectural, and Historical Sites

Historical structures and archeological sites located near Crane Station were identified using available Maryland Historical Trust (MHT) data and other information. Figure 2.3-1 presents this information. All the indicated sites and resources are shown to be located at distances of 0.5 mile or more from the plant site. The Scott-Andrew House, designated an “historic landmark,” is a Colonial-period residence dating from circa 1744; this property is approximately 0.5 mile west of the power plant site. The Mace-Luthardt House, listed in the Maryland Inventory of Historic Properties, was built in 1880. Neither house is listed in the National Register of Historic Places.

2.4 Land Use

The Crane Station site is located within an area of mixed uses. Land use features are evident in the aerial photograph of the site (see Figure 2.1-5).

2.4.1 Regional Setting

Crane Station is located in a developed area of suburban Baltimore. The site area is characterized by commercial and residential development, highways and roads, and railroad tracks.

The site is also within the Coastal rural legacy area (RLA) (see maps in Appendix B). Maryland’s Rural Legacy Program was created in 1997 to protect large, contiguous tracts of Maryland’s cultural and natural resource lands through grants made to local applicants. The Coastal RLA is comprised of 14,109 acres stretched along the southeastern Chesapeake Bay coast of Baltimore County, from Gunpowder Falls in the north to North Point State Park (immediately east of Sparrows Point) in the south. The RLA includes Baltimore County forest and agricultural lands as well as both fresh and tidal wetlands.

2.4.2 Comprehensive Land Use

Article 66-B of the Annotated Code of Maryland (ACM) requires Maryland counties adopt a comprehensive plan that sets forth goals, objectives, and policies as the basis for future growth and development. The comprehensive plan for Baltimore County is its Master Plan 2020 (Baltimore County, 2010). Master Plan 2020 also indicates portions of the county with community plans. The Crane Station site is within the Bowleys Quarters planning area. The

Bowleys Quarters Community Action Plan 2000 (Baltimore County, 2001) provides a proposed land use map and is intended to reflect general land use patterns and provide general directions and guidance related to zoning decisions. The Crane Station site is located on land designated industrial (see Appendix B). Adjacent lands are designated forest and agricultural/open space.

2.4.3 Existing and Approved Land Uses

This brief section identifies existing land uses in the vicinity of the site. This analysis is used as an inventory of land uses and does not necessarily imply there will be impacts to these uses.

The site area includes mostly rural residential, forested, and open space lands. Figure 2.4-1 shows existing land uses in the surrounding area (as compiled by MDNR). A mix of land uses is indicated, ranging from industrial (power plant site) to forest to cropland to residential.

Potentially sensitive land uses are some distances from Crane Station. As documented in the master plan, the nearest school is the Seneca Elementary School located more than 1 mile west of the plant site. No hospitals are located in the area.

2.4.4 Agricultural Resources

The Maryland Agricultural Land Preservation Program was created in 1977 to preserve productive agricultural lands and woodlands. According to information and maps provided on the website maintained by the Maryland Department of Planning, the site is near no agricultural land preservation areas.

2.4.5 Open Space Areas

There are state and county parks and other open space areas located in the vicinity of the Crane Station site (see Figure 2.4-2 and Figures 2.1-2, 2.1-3, and 2.1-4). The closest park, Gunpowder Falls State Park, is approximately 1 mile from the site.

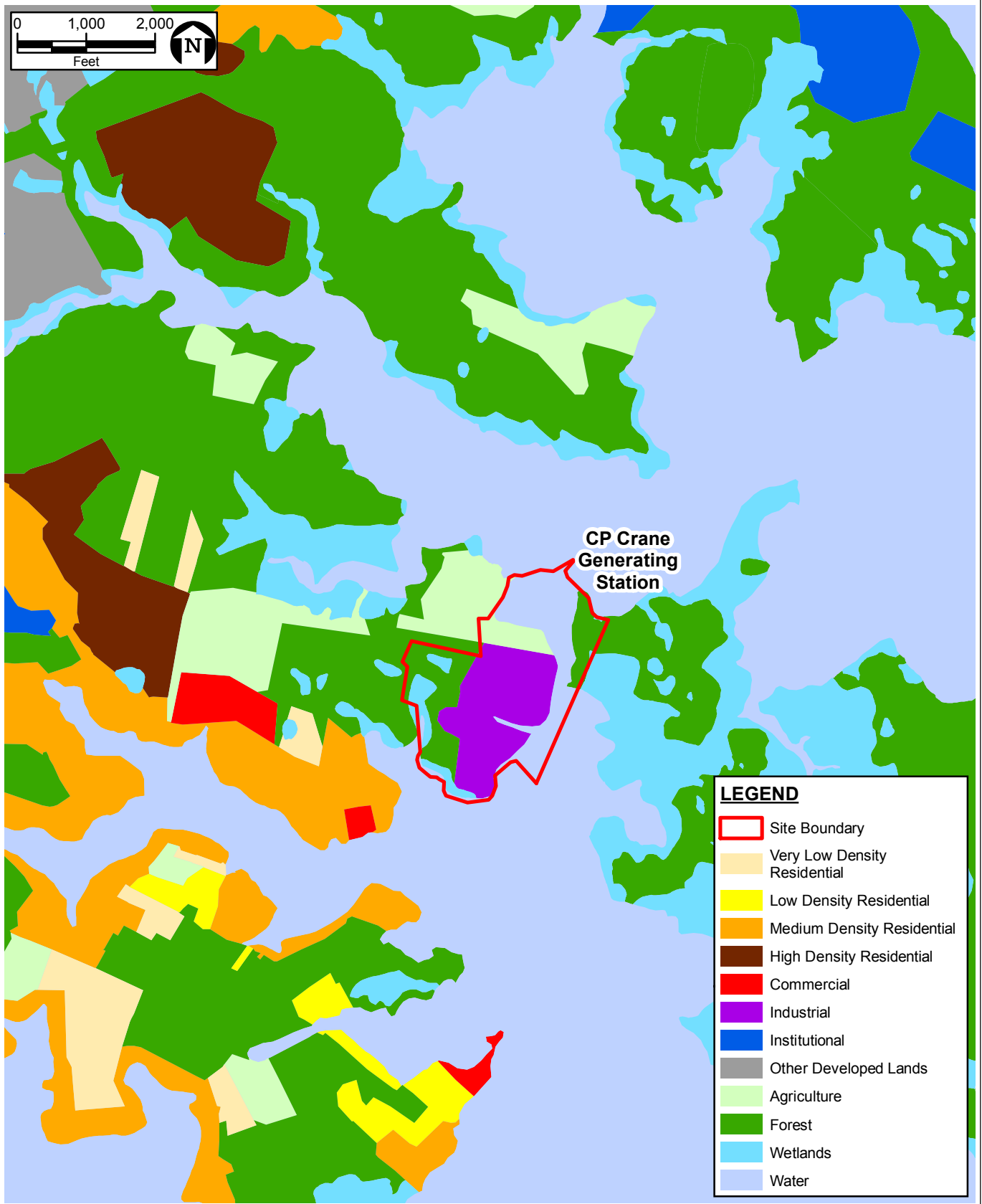


FIGURE 2.4-1.

LAND USE AND LAND COVER

Sources: MDNR, 2010; Baltimore County, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

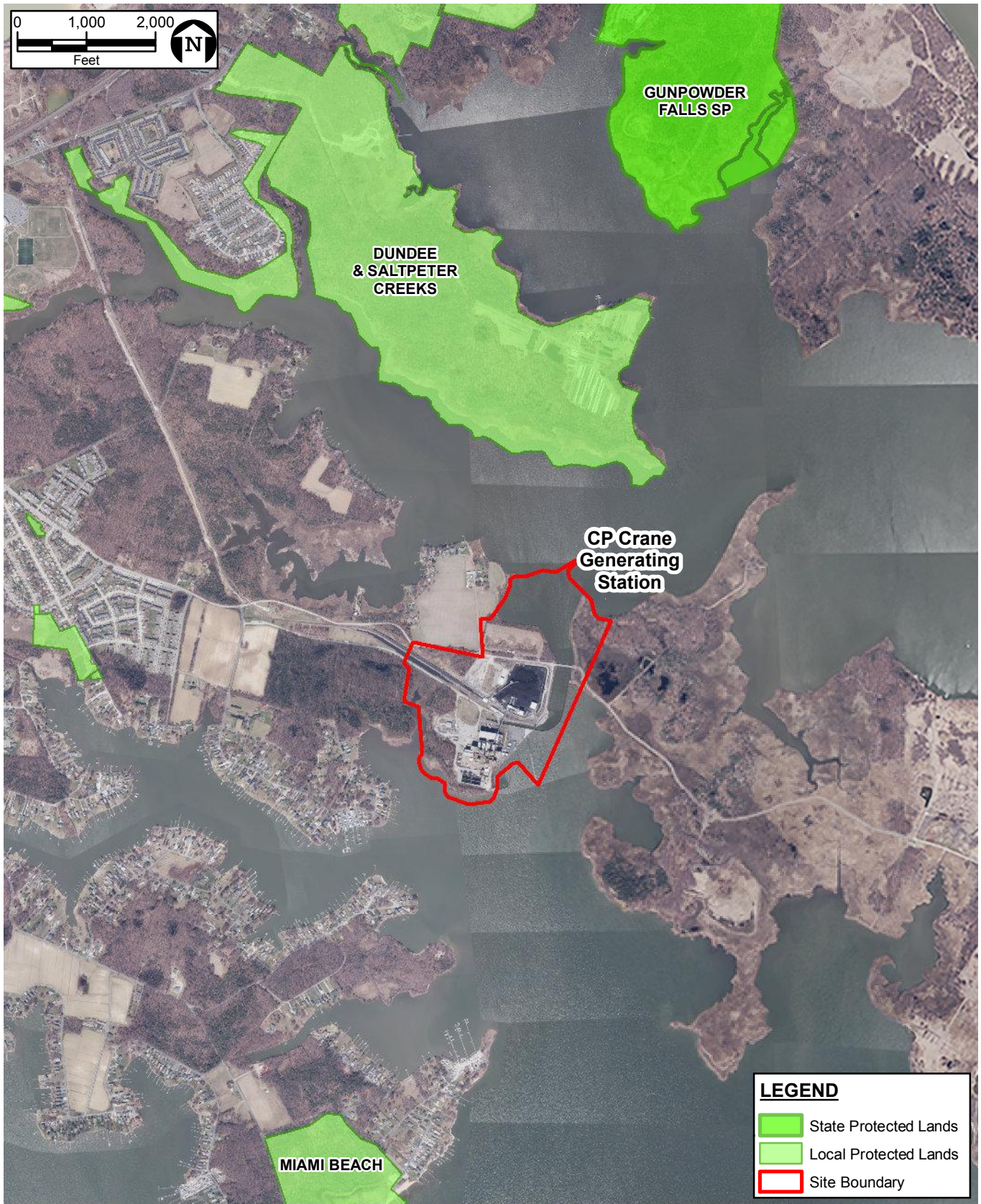


FIGURE 2.4-2.

PARKS AND CONSERVATION AREAS

Sources: MDNR, 2010; Baltimore County, 2017; ECT, 2018.

ECT Environmental Consulting & Technology, Inc.

2.4.6 Chesapeake Bay Critical Area

In 1984, the Maryland General Assembly passed the CBCA Law. This law requires jurisdictions abutting Chesapeake Bay to designate lands within 1,000 ft of tidal waters as critical areas and require environmental protection and mitigation for the effects of development and redevelopment within these zones. The state CBCA Commission was created to formulate protective criteria for the use and development of this planning area and oversee the programs developed by local jurisdictions. The state law requires local jurisdictions develop and adopt their own critical area programs based on the state CBCA Commission's criteria.

Figure 2.4-3 shows the boundaries of the critical area in the site vicinity. As this figure shows, the Crane Station property is located within the designated critical area and, more specifically, "intensely developed area." Properties developed within the critical area are subject to special regulations detailed in the Baltimore County Code (Article 33, Title 2).

2.4.7 Visual Quality

The visual quality of the site and surrounding area is consistent with the mix of land uses in the area. The power plant site contributes an industrial character, including boiler houses, stacks, high-voltage transmission lines, and railroad tracks. Other visual impacts result from the other commercial and residential lands located to the south and west of the site. The existing visual quality of the site area could readily be characterized as at least partially impacted by man-made activities.

The Baltimore County Master Plan 2020 (Baltimore County, 2010) provides an inventory of scenic resources. Scenic views are indicated on Map 37 in that plan (see Appendix B). No specific views are shown in the direction of Crane Station.

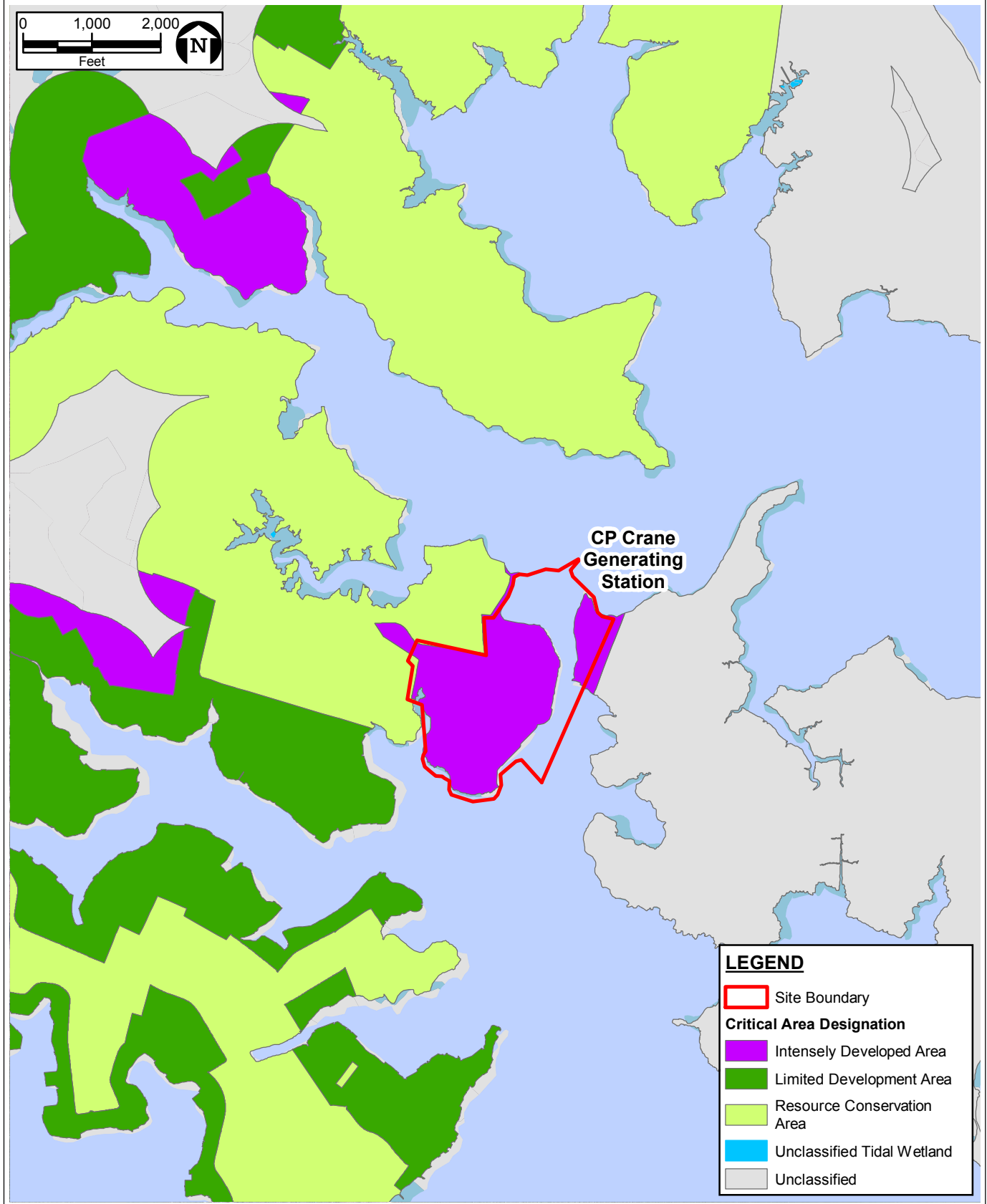


FIGURE 2.4-3.

CHESAPEAKE BAY CRITICAL AREA IN SITE VICINITY

Sources: MDE, 2014; Baltimore County, 2016, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

References

- Achmad, G. 1991. Simulated Hydrologic Effects of the Development of the Patapsco Aquifer System in Glen Burnie, Anne Arundel County, Maryland. Maryland Geologic Survey, Report of Investigations No. 54.
- American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE). 1989. Handbook, Fundamentals. Atlanta.
- Annotated Code of Maryland (ACM). Article 66-B.
- Baltimore County. 2000. Master Plan 2010. Adopted by Baltimore County Council. February 22.
- . 2001. Bowleys Quarters Community Action Plan. Adopted by Baltimore County Council. February 20.
- . 2005. Baltimore County Zoning Regulations. 1998 Edition, v13. Updated April 15, 2005.
- . 2006. A Citizen's Guide to Planning and Zoning in Baltimore County. Prepared by Baltimore County Office of Planning. January.
- Chapelle, F.H. 1985. Hydrogeology, Digital Solute Transport Simulation, and Geochemistry of the Lower Cretaceous Aquifer System Near Baltimore, Maryland. Maryland Geologic Survey, Report of Investigations No. 43.
- Code of Maryland Regulations (COMAR). 2006. <http://www.dsd.state.md.us/COMAR/ComarHome.html>. Accessed April 2018.
- Fleck, W.B., and Vroblesky, D.A. 1996. Simulation of Groundwater Flow of the Coastal Plain Aquifers in Parts of Maryland, Delaware and the District of Columbia. USGS Professional Paper 1404-J.
- Leahy, P.P., and Martin, M. 1993. Geohydrology and Simulation of Ground-Water Flow in the Northern Atlantic Coastal Plain Aquifer System, USGS Professional Paper 1404-K.
- Mack, F.K., and Achmad, G. 1986. Evaluation of the Water-Supply Potential of Aquifers in the Potomac Group of Anne Arundel County, Maryland. Maryland Geologic Survey, Report of Investigations No. 46.
- Maryland Department of the Environment (MDE). 1996. Maryland 303(d) List.
- . 2005. Maryland's 2004 303(d) List. February 17.

———. 2006. Maryland's 2006 303(d) List. Draft. January 19.

Southwick, D.L., and Owens, J.P. 1968. Geologic Map of Maryland. Maryland Geological Survey.

Wheeler, J.C., and Wilde, F.D. 1989. Groundwater Use in the Coastal Plain of Maryland, 1900-1980, USGS Open File Report 87-540.

Web Sites

Baltimore County, Maryland	www.co.ba.md.us
Baltimore County Code	http://www.amlegal.com/baltimoreco_md/
Maryland Department of Natural Resources, Geospatial Data	http://dnrweb.dnr.state.md.us/gis/data/
Maryland Department of Planning, Local Planning	www.mdp.state.md.us/info/localplan/counties.html
MERLIN Online	http://www.mdmerlin.net

3.0 Project Description

This chapter provides a description of the key components and systems of the proposed Repowering Project. The descriptions provide an estimate of the expected character, quality, and quantity of potential emissions and discharges associated with Project construction and operation. Also described are proposed measures to limit impacts on the environment. In response to the requirements for project information listed in COMAR 20.79.03.01, Description of Generating Station, the specific sections in this chapter are:

- 3.1—General Description
- 3.2—Project Design and Operational Features
 - Major components and process descriptions
 - Site layout
 - Fuel characteristics
 - Air emissions and controls
 - Water use and wastewater effluents
 - Onsite drainage and stormwater management (SWM)
 - Solid and hazardous wastes
- 3.3—Rationale for Site Selection and Project Conceptual Design
- 3.4—Impact on State Economics
- 3.5—Project Effect on Electric System Stability and Reliability
- 3.6—Features of Required Electrical System Upgrades
- 3.7—Project Schedule
 - Major milestones
 - Construction plans

The facilities and equipment descriptions and Project schedule presented in this chapter are based on CP Crane’s current plans and engineering and design information available for the proposed Project at this time.

3.1 General Description

The planned Repowering Project at CP Crane will involve the design, construction, and operation of:

- Three natural gas- and ULSD oil-fired aero-derivative GE LM6000 CTs.
- Liquid ULSD oil handling, piping, and storage.
- A natural gas compression station with associated treatment, piping, and regulation equipment.
- Water treatment and wastewater handling facilities.
- Electrical interconnection facilities.
- Ancillary equipment.

The electric generation units and associated equipment will be constructed on a portion of the approximately 157-acre Crane Station property. The Project's total nominal generating capacity at International Organization for Standardization (ISO) conditions will be 146 MW, relative to the approximately 400-MW capacity of the existing coal-fired units. The CTs are expected to serve as peaking units and operate at an annual capacity factor of up to 30 percent. The design of the CTs will allow them to start up and reach full load in 10 minutes or less and shut down quickly multiple times per day if circumstances warrant. The proposed CTs will fire natural gas as their primary fuel and will also be capable of firing ULSD fuel oil in situations when natural gas is not available in sufficient quantities.

Other Project components will include new natural gas compression facilities; liquid ULSD fuel oil delivery, handling, and storage facilities; process water supply storage, pumping, and treatment facilities; black start generator; continuous emissions monitoring; and wastewater collection and handling facilities. The electricity generated by the proposed CTs will be transmitted to the power grid via a new 115-kilovolt (kV) substation consisting of new generator step-up transformers, sulfur hexafluoride gas circuit breakers, and other mandated substation equipment. The new substation will connect to the existing electrical transmission lines present at Crane Station substation.

CP Crane's development plans for the Project have been designed to take full advantage, both environmentally and economically, of the Project site's location, existing infrastructure, and proximity to key support facilities. First, the CTs will be located inside the boundaries of an existing power plant, one that has been in active use since 1961. The specific area within the existing power plant property has been previously impacted and is currently the location of parking area and infrastructure, which will be removed, repurposed, or relocated onsite.

Second, given the new CTs will be located at a currently active power plant, the Project will be able to utilize some of the existing fuel- and water-related facilities, as well as in-plant auxiliaries. Natural gas will be the CTs' primary fuel. A natural gas pipeline already delivers gas to the site and has sufficient capacity to supply the new CTs operating at full load. The facility will utilize the existing onsite city and raw water supplies. A new water treatment facility will be installed to meet the Project's process water needs. Wastewater from the Project will discharge to the existing plant wastewater system, which will be repurposed in supporting the discharge of the newly installed equipment and balance of plant systems. The new CT installation will also connect to and make use of the current plant emergency fire water system, where required.

Third, the new CTs will take full advantage of the existing units' interconnection to the electrical transmission system. As mentioned previously, only a short 115-kV generation lead will be needed to make the Project's interconnection to the existing electrical transmission system. The interconnection's structures and lines will be located entirely on the Crane property. The Project will require no new offsite transmission lines or structures.

The following sections provide descriptions of the proposed electric generating units, operations of major processes and systems, and other facilities that will comprise the CP Crane CT Repowering Project.

3.2 Project Design and Operational Features

3.2.1 Major Components and Process Descriptions

The major components and systems of the proposed Repowering Project will include:

- Power Generation Equipment—The power block will consist of three GE LM6000PC SPray INTERcooling® (SPRINT®) CT units operating in simple-cycle configuration, with associated auxiliary and control systems. Each CT will be equipped with an inlet air evaporative cooling system, the use of which will result in decreased power degradation at high ambient temperatures. A separate inlet air heater coil will be included to provide freeze protection to the inlet air system.
- Natural Gas Supply—Natural gas supply to the CTs will be supplied from an existing onsite pipeline. A new gas compression system will increase the pressure of the natural gas from the current pressure of approximately 350 to the required 675 pounds per square inch. The system will include the required equipment for natural gas operation. Anticipated equipment (to be confirmed at final design) includes gas heaters, coalescing filters, and pressure-regulating equipment. In the event of low pipeline pressure, an additional gas compressor will be installed to continue reliable operation during these restricted conditions as well.
- Fuel Oil Off-loading, Storage, and Handling Facilities—ULSD fuel oil will be delivered to the site via truck and stored in two new tanks equipped with the proper containment system for liquid fuel operation during periods of restricted or limited natural gas availability. The required piping and forwarding pumps to deliver ULSD fuel oil to the CTs will be installed. In support of PJM's capacity performance requirements, the new tanks will have storage capacity to support 72 hours of continuous full-load operation of the three new CTs.
- Water-related Systems and Equipment—City water will be supplied from the existing power plant's raw water supply. A new water treatment system will be installed to demineralize the raw water to a condition suitable for use in the CTs. This new water treatment system will demineralize the raw water using reverse osmosis and electro-deionization equipment, as required. Once the water is suitable for use, it will be stored in new, aboveground tank(s). Wastewater streams resulting from this water treatment will be routed to the existing wastewater system for disposal. Equipment with condensate,

oily water drains, secondary oil containment, and the liquid fuel offloading station will be piped to a new oily water drain system with oily water separator, which will tie into the existing wastewater system for required management of the waste fluids. Existing stormwater systems will be modified as necessary to regulate stormwater flows consistent with regulatory requirements.

- Onsite Electrical Equipment—Each of the three Repowering Project CT generators will be connected to a dedicated generator step-up transformer and then to a new substation. The power block facilities will also be equipped with two auxiliary transformers to provide lower voltage power to auxiliary equipment via electric distribution systems within the facility. The existing 15-MW CT will be connected to a step-up transformer and connected to the same new substation. The required transmission line protection devices and metering equipment will be connected to the overhead conductors, allowing the proper protection and metering of the new CTs' output. The power output of the CTs will be connected to both circuits (#110591 and #110592) of the existing outgoing 115-kV transmission line, which formerly transmitted the CP Crane coal-unit power. The 115-kV line is owned and operated by Baltimore Gas & Electric Company (BGE). Medium- and low-voltage electrical distribution equipment will be installed to provide electrical power to Project equipment. This equipment will include transformers, switchgear, motor control centers, wire, and cable tray.
- Ancillary Equipment—Significant other CT plant components will include continuous emissions monitoring systems and fire protection equipment. The continuous emissions monitoring systems will be installed for each of the CTs to monitor and log emissions data of each CT's exhaust gas. A sample probe will be installed on each exhaust stack, and the sample gas will be routed through a heated sample line to sample conditioners and fed into certified gas analyzers. The data from the analyzers will be recorded in a certified data acquisition and handling system. The equipment will perform the required daily calibrations to meet EPA requirements. Control valves and instrumentation will be used to monitor and regulate the balance of plant systems in support of the CT's requirements. These items, as well as other equipment, will be orchestrated by an Allen Bradley-based platform control system. The controls will be housed in power distribution centers for the CTs, where operators can perform required measures in operating the plant.

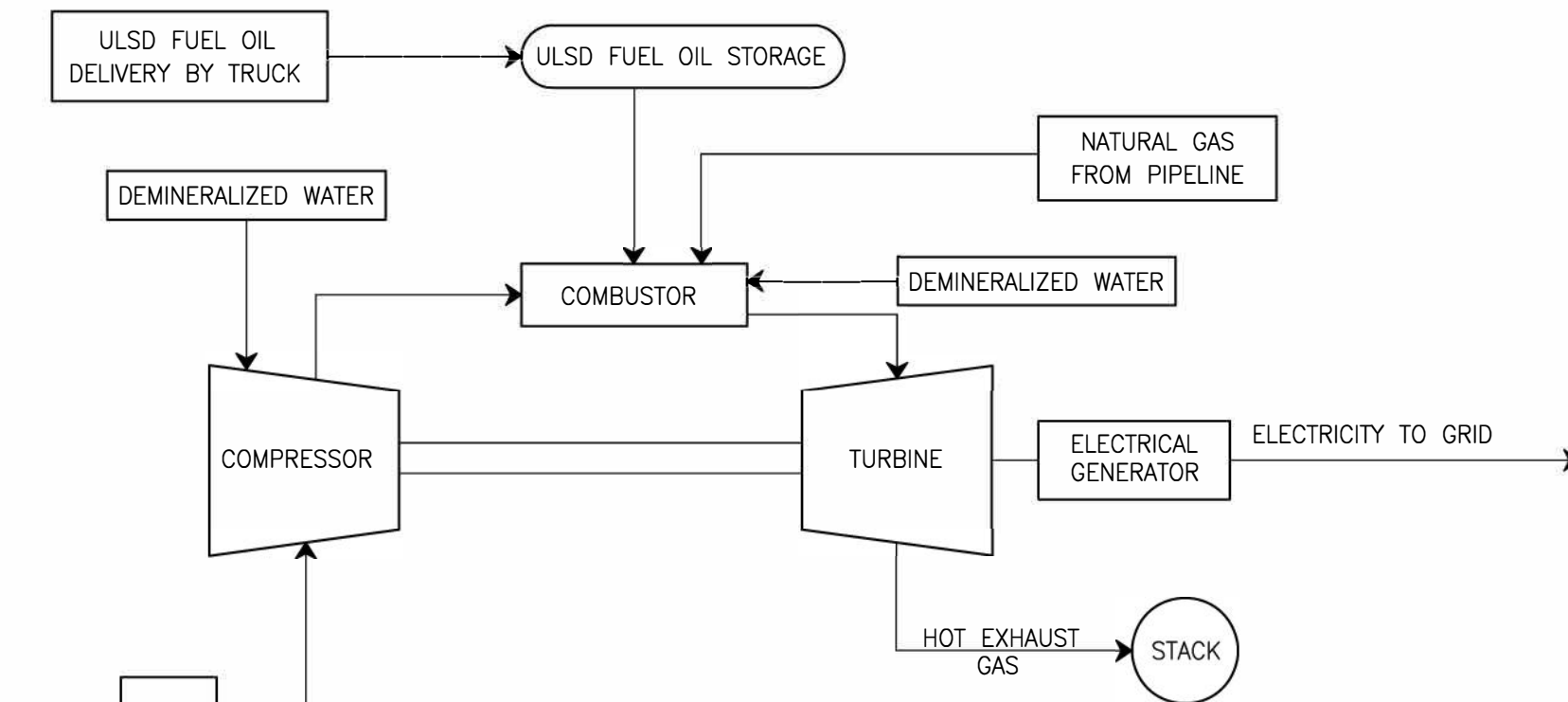
The Project will tie into the existing plant's fire protection system, and the required number of fire hydrants, per local code, will be located in the Project area. In addition, the CTs will be equipped with standard GE carbon dioxide-based fire protection systems.

Space is being reserved for the possible future addition of battery storage at the CP Crane plant.

Figure 3.2-1 presents a simplified process flow diagram showing a basic simple-cycle CT system and other principal plant systems. The following paragraphs provide additional information on the Project's power generation equipment components and conceptual design features.

The Project will employ three state-of-the-art GE LM6000PC CT packages, each offering the latest technology, efficiency, reliability, and environmental performance. The plant will be capable of producing approximately 146 MW of electricity (gross, at ISO conditions), with each CT nominally rated at 48 MW. With its 10-minute fast-start and ramping capabilities, the LM6000 is designed for intermediate-load and load-following utility service and peaking applications. It has a proven record of high availability and reliability in the power generation industry. Project CTs will be equipped with dual-fuel combustors with a demineralized water injection system to reduce NO_x emissions during operation. Demineralized water can also be injected to inter-cool the gas stream for increased output.

CTs are advanced technology engines that convert latent fuel energy into mechanical energy using compressed hot gas (i.e., air and products of combustion) as the working medium. CTs deliver mechanical energy by means of a rotating shaft used to drive an electrical generator, thereby converting a portion of the engine's mechanical output to electrical energy. In the CT cycle, ambient air is first filtered and then compressed by the CT compressor section. The CT compressor section increases the pressure of the combustion air stream and raises its temperature. The compressed combustion air is then combined with fuel, which is ignited in the CT's high-pressure combustor to produce hot exhaust gases. These high-pressure, hot gases next expand and drive the CT to produce rotary shaft power. The turbine rotor is coupled to an electric generator as well as to the CT compressor.



SIMPLE-CYCLE COMBUSTION TURBINE

FIGURE 3.2-1.

SIMPLIFIED FLOW DIAGRAM OF A BASIC SIMPLE-CYCLE POWER SYSTEM

Source: ECT, 2018.

For supplying electrical power during relatively short periods of peak demand, CTs used as simple-cycle (stand-alone) units have advantages over those constructed to operate in combined-cycle (which includes a heat recovery steam generator and steam turbine). The principal advantage of a simple-cycle CT is the ability to start up in less than 10 minutes, as opposed to combined-cycle units, which can take hours to come up to full load. Simple-cycle CTs are also compact and require smaller project sites, limiting the effect on the existing real estate. The final advantage is the reduced water requirement, as there is no need for an additional cooling cycle or cooling tower needed with steam power cycle condensing

The proposed Project CTs will be used as peaking units. Each CT will be capable of stable operation, within air permit limits, from 50 to 100 percent of CT design load.

For the Crane Repowering Project each CT will be outfitted with a modular, multiple-stage filtration system consisting of inlet screens, a prefilter and final barrier filter, as well as an inlet air heating system. The latter system will allow for safe operation of the CTs during prevailing icing conditions. Waste heat from the CT exhaust is used to provide thermal energy for heating a glycol-water mixture. This mixture is then pumped up to the heating coils mounted in each module of the air filter house. The coils span the width and height of the filter face and heat the entire area profile of the air stream entering the filter house; both package ventilation air as well as combustion air is heated. The glycol-water mixture is returned to the pumping skid after rejecting its heat into the air filter.

The CTs will also be capable of operating with evaporative cooling to increase electrical output during warm weather and high electrical demand periods. Evaporative cooling lowers the inlet air temperature to the gas turbine for additional power when needed. This system is designed for non-recirculation of evaporative cooling water from a sump in the bottom of the inlet air filter. Lowering the inlet air temperature increases the air density and increases the mass flow through the CT, thus increasing power output. Based on an analysis of late afternoon temperatures for one summer week in 2017, the average temperature during this period in the area was 87.1 degrees, with an average relative humidity of 50.1 percent. Under these conditions,

evaporative cooling would be expected to increase power output from the three units from 123.4 to 133.3 MW net power on liquid fuel and 129.1 to 133.7 MW net power on natural gas.

Each CT package will have a weatherproof, acoustic enclosure. The enclosure will provide average noise emissions of 85 dBA measured at a 3-ft (1.0-meter) horizontal distance and 5 ft (1.5 meters) above grade during full load operation. Figures 3.2-2 and 3.2-3 provide a typical rendering and a photograph, respectively, of an LM6000 CT package with enclosure.

3.2.2 Site Layout

Figure 3.2-4 shows the general Project site plan and layout along with the Project CTs and related site improvements in the context of the existing Crane Station. The new, Project-related equipment is shown in red, as are the areas proposed for use during construction for laydown and parking. The CT power block will be located generally west of the existing Crane Station Unit 2 Power Plant building. An existing site structure will be repurposed as the water treatment building, and a water storage tank(s) will be installed for demineralized water. Several existing plant components will be demolished to allow space for the new site layout. These components include the Unit 2 air heater, Unit 2 dust collector, Unit 2 electrical control and vacuum blower building, and the urea tanks. These components, highlighted on Figure 3.2-4, are located on the southwest side of the existing boiler structure.

Two 490,000-gallon capacity fuel oil tanks will be located in a bermed area west of the three CTs. A paved area for fuel oil truck ingress, egress, and unloading will be provided as well as roads for maintenance vehicles.

Figure 3.2-5 depicts a detailed arrangement showing the major Project equipment. The land area required for the Project CT power block and associated facilities will comprise less than approximately 4 acres of the Crane Station property. The CTs will be located outdoors. The height of the CT stacks will be 160 ft above final grade.

Space is being reserved for up to 100 MW of capacity for up to a 4-hour duration of batteries, or 400 megawatt-hours.



FIGURE 3.2-2.

RENDERING OF AN LM6000 CT UNIT

Source: ProEnergy, 2018.

ECT Environmental
Consulting &
Technology, Inc.



FIGURE 3.2-3.

PHOTOGRAPH OF AN LM6000 CT UNIT

Source: ProEnergy, 2018.

ECT Environmental
Consulting &
Technology, Inc.



Source: ECT, 2018; DMW, Inc., 2008; Pro Energy, 2018.

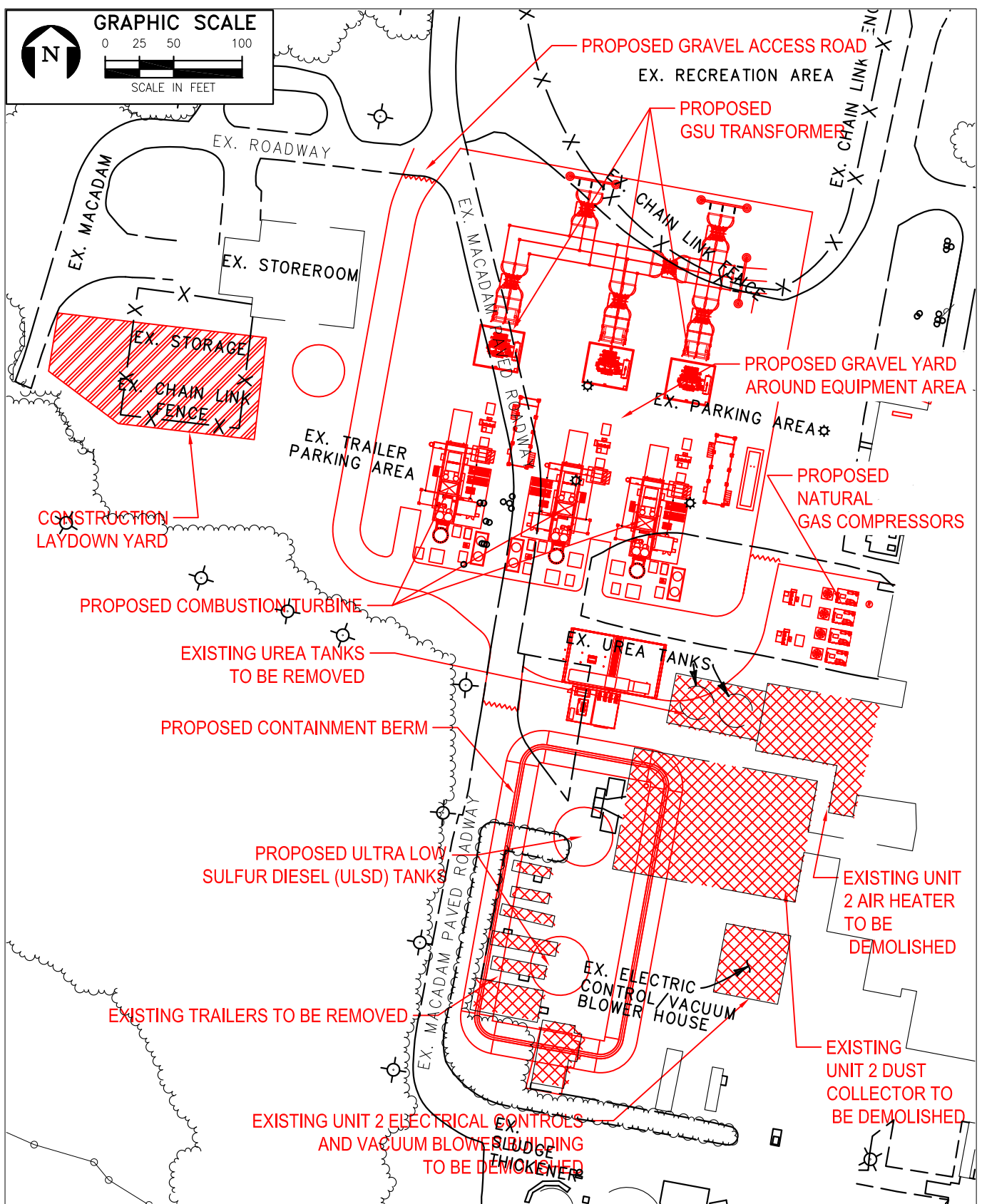


FIGURE 3.2-5.
DETAILED PROJECT EQUIPMENT ARRANGEMENT

Source: ECT, 2018; DMW, Inc., 2008; Pro Energy, 2018.

ECT Environmental Consulting & Technology, Inc.

3.2.3 Fuel Characteristics

To provide cost-effective, reliable power, the Repowering Project at CP Crane will be designed and permitted to fire clean-burning fuels: pipeline-quality natural gas and ULSD fuel oil.

Composition of the natural gas will be typical pipeline-quality gas with a maximum sulfur content of 0.5 grain of sulfur per 100 standard cubic feet (gr S/100 scf). Based on the natural gas net heat rate (million British thermal units per hour [MMBtu/hr]), all CTs will combust approximately 1.05 million standard cubic feet per hour (MMscf/hr) operating at full load, and at a temperature of 59°F. As stated in Appendix C for Case 9 (i.e., 100-percent load), each CT will burn approximately 0.35 MMscf/hr.

The ULSD fuel oil sulfur content will be a maximum of 15 parts per million by weight (ppmw). Assuming all CTs are being fired at 100-percent load on ULSD fuel oil at a temperature of 59°F, the total maximum fuel oil consumption will be approximately 7,368 gallons per hour. As stated in Appendix C for Case 12 (i.e., 100-percent load), each CT will burn 2,456 gallons per hour.

3.2.4 Air Emissions and Controls

3.2.4.1 Air Emissions Types and Sources

The principal sources of air emissions from CP Crane will be the three new CTs. The pollutants emitted in the largest quantities will be NO_x, carbon dioxide (CO), PM, particulate matter less than or equal to 10 micrometers (PM₁₀), and particulate matter less than or equal to 2.5 micrometers (PM_{2.5}); lesser amounts of SO₂, VOCs, lead, and sulfuric acid (H₂SO₄) mist will also be emitted from the CTs.

Other sources of emissions include a newly installed black-start generator, an existing 14-MW (summer capability) CT, an existing emergency generator diesel engine, and an emergency fire water pump diesel engine. The ULSD fuel oil off-loading and storage tanks will constitute relatively minor sources of VOC emissions. Some fugitive PM emissions will also occur due to truck traffic. For calculating the Project's maximum potential annual emissions, all three new CTs were assumed to operate:

- At 100-percent load.
- At a 30-percent annual capacity factor, equivalent to 2,628 hours per year (hr/yr) (excluding startup/shutdown).
- On ULSD fuel oil for approximately 10 percent of the 2,628 hours, or approximately 263 hr/yr.
- With 250 startups/synchronous events and shutdowns per year (75 hours), 25 of which could be on ULSD fuel oil.

Maximum hourly criteria pollutant emissions rates (exclusive of startup and shutdown) for each new CT are summarized in Table 3.2-1 for natural gas and ULSD fuel oil. Details of the hourly emissions calculations are included in the supporting documentation for the air permit application (see Appendix C).

Table 3.2-1. GE LM6000 Emissions Rates (per CT)

Pollutant	Maximum Emissions Rate (lb/hr)	
	Natural Gas	ULSD Fuel Oil
NO _x	35.45	58.99
CO	27.70	32.34
VOC	2.74	5.01
PM*	5.00	12.42
PM ₁₀ *	5.00	12.42
PM _{2.5} *	5.00	12.42
SO ₂	0.56	0.57
Lead	0.0002†	0.0053‡
H ₂ SO ₄	0.09	0.09

Note: lb/hr = pound per hour.

*Filterable and condensable emissions.

†Lead emissions calculated based on AP-42 Table 1.4-2 (EPA, 1998).

‡Lead emissions calculated based on AP-42 Table 3.1-5 (EPA, 2000).

Sources: CP Crane, Performance Data, 2018.
ECT, 2018.

Table 3.2-2 presents projected post-Project maximum annualized emissions. For the new CTs, modes of operation with maximum emissions rates were factored into calculations of annualized

emissions. In addition to emissions during normal load operations (i.e., between 50- and 100-percent CT loads), emissions during startup and shutdown events were also included.

Under normal circumstances, the newly installed black-start generator and existing emergency equipment will be expected to operate for only a few hours per year for testing and maintenance. However, for purposes of calculating the facility's maximum potential annual emissions, the emergency engines were conservatively assumed to operate up to 100 hours for testing, maintenance, and operation, as required. The existing CT annual emissions are based on the maximum actual emissions from 2012 through 2016.

Details of the annualized emissions calculations are included in the supporting documentation for the permit application (see Appendix C).

Table 3.2-2. Maximum Post-Project Potential Annualized Emissions Rates

Pollutant	Annualized Emissions Rates (tpy)				
	Proposed Three CT Units	Proposed Black-start Generator	Existing Emergency Fire Water Pump	Existing Emergency Generator	Existing CT Unit
NO _x	149.50	1.52	0.62	0.93	21.00
CO	111.43	1.88	0.13	0.20	0.08
PM*	22.68	0.089	0.044	6.60E-02	0.27
PM ₁₀ *	22.68	0.089	0.044	6.60E-02	0.27
PM _{2.5} *	22.68	0.089	0.044	6.60E-02	0.27
SO ₂	2.21	1.22E-03	0.041	6.15E-02	1.59
Lead	2.87E-03	—	—	—	3.35E-04
VOC	11.75	0.21	0.049	0.074	0.01
H ₂ SO ₄	3.38E-01	9.34E-05	0.003	4.71E-03	
Formaldehyde†	1.15	5.55E-05	1.65E-04	2.48E-04	6.70E-03
Total hazardous air pollutants	1.81	1.20E-03	5.53E-04	8.25E-04	3.00E-02
CO _{2e}	180,912	115.16	22.84	34.35	3,530.39

Note: CO_{2e} = carbon dioxide equivalent.
tpy = ton per year.

*Filterable and condensable emissions.

†Highest individual hazardous air pollutant.

Sources: CP Crane, 2018.
ECT, 2018.

3.2.4.2 Air Emissions Controls

The conceptual design of the Project incorporates state-of-the-art technology at every step. The new CTs' high efficiency will reduce emissions per unit of output by producing each megawatt-hour of electricity with less fuel. The use of low-sulfur fuels for the CTs also has the benefit of reducing emissions relative to most other potential fuels.

The use of low-sulfur fuels, along with highly efficient combustion, will limit PM/PM₁₀/PM_{2.5} emissions from the new CTs. The CTs will also be equipped with water injection to reduce emissions of NO_x to low levels. SO₂ and H₂SO₄ emissions will be controlled by use of pipeline-quality natural gas containing no more than 0.5 gr S/100 scf (annual average) and ULSD fuel oil having a sulfur content of no more than 15 ppmw (Table 3.2-3).

Table 3.2-3. Summary of Air Emissions Controls

Pollutant	Means of Control
PM/PM ₁₀ /PM _{2.5}	Exclusive use of pipeline-quality natural gas and ULSD fuel oil (CTs)
	Efficient combustion
	ULSD fuel oil (emergency diesel engines)
CO and VOC	Advanced combustion design
NO _x	Advanced combustion design (CTs and emergency engines)
	Wet injection (CTs)
SO ₂ /H ₂ SO ₄	Exclusive use of pipeline-quality natural gas and ULSD fuel oil (CTs)
	ULSD fuel oil (emergency diesel engines)

Source: ECT, 2018.

3.2.4.3 New Source Review Applicability Determination

A new source review (NSR) applicability determination was prepared for each applicable NSR pollutant specified in the Code of Federal Regulations (CFR), Title 40, Part 51.166. These pollutants include NO_x, SO₂, PM, PM₁₀, PM_{2.5}, CO, ozone (as VOC), lead, H₂SO₄, and greenhouse gases (GHGs).

The proposed Project is deemed to be subject to prevention of significant deterioration (PSD) or nonattainment new source review (NNSR), if there is a "significant emissions increase" for a

pollutant, as defined in 40 CFR 51.165 and .166, if the sum of the increases and decreases associated with the project exceeds the pollutant-specific thresholds or significant emissions rate (SER).

Emissions increases were calculated for the proposed Project and were compared to the pollutant-specific SER listed in Table 3.2-4. Results show emissions increases for NO_x, CO, PM₁₀, PM_{2.5}, and GHG (carbon dioxide equivalent [CO₂e]) are above their respective SER, indicating netting analyses are required. For the other pollutants, emissions increases are not significant, hence NSR is not applicable.

Table 3.2-4. Proposed Project Emissions and Comparison to the SER

Pollutant	Proposed Project (tpy)	SER (tpy)	Netting Required
NO _x	151.02	25	Yes
CO	113.31	100	Yes
VOC	11.96	25	No
PM	22.77	25	No
PM ₁₀	22.77	15	Yes
PM _{2.5}	22.77	10	Yes
SO ₂	2.21	40	No
H ₂ SO ₄	3.38E-01	7	No
Lead	2.87E-03	0.6	No
CO ₂ e	181,027	75,000	Yes

Note: tpy = ton per year.

Source: ECT, 2018.

As per COMAR 26.11.17.01, for an existing electric utility steam generating unit, baseline actual emissions is determined by the average rate, in tons per year (tpy), at which the unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 5-year period immediately preceding the date on which a complete application was submitted. In addition, the average rate must be adjusted downward to exclude emissions that exceeded the emissions limitation during the 24-month baseline period. Table 3.2-5 summarizes the contemporaneous decreases based on the data provided by CP Crane for the pollutants having proposed Project emissions above the SER. There are no contemporaneous emissions increases.

Table 3.2-5. Contemporaneous Project Emissions

Description of Emissions	Emissions (tpy)				
	NO _x	CO	PM ₁₀	PM _{2.5}	CO _{2e}
Baseline actual emissions	1,252.10	134.24	83.16	35.99	816,777

Source: ECT, 2018.

The final step of NSR applicability is a netting analysis to determine the significant net emissions increase for those pollutants that cause a significant increase. For NSR to apply, there must be a significant net emissions increase for that pollutant; i.e., the sum of the emissions increase from proposed Project and any other contemporaneous increases or decreases from the entire facility must be above the SER for that pollutant.

As shown in Table 3.2-6 the proposed Project does not result a significant net emissions increase for any NSR pollutant. In fact, the Project's estimated maximum annual emissions are indicated to be much less than actual emissions from the existing coal-fired units.

Table 3.2-6. Netting Analysis

Description	Emissions (tpy)				
	NO _x	CO	PM ₁₀	PM _{2.5}	CO _{2e}
Proposed Project (increases)	151.02	113.31	22.77	22.77	181,027
Baseline actual emissions (Units 1 and 2)	1,252.10	134.24	83.16	35.99	816,777
Contemporaneous emissions	0.00	0.00	0.00	0.00	0.00
NSR SERs	25	100	15	10	75,000
Net emissions increase/decrease	-1,101.88	-20.92	-60.39	-13.22	-635,750
Significant modification (Yes/No)	No	No	No	No	No

Source: ECT, 2018.

The complete air emissions source construction permit application for the proposed Project is provided in Appendix C. The application includes further details of proposed emissions and all supporting documentation.

3.2.5 Water Use and Wastewater Effluents

Figure 3.2-6 provides a conceptual water balance diagram for the Repowering Project. Water for the new facility will be drawn from the existing plant's raw water system. This water will be treated to provide demineralized water quality for use in the CTs. Demineralized water will be used for direct injection in the CTs for NO_x emissions control and power augmentation.

Evaporative cooling will be used as a secondary power augmentation. The water will be injected at rates as follows for the various needs.

- NO_x control, natural gas firing: 55 gallons per minute (gpm) per CT
- NO_x control, ULSD fuel oil firing: 70 gpm per CT
- Power augmentation (SPRINT®): 17 gpm per CT
- Evaporative cooling: 12 gpm per CT

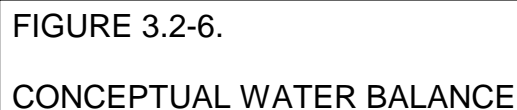
Water will also be used for washing the turbine compressor. The equipment drainage streams will be collected and sent to the existing plant's wastewater system.

3.2.6 Onsite Drainage and SWM

3.2.6.1 SWM Requirements

The Project will incorporate a comprehensive SWM system designed to manage onsite drainage and stormwater flows from within the Project footprint. The existing site SWM system will need to be modified to meet the rules outlined in the following paragraphs. Stormwater will be managed by a proposed bioretention pond.

SWM system design and operating features will be developed to provide adequate onsite stormwater controls, minimize impacts to surrounding waters, and comply with federal, state, and local requirements.



ECT Environmental Consulting & Technology, Inc.

In general, in the Project's final design phase, the proposed SWM system and facilities will be evaluated in detail for compliance with the requirements for a general permit in accordance with COMAR 26.08.04.09B and elements of MDE's Stormwater Design Manual, Volumes I and II, as adopted by Baltimore County. The general permit will incorporate compliance with the following:

- National Pollutant Discharge Elimination System (NPDES) regulations for stormwater discharges associated with industrial activities. Maryland is an NPDES-delegated state with general permitting authority and has issued a general permit for industrial stormwater discharges. Coverage for the Project will be sought under the state general permit, in continuance of the current situation.
- Modification of Crane Station's stormwater pollution prevention plan, which establishes the procedures and practices to be implemented to manage stormwater runoff as well as erosion and sediment.
- Modification of the Station's spill prevention, control, and countermeasure (SPCC) plan, including specific features to equip onsite chemical, solvent, lubricant, and fuel storage and unloading areas with adequate containment facilities to protect the Project and its surroundings in the event of an accidental spill.

The primary goals under these regulations are to maintain, as nearly as possible, the predevelopment runoff characteristics of the site and minimize stream channel erosion, pollution, siltation, sedimentation, and local flooding.

3.2.6.2 Construction Stormwater Runoff Control

A grading permit application, SWM permit, and erosion and sediment control plan for the construction activity will be submitted to the Baltimore County Permits Approvals and Inspections. The plan will be certified by a licensed professional engineer. In addition, a notice of intent will be submitted for coverage under MDE, General Permit for Construction Activity, under the NPDES program.

The CP Crane CT Project will comply with requirements of the grading permit, stormwater permit, and NPDES general permit that have specific and general conditions regarding stormwater discharge. These include the use of best available technology for erosion and

sediment control, periodic inspections, inspections following rainfall events, and maintenance of records. Following facility construction, a notice of termination will be submitted for the NPDES permit for construction activity.

Before construction commences, the limits of construction disturbance (approximately 8 acres, including construction laydown areas and construction parking) will be demarcated onsite. Erosion control measures prescribed in the grading permit to be implemented will include installation of silt fencing and stabilized construction entrances. Additional measures will include a temporary sediment basin and potentially perimeter swales and/or diversion dikes.

Temporary construction entrances, laydown areas, and contractor parking areas will be designated. These temporary areas will be stabilized with a 3-inch layer of crusher run stone placed on a compacted sub-base if the selected area is not already stabilized. A gravel apron will be used at the intersection of the construction entrance with local roads to prevent tracking of sediments offsite and provide a measure of protection to the road. Soil stockpile areas will be protected by silt fencing to control sediment transport. Other disturbed areas may be protected with mulch prior to final stabilization. Construction areas not needed for facility operation will be restored to their natural conditions following completion of construction activities. Areas outside the limits of construction activities will remain undisturbed.

During active construction, disturbed areas will be stabilized with vegetation, gravel, or paving following finish grading. At the end of the construction phase finish, grading will include the conversion of the temporary sediment basins and/or perimeter dike system to the permanent SWM system. Permanent seeding will occur during the first planting season after the final grading. A seed mixture suitable to the site soil conditions will be used. The specific elements of the construction phase SWM system will be included in the grading permit application.

3.2.6.3 SWM Operations

In general, SWM within Baltimore County must conform to the specific design requirements of Article 33, Title 4, of the Baltimore County Code and the 2000 Maryland Stormwater Design Manual (2009). Additionally, SWM must conform to MDE's SWM regulations.

Stormwater runoff from the approximately 5-acre proposed CP Crane CT Project area currently sheet flows across the existing paved parking area to several inlets north of the parking lot area. These inlets are piped to a wooded area north and west of the parking area that drains south to Seneca Creek.

A conceptual SWM plan describing current site runoff characteristics and proposed postdevelopment SWM runoff elements is being developed in accordance with the requirements discussed previously and will serve as the basis for the design of the Project SWM system, as incorporated into the Station's existing system.

Key features of the plan are summarized as shown in Figure 3.2-7 and are described as follows:

- Maintain as nearly as possible to the current conditions total Project site stormwater runoff directions and flows from the Project development area.
- Divert as much as possible offsite runoff from disturbed areas.
- Attain pollutant removal goals by providing storage needed to capture and treat 90 percent of the average annual stormwater runoff volume.
- Provide overbank flood protection by preventing the postdevelopment 2-year, 24-hour storm event peak discharge rate from exceeding the predeveloped peak discharge rate.
- Provide extreme flood volume to prevent flood damage from large storm events; maintain boundaries of the predevelopment 100-year floodplain and protect the physical integrity of best management practice (BMP) control structures.
- Implement BMPs to reduce pollutant loads from the Project site to a level at least 10 percent below the load generated at the site prior to development (per CBCA requirements).
- Release stormwater pond emergency discharge to Seneca Creek.

3.2.6.4 Runoff Management/Stormwater Conveyance

The Project SWM system will be designed to segregate process contact and nonprocess contact stormwaters as described in the following subsections.

Noncontact Stormwater

All runoff from nonprocess contact areas, such as rooftops, paved and gravel surfaces, and unimproved open space areas, will be collected and routed to generally follow the existing flow directions into the appropriate SWM control areas as previously described.

Wherever practical, noncontact stormwaters will be conveyed via overland flow to a bioretention pond for physical and biological treatment prior being discharged at a controlled rate. Where overland flow is not possible, runoff will be directed over the site via a closed stormwater sewer system that discharges into a stormwater quality bioretention pond.

Contact Stormwater

Contact stormwater is defined as stormwater runoff in and around equipment areas where potential contamination could occur, such as outdoor transformers or chemical storage or unloading areas.

Stormwater runoff from areas where potential oil contamination could occur will be directed into an onsite oily water separator for treatment prior to release to the local municipal wastewater treatment facility. Oil collected will be trucked offsite for recycling or disposal.

3.2.7 Solid and Hazardous Wastes

During operation of the Repowering Project CTs, nonhazardous solid wastes will generally be limited to small quantities of mixed office waste and general plant refuse. These wastes will be disposed of at an offsite, licensed landfill. Inlet air filters for the CTs will require periodic change-outs as filter performance degrades. These filters will be disposed of at an offsite, licensed landfill.

The facility will also produce maintenance and other wastes typical of power generation operations. Used oils collected from the oil/water separator, spent lubricating oils, oily rags, and used oil filters from the CTs will be transported offsite by an outside contractor and recycled or disposed. Periodic plant maintenance and overhaul activities will generate somewhat larger quantities of solid waste. Depending on the nature of the wastes, they would be disposed at an offsite licensed solid waste landfill or by a licensed hazardous waste contractor.

Minimal quantities of hazardous wastes and universal wastes will only be occasionally produced at the plant. Efforts will be made to select and use cleaners/degreasers, paints, and other maintenance chemicals to produce nonhazardous wastes. In circumstances where hazardous wastes are generated by the plant, the wastes will be managed in accordance with applicable federal and state requirements.

Washdown wastes will be generated from the periodic cleaning of the turbine blades. These wastes may include alkaline and acidic cleaning solutions used for cleaning of the CTs after the units are put into service. These wastes may contain detectable concentrations of metals and will be collected in the water wash tank prior to disposal to the oil/water separator or, if required, disposal at a licensed offsite disposal facility.

3.3 Rationale for Site Selection and Project Conceptual Design

3.3.1 Site Selection Alternatives

As previously stated, the process of selecting a site was driven by several factors, including access to infrastructure and land use compatibility. The existing CP Crane site has at least eight characteristics making it attractive for the Repowering Project:

- Immediate access to the electric transmission system via the existing onsite CP Crane substation that currently supports 499 MW of generation output
- Existing natural gas interconnection and metering station onsite
- Existing onsite raw water and wastewater treatment systems
- Proximity to existing sewer infrastructure
- Continued use of the existing site, which is a long-time power plant site
- Site environmental suitability, including buildable acreage, minimal wetlands, buffer, forest, etc.
- Retention and recommercialization of existing power plant facilities (14-MW gas turbine and associated ULSD fuel oil storage tank)
- Advantageous location close to a major load center

Virtually any other redevelopment or new build facility in the BGE zone would require construction of lengthy and costly new transmission lines and/or gas pipelines with their associated environmental, social, and economic impacts. Such a project at an already undeveloped site in the BGE zone would not be economically viable in the current power market.

3.3.2 Facility Conceptual Design Alternatives

The proposed site layout has been designed to minimize environmental impacts. The 157-acre parcel has ample acreage and essentially all necessary infrastructure in place for a CT redevelopment project. The proposed layout was established with consideration for both proximity to existing infrastructure and avoidance of environmental impacts. The Repowering Project was sited to avoid impacts to tidal and nontidal wetlands, forests, and wildlife habitat. The associated plant infrastructure (e.g., utilities, groundwater wells, SWM ponds, construction laydown, parking, etc.) was also sited to minimize environmental impacts by leveraging the existing CP Crane infrastructure, including roads, existing natural gas connection and water connection, existing generation lead lines, and existing spare parts building.

Alternative generation technologies, fuels, and emissions control systems were considered for the Repowering Project. The feasibility of the following conventional power generation technologies and fuels were evaluated:

- Simple-cycle CT (oil and/or natural gas)
- Combined-cycle CT (oil and/or natural gas)
- Conversion of the existing coal units to natural gas and/or oil
- Installation of SCR at the existing coal units

The aero-derivative, simple-cycle, dual-fuel technology was selected for the Repowering Project largely because of the following significant advantages over the other technology/fuel options:

- Shorter construction schedule
- Lower environmental impacts due to air emissions
- Lower operation and maintenance costs
- Less acreage needed for plant footprint

- Operational flexibility and ancillary services capability
- Higher reliability with dual-fuel capability

Using a proprietary market analysis, MRP determined additional generation was needed in the PJM market, specifically the BGE load serving area. When reviewing possible locations for this new generation, MRP limited its site alternatives analysis to the CP Crane site and then focused on the basic project development requirements for a new power project, such as proximity to a PJM grid interconnection with additional capacity, fuel storage, and a source of water.

To summarize, MRP analyzed the CP Crane station site in terms of the following minimum criteria:

- Sufficient clear land, 2 acres or greater, located as closely as practical to the existing power plant operations and infrastructure
- Access to 115 kV or greater electrical transmission lines with at least 160 MW of capacity injection rights
- Existing access to natural gas and the ability to add fuel oil supply and storage facilities suitable to fuel the Project for 72 consecutive hours
- Access to existing viable water supply sources
- Access to sufficient existing infrastructure required for ULSD fuel oil deliveries
- Ability to obtain required permits and licenses
- Community acceptance
- Avoidance or minimization of potential impacts to the environment and natural resources

The Repowering Project will minimize pollution over alternate power generating technologies in several ways that will result in lower environmental impacts than other power generation alternatives. The Repowering Project will be a clean and efficient addition to the electrical power grid in Maryland.

Specific Project systems have been conceived and designed to minimize pollution. Primary examples include:

- The use of natural gas and ULSD fuel oil for the CTs, which will result in:
 - Significantly less solid waste relative to other generation, especially coal-fired.
 - No excessive fugitive dust emissions and other environmental disturbances (e.g., noise) from delivery, storage, or handling of coal.
- The selection of CTs that incorporate advanced water injection combustion technology to minimize NO_x emissions, combined with efficient combustion design that minimizes the formation of CO and VOC at the same time.

The repowered Crane Station will be an industrial asset to the community and will have minimal environmental impacts. In addition to minimizing environmental impacts, having the flexibility to the use natural gas or ULSD fuel oil will enhance the ability of the Repowering Project to serve the market and enhance the reliability and resilience of PJM and the BGE locational deliverability area.

3.4 Impact on State Economics

The proposed Repowering Project will have a positive impact on the economics of the state of Maryland through the creation of jobs and the redevelopment of electrical generating capacity to economically meet existing demand and support future economic growth. The Project will employ approximately 75 construction workers at its peak of construction. CP Crane will have a strong preference for hiring skilled local workers for construction.

3.5 Project Effect on Electric System Stability and Reliability

The proposed repowering of Crane Station as described in this application is an important factor to allow the continued operation of the plant. Therefore, the proposed modification allows Crane to continue to support electrical system stability and reliability.

The Repowering Project will provide replacement electric generating capacity and voltage control at the same injection point the CP Crane coal-fired plant served for many years. Although the total generating capacity of Crane Station after implementing the Repowering Project will be less than the original coal-fired plant, the Project generating units will provide PJM with additional generating flexibility, including faster startups and faster load changing capacity.

The Repowering Project will deliver its produced electricity directly into existing BGE 115-kV transmission lines that cross portions of the Crane site. These lines are part of the PJM Interconnection, the largest centrally dispatched control area in North America. PJM, in fulfilling its responsibility for overall system stability and reliability, coordinates the operation of approximately 178,600 MW of generating capacity.

The PJM services area is vast and includes all or part of Maryland, Pennsylvania, New Jersey, Delaware, Virginia, the District of Columbia, Illinois, Indiana, Kentucky, Michigan, North Carolina, Ohio, Tennessee, and West Virginia. Through the established process, the Project will operate in conformance with the requirements of PJM. These requirements will also meet the reliability criteria and standards of the North American Electric Reliability Council (NERC) and BGE.

In conformance with its tariff, filed and approved by the Federal Energy Regulatory Commission, PJM has established procedures and requirements for generators that propose to interconnect with the PJM Interconnection. The Repowering Project has initiated the PJM process and will continue with that process to develop and construct a project that conforms to PJM's requirements concerning electric system stability and reliability. Central to this process is a series of electrical studies required for each proposed generator, which include a feasibility study, system impact study, and facilities study where PJM determines such studies are needed. These studies result in the view by PJM of the system's needs and the fit of the Project into the PJM system. MRP and its consultants are working with PJM on the study process.

In applying the criteria of PJM, NERC, and BGE, any unacceptable impact is addressed with a proposed system upgrade or modification to maintain system goals. The proposed Project is expected to require minimal, if any, PJM system modifications or upgrades.

3.6 Features of Required Electric System Upgrades

Each of the Repowering Project CT units will be connected to a dedicated generator step-up transformer. The power block facilities will also be equipped with two auxiliary transformers to

provide redundant lower voltage power to auxiliary equipment via electric distribution systems within the facility. The Project will be interconnected to the BGE electric transmission network through a new substation consisting of two separate 115-kV buses with a bus tie breaker (in a normally open position) between the two new 115-kV buses with each new 115-kV bus separately connected to one of the existing BGE 115-kV transmission lines located on the CP Crane site, just to the north of the proposed Project facilities. The Project will have the ability to interconnect to either or both existing lines. MRP has applied for PJM generator interconnection for the Repowering Project. Any required offsite transmission system upgrades will be completed by BGE and/or others, and such upgrades are not included in this CPCN filing.

3.7 Project Schedule and Construction Plans

3.7.1 Major Schedule Milestones

The following list presents the major schedule milestones that pertain to engineering, construction, and operation of the Repowering Project. These milestones are estimates based on the most recent information and are subject to change:

Milestone	Date
Finalize site layout and one-line diagram	April 2018
Submit CPCN application	May 2018
Limited notice to proceed for engineering	December 2018
Receive CPCN and other necessary permits and approvals	December 2018
Begin detailed design and procurement	January 2019
Demolition/relocation of existing warehouses	March 2019
Begin onsite Project construction	March 2019
Set CTs	July 2019
Energize switchyard	September 2019
Initial CT startup, commissioning and testing	October 2019
Commence commercial operation	December 2019

3.7.2 Construction Plans

The planned date to start onsite construction of the Project is April 2019, after the necessary licenses and permits are obtained and engineering is advanced to a sufficient level. Construction

of the Project will require approximately 10 to 12 months. Under this schedule, the Project would reach commercial operation in December 2019. Project construction activities will include:

- Site mobilization.
- Demolition/relocation of existing buildings in the area of the proposed CTs and supportive systems.
- Site preparation and excavation.
- Forming, installation of rebar, and pouring of concrete foundations.
- Installation of underground utilities and routings.
- Site backfill and compaction.
- Mechanical and electrical equipment installation.
- Steel erection.
- Piping, electrical wiring, and controls installation.
- Final site grading and cleanup.
- Equipment commissioning, startup, and testing.

The first step in the onsite power plant construction process will be demolishing the structures currently occupying the area proposed for the new CTs. Existing plant equipment to be demolished includes the Unit 2 air heater, dust collector, and electrical control and vacuum blower building and the urea tanks. General site preparation, including minor modification of the plant's existing SWM system, will follow. Ingress/egress to the Project site will be constructed to provide access for construction equipment. During construction, vehicles and equipment will access the site via the plant's existing entrance. Site preparation will consist primarily of grading and leveling. Given the site's low elevation and proximity to surface waters, it is possible dewatering may be required during construction of foundations and underground piping. Areas for materials and equipment laydown will be created.

CP Crane and its engineers will assess whether pile-supported foundations may be necessary at the power block location and other major foundation locations. More information will be available after Project-specific geotechnical investigations are completed. Following concrete foundation construction and underground installation, major equipment will be set in place and

buildings constructed. Finally, piping, electrical wiring, and controls installation will proceed to complete the Project construction phase.

Construction of the associated facilities (electrical transmission interconnection and related structures, water treatment facilities, and fuel delivery systems) will begin concurrently with construction of the CTs. These construction activities are anticipated to be completed within the approximately 10- to 12-month overall Project construction schedule.

Once the power plant and associated facilities are in place, equipment will be put through necessary commissioning, start-up, and testing procedures. Upon completion of these procedures and any necessary adjustments, the plant will be ready for commercial operation.

The average annual construction labor force is expected to be approximately 60 workers, with an estimated 75 workers at the peak of the construction period. Most of the construction labor force is expected to be drawn from within the county and the surrounding area, where significant existing construction workforce is available and currently working in the county. Work will normally be scheduled for six 10-hour days per week. A limited second shift or longer work days may be established for schedule recovery to make up for bad weather or unforeseen problems.

It is conservatively assumed that nearly all construction workers will travel to work using their personal vehicles with an average loading of 1.2 persons per vehicle. During peak times, up to 75 workers will arrive, resulting in approximately 63 vehicles arriving at the site each morning and departing at the end of the day. Shift hours by skillset may be staggered if needed to reduce peak congestion.

Construction employees will remain onsite during the day and will most likely bring their own lunches. Significant traffic associated with break activities during the day will not be generated by onsite employees during the day associated with break activities. A small number of supervisory personnel are expected to arrive and depart the site each day.

Delivery of materials and equipment will occur via truck to the Crane site. Construction traffic will be directed to adhere to a specific route designed for minimal area congestion, safety, and efficiency.

References

U. S. Environmental Protection Agency (EPA). 1995 (as updated). AP 42, Fifth Edition, Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.

4.0 Effects of Site Preparation and Project Construction

This chapter identifies and discusses the potential impacts from construction of the proposed Crane Repowering Project on the social, physical, and natural resources of the site and vicinity. It contains the following sections, in compliance with the regulatory requirement that the environmental information include “[a] summary of the environmental and socioeconomic effects of the construction and operation of the project, including a description of the unavoidable impact and recommended mitigation,” per COMAR 20.79.03.02.B.(1)(b):

- 4.1—Impacts on Air Quality
- 4.2—Impacts on Groundwater
- 4.3—Impacts on Surface Water Bodies
- 4.4—Ecological Impacts
- 4.5—Noise Impacts
- 4.6—Socioeconomic and Land Use Impacts

The potential impacts are presented in relation to the existing resources and environmental conditions described in Chapter 2.0, the baseline for assessing impacts, and are evaluated for compliance with applicable regulations and standards.

4.1 Impacts on Air Quality

Impacts on air quality resulting from Project construction will be minimal. Three general activities will temporarily generate air emissions during construction. First, land clearing, site preparation, and vehicle movement will generate fugitive dust emissions; open burning, if needed and if allowed by local codes, would also generate emissions. Second, internal combustion engines will release NO_x, CO, and other combustion products. And third, construction worker travel to the site will result in vehicular emissions.

Fugitive dust emissions will be greater during the land clearing and site preparation phases of construction and during the more active construction periods due to increased vehicle traffic on the site. Fugitive dust emissions from the construction site will be minimized using appropriate dust suppression control methods, if and as needed.

Increased emissions from internal combustion engines will occur temporarily during site preparation and Project construction due to the amount of onsite construction equipment using engines for site excavation and grading, concrete placement, and structural steel and major equipment installation. Potential minor sources of VOCs include:

- Evaporative losses from onsite painting.
- Refueling of construction equipment.
- Application of adhesives and waterproofing chemicals.

Project construction will occur over an approximately 10- to 12-month period. There will be an average of approximately 60 workers during that time with a peak employment of approximately 75 construction workers. The number of employees currently operating the existing coal-fired units is also approximately 60, most on the day shift but some working the night shift. There have typically been even more workers onsite during a maintenance outage at the plant. Thus, the number of workers present onsite during construction of the CT Repowering Project will be roughly the same as has been the case for many years. In any case, most of these construction personnel will likely be drawn from the Baltimore metro area and will commute to the job site. While not readily quantifiable, the temporary net changes in vehicle-miles traveled in the area would be insignificant, as would any temporary net changes in areawide vehicular emissions.

Air quality impacts caused by construction activity will vary as a function of the level of activity, the specific nature of the activity, weather conditions while the activity is occurring, and the emissions controls applied to the activity. However, even under worst-case conditions, the maximum ambient impacts caused by construction emissions are expected to be small and limited to the specific area of the site under construction. Also, potential emissions are not anticipated to have a significant adverse impact on ambient air quality.

4.2 Impacts on Groundwater

Impacts to groundwater resources during construction of the new CTs should be minimal. Approximately 8 acres of the Crane property will be affected during construction of the Project CTs and related facilities. Systems for surface runoff and drainage from construction and laydown areas will be designed in accordance with applicable soil conservation regulations. The use of appropriate sediment and erosion control BMPs in conjunction with a sediment basin will control the discharge of suspended solids to adjacent surface waters (see Subsection 3.2.6 and Section 4.3). Stormwater runoff captured in this basin will be discharged to surrounding surface waters, evaporate, and/or infiltrate (percolate) in to the groundwater system. The natural filtering action of soils and sediments above the water table will prevent suspended solids from infiltrating the surrounding groundwater. Therefore, no impacts associated with construction runoff to groundwater are anticipated during construction of the Repowering Project.

Some excavation will be required for construction of the new CTs. Excavated material, except clays, will be used for backfilling and leveling the site or disposed of offsite at an approved location. As part of construction, loose or soft soils will be identified and removed or compacted. Some dewatering may be necessary for construction of the foundations for the new CTs, air exhaust stacks, generator step-up transformers, ULSD fuel oil tanks, and possibly the natural gas compressors. This dewatering is expected to be minimal and occur over a short period of time, with discharge to the temporary construction sediment basin, which would allow recharge to the groundwater system. Therefore, the relatively minor, temporary withdrawals during construction, if required, would not be expected to result in brackish water intrusion or other negative impacts (e.g., to wetlands).

Storage of construction materials will be conducted in a manner that will not create an environmental or safety hazard. Handling and storage of fuels and other construction materials, along with wastes and by-products, will occur in a manner that complies with applicable environmental regulations and prevents the release of untreated chemical constituents to the site soil, surface water, or groundwater resources.

4.3 Impacts on Surface Water

Given the absence of plans to disturb existing wetlands (see Section 4.4) and the establishment/modification of effective stormwater quantity and quality controls as well as SPCC procedures, no significant impacts on surface waters resulting from site construction will occur.

A stormwater pollution prevention plan, including a detailed erosion and sediment control plan, will be prepared in accordance with the Baltimore County Soil Conservation District requirements and consistent with state requirements (see Subsection 3.2.6.2). These plans will form the basis for providing adequate protection of the surrounding surface waters (Seneca Creek and Saltpeter Creek) during construction.

Essentially, there are four potential sources of impacts to surface waters during Project construction:

- Direct Disturbance of Existing Wetlands or Waters of the United States—As previously indicated, none of the areas proposed for development of the Project lie within any existing wetland areas. Therefore, no direct impacts on any of these areas are expected to occur during Project construction.
- Erosion of Disturbed Areas that May Transport Sediment—As stated in Subsection 3.2.6.2, an erosion and sediment control plan will be developed in accordance with Baltimore County Soil Conservation District requirements. Implementation of the approved sediment and control plan will prevent discharge of sediment-laden runoff from entering surrounding surface water bodies. The erosion control plan will be a living document and, if for any reason the plan is not achieving desirable results, will be modified accordingly with the approval from a Baltimore County Sediment and Erosion Control Inspector.
- Significant Changes in Stormwater Quantities and/or Qualities Discharged Offsite—The temporary construction sediment basin will be designed per the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Therefore, no significant impacts in surrounding surface water quality or quantities are expected to result during construction of Project improvements.

The existing Crane Station SWM systems will be modified in association with Project construction. A combination of a temporary sediment basin and sediment control BMPs will be developed and installed to accommodate construction activities and achieve an acceptable transition from existing conditions to the final, modified SWM system. Key construction period controls will include:

- Existing vegetation being left in place wherever possible, and disturbed soils being stabilized as necessary to prevent significant erosion.
- Erosion and sediment controls and a temporary sediment basin being installed as required at the initiation of construction to provide adequate stormwater facilities. These facilities will be modified and/or expanded as needed during construction.
- Temporary sediment basin embankments being compacted as required and stabilized with seed and mulch within 3 days of completion to prevent sediment basin bank erosion.
- Accidental Spills of Onsite Chemicals, Lubricants, or Other Potential Contaminants—SPCC procedures directed at construction materials and activities will be developed and strictly followed. These procedures will be designed to minimize the opportunity for accidental spills and provide adequate systems to contain accidental spills.

The implementation of these plans, in accordance with the approved erosion and sediment control plans, and the application of BMPs will prevent significant impacts from occurring to any onsite or nearby offsite surface waters or wetlands during Project construction.

There will be no impacts to the 100-year floodplain, as no construction or other disturbances are proposed within this area.

4.4 Ecological Impacts

Proposed construction activities will take place within developed or previously impacted areas of Crane Station property. Therefore, few ecological impacts will potentially result. The Repowering Project will involve demolishing several existing plant structures and adding new CTs and other associated facilities (pipelines, fuel tanks, water storage tanks) within Station

property. This work will take place within the developed portion of the property, and none of it will result in permanent ecological impacts. Construction laydown and parking areas will use existing developed areas of the Station property. In addition, the existing paved parking lot is large enough to handle construction parking. Space required for construction materials laydown will be modest, and the area immediately south of the existing warehouse has been determined adequate for that purpose. Thus, there will be no construction-related impacts to natural vegetation communities onsite. No state or federally listed plants are likely to occur onsite due to lack of suitable habitat. For these reasons, Project construction activities will not cause significant impacts to the site's or area's ecological resources and features.

There will be no impacts to natural communities onsite, as the proposed development will take place within previously disturbed and developed portions of the site. Therefore, there will be no changes in the land uses or vegetation communities onsite. Secondary impacts resulting from sediment erosion and stormwater runoff will be controlled through development and implementation of a county-approved sediment erosion control plan and SWM plan, as discussed elsewhere.

The primary impacts of Project construction activities on local wildlife resources will be temporary in nature and include the displacement of species in the immediate area due to noise, traffic, and human presence during construction. However, these impacts are expected to be relatively minor considering the site is already developed and human activity is a regular occurrence (and has been for some time). The current level of wildlife activity is expected to resume once construction is complete, and since there are no natural communities that will be cleared within the main Project location, there will be no permanent displacement of wildlife habitat or species. There is FIDS habitat on the Crane site west of the Project area (refer to Figure 2.2-14), but this part of the site will be untouched. So, no impacts to FIDS species should result from Project development, with the possible exception of temporary disturbance (e.g., noise) caused by construction activities.

According to the USFWS IPaC tool queried on February 27, 2018 (Appendix B-3), there are no endangered species under USFWS jurisdiction expected to occur within a 1-mile radius of the Project site. Additionally, there are no refuge lands or fish hatcheries. There are wetland areas

(NWI and other) within a 1-mile radius of the site, as discussed previously, as well as the potential for bald and golden eagle and numerous migratory birds to occur. However, no alteration of existing land use, including tree clearing, will result during Project construction. Thus, no impacts to wetlands, migratory birds, or eagles will result from the Project.

No construction activity will take place within Seneca Creek or its buffer areas, so no direct impacts will result from construction of Project CTs or related facilities. Potential secondary impacts such as sedimentation and stormwater runoff will be controlled to the extent possible using a county-approved sediment erosion control plan and SWM plan. Therefore, it can be concluded that there will be no significant impacts to the creek or its aquatic habitats because of Project construction.

In summary, the Crane Repowering Project will take place primarily on a developed parcel of land that has housed an operational power plant since the early 1960s. No natural communities will be cleared for the Project; therefore, no direct impacts to natural communities will result. Temporary impacts to wildlife species inhabiting adjacent areas may result during the construction process due to human presence and noise. These disturbances will last only during the duration of Project construction and should have no long-term effect on the wildlife community.

4.5 Noise Impacts

The construction of the Crane Repowering Project will require the use of equipment that may be audible from offsite locations. Project construction is expected to take approximately 10 to 12 months and will consist of site clearing, excavation, foundation work, steel erection, installation of Project equipment, and finishing work. Work on these phases will overlap. Excavations for foundations would be relatively modest in size due to the simplicity of the peaking plant design. The need for piles would be determined during the geotechnical investigation of the site. If it were determined later that pile driving was required, such work would be limited to the daytime working hours of 8 a.m. to 5 p.m., during which time pile driving is exempt from noise limits (COMAR 26.02.03.02.C).

Sound levels resulting from construction activities vary greatly depending on factors such as the type of equipment, specific equipment model, operations being performed, and overall condition of the equipment. Variations in power expended by the equipment and changes in construction phases and equipment mix make prediction of potential noise impacts even more challenging.

EPA (1971) has published data on average sound levels for typical construction phases of industrial facilities. These average levels were projected from the acoustic center of the Project's power block footprint to the closest residential receptor, a residence to the southwest on Seneca Park Road, located at approximately 1,300 ft away. These calculations conservatively assume all equipment operating concurrently onsite for the specified construction phase. Table 4.5-1 presents the results of these calculations, which show estimated construction sound levels at the nearest residence will be between 50 and 61 dBA. These levels comply with the state's noise regulation daytime limit of 90 dBA for construction activities (7 a.m. to 10 p.m.) (COMAR 26.02.03.02). Only low-noise construction activities will be scheduled after 10 p.m. and before 7 a.m. to comply with the 55-dBA nighttime limits in Maryland's noise regulation. At more distant locations, the sound from construction activities will be less, since sound level decreases with distance from the source of the sound.

Table 4.5-1. Estimated Sound Levels at the Closest Residential Receptor by Construction Phase

Construction Phase	50 ft from Source (dB)	At Residence on Seneca Park Road (dB)
Site clearing	84	56
Excavation	89	61
Foundations	78	50
Erection	85	57
Finishing	89	61

Sources: EPA, 1971.

HyperPhysics, <http://hyperphysics.phy-astr.gsu.edu/hbase/Acoustic/isprob2.html>, 2018.
ECT, 2018.

Every reasonable effort will be made to minimize sound resulting from construction activities. Construction activities that produce significant sound will generally be limited to daytime hours. As the design of the Project progresses and construction scheduling has been finalized, CP Crane

will work with the community, if warranted, to determine and implement additional measures to minimize the effects of construction sound.

4.6 Socioeconomic and Land Use Impacts

This section summarizes the impacts to the local economy, land use, public services and facilities, and cultural resources associated with site preparation and construction of the Crane Repowering Project. Overall, the Project is expected to have positive socioeconomic impacts at the state and local levels during construction, creating up to 75 temporary local construction jobs, contributing significantly in tax revenues to the state, and increasing consumer demand for goods and services produced by the local economy.

4.6.1 Socioeconomic Impacts

Project construction is anticipated to require approximately 10 to 12 months to complete. Based on this schedule and typical contractor construction sequencing for this type of facility, the average annual construction labor force is expected to be approximately 60 employees, with an estimated 75 employees at the peak of construction. Most of the construction labor is expected to be drawn from within the Baltimore metropolitan area. An estimated total of more than \$6.5 million will be spent on construction labor.

Project construction will generate significant tax revenues for the state from various sources, including income taxes, retail sales tax on materials, supplies and selected construction services, retail sales tax on expenditures by workers, and corporate income taxes paid by local contractors working on the Project.

Local government tax revenues during construction will primarily accrue from personal income taxes, property taxes, and permitting and impact fees. Although there is no local sales tax, state sales tax collections for general revenue are returned to the local level through intergovernmental transfers, grants, etc. There is no local corporate income tax in Baltimore County.

The Project is expected to have a positive impact on local businesses and the local economy during construction.

Local businesses will benefit by servicing the needs of CP Crane and its contractors during construction. Purchases of services and supplies such as fuel oil, concrete, aggregate, lumber, conduit, cable, building supplies, office supplies, and tools are likely to be made locally, whenever available. Local eating and drinking establishments and retail businesses will also benefit.

No state expenditures are expected to be required for infrastructure improvements to support the construction workforce. And as further described in Section 4.6.3, no significant impacts on public services and facilities are expected to be required to support Project construction. Further, no county expenditures are expected to be required to pay for infrastructure improvements to support construction.

4.6.2 Land Use Impacts

The CP Crane site has been an active electric generating plant since the early 1960s. As noted in Section 2.4, the site area is characterized by mixed uses. Given the Project will use a small portion of the long-active power plant site, these existing mixed uses should not be impacted by the proposed repowering plan.

4.6.3 Public Services and Facilities

No significant impacts to public services and facilities are expected to occur during Project construction, as further described in the following paragraphs.

Existing fire-fighting resources located in the area are considered adequate for providing service to Crane Station during construction. Impacts to local police and medical facilities resulting from the need to provide direct services are expected to be minimal, since most of the construction workforce is expected to be drawn from existing resources within the county and the surrounding region.

The peak construction workforce is expected to reach approximately 75 employees from in and around the region. An adequate construction trades workforce is expected to be found in the Baltimore metropolitan area, such that anticipated construction-related traffic will constitute

rerouting many of the existing trips on the roadway network. The Project site is located in excellent proximity to major roadways, including Interstates 95 and 695 and Highway 150, feeding ultimately to the plant site via Carroll Island Road. Temporary construction-related traffic impacts are expected to be largely confined to and occur mainly along these highways and roads. Finally, as discussed in Section 4.1, the number of workers present onsite during construction of the Repowering Project will be roughly the same as has been the case for many years for operating the existing coal- and diesel-fired units. Thus, it may be concluded that future impacts on traffic and roads will change little from those due to existing operations.

Project construction is expected to generate construction debris and solid waste, which will be either recycled or disposed of at licensed facilities. As the volume of solid wastes generated during construction is expected to be insignificant in comparison to this available regional disposal capacity, no significant impacts are expected to result to existing solid waste facilities because of Project construction. No significant quantities of hazardous wastes will be generated during construction, and any such wastes will be properly manifested and disposed of according to state regulations.

Most construction employees are expected to be from the local and surrounding areas, and construction will require only from 10 to 12 months. Therefore, no significant increase in the number of people permanently living or working in the area is expected to occur.

4.6.4 Cultural Resources

No historical structures or archaeological sites exist on or near the Project site that would be expected to be impacted by construction activities. The nearest historical structures are located approximately 1 mile from the Project site (see Figure 2.3-1). Project activities will have no impact on these structures.

4.6.5 CBCA

The CP Crane property is located within the intensely developed area of the CBCA. As such, the Project will be subject to the parts of the Baltimore County Code pertaining to activities proposed within the CBCA. CP Crane will comply with these regulations via Baltimore County's permitting process.

References

Code of Maryland Regulations (COMAR). 2006. <http://www.dsd.state.md.us/COMAR/ComarHome.html>. Accessed May 2018.

HyperPhysics. 2018. Estimating Sound Levels with the Inverse Square Law. <http://hyperphysics.phy-astr.gsu.edu/hbase/Acoustic/isprob2.html>. Accessed May 2018.

U.S. Environmental Protection Agency (EPA). 1971. PB 206 717. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances.

5.0 Effects of Project Operation

This chapter identifies and discusses the potential operational impacts resulting from the proposed Repowering Project on the social, physical, and natural resources of the site and vicinity. It contains the following sections, in compliance with the regulatory requirement that the environmental information include, “[a] summary of the environmental and socioeconomic effects of the construction and operation of the project, including a description of the unavoidable impact and recommended mitigation,” per COMAR 20.79.03.02.B.(1)(b):

- 5.1—Impacts on Air Quality
- 5.2—Impacts on Groundwater
- 5.3—Impacts on Surface Water Bodies
- 5.4—Ecological Impacts
- 5.5—Noise Impacts
- 5.6—Impacts on Solid Waste Disposal
- 5.7—Socioeconomic and Land Use Impacts

As was the case in Chapter 4.0, the existing environmental and socioeconomic conditions described in Chapter 2.0 constitute the baseline for assessing impacts. In addition, the potential impacts are presented in terms of their relationship with applicable regulations and standards.

5.1 Impacts on Air Quality

5.1.1 Introduction

Analyses were conducted to calculate the potential air quality impacts of emissions from the Project. These analyses are described in detail in the air quality information document contained in Appendix C. This section presents a summary of the approach used and the results obtained. The results demonstrate the operation of the facility (post-Project) will not cause or contribute to a violation of any applicable NAAQS.

5.1.2 NSR Applicability and Overview of Impact Analyses

Based on the NSR applicability analysis presented in Subsection 3.2.4.3, the proposed Project will not result in a significant increase in emissions of any NSR pollutant.

Per MDE request, in support of the CPCN and permit-to-construct applications, an air quality impact modeling, facility-only NAAQS analysis was performed. The analysis provided a demonstration through air dispersion modeling using agency-approved meteorological data that the post-Project emissions rates for criteria air pollutants will result in ambient air impacts that comply with NAAQS. Specifically, the NAAQS modeling analysis consisted of existing sources remaining in operation, proposed new emissions sources, and a representative, agency-approved ambient background concentration.

5.1.3 Analytical Approach

5.1.3.1 Air Quality Model

The most recent version of the American Meteorological Society (AMS)/EPA regulatory model (AERMOD) system (Version 16216r, January 17, 2017), together with 5 years of preprocessed hourly meteorological data were used in the analysis. AERMOD was used to obtain impact predictions for both short-term (i.e., periods equal to or less than 24 hours) and annual averaging periods.

5.1.3.2 Meteorological Data

The meteorological data used in the air quality modeling consist of the most recent 5 years (2013 to 2017) of NWS data from the BWI surface meteorological station and the Sterling, Virginia, upper air station. The surface meteorological NWS site (Weather-Bureau-Army-Navy [WBAN] Station No. 93721) is located at BWI approximately 32 kilometers southeast of the Project site. The meteorological data was provided by MDE to ECT on March 27, 2018.

5.1.3.3 Emissions Source Input Data

The Project modeling analysis included the three proposed CTs, a newly installed black-start generator, and the existing sources remaining in operation (CT, fire water pump, and emergency generator). During normal operations, the proposed CTs will operate over a range of loads (50 to 100 percent) and ambient temperatures. Appendix C provides a summary of the 21 operating

cases evaluated for natural gas and the 21 operating cases evaluated for ULSD fuel oil for the proposed CTs. Plume dispersion and ground-level impacts will vary, since emissions rates, exit temperatures, and exhaust gas velocities are different for the operating scenarios. The operating cases enveloped the range of ambient temperatures to create values that represent worst-case parameters and emissions rates for four operating loads (100, 75, 60 and 50 percent). These four worst-case operating scenarios were evaluated using the refined AERMOD system. Emissions associated with the startup of the proposed CTs were also evaluated.

The newly installed black-start generator will be tested once a year for 1 hour. Therefore, the modeled short-term emissions (24 hours or less) were normalized to operate 1 hour within the averaging period for the assessment of short-term modeled averaging periods. The newly installed black-start generator is only expected to operate when there is no electricity on the grid; however, 100 hours of annual operation were conservatively assumed for assessment of annual modeled averaging periods.

The existing CT was modeled based on the maximum emissions provided for the 5-year operation period of 2012 through 2016. The emergency diesel generator is tested for 30 minutes every month, while the fire water pump is tested for 30 minutes every week. Therefore, the modeled short-term emissions (24 hours or less) were normalized to operate 30 minutes within the averaging period for the assessment of short-term modeled averaging periods.

The emergency generator and fire water pump are expected to operate no more than 10 and 50 hr/yr, respectively. However, the modeled annual emissions rates were conservatively based on 100 hours of annual operation for the assessment of annual modeled averaging periods.

Emissions parameters for the Project sources were based primarily on information provided by equipment vendors. Some emissions inputs were derived using EPA and other emissions factors and equipment design data.

5.1.4 Summary of Air Quality Impacts

The primary objective of the analysis was to demonstrate that post-Project emissions from the facility will result in air quality impacts that comply with NAAQS. Table 5.1-1 summarizes the

maximum modeled air quality concentrations calculated by AERMOD. As shown in the table, the maximum modeled concentrations, when combined with a representative background concentration, are less than the applicable NAAQS for all pollutants and averaging times.

Table 5.1-1. Facility Maximum Modeled Concentrations Compared to NAAQS

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu\text{g}/\text{m}^3$)*	Monitored Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)	Complies? (Yes/No)
CO	1-hour†	5,291.19	5,257.14	10,548.33	40,000	Yes
	8-hour†	262.18	1,888.89	2,151.07	10,000	Yes
NO ₂	1-hour‡	46.26	90.24	136.50	188	Yes
	Annual§	3.03	29.92	32.95	100	Yes
PM ₁₀	24-hour£	6.44	35.00	41.44	150	Yes
PM _{2.5}	24-hour‡	2.26	22.67	24.93	35	Yes
	Annual¥	0.19	9.47	9.66	12	Yes
SO ₂	1-hour€	116.04	49.65	165.69	196	Yes
	3-hour†	68.39	114.92	183.31	1,300	Yes
Lead	Rolling 3-month	0.0007	0.004	0.005	0.15	Yes

Note: $\mu\text{g}/\text{m}^3$ = microgram per cubic meter.

*Maximum modeled concentration across all fuels and operating loads.

†Not to be exceeded more than once per calendar year.

‡98th percentile averaged over 3 years.

§Annual mean.

£Not to be exceeded more than once per year on an average over 3 years.

¥Annual arithmetic mean concentration averaged over 3 years.

€99th percentile of 1-hour daily maximum concentrations averaged over 3 years.

Source: ECT, 2018.

5.2 Impacts on Groundwater

The proposed new Project CTs will have no direct discharges to groundwater other than percolation from onsite stormwater bioretention pond. Other waste streams will be discharged directly the local municipal wastewater system.

5.3 Impacts on Surface Waters

There are four potential sources of impacts to onsite or nearby surface waters during Project operations:

- Direct Disturbance of Existing Wetlands or Surface Waters—The new CTs will be located in an existing developed area of the site, and no disturbance to existing wetlands is proposed.
- Direct Discharge of Process Effluents—Process wastewater generated by Project operation will be discharged to a new oily water separator and ultimately the municipal waste water system. Since there will be no direct discharge of process wastewater to any surrounding surface waters, there will be no surface water impacts associated with Project operations. If any surface water impacts result from this Project, they will be positive, in that the shutting down of the coal-fired units' cooling system will eliminate impingement and entrainment from cooling water intake as well as the thermal load from the discharge.
- Significant Changes in Stormwater Quantities and/or Qualities Discharged Offsite—The Repowering Project will include an SWM system designed and installed to ensure water quality volume, groundwater recharge, and channel protection. Operating and maintenance procedures designed to ensure the continued effectiveness of this system will be developed and implemented. Based on installation of a sound SWM system and proper operations and maintenance of these facilities, no significant impacts to any surrounding surface waters are expected because of Project operations.
- Accidental Spills of Onsite Chemicals, Lubricants, or Other Potential Contaminants—The Project will be designed to include spill containment and control features as developed under the overall SPCC plan and chemical/hazardous materials management procedures. These procedures will be designed to minimize the opportunity for accidental spills and identify the appropriate and timely response procedures to be followed in case of an accidental spill.

5.4 Ecological Impacts

Given: (1) the previous site disturbances and current operation of the existing Crane Station power plant; (2) the absence of unique ecological communities or species including rare,

threatened, or endangered plant or wildlife species; (3) the implementation of Project systems and operating procedures designed to minimize impacts to the site and surrounding ecology, and (4) environmental benefits resulting from shutting down the existing coal-fired units, no significant ecological impacts are expected to occur due to Project operations. In fact, any impacts to ecological resources will be positive.

Potential effects of Project operation to the regional and onsite ecological resources could arise from stack emissions, operational noise, human presence, and stormwater runoff. As discussed previously, air quality impacts will be well within standards. As also discussed in a previous section, emissions from the planned new CTs will be much less than emissions from the two coal-fired units. Therefore, impacts on ecological resources resulting from emissions of air pollutants will be much less because of the Project.

Similarly, as mentioned in the Section 5.3, Project impacts on ecological resources would be positive, overall, resulting from the shutting down of the cooling water intake and discharge.

The presence of humans and noise are indirect effects of Project operation that could potentially affect surrounding wildlife. There will be less human presence at Crane Station because of the Project, as the number of employees will decrease relative to current levels. According to the noise modeling results, noise levels will remain within the state noise regulation and should have little effect on the surrounding wildlife communities. Mammal and bird species would be expected to experience the most effects, since their auditory systems are the most developed. However, the mobility of these species and the fact that there is a substantial amount of similar habitats in the area should enable these species to relocate to more desirable locations, if necessary. Species typically onsite are well adapted to human presence and noise and will continue to coexist with the Project, just as they have done for many years with the existing Crane Station.

5.5 Noise Impacts

5.5.1 Introduction

The predominant sources of noise from the repowered Crane simple-cycle CT facility will be the CTs themselves. Sound is produced from three different areas of a CT: air inlet/filter, air exhaust stack, and CT casing. The newly installed black-start generator will be used for the sole purpose of starting the CT during periods when electricity from the grid is unavailable. During normal operation, the newly installed black-start generator will not be in operation and is considered insignificant. Noise emanating from the CTs during normal operation will be steady, with little fluctuations in noise levels.

The following subsections describe the state noise regulations applicable to the Project and noise controls included in its design and provide a demonstration that noise emanating from the Project will comply with state noise regulations.

5.5.2 State Noise Regulations

MDE has established a state noise regulation in COMAR 26.02.03 that sets maximum allowable sound levels from a source at industrial property lines of 75 dBA (day and night), at commercial property lines of 67 (day) and 62 (night) dBA, and at residential property lines of 65 (day) and 55 dBA (night). The regulation also prohibits the creation of pure tones. These limits do not apply to motor vehicle traffic or pile-driving activity during the daytime hours of 8 a.m. to 5 p.m.

5.5.3 Summary of Noise Attenuation Measures

The Repowering Project is being designed to limit sound effects on the surrounding area. Sound baffles will be employed to reduce sound levels from the air exhaust stacks from each CT. Sound baffles are used to reduce airborne sound and are commonly used in air exhaust sound attenuation. As applied to the air exhaust system for each CT, the baffles will be placed in a section of the air exhaust stack called the silencer, located just above the inlet portion or the breech opening. This will result in a noise level for each CT of no more than 60 dBA at 400 ft.

5.5.4 Demonstration of Compliance with State Noise Regulations

Applying standard logarithmic noise calculations techniques to account for multiple identical sources, the combined noise level at a 400-ft level from all three CTs running simultaneously would be 64.8 dBA. The closest residential noise receptor is located to the southwest on Seneca Park Road, approximately 1,300 ft from the acoustic center of the Project's power block. The design noise level of 64.8 dBA at 400 ft from all three CTs can be projected to the closest residence using the inverse square law:

$$\frac{I_2}{I_1} = \left[\frac{d_1}{d_2} \right]^2$$

where: I_2 = sound at distance 2.

I_1 = sound at distance 1.

d_1 = distance 1 from sound source.

d_2 = distance 2 from sound source.

The resulting noise level at 1,300 ft is calculated to be 54.6 dBA. Therefore, the projected noise level at the closest residential receptor from the simultaneous operation of all three CTs is demonstrated to comply with both the daytime (65 dBA) and nighttime (55 dBA) maximum allowable sound levels. No accounting was taken for the sound attenuation that would result from intervening structures or other obstacles (e.g., trees).

5.6 Socioeconomic and Land Use Impacts

This section provides a general description of the potential impacts the Crane Repowering Project operations may have on the local economy, land use, public services and facilities, and cultural resources. Overall, the Project is expected to have a small yet net positive socioeconomic impact at the state and local levels during operations, contributing additional tax revenues and purchases to the local economy while creating little to no increased needs for public services and facilities.

5.6.1 Socioeconomic Impacts

With the CP Crane coal- and diesel-fired units shutting down permanently on June 1, 2018, and the site potentially sitting vacant and unused beyond that time if no other development is planned for the site, the development, construction, and operation of the proposed new CTs and refurbishment of the exiting diesel generator will result in a long-term positive socioeconomic benefit in the form of continued payment of property taxes, employment of plant staff (approximately four employees), as well as engagement of local contractors for maintenance and services. Indirect revenues generated by the Project will include the purchase of maintenance materials as well as a variety of services (e.g., equipment rentals, periodic maintenance support). The Project operation is expected to purchase approximately \$400,000 to \$500,000 in annual goods and services, many of which could be sourced from local suppliers. The development, construction, and operation of the new CTs is not expected to affect or create a need for any local or state services or expenditures, as these have been in place historically to support the CP Crane coal- and diesel-fired units.

The planned operational life of the proposed new CTs is at least 30 years.

5.6.2 Land Use Impacts

The Project site has been home to an electrical generating plant since the early 1960s. Existing land uses in and around the Crane plant have been in place for several decades and are not expected to change in any significant way because of Project operation.

5.6.3 Public Services and Facilities

No significant impacts to public services and facilities are expected to occur during operation of the Project, as further described in the following paragraphs.

The Project is expected to generate minimal amounts of solid waste during operation. All such wastes will be either recycled or disposed of at licensed regional facilities as appropriate. As the volume of solid waste generated during operation is expected to be insignificant in comparison to available regional disposal capacity, no significant impacts are expected to result to existing county solid waste facilities during Project operation.

No significant quantities of hazardous wastes will be generated during operation, and any such wastes will be properly manifested and disposed of according to state regulations. As the quantities and types of hazardous wastes are expected to be ordinary and of low volume, no significant impacts are expected to result to any existing regional hazardous waste disposal facilities during Project operation.

5.6.4 Cultural Resources

There are several of standing historical structures within approximately 1 mile of the Crane Station Project site. Project operations are no anticipated to have any direct or indirect impacts on these resources.

References

- HyperPhysics. 2018. Estimating Sound Levels with the Inverse Square Law.
<http://hyperphysics.phy-astr.gsu.edu/hbase/Acoustic/isprob2.html>. Accessed May 2018.
- Tontechnik-Rechner – sengpielaudio. 2018. Adding acoustic levels of sound sources.
<http://www.sengpielaudio.com/calculator-spl.htm>. Accessed May 2018.

Appendix A

Agency Communications

From: George Aburn -MDE- <george.aburn@maryland.gov>

Sent: Tuesday, October 24, 2017 2:16:54 PM

To: Forbes, John

Cc: George Aburn

Subject: Crane

This is to follow-up our conversation regarding the proposed installation of three dual-fired (natural gas-No.2 fuel oil) combustion turbines and the removal of existing coal-fired units 1 and 2 at the Crane electric generating facility. As we've discussed, I am very supportive of this potential option for the Crane units.

Based on preliminary information provided by Crane, it appears likely that the new units will be able to net out of Major New Source Review. Assuming that this is the case, then the proposed project will not trigger Lowest Achievable Emission Rate (LAER) control technology requirements. Other federal and State requirements will apply.

As always, feel free to call.

Tad

--

George (Tad) S. Aburn, Jr., Director
MDE-Air & Radiation Administration
1800 Washington Boulevard
Baltimore MD 21230
410-537-3255 (phone)
410-537-3391 (fax)
george.aburn@maryland.gov (email)

From: Forbes, John [<mailto:jforbes@cpcranepower.com>]
Sent: Friday, October 27, 2017 7:45 AM
To: Tad Aburn MDE <george.aburn@maryland.gov>
Cc: Charitonuk, Eric <echaritonuk@cpcranepower.com>; David Dunbar <ddunbar@mrpgenco.com>
Subject: Crane Deactivation



Good Morning Tad,

Just wanted to let you know that we have notified PJM of our intent to deactivate Crane 1 and 2 on 6/1/2018. We expect a response from PJM within 90 days. I will keep you posted on any updates.

The site is continuing to pursue a redevelopment project involving gas fired combustion turbines.

I expect the deactivation request to become public knowledge within 30 days. PJM updates their website on a monthly basis, so it could be as soon as next week.

Thanks,
John

John Forbes
Plant Manager
C.P. Crane Station

A  COMPANY
1001 Carroll Island Rd.
Baltimore, MD. 21220
Office – (410) 682-9701

January 5, 2018
ECT No. 170604-0300

Mr. Shawn Seaman, Program Manager
Power Plant Research Program
Maryland Department of Natural Resources
Tawes State Office Building, B-3
Annapolis, Maryland 21401

Re: CP Crane, LLC, Combustion Turbine Repowering Project—Proposed Plan of Study

Dear Shawn:

As you will recall from our meeting on October 19, 2017, CP Crane, LLC, is planning to modify the CP Crane power plant. The project involves adding three General Electric (GE) LM6000 combustion turbines (CTs) in conjunction with shutting down the existing coal-fired units. The CTs will be fired primarily with natural gas, which will be backed up by ultra-low-sulfur distillate (ULSD) fuel oil.

The project will be subject to review and approval by the Maryland Public Service Commission (PSC). This letter outlines activities and studies proposed to be carried out and included in the application for a certificate of public convenience and necessity (CPCN), the requirements for which are enumerated at Title 20, Subtitle 79, Code of Maryland Regulations (COMAR), and the accompanying environmental review document (ERD). CP Crane plans to submit its CPCN application in March or April 2018. Given this timeline, we would appreciate any comments you might have on the proposed study plan at your earliest convenience. If needed, CP Crane representatives would be happy to meet again with you and other Power Plant Research Program (PPRP) staff who might be involved in the review of the pending application to review this plan.

PROJECT OVERVIEW

Figures 1 and 2 show the general location of the CP Crane generating station. Figures 3 through 5 focus in on the plant site and show the features of the immediate surroundings.

The planned project at the CP Crane power plant will result in the permanent shutdown of two existing coal-fired generating units and installation of three CTs of the aero-derivative type and associated ancillary equipment. The proposed CTs will fire natural gas as their primary fuel and will also be capable of firing ULSD fuel oil in situations when natural gas is not available in sufficient quantities. The CTs are expected to serve as peaking units and operate at a capacity factor of up to 30 percent. The CTs' design will allow them to start up and shut down quickly and at multiple times per day, if circumstances warrant.

3701 Northwest
98th Street
Gainesville, FL
32606

(352) 332-0444

FAX
(352) 332-6722

Y:\GDP\C1574\170604\JLM010518.DOCX.1

The CTs will be equipped with dual-fuel natural gas/ULSD fuel oil burners. They will also be equipped with inlet evaporative cooling and water injection systems. Both systems will provide power output augmentation, while the latter will also help reduce emissions of nitrogen oxides (NO_x) when firing ULSD fuel oil.

Although economic analysis is still in progress, CP Crane's owners are contemplating a battery storage option for the site. If feasible, the battery storage would be located on the existing CP Crane site, near the existing high-voltage interconnection. Self-contained, outdoor-rated power-pack enclosures, including batteries, inverters, and controllers, would be mounted on a concrete pad with transformer(s) and switchgear. Although final storage requirements have not yet been determined, as an example, a battery storage facility with a 10-megawatt (MW) capacity and 4-hour storage would be set on an 80-foot (ft) by 100-ft concrete pad.

Natural gas is already delivered to the CP Crane site via pipeline sized to deliver natural gas to the CTs such that all three CTs will be capable of peak operation simultaneously. ULSD fuel oil will be delivered by truck and stored in a new 600,000-gallon storage tank. The project will require constructing a new switchyard to connect to the existing 115-kilovolt (kV) electrical transmission system.

Construction activities associated with the proposed repowering project will involve only a small portion of the plant site. Figure 6 indicates the areas of the site expected to be impacted. As shown, the project will be constructed entirely on previously impacted land.

The project schedule currently anticipates starting construction on or before April 1, 2019. Commercial operation of the new units is planned to commence in October 2019.

COLLECTION OF BASELINE DATA AND INFORMATION

The proposed CT repowering project will have limited potential to impact environmental and other resources:

- Potential emissions of most air pollutants will be reduced dramatically, especially sulfur dioxide (SO₂) and NO_x.
- Surface and groundwater resources will not be affected.
- The project will be constructed within an existing plant site on previously used land; thus, ecological resources and land use will not be materially impacted.
- For the same reasons, cultural and historic resources will not be impacted.
- The project will require only limited workers during construction, and staffing of the plant after operation commences will be at or below current levels; thus, socioeconomic resources will experience little if any impacts.

With the exception of the acoustic environment, given the limited potential of the planned project to impact the environment, the ERD will characterize existing conditions using primarily information readily available from state and federal sources and databases (e.g., U.S. Environmental Protection Agency [EPA] Air Data, Maryland's Environmental Resources and Land Information Network [MERLIN], the Maryland GeoSpatial Data Center, and the U.S. Fish & Wildlife Service [USFWS] Information for Planning and Conservation [IPaC] database).

The acoustic environment of the project area is of some importance, since the proposed CTs will constitute new sources of noise on the CP Crane site. It is not known how noise levels on and around the site will be affected. Data to characterize existing sound levels will be collected at the plant site and in the surrounding area. Short-duration sound-level measurements will be collected at several locations. If possible, these measurements will be carried out both with the existing coal-fired units operating and with those units not operating.

In addition, site-specific geotechnical information will be obtained to support foundation engineering. This information will also be presented in the ERD to characterize existing subsurface conditions.

IMPACTS ASSESSMENTS

The assessment of potential impacts associated with construction and operation of the repowering project will focus on air quality and noise. Impacts related to other environmental resource areas will be assessed qualitatively, commensurate with the limited potential for impacts of any significance.

AIR QUALITY

Based on the preliminary new source review (NSR) applicability analysis that was discussed last October, the proposed project is expected to be a minor source modification with regards to the federal NSR regulations. The preliminary NSR applicability analysis suggests the proposed project will not result in a significant increase in emissions of any NSR pollutant, with a possible exception for greenhouse gas (GHG) emissions. GHG emissions have been categorized as an "anyway" pollutant and require another NSR pollutant to be subject to NSR review before NSR review applies to GHG emissions. Therefore, GHG emissions are not expected to be subject to NSR review for the proposed project.

In support of the CPCN and permit-to-construct applications for the proposed project, the following air quality data/analyses will be provided in the ERD:

- Detailed description of the proposed project and associated equipment.
- Detailed emissions data/calculations for proposed project.
- Regulatory review/applicability analyses:

- NSR major modification applicability analyses (pollutant-by-pollutant):
 - Sourcewide evaluation of creditable contemporaneous emissions decreases.
 - Sourcewide evaluation of creditable contemporaneous emissions increases.
- Federal regulatory review analysis.
- State regulatory review analysis.
- Air quality impact modeling, facility-only National Ambient Air Quality Standards (NAAQS) analysis. The application will provide a demonstration through air dispersion modeling using agency-approved meteorological data that the post-project emissions rates are in compliance with NAAQS for criteria air pollutants. Specifically, the NAAQS modeling analysis will consist of the existing sources remaining in operation, the proposed new emissions sources, and a representative, agency-approved ambient background concentration. Five years of meteorological data (2012 through 2016) from the Baltimore/Washington International Thurgood Marshall Airport (BWI) station will be processed and used for the analysis. Nearby, offsite emissions sources are not proposed for this analysis. The criteria air pollutants/averaging periods to be addressed in the compliance demonstration are as follows:
 - NO₂: 1-hour.
 - NO₂: annual.
 - SO₂: 1-hour.
 - SO₂: 24-hour.
 - SO₂: annual.
 - PM₁₀: 24-hour.
 - PM₁₀: annual.
 - PM_{2.5}: 24-hour.
 - PM_{2.5}: annual.

The ERD will describe the model inputs and results in detail.

- MDE air quality application forms.

NOISE

When running, the CTs will generate noise. To assess noise impacts from CT operations, a noise modeling analysis will be performed. The purpose of this noise modeling analysis will be to predict noise levels at various locations to evaluate compliance with MDE noise standards found at COMAR 26.02.03, Control of Noise Pollution. The specific noise levels allowed at various receiving properties are as follows:

Maximum Allowable Noise Levels for Receiving Land Use Categories (dBA)

<u>Day/Night</u>	<u>Industrial</u>	<u>Commercial</u>	<u>Residential</u>
Day	75	67	65
Night	75	62	55

Mr. Shawn Seaman, Program Manager
Maryland Department of Natural Resources
January 5, 2018
Page 5

To assess potential impacts, a modeling assessment will be performed. The Computer Aided Noise Abatement (CadnaA) noise model (or equivalent) will be used. The CadnaA model is a state-of-the-art noise prediction software for outdoor noise sources that accounts for various attenuation effects observed during outdoor sound propagation. It conservatively utilizes meteorological conditions favorable to sound propagation, such as downwind propagation.

OTHER ENVIRONMENTAL RESOURCES

To the limited extent necessary to satisfy CPCN requirements, impacts in other subject areas (e.g., ecological and water resources, socioeconomics, land use) will be addressed in the application/ERD. Only brief, qualitative assessments are planned for this project. Given the coal-fired units will be shut down and their once-through cooling water systems will no longer operate, impacts to ecological and water resources from the project will only be positive. And given the plan to use an existing power plant site, the project's socioeconomic and land use impacts should be minimal to nonexistent.

Thank you in advance for your review of this plan. We look forward to your comments.

Sincerely,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.



Jeffrey L. Meling, P.E.
Senior Vice President



Thomas O. Pritcher, P.E.
Senior Principal Engineer

JLM/dlm

Attachments

cc (with attachments): D. Dunbar, Middle River Power, LLC
J. Forbes, CP Crane, LLC
E. Charitonuk, CP Crane, LLC
W. DuBois, Esq., Venable, LLP

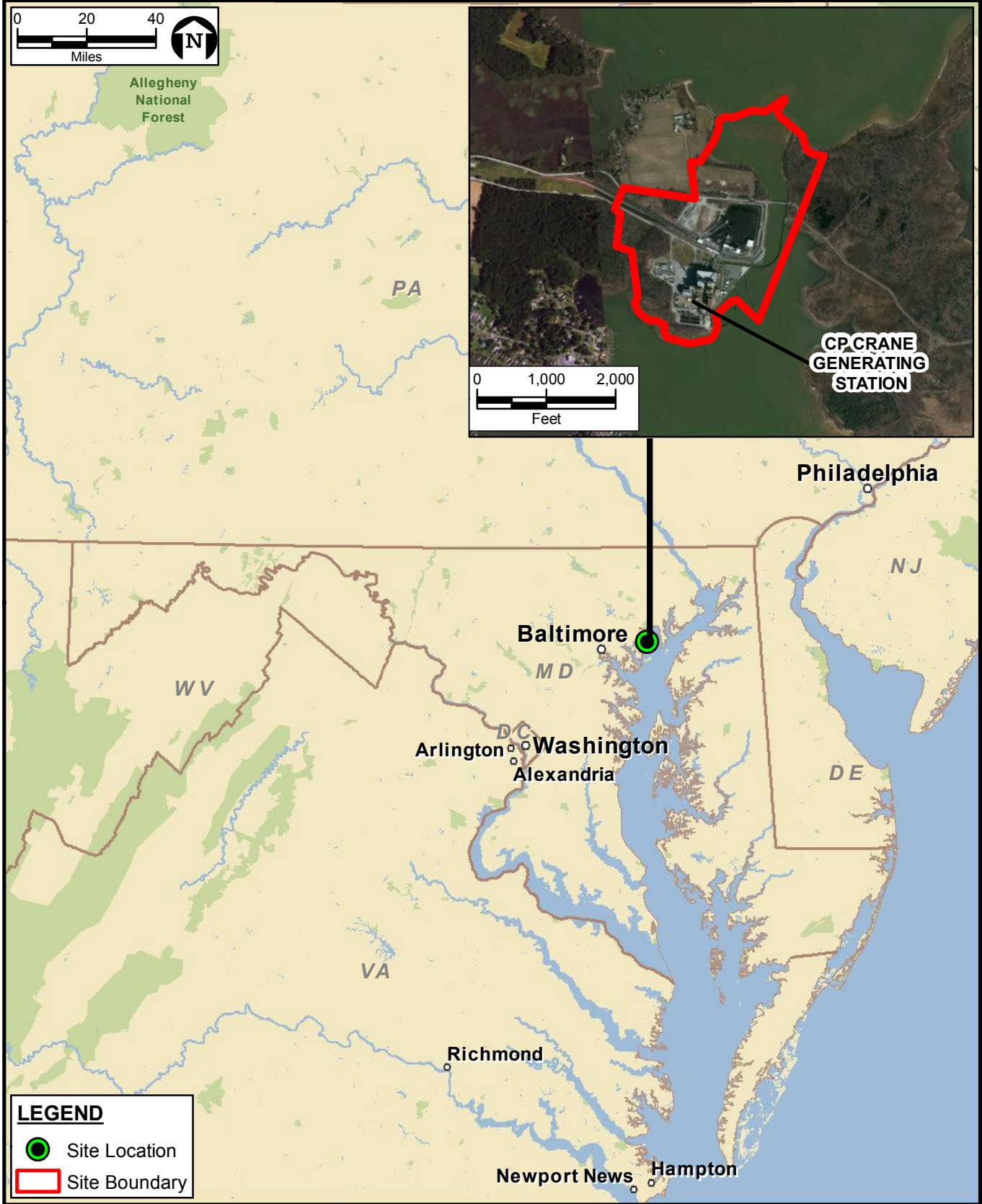


FIGURE 1.

SITE LOCATION MAP

Sources: MDE, 2014; ESRI, 2016; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

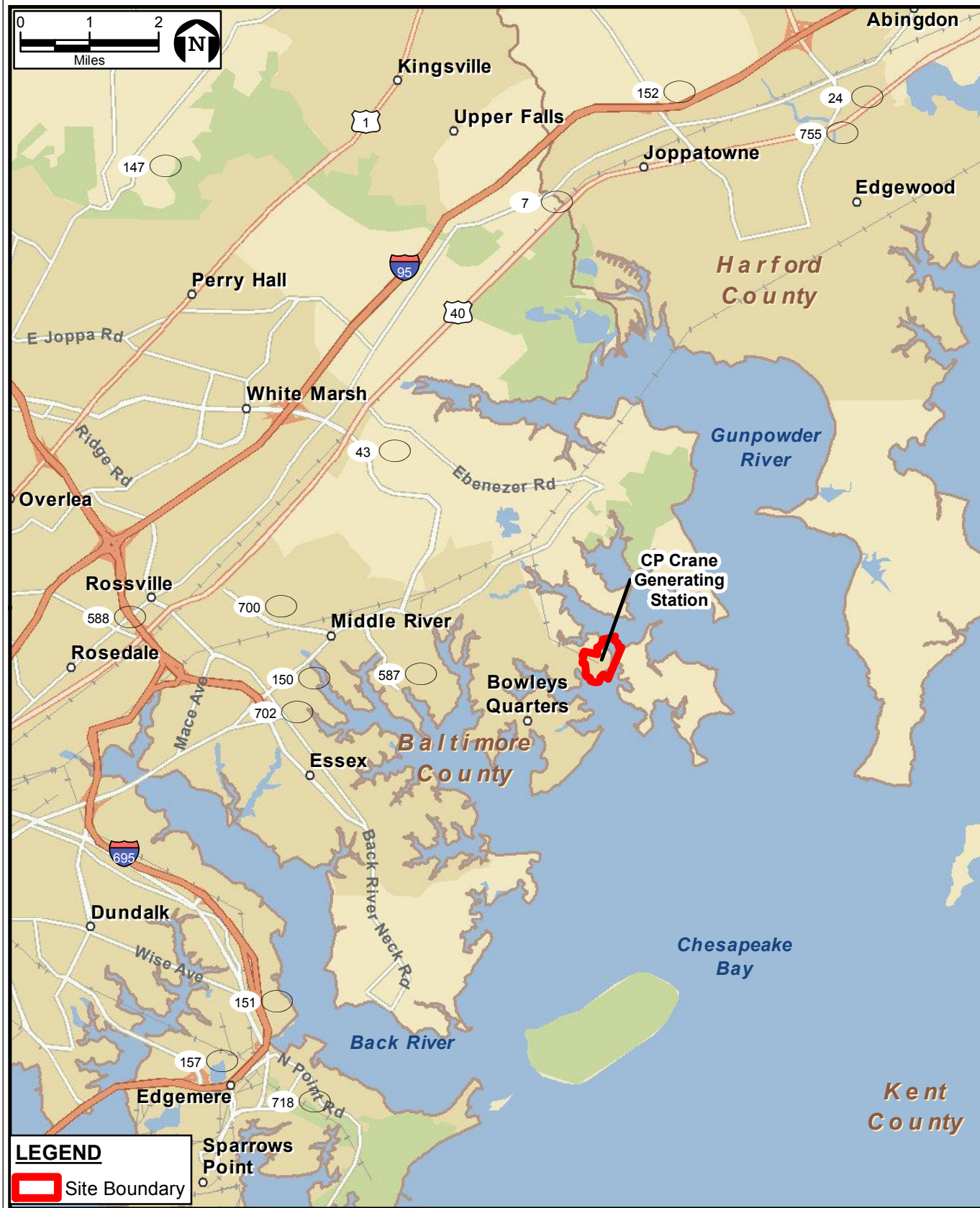


FIGURE 2.

PROJECT SITE AND SURROUNDING AREA COMMUNITIES

Sources: ESRI, 2016; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.

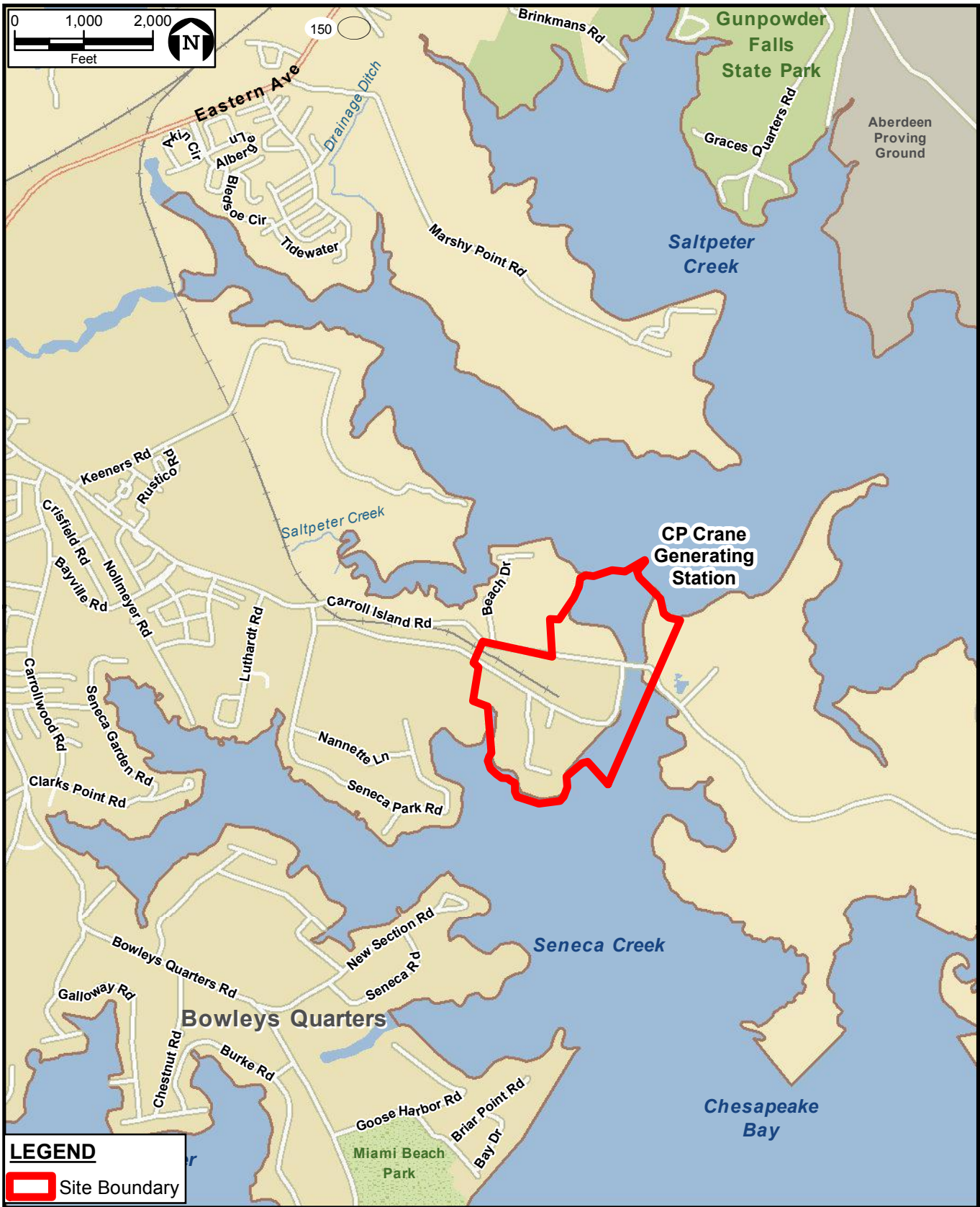


FIGURE 3.

PROJECT SITE AND LOCAL ROADS

Sources: ESRI, 2016; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.



FIGURE 4.

TOPOGRAPHIC MAP

Sources: USGS, Gunpowder Neck and Middle River Quads, 2017; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.



FIGURE 5.

AERIAL PHOTOGRAPH OF SITE AND VICINITY

Sources: USGS, 2014; ECT, 2018.

ECT Environmental
Consulting &
Technology, Inc.



FIGURE 6.

APPROXIMATE LIMITS OF CONSTRUCTION

Sources: USGS, 2014; ECT, 2018.


ECT Environmental
Consulting &
Technology, Inc.

Jeff Meling

From: Susan T Gray -DNR- <susan.gray@maryland.gov>
Sent: Tuesday, January 30, 2018 8:06 AM
To: Thomas Pritcher
Cc: shawn.seaman@maryland.gov; Charitonuk, Eric; Forbes, John; David Dunbar; Jeff Meling; DuBois, William; Josh Ralph; Bill Paul -MDE- (bill.paul@maryland.gov); Karen Irons -MDE-; Michael Woodman -MDE- (mike.woodman@maryland.gov); Tom Wickstrom; Amber Kara
Subject: Re: C. P. Crane - Air Dispersion Modeling Plan of Study

Tom, Eric, and Jeff:

After the conference call on January 23, 2018, PPRP has conferred internally with MDE regarding CP Crane's proposed modeling approach for the planned repowering project. Our preferred path forward for the air quality modeling analysis is for CP Crane to submit an air quality modeling protocol for review and approval for the modeling approach described in the January 5, 2018 letter from Jeffrey Meling and Thomas Pritcher of ECT. The January 5 letter contained a brief description of the proposed air quality modeling analysis: a "post-project" NAAQS compliance demonstration. At this time, PPRP will not request that the repowering project also be represented as a "netting" analysis in the air quality model. Please let us know if you have any questions by contacting Shawn Seaman or me. Thanks.

	<p>Susan Gray Deputy Director, Power Plant Assessment Division Department of Natural Resources 580 Taylor Avenue, B-3 Annapolis, Maryland 21401 410-260-8661 (office) 443-534-0379 (cell) susan.gray@maryland.gov</p>
---	--

[Click here](#) to complete a three question customer experience survey.

On Tue, Jan 16, 2018 at 9:13 AM, Thomas Pritcher <tpritcher@ectinc.com> wrote:

Shawn and Susan,

During our meeting last Thursday (January 11th) at C. P. Crane, our discussion related to air dispersion modeling lead us to the following thoughts/action items:

- The modeling leads for MDE and ERM would be briefed on the January 5, 2018 letter that outlined a proposed plan of study for the repowering of C. P. Crane. More Specifically, the lead modelers would be briefed on our discussion regarding air dispersion modeling for the proposed project.
- A follow-up call would be setup with the lead modelers and the C. P. Crane project team to discuss the air dispersion modeling plan of study.
- Based on the follow-up call, an Air Dispersion Modeling Protocol letter would be prepared by ECT and submitted for agency review/approval.

The purpose of this email is to follow-up on these items and to initiate the process of setting up a follow-up call. Please let us know how we can assist in setting up this call. Thank you in advance for your assistance.

Thomas Pritcher, P.E.

Senior Principal Engineer

Environmental Consulting & Technology, Inc.

[7208 Falls of Neuse Road, Suite 102 | Raleigh NC 27615-3244](#)

[\(919\) 861-8888 xt 1](#) (office) | [\(919\) 631-1537](#) (mobile)

tpritcher@ectinc.com | www.ectinc.com

Follow us: [LinkedIn](#) | twitter.com/ectinc

C.P. Crane Combustion Turbine Repowering Project

Air Quality Impact Analysis Modeling Protocol

C.P. CRANE, LLC
Chase, Maryland


February 2018
ECT No. 170604-0300

Document Review

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc.'s (ECT's) Document Review Policy No. 9.03. ECT documents undergo technical/peer review prior to dispatching these documents to an outside entity.

This document has been authored and reviewed by the following employees:

Joshua Ralph


Author


Signature

February 27, 2018

Date

Thomas O. Pritcher

Peer Review


Signature

February 27, 2018

Date

Table of Contents

<u>Section</u>	<u>Page</u>
1.0 Introduction	1-1
2.0 Project Overview	2-1
2.1 Project Location	2-1
2.2 Project Description	2-1
3.0 Models Proposed and Modeling Techniques	3-1
3.1 Models Proposed	3-1
3.2 NO ₂ Ambient Impact Analysis	3-2
4.0 Terrain Consideration	4-1
5.0 Building Wake Effects	5-1
6.0 Receptor Grids	6-1
7.0 Meteorological Data	7-1
8.0 Representative Background Ambient Concentrations	8-1
9.0 Model Results	9-1
9.1 Presentation of Model Results	9-1
10.0 References/Bibliography	10-1

APPENDICES

Appendix—Conceptual Site Layout

List of Tables

<u>Table</u>	<u>Page</u>
2-1 National Ambient Air Quality Standards	2-5
8-1 Proposed Background Concentrations	8-2

List of Figures

<u>Figure</u>	<u>Page</u>
2-1 General Site Location Map	2-3
2-2 Aerial Photograph of Project Site and Vicinity	2-4

List of Acronyms and Abbreviations

$\mu\text{g}/\text{m}^3$	microgram per cubic meter
AERMAP	AERMOD terrain preprocessing program
AERMET	AERMOD meteorological preprocessing program
AERMOD	AMS/EPA Regulatory Model
AMS	American Meteorological Society
AQS	Air Quality System
BPIP	EPA's Building Profile Input Program
BPIPPRM	EPA's Building Profile Input Program for plume rise model enhancements
BWI	Baltimore/Washington International Thurgood Marshall Airport
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CPCN	certificate of public convenience and necessity
CT	combustion turbine
ECT	Environmental Consulting & Technology, Inc.
EPA	U.S. Environmental Protection Agency
ft	foot
ft-msl	foot above mean sea level
GAQM	Guideline for Air Quality Models
GeoTIFF	geo-referenced tagged image file format
GEP	good engineering practice
GHG	greenhouse gas
hr/yr	hour per year
km	kilometer
MDE	Maryland Department of the Environment
NAAQS	national ambient air quality standard
NED	National Elevation Dataset
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NWS	National Weather Service
PM	particulate matter
PM_{10}	particulate matter equal to or less than 10 microns
$\text{PM}_{2.5}$	particulate matter less than or equal to 2.5 microns
ppb	part per billion
PRIME	plume rise model enhancements
SO_2	sulfur dioxide
ULSD	ultra-low-sulfur diesel
USGS	U.S. Geological Survey
WBAN	Weather-Bureau-Army-Navy

1.0 Introduction

C.P. Crane, LLC (C.P. Crane) is proposing to modify the C.P. Crane power plant site located in Baltimore County, Maryland. The project involves adding three General Electric (GE) LM6000 combustion turbines (CTs) in simple cycle service in conjunction with shutting down the existing coal-fired units.

The planned project at the C.P. Crane power plant will result in the permanent shutdown of two existing coal-fired generating units and installation of three CTs of the aero-derivative type and associated ancillary equipment. The proposed CTs will fire natural gas as their primary fuel and will also be capable of firing ultra-low sulfur distillate (ULSD) fuel oil in situations when natural gas is not available in sufficient quantities. The CTs are expected to serve as peaking units and operate at an annual average capacity factor of up to 30 percent. The CTs design will allow them to start up and shut down quickly and at multiple times per day, if circumstances warrant.

The Maryland Department of the Environment (MDE) requested submittal of an air quality impact analysis modeling protocol for agency review and approval prior to the start of modeling. Accordingly, Environmental Consulting & Technology, Inc. (ECT), prepared this modeling protocol for the project air quality impact analysis for agency review and comments.

This modeling protocol addresses the following major topics:

- General project information, including project description, and location.
- Pollutants to be evaluated.
- Modeled emissions sources.
- Dispersion models and model options.
- Building wake effects (downwash).
- Receptor grids, including terrain considerations.
- Meteorological data.
- Representative Ambient Background Concentrations
- Format of model results.

Following this introduction, this project modeling protocol is organized as follows:

- Section 2.0—Project Overview.
- Section 3.0—Models Proposed and Modeling Techniques.
- Section 4.0—Terrain Consideration.
- Section 5.0—Building Wake Effects.
- Section 6.0—Receptor Grids.
- Section 7.0—Meteorological Data.
- Section 8.0— Representative Ambient Background Concentrations.
- Section 9.0—Model Results.
- Section 10.0—References/Bibliography.

2.0 Project Overview

2.1 Project Location

The C.P. Crane facility is located in eastern Baltimore County, along the Chesapeake Bay approximately 20 kilometers (km) east of Baltimore. Figure 2-1 illustrates the location of the project within the state of Maryland and within Baltimore County. Figure 2-2 provides an aerial photograph showing the location of the project. A conceptual site layout is provided in the appendix.

2.2 Project Description

Based on the preliminary New Source Review (NSR) applicability analysis, the proposed project is expected to be a minor source modification with regards the federal NSR regulations. The preliminary NSR applicability analysis suggests that the proposed project will not result in a significant increase in emissions of a NSR pollutant, with a possible exception for Greenhouse Gas (GHG) emissions. Please note that GHG emissions have been categorized as an “anyway” pollutant and require another NSR pollutant to be subject to NSR review before NSR review applies to GHG emissions. Therefore, GHG emissions are not expected to be subject to NSR review for the proposed project.

In support of the Certificate of Public Convenience and Necessity (CPCN) and Permit to Construct applications for the proposed project, an air quality impact modeling, facility-only National Ambient Air Quality Standards (NAAQS) analysis will be provided in the Environmental Review Document (ERD). Table 2-1 shows the air pollutants/averaging periods that will be addressed in the C. P. Crane’s compliance demonstration.

The application will provide a demonstration through air dispersion modeling utilizing agency approved meteorological data that the post-project emission rates for criteria air pollutants are in compliance with the NAAQS. Specifically, the NAAQS modeling analysis will consist of the

existing sources remaining in operation, the proposed new emission sources, and a representative, agency-approved ambient background concentration. Please note that nearby, off-site emission sources are not proposed for this analysis.

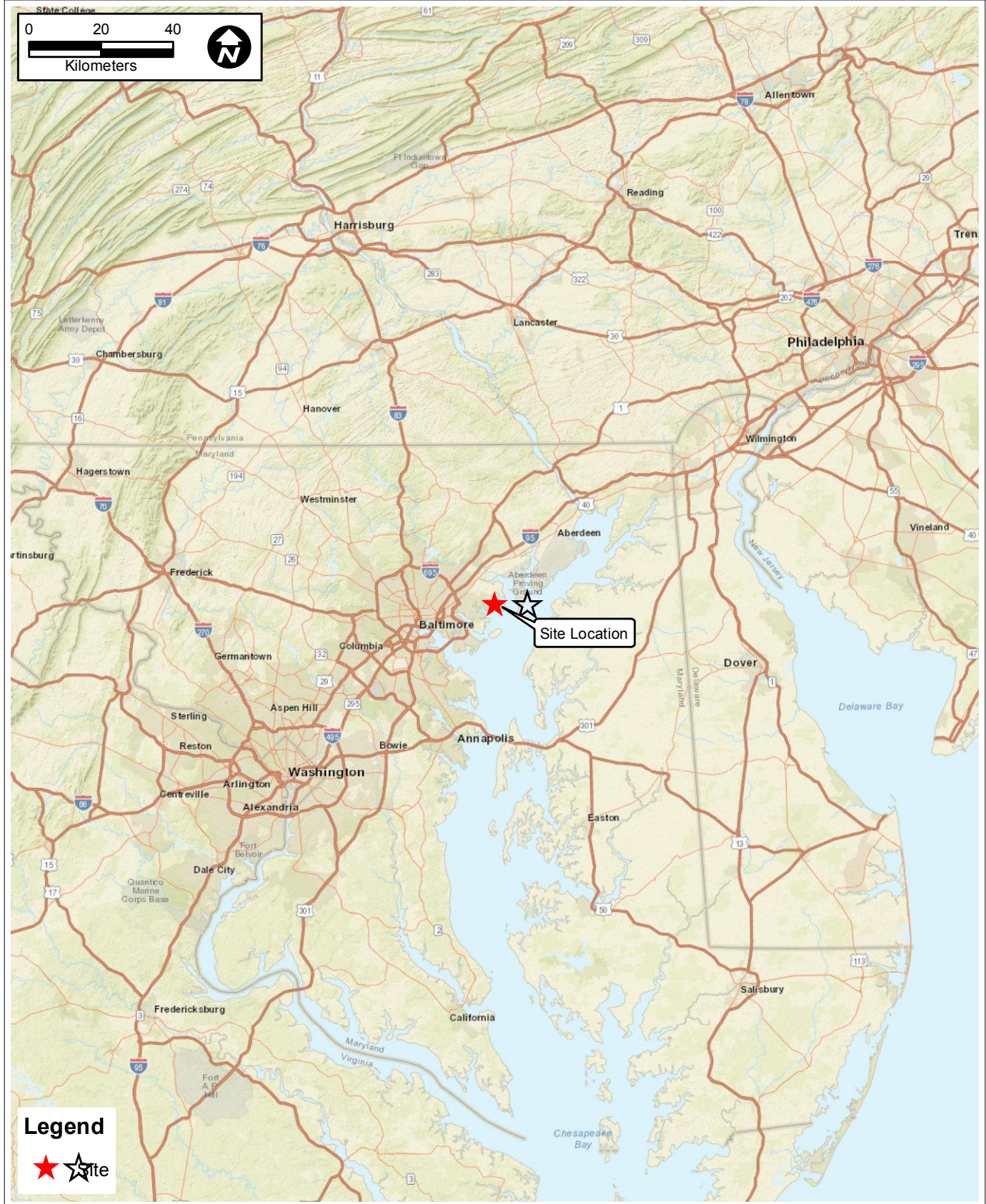


FIGURE 2-1.
GENERAL SITE LOCATION MAP

Sources: Esri Basemap, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

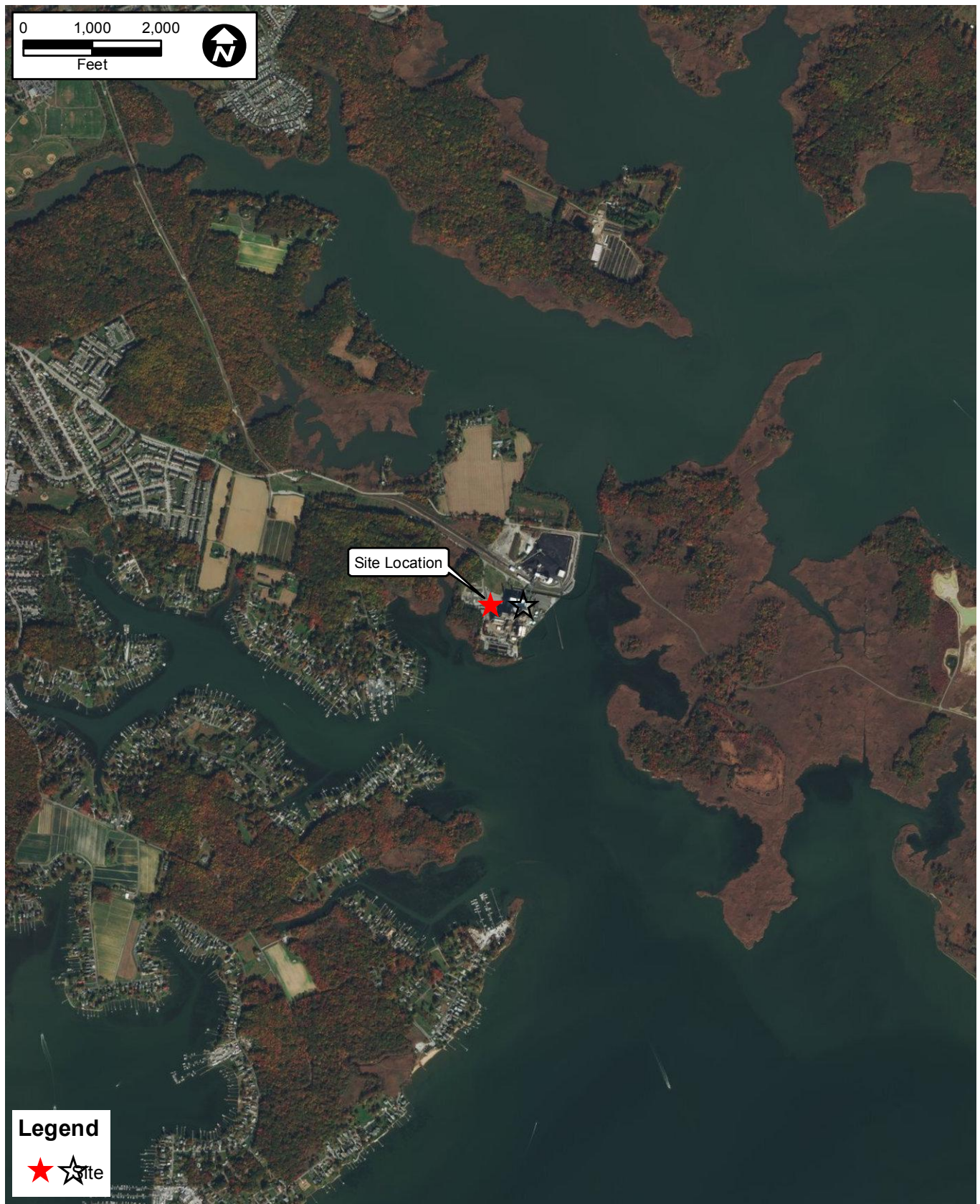


FIGURE 2-2.
AERIAL IMAGERY OF PROJECT SITE AND VICINITY

Sources: Esri Basemap, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

Table 2-1. National Ambient Air Quality Standards

Pollutant (units)	Averaging Periods	NAAQS
SO ₂ (ppb)	1-hour* 3-hour†	75 500
PM ₁₀ (µg/m ³)	24-hour§	150
PM _{2.5} (µg/m ³)	24-hour** Annual††	35 12
CO (ppm)	1-hour† 8-hour†	35 9
NO ₂ (ppb)	1-hour Annual‡	100¥ 53
Lead (µg/m ³)	Rolling 3-month average	0.15

Note: ppmv = part per million by volume.

ppb = part per billion.

µg/m³ = microgram per cubic meter.

ppm = part per million.

*Standard based on three-year average of the 99th percentile of the annual distribution of 1-hour daily maximum SO₂ concentrations.

†Not to be exceeded more than once per calendar year.

‡Arithmetic mean.

§The standards are attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m³, as determined in accordance with 40 CFR 50 Appendix K, is equal to or less than one.

**98th percentile concentration, as determined in accordance with 40 CFR 50 Appendix N.

††Arithmetic mean concentration, as determined in accordance with 40 CFR 50 Appendix N.

¥Standard based on three-year average of the 98th percentile of the annual distribution of 1-hour daily maximum NO₂ concentrations.

Source: 40 CFR 50.

3.0 Models Proposed and Modeling Techniques

3.1 Models Proposed

Air quality models are applied at two levels: screening and refined. At the screening level, models provide conservative estimates of impacts to determine whether more detailed modeling is required. Screening modeling can also be used to identify worst-case operating scenarios for subsequent refined modeling analysis.

The refined level consists of techniques that provide more advanced technical treatment of atmospheric processes. Refined modeling requires more detailed and precise input data but also provides improved estimates of source impacts. For the air quality impact analysis, the current version of the U.S. Environmental Protection Agency (EPA)-approved American Meteorological Society (AMS)/EPA Regulatory Model (AERMOD) system, together with a set of five years of hour-by-hour National Weather Service (NWS) meteorological data, will be used to obtain refined impact predictions for short-term periods (i.e., periods equal to or less than 24 hours), as well as annual average concentrations.

Recommended procedures for conducting air quality impact assessments are contained in EPA's Guideline for Air Quality Models (GAQM) (EPA, 2017). The GAQM is codified in Appendix W of Title 40, Part 51, Code of Federal Regulations (CFR). In the November 9, 2005, Federal Register, EPA approved the use of AERMOD as a GAQM Appendix A preferred model effective December 9, 2005. AERMOD is recommended for use in a wide range of regulatory applications, including both simple and complex terrain. The AERMOD system consists of meteorological and terrain preprocessing programs (AERMET and AERMAP, respectively) and the dispersion aspects of AERMOD. The current EPA-approved versions of AERMOD (Version 16216r dated January 17, 2017) and AERMAP (Version 11103 dated April 13, 2011) will be used to assess project air quality impacts. AERMOD will be run using the most recent

version of the Providence Engineering and Environmental Group, LLC, BEEST suite (BEEST), currently Version 11.10, interface for EPA's AERMOD.

Procedures applicable to the AERMOD system specified in the latest version of the AERMOD User's Guide (December 2016), AERMOD Implementation Guide (updated December 2016), the Addendums to the User's Guide, and the current GAQM will be followed. In particular, the AERMOD control pathway MODELOPT keyword parameters DFAULT and CONC will be selected. Selection of the parameter DFAULT, which specifies use of the regulatory default options, is recommended by the GAQM. The CONC option specifies the calculation of concentrations. Since the proposed project will be located in rural Baltimore County, the AERMOD options regarding urban area increased surface heating (URBANOPT keyword), pollutant exponential decay (HALFLIFE and DCAYCOEF keywords), and flagpole receptors (FLAGPOLE keyword) will not be employed.

3.2 NO₂ Ambient Impact Analysis

For the 1-hour and annual average NO₂ refined modeling, the default Tier 2/ambient ratio method (ARM2) NO_x conversion option will be used in accordance with 40 CFR Part 51, EPA guidance revised in 2017. The national default for ARM2 has a minimum ambient NO₂/NO_x ratio of 0.5 and a maximum ambient ratio of 0.9 which will be used as discussed in EPA NO₂ modeling guidance.

It is not anticipated that a Tier 3 NO_x conversion option will be necessary (e.g., the Plume Volume Molar Ratio Method) for this modeling analysis. Therefore, additional documentation in support of its use is not provided in this protocol.

Additionally, as identified in the EPA's March 1, 2011, 1-hour NO₂ modeling guidance memorandum, emissions sources that operate intermittently will not be included in the modeling analysis.

4.0 Terrain Consideration

The GAQM defines flat terrain as terrain equal to the elevation of the stack base, simple terrain as terrain lower than the height of the stack top, and complex terrain as terrain exceeding the height of the stack being modeled. As previously discussed in Section 4.1, AERMOD is capable of developing estimates of air quality impacts for the three types of terrain.

The elevation of the project site is approximately 10 feet above mean sea level (ft-msl). U.S. Geological Survey (USGS) National Elevation Dataset (NED) terrain data in geo-referenced tagged image file format (GeoTIFF) were examined for terrain features within the expected project impact area. Based on this examination, terrain in the vicinity of the project site is classified as ranging from flat to complex terrain.

In accordance with the GAQM recommendations for AERMOD, each modeled receptor will be assigned a terrain elevation based on USGS NED data and use of AERMAP, the AERMOD terrain preprocessor program. AERMAP will be used in accordance with the latest version of the AERMAP User's Guide (March 2011) (EPA, 2011) and EPA's GAQM.

5.0 Building Wake Effects

The Clean Air Act (CAA) Amendments of 1990 require the degree of emissions limitation required for control of any pollutant not be affected by a stack height that exceeds good engineering practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (40 CFR 51). The stack heights for the project emissions sources will comply with EPA stack height regulations.

While the GEP stack height rules address the maximum stack height that can be employed in a dispersion model analysis, stacks having heights lower than GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. AERMOD evaluates the effects of building downwash based on the plume rise model enhancements (PRIME) building downwash algorithms. For the project's ambient impact analysis, the complex downwash analysis implemented by AERMOD will be performed using the current version of EPA's Building Profile Input Program (BPIP) for PRIME (BPIPPRM) (Version 04274 [September 30, 2004]). The EPA BPIPPRM program will be used to determine the area of influence for each building/structure, whether a particular stack is subject to building downwash, the area of influence for directionally dependent building downwash, and to generate the specific building dimension data required by the model. BPIPPRM output consists of an array of 36 direction-specific (10- to 360-degree) building heights (BUILDHGT keyword), lengths (BUILDLIN keyword), widths (BUILDWID keyword), and along-flow (XBADJ keyword) and across-flow (YBADJ keyword) distances for each stack suitable for use as input to AERMOD.

6.0 Receptor Grids

Receptors will be placed at locations considered to be *ambient air*, defined as “that portion of the atmosphere, external to buildings, to which the general public has access.” The nearest locations of general public access will be at the existing fence line and the water front boundary.

The following receptors will be used to assess the air quality impact of the proposed facility:

- Fence Line Receptors—Receptors placed along the existing fence line and water front boundary spaced 25 meters apart.
- Fine Grid Receptors—Receptors at 100-meter spacings starting at the fence line and extending to approximately 10,000 meters.

7.0 Meteorological Data

The EPA AERMET and AERSURFACE meteorological data preprocessing programs were used to generate the meteorological data required by AERMOD. The AERMET meteorological preprocessing program creates two files that are used by AERMOD (i.e., surface and profile files). The surface file contains boundary layer parameters including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convectively generated boundary layer height, stable boundary layer height, and surface heat flux. The profile file contains multilevel data of windspeed, wind direction, and temperature.

AERMET passes observed meteorological parameters to AERMOD, including wind direction and speed (at multiple heights, if available), temperature, and, if available, measured turbulence. AERMOD uses this information to calculate concentrations in a manner that accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological processor requires the determination of three surface characteristics: surface roughness length (z_o), albedo (r), and Bowen ratio (B_o). Surface roughness length is related to the height of obstacles to the wind flow and is the height at which the mean horizontal wind speed is zero based on a logarithmic profile. Surface roughness length influences the surface shear stress and is an important factor in determining the magnitude of mechanical turbulence and the stability of the boundary layer. Albedo is the fraction of total incident solar radiation reflected by the surface back to space without absorption. The daytime Bowen ratio, an indicator of surface moisture, is the ratio of sensible heat flux to latent heat flux and, together with albedo and other meteorological observations, is used for determining planetary boundary layer parameters for convective conditions driven by the surface sensible heat flux. The EPA AERSURFACE program was developed to aid users in obtaining realistic and reproducible surface characteristic values, including albedo, Bowen ratio, and surface roughness length, for input to AERMET. The program uses publicly available national land

cover datasets and look-up tables of surface characteristics that vary by land cover type and season.

The meteorological data proposed for use in the air quality modeling consists of the most recent five years of NWS data from the from Baltimore/Washington International Thurgood Marshall Airport (BWI) surface meteorological station and the Sterling, Virginia, upper air station. The surface meteorological NWS site (Weather-Bureau-Army-Navy [WBAN] Station No. 93721) is located at the BWI approximately 32 km southeast of the project site. ECT would like to request that MDE provide the processed meteorological data files, if possible. If not, ECT will contract Lakes Environmental to provide the processed (AERMOD ready) meteorological data files.

8.0 Representative Background Ambient Concentrations

Background concentrations representative of the Project modeling domain were obtained from the most recent years of certified monitoring data (2014 through 2016) from the EPA Air Data website (<https://www.epa.gov/outdoor-air-quality-data>). Background concentrations of NO₂, SO₂, CO, and PM_{2.5} are based on the Essex monitor data, whereas background concentrations of PM₁₀ are based on the Glen Burnie monitor data and lead background concentrations are based on the Beltsville monitor data. The CO 1-hour and 8-hour background concentration is the highest concentration from the three years of monitor values. The NO₂ 1-hour background concentration is the average of the three-year 98th percentile monitor value. The NO₂ annual background concentration is the highest concentration from the three years of monitor values. The SO₂ 1-hour background concentration is the average of the three-year 99th percentile monitor value. The SO₂ 3-hour background concentration is the highest concentration from the three years of monitor values. The PM₁₀ 24-hour background concentration is the highest concentration from the three years of monitor values. The PM_{2.5} 24-hour background concentration is the three-year average of the 98th percentile. The PM_{2.5} annual background concentration value is the three-year average of the weighted arithmetic mean monitor value. For lead, since the only Maryland monitor was reporting 0.0 for the maximum 3-month average, the average of the fourth maximum monitor value is being conservatively used. A summary of the ambient background concentrations to be used in the NAAQS compliance assessment is provided in Table 8-1.

Table 8-1. Proposed Background Concentrations

Pollutant	Averaging Period	Proposed Background Concentration ($\mu\text{g}/\text{m}^3$)
NO ₂	1 hour	90.24
	Annual	29.92
PM _{2.5}	24-hour	22.67
	Annual	9.47
PM ₁₀	24-hour	35.00
CO	1 hour	5,257.14
	8-hour	1,888.89
SO ₂	1-hour	49.65
	3-hour	114.92
Lead	Rolling 3-Month	0.004

Source: EPA Air Data Website (<https://www.epa.gov/outdoor-air-quality-data>)
ECT, 2018.

9.0 Model Results

9.1 Presentation of Model Results

The primary objective of the analysis is to demonstrate that the post-project emissions from the facility will demonstrate compliance with the NAAQS. Refined modeling results obtained from the AERMOD system will be summarized in tabular format. For the NAAQS analysis, the model results tables will indicate, for each pollutant, the year of meteorology, applicable averaging period, modeled impact, background concentration, and total analysis impact (modeled impact plus background concentration).

The ambient impact analysis report will include methods and data used in conducting the dispersion modeling study. Building downwash, dispersion model input and output, and meteorological data files will be provided (on digital media) with the analysis.

10.0 References/Bibliography

- U.S. Environmental Protection Agency (EPA). 1985. Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations [Revised]). EPA 450/4 80 023R. Research Triangle Park, North Carolina.
- . 2016. User's Guide for the American Meteorological Society (AMS)/EPA Regulatory Model (AERMOD). EPA-454/B-03-001. Research Triangle Park, North Carolina.
- . 2016. User's Guide for the AERMOD Meteorological Preprocessor (AERMET). EPA-454/B-03-002. Research Triangle Park, North Carolina.
- . 2015. Addendum User's Guide for AERMOD. EPA-454/B-03-001. Research Triangle Park, North Carolina.
- . 2011. Addendum User's Guide for AERMAP. EPA-454/B-03-003. Research Triangle Park, North Carolina.
- . 2015. Addendum User's Guide for AERMET. EPA-454/B-03-002. Research Triangle Park, North Carolina.
- . 2017. Guideline on Air Quality Models (GAQM) (Revised). (Appendix W, 40 CFR 51).

Appendix


Conceptual Site Layout

Jeff Meling

From: Susan T Gray -DNR- <susan.gray@maryland.gov>
Sent: Monday, April 02, 2018 2:04 PM
To: Thomas Pritcher
Cc: Shawn Seaman -DNR-; DuBois, William; David Dunbar; Dennis Corn; Jeff Meling; Josh Ralph; David Tancabel -DNR-; Angelo Bianca -MDE- (angelo.bianca@maryland.gov); Michael Woodman -MDE- (mike.woodman@maryland.gov); Lian Zhuang -MDE-; Amber Kara
Subject: Re: C.P. Crane - Air Dispersion Modeling Protocol
Attachments: CP Crane Comments_to_Modeling_Protocol_March2018.docx

Thomas, attached are MDE's comments on the modeling protocol. Please let me know if you have any questions.

PS - Shawn has a lot of his plate right now with several other time-sensitive projects, so I will be assuming the PM role for this project. Thanks.

 <p>CHANGING Maryland for the Better</p> <p>dnr.maryland.gov</p>	<p>Susan Gray Deputy Director, Power Plant Assessment Division Department of Natural Resources 580 Taylor Avenue, B-3 Annapolis, Maryland 21401 410-260-8661 (office) 443-534-0379 (cell) susan.gray@maryland.gov</p>
---	--

[Click here](#) to complete a three question customer experience survey.

Maryland Department of the Environment

Comments on C.P. Crane, LLC

C.P. Crane Combustion Turbine Repowering Project

Air Quality Impact Analysis Modeling Protocol, dated February 2018

March 29, 2018

1. Emission Source Summary

Please provide a list of emission sources that will be included in the dispersion modeling. This list will be preliminary due to the uncertainties with regard to what emission sources might remain operational at the site.

2. Start-up and Shut-down Conditions

Since the CTs are allowed to have relatively frequent start-ups and shut-downs by design, please include descriptions of start-up and shut-down conditions for the CTs and how these emission scenarios will be accounted for in modeling.

3. Section 3.1 Models Proposed

In the modeling report include analysis to demonstrate rural is the proper land use classification.

4. Section 3.2 NO₂ Ambient Impact Analysis – Intermittent Sources

Please also include a statement of what emission sources would be considered intermittent sources and would be excluded from 1-hour NO₂ modeling.

5. Section 4.0 Terrain Consideration – NED Data Resolution

Please specify the resolution of the NED terrain data that will be used in association with AERMAP.

6. Section 8.0 Representative Background Ambient Concentrations

Include AQS # of any monitors being discussed in the modeling report.

May 4, 2018
ECT No.: 170604.0300

Ms. Susan Gray
Deputy Director, Power Plant Assessment Division
Department of Natural Resources
580 Taylor Avenue, B-3
Annapolis, Maryland 21401

Re: Response to MDE Comments on Air Dispersion Modeling Protocol
C.P. Crane Combustion Turbine Repowering Project
Baltimore County, MD

Dear Ms. Gray:

On behalf of C.P. Crane, please accept the following responses to your technical questions received March 29, 2018. For ease of understanding, your questions are repeated and followed by our response.

1. Emission Source Summary:

Please provide a list of emission sources that will be included in the dispersion modeling. This list will be preliminary due to the uncertainties with regard to what emission sources might remain operational at the site.

Response:

The following emission sources will be included in the dispersion modeling:

Proposed Project

- Three (3) proposed General Electric LM6000 combustion turbines
- One (1) proposed black start generator (See Project Design Update Below)

Existing, On-site Emission Sources

- One (1) existing combustion turbine
- One (1) existing emergency generator
- One (1) existing fire water pump

2. Start-up and Shut-down Conditions:

Since the CTs are allowed to have relatively frequent start-ups and shut-downs by design, please include descriptions of start-up and shut-down conditions for the CTs and how these emission scenarios will be accounted for in modeling.

Response:

Startup/shutdown modeling will be conducted for the short-term pollutants and averaging periods that have the potential for elevated emissions combined with lower plume rise during startup/ shutdown conditions. Since emissions are higher for startup operations than shutdown, the more conservative startup emissions will be modeled. Also, only NO_x and CO emissions will be modeled during startup, since emissions of SO₂, PM₁₀ and PM_{2.5} are higher during normal operation. Therefore, the pollutants and averaging periods that will be evaluated include 1-hour NO₂, 1-hour CO and 8-hour CO.

For purposes of modeling ambient impacts from startups, short-term emissions rates developed for startup operations for the proposed CTs take into account the time from ignition to compliance. The startup of the CTs has a duration of approximately 10 minutes. The emissions are calculated per startup event. Therefore, to conservatively quantify short-term average emissions rates for startup events, it has been assumed the CTs are at 100-percent load for the balance of the averaging period when it is not in startup mode. The startup event and the balance of the averaging period at 100-percent will be modeled as separate stacks which will be source grouped together to get the overall concentration. The table below summarizes the maximum short-term average emissions rates developed in this manner.

An example calculation for the 1-hour NO₂ 100-percent load emission rate for the balance of the averaging period when it is not in startup mode is provided below.

NO_x Emission Rate at 100-percent load: 35.45 lb/hr

Remaining time in averaging period (after startup): 50 minutes

$$35.45 \text{ lb/hr} * 50/60 = 29.54 \text{ lb/hr}$$

Annual emissions resulting from startup/shutdown operations for the proposed CTs are based on 250 startups per year, of which 25 startups could be on ULSD.

Scenario	Units	One Unit (per event)	Startup		100% Load	
			Per Hour		Per Hour	
			1-hour Average	8-hour Average	1-hour Average	8-hour Average
Natural Gas						
Time from ignition until compliance	minutes	10				
Estimated exit velocity	fps		88.15	88.15	100.78	100.78
Estimated stack temperature	°F		717.00	717.00	837.00	837.00
NOx	lb		3.60	N/A	29.54	N/A
CO	lb		3.20	0.80	21.58	24.81
Fuel Oil						
Time from ignition until compliance	minutes	10				
Estimated exit velocity	fps		86.88	86.88	102.04	102.04
Estimated stack temperature	°F		722.00	722.00	833.00	833.00
NO _x	lb		12.80	N/A	49.16	N/A
CO	lb		11.60	2.90	25.65	29.50

3. Section 3.1 Models Proposed:

In the modeling report include analysis to demonstrate rural is the proper land use classification.

Response:

This information will be provided in the modeling report.

4. Section 3.2 NO₂ Ambient Impact Analysis – Intermittent Sources:

Please also include a statement of what emission sources would be considered intermittent sources and would be excluded from 1-hour NO₂ modeling.

Response

Due to their limited (non-emergency) operations, and their random schedule that cannot be controlled, the emergency generator and fire water pump are considered intermittent sources with regards to the 1-hour NO₂ modeling. Similarly, the existing combustion turbine has demonstrated historical limited usage and its expected future operation is random and not predictive. As a result, these sources will be excluded from the 1-hour NO₂ modeling analysis.

5. Section 4.0 Terrain Consideration – NED Data Resolution:

Please specify the resolution of the NED terrain data that will be used in association with AERMAP.

Response:

This information will be provided in the modeling report.

6. Section 8.0 Representative Background Ambient Concentrations:

Include AQS # of any monitors being discussed in the modeling report.

Response:

This information will be provided in the modeling report.

Project Design Update:

The project design has been updated to include a black start generator. The black start generator will not be used to produce electricity for the grid and will only be used to start the proposed combustion turbines when there is no electricity on the grid. Since its operation will be random and not predictive the black start generator will be considered an intermittent source with regards to the 1-hour NO₂ modeling and excluded from the 1-hour NO₂ modeling analysis.

Susan Gray
Department of Natural Resources
May 4, 2018
Page 5

Upon completion of your review of the responses provided, please do not hesitate to contact us at (919) 861-8888 if you have any additional questions or comments.

Sincerely,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.



Joshua Ralph
Staff Engineer III
jralph@ectinc.com



Thomas Pritcher
National Air Quality Service Line Director
tpritcher@ectinc.com

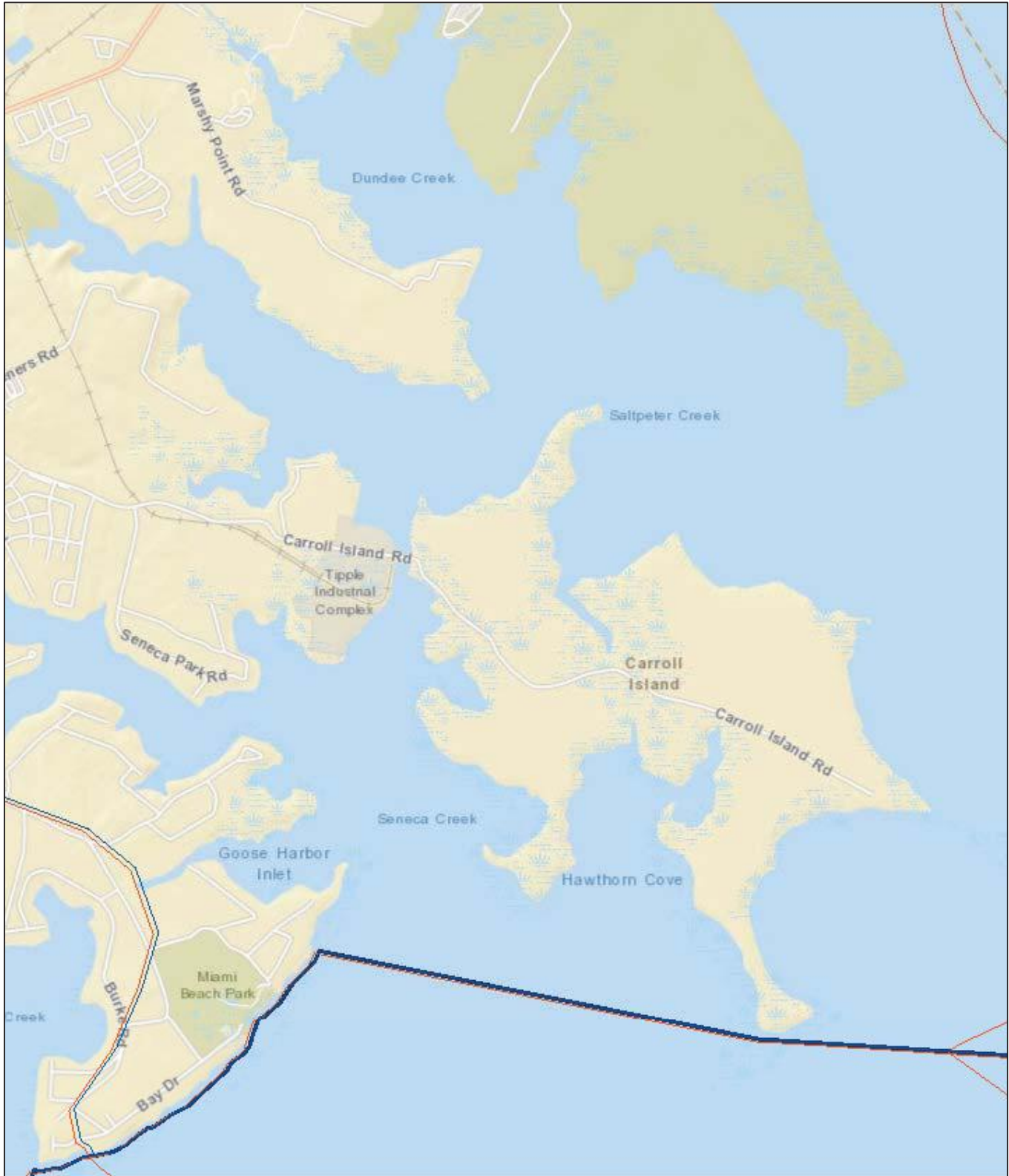
Appendix B

Information and Data

Appendix B1

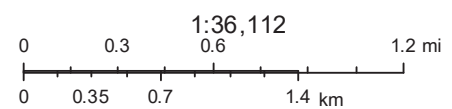
MERLIN Data

Watersheds



January 31, 2018

- State Boundary Mask
- Federal Watersheds - HUC11
- 8 Digit Watersheds
- 12 Digit Watersheds

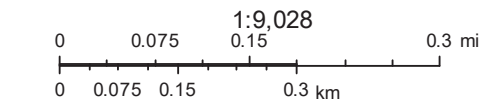
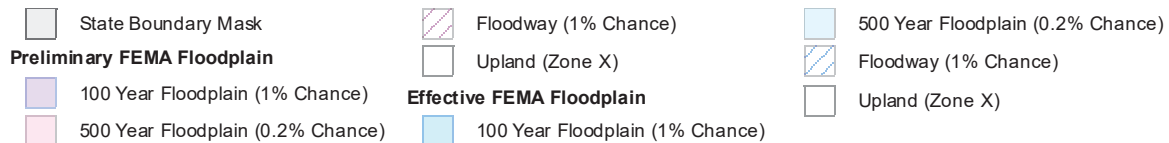


MD iMAP, DNR
 Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Floodplain



January 31, 2018

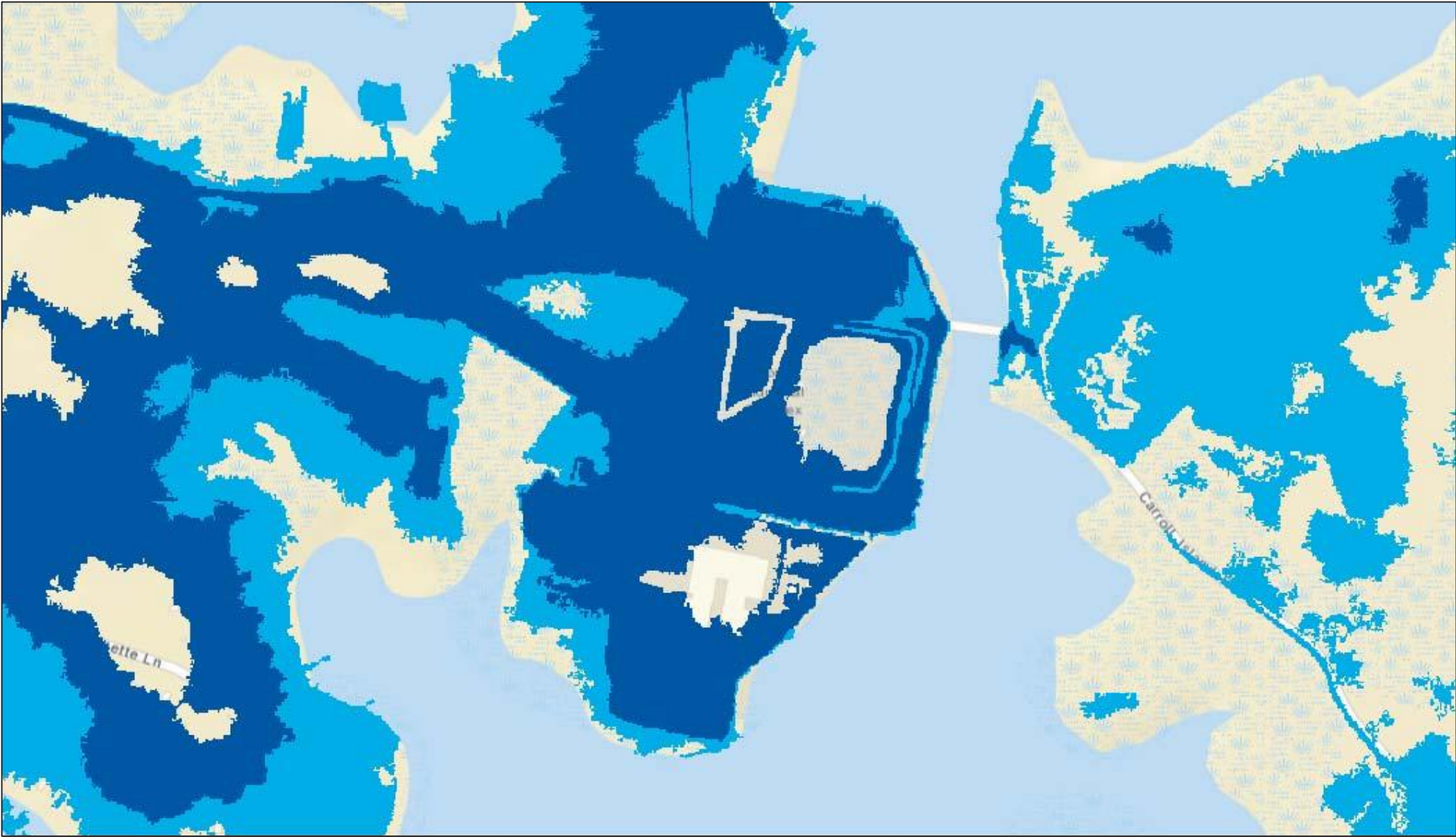


Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
MD iMAP, MDE

Maryland Department of Natural Resources

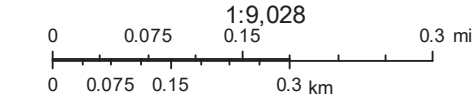
Carbanes Cooperative Oxford Laboratory | MD iMAP, DNR | MD iMAP, MDOT, MDOT SHA, DoIT, MDP | MD iMAP, MDP, SDAT | MD iMAP, SHA, DoIT | MD iMAP, MHEC, PSC, MSDE, MDP, DoIT | MD iMAP, ESRI | MD iMAP, SDAT, MDP | Esri, HERE | VITA, Esri, HERE, Garmin, INCREMENT P, NGA, USGS |

Sea Level Rise Vulnerability



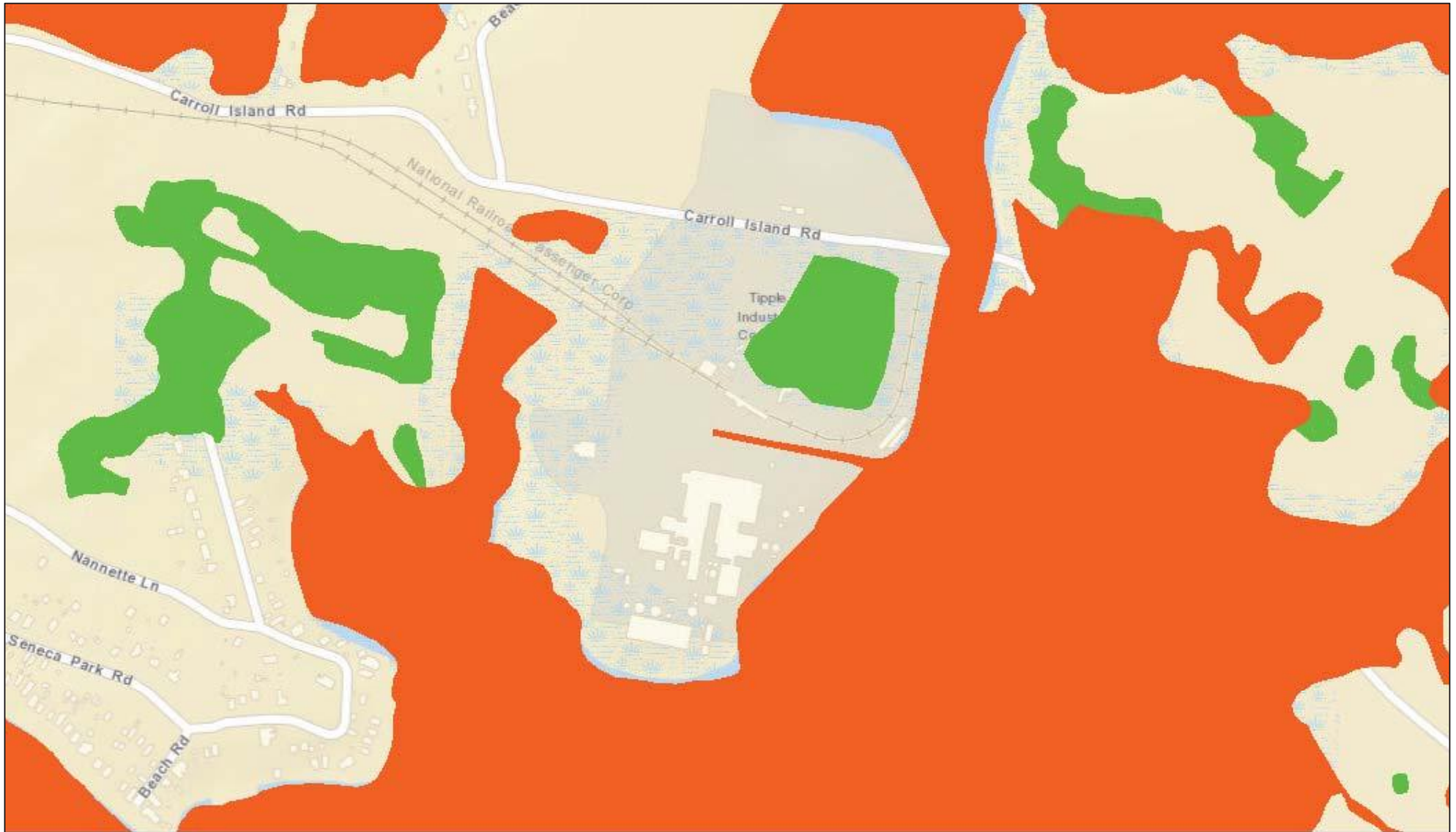
January 31, 2018

- State Boundary Mask
- 2 to 5 Foot Inundation
- 5 to 10 Foot Inundation



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
MD iMap, DNR

DNR Wetlands



January 31, 2018

State Boundary Mask

Wetlands - Linear - Department of Natural Resources

- Estuarine
- Palustrine

Riverine

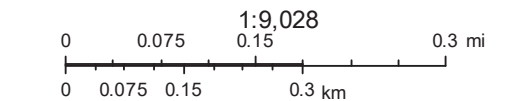
Wetlands - Polygon - Department of Natural Resources

- Estuarine
- Lacustrine

Marine

Palustrine

Riverine

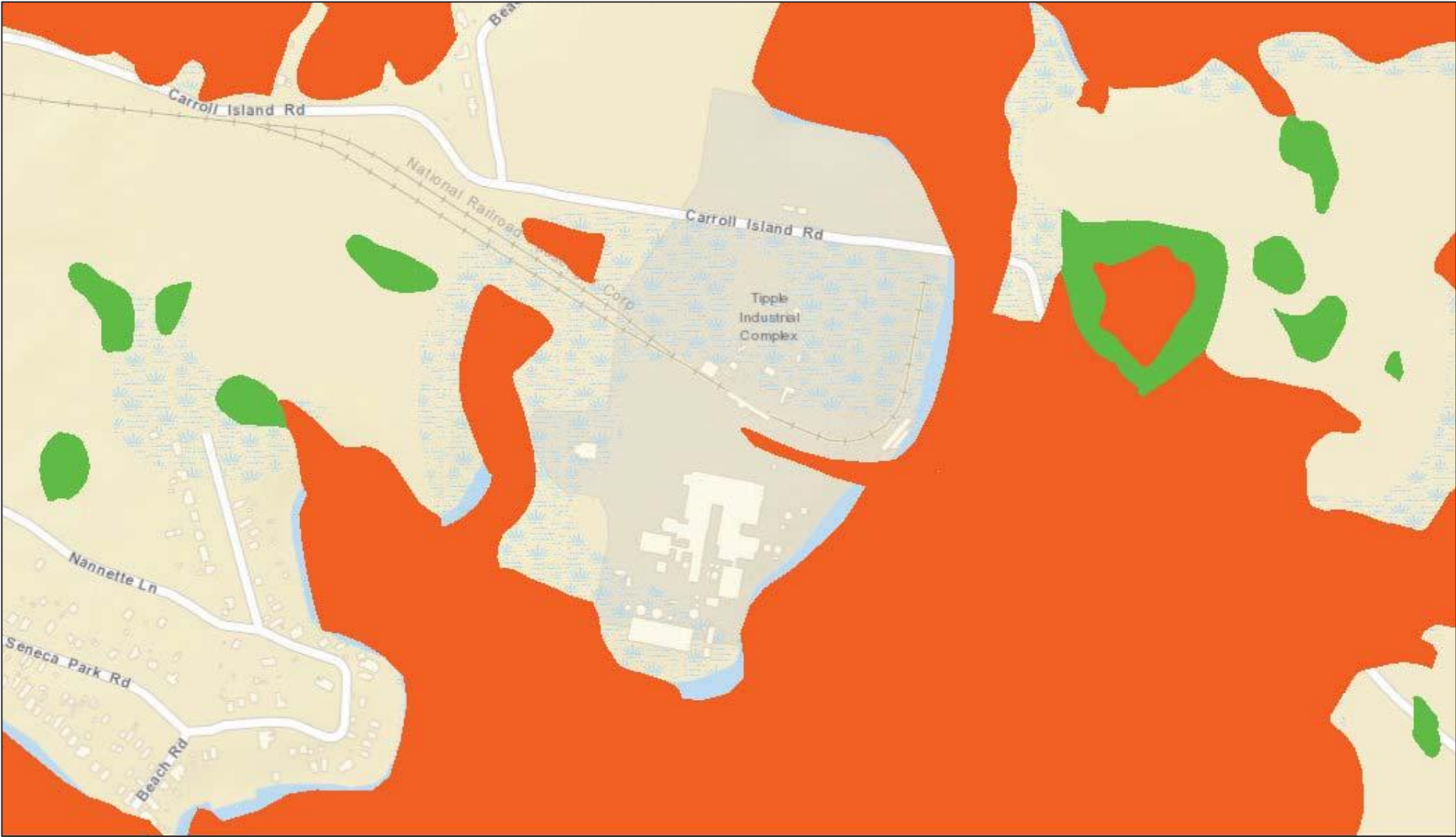


MD iMAP, DNR, USFW
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Maryland Department of Natural Resources

Carbanes Cooperative Oxford Laboratory | MD iMAP, DNR | MD iMAP, MDOT, MDOT SHA, DoIT, MDP | MD iMAP, MDP, SDAT | MD iMAP, SHA, DoIT | MD iMAP, MHEC, PSCF, MSDE, MDP, DoIT | MD iMAP, ESRI | MD iMAP, SDAT, MDP | Esri, HERE | VITA, Esri, HERE, Garmin, INCREMENT P, NGA, USGS |

NWI



January 31, 2018

- State Boundary Mask
- Lacustrine
- Riverine
- Marine
- Estuarine
- Palustrine

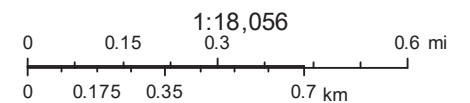
1:9,028
0 0.075 0.15 0.3 mi
0 0.075 0.15 0.3 km
MD iMAP, DNR, USFW
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

NWI2



February 27, 2018

State Boundary Mask



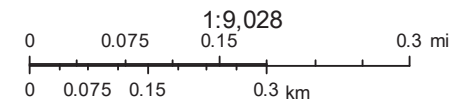
U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

SAV



January 31, 2018

- State Boundary Mask
- SAV 2016








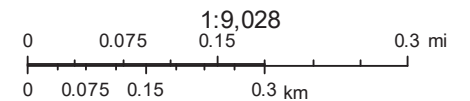
MD iMAP, DNR
 Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Historical SAV



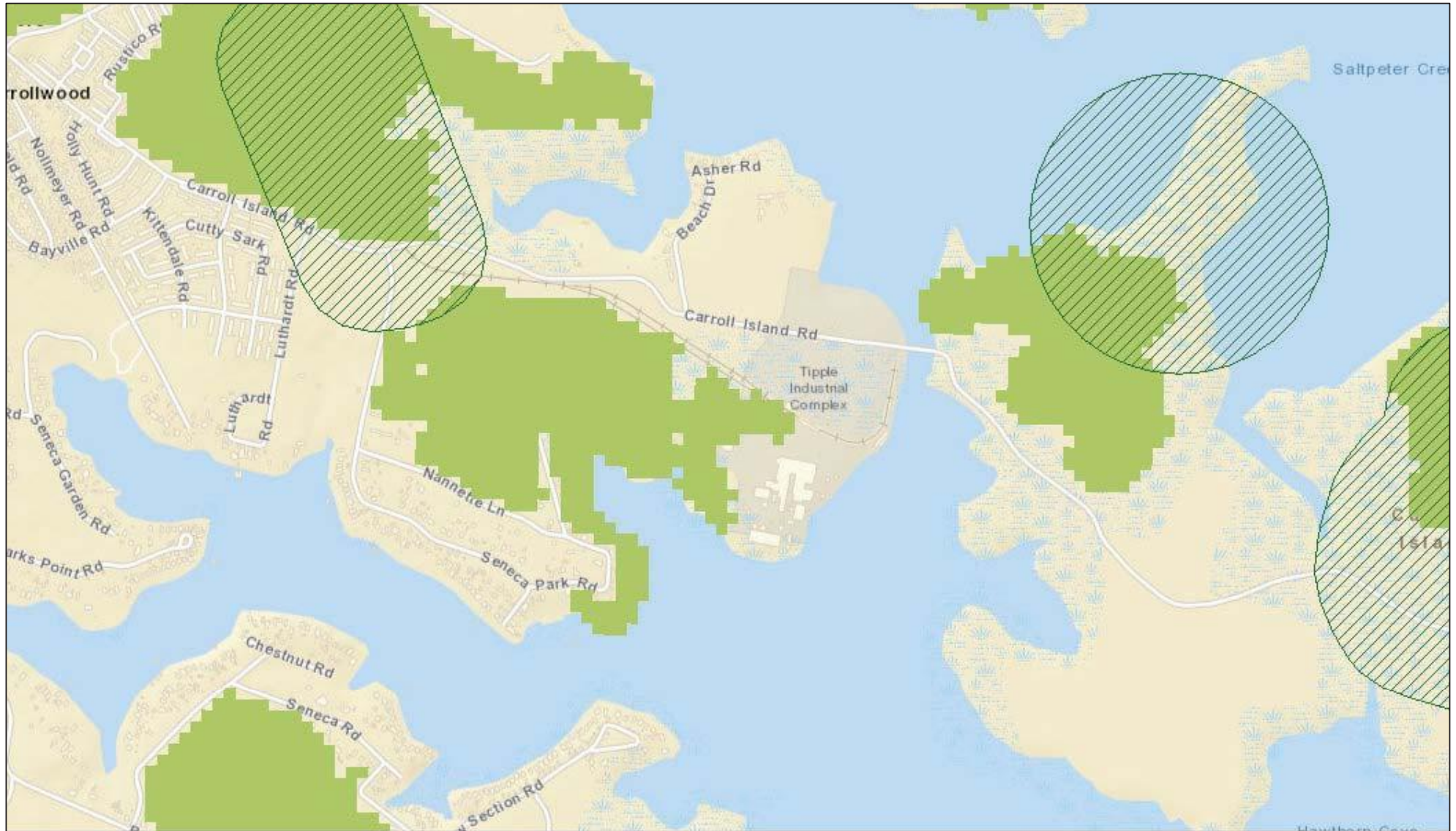
January 31, 2018

- | | | | |
|--|---------------------|---|----------|
|  | State Boundary Mask |  | SAV 2000 |
|  | SAV 1984 |  | SAV 2010 |
|  | SAV 1990 | | |



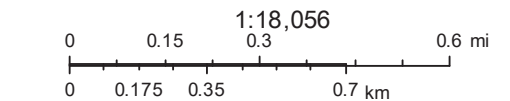
MD iMAP, DNR, VIMS
 Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Sensitive Species, FIDS



January 31, 2018

- State Boundary Mask
- Coastal Bays Shorebirds
- Sensitive Species Project Review Areas
- Forest Interior Dwelling Species
- Natural Heritage Areas



MD iMAP, DNR
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Green Infrastructure



January 31, 2018

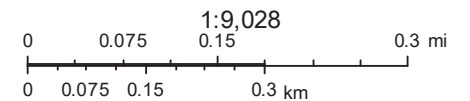
State Boundary Mask

Hub

Green Infrastructure Hubs And Corridors

Green Infrastructure Gaps

Corridor



MD iMAP, DNR
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Maryland Department of Natural Resources

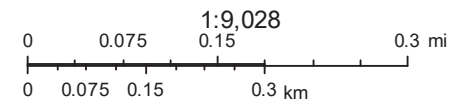
Carbanes Cooperative Oxford Laboratory | MD iMAP, DNR | MD iMAP, MDOT, MDOT SHA, DoIT, MDP | MD iMAP, MDP, SDAT | MD iMAP, SHA, DoIT | MD iMAP, MHEC, PSCF, MSDE, MDP, DoIT | MD iMAP, ESRI | MD iMAP, SDAT, MDP | Esri, HERE | VITA, Esri, HERE, Garmin, INCREMENT P, NGA, USGS |

DNR Focal Areas



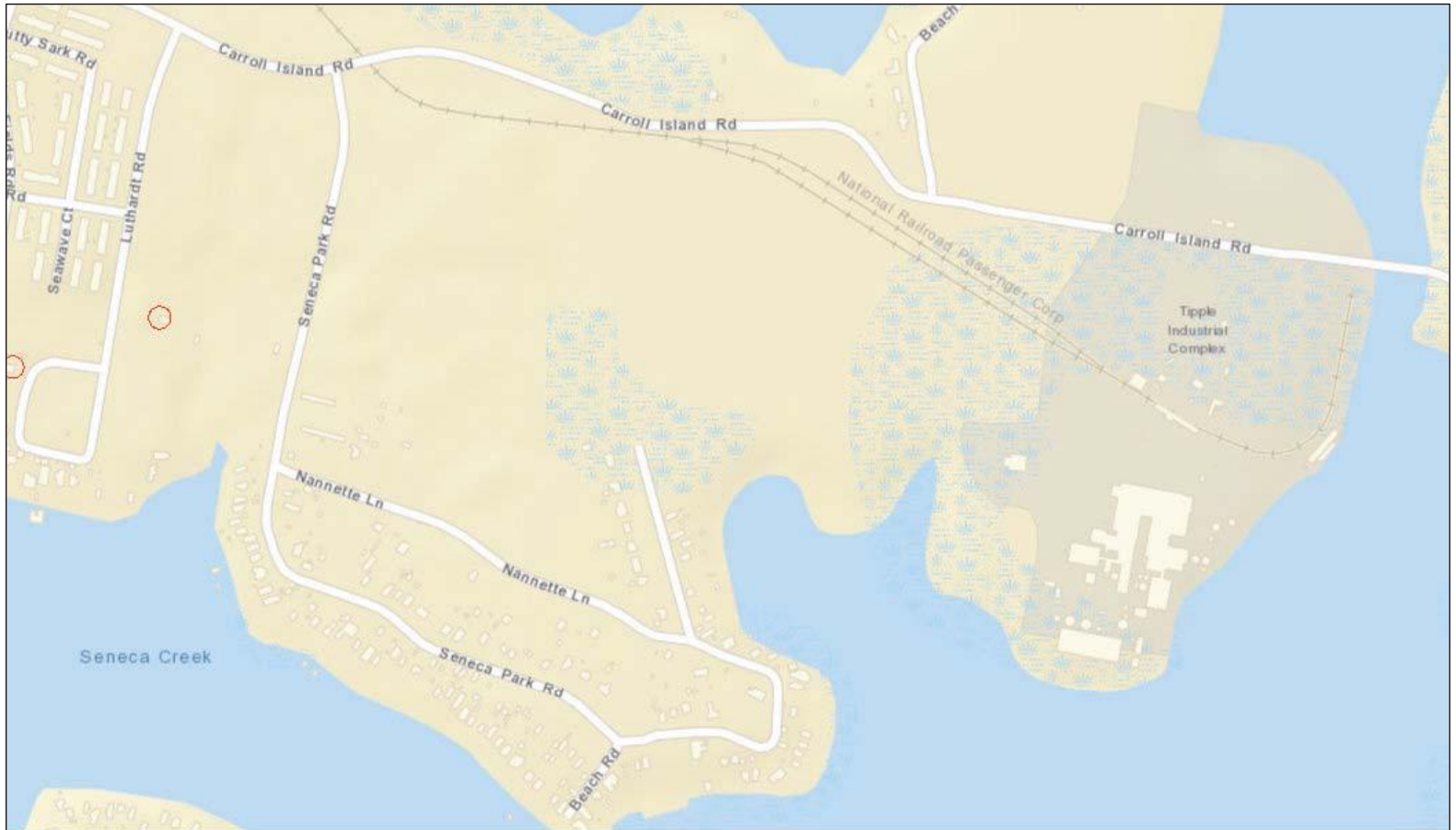
January 31, 2018

- State Boundary Mask
- Rural Legacy Boundaries
- Targeted Ecological Areas



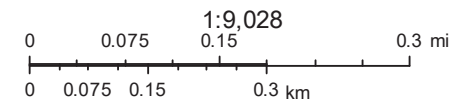
MD iMAP, DNR
 Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

MIHP



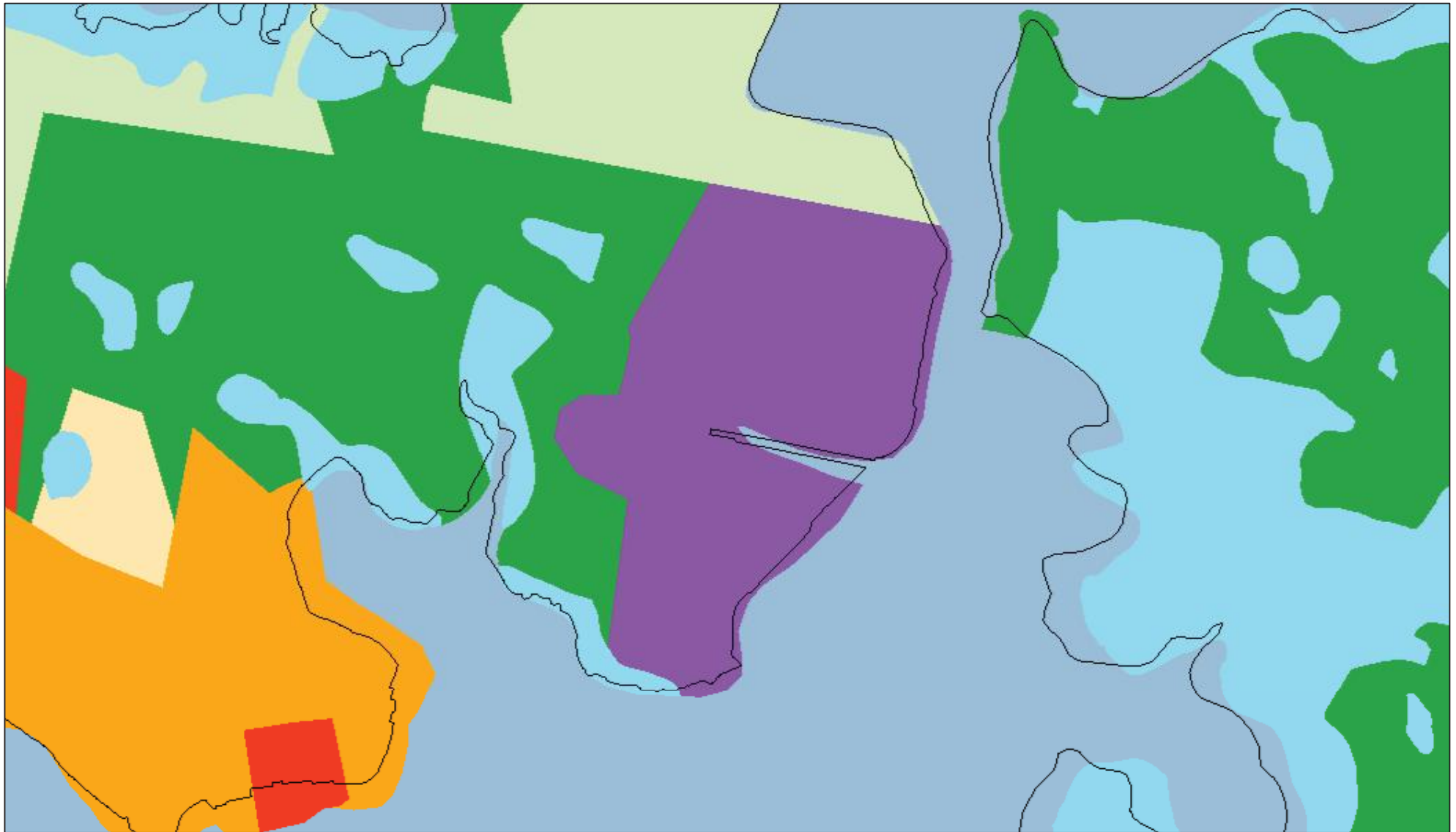
January 31, 2018

- State Boundary Mask
- Maryland Inventory of Historic Properties





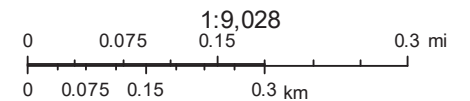
MD iMAP, MDP, MHT
 Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

MDP Land Use, Cover



January 31, 2018

-  State Boundary Mask
-  County Land Use Land Cover 2010



MD iMAP, MDP
 Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Federal Lands



January 31, 2018

State Boundary Mask Non-Military

Federal Lands

Military

1:9,028
0 0.075 0.15 0.3 mi
0 0.075 0.15 0.3 km

MD iMAP, DNR, MDP
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Maryland Department of Natural Resources

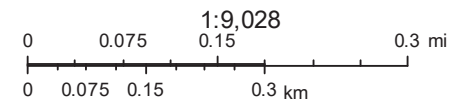
Carbanes Cooperative Oxford Laboratory | MD iMAP, DNR | MD iMAP, MDOT, MDOT SHA, DoIT, MDP | MD iMAP, MDP, SDAT | MD iMAP, SHA, DoIT | MD iMAP, MHEC, PSC, MSDE, MDP, DoIT | MD iMAP, ESRI | MD iMAP, SDAT, MDP | Esri, HERE | VITA, Esri, HERE, Garmin, INCREMENT P, NGA, USGS |

Preserved Ag Lands



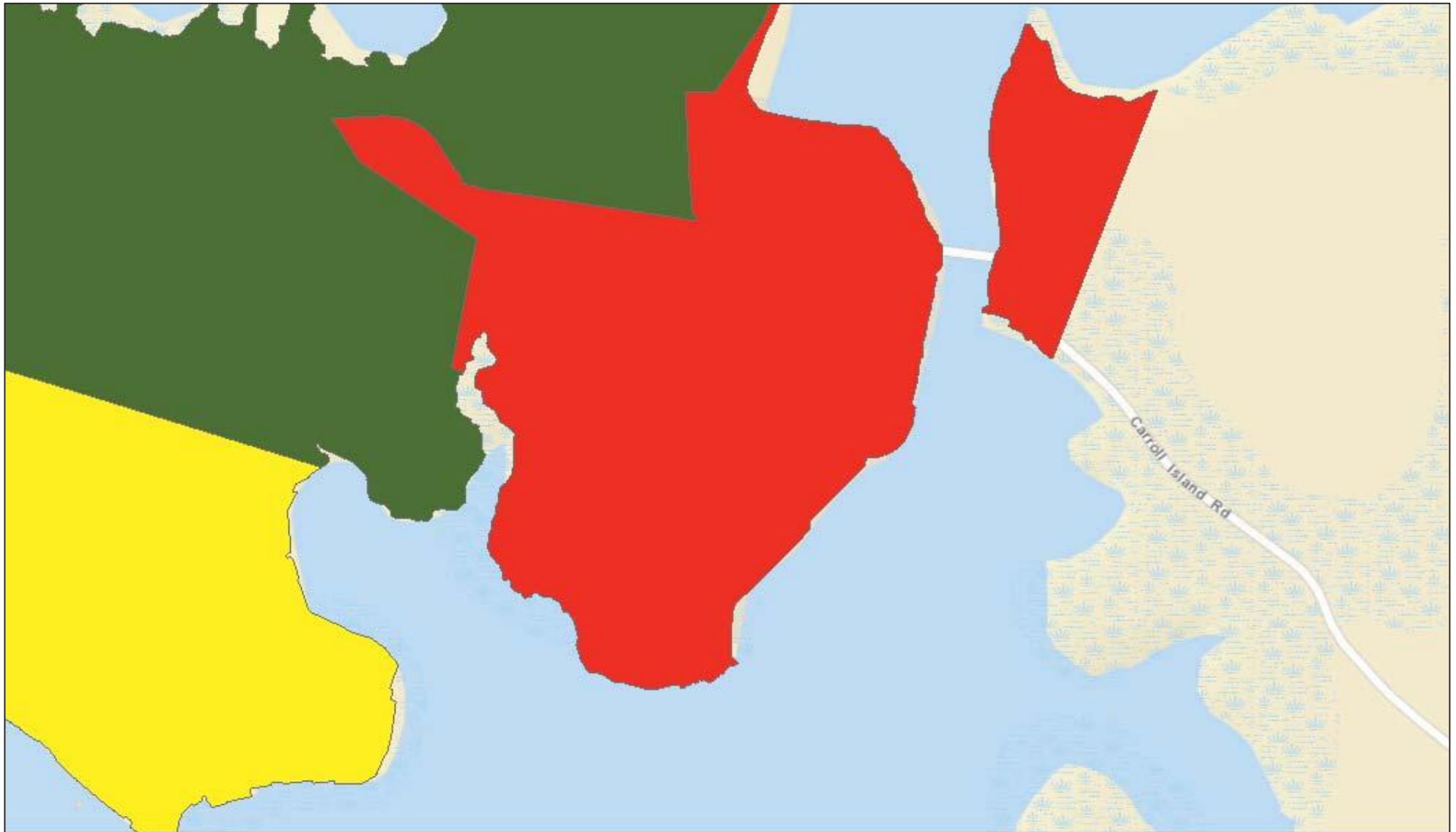
January 31, 2018

- State Boundary Mask
- Permanently Preserved Agricultural Lands

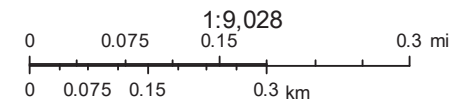
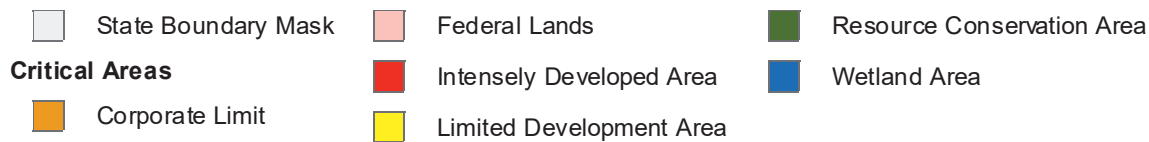


MD iMAP, MDP
 Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Critical Area



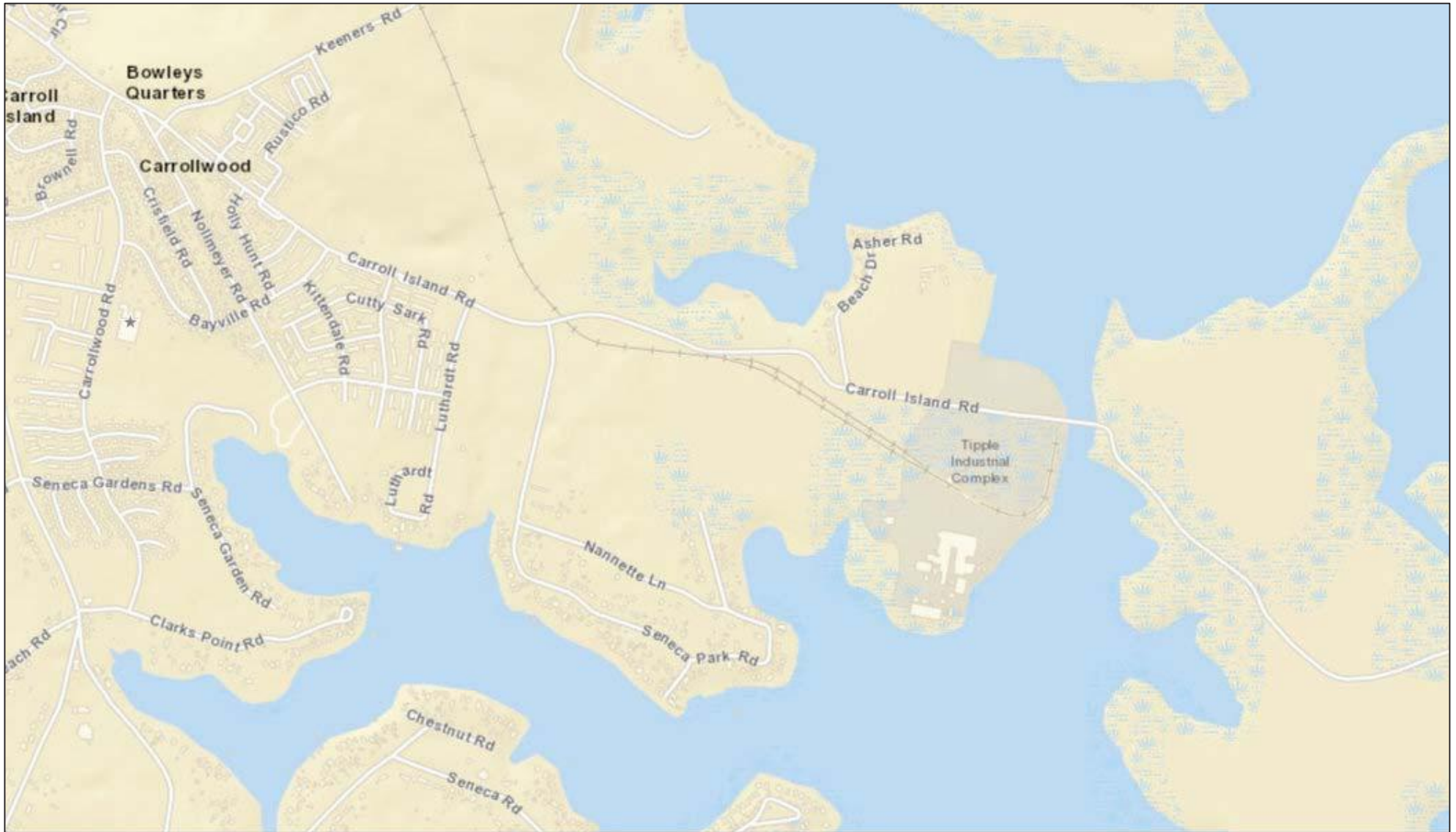
January 31, 2018









Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
MD iMAP, DNR, MDP, CBCAC, Anne Arundel County, Baltimore City, Baltimore

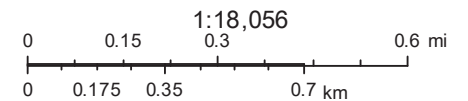
Maryland Department of Natural Resources

Schools



January 31, 2018

-  State Boundary Mask
-  Higher Education - Private Four-Year
-  Higher Education - Public Four-Year
-  Higher Education - Private Two-Year
-  Higher Education - Public Two-Year
-  Higher Education - Regional Education Centers

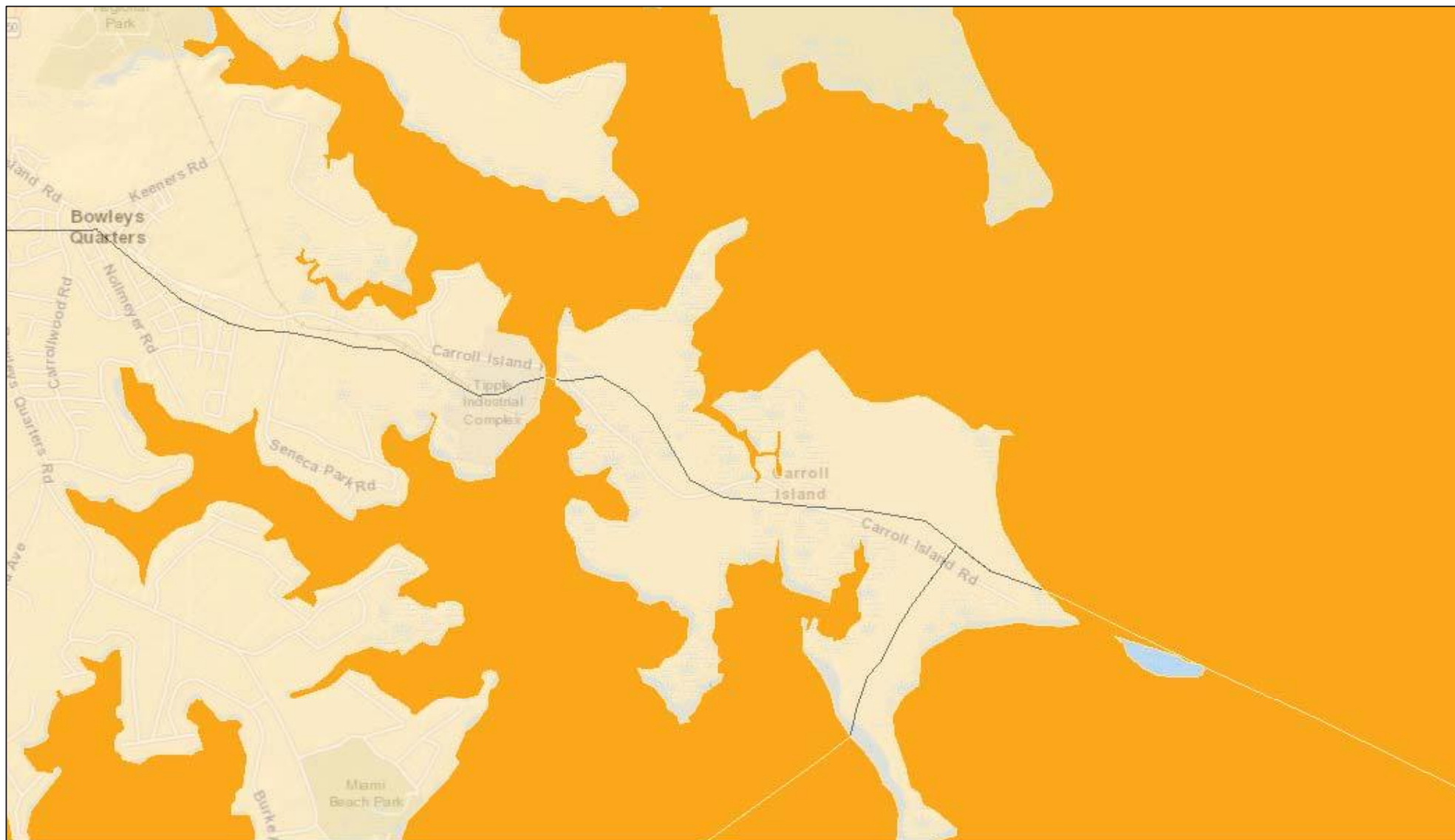


Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
MD iMAP, MHEC, PSCP, MSDE, MDP, DoT

Appendix B2

Water Quality Data

ArcGIS Web Map



February 27, 2018

IR - BOD - Streams

- 2-Meets Water Quality Criterion
- 4a-Impaired, TMDL Complete

IR - BOD - Tidal Water

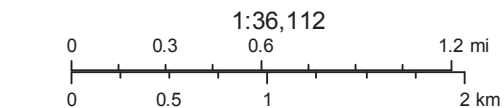
- 4a-Impaired, TMDL Complete
- TMDL - BOD - Tidal Water
- TMDL - BOD - Streams

IR - Nitrogen - Streams

- 2-Meets Water Quality Criterion
- 3-Insufficient Information
- 4a-Impaired, TMDL Complete

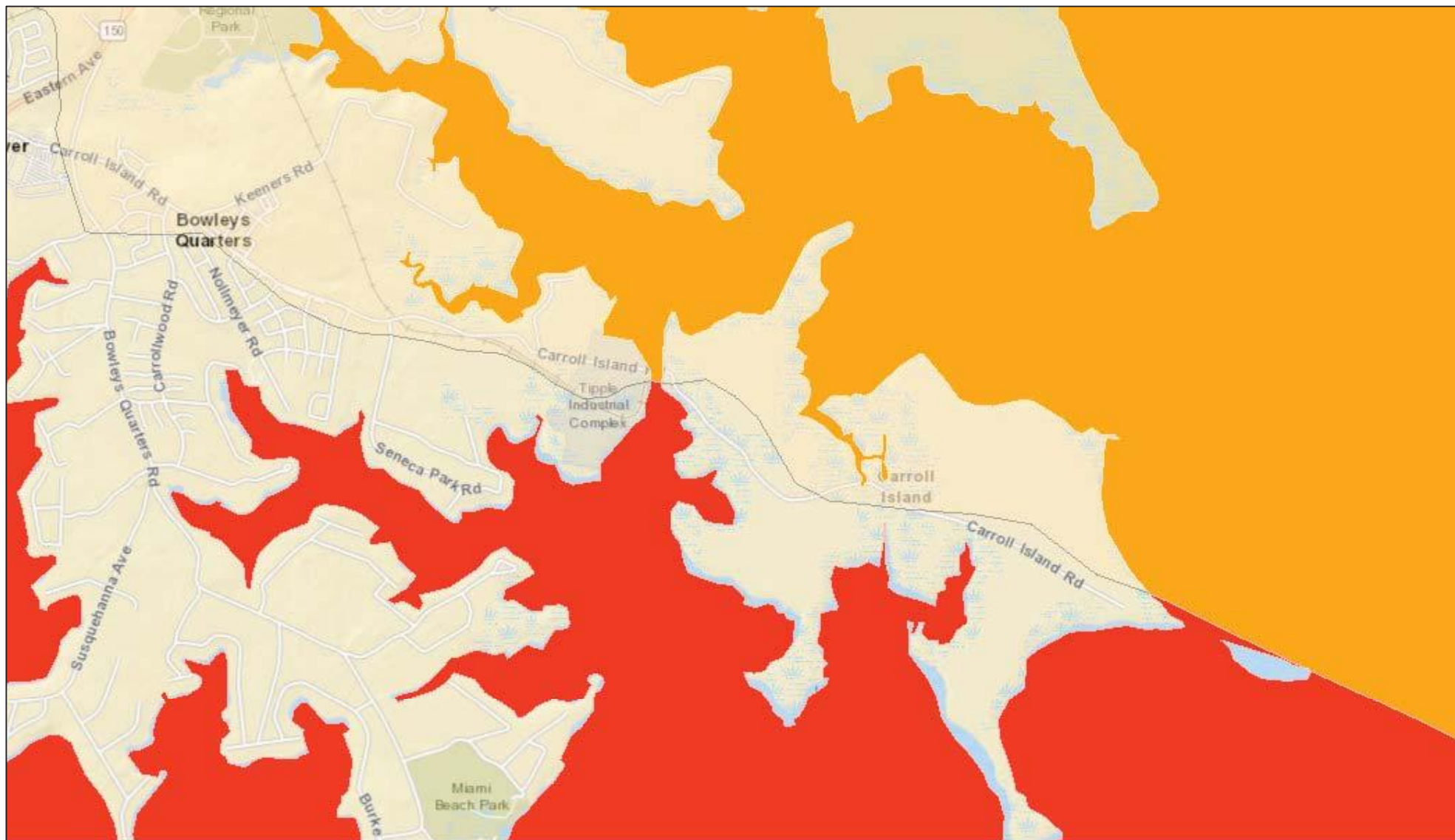
IR - Nitrogen - Impoundment

- 2-Meets Water Quality Criterion



Maryland Department of the Environment, MDE, WSA
MDE
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, ©

ArcGIS Web Map



February 27, 2018

IR - PCBs - Streams

- 2-Meets Water Quality Criterion
- 3-Insufficient Information
- 4a-Impaired, TMDL Complete

IR - PCBs - Impoundments

- 5-Impaired, TMDL Needed
- 2-Meets Water Quality Criterion
- 3-Insufficient Information

IR - PCBs - Tidal Water

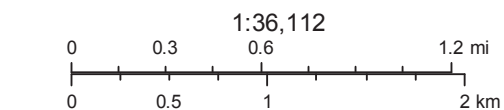
- 2-Meets Water Quality Criterion

IR - PCBs - Streams

- 4a-Impaired, TMDL Complete
- 5-Impaired, TMDL Needed

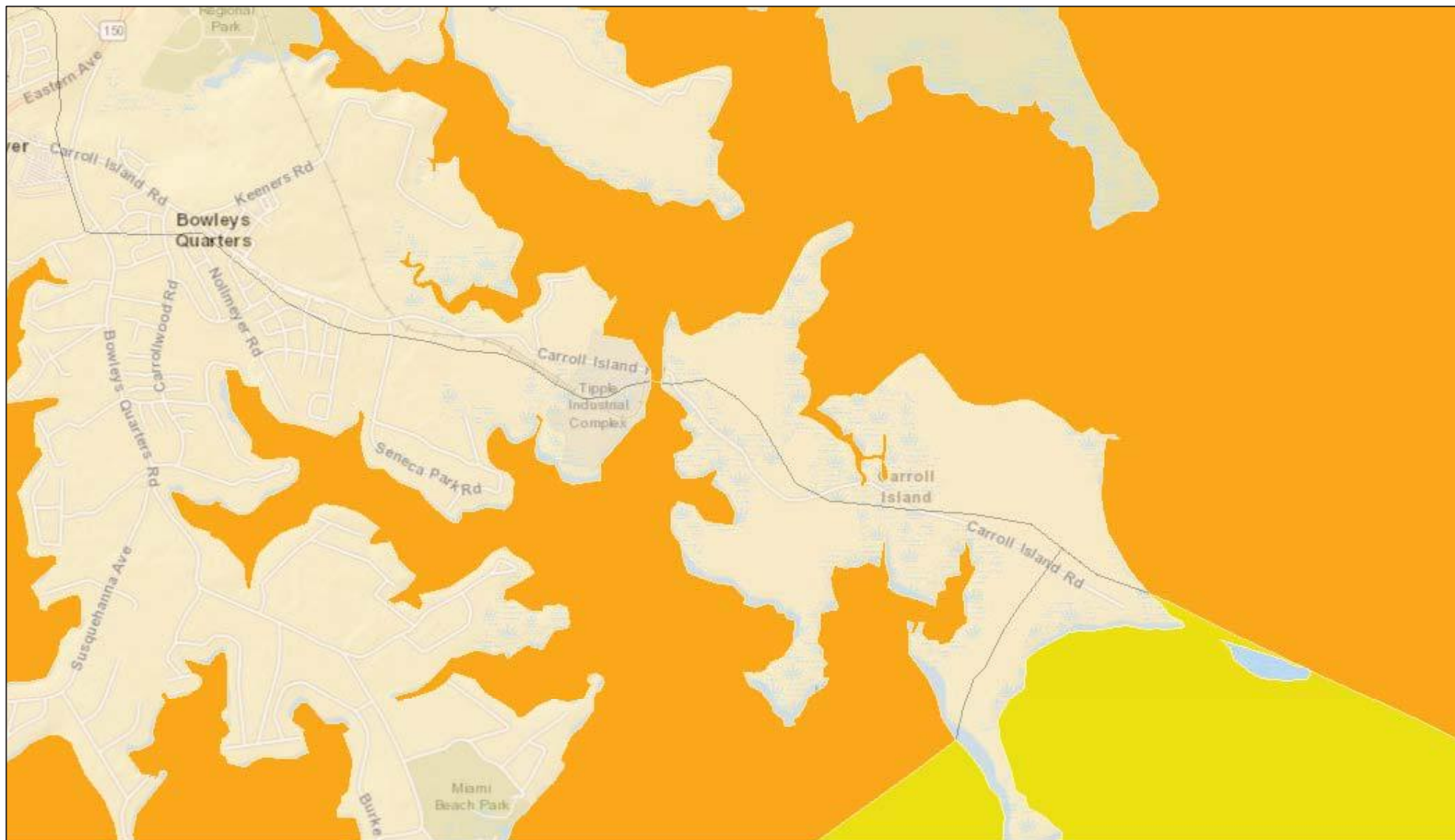
IR - PCBs - Streams

- 3-Insufficient Information
- 4a-Impaired, TMDL Complete
- 5-Impaired, TMDL Needed



Maryland Department of the Environment, MDE, WSA
MDE
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, ©

ArcGIS Web Map



February 27, 2018

IR - Sediments - Streams

- 2-Meets Water Quality Criterion
- 4a-Impaired, TMDL Complete
- 5-Impaired, TMDL Needed

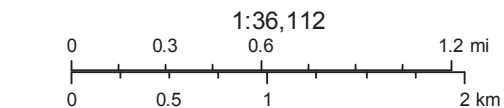
IR - Sediments - Impoundments

- 2-Meets Water Quality Criterion
- 3-Insufficient Information
- 4a-Impaired, TMDL Complete

IR - Sediments - Tidal Water

- 2-Meets Water Quality Criterion
- 3-Insufficient Information
- 4a-Impaired, TMDL Complete

- TMDL - Sediments - Tidal Water
- TMDL - Sediments - Streams



Maryland Department of the Environment, MDE, WSA
MDE
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, ©

Appendix B3

IPaC Information

IPaC Information for Planning and Consultation U.S. Fish & Wildlife Service

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as trust resources) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

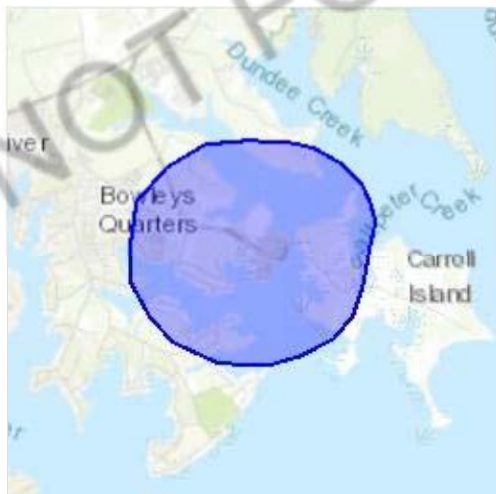
Project information

NAME

CP Crane 1 mile

LOCATION

Baltimore County, Maryland



DESCRIPTION

Unknown at this time.

Local office

Chesapeake Bay Ecological Services Field Office

☎ (410) 573-4599

📅 (410) 266-9127

177 Admiral Cochrane Drive
Annapolis, MD 21401-7307

<http://www.fws.gov/chesapeakebay/>

<http://www.fws.gov/chesapeakebay/endsppweb/ProjectReview/Index.html>

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species¹ are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service.

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.

THERE ARE NO ENDANGERED SPECIES EXPECTED TO OCCUR AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see maps of where birders and the general public have sighted birds in and around your project area, visit E-bird tools such as the [E-bird data mapping tool](#) (search for the name of a bird on your list to see specific locations where that bird has been reported to occur within your project area over a certain timeframe) and the [E-bird Explore Data Tool](#) (perform a query to see a list of all birds sighted in your county or region and within a certain timeframe). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A
BREEDING SEASON IS
INDICATED FOR A BIRD ON
YOUR LIST, THE BIRD MAY
BREED IN YOUR PROJECT AREA
SOMETIME WITHIN THE
TIMEFRAME SPECIFIED, WHICH
IS A VERY LIBERAL ESTIMATE OF
THE DATES INSIDE WHICH THE
BIRD BREEDS ACROSS ITS

ENTIRE RANGE. "BREEDS
ELSEWHERE" INDICATES THAT
THE BIRD DOES NOT LIKELY
BREED IN YOUR PROJECT AREA.)

American Oystercatcher *Haematopus palliatus*

Breeds Apr 15 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/8935>

Bald Eagle *Haliaeetus leucocephalus*

Breeds Oct 15 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1626>

Black Scoter *Melanitta nigra*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Black Skimmer *Rynchops niger*

Breeds May 20 to Sep 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/5234>

Black-billed Cuckoo *Coccyzus erythrophthalmus*

Breeds May 15 to Oct 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9399>

Bobolink *Dolichonyx oryzivorus*

Breeds May 20 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Bonaparte's Gull *Chroicocephalus philadelphia*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Brown Pelican *Pelecanus occidentalis*

Breeds Jan 15 to Sep 30

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Buff-breasted Sandpiper *Calidris subruficollis*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9488>

Cerulean Warbler *Dendroica cerulea*

Breeds Apr 29 to Jul 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/2974>

Clapper Rail *Rallus crepitans*

Breeds Apr 10 to Oct 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Common Loon *gavia immer*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/4464>

Common Tern *Sterna hirundo*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/4963>

Double-crested Cormorant *phalacrocorax auritus*

Breeds Apr 20 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/3478>

Eastern Whip-poor-will *Antrostomus vociferus*

Breeds May 1 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Evening Grosbeak *Coccothraustes vespertinus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Golden Eagle *Aquila chrysaetos*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1680>

Golden-winged Warbler *Vermivora chrysoptera*

Breeds May 1 to Jul 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/8745>

Great Black-backed Gull *Larus marinus*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Gull-billed Tern *Gelochelidon nilotica*

Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9501>

Herring Gull *Larus argentatus*

Breeds Apr 20 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Hudsonian Godwit *Limosa haemastica*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Kentucky Warbler *Oporornis formosus*

Breeds Apr 20 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

King Rail <i>Rallus elegans</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Least Tern <i>Sterna antillarum</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 20 to Sep 10
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-eared Owl <i>asio otus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds elsewhere
Long-tailed Duck <i>Clangula hyemalis</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/7238	Breeds elsewhere
Nelson's Sparrow <i>Ammodramus nelsoni</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Sep 5
Northern Gannet <i>Morus bassanus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31

Purple Sandpiper *Calidris maritima*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-breasted Merganser *Mergus serrator*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-headed Woodpecker *Melanerpes erythrocephalus*

Breeds May 10 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-necked Phalarope *Phalaropus lobatus*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-throated Loon *Gavia stellata*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ring-billed Gull *Larus delawarensis*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Royal Tern *Thalasseus maximus*

Breeds Apr 15 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Rusty Blackbird *Euphagus carolinus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Seaside Sparrow *Ammodramus maritimus*

Breeds May 10 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Semipalmated Sandpiper *Calidris pusilla*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Short-billed Dowitcher *Limnodromus griseus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9480>

Snowy Owl *Bubo scandiacus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Surf Scoter *Melanitta perspicillata*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Whimbrel *Numenius phaeopus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9483>

White-winged Scoter *Melanitta fusca*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Willet *Tringa semipalmata*

Breeds Apr 20 to Aug 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush *Hylocichla mustelina*

Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in your project's counties during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the counties of your project area. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

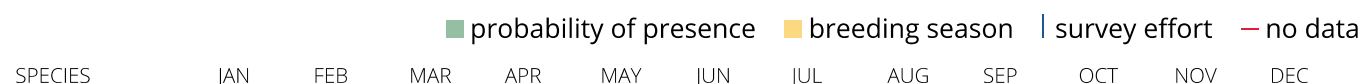
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information.



American
Oystercatcher
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Bald Eagle
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)



Black Scoter
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)



Black Skimmer
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Black-billed
Cuckoo
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Bobolink
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental

USA and Alaska.)

Bonaparte's Gull
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)

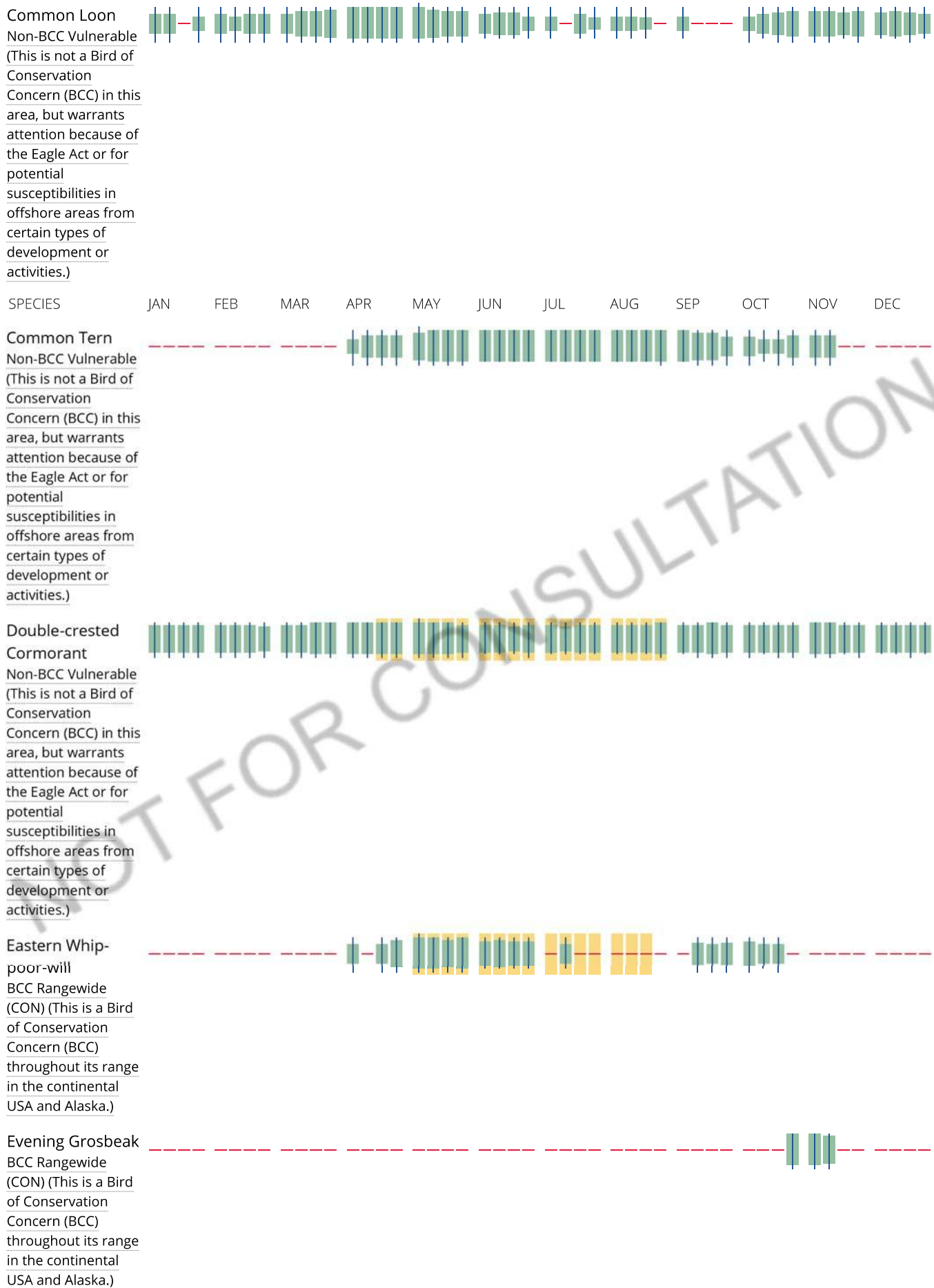
Brown Pelican
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)

Buff-breasted
Sandpiper
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)

Cerulean Warbler
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)

Clapper Rail
BCC - BCR (This is a
Bird of Conservation
Concern (BCC) only
in particular Bird
Conservation
Regions (BCRs) in
the continental USA)





Golden Eagle
Non-BCC Vulnerable
(This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Golden-winged Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Great Black-backed Gull
Non-BCC Vulnerable
(This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



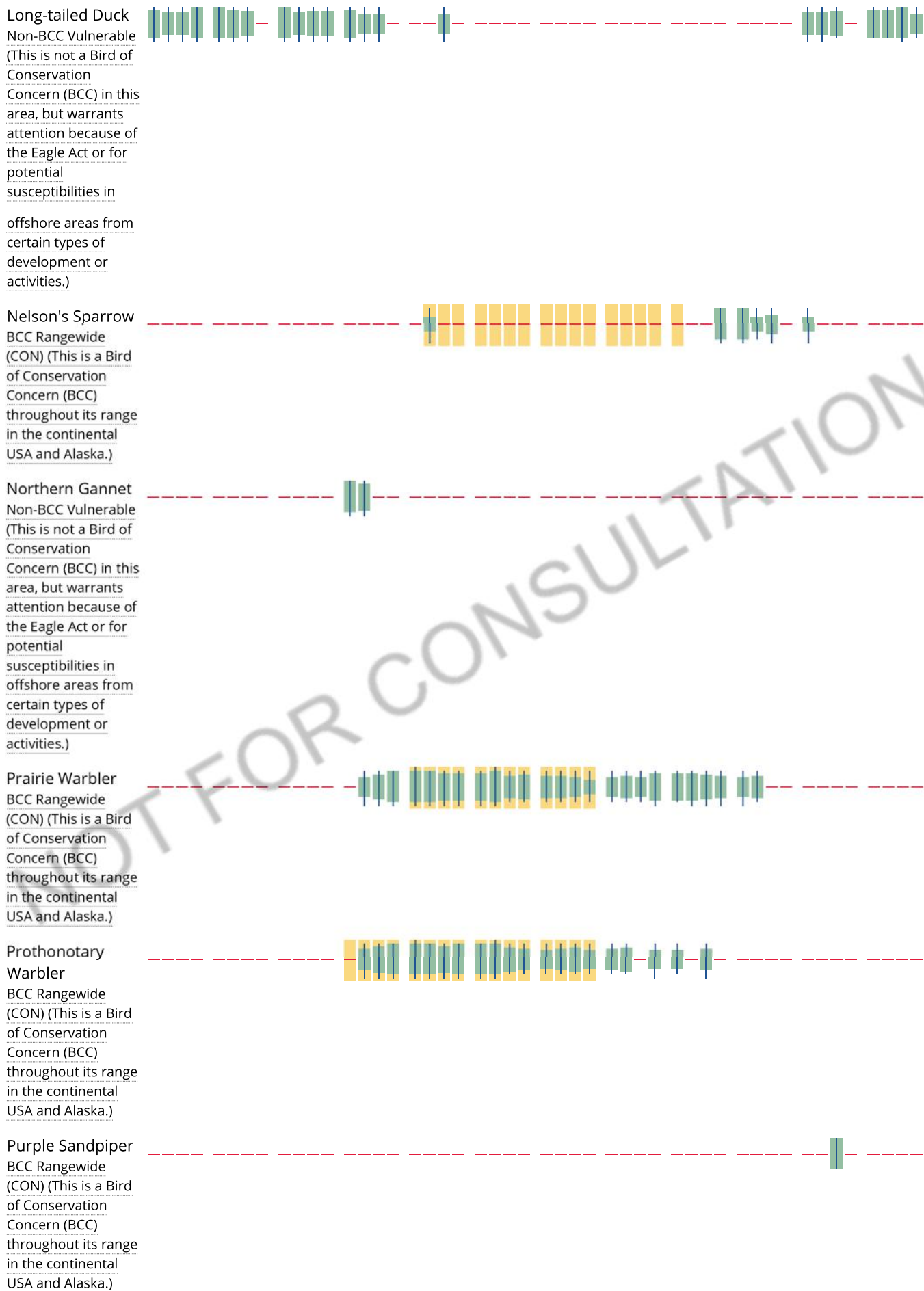
Gull-billed Tern
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

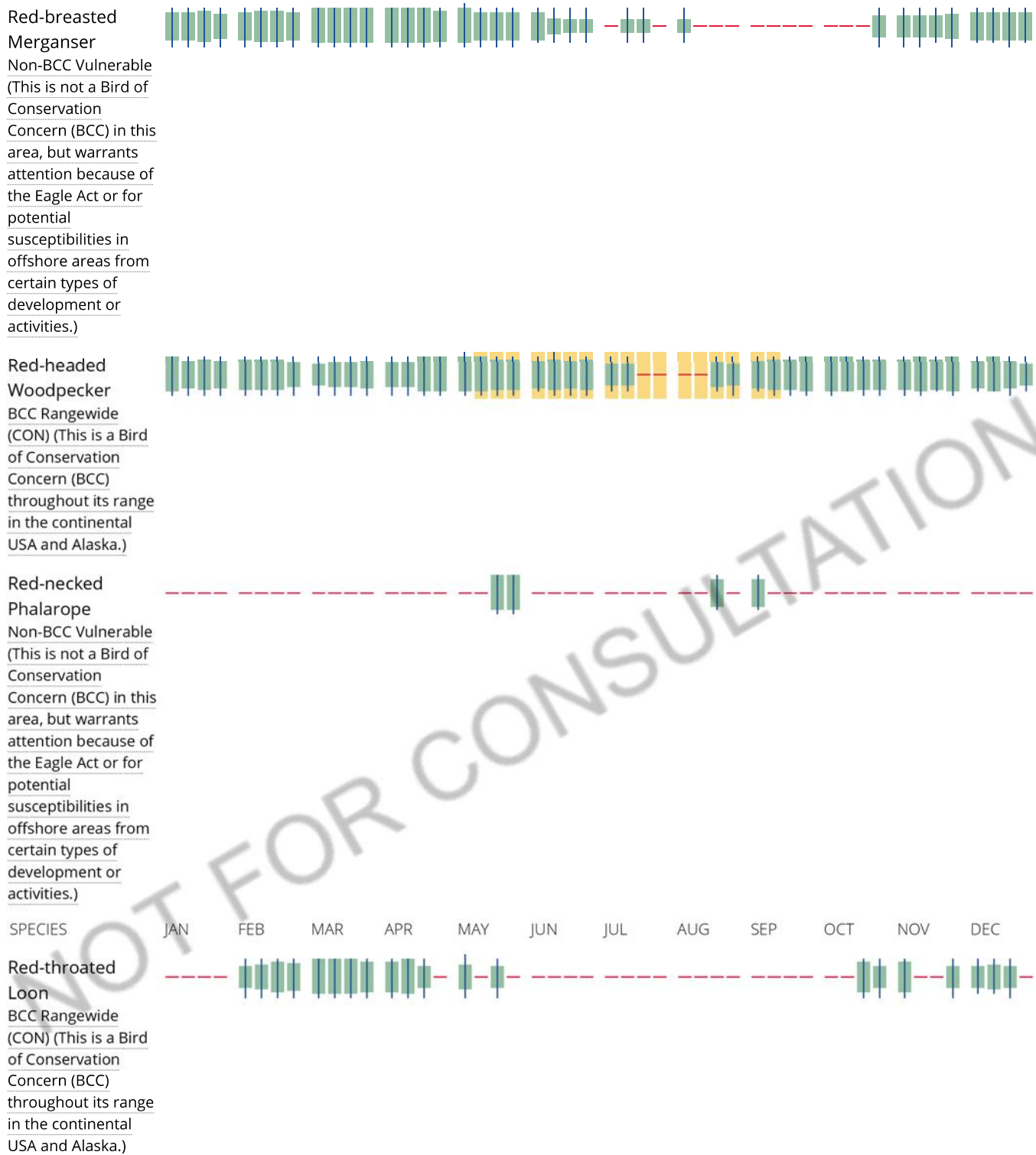


Herring Gull
Non-BCC Vulnerable
(This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)









Ring-billed Gull
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of

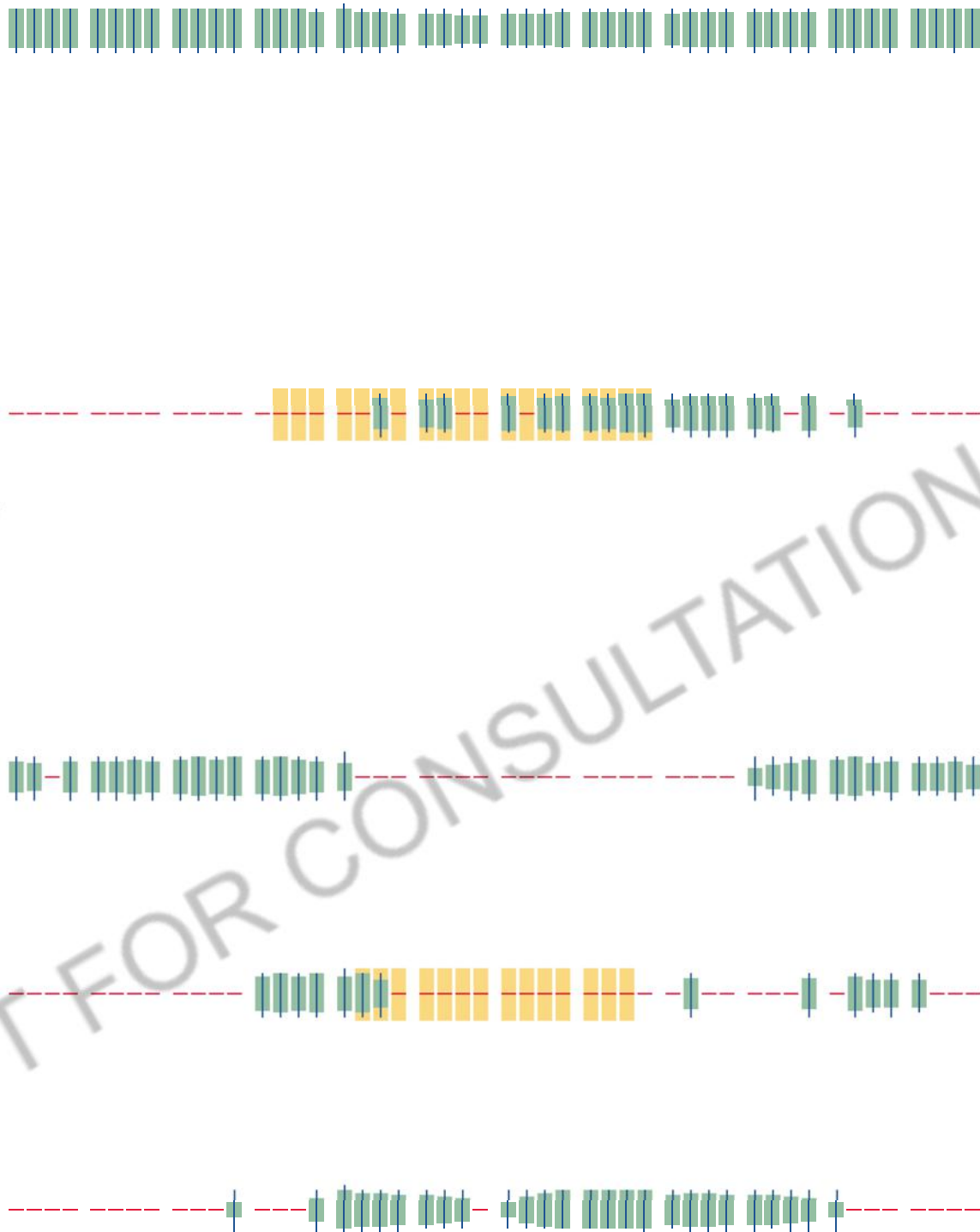
development or
activities.)

Royal Tern
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)

Rusty Blackbird
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)

Seaside Sparrow
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)

Semipalmated
Sandpiper
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Short-billed
Dowitcher
BCC Rangwide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Snowy Owl
BCC Rangwide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Surf Scoter
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)

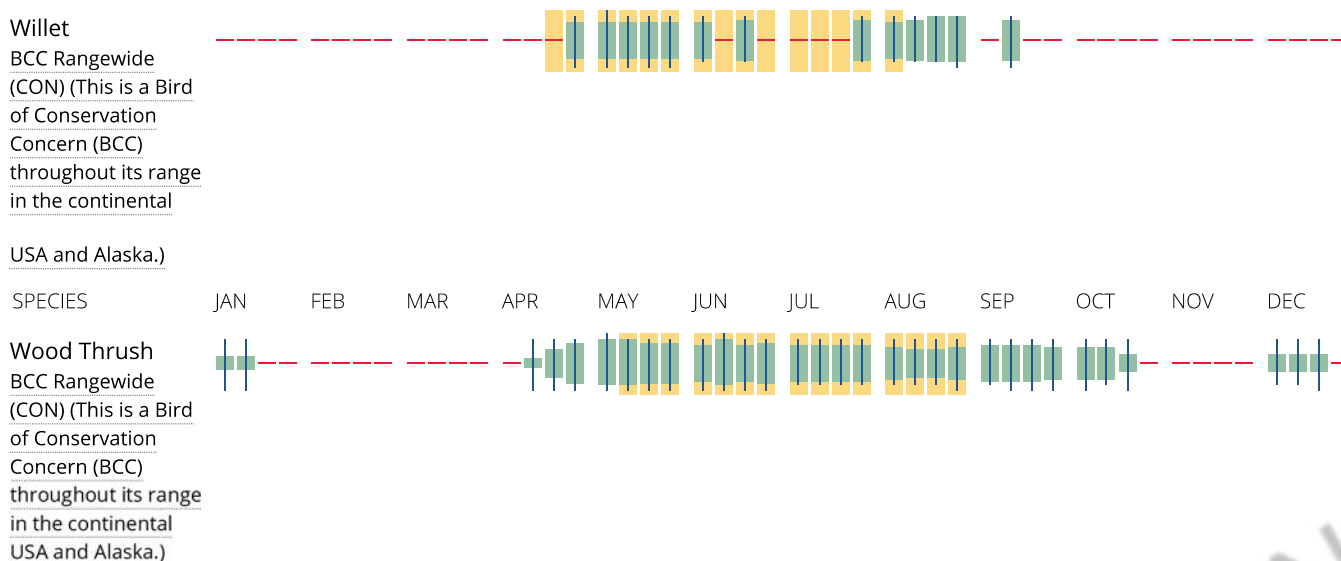


Whimbrel
BCC Rangwide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



White-winged
Scoter
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)





Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the [Probability of Presence Summary](#). [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the counties which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [E-bird Explore Data Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret

them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird entry on your migratory bird species list indicates a breeding season, it is probable that the bird breeds in your project's counties at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the BGEPA should such impacts occur.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

[E1UBL6](#)

[E1UBLx](#)

[E1UBLh](#)

ESTUARINE AND MARINE WETLAND

[E2EM1P6](#)

[E2SS1P6](#)

[E2EM1/SS1P6](#)

[E2EM1P](#)

[E2EM1N](#)

FRESHWATER EMERGENT WETLAND

[PEM1Ch](#)

[PEM1F](#)

[PEM1Fh](#)

FRESHWATER FORESTED/SHRUB WETLAND

[PFO1A](#)[PFO1E](#)[PFO1R](#)[PFO1T](#)[PFO1C](#)[PFO1F](#)[PFO1/EM1R](#)[PFO1Ex](#)[PFO1/4A](#)[PSS1Ex](#)

FRESHWATER POND

[PUBHx](#)[PUBF](#)

A full description for each wetland code can be found at the National Wetlands Inventory website: <https://ecos.fws.gov/ipac/wetlands/decoder>

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local

government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

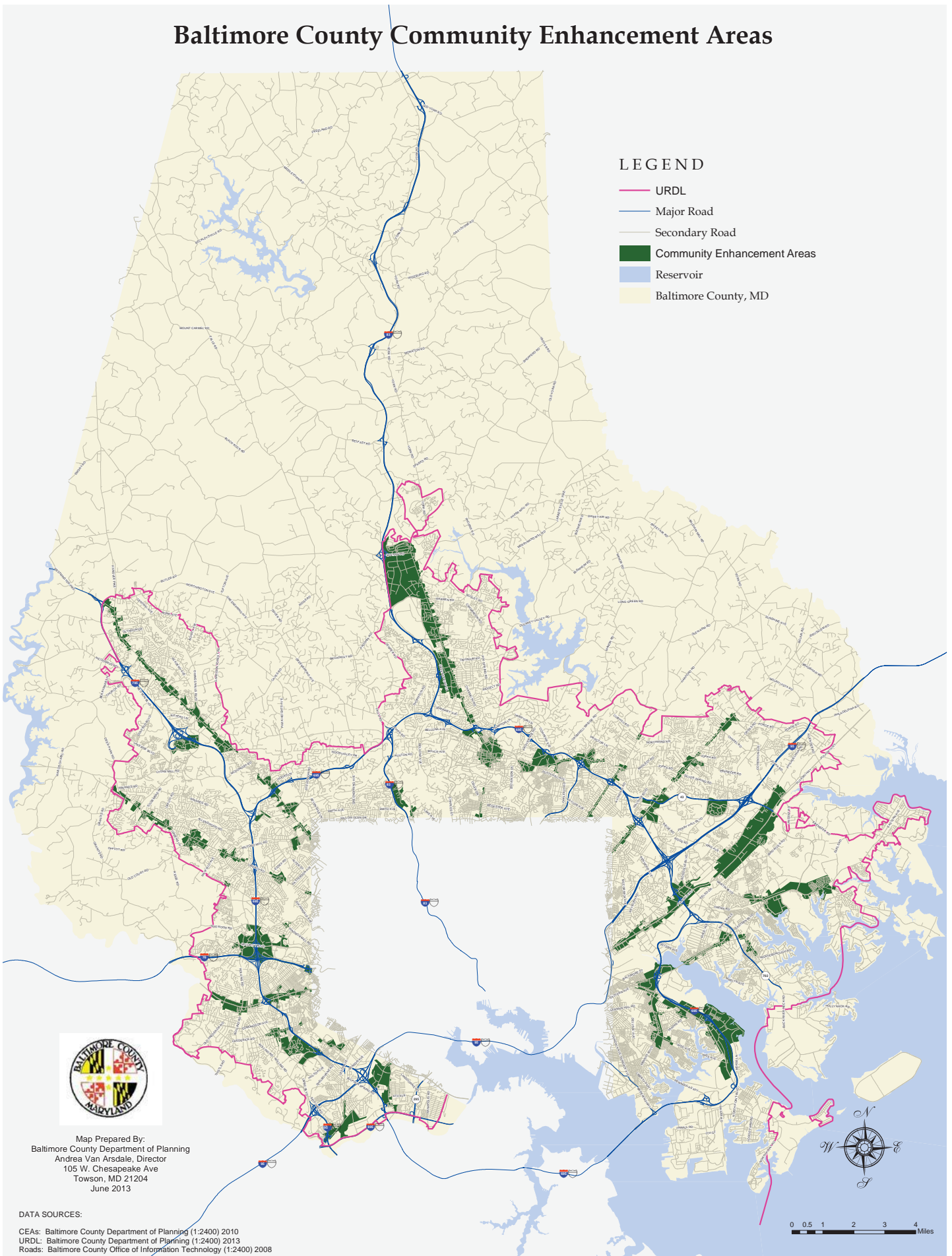
Appendix B4

Baltimore County Maps

Baltimore County Community Enhancement Areas

LEGEND

- URDL
- Major Road
- Secondary Road
- Community Enhancement Areas
- Reservoir
- Baltimore County, MD

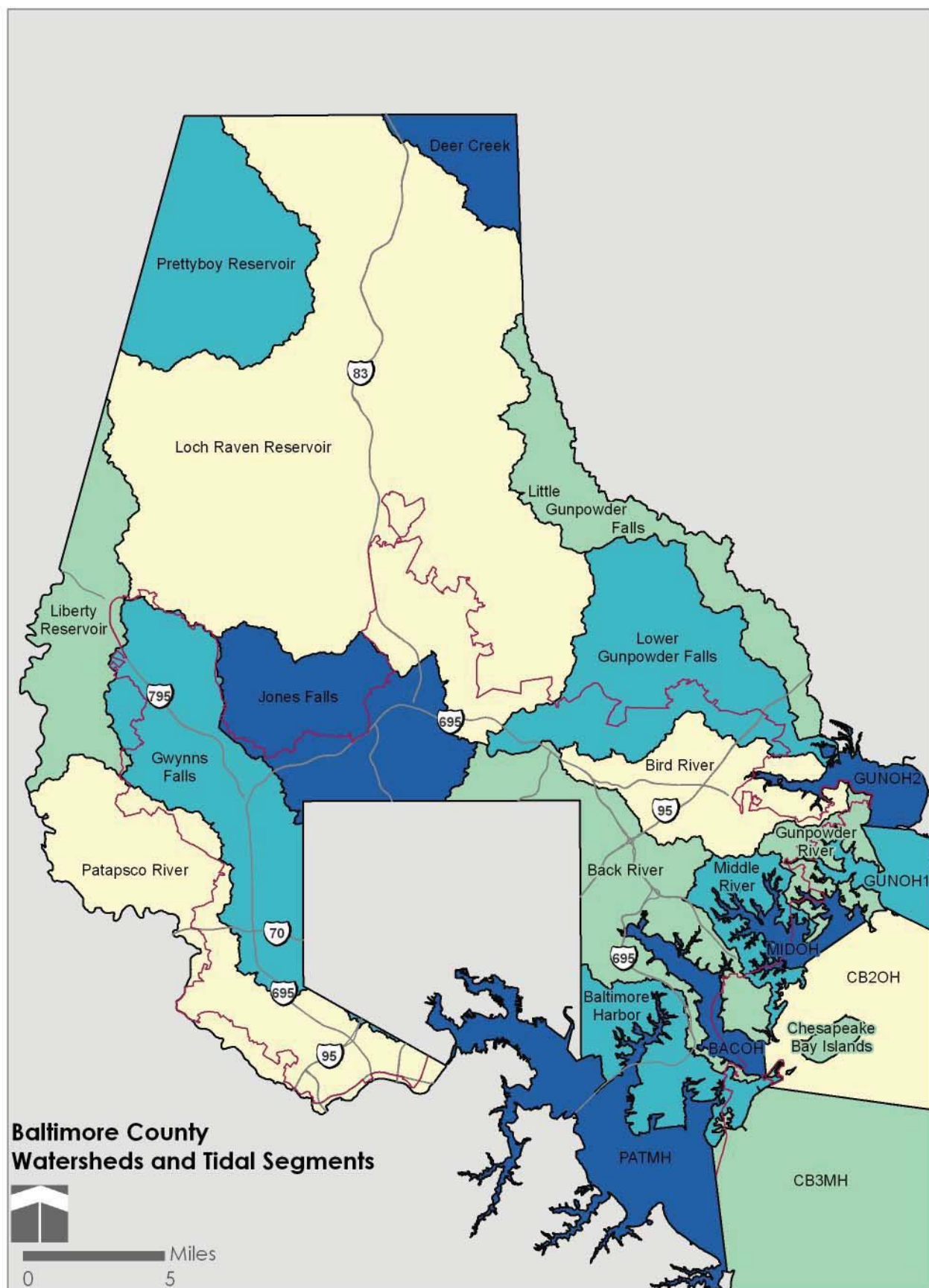


Map Prepared By:
Baltimore County Department of Planning
Andrea Van Arsdale, Director
105 W. Chesapeake Ave
Towson, MD 21204
June 2013

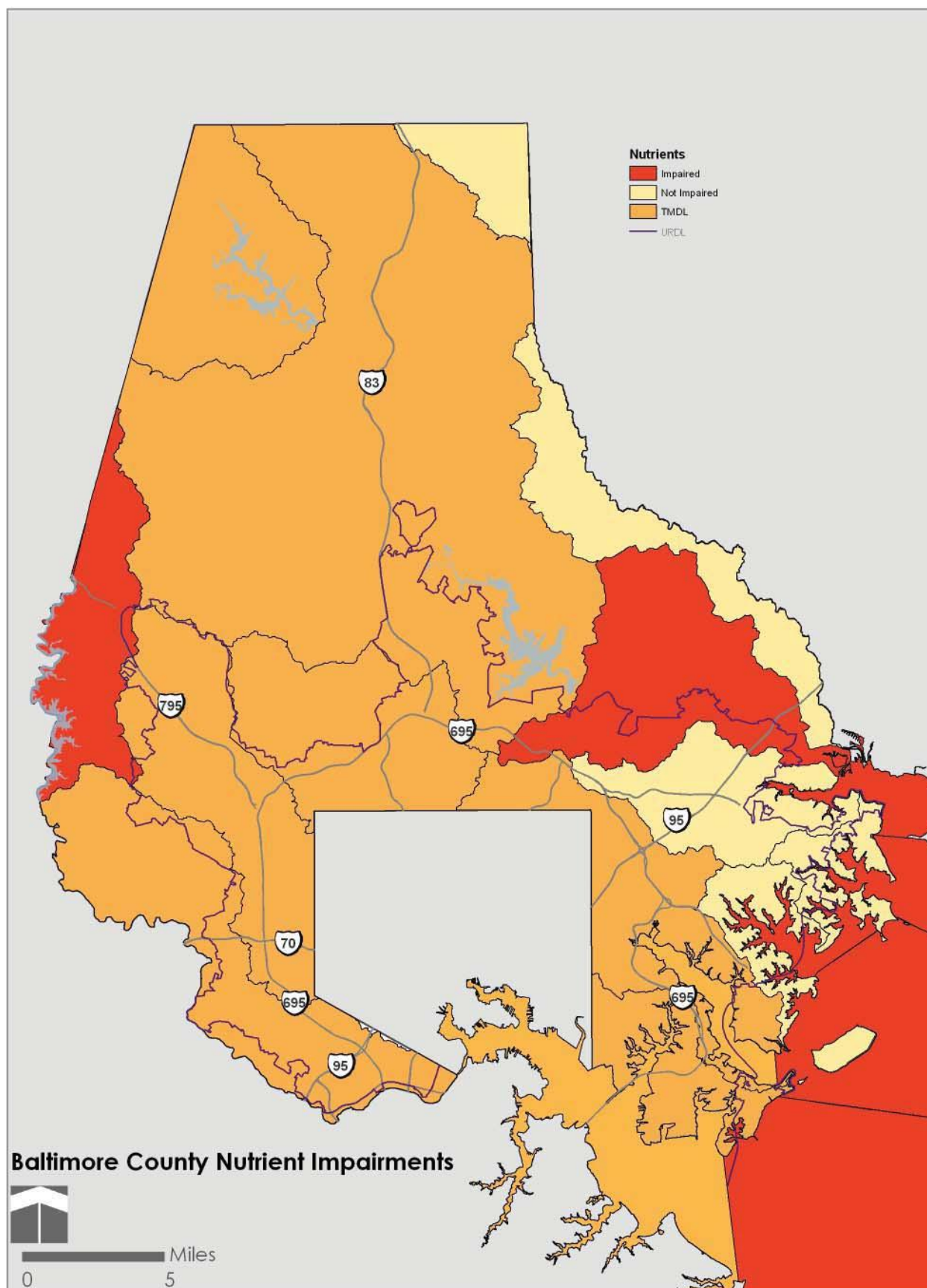
DATA SOURCES:

CEAs: Baltimore County Department of Planning (1:2400) 2010
URDL: Baltimore County Department of Planning (1:2400) 2013
Roads: Baltimore County Office of Information Technology (1:2400) 2008

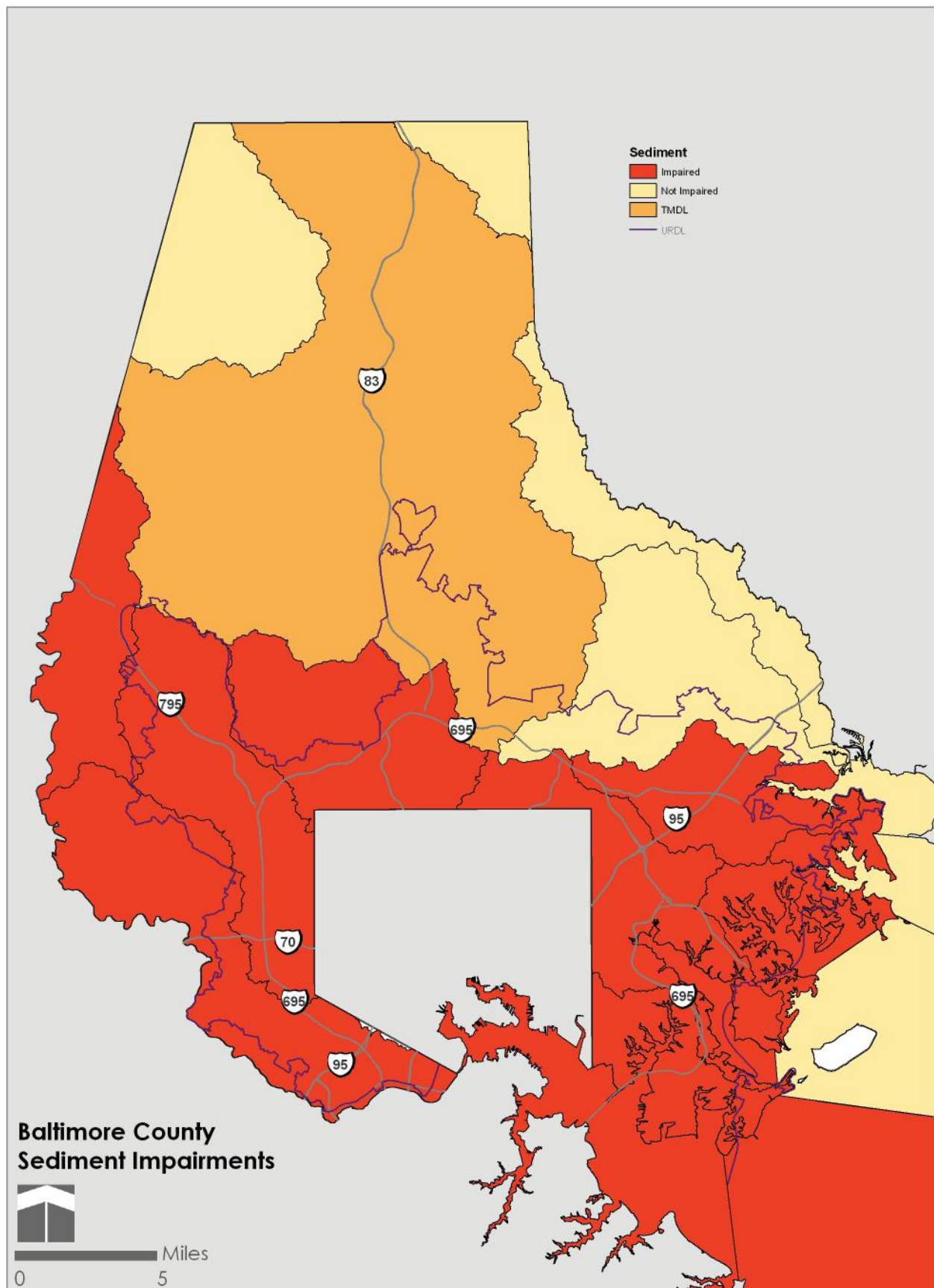
Map 36: Watersheds and Tidal Segments



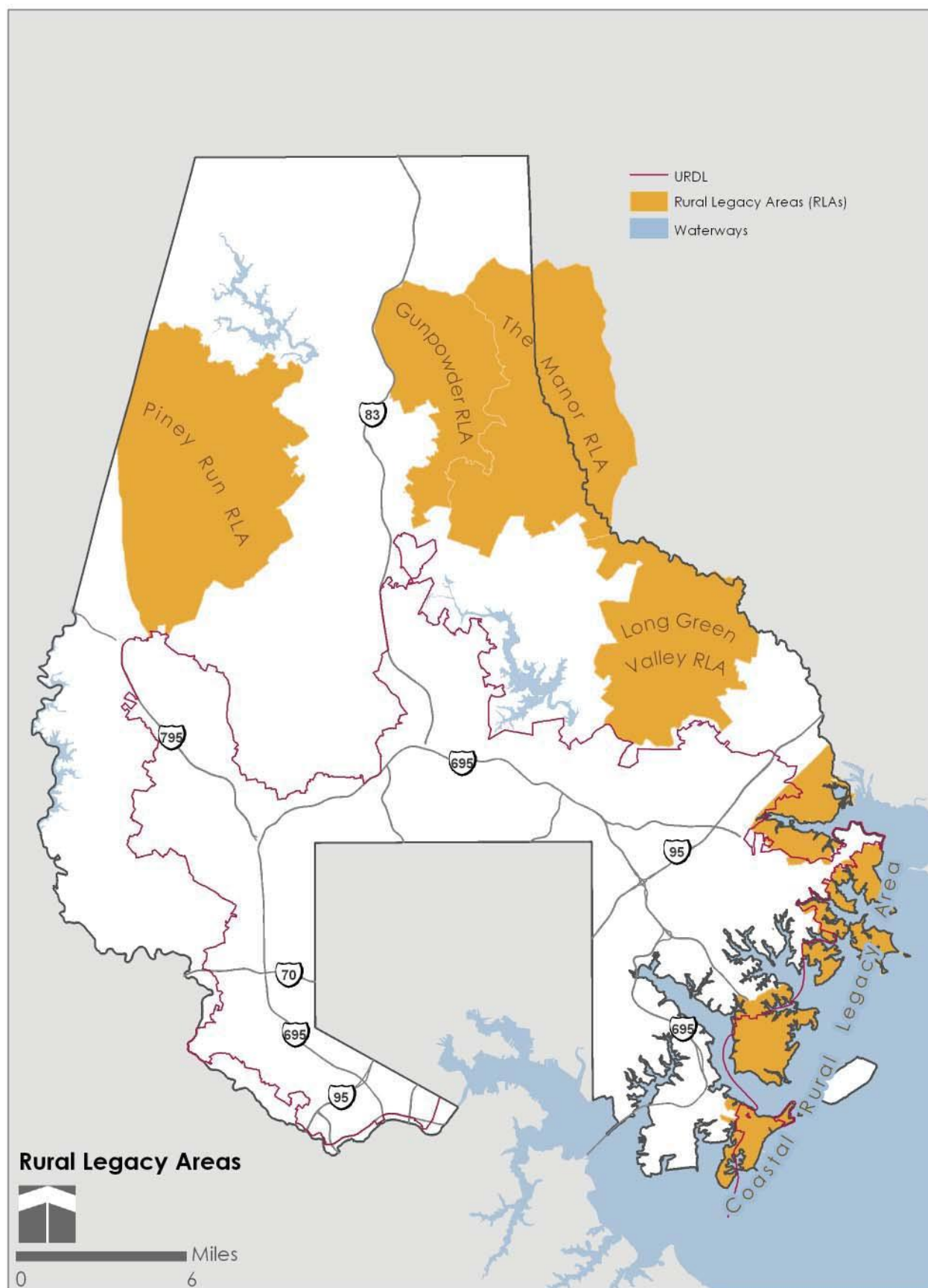
Map 38: Nutrient Impairments



Map 40: Sediment Impairments



Map 42: Rural Legacy Areas



YORK COUNTY, PA



BALTIMORE COUNTY GROWTH TIERS

- Urban-Rural Demarcation Line
— Road
Hydrology
- Growth Tier:
- Tier I Served by public sewer inside URDL
 - Tier IA Served by public sewer outside URDL
 - Tier II Planned for public sewer inside URDL
 - Tier IIA Planned for public sewer outside URDL or no current plan for public sewer inside URDL
 - Tier III Large lot developments on septic
 - Tier IV Preservation and conservation areas - No major subdivisions on septic

CARROLL COUNTY

HARFORD COUNTY

BALTIMORE CITY

HOWARD COUNTY

ANNE ARUNDEL COUNTY

Chesapeake Bay



Map Prepared June 14, 2007 by
Baltimore County Department of Planning
835 W. Chesapeake Ave., Towson, MD 21204

Data Sources:
URDL & Tiers - Baltimore County Dept. of Planning
All Other - Baltimore County Office of Info. Tech.

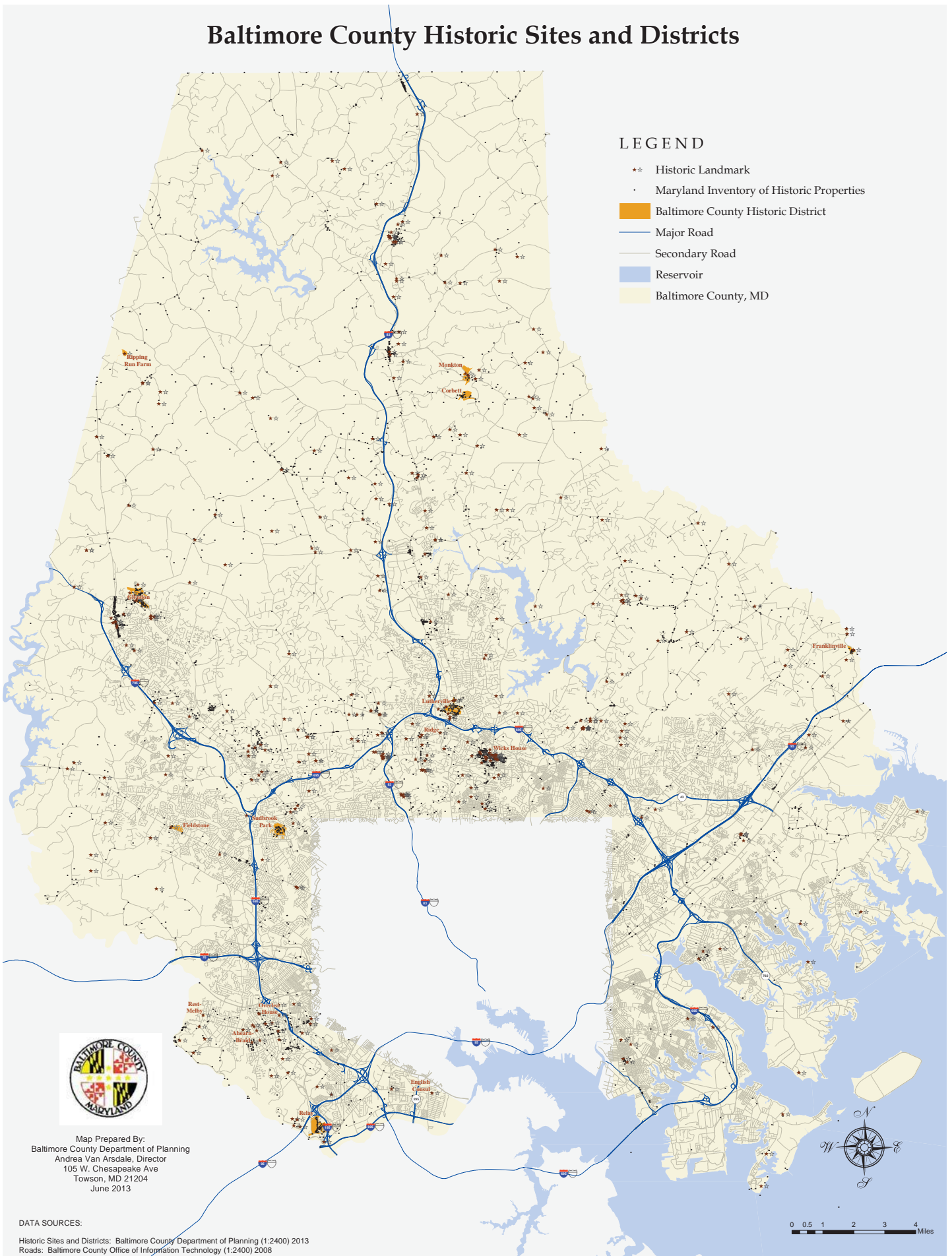
Amended Growth Tiers adopted June 5, 2007

S:\Planning\Shared Users\Inventory\SR236\SR236Data\Growth Tiers\Amended2007\SR236Amended2007.mxd

Baltimore County Historic Sites and Districts

LEGEND

- ★★ Historic Landmark
- Maryland Inventory of Historic Properties
- Baltimore County Historic District
- Major Road
- Secondary Road
- Reservoir
- Baltimore County, MD



Map Prepared By:
Baltimore County Department of Planning
Andrea Van Arsdale, Director
105 W. Chesapeake Ave
Towson, MD 21204
June 2013

DATA SOURCES:

Historic Sites and Districts: Baltimore County Department of Planning (1:2400) 2013
Roads: Baltimore County Office of Information Technology (1:2400) 2008

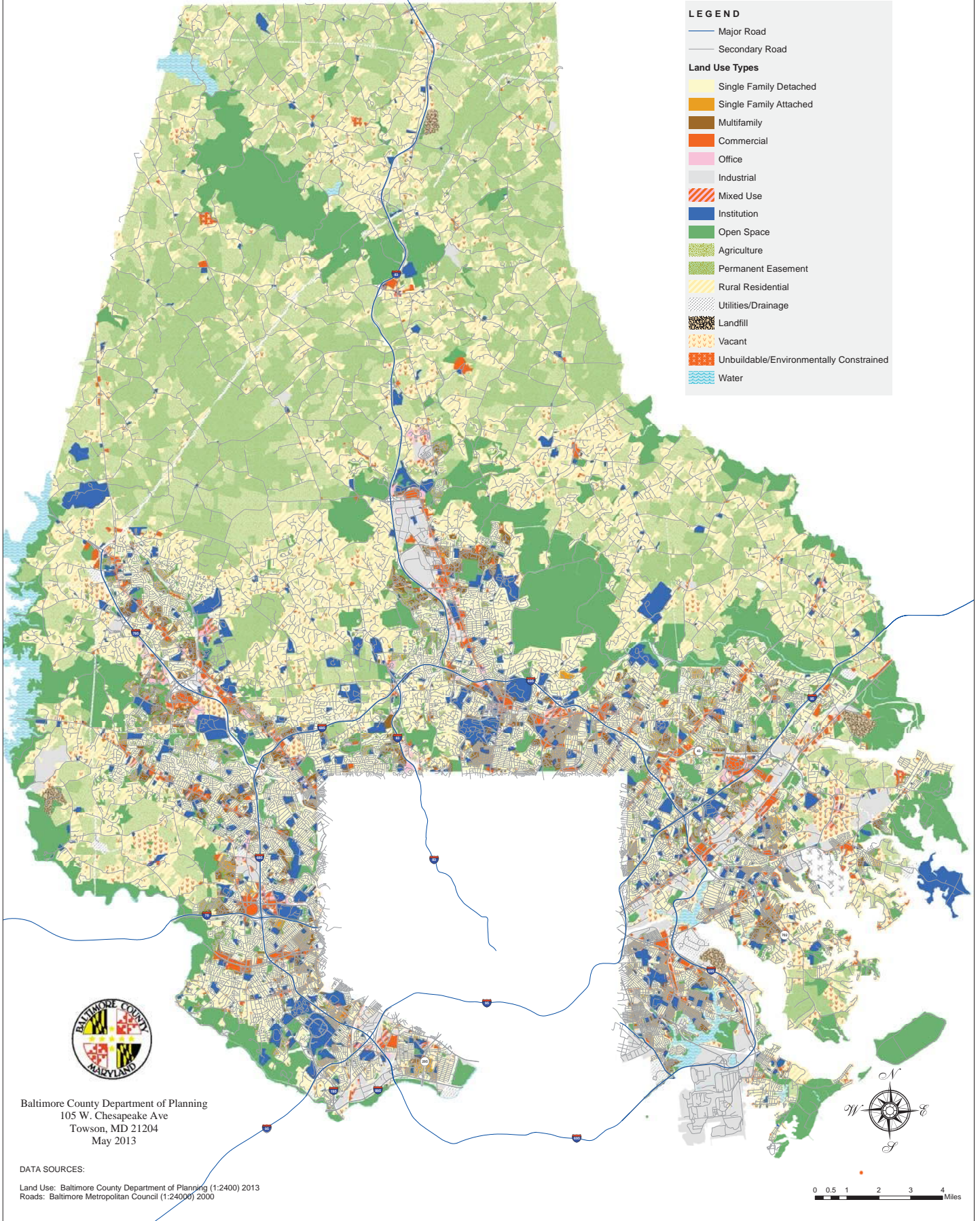
Baltimore County Land Use Map

LEGEND

- Major Road
- Secondary Road

Land Use Types

- Single Family Detached
- Single Family Attached
- Multifamily
- Commercial
- Office
- Industrial
- Mixed Use
- Institution
- Open Space
- Agriculture
- Permanent Easement
- Rural Residential
- Utilities/Drainage
- Landfill
- Vacant
- Unbuildable/Environmentally Constrained
- Water



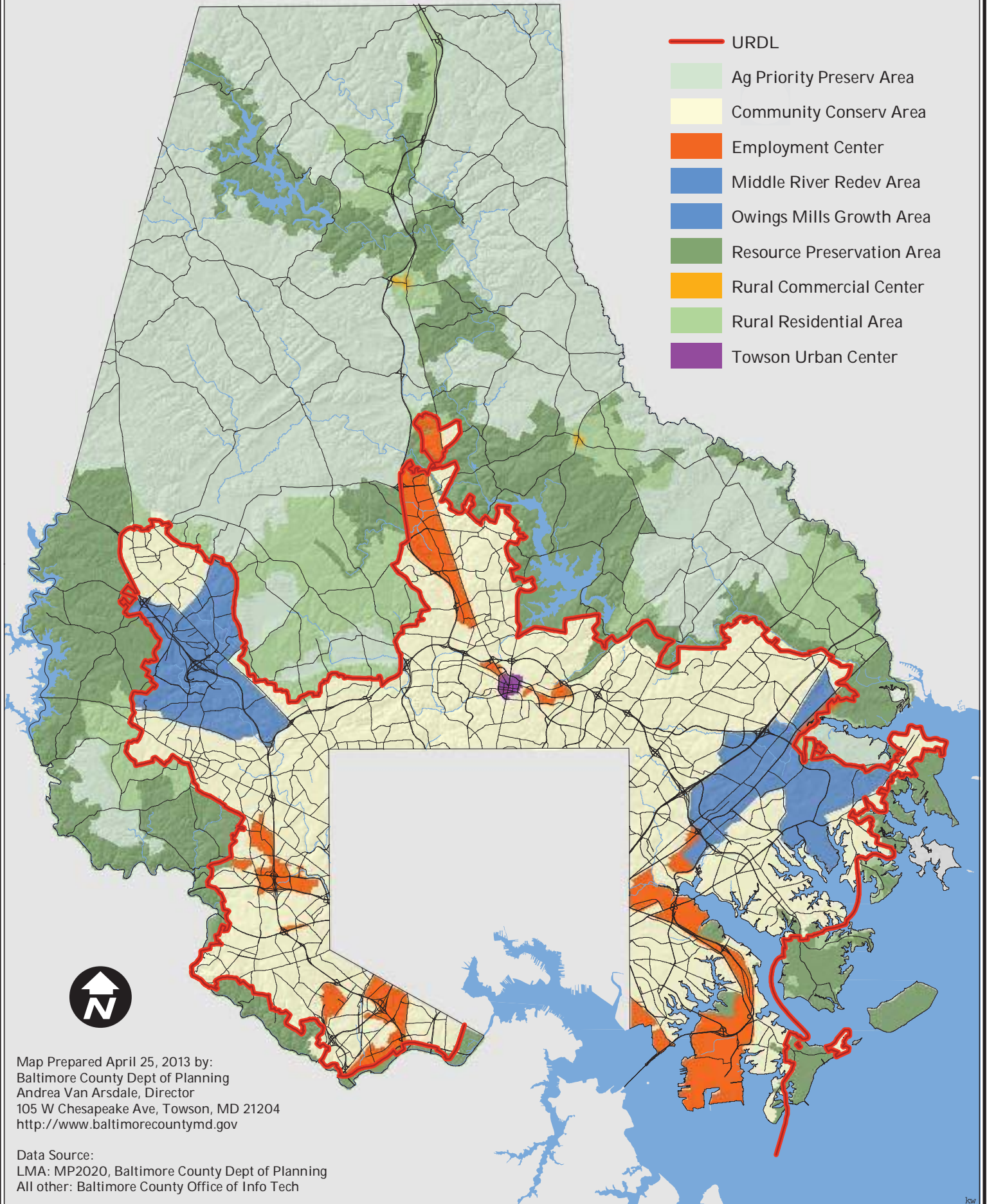
Baltimore County Department of Planning
105 W. Chesapeake Ave
Towson, MD 21204
May 2013

DATA SOURCES:

Land Use: Baltimore County Department of Planning (1:2400) 2013
Roads: Baltimore Metropolitan Council (1:24000) 2000

0 0.5 1 2 3 4 Miles

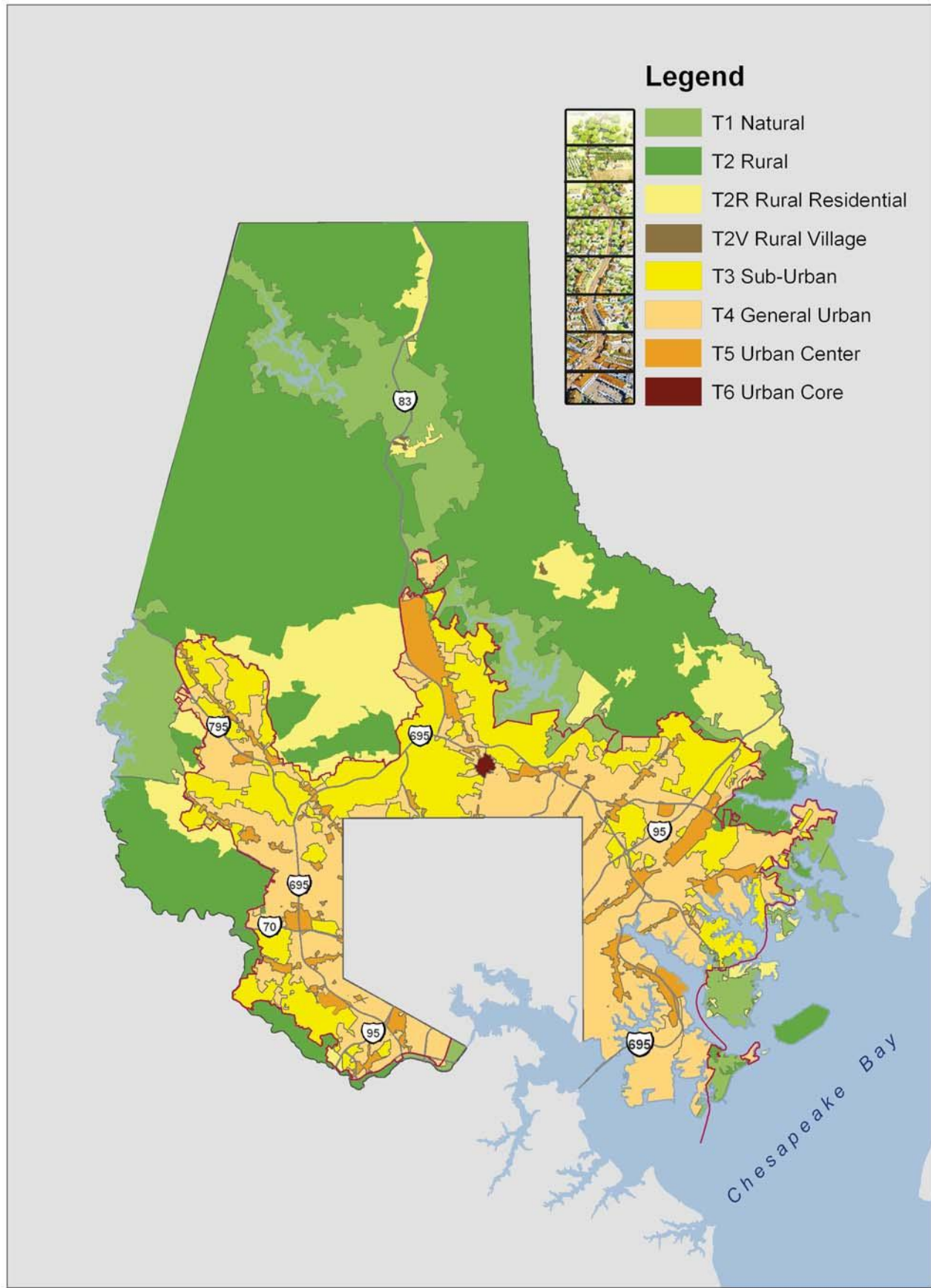
Baltimore County's Land Management Areas

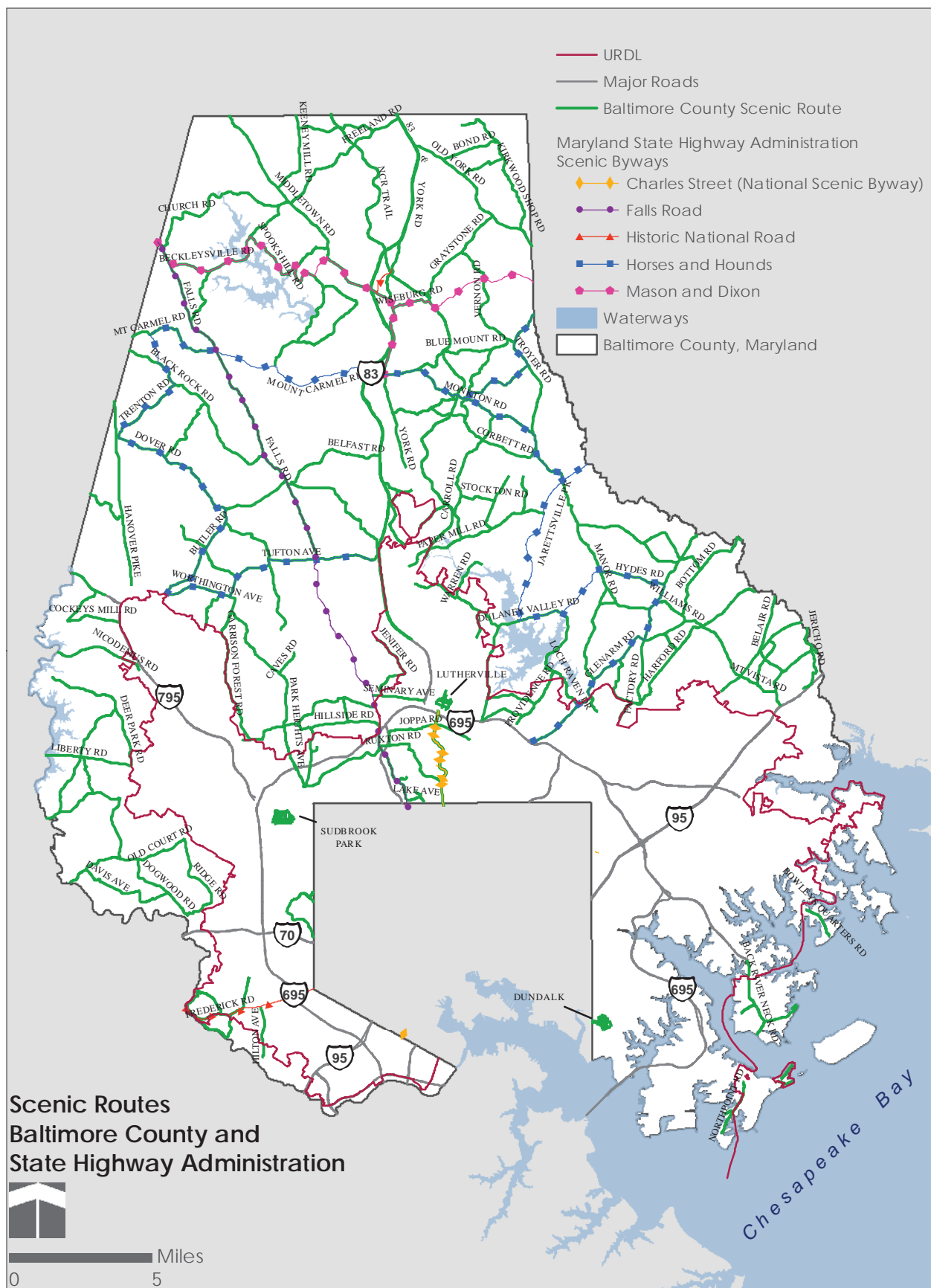


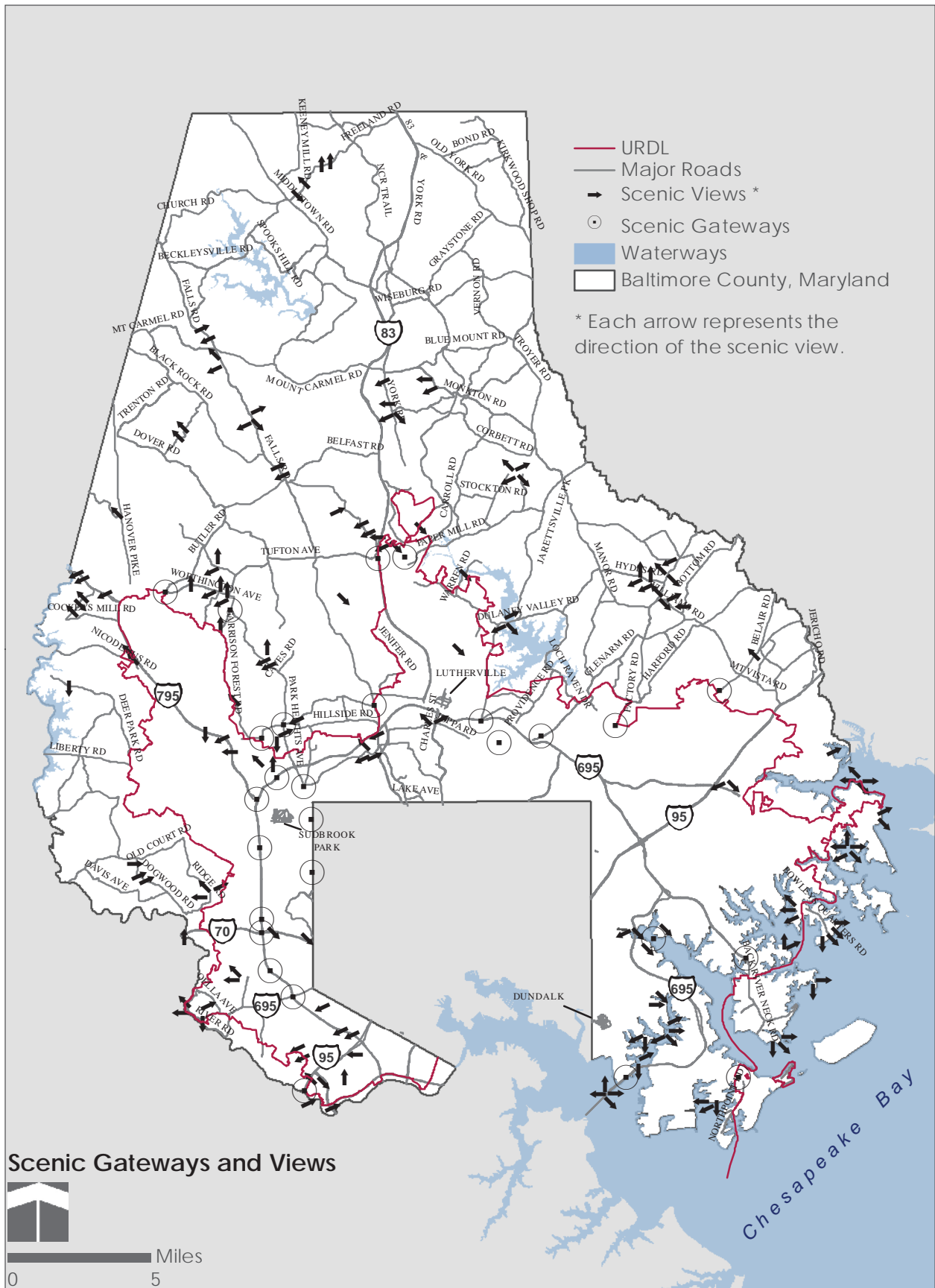
Map Prepared April 25, 2013 by:
Baltimore County Dept of Planning
Andrea Van Arsdale, Director
105 W Chesapeake Ave, Towson, MD 21204
<http://www.baltimorecountymd.gov>

Data Source:
LMA: MP2020, Baltimore County Dept of Planning
All other: Baltimore County Office of Info Tech

Proposed Land Use Baltimore County Smart Coded

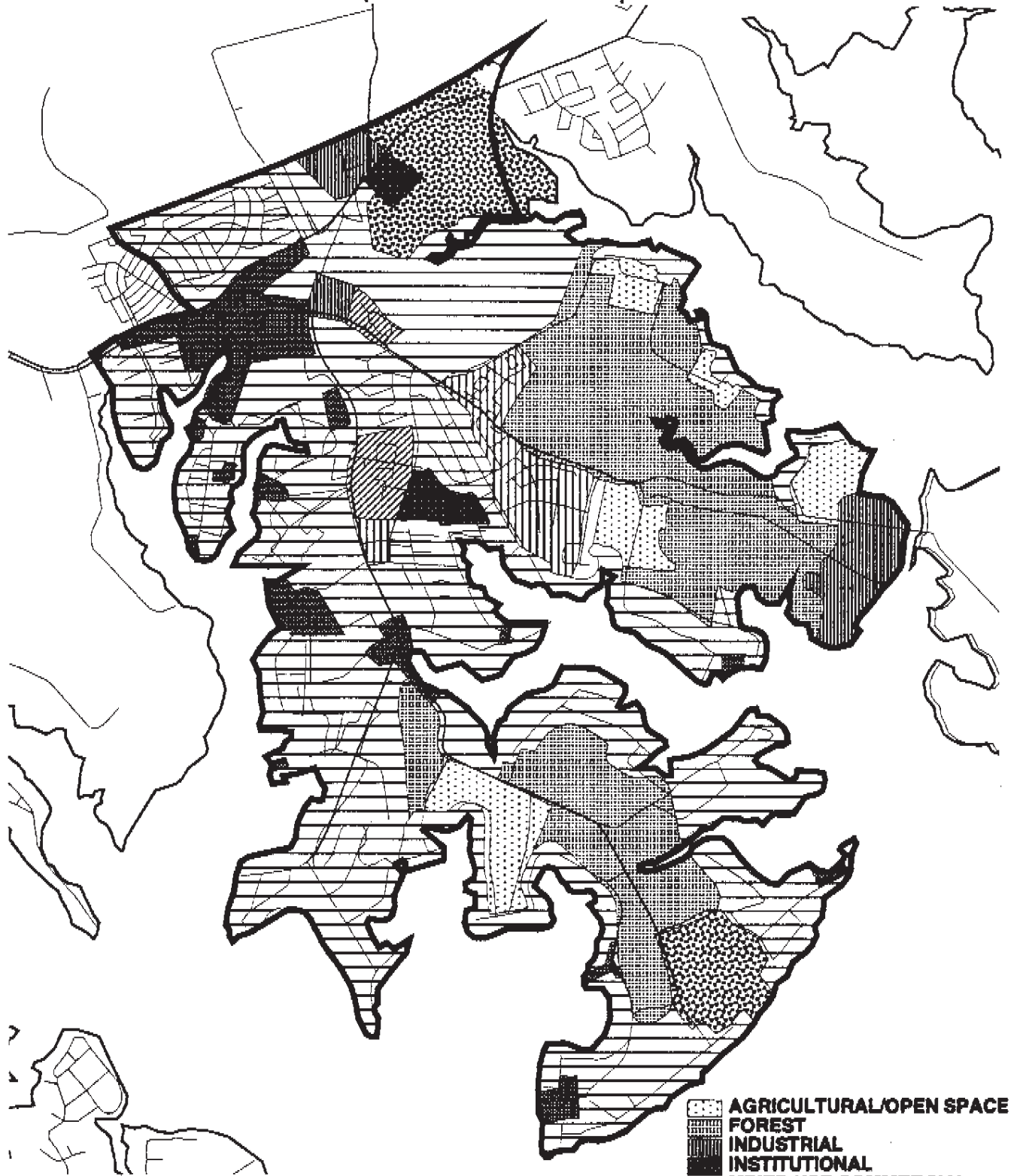















Bowl ys Quarters Community Plan

Proposed Land Use Map



-  AGRICULTURAL/OPEN SPACE
-  FOREST
-  INDUSTRIAL
-  INSTITUTIONAL
-  MIXED USE COMMERCIAL
-  MULTI FAMILY
-  PARK/RECREATION
-  SINGLE FAMILY ATTACHED
-  SINGLE FAMILY DETACHED

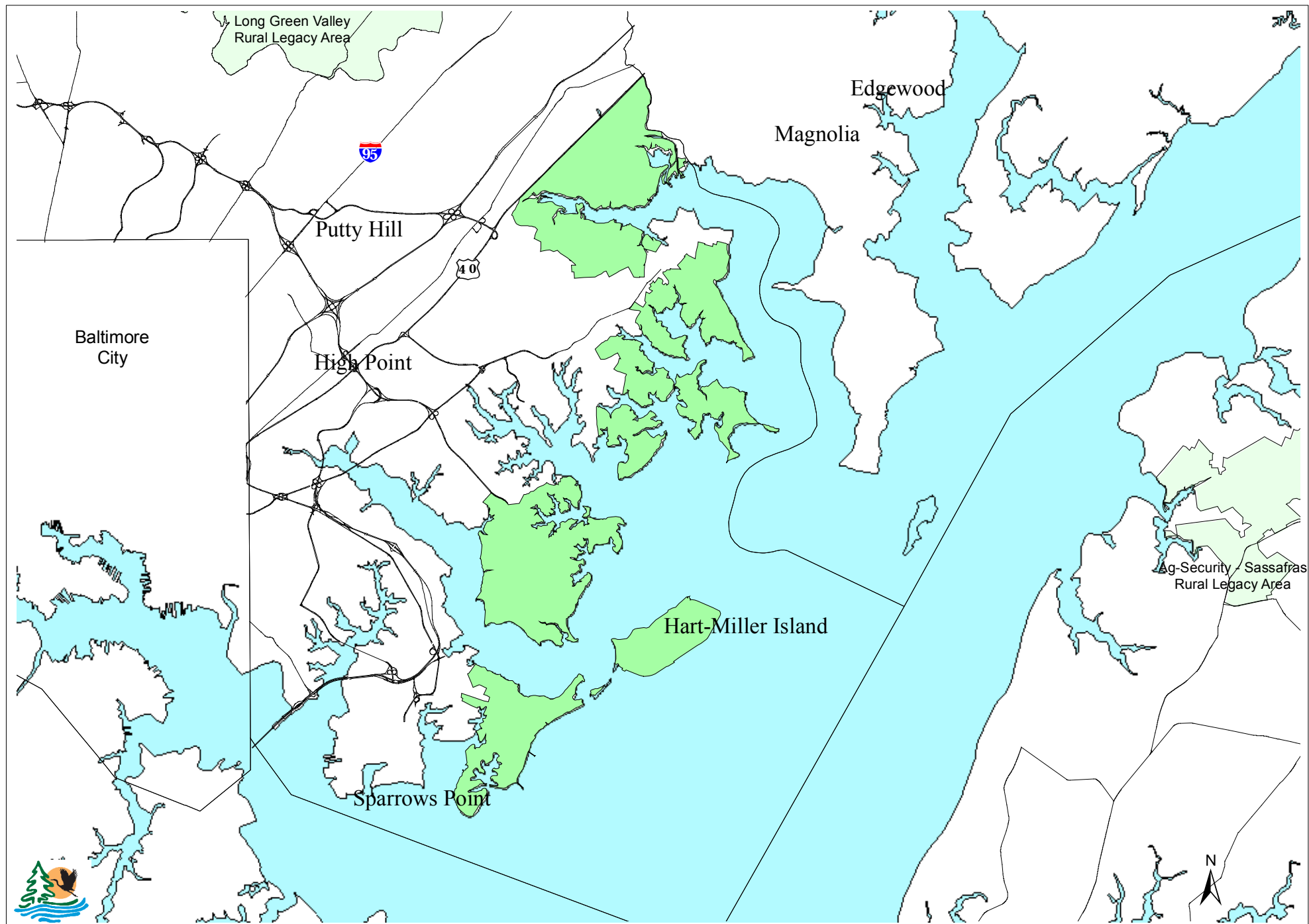
Data Source:
Land Use: Baltimore County Office of Planning (124000)
Roads: Baltimore Metropolitan Council (124000)



1000 0 1000 2000 Feet



Baltimore County Coastal Rural Legacy Area



Appendix C

Air Construction Permit Application

CP Crane Station Combustion Turbine Repowering Project

Air Construction Permit Application



CP CRANE, LLC
Baltimore, Maryland

May 2018
ECT No. 170604-0300

Document Review

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc.'s (ECT's) Document Review Policy No. 9.03. ECT documents undergo technical/peer review prior to dispatching these documents to an outside entity.

This document has been authored and reviewed by the following employees:

Joshua T. Ralph

Author



Signature

May 24, 2018

Date

Amrita Iyer

Peer Review



Signature

May 24, 2018

Date

Table of Contents

<u>Section</u>	<u>Page</u>
1.0 Introduction and Summary	1-1
1.1 Introduction	1-1
1.2 Summary	1-2
2.0 Project Description	2-1
2.1 Project Location	2-1
2.2 Major Facility Components	2-1
2.2.1 Proposed CTs	2-1
2.2.2 Proposed Black-start Generator	2-5
2.2.3 Existing Sources	2-5
3.0 New Source Review Applicability Determination and Proposed Emissions	3-1
3.1 NSR Applicability Determination	3-1
3.2 Proposed Project Emissions	3-3
3.2.1 Continuous Operations Scenario	3-4
3.2.2 Startup and Shutdown	3-5
3.2.3 Maximum Annual Emissions	3-5
3.3 Baseline Actual Emissions	3-6
3.4 Netting Analysis	3-8
4.0 State and Federal Emissions Standards	4-1
4.1 Federal Regulatory Review	4-1
4.1.1 40 CFR 60—New Source Performance Standards	4-2
4.1.1.1 NSPS Subpart A—General Provisions	4-2
4.1.1.2 NSPS Subpart Da—Standards of Performance for Electric Utility Steam-generating Units	4-2

Table of Contents (Continued, Page 2 of 4)

<u>Section</u>	<u>Page</u>
4.1.1.3 NSPS Subpart Db—Standards of Performance for Industrial-Commercial-Institutional Steam-generating Units	4-2
4.1.1.4 NSPS Subpart Dc—Standards of Performance for Small Industrial Commercial Institutional Steam-generating Units	4-2
4.1.1.5 NSPS Subpart Kb—Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced After July 23, 1984	4-3
4.1.1.6 NSPS Subpart GG—Standards of Performance for Stationary Gas Turbines	4-3
4.1.1.7 NSPS Subpart IIII—Standards of Performance for Stationary Compression Ignition Internal Combustion Engines	4-3
4.1.1.8 NSPS Subpart KKKK—Standards of Performance for Stationary CTs	4-4
4.1.1.9 NSPS Subpart TTTT—Standards of Performance for GHG Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units	4-5
4.1.2 40 CFR 61, Subpart M— National Emissions Standards for Asbestos	4-5
4.1.3 40 CFR 63— National Emissions Standards for Hazardous Air Pollutants (NESHAP)	4-5
4.1.3.1 NESHAP Subpart YYYY—Stationary CTs	4-6
4.1.3.2 NESHAP Subpart ZZZZ—Stationary Reciprocating Internal Combustion Engine	4-6
4.1.4 40 CFR 68—CAA Section 112(r)	4-6
4.1.5 40 CFR 72 and 75—Acid Rain Program	4-7
4.1.6 40 CFR 97—Cross-State Air Pollution Rule	4-7
4.1.7 40 CFR 98—Mandatory GHG Reporting	4-7

Table of Contents (Continued, Page 3 of 4)

<u>Section</u>	<u>Page</u>
4.2 State Regulatory Review	4-7
4.2.1 COMAR 26.11.01—General Administrative Provisions	4-7
4.2.2 COMAR 26.11.03—Permits, Approvals and Registrations – Title V Permits	4-8
4.2.3 COMAR 26.11.04—Ambient Air Quality Standards	4-8
4.2.4 COMAR 26.11.05—Air Pollution Episode System	4-8
4.2.5 COMAR 26.11.06—General Emissions Standards, Prohibitions, and Restrictions	4-8
4.2.5.1 COMAR 26.11.06.02—Visible Emissions	4-8
4.2.5.2 COMAR 26.11.06.03—PM	4-9
4.2.5.3 COMAR 26.11.06.04—CO in Areas III and IV	4-9
4.2.5.4 COMAR 26.11.06.06—VOCs	4-9
4.2.5.5 COMAR 26.11.06.08 and .09—Nuisance and Odors	4-9
4.2.5.6 COMAR 26.11.06.12—Control of NSPS Sources	4-10
4.2.5.7 COMAR 26.11.06.14—Control of PSD Sources	4-10
4.2.6 COMAR 26.11.07—Open Fires	4-10
4.2.7 COMAR 26.11.09—Control of Fuel-burning Equipment, Stationary Internal Combustion Engines, and Certain Fuel-burning Installations	4-10
4.2.7.1 COMAR 26.11.09.05—Visible Emissions	4-10
4.2.7.2 COMAR 26.11.09.06—Control of PM	4-10
4.2.7.3 COMAR 26.11.09.07—Control of Sulfur Oxides from Fuel-burning Equipment	4-11
4.2.7.4 COMAR 26.11.09.08—Control of NO _x Emissions for Major Stationary Sources	4-11
4.2.8 COMAR 26.11.15—Toxic Air Pollutants	4-11
4.2.9 COMAR 26.11.17—Nonattainment Provisions for Major New Sources and Major Modifications	4-11
4.2.10 COMAR 26.11.26—Conformity	4-12
4.2.11 COMAR 26.11.27—Emissions Limitations for Power Plants	4-12

Table of Contents (Continued, Page 4 of 4)

<u>Section</u>	<u>Page</u>
4.3 COMAR 26.09—Maryland CO ₂ Budget Trading Program	4-12
5.0 Air Quality Impact Analysis Methodology	5-1
5.1 General Approach	5-1
5.2 Pollutants Evaluated	5-1
5.3 Model Selection	5-1
5.4 Model Options	5-3
5.4.1 Regulatory Default Options	5-3
5.4.2 Averaging Periods	5-4
5.4.3 Urban/Rural Dispersion Coefficients Determination	5-4
5.4.4 NO ₂ Ambient Impact Analysis	5-4
5.5 Terrain Consideration	5-5
5.6 Good Engineering Practice Stack Height and Building Downwash Evaluation	5-6
5.7 Receptor Grids	5-9
5.8 Meteorological Data	5-9
5.9 Representative Background Ambient Concentrations	5-13
5.10 Modeled Emissions Inventory	5-16
5.10.1 Simple-cycle Turbine—Normal Operation	5-17
5.10.2 Simple-cycle Turbine—Startup/Shutdown Operation	5-18
5.10.3 Black-start Generator	5-19
5.10.4 Ancillary Sources	5-20
6.0 Results of Class II Air Quality Impact Analyses	6-1

Appendices

Appendix A—MDE Air Permitting Forms
Appendix B—Emissions Calculations and NSR Applicability Analysis
Appendix C—Air Dispersion Modeling Protocol
Appendix D—Dispersion Modeling Files
Appendix E—Acid Rain Permit Application

List of Tables

<u>Table</u>		<u>Page</u>
1-1	Summary of NSR Applicability Analysis	1-3
3-1	Classification of Baltimore County, Maryland, for Each Criteria Pollutant	3-2
3-2	PSD and NNSR SERs	3-3
3-3	GE LM6000 Emissions Rates per CT	3-4
3-4	Startup and Shutdown Operations per CT	3-5
3-5	Proposed Project Maximum Annual Emissions and Comparison to the SER	3-6
3-6	Baseline Actual Emissions	3-7
3-7	Netting Analysis	3-8
5-1	Summary of Applicable NAAQS	5-2
5-2	Meteorological Data Used in Running AERMET	5-13
5-3	Proposed Background Concentrations	5-16
5-4	Worst-case Data* for Proposed GE LM6000PC Simple-cycle Turbine Operation	5-18
5-5	Summary of Short-term Average Emissions Rates for CT Startups	5-19
5-6	Source Parameters and Criteria Pollutant Emissions Rates for the Black-start Generator	5-20
5-7	Source Parameters and Criteria Pollutant Emissions Rates for the Existing CT	5-20
5-8	Source Parameters and Criteria Pollutant Emissions Rates for Emergency Equipment, ULSD Fuel Oil-fired	5-21
6-1	Facility Maximum Modeled Concentrations Compared to NAAQS	6-1

List of Figures

<u>Figure</u>		<u>Page</u>
2-1	General Site Location Map	2-2
2-2	Aerial Imagery of Project Site and Vicinity	2-3
2-3	Topographic Map of Project Site and Vicinity	2-4
5-1	Project Site Land Cover (NLCD 2011)	5-5
5-2	Source Locations, Fence Line, and Main Building Structures Included in GEP Analysis	5-8
5-3	10-km Receptor Grid for NAAQS Modeling Analysis	5-10
5-4	Near-field Receptor Grid for NAAQS Modeling Analysis	5-11
5-5	Location of Meteorological Sites	5-14
5-6	BWI Airport Wind Rose (2012-2016)	5-15

List of Acronyms and Abbreviations

°F	degree Fahrenheit
µg/m ³	microgram per cubic meter
ACFM	actual cubic feet per minute
AERMAP	AERMOD terrain preprocessor program
AERMET	AERMOD meteorological preprocessor program
AERMIC	AMS/EPA Regulatory Improvement Committee
AERMOD	AERMIC model
AMS	American Meteorological Society
BEEST	Providence Engineering and Environmental Group, LLC, BEEST Suite
BPIP	Building Profile Input Program
BPIPPRM	BPIP for PRIME
BWI	Baltimore/Washington International Thurgood Marshall Airport
CAA	Clean Air Act
CBL	convectively generated boundary layer
CEMS	continuous emissions monitoring system
CFR	Code of Federal Regulations
CO	carbon monoxide
CO ₂ e	carbon dioxide equivalent
COMAR	Code of Maryland Regulations
CP Crane, LLC	CP Crane
CPCN	Certificate of Public Convenience and Necessity
Crane Station	Charles P. Crane Generating Station
CT	combustion turbine
ECT	Environmental Consulting & Technology, Inc.
EPA	U.S. Environmental Protection Agency
ERD	environmental review document
fps	foot per second
ft-agl	foot above ground level
ft-msl	foot above mean sea level
g/kW-hr	gram per kilowatt-hour
GAQM	Guideline on Air Quality Models
GE	General Electric
GeoTIFF	georeferenced tagged image file format

List of Acronyms and Abbreviations (Continued, Page 2 of 3)

GEP	good engineering practice
GHG	greenhouse gas
gr/100 scf	grain per 100 standard cubic feet
H ₂ SO ₄	sulfuric acid
HAP	hazardous air pollutant
HHV	high heating value
hr/yr	hour per year
ISO	International Organization for Standardization
km	kilometer
kW	kilowatt
lb	pound
lb/hr	pound per hour
lb/MMBtu	pound per million British thermal units
lb/MWh	pound per megawatt-hour
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NED	National Elevation Dataset
NESHAP	National Emission Standards for Hazardous Air Pollutants
ng/J	nanogram per joule
NLCD	National Land Cover Database
NNSR	nonattainment new source review
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
NSPS	new source performance standards
NSR	new source review
NWS	National Weather Service
PM	particulate matter
PM ₁₀	particulate matter with diameter less than 10 microns in diameter
PM _{2.5}	particulate matter with diameter less than 2.5 microns in diameter

List of Acronyms and Abbreviations (Continued, Page 3 of 3)

ppm	part per million
ppmvd	parts per million by volume dry
PPRP	Power Plant Research Program
PRIME	Plume Rise Model Enhancement
Project	CP Crane CT Repowering Project
PSC	Public Service Commission
PSD	prevention of significant deterioration
PTE	potential to emit
Repowering Project	CP Crane CT Repowering Project
SBL	stable boundary layer
SER	significant emissions rate
SO ₂	sulfur dioxide
TBACT	best available control technology for toxics
tpy	ton per year
ULSD	ultra-low-sulfur diesel
USGS	U.S. Geological Survey
VOC	volatile organic compounds
WBAN	Weather Bureau Army Navy

1.0 Introduction and Summary

1.1 Introduction

CP Crane, LLC (CP Crane), is proposing a modification to the Charles P. Crane Generating Station (Crane Station) located in Baltimore County, Maryland. CP Crane proposes to repower Crane Station by retiring its existing coal-fired units (Units 1 and 2) and adding three General Electric (GE) LM6000 combustion turbines (CTs) fired primarily with natural gas: the CP Crane CT Repowering Project (hereinafter referred to as the Repowering Project or Project).

The Repowering Project at Crane Station will result in the permanent shutdown of two existing coal-fired generating units and installation of three CTs, of the aero-derivative type, and associated ancillary equipment. The proposed CTs will fire natural gas as their primary fuel and will also be capable of firing ultra-low-sulfur distillate (ULSD) fuel oil when natural gas is not available in sufficient quantities. The CTs are expected to serve as peaking units and operate at a capacity factor of up to 30 percent. The CTs' design will allow them to start up and shut down quickly and at multiple times per day if circumstances warrant.

This report is organized as follows:

- Section 1.0 provides the introduction and summary of the proposed modifications and conclusions.
- Section 2.0 describes the proposed facility and emissions sources.
- Section 3.0 describes new source review (NSR) applicability determination and proposed emissions.
- Section 4.0 provides a summary of the applicable federal and state emissions standards.
- Section 5.0 describes the modeling approach for source impact analyses.
- Section 6.0 presents the results of source impact analyses.
- Appendix A provides the requisite Maryland Department of the Environment (MDE) air quality permit application forms.

- Appendix B provides air pollutant emissions calculations and NSR applicability analysis.
- Appendix C includes a copy of the modeling protocol dated February 2018, which outlines CP Crane's methodology in demonstrating compliance with the air quality impact analyses, and any Maryland Department of Natural Resources (MDNR) Power Plant Research Program (PPRP) and MDE comments.
- Appendix D provides modeling input and output files on compact disc.
- Appendix E provides the acid rain permit application.

1.2 Summary

The proposed modification, which includes installation of three CTs and a newly installed black-start generator, will result in potential emissions of nitrogen oxides (NO_x), sulfur dioxide (SO₂), particulate matter (PM), particulate matter with diameter less than 10 microns in diameter (PM₁₀), particulate matter with diameter less than 2.5 microns in diameter (PM_{2.5}), carbon monoxide (CO), carbon dioxide equivalent (CO_{2e}), ozone (as volatile organic compounds [VOC]), lead, sulfuric acid (H₂SO₄), and greenhouse gases (GHGs).

Potential annual emissions of hazardous air pollutants (HAPs) were also calculated based on the proposed modification to Crane Station. These estimates were compared to major source thresholds found in Section 112(a)(1) of the Clean Air Act (CAA). The major source thresholds for HAPs are 10 tons per year (tpy) for any individual HAP and 25 tpy for total HAPs. Potential annual HAP emissions post-Project for Crane Station were below major source thresholds; therefore, this facility is an area source of HAPs.

Table 1-1 provides a summary of the worst-case emissions of proposed CTs when running on natural gas and ULSD fuel and the proposed newly installed black-start generator. Based on the NSR applicability analysis, the Repowering Project will not result in a significant increase in emissions of any NSR pollutant. Therefore, the Project is expected to be a minor source modification with regards the federal NSR regulations.

Table 1-1. Summary of NSR Applicability Analysis

Pollutant	Repowering Project Emissions (tpy) [†]	Baseline Actual Emissions (tpy) [‡]	Net Emissions Increases/Decreases (tpy)	SER (tpy)	Major Modification (Yes/No)
NO _x	151.02	1,252.10	-1,101.08	25	No
CO	113.31	134.24	-20.92	100	No
PM	22.77	NA	NA	25	No
PM ₁₀	22.77	83.16	-60.39	15	No
PM _{2.5}	22.77	35.99	-13.22	10	No
VOC	11.96	NA	NA	25	No
SO ₂	2.21	NA	NA	40	No
Lead*	2.87E-03	NA	NA	0.6	No
H ₂ SO ₄	3.38E-01	NA	NA	7	No
CO ₂ e	181,027	816,777	-635,750	75,000	No
Total HAP	1.82	—	—	25§	No
Maximum individual HAP	1.15 (formaldehyde)	—	—	10§	No

Note: NA = proposed emissions below respective SERs; netting analysis is not required.

*Lead emissions are calculated based on AP-42 factors.

[†]Includes emissions from the three CTs and newly installed black-start generator.

[‡]Emissions decreases from shutdown of coal Units 1 and 2.

§Major source thresholds for HAPs. Netting analysis is not conducted for HAPs.

Sources: CP Crane, Performance Data, 2018.
ECT, 2018.

The Repowering Project is located in an area classified as nonattainment for 8-hour ozone (2008) and SO₂ (2010). NO_x and VOCs are regulated as nonattainment in the ozone nonattainment areas, as they are classified as precursors to ozone formation in ambient air.

Under prevention of significant deterioration (PSD), if the Project's emissions increase and net emissions increase are both significant for any regulated air pollutant, then PSD permitting is required. Similarly, under nonattainment new source review (NNSR), if the Project's net emissions increase is significant for any NNSR-regulated air pollutant, applicable NNSR permitting is required. The Project will be considered a minor source with respect to NSR permitting requirements at Title 26, Subtitle 11, Chapter 17, of the Code of Maryland Regulations (COMAR) and Title V major source permitting requirements at COMAR 26.11.03. The Repowering Project does not result in significant net emissions increase of any NSR pollutant and is not subject to PSD or NNSR applicability, as described further in Section 3.0.

Per MDE request, in support of the Crane Station CT Repowering Project Maryland Certificate of Public Convenience and Necessity (CPCN) and Permit-to-construct applications, an air quality impact modeling, facility-only National Ambient Air Quality Standards (NAAQS) analysis will be provided in the Crane Project Environmental Review Document (ERD). This application provides a demonstration through air dispersion modeling using agency-approved meteorological data that the ambient air impacts from post-Project emissions rates for criteria air pollutants comply with NAAQS. Specifically, the NAAQS modeling analysis will consist of the existing sources remaining in operation, the proposed new emissions sources, and a representative, agency-approved ambient background concentration. Nearby, offsite emissions sources are not proposed for this analysis. The results of the multisource modeling analyses demonstrate ambient air impacts from the Project will not cause or contribute to a violation of any applicable NAAQS, as described further in Section 6.0.

2.0 Project Description

2.1 Project Location

The Crane Station facility is located in eastern Baltimore County along the Chesapeake Bay approximately 20 kilometers (km) east of Baltimore. Figure 2-1 illustrates the location of the Project within the state of Maryland and within Baltimore County. Figure 2-2 provides an aerial photograph showing the location of the Project. Figure 2-3 presents the map showing facility site boundaries and nearby prominent geographical, topographical, and land use features.

2.2 Major Facility Components

The primary sources of air pollutants associated with the proposed modification are the three GE LM6000 CTs and the newly installed black-start generator. Other sources of pollutants from the existing sources at Crane Station include a CT, an emergency generator, and a fire water pump. The following subsections provide brief descriptions of the major components of Crane Station.

2.2.1 Proposed CTs

As stated previously, CP Crane plans to construct three GE LM6000 CTs in Baltimore County, Maryland. The proposed Project will have an approximate generating capacity of 146 megawatts (MW)-electric (nominally) at International Organization for Standardization (ISO) conditions.

CTs are heat engines that convert latent fuel energy into work using compressed hot gas as the working medium. CTs deliver mechanical output by means of a rotating shaft used to drive an electrical generator, thereby converting a portion of the engine's mechanical output to electrical energy. Ambient air is first filtered and then compressed by the CT compressor, which then increases the pressure of the combustion air stream and also raises its temperature. During warm days (typically 60 degrees Fahrenheit [°F] or greater), the CT inlet ambient air can be cooled by evaporative cooling, thus providing denser air for combustion and improving power output. The compressed combustion air is then combined with the natural gas fuel and burned in the CT's

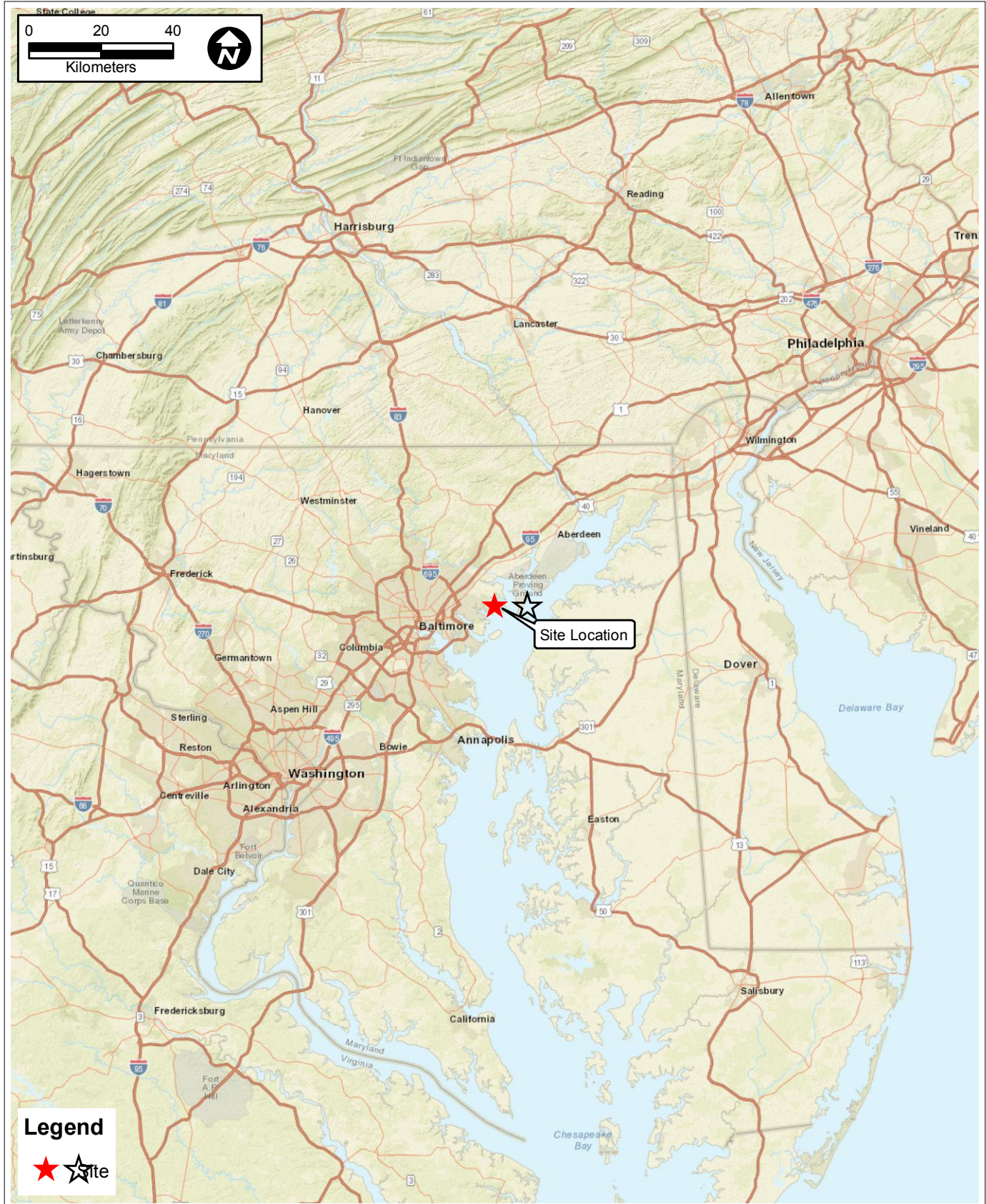


FIGURE 2-1.

GENERAL SITE LOCATION MAP

Sources: Esri Basemap, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

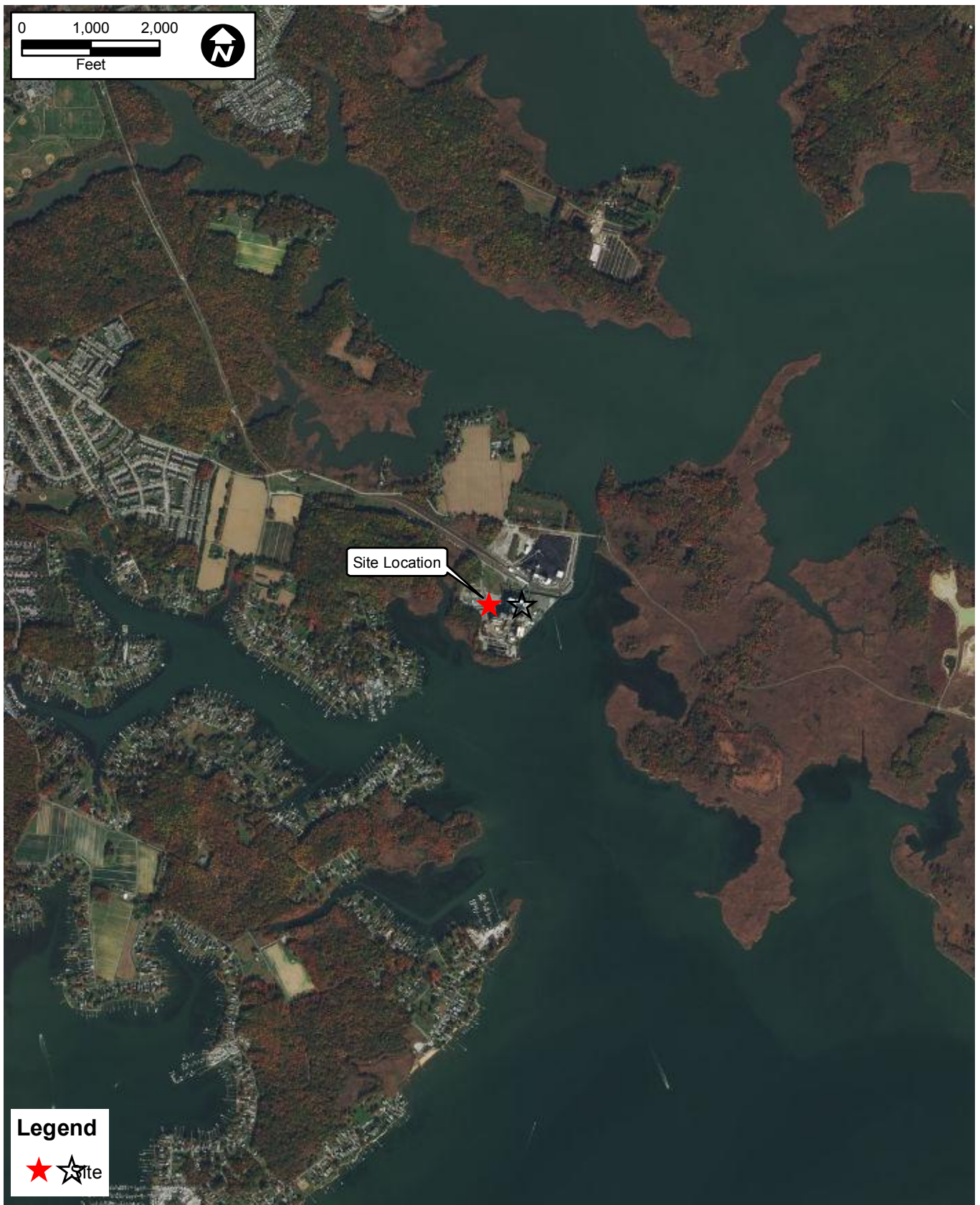


FIGURE 2-2.

AERIAL IMAGERY OF PROJECT SITE AND VICINITY

Sources: Esri Basemap Imagery, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

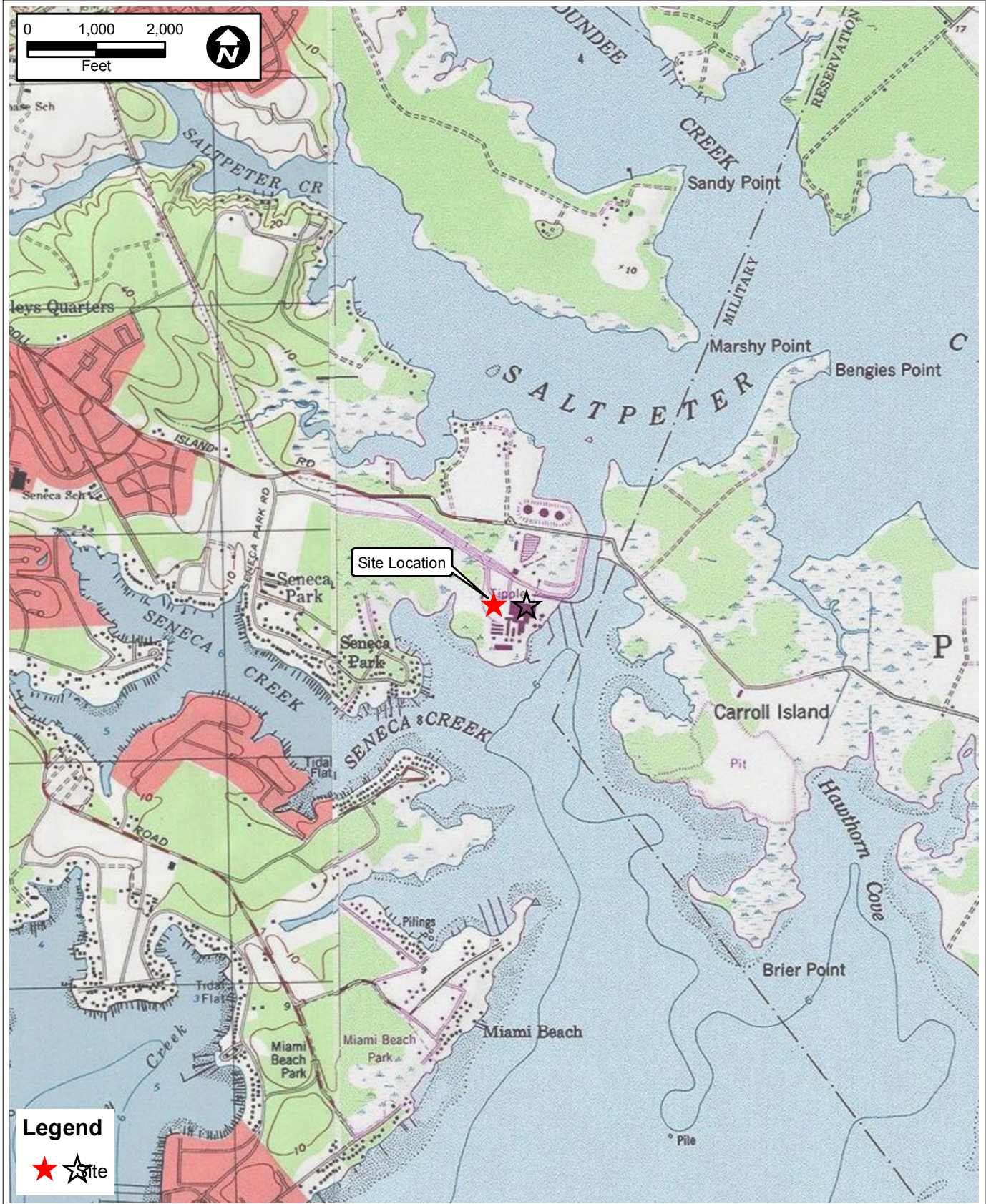


FIGURE 2-3.

TOPOGRAPHIC MAP OF PROJECT SITE AND VICINITY

Sources: Esri Basemap USGS Topographic Quadrangles, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

High-pressure combustor to produce hot exhaust gases. These high-pressure, hot gases next expand and turn the CT to produce rotary shaft power, which is used to drive an electric generator as well as the CT air compressor. CT exhaust gases will be discharged to the atmosphere after passing through the CT.

The conceptual design of the Repowering Project incorporates state-of-the-art technology at every step. The CTs' high efficiency will reduce emissions per unit of output by producing each MW-hour of electricity with less fuel. The use of low-sulfur fuels for the CTs also has the benefit of producing lower emissions relative to most other potential fuels. Each CT will be capable of firing pipeline-quality natural gas containing no more than 0.5 grain per 100 standard cubic feet (gr/100 scf) (annual average) and ULSD fuel oil having a sulfur content of no more than 0.0015 percent by weight.

For purposes of developing worst-case Project emissions rates and stack parameters and conducting required regulatory compliance demonstrations and air quality impact analyses for this application, CP Crane obtained performance and emissions data for the GE LM6000 CT in simple-cycle configuration. The required demonstrations were performed using worst-case emissions and other specifications from the CT model.

2.2.2 Proposed Black-start Generator

A 1,500-kilowatt (kW), newly installed black-start generator will be used to start the proposed CTs when there is no electricity on the grid and will not be used to produce electricity for the grid. The unit will be limited to 100 hours per year (hr/yr) for routine testing and maintenance.

2.2.3 Existing Sources

Existing sources of emissions include a CT, emergency generator, and fire water pump. The existing CT is rated at 14 MW (summer capability) fired by No. 2 fuel oil. The fire water pump is used for emergency purposes in case of a fire and for routine operations and testing as required by the National Fire Prevention Association Code. The emergency diesel fire water pump is rated at a maximum 399 horsepower. The unit will be limited to 100 hr/yr for routine testing and maintenance. The emergency diesel engine-powered standby generator, rated at 600 horsepower, allows maintenance of vital plant loads during power outages or switchyard maintenance. The

emergency diesel generator is not intended to provide sufficient power for a black-start, peak shaving, or nonemergency power. The emergency generator will be operated up to 100 hr/yr for maintenance checks and readiness testing.

3.0 NSR Applicability Determination and Proposed Emissions

This section provides detailed description of the steps involved in an NSR netting analysis. A summary of the NSR applicability determination for the proposed Project is provided first, followed by the basis and methodology for the calculation of air pollutant emissions increases from the Repowering Project. Following the emissions increases section, contemporaneous emissions decreases are explained. Finally, netting analysis is presented, and the result of this analysis were used to determine whether pollutants were potentially subject to NSR applicability. Appendix B presents detailed emissions calculation methodologies for emissions increases and a summary of the results of the NSR applicability determination.

3.1 NSR Applicability Determination

NSR requires preconstruction review and permitting of stationary sources. A source may be subject to one or more of the NSR programs depending on the facility's emissions and NAAQS attainment status of the area. There are three categories of NSR permitting:

- PSD—applies to new major sources and major modifications in attainment areas
- NNSR—applies to new major sources and major modifications in nonattainment areas
- Minor NSR—applies to pollutants that do not trigger PSD or NNSR requirements

When a physical change or change in the method of operation is proposed for an existing major stationary source, these permitting programs are required to be evaluated. As a result of the CAA, the U.S. Environmental Protection Agency (EPA) enacted primary and secondary NAAQS for criteria air pollutants. Primary NAAQS are intended to protect the public health, and secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in ambient air. Areas of the country in violation of NAAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. Maryland has also

adopted NAAQS in COMAR 26.11.04. Section 5.0 provides a further discussion on the federally promulgated NAAQS standards adopted by MDE as state standards.

The determination of whether PSD/NNSR/minor NSR regulations are applicable to a specific project must be conducted in two parts: the air quality status of the location of the project must be determined and the type and quantity of PSD-regulated pollutants that will be emitted must be evaluated. First, it must be determined whether the proposed project is located in an attainment or nonattainment area. Then, it must be determined whether the proposed project is a major or minor modification. If the results indicate a major modification, any pollutants subject to PSD and/or NNSR permitting requirements must be identified. MDE has adopted the federal PSD permitting program in COMAR 26.11.06.14 and the NNSR permitting program in COMAR 26.11.17. Table 3-1 lists the current federal air quality classifications for each criteria pollutant for the Repowering Project area in Baltimore County. The Project is located in an area classified as attainment for all criteria pollutants except for 8-hour ozone (2008) and SO₂ (2010). NO_x and VOCs are regulated in the ozone nonattainment areas, as they are classified as precursors to ozone formation in ambient air.

Table 3-1. Classification of Baltimore County, Maryland, for Each Criteria Pollutant

Pollutant	Attainment Status
CO	Unclassifiable/attainment
NO ₂	Unclassifiable/attainment
PM _{2.5}	Unclassifiable/attainment
PM ₁₀	Unclassifiable/attainment
SO ₂	Nonattainment
Ozone (8-hour)	Nonattainment
Lead	Unclassifiable/attainment

Note: NO₂ = nitrogen dioxide.

Source: 40 CFR 81.321.

An NSR applicability determination was prepared for each applicable NSR pollutant specified in the Code of Federal Regulations (CFR), Title 40, Part 51.166. These pollutants include NO_x, SO₂, PM, PM₁₀, PM_{2.5}, CO, ozone (as VOC), lead, H₂SO₄, and GHGs. The Repowering Project is deemed subject to PSD or NNSR, if there is a “significant emissions increase” for a pollutant,

as defined in 40 CFR 51.165 and 51.166, if the sum of the increases and decreases associated with the Project exceeds the pollutant-specific thresholds or significant emissions rate (SER). SERs used are as defined in COMAR 26.11.17.01 and shown in Table 3-2. The Project is a minor source modification with regard to federal NSR regulations, with all NSR pollutants falling below the SERs, explained in detail in the following subsections.

Table 3-2. PSD and NNSR SERs

Pollutant	SER (tpy)
CO	100
NO _x	25
VOC	25
PM	25
PM ₁₀	15
PM _{2.5}	10
SO ₂	40
H ₂ SO ₄	7
Lead	0.6
GHGs CO ₂ e	75,000

Source: COMAR 26.11.17.01
40 CFR 51.166

3.2 Proposed Project Emissions

This section presents a summary of Project emissions and the methodology used to calculate these emissions increases. Emissions calculation procedures used in determining potential Project emissions are based on information provided by the manufacturer, other equipment vendor data, and emissions factors documented in EPA's Compilation of Air Pollution Emissions Factors, AP-42. Annual operational limitations have been accounted for while estimating potential annual emissions. Data presented in the following subsections are based on the information provided by CP Crane for the GE LM6000PC CT.

The following subsections present maximum hourly and annual emissions for the simple-cycle CT during normal operations and startup/shutdown using both natural gas and ULSD fuel oil and the newly installed black-start generator.

CP Crane is proposing to construct three CTs; the emissions presented in the following sections are per turbine unless specified. Appendix B provides additional details of CT emissions calculations at various loads.

The Project's proposed units are new and do not have 24 consecutive months of operating data; therefore, baseline actual emissions will equal to zero. The emissions increase equals the potential to emit (PTE) of the proposed CTs.

3.2.1 Continuous Operations Scenario

Normal operation of a CT is characterized as continuous operation from minimum compliance load to 100 percent. The three CTs are proposed to operate at a 30-percent capacity factor, which is equivalent to 2,628 hr/yr (excluding startup/shutdown), of which approximately 10 percent, or 263 hr/yr, may be with ULSD fuel oil. Maximum emissions for all load types (100, 75, 60, and 50 percent) for both natural gas and ULSD fuel oil were calculated based on the performance data provided by CP Crane. Emissions for the dual-fuel scenario were based on burning natural gas 90 percent of the time and ULSD fuel 10 percent of the time. Lead emissions were calculated based on the AP-42 factor, Section 1.4, Table 1.4-2, for natural gas and Section 3.1, Table 3.1-5, for ULSD fuel. Table 3-3 provides CT pound per hour (lb/hr) emissions (excluding startup/shutdown) for natural gas and ULSD fuel oil scenarios.

Table 3-3. GE LM6000 Emissions Rates per CT

Pollutant	Maximum Emissions Rate (lb/hr)	
	Natural Gas	ULSD Fuel Oil
NO _x	35.45	58.99
CO	27.70	32.34
VOC	2.74	5.01
PM	5.00	12.42
PM ₁₀	5.00	12.42
PM _{2.5}	5.00	12.42
SO ₂	0.56	0.57
Lead	0.0002*	0.0053†
H ₂ SO ₄	0.09	0.09
CO ₂ e	44,204	60,241

*Based on AP-42 Table 1.4-2 (EPA, 1998).

†Based on AP-42 Table 3.1-5 (EPA, 2000).

Sources: CP Crane, Performance Data, 2018.
ECT, 2018.

3.2.2 Startup and Shutdown

CP Crane proposes the following definitions for startup and shutdown events:

- Startup—From first flame until minimum emissions compliance is reached
- Shutdown—From minimum emissions compliance until the time flame-out is reached

The design of the CTs will allow them to start up and reach full load in 10 minutes or less and shut down quickly multiple times per day if circumstances warrant. Annual emissions resulting from startup/shutdown operations for the proposed CTs are based on 250 startups per year, of which 25 startups could be with ULSD fuel oil.

Table 3-4 summarizes emissions during each event of startup and shutdown operations (in pounds [lb] per event) and the duration of the startup and shutdown event.

Table 3-4. Startup and Shutdown Operations per CT

Scenario	NO _x (lb per event)	CO (lb per event)	VOC (lb per event)	Duration (minutes)
Natural Gas				
Startup	3.6	3.2	0.5	10
Shutdown	3.1	2.5	0.33	8
ULSD Fuel Oil				
Startup	12.8	11.6	0.4	10
Shutdown	10.9	9.9	0.4	8

Sources: CP Crane, 2018.
ECT, 2018.

3.2.3 Maximum Annual Emissions

CT fuel firing rates and emissions rates vary as a function of operating load and ambient temperature. In addition, emissions rates of some pollutants are greatest during startups and shutdowns, while emissions of other pollutants are greatest during normal full-power operation. Annual emissions for the CTs were calculated based on the maximum of either normal operation or emissions that include the maximum number of startup/shutdown events, depending on which operational scenario resulted in worst-case emissions. Potential emissions of HAPs from the CTs

were estimated using AP-42 Table 3.1-3 for natural gas and Tables 3.1-4 and 3.1-5 for distillate oil emissions factors.

Table 3-5 presents the PTE of the Project, the worst-case annual emissions (tpy), including startup and shutdown emissions of PSD/NNSR pollutants for the two fuel options, and a comparison to the respective SER.

Table 3-5. Proposed Project Maximum Annual Emissions and Comparison to the SER

Pollutant	Percent Load	Emissions for Three Turbines (tpy)	Black-start Generator (tpy)	Project Total (tpy)	SER (tpy)	Netting Required
NO _x	100%	149.50	1.52	151.02	25	Yes
CO	60%	111.43	1.88	113.31	100	Yes
VOC	50%	11.75	0.21	11.96	25	No
PM	100%	22.68	0.09	22.77	25	No
PM ₁₀	100%	22.68	0.09	22.77	15	Yes
PM _{2.5}	100%	22.68	0.09	22.77	10	Yes
SO ₂	100%	2.21	1.22E-03	2.21	40	No
H ₂ SO ₄	100%	3.38E-01	9.34E-05	3.38E-01	7	No
Lead	100%	2.87E-03	—	2.87E-03	0.6	No
CO _{2e}	100%	180,912	115.16	181,027	75,000	Yes

Note: All pollutants at normal operation, burning natural gas at 90 percent and ULSD fuel oil at 10 percent, with startup/shutdown.

Sources: CP Crane, 2018.
ECT, 2018.

Once the emissions increases were calculated for the Repowering Project, they were compared to the pollutant-specific SERs listed in Table 3-2. Results show emissions increases for NO_x, CO, PM₁₀, PM_{2.5}, and GHG (CO_{2e}) are above their respective SER; hence, netting analysis is required. For all other pollutants, the emissions increase is not significant, so NSR is not applicable.

3.3 Baseline Actual Emissions

Per COMAR 26.11.17.01, for an existing electric utility steam generating unit, baseline actual emissions are determined by the average rate, in tons per year, at which the unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within

the 5-year period immediately preceding the date on which a complete application was submitted. In addition, the average rate must be adjusted downward to exclude emissions that exceeded any emissions limitation during the 24-month baseline period. Table 3-6 summarizes the baseline actual emissions based on the data provided by CP Crane for the pollutants that have proposed Project emissions above the SER.

Table 3-6. Baseline Actual Emissions

Parameter	NO _x	CO	PM ₁₀	PM _{2.5}	CO _{2e}
Baseline actual emissions (tpy)	1,252.10	134.24	83.16	35.99	816,777
24-month period	June 2013 through May 2015	October 2013 through September 2015	July 2013 through June 2015	July 2013 through June 2015	June 2013 through May 2015

Source: CP Crane, 2018.
ECT, 2018.

Creditable means the increase or decrease has not been relied on in a previous permit action. Contemporaneous project emissions include the creditable emissions decreases that have occurred at the facility, which include the shutdown of existing coal-fired Unit 1 (MDE No. 3-0108) and Unit 2 (MDE No. 3-01109). Baseline actual emissions were based on the worst-case 24-month average annual emissions between the 5-year look-back period of June 2013 to May 2018. NO_x, CO, and GHG (CO_{2e}) emissions data for these years was provided by CP Crane. PM emissions were calculated based on the pound-per-million-British-thermal-units (lb/MMBtu) values from the stack test data provided by CP Crane and the actual monthly heat input (million British thermal units [MMBtu] per month) for Units 1 & 2. Per AP-42, particulate size fractions of 67 percent for PM₁₀ and 29 percent for PM_{2.5} were applied to total PM emissions. This results in a conservative netting analysis for PM₁₀ and PM_{2.5}, as potential PM₁₀ and PM_{2.5} emissions from the three proposed CTs were not reduced based on these particulate size fractions.

Appendix B provides this information in more detail.

3.4 Netting Analysis

The final step of NSR applicability is netting analysis to determine a significant net emissions increase/decrease for those pollutants that caused a significant increase based on the Project. For NSR to apply, there has to be significant net emissions increase as well as significant emissions increase from the proposed Project. A significant net emissions increase is the sum of the emissions increases from the Project (Section 3.2), baseline actual emissions (Section 3.3), and any other increases and decreases at the entire facility that are contemporaneous and creditable during the contemporaneous period. There have been no permitting actions during the contemporaneous period (defined as 5 years prior to submittal of a complete application to the actual date when emissions occur).

As shown in Table 3-7 the Repowering Project does not result in a significant net emissions increase of any NSR pollutant.

Table 3-7. Netting Analysis

Description	NO _x	CO	PM ₁₀	PM _{2.5}	CO ₂ e
Repowering Project (increases) (tpy)	151.02	113.31	22.77	22.77	181,027
Baseline actual emissions (Units 1 and 2) (tpy)	1,252.10	134.24	83.16	35.99	816,777
Contemporaneous emissions (tpy)	0.00	0.00	0.00	0.00	0.00
Net emissions increases/decreases (tpy)	-1,101.08	-20.92	-60.39	-13.22	-635,750
NSR SERs (tpy)	25	100	15	10	75,000
Major modification (Yes/No)	No	No	No	No	No

Source: ECT, 2018.

4.0 State and Federal Emissions Standards

The regulatory mechanism for the Maryland Public Service Commission's (PSC's) review and approval process that applies to both construction and modification of an electrical generating station is contained in the PSC Law and corresponding regulations. The applicable regulations are found at COMAR 20.79, Applications Concerning the Construction or Modification of Generating Stations and Overhead Transmission Lines by a Nonutility Generator.

COMAR 20.79.03.02 lists the specific environmental information required in a CPCN application. The CPCN functions as the PSD permit, NNSR authorization, and state air quality construction permit to construct. In accordance with COMAR 26.11.02.10, the Repowering Project is otherwise exempt from the need to apply for and obtain a permit to construct and approvals from MDE. In accordance with COMAR 20.79.01.06, a person may not commence a modification to the facilities at a power plant without receiving prior approval from the PSC.

MDE has adopted the federal EPA rules pertaining to PSD as contained in 40 CFR 52.21 (COMAR 26.11.06.14).

This section presents a review of the air quality regulations that will govern permitting and operation of the Repowering Project, which includes analysis of the applicability of federal and state air quality regulations.

4.1 Federal Regulatory Review

Federal regulatory programs, as administered and delegated by EPA, have been developed under the authority of the CAA and its amendments. The following subsections review the key elements of the federal regulatory program and the impact they have on the permitting and operation of the Project.

4.1.1 40 CFR 60—New Source Performance Standards

New source performance standards (NSPS) are technology-based standards applicable to new and modified stationary sources. The standards relevant to the Repowering Project are discussed in the following subsections.

4.1.1.1 NSPS Subpart A—General Provisions

NSPS Subpart A contains general requirements for notifications, recordkeeping, and performance testing and applies to stationary sources subject to NSPS. Any source subject to provisions under an NSPS subpart is also subject to the general provisions of NSPS Subpart A, except as noted in the applicable subpart. The proposed CTs are subject to the general provisions for NSPS units in 40 CFR 60, Subpart A, as they are subject to another NSPS as described in the following subsections.

4.1.1.2 NSPS Subpart Da—Standards of Performance for Electric Utility Steam-generating Units

Per 40 CFR 60.40Da(e)(1), “Affected facilities associated with a stationary CT that are capable of combusting more than 73 MW (250 million British thermal units per hour [MMBtu/hr]) heat input of fossil fuel are subject to this subpart except in cases when the affected facility meets the applicability requirements of and is subject to Subpart KKKK of this part.” NSPS Subpart Da does not apply to the proposed CTs, since the simple-cycle CTs are not steam-generating units and are subject to Subpart KKKK.

4.1.1.3 NSPS Subpart Db—Standards of Performance for Industrial-Commercial-Institutional Steam-generating Units

NSPS Subpart Db applies to steam-generating units constructed after June 19, 1989, with a maximum design heat input capacity greater than 100 MMBtu/hr except in cases when the affected facility meets the applicability requirements of and is subject to Subpart KKKK of this part. NSPS Subpart Db does not apply to the Project CTs, since the simple-cycle CTs are not steam-generating units and are subject to Subpart KKKK.

4.1.1.4 NSPS Subpart Dc—Standards of Performance for Small Industrial Commercial Institutional Steam-generating Units

NSPS Subpart Dc applies to steam-generating units that commenced construction after June 9, 1989, and have a maximum design heat input capacity between 10 and 100 MMBtu/hr except in

cases when the affected facility meets the applicability requirements of and is subject to Subpart KKKK of this part. NSPS Subpart Dc does not apply to the Project CTs, since the simple-cycle CTs are not steam-generating units and are subject to Subpart KKKK.

4.1.1.5 NSPS Subpart Kb—Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced After July 23, 1984

Per 40 CFR 60.110(a), the affected facility to which this subpart applies is each storage vessel with a capacity greater than 75 cubic meters (19,813 gallons) used to store volatile organic liquid for which construction, reconstruction, or modification is commenced after July 23, 1984. There are no storage tanks proposed as part of this Project, so NSPS Subpart Kb does not apply.

4.1.1.6 NSPS Subpart GG—Standards of Performance for Stationary Gas Turbines

NSPS Subpart GG applies to stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (10 MMBtu/hr) based on the lower heating value of the fuel fired. Per 40 CFR 60.4305(b), turbines subject to the requirements of NSPS Subpart KKKK are exempt from NSPS Subpart GG. NSPS Subpart GG does not apply to the Repowering Project, because the proposed CTs will be subject to NSPS Subpart KKKK.

4.1.1.7 NSPS Subpart IIII—Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

NSPS Subpart IIII applies to the proposed newly installed black-start generator. Per 40 CFR 60.4200(a)(2), the provisions of this subpart are applicable to, “Owners and operators of stationary compression ignition internal combustion engines that commence construction after July 11, 2005, where the stationary compression ignition internal combustion engines are:

- (i) Manufactured after April 1, 2006, and are not fire pump engines, or
- (ii) Manufactured as a certified National Fire Protection Association fire pump engine after July 1, 2006.”

The newly installed black-start generator will commence construction (be ordered) after July 11, 2005, and will be manufactured after April 1, 2006; therefore, the newly installed black-start generator is subject to Subpart IIII. Per 40 CFR 60.4205(a), owners and operators of pre-2007 model year emergency stationary compression ignition internal combustion engines with a

displacement of less than 10 liters per cylinder that are not fire pump engines must comply with the emissions standards in Table 1, 40 CFR 60, Subpart IIII. Per this Table 1, the applicable certification standards for units greater than 560 kW are 9.2 grams per kilowatt-hour (g/kW-hr) NO_x, 11.4 g/kW-hr CO, 1.3 g/kW-hr VOC, and 0.54 g/kW-hr PM. CP Crane will purchase a generator with limits equal to or more stringent than these limits.

4.1.1.8 NSPS Subpart KKKK—Standards of Performance for Stationary CTs

Per 40 CFR 60.4305, this subpart applies to stationary CTs with a heat input at peak load equal to or greater than 10 MMBtu/hr based on the high heating value (HHV) of the fuel and which commenced construction after February 18, 2005. The Project CTs commenced construction after February 18, 2005, and have an HHV input greater than 10 MMBtu/hr, so NSPS Subpart KKKK does apply to the Project CTs. Applicable requirements from this subpart include emissions limitations; testing, reporting, and recordkeeping requirements; and work practice standards. Since the Project CTs are subject to Subpart KKKK, they are exempt from the requirements of Subparts GG, Da, Db, and Dc.

Per 40 CFR 60.4333(a), CP Crane will operate and maintain the CTs, air pollution control equipment, and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times, including during startup, shutdown, and malfunction.

The peak load heat input rate of each of the simple-cycle CTs is 398 MMBtu/hr firing natural gas and 381 MMBtu/hr firing ULSD fuel oil. Therefore, the Repowering Project CTs are subject to this rule and subject to NO_x and SO₂ emissions limits in NSPS KKKK.

Emissions Limits for NO_x

As natural gas-fired CTs with a heat input at peak load greater than 50 MMBtu/hr and less than 850 MMBtu/hr, NO_x emissions from the turbines must be limited to 25 parts per million (ppm) at 15-percent oxygen gas or 150 nanograms per joule (ng/J) (1.2 pounds per megawatt-hour [lb/MWh]) of useful output. In addition, NO_x emissions from the CTs combusting ULSD fuel oil must be limited to 74 ppm at 15-percent oxygen gas or 460 ng/J (3.6 lb/MWh) of useful output. The proposed simple-cycle NO_x emissions from the CTs will not exceed 25 parts per million by

volume dry (ppmvd) at 15-percent oxygen gas when operating on natural gas and 42 ppmvd at 15-percent oxygen gas when operating on ULSD fuel oil. When the CTs are operating at loads less than 75 percent of peak load, NO_x emissions will not exceed 96 ppm at 15-percent oxygen gas.

To demonstrate compliance with NO_x emissions limits, CP Crane will install continuous emissions monitoring systems (CEMS) for NO_x, thereby satisfying the requirements specified in 40 CFR 60.4340(b)(1). CP Crane will comply with CEMS requirements specified in 40 CFR 60.4345 and excess emissions requirements specified in 40 CFR 60.4350.

Emissions Limits for SO₂

Per 40 CFR 60.4330(a)(2), for SO₂ emissions, each CT must comply with either limiting emissions to less than 110 ng/J (0.90 lb/MWh) gross output or burning fuel that contains total potential sulfur equal or less than 26 ng/J (0.060 lb/MMBtu) heat input. CP Crane will comply with SO₂ emissions limitations by combusting pipeline-quality natural gas with sulfur content less than 0.5 gr/100 scf based an annual averaging period and ULSD fuel oil with a sulfur content of 0.0015 percent by weight.

4.1.1.9 NSPS Subpart TTTT—Standards of Performance for GHG Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units

NSPS Subpart TTTT was finalized on October 23, 2015, and is applicable to fossil fuel-fired power plants that commenced construction on or after January 8, 2014; therefore, Subpart TTTT is applicable to the Repowering Project. CP Crane will comply with applicable monitoring, reporting, and performance test requirements of the rule.

4.1.2 40 CFR 61, Subpart M—National Emissions Standards for Asbestos

CP Crane will comply with 40 CFR 61, Subpart M, when conducting renovation or demolition activities at the facility.

4.1.3 40 CFR 63—National Emissions Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAP) are emissions standards for HAPs emitted from stationary sources. A major source of HAPs is any stationary source with

a PTE of 10 tpy or more of a single HAP or 25 tpy of combined HAPs. Recent NESHAP promulgated under 40 CFR 63 reflect retracting the “once in, always in” policy for major sources of HAPs, meaning facilities that are currently a major source of HAP may switch to area source status if facilities take measures to bring HAP emissions below applicable thresholds.

CP Crane is currently a major source of HAP, and the proposed post-Project will not have emissions greater than 10 tpy of any one HAP or a total of 25 tpy of all HAPs combined. Therefore, for NESHAP applicability, post-Project is considered an area source of HAP emissions.

4.1.3.1 NESHAP Subpart YYYY—Stationary CTs

Subpart YYYY applies to stationary CTs at major sources of HAPs. Emissions and operating limitations under Subpart YYYY apply to new and reconstructed stationary CTs. Crane Station is an area source (i.e., not major source) of HAPs. Therefore, this subpart will not apply, because it only applies to major sources.

4.1.3.2 NESHAP Subpart ZZZZ—Stationary Reciprocating Internal Combustion Engine

NESHAP Subpart ZZZZ applies to new and existing internal combustion engines located at major and area sources. Subpart ZZZZ contains emissions and operating limits for HAPs emitted from stationary reciprocating internal combustion engines. Per 40 CFR 63.6590(c), the requirements of Subpart ZZZZ are met via compliance with 40 CFR 60, Subpart IIII.

4.1.4 40 CFR 68—CAA Section 112(r)

Title III of the 1990 CAA Amendments contains requirements for subject facilities that store and/or process certain hazardous substances for their safe use and storage. Under these requirements, facilities must identify and assess their hazards and carry out certain activities designed to reduce the likelihood and severity of accidental chemical releases. Section 112(r) of the CAA, codified in 40 CFR 68, mandates EPA publish rules to develop and implement risk management plans for sources with more than the threshold quantity of a listed regulated substance to identify, prevent, and minimize the consequences of accidental releases. There will be no change to the applicability of this rule due to the Project.

4.1.5 40 CFR 72 and 75—Acid Rain Program

Proposed CT units will be subject to EPA's Acid Rain Program, and CP Crane will comply with the requirements of an acid rain permit. Appendix E contains a completed acid rain permit application form.

4.1.6 40 CFR 97—Cross-State Air Pollution Rule

The Cross-State Air Pollution Rule was finalized on July 6, 2011, and requires states to improve air quality by reducing power plant emissions that contribute to ozone and/or fine particulate pollution in other states. Reduction will be achieved by means of a regional cap-and-trade program for SO₂ and NO_x emissions. After a number of delays due to court actions, the Cross-State Air Pollution Rule took effect January 1, 2015, and is applicable to the Repowering Project. CP Crane will comply with the requirements of 40 CFR 97.

4.1.7 40 CFR 98—Mandatory GHG Reporting

The Mandatory GHG Reporting Rule requires facilities that emit greater than 25,000 metric tpy of CO₂e to report their GHG emissions. As the Project will exceed this threshold, reporting under 40 CFR 98 will be required. The requirements for the electricity generation category are outlined in 40 CFR 98, Subpart D. The Project will install CO₂ CEMS or use Equation G-4 in 40 CFR 75, Appendix G, to monitor CO₂ emissions. Methane and nitrous oxide emissions will be calculated based on the methodologies specified in 40 CFR 98, Subpart C.

4.2 State Regulatory Review

Crane Station's air emissions sources are subject to various MDE general emissions standards for stationary sources contained in COMAR 26.11.06, General Emissions Standards, Prohibitions, and Restrictions. Baltimore County is included in Area III for MDE air regulatory purposes as specified in COMAR 26.11.01.03. Potentially applicable regulations from COMAR 26.11 are identified in the subsections.

4.2.1 COMAR 26.11.01—General Administrative Provisions

COMAR 26.11.01 contains general administrative provisions applicable to the Crane Station Repowering Project, including requirements for testing, monitoring, recordkeeping, an emissions

certification report, and malfunctions. CP Crane will comply with the applicable provisions of COMAR 26.11.01.

4.2.2 COMAR 26.11.03—Permits, Approvals, and Registrations: Title V Permits

COMAR 26.11.03 requires CP Crane to complete and submit a Title V Part 70 application no later than 12 months after the date the emissions units commence operation.

4.2.3 COMAR 26.11.04—Ambient Air Quality Standards

COMAR 26.11.04 adopts the federal NAAQS and establishes a state ambient air quality for fluorides. The state ambient air quality standard for fluorides established in COMAR 26.11.04.01 does not apply to the Project, as no emissions of fluorides are expected from the proposed emissions units. The Repowering Project will comply with the federal NAAQS provisions incorporated into COMAR 26.11.04.02.

4.2.4 COMAR 26.11.05—Air Pollution Episode System

COMAR 26.11.05 establishes the requirements for development and operation under an air pollution episode system, which is designed to provide standards and procedures to be followed whenever pollution of the air has the potential of reaching an emergency condition if allowed to go unchecked. COMAR 26.11.05 is applicable at MDE's discretion. If requested by MDE, CP Crane will prepare in writing standby emissions reduction plans, consistent with good industrial practice and safe operating procedures, for reducing emissions creating air pollution during periods of alert, warning, or emergency of an air pollution episode.

4.2.5 COMAR 26.11.06—General Emissions Standards, Prohibitions, and Restrictions

COMAR 26.11.06 establishes emissions standards for various pollutants from certain source types. Subsections of COMAR 26.11.06 potentially applicable to the Repowering Project are discussed in the following paragraphs.

4.2.5.1 COMAR 26.11.06.02—Visible Emissions

COMAR 26.11.06.02 establishes visible emissions limits for emissions sources. Per COMAR 26.11.09.02(A), the emissions sources required to comply with COMAR 26.11.09.05

take precedence over the requirements under this rule. Proposed sources are subject to COMAR 26.11.09.05 and, therefore, are not applicable to this rule. The visible emissions limitation specific to the Crane Station Repowering Project is explained under COMAR 26.11.09.05.

4.2.5.2 COMAR 26.11.06.03—PM

COMAR 26.11.06.03 establishes PM emissions limits for confined and unconfined sources and materials handling and construction operations. To minimize fugitive PM emissions from construction, the Project will comply with work practice standards in COMAR 26.11.06.03(D).

4.2.5.3 COMAR 26.11.06.04—CO in Areas III and IV

COMAR 26.11.06.04 is applicable only in Areas III and IV, and Baltimore County is under Area III. COMAR 26.11.06.04.A(2) applies to any installation that discharges CO at a rate exceeding 500 lb per day and at a concentration exceeding 12 percent by volume.

As per COMAR 26.11.06.04.A(4), a facility is not subject to this rule if the CO emissions will not violate NAAQS standards and the gas mixture containing CO will not support combustion due to the presence of noncombustible gases. The Repowering Project will not violate NAAQS and will demonstrate to MDE that the gas mixture containing CO will not support combustion; hence, this rule is not applicable.

4.2.5.4 COMAR 26.11.06.06—VOCs

The provisions of this regulation do not apply to the operations subject to the provisions of COMAR 26.11.09. The proposed CTs are subject to COMAR 26.11.09, and the subsections of that rule may be potentially applicable; hence, COMAR 26.11.06.06 is not applicable.

4.2.5.5 COMAR 26.11.06.08 and .09—Nuisance and Odors

COMAR 26.11.06.08 and .09 establish general provisions for control of nuisances and odor, respectively. The Repowering Project will be subject to these general requirements and will comply with the applicable requirements.

4.2.5.6 COMAR 26.11.06.12—Control of NSPS Sources

COMAR 26.11.06.12 adopts the federal NSPS regulations codified in 40 CFR 60. Applicability of NSPS regulations is discussed in Section 4.1.1.

4.2.5.7 COMAR 26.11.06.14—Control of PSD Sources

COMAR 26.11.06.14 incorporates by reference the federal PSD permitting regulations codified in 40 CFR 52.21. Nonapplicability of PSD permitting is discussed in Section 3.0.

4.2.6 COMAR 26.11.07—Open Fires

COMAR 26.11.07 prohibits open fires except as provided in COMAR 26.11.07.03 through .05. The Repowering Project will comply with the open fire prohibition and requirements.

4.2.7 COMAR 26.11.09—Control of Fuel-burning Equipment, Stationary Internal Combustion Engines, and Certain Fuel-burning Installations

COMAR 26.11.09 applies to fuel-burning units and establishes emissions standards for various pollutants from certain source types of fuel-burning units. The Project CTs meet the definition of fuel-burning equipment, and subsections of COMAR 26.11.09 potentially applicable to the Repowering Project are discussed in the following paragraphs.

4.2.7.1 COMAR 26.11.09.05—Visible Emissions

COMAR 26.11.09.05 establishes visible emissions limits for fuel burning equipment. The CTs for the Repowering Project will need to comply visible emissions limits under this regulation. Per COMAR 26.11.09.05(A)(2), proposed sources should not discharge emissions, other than water in an uncombined form, which is visible to human observers (i.e., to comply with a visible emissions limit of 10-percent opacity), except during startup and process modification or adjustments or occasional cleaning of control equipment if the visible emissions will not exceed 40-percent opacity and the visible emissions do not occur for more than 6 consecutive minutes in any 60-minute period. The Project will comply with COMAR 26.11.09.05.

4.2.7.2 COMAR 26.11.09.06—Control of PM

COMAR 26.11.09.06 limits emissions of PM from fuel-burning equipment. The requirements in this chapter do not apply to natural gas-burning or distillate oil-burning equipment. Since natural

gas and distillate oil is proposed to be the sole sources of fuel for the CTs being installed for this Project, these requirements do not apply to the Repowering Project.

4.2.7.3 COMAR 26.11.09.07—Control of Sulfur Oxides from Fuel-burning Equipment

COMAR 26.11.09.07 establishes limits for sulfur oxides emissions from fuel-burning equipment. The Repowering Project is in Area III and will comply with a limit of 0.3-percent sulfur content in ULSD fuel oil burned in the CTs per COMAR 26.11.09.07(A)(2)(b).

4.2.7.4 COMAR 26.11.09.08—Control of NO_x Emissions for Major Stationary Sources

COMAR 26.11.09.08 applies to installations that cause emissions of NO_x located at a facility that has a PTE for NO_x of 25 tpy or more located in Baltimore County.

The Project CTs emit NO_x emissions greater than 25 tpy; therefore, this rule is applicable. To demonstrate compliance with NO_x emissions limits, CP Crane will install CEMS for NO_x (as mentioned under NSPS Subpart KKKK), thereby satisfying the requirements specified in COMAR 26.11.09.08 B.2. CP Crane will comply with applicable provisions for CTs under this rule.

This rule does not apply to the proposed newly installed black-start generator, because the PTE emissions are less than 25 tpy, and the generator is not considered a major stationary source.

4.2.8 COMAR 26.11.15—Toxic Air Pollutants

COMAR 26.11.15.03 exempts fuel-burning equipment other than equipment burning refuse-derived fuel from conducting an analysis of best available control technology for toxics (TBACT). Per COMAR 26.11.15.03(B), the CTs and newly installed black-start generator are exempt from TBACT requirements. Hence, the Project CTs are not subject to this requirement.

4.2.9 COMAR 26.11.17—Nonattainment Provisions for Major New Sources and Major Modifications

COMAR 26.11.17 establishes Maryland's NNSR permitting program for major sources and major modifications. The Repowering Project is not a major modification, and the nonapplicability of NNSR permitting is demonstrated in Section 3.0.

4.2.10 COMAR 26.11.26—Conformity

COMAR 26.11.26 implements the conformity required of the CAA. CP Crane will comply with the general conformity requirements of 40 CFR 93, Subpart B, and COMAR 26.11.26.09.

4.2.11 COMAR 26.11.27—Emissions Limitations for Power Plants

COMAR 26.11.27 establishes emissions limitations for facilities listed in COMAR 26.11.27.01(B)(1). Crane Station is in the list of affected facilities. But CP Crane is proposing to shut down the existing coal-fired Units 1 and 2; therefore, COMAR 26.11.27 is not applicable.

4.3 COMAR 26.09—Maryland CO₂ Budget Trading Program

Crane Station is subject to the Maryland CO₂ Budget Trading Program outlined in COMAR 26.09. The Repowering Project is subject to the requirements of CO₂ reporting and the emissions reduction program. CP Crane will comply with the applicable requirements under this rule.

5.0 Air Quality Impact Analysis Methodology

5.1 General Approach

At the federal level, because the emissions increases from the Crane Station equipment are less than applicable major source thresholds, Crane Station will not trigger federal NSR requirements for any regulated air pollutant under either PSD or NNSR permitting programs. At the state level, the Repowering Project triggers air permitting through MDE as a minor source of air emissions subject to state permit-to-construct-and-operate permitting. If the agency considers any project triggering minor NSR permitting could threaten attainment with NAAQS, MDE can require air dispersion modeling for that project. A sitewide modeling analysis for criteria pollutants has been performed to demonstrate the Project will comply with NAAQS. This section details the NAAQS modeling assessment for the Repowering Project.

5.2 Pollutants Evaluated

NAAQS analysis was performed for NO_x, CO, PM₁₀, PM_{2.5}, SO₂, and lead (Table 5-1). An air quality impact analysis is not required for VOC or GHG, as EPA has not established NAAQS for these pollutants.

5.3 Model Selection

The most recent versions of the American Meteorological Society (AMS)/EPA Regulatory Model Improvement Committee (AERMIC) model (AERMOD) system components were used. These include the existing regulatory components (AERMOD, AERMOD meteorological preprocessor program [AERMET], AERMOD terrain preprocessor program [AERMAP], and Building Profile Input Program [BPIP] for Plume Rise Model Enhancement [PRIME] [BPIPPRM]), AERSURFACE, and AERMINUTE.

Table 5-1. Summary of Applicable NAAQS

Pollutant	Averaging Period	NAAQS ($\mu\text{g}/\text{m}^3$)
SO ₂	1- hour*	196
	3-hour†	1,300
PM ₁₀	24-hour§	150
PM _{2.5}	24-hour¥	35
	Annualψ	12
NO ₂	1-hour	188Δ
	Annual‡	100
CO	1-hour†	40,000
	8-hour†	10,000
Lead	Rolling 3-month	0.15

Note: $\mu\text{g}/\text{m}^3$ = microgram per cubic meter.
NO₂ = nitrogen dioxide.

*Standard based on 3-year average of the 99th percentile of the annual distribution of 1-hour daily maximum SO₂ concentrations.

†Not to be exceeded more than once per calendar year.

‡Arithmetic mean.

§Standards are attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu\text{g}/\text{m}^3$, as determined in accordance with 40 CFR 50, Appendix K, is equal to or less than 1 day.

¥98th percentile concentration, as determined in accordance with 40 CFR 50, Appendix N.

ψArithmetic mean concentration, as determined in accordance with 40 CFR 50, Appendix N.

ΔStandard based on 3-year average of the 98th percentile of the annual distribution of 1-hour daily maximum NO₂ concentrations.

Source: ECT, 2018.

AERMOD (Version 16216r) was used in the refined modeling analyses for flat, elevated, and complex terrain. AERMOD was run using the most recent version of the Providence Engineering and Environmental Group, LLC, BEEST Suite (BEEST), currently Version 11.11, an interface for EPA's AERMOD. AERMOD is an EPA-approved refined dispersion model for evaluating impacts of land-based stationary sources. AERMOD is one of the listed refined dispersion models in EPA's Guideline on Air Quality Models (GAQM) (40 CFR 51, Appendix W), which are required to be used for state implementation plan revisions for existing sources and NSR and PSD programs. An equivalency demonstration using EPA's standard version of the AERMOD code and the BEEST version of the AERMOD code was provided by Providence Engineering and Environmental Group, LLC, and is included with the air dispersion modeling data in Appendix D.

AERMOD with PRIME includes building downwash algorithms capable of modeling receptors in both the near-building wake (cavity) and far-building wake regions. The PRIME algorithm takes into account the distance from each building or structure to potentially affected sources in that building's region of influence. The inclusion of the cavity predictions within AERMOD removes a modeling discontinuity that existed with AERMOD without using the PRIME algorithm and removes the need for additional cavity impact analysis using the SCREEN3/AERSCREEN model or other calculation procedures.

5.4 Model Options

5.4.1 Regulatory Default Options

Default AERMOD control options were used in the refined modeling analysis consistent with EPA recommendations, including:

- Stack-tip downwash.
- Incorporation of effects of elevated terrain.
- Calm wind processing routine.
- Missing data processing routine.
- Default wind profile exponents.
- Default vertical potential temperature gradients.

5.4.2 Averaging Periods

Table 5-1 provides the applicable pollutants and applicable form of the averaging period for determination of ambient background design values and NAAQS.

5.4.3 Urban/Rural Dispersion Coefficients Determination

The selection of urban or rural designation for refined modeling input is based on the Auer land use classification procedure. The area, circumscribed by a 3-km radius circle centered about the Project CT stacks, is depicted on a U.S. Geological Survey (USGS) topographical map on Figure 2-3, Section 2.0. In making the urban/rural determinations, areas on the topographic map shaded pink and purple are considered urban, and areas shaded green are considered rural. National Land Cover Database (NLCD) Code 23 (developed, medium intensity) and Code 24 (developed, high intensity) are considered equivalent to Auer land use types recommended to be urban, according to land use procedures in Subsection 7.2.3(c) of EPA's GAQM. As shown in Figure 5-1, land use is predominantly rural classifications. Therefore, rural dispersion coefficients were used in the dispersion modeling analysis.

5.4.4 NO₂ Ambient Impact Analysis

For 1-hour nitrogen dioxide (NO₂) impacts, the default Tier 2/ambient ratio method NO_x conversion option was used in accordance with 40 CFR 51, Appendix W, EPA guidance revised in 2017. The national default for the default Tier 2/ambient ratio method has a minimum ambient NO₂/NO_x ratio of 0.5 and a maximum ambient ratio of 0.9, which was used as discussed in EPA NO₂ modeling guidance.

The Tier 3 NO_x conversion option was not necessary (e.g., plume volume molar ratio method) for this modeling analysis. Therefore, additional documentation in support of its use is not provided in this application. Additionally, as identified in EPA's revised Appendix W, emissions sources that operate intermittently were not included in the modeling analysis.

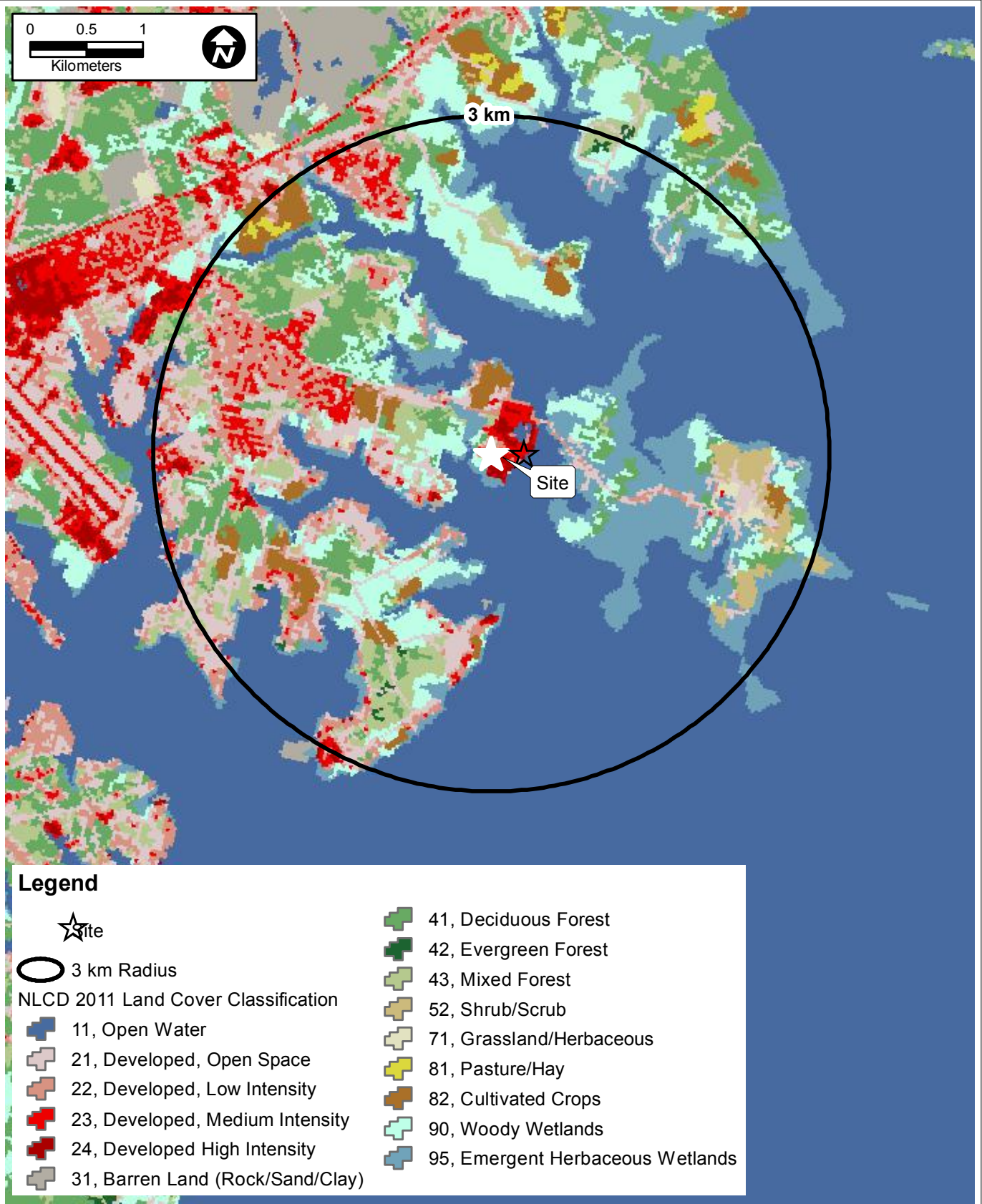


FIGURE 5-1.

PROJECT SITE LAND COVER (NLCD 2011)

Sources: Esri Basemap Imagery, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

5.5 Terrain Consideration

The GAQM defines flat terrain as terrain equal to the elevation of the stack base, simple terrain as terrain lower than the height of the stack top, and complex terrain as terrain exceeding the height of the stack being modeled.

The site elevation for the Project site is approximately 5 feet above mean sea level (ft-msl). The Project CT stacks will each have a height of 150 feet above ground level (ft-agl). Accordingly, terrain elevations above approximately 155 ft-msl (for the CT) are classified as complex terrain. USGS National Elevation Dataset (NED) terrain data in georeferenced tagged image file format (GeoTIFF) were examined for terrain features within the expected Project impact area. Crane Station occupies the end of a small peninsula into Gunpowder River and Chesapeake Bay. Saltpeter Creek lies to the north, while Seneca Creek is to the south. The topography near the Project site is mostly flat with elevations gradually increasing as you move out from the Project site in all directions. The maximum elevation within 10 km of the Project site is 375 ft-msl. Based on this examination, terrain near the Project site is classified as ranging from flat to complex terrain.

In accordance with the GAQM recommendations for AERMOD, each modeled receptor was assigned a terrain elevation based on USGS NED data and use of AERMAP, the AERMOD terrain preprocessing program. AERMAP was used in accordance with the latest version of the AERMAP User's Guide (March 2011) (EPA, 2011) and EPA's GAQM.

5.6 Good Engineering Practice Stack Height and Building Downwash Evaluation

The CAA Amendments of 1990 require the degree of emissions limitation required for control of any pollutant not be affected by a stack height that exceeds good engineering practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (40 CFR 51). GEP stack heights for the facility emissions sources will comply with EPA promulgated final stack height regulations. GEP stack height is defined as the highest of 65 meters, or a height established by applying the formula:

$$H_g = H + 1.5L$$

where: H_g = GEP stack height.

H = height of the structure or nearby structure.

L = lesser dimension (height or projected width) of the nearby structure.

Nearby is defined as a distance up to five times the lesser of the height or width dimension of a structure or terrain feature but not greater than 800 meters. While GEP stack height regulations require stack height used in modeling for determining compliance with NAAQS and PSD increments not exceed GEP stack height, the actual stack height may be greater.

Heights proposed for the CT stacks (150 ft-agl) are less than the GEP stack height calculated by BPIPPRM as well as the default GEP height of 213 ft (65 meters). Since the stack heights for the Project emissions sources will comply with EPA promulgated final stack height regulations, the proposed Project stack heights were used in the modeling analyses.

While GEP stack height rules address the maximum stack height that can be employed in a dispersion model analysis, stacks having heights lower than GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. AERMOD evaluates the effects of building downwash based on PRIME building downwash algorithms. For the ambient impact analysis, the complex downwash analysis implemented by AERMOD was performed using the current version of EPA's BPIPPRM (Version 04274 September 30, 2004). The EPA BPIP program was used to determine the area of influence for each building, whether a particular stack is subject to building downwash, the area of influence for directionally dependent building downwash, and finally to generate the specific building dimension data required by the model. BPIP output consists of an array of 36 direction-specific (10 to 360 degrees) building heights (BUILDHGT keyword), lengths (BUILDLIN keyword), widths (BUILDWID keyword), along-flow (XBADJ keyword), and across-flow (YBADJ keyword) distances for each stack suitable for use as input to AERMOD. Downwash was computed for the Project's source stacks. The building/structure dimensions were determined from engineering layouts and specifications. Figure 5-2 shows the buildings/structures source locations considered in the modeling analysis and the fence line.



FIGURE 5-2.

SOURCE LOCATIONS, FENCE LINE, AND MAIN BUILDING
STRUCTURES INCLUDED IN GEP ANALYSIS

Sources: Esri Basemap Imagery, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

5.7 Receptor Grids

Receptors were placed at locations considered ambient air, defined as “that portion of the atmosphere, external to buildings, to which the general public has access.” The nearest locations of general public access will be at the existing fence line and the waterfront boundary.

The ambient impact analysis used the following receptor grids:

- Fence Line Receptors—Receptors placed along the existing fence line and waterfront boundary spaced 25 meters apart
- Fine Grid Receptors—Receptors at 100-meter spacings starting at the fence line and extending to approximately 10,000 meters

Per the AERMAP User’s Guide, the domain was considered sufficiently large to accommodate the significant nodes such that all terrain features that exceed a 10-percent elevation slope from any given receptor were considered. The “calculate domain” feature of BEEST was used to determine the domain and quads required so the terrain that exceeds the 10-percent slope was included.

Terrain elevations at each of the receptor points was specified by importing NED GeoTIFF terrain data files covering the modeling domain into the BEEST interface. The 0.33-arc-second (10-meter spatial resolution) NED elevation GeoTiff files were obtained for the modeling domain from the Multi-Resolution Land Characteristics Consortium website (<http://www.mrlc.gov/>). The receptor grid used in the modeling analysis was based on North American Datum of 1983 datum and in Zone 18. Figures 5-3 and 5-4 show the far-field and near-field Cartesian receptor grid, respectively, considered for the modeling analysis.

5.8 Meteorological Data

EPA AERMET and AERSURFACE meteorological data preprocessing programs were used to generate the meteorological data required by AERMOD. The AERMET meteorological preprocessing program creates two files used by AERMOD: surface and profile. The surface file contains boundary layer parameters, including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convectively generated boundary layer (CBL)

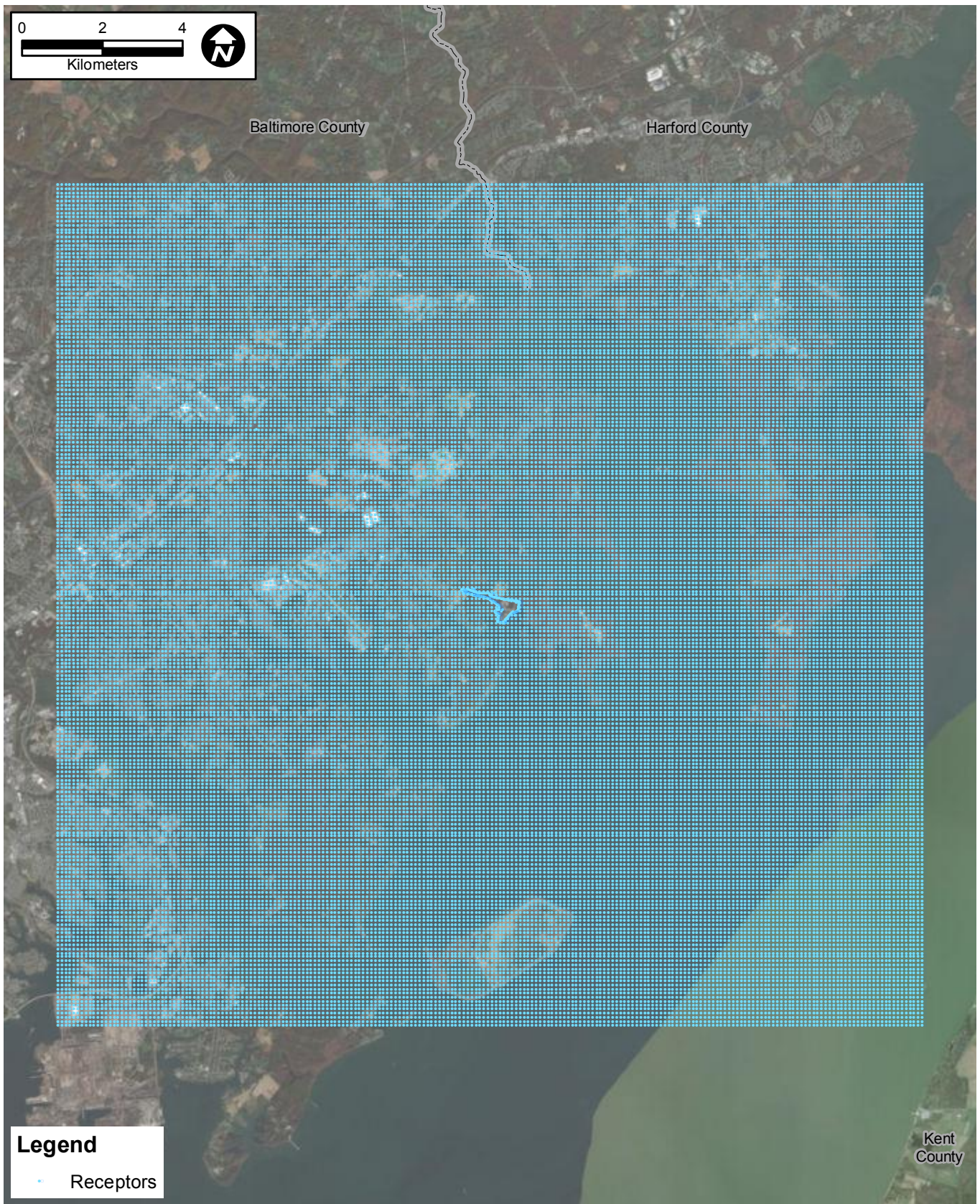


FIGURE 5-3.

10-km RECEPTOR GRID FOR NAAQS MODELING
ANALYSIS

Sources: Esri Basemap Imagery, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.



FIGURE 5-4.
NEAR-FIELD RECEPTOR GRID FOR NAAQS MODELING
ANALYSIS

Sources: Esri Basemap Imagery, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

height, stable boundary layer (SBL) height, and surface heat flux. The profile file contains multilevel data of windspeed, wind direction, and temperature.

AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, CBL and SBL heights, and surface heat flux. In addition, AERMET passes the observed meteorological parameters to AERMOD, including wind direction and speed (at multiple heights, if available), temperature, and, if available, measured turbulence. AERMOD uses this information to calculate concentrations in a manner that accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological processor requires the determination of three surface characteristics: surface roughness length (z_o), albedo (α), and Bowen ratio (B_o). Surface roughness length is related to the height of obstacles to the wind flow and is the height at which the mean horizontal wind speed is zero based on a logarithmic profile. Surface roughness length influences the surface shear stress and is an important factor in determining the magnitude of mechanical turbulence and stability of the boundary layer. Albedo is the fraction of total incident solar radiation reflected by the surface back to space without absorption. The daytime Bowen ratio, an indicator of surface moisture, is the ratio of sensible heat flux to latent heat flux and, together with albedo and other meteorological observations, is used for determining planetary boundary layer parameters for convective conditions driven by the surface sensible heat flux. The EPA AERSURFACE program was developed to aid users in obtaining realistic and reproducible surface characteristic values, including albedo, Bowen ratio, and surface roughness length, for input to AERMET. The program uses publicly available national land cover datasets and look-up tables of surface characteristics that vary by land cover type and season.

The meteorological data used in the air quality modeling consists of the most recent 5 years (2012 to 2016) of National Weather Service (NWS) data from the Baltimore/Washington International Thurgood Marshall Airport (BWI) surface meteorological station and the Sterling, Virginia, upper air station. The surface meteorological NWS site (Weather Bureau Army Navy [WBAN] Station No. 93721) is located at BWI approximately 32 km southeast of the Project site. MDE provided the meteorological data on March 27, 2018.

Table 5-2 summarizes identifying and location information for the BWI and Sterling, Virginia, stations. Figure 5-5 shows the relative locations of the meteorological sites and Repowering Project site. Figure 5-6 presents a wind rose for BWI from the 10-meter level. The wind rose was generated using the AERMET surface file (which included the 1-minute automated surface observing system data). As shown in the wind rose, the predominant wind direction for the site is from the west, although winds out of the southwest are also common.

Table 5-2. Meteorological Data Used in Running AERMET

Meteorological Site	Latitude	Longitude	Base Elevation (meters)
BWI	39.183	76.667	47.0
Sterling, Virginia	38.974	77.468	82.0

Source: ECT, 2018.

5.9 Representative Background Ambient Concentrations

Background concentrations representative of the Project's modeling domain were obtained from the most recent years of certified monitoring data (2014 through 2016) from the EPA Air Data website (<https://www.epa.gov/outdoor-air-quality-data>). Background concentrations of NO₂, SO₂, CO, and PM_{2.5} are based on data from the Essex monitor (Site ID 24-005-3001), whereas background concentrations of PM₁₀ are based on data from the Glen Burnie monitor (Site ID 24-003-1003) and lead from the Beltsville monitor (Site ID 24-033-0030). The CO 1- and 8-hour background concentrations are the highest concentrations from the 3 years of monitor values. The NO₂ 1-hour background concentration is the average of the 3-year 98th percentile monitor value. The NO₂ annual background concentration is the highest concentration from the 3 years of monitor values. The SO₂ 1-hour background concentration is the average of the 3-year 99th percentile monitor value. The SO₂ 3-hour background concentration is the highest concentration from the 3 years of monitor values. The PM₁₀ 24-hour background concentration is the highest concentration from the 3 years of monitor values. The PM_{2.5} 24-hour background concentration is the 3-year average of the 98th percentile. The PM_{2.5} annual background concentration value is the 3-year average of the weighted arithmetic mean monitor value. For

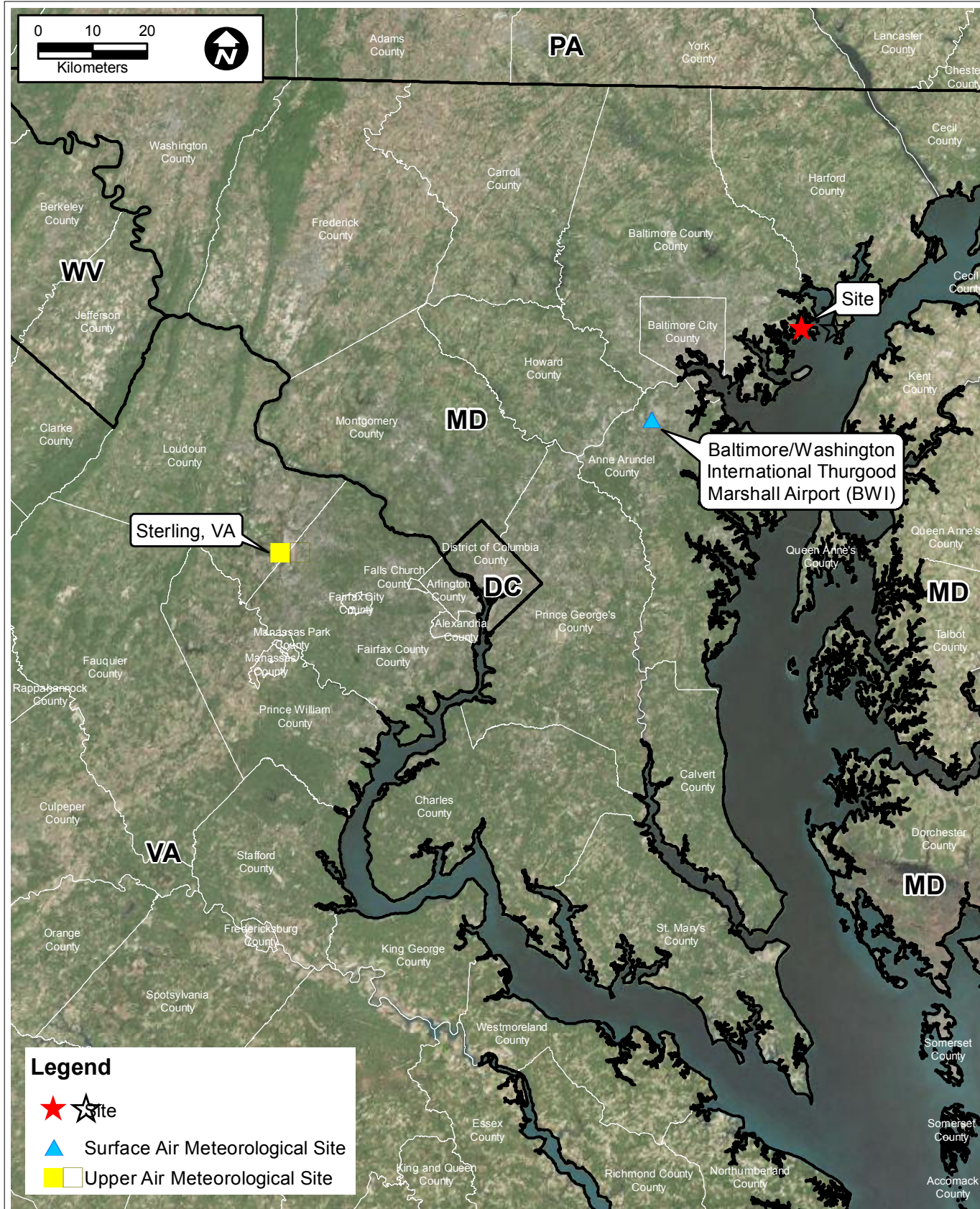
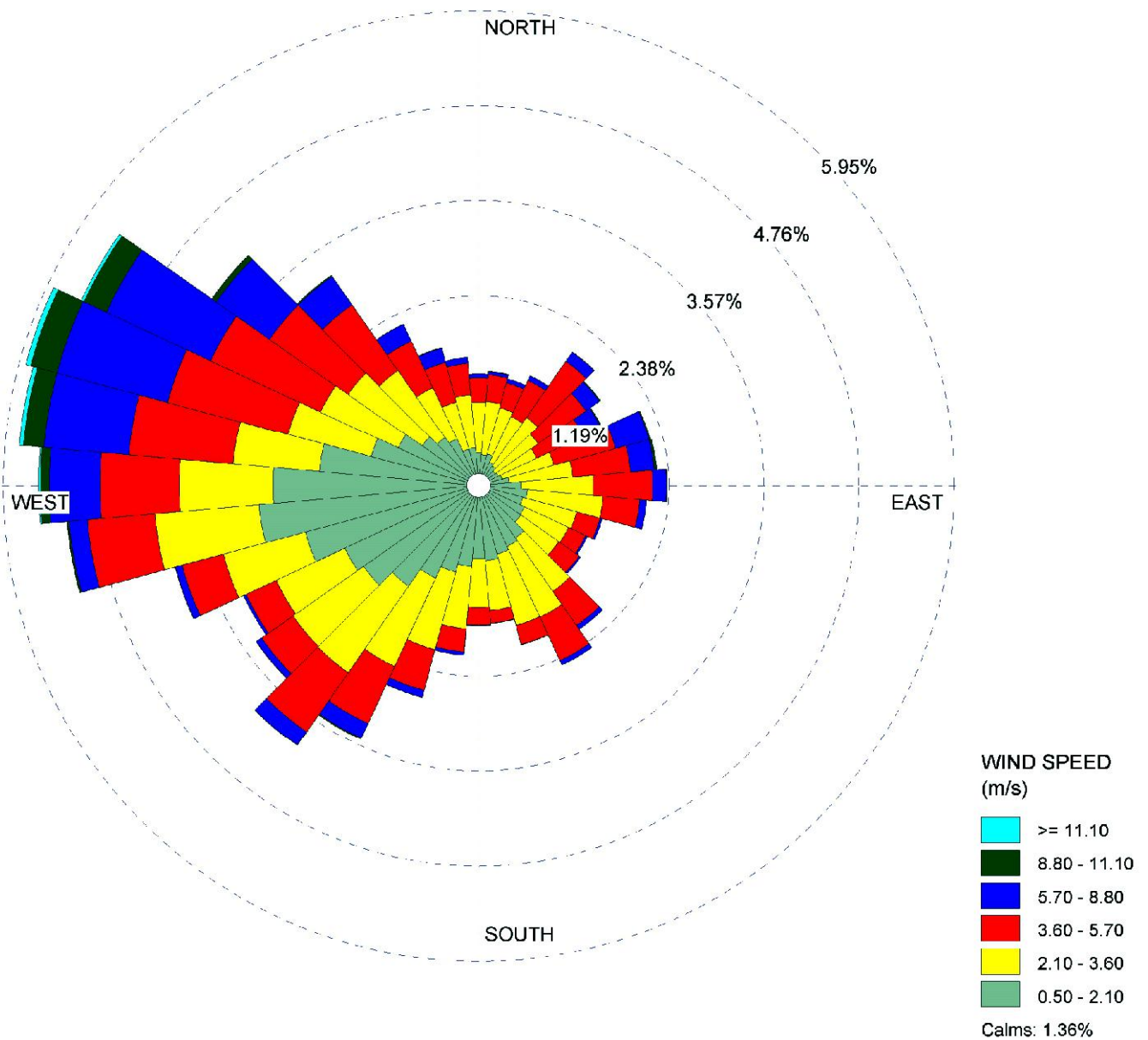


FIGURE 5-5.

LOCATIONS OF METEOROLOGICAL SITES

Sources: Esri Basemap Imagery, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.



Note: Wind Direction (Blowing From)

FIGURE 5-6.

BWI AIRPORT WIND ROSE (2012-2016)

Sources: MDE Provided Met Data.

ECT Environmental Consulting & Technology, Inc.

lead, since the only Maryland monitor was reporting 0.0 for the maximum 3-month average, the average of the fourth maximum monitor value is being conservatively used. Table 5-3 provides a summary of the ambient background concentrations to be used in the NAAQS compliance assessment.

Table 5-3. Proposed Background Concentrations

Pollutant	Averaging Period	Proposed Background Concentration ($\mu\text{g}/\text{m}^3$)
NO ₂	1 hour	90.24
	Annual	29.92
PM _{2.5}	24-hour	22.67
	Annual	9.47
PM ₁₀	24-hour	35.00
CO	1 hour	5,257.14
	8-hour	1,888.89
SO ₂	1-hour	49.65
	3-hour	114.92
Lead	Rolling 3-month	0.004

Sources: EPA Air Data Website (<https://www.epa.gov/outdoor-air-quality-data>).
ECT, 2018.

5.10 Modeled Emissions Inventory

The dispersion modeling analyses conducted for the Repowering Project adheres to EPA's revised GAQM (40 CFR 51, Appendix W) (EPA, 2017). Based on the current Project design, the CTs are the primary sources of pollutant emissions at Crane Station. Significantly smaller quantities of criteria pollutants are emitted from the newly installed black-start generator, existing CT, existing emergency generator, and existing fire water pump. Modeling of facility sources was performed using appropriate emissions rates and stack parameters for each individual pollutant and averaging time.

As will be discussed in the following sections, dispersion modeling for the Repowering Project was conducted in a manner that used the CTs' worst-case operating conditions associated with the ambient temperature range that emissions were evaluated, in an effort to predict the highest

impact for each pollutant and averaging period. Maximum predicted impacts from the worst-case scenarios were analyzed for comparison to federal NAAQS.

5.10.1 Simple-cycle Turbine—Normal Operation

Based on current Project design parameters, CP Crane intends to apply for a permit that will allow annual operation of 2,628 hours, of which 263 hours may be burning ULSD fuel (excluding startup and shutdown). Since emissions rates and flue gas characteristics for a given CT load vary as a function of ambient temperature, data was derived for both natural gas and ULSD fuel oil for four operating loads (100, 75, 60, and 50 percent) and three ambient temperatures (95, 59, and 0°F) each.

The proposed GE CT is rated at a maximum capacity of 398 MMBtu/hr when operating on natural gas and 381 MMBtu/hr when operating on ULSD fuel.

To conservatively calculate ground-level concentrations, a composite worst-case set of emissions parameters were used in the modeling in an initial approach. For each CT load in the initial modeling, the highest pollutant-specific emissions rate coupled with the lowest exhaust temperature and exhaust flow rate was selected. Table 5-4 summarizes worst-case emissions parameters for the CTs over the proposed operating loads.

Table 5-4. Worst-case Data* for Proposed GE LM6000PC Simple-cycle Turbine Operation

Parameter		100%	75%	60%	50%
Stack height (ft)		150	150	150	150
Stack diameter (ft)		9	9	9	9
Natural Gas-fired					
Exit temperature (°F)		837	767	746	717
Exit velocity (fps)		100.78	105.02	99.49	88.15
Pollutant emissions per CT (lb/hr)	PM ₁₀	5.00	4.01	3.44	3.03
	PM _{2.5}	5.00	4.01	3.44	3.03
	NO _x	35.45	32.31	29.94	28.15
	CO	25.89	27.54	27.70	27.41
	SO ₂	0.56	0.45	0.38	0.34
	Lead	1.95E-04	1.95E-04	1.95E-04	1.95E-04
ULSD Fuel Oil-fired					
Exit temperature (°F)		833	771	752	722
Exit velocity (fps)		102.04	103.34	98.36	86.88
Pollutant emissions per CT (lb/hr)	PM ₁₀	12.42	9.96	8.65	7.63
	PM _{2.5}	12.42	9.96	8.65	7.63
	NO _x	58.99	53.55	49.59	46.56
	CO	30.78	31.82	32.34	31.71
	SO ₂	0.57	0.46	0.40	0.35
	Lead	5.33E-03	5.33E-03	5.33E-03	5.33E-03

Note: °F = degree Fahrenheit.
fps = foot per second.
ft = foot.
lb/hr = pound per hour.

*Table values represent per turbine worst-case parameters and emissions rates for each of the four operating loads enveloped across ambient temperatures.

Source: ECT, 2018.

5.10.2 Simple-cycle Turbine—Startup/Shutdown Operation

Startup/shutdown modeling was conducted for the short-term pollutants and averaging periods that had the potential for elevated emissions combined with lower plume rise during startup/shutdown conditions. Since emissions are higher for startup operations than shutdown, the more conservative startup emissions were modeled. Also, only NO_x and CO emissions were modeled during startup, since emissions of SO₂, PM₁₀, and PM_{2.5} are higher during normal operation. Therefore, the pollutants and averaging periods evaluated included 1-hour NO₂, 1-hour CO, and 8-hour CO.

For purposes of modeling ambient impacts from startups, short-term emissions rates developed for startup operations for the proposed CTs take into account the time from ignition to compliance. The startup of the CTs has a duration of approximately 10 minutes. Emissions were calculated per startup event. Therefore, to conservatively quantify short-term average emissions rates for startup events, it was assumed the CTs were at 100-percent load for the balance of the averaging period when it is not in startup mode. The startup event and balance of the averaging period at 100 percent were modeled as separate stacks and were source-grouped together to get the overall concentration. Table 5-5 shows a summary of the startup emissions and pollutants for which startup modeling was conducted.

Table 5-5. Summary of Short-term Average Emissions Rates for CT Startups

Scenario	Units	Startup			100% Load	
		One Unit (per event)	Per Hour		Per Hour	
			1-hour Average	8-hour Average	1-hour Average	8-hour Average
Natural Gas						
Time from ignition until compliance	minutes	10				
Estimated exit velocity	fps		71.40	71.40	81.63	81.63
Estimated stack temperature	°F		717	717	837	837
NO _x	lb		3.60	N/A	29.54	N/A
CO	lb		3.20	0.80	21.58	24.81
ULSD Fuel Oil						
Time from ignition until compliance	minutes	10				
Estimated exit velocity	fps		70.37	70.37	82.65	82.65
Estimated stack temperature	°F		722	722	833	833
NO _x	lb		12.80	N/A	49.16	N/A
CO	lb		11.60	2.90	25.65	29.50

Note: ACFM = actual cubic feet per minute.

°F = degree Fahrenheit.

lb = pound.

Source: ECT, 2018.

5.10.3 Black-start Generator

The newly installed black-start generator will be tested once per year for 1 hour. Therefore, the modeled short-term emissions (24 hours or less) were normalized to operate 1 hour within the averaging period for the assessment of short-term modeled averaging periods. The newly installed black-start generator is only expected to operate when there is no electricity on the grid; however, 100 hours of annual operation was conservatively assumed for assessment of annual

modeled averaging periods. Table 5-6 provides stack parameters and criteria pollutant emissions rates for the newly installed black-start generator.

Table 5-6. Source Parameters and Criteria Pollutant Emissions Rates for the Black-start Generator

Stack Height (ft)	Stack Diameter (ft)	Exit Temperature (°F)	Exit Velocity (fps)	Hourly Emissions (lb/hr)					
				NO _x	CO	PM ₁₀	PM _{2.5}	SO ₂	Lead
9.33	0.7	750	147.34	*	37.70	0.0744	0.0744	0.0244	—

Note: °F = degree Fahrenheit.
fps = foot per second.
ft = foot.
lb/hr = pound per hour.

*Not included; intermittent source.

Source: ECT, 2018.

5.10.4 Ancillary Sources

Since the performance data for the auxiliary equipment are not affected by ambient conditions, only one set of parameters were modeled (e.g., stack parameters and emissions rates associated with 100-percent load). Table 5-7 provides stack parameters and criteria pollutant emissions rates for the existing CT.

Table 5-7. Source Parameters and Criteria Pollutant Emissions Rates for the Existing CT

Stack Height (ft)	Stack Diameter (ft)	Exit Temperature (°F)	Exit Velocity (fps)	Hourly Emissions (lb/hr)					
				NO _x	CO	PM ₁₀	PM _{2.5}	SO ₂	Lead
32	7.5	900	151.08	*	0.90	1.13	1.04	28.06	3.67E-03

Note: °F = degree Fahrenheit.
fps = foot per second.
ft = foot.
lb/hr = pound per hour.

*Not included; intermittent source.

Source: ECT, 2018.

The emergency diesel generator is tested for 30 minutes every month while the fire water pump is tested for 30 minutes every week. Therefore, the modeled short-term emissions (24 hours or less) were normalized to operate 30 minutes within the averaging period for the assessment of

short-term modeled averaging periods. Testing scenarios are assumed to not occur during startup or shutdown scenarios and therefore are only included during the normal operation scenarios. Additionally, for 1-hour NO₂ modeling, these units were not included in the modeling because of their intermittent operations.

The emergency generator and fire water pump are expected to operate no more than 10 and 50 hr/yr, respectively. However, the modeled annual emissions rates were conservatively based on 100 hours of annual operation for the assessment of annual modeled averaging periods.

Table 5-8 provides stack parameters and criteria pollutant emissions rates for the existing emergency diesel generator and existing fire water pump.

Table 5-8. Source Parameters and Criteria Pollutant Emissions Rates for Emergency Equipment, ULSD Fuel Oil-fired

Stack Height (ft)	Stack Diameter (ft)	Exit Temperature (°F)	Exit Velocity (fps)	Emissions									
				NO _x		CO		PM ₁₀	PM _{2.5}		SO ₂		Lead
				Annual (tpy)	1-hour (lb/hr)	1-hour (lb/hr)	8-hour (lb/hr)	24-hour (lb/hr)	24-hour (lb/hr)	Annual (tpy)	1-hour (lb/hr)	3-hour (lb/hr)	Monthly (lb/hr)
Emergency generator													
10	0.75	695	95.79	0.93	*	2.004	0.251	0.0275	0.0275	0.066	0.62	0.205	—
Firewater pump engine													
8	0.5	853	194.98	0.618	*	1.333	0.167	0.0183	0.0183	0.044	0.41	0.136	—

Note: °F = degree Fahrenheit.
fps = foot per second.
ft = foot.
lb/hr = pound per hour.

*Not included; intermittent source

Source: ECT, 2018.

6.0 Results of Class II Air Quality Impact Analyses

Table 6-1 presents the maximum modeled ambient air impacts from post-Project emissions from Crane Station calculated by AERMOD. As shown in the table, the maximum modeled concentrations when combined with a representative background concentration are less than applicable NAAQS for all pollutants.

Table 6-1. Facility Maximum Modeled Concentrations Compared to NAAQS

Pollutant	Averaging Period	Maximum Modeled Concentration* (µg/m³)	Monitored Background Concentration (µg/m³)	Total Concentration (µg/m³)	NAAQS (µg/m³)	Complies? (Yes/No)
CO	1-hour†	5,291.19	5,257.14	10,548.33	40,000	Yes
	8-hour†	262.18	1,888.89	2,151.07	10,000	Yes
NO ₂	1-hour‡	46.26	90.24	136.50	188	Yes
	Annual§	3.03	29.92	32.95	100	Yes
PM ₁₀	24-hour¥	6.44	35.00	41.44	150	Yes
PM _{2.5}	24-hour‡	2.26	22.67	24.93	35	Yes
	Annualψ	0.19	9.47	9.66	12	Yes
SO ₂	1-hourΔ	116.04	49.65	165.69	196	Yes
	3-hour†	68.39	114.92	183.31	1,300	Yes
Lead	Calendar quarter arithmetic mean	0.0007	0.004	0.005	0.15	Yes

*Maximum modeled concentration across all fuels and operating loads.

†Not to be exceeded more than once per calendar year.

‡98th percentile averaged over 3 years.

§Annual mean.

¥Not to be exceeded more than once per year on an average over 3 years.

ψAnnual arithmetic mean concentration averaged over 3 years.

Δ99th percentile of 1-hour daily maximum concentrations averaged over 3 years.

Source: ECT, 2018.

Appendix A

MDE Air Permitting Forms



AIR QUALITY PERMIT TO CONSTRUCT APPLICATION CHECKLIST

OWNER OF EQUIPMENT/PROCESS	
COMPANY NAME:	C.P. Crane, LLC
COMPANY ADDRESS:	200 W. Madison St., Suite 3810 Chicago, IL 60606
LOCATION OF EQUIPMENT/PROCESS	
PREMISES NAME:	C.P. Crane, LLC
PREMISES ADDRESS:	1001 Carroll Island Road, Chase, Maryland 21220
CONTACT INFORMATION FOR THIS PERMIT APPLICATION	
CONTACT NAME:	David R. Dunbar
JOB TITLE:	VP Operations & Development
PHONE NUMBER:	404-229-1069
EMAIL ADDRESS:	ddunbar@mrpgenco.com
DESCRIPTION OF EQUIPMENT OR PROCESS	
Three (3) Simple Cycle Combustion Turbines and One (1) Black Start Generator	

Application is hereby made to the Department of the Environment for a Permit to Construct for the following equipment or process as required by the State of Maryland Air Quality Regulation, COMAR 26.11.02.09.

Check each item that you have submitted as part of your application package.

- ☒ Application package cover letter describing the proposed project
- ☒ Complete application forms (Note the number of forms included or NA if not applicable.)

No. <u>NA</u> Form 5	No. <u>1</u> Form 11
No. <u>NA</u> Form 5T	No. <u>NA</u> Form 41
No. <u>NA</u> Form 5EP	No. <u>1</u> Form 42
No. <u>1</u> Form 6	No. <u>NA</u> Form 44
No. <u>NA</u> Form 10	
- ☒ Vendor/manufacturer specifications/guarantees
- ☒ Evidence of Workman's Compensation Insurance
- ☐ Process flow diagrams with emission points
- ☒ Site plan including the location of the proposed source and property boundary
- ☒ Material balance data and all emissions calculations
- ☐ Material Safety Data Sheets (MSDS) or equivalent information for materials processed and manufactured.
- ☐ Certificate of Public Convenience and Necessity (CPCN) waiver documentation from the Public Service Commission ⁽¹⁾
- ☐ Documentation that the proposed installation complies with local zoning and land use requirements ⁽²⁾
 - ⁽¹⁾ Required for emergency and non-emergency generators installed on or after October 1, 2001 and rated at 2001 kW or more.
 - ⁽²⁾ Required for applications subject to Expanded Public Participation Requirements.

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Blvd ▪ Baltimore, Maryland 21230
(410) 537-3230 ▪ 1-800-633-6101 ▪ www.mde.state.md.us

Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR FUEL BURNING EQUIPMENT

Permit to Construct ☒ Registration Update ☐ Initial Registration ☐

1A. Owner of Equipment/Company Name C.P. Crane, LLC				DO NOT WRITE IN THIS BOX 2. Registration Number <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;"> County No. <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 1-2 </td> <td style="width: 50%; text-align: center;"> Premises No. <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 3-6 </td> </tr> <tr> <td style="text-align: center;"> Registration Class <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 7 </td> <td style="text-align: center;"> Equipment No. <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 6-11 </td> </tr> <tr> <td style="text-align: center;"> Data Year <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 12-13 </td> <td style="text-align: center;"> Application Date <div style="border: 1px solid black; width: 100%; height: 20px; margin: 0 auto;"></div> </td> </tr> </table>				County No. <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 1-2	Premises No. <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 3-6	Registration Class <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 7	Equipment No. <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 6-11	Data Year <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 12-13	Application Date <div style="border: 1px solid black; width: 100%; height: 20px; margin: 0 auto;"></div>																						
County No. <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 1-2	Premises No. <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 3-6																																		
Registration Class <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 7	Equipment No. <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 6-11																																		
Data Year <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> 12-13	Application Date <div style="border: 1px solid black; width: 100%; height: 20px; margin: 0 auto;"></div>																																		
Mailing Address/Street 200 W. Madison St. Suite 3810																																			
City Chicago	State IL	Zip Code 60606																																	
Telephone Number 404-229-1069																																			
Print Name/Title David R. Dunbar / VP Operations & Development																																			
Signature:				Date: May 24, 2018																															
1B. Equipment Location (if different from above give Street Number and Name, City, State, Zip and Telephone Number): 1001 Carroll Island Road, Chase, Maryland, 21220 Premises Name (if different from above):																																			
<table style="width: 100%; border: none;"> <tr> <td style="width: 20%;">3. Status</td> <td style="width: 20%;">Status</td> <td style="width: 20%;">New Construction Began (MM/YY)</td> <td style="width: 20%;">New Construction Completed (MM/YY)</td> <td style="width: 20%;">Existing Initial Operation (MM/YY)</td> </tr> <tr> <td> A= New Equipment B= Modification to Existing Equipment C= Existing Equipment </td> <td style="text-align: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;">A</div> 15 </td> <td style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 16-19 </td> <td style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 20-23 </td> <td style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 20-23 </td> </tr> </table>								3. Status	Status	New Construction Began (MM/YY)	New Construction Completed (MM/YY)	Existing Initial Operation (MM/YY)	A= New Equipment B= Modification to Existing Equipment C= Existing Equipment	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;">A</div> 15	<div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 16-19	<div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 20-23	<div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 20-23																		
3. Status	Status	New Construction Began (MM/YY)	New Construction Completed (MM/YY)	Existing Initial Operation (MM/YY)																															
A= New Equipment B= Modification to Existing Equipment C= Existing Equipment	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;">A</div> 15	<div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 16-19	<div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 20-23	<div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> 20-23																															
4. Describe this Equipment (Make, Model, Features, Manufacturer, etc.): General Electric LM6000 Combustion Turbine																																			
5. Workmen's Compensation Coverage: Binder/Policy Number: 7839-09-30 Company Name: Federal Insurance Company Expiration Date April 7, 2019 NOTE: Before a Permit to Construct may be issued by the Department, the applicant must provide the Department with proof of worker's compensation coverage as required under Section 1-202 of the Worker's Compensation Act.																																			
6. Number of Pieces of Identical Equipment to be Registered/Permitted at this Time: 3																																			
7. Person Installing this Equipment (if different from above give Name/Title, Company Name, Mailing Address and Telephone Number):																																			
8. Major Activity, Product or Service of Company at this Location: Electric Utility Generation																																			
9. Control Devices Associated with this Equipment <table style="width: 100%; border: none;"> <tr> <td style="width: 12.5%;">None <input type="checkbox"/></td> <td style="width: 12.5%;">Simple/Multiple <input type="checkbox"/></td> <td style="width: 12.5%;">Spray/Adsorb <input type="checkbox"/></td> <td style="width: 12.5%;">Venturi <input type="checkbox"/></td> <td style="width: 12.5%;">Carbon <input type="checkbox"/></td> <td style="width: 12.5%;">Electrostatic <input type="checkbox"/></td> <td style="width: 12.5%;">Bag-house <input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">24-0</td> <td style="text-align: center;">24-1</td> <td style="text-align: center;">24-2</td> <td style="text-align: center;">24-3</td> <td style="text-align: center;">24-4</td> <td style="text-align: center;">24-5</td> <td style="text-align: center;">24-6</td> </tr> <tr> <td colspan="2" style="text-align: center;">Thermal/Catalytic <input type="checkbox"/></td> <td style="text-align: center;">Dry <input type="checkbox"/></td> <td style="text-align: center;">Other <input checked="" type="checkbox"/></td> <td colspan="3"></td> </tr> <tr> <td colspan="2" style="text-align: center;">Afterburner 24-7</td> <td style="text-align: center;">Scrubber 24-8</td> <td style="text-align: center;">24-9</td> <td colspan="3"></td> </tr> </table> Describe <u>Water Injection</u>								None <input type="checkbox"/>	Simple/Multiple <input type="checkbox"/>	Spray/Adsorb <input type="checkbox"/>	Venturi <input type="checkbox"/>	Carbon <input type="checkbox"/>	Electrostatic <input type="checkbox"/>	Bag-house <input type="checkbox"/>	24-0	24-1	24-2	24-3	24-4	24-5	24-6	Thermal/Catalytic <input type="checkbox"/>		Dry <input type="checkbox"/>	Other <input checked="" type="checkbox"/>				Afterburner 24-7		Scrubber 24-8	24-9			
None <input type="checkbox"/>	Simple/Multiple <input type="checkbox"/>	Spray/Adsorb <input type="checkbox"/>	Venturi <input type="checkbox"/>	Carbon <input type="checkbox"/>	Electrostatic <input type="checkbox"/>	Bag-house <input type="checkbox"/>																													
24-0	24-1	24-2	24-3	24-4	24-5	24-6																													
Thermal/Catalytic <input type="checkbox"/>		Dry <input type="checkbox"/>	Other <input checked="" type="checkbox"/>																																
Afterburner 24-7		Scrubber 24-8	24-9																																



10. Annual Fuel Consumption for this Equipment Only

OIL-1000 GALLONS

26-31

SULFUR %

32-33

GRADE

34

NATURAL GAS-1000 FT³

35-41

LP GAS-100 GALLONS

42-45

GRADE

64-65

COAL- TONS

46-52

SULFUR %

53-55

ASH%

56-58

WOOD-TONS

59-63

MOISTURE %

64-65

OTHER FUELS

(Specify Type)

ANNUAL AMOUNT CONSUMED

(Specify Units of Measure)

OTHER FUEL

(Specify Type)

ANNUAL AMOUNT CONSUMED

(Specify Units of Measure)

1= Coke 2= COG 3=BFG 4=Other

11. Operating Schedule (for this equipment)

Comfort/Space Heating Only

67-1

Process Heat Only

☒

67-2

Percent Process Heat

68-69

Oil Burner Type

70

1=Pressure Gun
2=Air Atomizer
3=Steam Atomizer
4=Rotary Cup

Coal Burner Type

71

1=Cyclone
2=Stoker
3=Pulverized
4=Hand Fired**SEASONAL VARIATION IN OPERATION (PERCENT):**

Days Per Week

72

Days Per Year

73-75

None

☒

76

Winter

77-78

Spring

79-80

Summer

81-82

Fall

83-84

12. Exhaust Stack Information

Height Above Ground (ft)

86-88

Inside Diameter at Top (inches)

89-91

Exit Temperature (°F)

92-95

Exit Velocity (ft/sec)

96-98

13. Total Stack Emissions (for this equipment only) in Pounds Per Operating Day

*Max Emissions Between Natural Gas and ULS

Particulate Matter

99-104

Oxides of Sulfur

105-110

Oxides of Nitrogen

111-116

Carbon Monoxide

117-122

Volatile Organic Compounds

123-128

PM-10

129-134

14. Method Used to Determine Emissions (1=Estimate, 2=AP42, 3=Stack Test, 4=Other Emission Factor)TSP SOx NOx CO VOC PM10 **15. What is the Maximum Rated Heat Input of this Unit (Million Btu/hr)?**

Air and Radiation Management Administration Use Only

16. Date Rec'd Local _____ Date Rec'd State _____

Return to Local Jurisdiction Date _____ By _____

Rev'd by Local Jurisdiction: Date _____ By _____ Rev'd by State: Date _____ By _____

Acknowledgement Sent by State: Date _____ By _____

17. Inventory Date (MM/YY)

171-174

SCC Code

178-185

18. Annual Operating Rate

186-192

Maximum Design Hourly Rate

193-199

Permit to Operate Month

200-201

Transaction Date

202-207

Staff Code

208-210

VOC

211-212

SIP Code

213-214

Regulation Code

215-218

Confidentiality

219

Point Description

220-238

Action

239

A: Add
C: Change

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Blvd ▪ Baltimore, Maryland 21230
(410) 537-3230 ▪ 1-800-633-6101 ▪ www.mde.state.md.us

Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PERMIT TO CONSTRUCT GAS CLEANING OR EMISSION CONTROL EQUIPMENT

1. Owner of Installation C.P. Crane, LLC	Telephone No. 312-766-4499	Date of Application May 24, 2018
2. Mailing Address 200 W. Madison Street, Suite 3810	City Chicago	Zip Code 60606
3. Equipment Location 1001 Carroll Island Road	City/Town or P.O. Chase	County Baltimore
4. Signature of Owner or Operator VP Operations & Development	Title VP Operations & Development	Print or Type Name David R. Dunbar
5. Application Type:	Alteration <input type="checkbox"/>	New Construction <input checked="" type="checkbox"/>
6. Date Construction is to Start: March 2019	Completion Date (Estimate): December 2019	
7. Type of Gas Cleaning or Emission Control Equipment:		
Simple Cyclone <input type="checkbox"/> Multiple Cyclone <input type="checkbox"/> Afterburner <input type="checkbox"/> Electrostatic Precipitator <input type="checkbox"/>		
Scrubber <input type="checkbox"/> _____ (type) Other <input checked="" type="checkbox"/> Water Injection _____ (type)		
8. Gas Cleaning Equipment Manufacturer	Model No.	Collection Efficiency (Design Criteria)
9. Type of Equipment which Control Equipment is to Service: Combustion Turbine		
10. Stack Test to be Conducted:		
Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> TBD _____ (Stack Test to be Conducted By) _____ (Date)		
11. Cost of Equipment _____ TBD		
Estimated Erection Cost _____ TBD		



12. The Following Shall Be Design Criteria:

	<u>INLET</u>	<u>OUTLET</u>
Gas Flow Rate	<u>480,614</u> ACFM*	<u>480,614</u> ACFM*
Gas Temperature	<u>873</u> °F	<u>873</u> °F
Gas Pressure	<u>TBD</u> INCHES W.G.	<u>TBD</u> INCHES W.G.
	PRESSURE DROP _____	
Dust Loading	<u>N/A</u> GRAINS/ACFD**	<u>N/A</u> GRAINS/ACFD**
Moisture Content	<u>TBD</u> %	_____ %
OR		
Wet Bulb Temperature	_____ °F	_____ °F
Liquid Flow Rate (Wet Scrubber)	<u>N/A</u> GALLONS/MINUTE	
(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)		
	*= ACTUAL CUBIC FEET PER MINUTE	**= ACTUAL CUBIC FEET DRY

WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

<u>Size of Dust Particles Entering Cleaning Unit</u>	<u>% of Total Dust</u>	<u>% to be Collected</u>
0 to 10 Microns	<u>N/A</u>	<u>N/A</u>
10 to 44 Microns	<u>N/A</u>	<u>N/A</u>
Larger than 44 Microns	<u>N/A</u>	<u>N/A</u>

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat _____

Combustion Chamber _____ (diameter) _____ (length) Operating Temperature at Afterburner _____ °F

Retention Time of Gases _____



15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

The CTs will be equipped with a demineralized water injection system to reduce NOx emission to 42 ppmvd @ 15% oxygen during fuel oil operation.

Date Received: Local _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date _____

By _____

Application Returned to Applicant:

Date _____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT:

--	--	--	--

PREMISES NUMBER:

--	--

--	--	--	--

Emission Calculations Revised By _____ Date _____



MARYLAND DEPARTMENT OF THE ENVIRONMENT
Air and Radiation Management Administration • Air Quality Permits Program
1800 Washington Boulevard • Baltimore, Maryland 21230
(410)537-3230 • 1-800-633-6101 • www.mde.state.md.us

Mail application to

MDE/ARMA
1800 Washington Blvd, Suite 720
Baltimore, MD 21230-1720

Air Quality Permit to Construct & Registration Application for
EMERGENCY GENERATOR

You must check off all of the following items to be able to use this application form

- ☒ This generator is a dedicated emergency backup generator, and will not be used for peak or load shaving.
- ☒ This generator is powered by an internal combustion engine, not a turbine
- ☒ This generator's engine is at least 500 brake horsepower (373 kilowatts)
(Smaller emergency engines do not need a permit)

AND

You must check off one of the following items to be able to use this application form

- ☒ I do not need a CPCN Exemption because the generator is rated at 2000 kW or less
- ☐ I do not need a CPCN Exemption because the generator was installed before October 1, 2001
- ☐ I have a CPCN Exemption from the Public Service Commission for this generator
(Contact the Public Service Commission at 410.767.8131)

1) Business/Institution/Facility where the equipment will be located		<input type="checkbox"/> Check if this is a federal facility	
Business/Institution/Facility Name: C.P. Crane, LLC		Phone: 410-682-9703 Mobile: 410-599-5953	
Contact Person's Name: Kenneth McGreevy Email Address: kmcgreevy@cpcranepower.com			
Street Address: 1001 Carroll Island Road			
City: Chase	State: Maryland	Zip Code: 21220	County: Baltimore

2) Owner <input checked="" type="checkbox"/> Check if different from above. If checked, complete the following:	
Name: C.P. Crane, LLC	Phone: 404-229-1069
Mailing Address: 200 W. Madison St. Suite 3810	
City: Chicago	State: IL Zip Code: 60606

3) Installer <input type="checkbox"/> Check if different from above. If checked, complete the following:		
Contact Name:	Contact Company:	Phone:

4) Equipment Information

Manufacturer / Model: GN1500HSPCON, G19

Installation Date: TBD

☐ Yes This generator will be operated as part of an emergency demand response program.
☒ No

Number Installed: 1	Number Removed:	Stack Height (feet, estimated): 9.33	Stack Diameter (inches, estimated): 8.52	
Engine Make / Model: Cummins KTA50G9	EPA Tier Certified: Tier 1	Engine Horsepower : 2011.53	Engine Manufacture Date: TBD	Fuel Type: ULSD

5) Required Attachments (check that you've included them)

- ☒ Vendor literature
☐ CPCN Exemption from the Public Service Commission
(not needed for generators installed before October 1, 2001, or rated at 1500 kW or less)

6) Workers Compensation Information (Environmental Article §1-202)

Workers insurance policy or binder number: 7839-09-30

☐ Check if self-employed or otherwise exempt from this requirement

"I CERTIFY UNDER PENALTY OF LAW THAT THE INFORMATION SUBMITTED IN THIS REQUEST FOR COVERAGE IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS."

Owners Signature

David R. Dunbar / VP Operations & Development
Printed Name and Title

May 24, 2018
Date

**LEAVE BLANK
MDE USE ONLY**

- ☐ Permit
☐ Registration (Less than 1,000 brake horsepower & installed prior to 11/24/03)

Permit/Registration Number: _____ - _____ - _____ - _____

AI: _____

Emissions

Stack _____

Fugitive _____
Sox Nox CO VOC PM PM-10



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
04/06/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Marsh USA, Inc. 1166 Avenue of the Americas New York, NY 10036 119-042-100--GAWU-18-19	CONTACT NAME: PHONE (A/C, No. Ext): FAX (A/C, No): E-MAIL ADDRESS: INSURER(S) AFFORDING COVERAGE INSURER A : Federal Insurance Company INSURER B : INSURER C : INSURER D : INSURER E : INSURER F :	NAIC # 20281
--	---	------------------------

COVERAGES

CERTIFICATE NUMBER:

NYC-010054692-04

REVISION NUMBER: 3

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC <input type="checkbox"/> OTHER:			3711-46-68	04/07/2018	04/07/2019	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 1,000,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 1,000,000
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> NON-OWNED AUTOS ONLY						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
	UMBRELLA LIAB <input type="checkbox"/> OCCUR EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> DED <input type="checkbox"/> RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? <input type="checkbox"/> Y / N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below		N / A				PER STATUTE <input type="checkbox"/> OTH-ER <input type="checkbox"/> E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Re: 9460 Double R Blvd., Suite 104, Reno NV 89521

Brusco Trust c/o Hallmark Investments & Management LLC is included as additional insured where required by written contract. Waiver of subrogation is applicable where required by written contract and subject to policy terms and conditions.

CERTIFICATE HOLDER

CANCELLATION

Brusco Trust c/o Hallmark Investments & Management LLC 3100 Mill #204 Reno, NV 89502	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE of Marsh USA Inc. Manashi Mukherjee <i>Manashi Mukherjee</i>
---	--

© 1988-2016 ACORD CORPORATION. All rights reserved.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
04/06/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Marsh USA, Inc. 1166 Avenue of the Americas New York, NY 10036 119-042-100--GAWU-18-19	CONTACT NAME:	FAX (A/C, No):	
	PHONE (A/C, No, Ext):	E-MAIL ADDRESS:	
INSURED Middle River Power, LLC 570 Lake Cook Road, Suite 126 Deerfield, IL 60015	INSURER(S) AFFORDING COVERAGE		NAIC #
	INSURER A : Federal Insurance Company		20281
	INSURER B :		
	INSURER C :		
	INSURER D :		
	INSURER E :		
	INSURER F :		

COVERAGES**CERTIFICATE NUMBER:**

NYC-010053536-04

REVISION NUMBER: 1

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			3711-46-68	04/07/2018	04/07/2019	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 1,000,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 1,000,000
A	<input type="checkbox"/> AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY			7359-74-75	04/07/2018	04/07/2019	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
A	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED <input type="checkbox"/> RETENTION \$			7986-80-45	04/07/2018	04/07/2019	EACH OCCURRENCE \$ 5,000,000 AGGREGATE \$ 5,000,000
A	<input checked="" type="checkbox"/> WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	N/A	7839-09-30	04/07/2018	04/07/2019	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

When Federal Insurance Company cancels this policy for any reason, other than non-payment of premium, Federal Insurance Company will notify Deerbrook Center, LLC c/o Transwestern (Address: 570 Lake Cook Road, Suite 110, Deerfield, IL 60015, Attn: Linda Lee) at least 30 days in advance of the cancellation date. Any failure by Federal Insurance Company to notify such person(s) or organization(s) will not impose any liability or obligation of any kind upon Federal Insurance Company; or invalidate such cancellation.

CERTIFICATE HOLDERDeerbrook Center L.L.C. c/o Transwestern
Attn: Linda Lee
570 Lake Cook Road, Suite 110
Deerfield, IL 60015**CANCELLATION**

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
of Marsh USA Inc.

Manashi Mukherjee

© 1988-2016 ACORD CORPORATION. All rights reserved.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
04/06/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Marsh USA, Inc. 1166 Avenue of the Americas New York, NY 10036 119-042-100--GAWU-18-19	CONTACT NAME: PHONE (A/C. No. Ext): FAX (A/C. No): E-MAIL ADDRESS: INSURER(S) AFFORDING COVERAGE INSURER A : Federal Insurance Company INSURER B : INSURER C : INSURER D : INSURER E : INSURER F :	NAIC # 20281
--	---	------------------------

COVERAGES

CERTIFICATE NUMBER:

NYC-010066257-04

REVISION NUMBER: 6

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC <input type="checkbox"/> OTHER:						EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$ \$
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> NON-OWNED AUTOS ONLY						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
	UMBRELLA LIAB <input type="checkbox"/> OCCUR EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED <input type="checkbox"/> RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$ \$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N <input checked="" type="checkbox"/> N	N/A	7839-09-30	04/07/2018	04/07/2019	X PER STATUTE <input type="checkbox"/> OTH-ER <input type="checkbox"/> E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

CANCELLATION

EmPower 1821 Walden Office Square, Suite 300 Schaumburg, IL 60173	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE of Marsh USA Inc. Manashi Mukherjee <i>Manashi Mukherjee</i>
---	--

© 1988-2016 ACORD CORPORATION. All rights reserved.

Generator
1500kW Generator GEMPAC 40ft. Container - Prime

Document No G0811054
Date 06-Aug-07
Page 1 of 2

MODEL

Model reference	GN1500HSPCON, G19
Model size and rating	1500 kW
Bill of Material reference number	B0111896A

PERFORMANCE DATA

Design Rating	kW 1500
Maximum Ambient	°F 115

ELECTRICAL DATA

Continuous Power (COP)	kW 1250
Power/Standby	kW 1500
Voltage Capability	277/480V 3 Phase

ENGINE

Make/Type	Cummins KTA50G9
Cylinders and Form (V)	16
Aspiration	Turbocharged & Aftercooled (16cyl)
Fuel Pump	Cummins PT
Governor Make/Type	Cummins EFC
Steady State Frequency	+/- 0.05hz
Battery Voltage (VDC)	V 24

CIRCUIT BREAKER

Make/Type	ABB/SACE58
Number of Poles	3
Rating	Amp 2500

ALTERNATOR

Class F Temp Rise (105°C)-3ph	kW 1500
Ends Out	4
AVR	DVR2000
Make	Marathon 743RSL4050
Regulation	2%

LOAD TERMINALS

Type	Busbar with lugs
------	------------------

FUEL CONSUMPTION

Standby/Fuel Stop	US gal 103
100% Prime Power	US gal 87
75% Prime Power	US gal 68

This document Contains PROPRIETARY and CONFIDENTIAL information and may NOT be copied or reproduced in any media without written permission from Aggreko, LLC.

Technical Information contained herein is subject to change without notice. Some data may vary on machines.

Aggreko LLC
North America
National Operations
877.604.9492 (US)
www.aggreko.com

Generator
1500kW Generator GEMPAC 40ft. Container - Prime

Document No G0811054

Date 06-Aug-07

Page 2 of 2

50% Prime Power US gal 47

EXHAUST EMISSIONS

NOx - Oxides of Nitrogen	9.20 g/kWm-h
PM - Particulate Matter	0.54 g/kWm-h
CO - Carbon Monoxide	11.40 g/kWm-h
HC - Unburnt Hydrocarbons	1.3 g/kWm-h

EXHAUST SILENCER

Make/Type	CRITICAL
Permissible back pressure	2

RUNNING HOURS

100% Prime (hours)	10.35
75% Power (hours)	13.23
50% Power (hours)	19.15

NOISE DATA

Sound Pressure at 7M/21Ft	79 dBA
---------------------------	--------

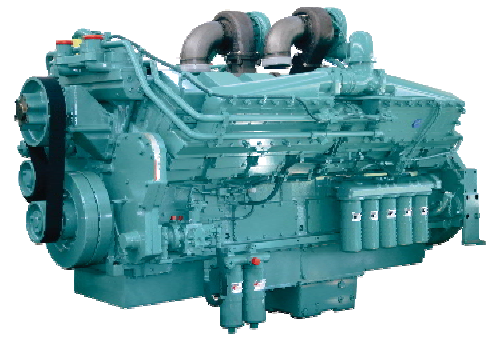
OTHER CAPACITIES AND DIMENSIONS

Lube Capacity (total)	US gal 54
Lube Capacity (pan)	US gal 47
Coolant Capacity (JW)	US gal 43
Coolant Capacity (LTA)	US gal 43
External Fuel Supply Max Above Base	ft 5.91
External Fuel Supply Max Below Base	ft 5.91

PHYSICAL CHARACTERISTICS

Length	in 480
Width	in 96
Height	in 114
Gross Weight	lbs 54,100
Net Weight	lbs 46,900
Gross Fuel	US Gal 1,000
Net Fuel	US Gal 900

KT A50-G9



> Specification sheet

Our energy working for you.™



Description

The KTA50-Series benefits from years of technical development and improvement to bring customers an innovative and future proof diesel engine that keeps pace with ever changing generator set requirements.

Recognised globally for its performance under even the most severe climatic conditions, the KTA50-Series is widely acknowledged as the most robust and cost-effective diesel engine in its power range for the generator set market.



This engine has been built to comply with CE certification.



This engine has been designed in facilities certified to ISO9001 and manufactured in facilities certified to ISO9001 or ISO9002.

Features

Coolpac Integrated Design - Products are supplied complete with cooling package and air cleaner kit for a complete power package. Each component has been specifically developed and rigorously tested for G-Drive products, ensuring high performance, durability and reliability.

Aftercooler – Large capacity integral aftercoolers are supplied with cooling water separate from the engine jacket. This provides cooler, denser intake air for more complete combustion and reduced engine stresses for longer life.

Cooling System – A one pump, two loop system must be employed; i.e. the engine jacket is cooled by one radiator or heat exchanger and the aftercoolers are cooled by a separate radiator or heat exchanger.

Pistons – Pistons are a dual Ni-resist, aluminium alloy, ground and shaped to compensate for thermal expansion, which assures a precise fit at all normal operating temperatures.

Service and Support - G-Drive products are backed by an uncompromising level of technical support and after sales service, delivered through a world class service network.

1800 rpm (60 Hz Ratings)

Gross Engine Output			Net Engine Output			Typical Generator Set Output					
Standby	Prime	Base	Standby	Prime	Base	Standby (ESP)		Prime (PRP)		Base (COP)	
kWm/BHP			kWm/BHP			kWe	kVA	kWe	kVA	kWe	kVA
1656/2220	1384/1855	1224/1640	1605/1252	1349/1809	1189/1594	1500	1875	1295	1619	1141	1427

Our energy working for you.™

www.cumminsdrive.com

©2009 | Cummins G-Drive Engines | Specifications Subject to Change Without Notice | Cummins is a registered trademark of Cummins Inc. (07/09) (GDSS160)



General Engine Data

Type	4 cycle, in line, Turbocharged and After-cooled
Bore mm	158.8
Stroke mm	158.8
Displacement Litre	50
Cylinder Block	16-cylinder, direct injection, 4-cycle diesel engine
Battery Charging Alternator	55A
Starting Voltage	24V
Fuel System	Direct injection
Fuel Filter	Dual spin on paper element fuel filters with standard water separator
Lube Oil Filter Type(s)	Spin on full flow filter
Lube Oil Capacity (l)	204
Flywheel Dimensions	SAE 0

Coolpac Performance Data

Cooling System Design	2 pump - 2 loop
Coolant Ratio	50% ethylene glycol; 50% water
Coolant Capacity (l)	240.0
Limiting Ambient Temp (°C)**	50.0
Fan Power (kWm)	33.0
Cooling System Air Flow (m³/s)**	28.2
Air Cleaner Type	Dry replaceable element with restriction indicator

** @ 13 mm H₂O

Weight & Dimensions

Length	Width	Height	Weight (dry)
mm	mm	mm	kg
3497	2000	2703	6565

Fuel Consumption 1800 rpm (60 Hz)

%	kWm	BHP	L/ph	US gal/ph
Standby Power				
100	1656	2220	392	103.6
Prime Power				
100	1384	1855	330	87.3
75	1038	1391	257	68
50	692	928	180	47.6
25	346	463	111	29.2
Continuous Power				
100	1224	1640	299	79

Cummins G-Drive Engines

Asia Pacific
10 Toh Guan Road
#07-01
TT International TradePark
Singapore 608838
Phone 65 6417 2388
Fax 65 6417 2399

Europe, CIS, Middle East and Africa
Manston Park Columbus Ave
Manston Ramsgate
Kent CT12 5BF, UK
Phone 44 1843 255000
Fax 44 1843 255902

Latin America
Rua Jati, 310, Cumbica
Guarulhos, SP 07180-900
Brazil
Phone 55 11 2186 4552
Fax 55 11 2186 4729

Mexico
Cummins S. de R.L. de C.V.
Eje 122 No. 200 Zona Industrial
San Luis Potosí, S.L.P. 78090
Mexico
Phone 52 444 870 6700
Fax 52 444 870 6811

North America
1400 73rd Avenue N.E.
Minneapolis, MN 55432
USA
Phone 1 763 574 5000
USA Toll-free 1 877 769 7669
Fax 1 763 574 5298

Ratings Definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):

Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN6271 and BS 5514.



Our energy working for you.™

www.cumminsgdrive.com

©2009 | Cummins G-Drive Engines | Specifications Subject to Change Without Notice | Cummins is a registered trademark of Cummins Inc. (07/09) (GDSS160)



Appendix B

Emissions Calculations and NSR Applicability Analysis

Emissions Calculations

ProEnergy Maryland Site

February 2018

Tubrine Model:
GE LM6000PC

[illegible]

1 - All PM emitted is less than 2.5 microns

2 - Fuels represented as pipeline quality natural gas fuel based upon sulfur content of 0.5 grain/100scf and ultra low sulfur diesel fuel based upon sulfur content of 0.0015%

3 - Updated Performance Data from Taylor DeLaFosse, received on Feb 23, 2018.

4- Based on AP-42 1,020 Btu/scf

5- Based on a AP-42 140,000 Btu/gal

	Startup		Shutdown	
	Gas	Diesel	Gas	Diesel
Estimated Time per Event (min)	10		8	
NOx Emissions per Event (lb)	3.6	12.8	3.1	10.9
CO Emissions per Event (lb)	3.2	11.6	2.5	9.9
VOC Emissions per Event (lb)	0.5	0.4	0.33	0.4
Natural Gas Heat Consumption (mmBtu/event)	27.3	26.5	24.7	23

[illegible]ECT calculated values

From AP-42 Appendix A

Distillate Fuel	140,000 Btu/gal
-----------------	-----------------

Conversion

19858 Btu/l

ProEnergy Maryland Site

February 2018

Turbine Model: GE LM6000PC

Estimated Emissions for LM6000PC Burning Natural Gas

	100% - Gas									75% - Gas						60% - Gas		50% - Gas			
Case	Case 1	Case 2	Case 7	Case 8	Case 3	Case 9	Case 25	Case 26	Case 27	Case 13	Case 14	Case 15	Case 31	Case 32	Case 33	Case 19	Case 37	Case 20	Case 21	Case 38	Case 39
Elevation (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Gas Compressor	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Inlet Heating	No	No	No	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes
Sprint	Yes	No	Yes	No	No	No	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
Evap Cooling	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	No	No	No	No	Yes	No	Yes	No	No	No
Temperature	95	95	59	59	95	59	0	0	0	59	59	59	0	0	0	59	0	59	59	0	0
Load %	100%	100%	100%	100%	100%	100%	100%	100%	100%	75%	75%	75%	75%	75%	75%	60%	60%	50%	50%	50%	50%
Fuel Type	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas	Gas
Stack Height (ft)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Stack diameter (ft)	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Exhaust Temp (°F)	870	857	843	849	856	854	837	838	838	785	785	792	776	767	767	774	746	741	752	717	717
Exhaust velocity (ft/sec)	116.92	106.93	125.90	122.74	100.78	120.88	127.51	126.75	126.75	109.35	106.64	105.02	110.76	109.74	109.74	99.49	100.13	89.42	88.15	91.88	91.88
Estimated Stack Flow (ft³/hr)	26,778,057	24,488,460	28,834,341	28,110,929	23,079,913	27,683,234	29,203,307	29,027,615	29,027,615	25,044,497	24,423,454	24,050,951	25,366,761	25,132,087	25,132,087	22,784,978	22,930,951	20,479,240	20,188,697	21,043,541	21,043,541
NOx - (Lbs/hr)	31.70	29.27	34.84	33.81	27.61	33.17	35.45	35.21	35.21	31.67	30.89	30.24	32.31	32.25	32.25	29.07	29.94	26.85	26.23	28.15	28.15
CO (Lbs/hr)	13.12	12.12	16.97	16.46	11.43	16.15	25.89	25.72	25.72	16.96	16.54	16.20	27.54	27.48	27.48	17.70	27.70	17.65	17.24	27.41	27.41
VOC (Lbs/hr)	0.44	0.41	0.48	0.47	0.38	0.46	0.99	0.98	0.98	0.88	0.86	0.84	2.25	2.24	2.24	1.21	2.50	1.49	1.46	2.74	2.74
Primary PM/PM ₁₀ /PM _{2.5} Total (Lbs/hr)	4.53	3.78	5.00	4.65	3.50	4.53	4.97	4.85	4.85	4.01	3.76	3.67	3.97	3.90	3.90	3.43	3.44	2.94	2.89	3.03	3.03
SO ₂ (lb/hr)	0.50	0.42	0.56	0.52	0.39	0.50	0.55	0.54	0.54	0.45	0.42	0.41	0.44	0.43	0.43	0.38	0.38	0.33	0.32	0.34	0.34
H ₂ SO ₄ (Lbs/hr)	0.077	0.064	0.085	0.079	0.060	0.077	0.085	0.083	0.083	0.068	0.064	0.063	0.068	0.067	0.067	0.058	0.059	0.050	0.049	0.052	0.052
CO ₂ Massflow (Lbs/hr)	39641	33115	43763	40697	30618	39680	43492	42446	42446	35075	32900	32124	34776	34175	34175	29990	30097	25768	25263	26550	26550
CO ₂ Equivalent (Lb/hr)	40041	33449	44204	41107	30927	40080	43931	42874	42874	35429	33231	32447	35127	34520	34520	30292	30400	26027	25518	26818	26818

	100	75	60	50
Stack Parameters				
Height (ft)	150	150	150	150
Diameter (ft)	9	9	9	9
Temperature (deg F)	837	767	746	717
Velocity (ft/sec)	100.78	105.02	99.49	88.15
Emissions Data (lb/hr)				
NOx	35.45	32.31	29.94	28.15
CO	25.89	27.54	27.70	27.41
VOC	0.99	2.25	2.50	2.74
Primary PM/PM ₁₀ /PM _{2.5}	5.00	4.01	3.44	3.03
SO ₂	0.56	0.45	0.38	0.34
H ₂ SO ₄	0.09	0.07	0.06	0.05
CO ₂	43762.74	35075.40	30096.99	26550.11
CO ₂ e	44203.95	35429.02	30400.42	26817.78

ProEnergy Maryland Site

February 2018

Tubrine Model: GE LM6000PC

Estimated Emissions for LM6000PC Burning ULSD

	100% - FO									75% - FO						60% - FO		50% - FO			
Case	Case 4	Case 5	Case 10	Case 11	Case 6	Case 12	Case 28	Case 29	Case 30	Case 16	Case 17	Case 18	Case 34	Case 35	Case 36	Case 22	Case 40	Case 23	Case 24	Case 41	Case 42
Elevation (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Gas Compressor	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Inlet Heating	No	No	No	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes
Sprint	Yes	No	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Evap Cooling	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	No	No	No	No	Yes	No	Yes	No	No	No
Temperature	95	95	59	59	95	59	0	0	0	59	59	59	0	0	0	59	0	59	59	0	0
Load %	100%	100%	100%	100%	100%	100%	100%	100%	100%	75%	75%	75%	75%	75%	75%	60%	60%	50%	50%	50%	50%
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Stack Height (ft)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Stack diameter (ft)	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Exhaust Temp (°F)	867	873	840	847	871	852	833	834	834	806	790	799	780	771	771	779	752	747	760	722	722
Exhaust velocity (ft/sec)	114.98	108.39	123.95	120.67	102.04	118.62	125.91	124.76	124.76	108.74	105.00	103.34	109.62	108.34	108.34	98.36	99.22	88.22	86.88	90.84	90.84
Estimated Stack Flow (ft ³ /hr)	26,332,645	24,823,284	28,387,469	27,635,550	23,370,082	27,166,945	28,836,820	28,572,606	28,572,606	24,903,079	24,047,525	23,666,338	25,104,865	24,812,999	24,812,999	22,527,281	22,724,237	20,203,711	19,896,577	20,805,037	20,805,037
NOx - (Lbs/hr)	52.49	49.26	57.76	55.93	46.44	54.77	58.99	58.40	58.40	52.03	50.88	49.72	53.55	53.32	53.32	48.09	49.59	44.27	43.14	46.56	46.56
CO (Lbs/hr)	17.50	16.42	20.93	20.26	15.48	19.84	30.78	30.47	30.47	21.11	20.65	20.18	31.82	31.68	31.68	20.91	32.34	20.53	20.01	31.71	31.71
VOC (Lbs/hr)	2.17	2.04	2.39	2.32	1.92	2.27	3.42	3.39	3.39	3.02	2.95	2.88	4.43	4.42	4.42	3.58	4.93	3.67	3.57	5.01	5.01
Primary PM/PM ₁₀ /PM _{2.5} Total (Lbs/hr)	11.23	9.94	12.42	11.52	9.08	11.21	12.38	12.05	12.05	9.89	9.39	9.16	9.96	9.77	9.77	8.60	8.65	7.39	7.24	7.63	7.63
SO ₂ (lb/hr)	0.52	0.46	0.57	0.53	0.42	0.52	0.57	0.56	0.56	0.46	0.43	0.42	0.46	0.45	0.45	0.40	0.40	0.34	0.33	0.35	0.35
H ₂ SO ₄ (Lbs/hr)	0.080	0.070	0.088	0.082	0.064	0.079	0.088	0.085	0.085	0.070	0.066	0.065	0.071	0.069	0.069	0.061	0.061	0.052	0.051	0.054	0.054
CO ₂ Massflow (Lbs/hr)	54054	47858	59818	55450	43733	53985	59605	58015	58015	47625	45189	44113	47973	47034	47034	41406	41652	35563	34852	36737	36737
CO ₂ Equivalent (Lb/hr)	54436	48196	60241	55841	44042	54366	60026	58425	58425	47962	45508	44425	48312	47367	47367	41698	41946	35815	35099	36996	36996

	100	75	60	50
Stack Parameters				
Height (ft)	150	150	150	150
Diameter (ft)	9	9	9	9
Temperature (deg F)	833	771	752	722
Velocity (ft/sec)	102.04	103.34	98.36	86.88
Emissions Data (lb/hr)				
NOx	58.99	53.55	49.59	46.56
CO	30.78	31.82	32.34	31.71
VOC	3.42	4.43	4.93	5.01
Primary PM/PM ₁₀ /PM _{2.5}	12.42	9.96	8.65	7.63
SO ₂	0.57	0.46	0.40	0.35
H ₂ SO ₄	0.09	0.07	0.06	0.05
CO ₂	59817.99	47973.21	41652.10	36736.60
CO ₂ e	60240.53	48312.07	41946.32	36996.09

Natural Gas fired LM6000PC Turbine

Turbine Heat Input				Capacity				Emissions Rates Per Turbine													
Source		Load %	Operations	NO _x		CO		VOC		PM/PM ₁₀ /PM _{2.5}		NH ₃		SO ₂ ECT		Lead		H ₂ SO ₄ ECT		CO ₂ e	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Turbine Natural Gas	00	2, 2			2	02	0	0	00	7	0 00	0 00	7E-0	7 E-0	E-0	2 E-0	2E-02	2E-0	,20	,0	
	7	2, 2	2	2	27		2 2	2	0	27	0 00	0 00	E-0	E-0	E-0	2 E-0	E-02	7E-02	, 2 02	, 7	
	0	2, 2	2		27 70		2 0	2		2	0 00	0 00	E-0	0 E-0	E-0	2 E-0	E-02	7 70E-02	0, 00 2	, 7	
	0	2, 2	2		27	02	2 7	0	0		0 00	0 00	E-0	E-0	E-0	2 E-0	7E-02	7 E-02	2 , 7 7	, 2	
Turbine Natural Gas	events/yr	min/event	hr/yr	lb/event	tpy	lb/event	tpy	lb/event	tpy	lb/event	tpy	lb/hr	tpy	lb/event	tpy	lb/hr	tpy	lb/event	tpy	lb/event	tpy
	2 0	0	7	0	0 0	20	0 07	0 0	0 0	0	0 007	0 00	0 00	2E-02	7 E-0	E-0	0 E-0	E-0	22E-0	0 2	
	Shutdown	2 0		0	0 0	2 0	0 0	0	0 0	0	0 00	0 00	0 00	E-02	7 E-0	E-0	2 E-0	2 E-0	2E-0	27	7
Subtotal - Startups Shutdowns					0	0		0 02		0 0 2		0 00		7E-0		7 E-0		2 0E-0		0	
Total Normal 00 and S SD					7						0 00		7 E-0		2 E-0		2E-0		, 2 2		
Total Normal 7 and S SD					2	2		2 7		2	0 00		7E-0		2 E-0		E-02		, 2 7		
Total Normal 0 and S SD						0		0			0 00		0 E-0		2 E-0		7 72E-02		0,0 0		
Total Normal 0 and S SD					7			2		00		0 00		E-0		2 E-0		E-02		, 7 0	

Notes:

- Short term 1 hr rates except for Lead, turbine heat input and Shutdown hours are from the Performance Data Report, 2013, CP Crane
- Lead emissions are calculated using emission factor from AP- 42 Section 9.3.1a for natural gas
- Shutdown events per year is from Prairie Power Alsey Station Compliance Report
- Shutdown - PM₁₀, PM_{2.5}, SO₂, H₂S and CO₂e emissions are based on Shutdown MMBtu event and maximum 1 MMBtu values for each pollutant

Lead Emission factor natural gas **4.90E-07** 1 MMBtu

Burning 90% Natural Gas and 10% Fuel Oil LM6000PC Turbine

Natural Gas Heat Input as MMBtu/hr 0 Capacity factor
 Fuel Oil Heat Input as MMBtu/hr 2.2 hr/yr 100% operation

Source		Load %	Operations	Emissions Rates Per Turbine																	
				NO _x		CO		VOC		PM/PM ₁₀ /PM _{2.5}		NH ₃		SO ₂ ECT		Lead		H ₂ SO ₄ ECT		CO ₂ e	
			hr/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
ur ine- atural as		00	2,		2	2	0 2	0	7	00		0 00	0 00	7E-0	E-0	E-0	2 E-0	2E-02	0 E-0	20	2,27
		7	2,	2	2	27	2	2 2	2	0	7	0 00	0 00	E-0	27E-0	E-0	2 E-0	E-02	0 E-02	2 02	,
		0	2,	2	0	27 70	2 7	2 0	2		07	0 00	0 00	E-0	E-0	E-0	2 E-0	E-02	0, 00	2,	,
		0	2,	2	2	27	2 2	2 7	2	0		0 00	0 00	E-0	E-0	E-0	2 E-0	7E-02	E-02	2 , 7 7	, 7 7
ur ine- uel il		00	2		7 7	0 7	0	2	0	2 2		0 00	0 00	0 7	7 E-02	E-0	7 0 E-0	0E-02	E-02	0,2 0	7,
		7	2		7 0	2			0			0 00	0 00	0	0 E-02	E-0	7 0 E-0	7 0 E-02	2 E-0	, 2 07	, 2
		0	2		2	2	2		0			0 00	0 00	0 0	2 E-02	E-0	7 0 E-0	E-02	0 E-0	, 2	, 7
		0	2		2	7	7	0	0	7	00	0 00	0 00	0	E-02	E-0	7 0 E-0	E-02	7 0E-0	, 0	, 2
ur ine- atural as	events/yr	min/event	hr/yr	lb/event	tpy	lb/event	tpy	lb/event	tpy	lb/event	tpy	lb/hr	tpy	lb/event	tpy	lb/hr	tpy	lb/event	tpy	lb/event	tpy
	22	0	7	0	0 07	20	0 0	0 0 0	0 0	0	0 00	0 00	0 00	2E-02	7 E-0	E-0	E-0	E-0	0E-0	0, 2	7
	22		0	0	0 0	2 0	0 0	0	0 00	0	0 00	0 00	0 00	E-02	E-0	E-0	2 E-0	7 E-0	2,7	7	
ur ine- uel il																					
	2	0	7	2 0	0 0	0	0 02	0 0	0 00	0	0 002	0 00	0 00	00E-02	E-0	E-0	E-0	2E-0	2 E-0	,	7
	2			0 0	0 02	0	0 02	0 0	0 00	0 7	0 00	0 00	0 00	7E-02	7 E-0	E-0	E-0	E-0	E-0	,	0
Su total - Startups Shutdowns					0		0		0 02		0 0		0 000		E-0		2 E-0		2 E-0		2
total ormal 00 and S SD							0				7		0 00		7 E-0		E-0		E-0		0, 0 02
total ormal 7 and S SD									2		0		0 00		E-0		E-0		02E-02		, 0
total ormal 0 and S SD					2 0		7		2		22		0 00		07E-0		E-0		7 7 E-02		, 7
total ormal 0 and S SD					7		7		2		0		0 00		7E-0		E-0		E-02		, 2

Notes:

- Short term 1 hr rates except for Lead, Natural Gas heat input and S SD hours are from the Performance Data Report, E-20, CP Crane
 - Lead emissions are calculated using emission factor from AP-2 Section 3, a leaded or Natural Gas and AP-2 Section 3, a leaded or Distillate oil
- S SD events yr is from Prairie Power Alsey Station Compliance Report
- S SD - PM₁₀ PM_{2.5}, S₂, H₂S and CO₂e emissions are based on S SD MMBtu content and maximum 1 MMBtu values for each pollutant

Lead Emission factor Natural Gas **4.90E-07** 1 MMBtu
 Lead Emission factor Distillate oil **1.40E-05** 1 MMBtu

Black Start Generator

POTENTIAL EMISSION INVENTORY WORKSHEET									
<i>EMISSION SOURCE TYPE</i>									
I E R A L C M B S I E I E S									
<i>FACILITY AND SOURCE DESCRIPTION</i>									
Emission Source Description:					Black Start Generator				
Emission Control Method s ID o s :					none				
Emission Point Description:					20 hp Diesel Engine 00				
<i>EMISSION ESTIMATION EQUATIONS</i>									
Emission l hr Emission actor g -hr Engine power rating l g									
Emission l hr Emission actor l hp-hr Engine power rating hp									
Emission l hr Emission actor l MMBtu Heat Input MMBtu hr									
Emission ton yr Hourly Emissions l hr perating Period hrs yr ton 2,000 l									
<i>INPUT DATA AND EMISSIONS CALCULATIONS</i>									
Permitted Hours: 00 hrs yr									
esting Hours: hrs yr									
o o Engines:					Diesel Sul ur Content: 0 00 weight				
Heat Input: 0 MMBtu hr HH					Diesel Heat Content: 7,000 Btu hp-hr				
Pollutant	Emission actor		Potential Emission Rates		Pollutant	Emission actor l MMBtu	Potential Emission Rates		
	g -hr	l -hp-hr	Per nit l hr	Per nit tpy			Per nit l hr	Per nit tpy	
	20		0	2	Acetaldehyde	2 2E-0	E-0	77E-0	
C	0		7 70		Acrolein	7 E-0	E-0	E-0	
C	0			0 2	Ben ene	7 7 E-0	0 E-02	E-0	
S ₂		2 E-0	0 02	22E-0	ormaldehyde	7 E-0	E-0	E-0	
PM	0		7	0 0	aphthalene	0E-0	E-0	E-0	
PM ₀	0		7	0 0	PAH	2 2E-0	2 E-0	E-0	
PM ₂	0		7	0 0	oluene	2 E-0	E-0	E-0	
Highest HAP			0 E-02	E-0	ylenes	E-0	2 72E-0	E-0	
otal HAPs			0 02	0 00 2					
H ₂ S		2 E-07	0 00	E-0					
Summary of GHG Emissions:									
Pollutant	Emission Factor (kg/MMBtu) ²	Emissions (metric tons/yr) ³	Emissions (US tons/yr) ⁴						
CO ₂	7	0	7						
CH ₄	0E-0	0 00	0 00						
N ₂ O	0E-0	0 00	0 00						
CO ₂ e ³	--	0 0	115.16						
<i>SOURCES OF INPUT DATA</i>									
Parameter					Data Source				
Power utput, Heat Content and Hours o operation					By CP Crane				
, C , PM, PM ₀ , PM ₂ and C emission actor					SPS Su part IIII				
H ₂ S					Based on con ersion o S ₂ to S and 00 con ersion o S to H ₂ S				
S ₂					Emission actors ased on a le -, per S EPA AP- 2, Chapter - Large Stationary Diesel All Stationary Dual uel Engines				
HAPs					Emission actors ased on a le -, per S EPA AP- 2, Chapter - Large Stationary Diesel All Stationary Dual uel Engines				
2 Based on EPA de ault actors in 0 C R Part Su part C a les C- and C-2 or Distillate uel il o 2									
Calculated ased on the heat input, emission actors, and e uations C- and C- o 0 C R Part Su part C C ₂ e ased on Su part A a le A- actors									
C ₂ , CH ₄ , or ₂ metric tpy E-0 as MMBtu yr Emission actor g MMBtu									
metric ton 02 S ton									
C ₂ e C ₂ , CH ₄ , or ₂ tpy lo al arming Potential actor P									
C ₂ P									
CH ₄ P 2									
2 P 2									
<i>NOTES AND OBSERVATIONS</i>									
Assume PM PM ₀ PM ₂									

Proposed Project Emissions

CT Scenario	Description				NO _x		CO		VOC		PM/PM ₁₀ /PM _{2.5}		NH ₃		SO ₂		Lead		H ₂ SO ₄		CO ₂ e	
					Turbine (tpy)	3 Turbines (tpy)	Turbine (tpy)	3 Turbines (tpy)	Turbine (tpy)	3 Turbines (tpy)	Turbine (tpy)	3 Turbines (tpy)	Turbine (tpy)	3 Turbines (tpy)	Per Turbine (tpy)	3 Turbines (tpy)	Turbine (tpy)	3 Turbines (tpy)	Turbine (tpy)	3 Turbines (tpy)	Turbine (tpy)	3 Turbines (tpy)
100% Load	2	ormal	peration	urning		7	02	02 07	0		7	7	0 00	0 00	0 7	2	2 E-0	7 E-0	2E-0	E-0	0	7 ,2 2
		ormal	peration	urning with S	SD	7	0 2	02 0				7	0 00	0 00	0 7	2 20	2 E-0	7 E-0	2E-0	7E-0		7 , 7
		ormal	peration	load urning 0	and 0	7	02	7 0 00	2		7	22	0 00	0 00	0 7	2 20	2E-0	2 7 E-0	2E-0	7E-0	0	0, 7
		ormal	peration	load urning 0	and 0 with S	SD	0	0		0	7	22	0 00	0 00	0 7	2 2	E-0	2 7E-0	E-0	E-0	0 0	0, 2
75% Load	2	ormal	peration	urning		2	27 7	0	2		27	0	0 00	0 00	0	7	2 E-0	7 E-0	7E-02	2 E-0		,
		ormal	peration	urning with S	SD	2	27 7	2 0 7	2 7		2		0 00	0 00	0	7	2 E-0	7 E-0	E-02	2 70E-0		,
		ormal	peration	load urning 0	and 0	2	7	7 0 2	2	72	0		0 00	0 00	0	7	2E-0	2 7 E-0	00E-02	2 70E-0	2 7	,7 0
		ormal	peration	load urning 0	and 0 with S	SD	22	0	2	77	0		0 00	0 00	0	77	E-0	2 7E-0	02E-02	2 7 E-0		,07
60% Load	2	ormal	peration	urning			0	0	2		2		0 00	0 00	0 0		2 E-0	7 E-0	7 70E-02	2 E-0		,
		ormal	peration	urning with S	SD			0	0	0			0 00	0 00	0 0		2 E-0	7 E-0	7 72E-02	2 2E-0	00	20,
		ormal	peration	load urning 0	and 0	2	2 7	7 00	0	0	20		0 00	0 00	0	2	2E-0	2 7 E-0	7 7 E-02	2 2E-0		2 , 0
		ormal	peration	load urning 0	and 0 with S	SD	2 0	2 2	7	2	0	22	0 00	0 00	0	2	E-0	2 7E-0	7 7 E-02	2 E-0	7	2 ,72
50% Load	2	ormal	peration	urning		0	02	0 07	0	0			0 00	0 00	0		2 E-0	7 E-0	7 E-02	2 0 E-0	2	0 ,7
		ormal	peration	urning with S	SD	7		0	2	0	00		0 00	0 00	0		2 E-0	7 E-0	E-02	2 0 E-0	7	0 0 2
		ormal	peration	load urning 0	and 0		22	0 7	0	70		77	0 00	0 00	0		2E-0	2 7 E-0	2E-02	2 0 E-0	7	0 ,72
		ormal	peration	load urning 0	and 0 with S	SD	7	70	7	0	2	7	0 00	0 00	0		E-0	2 7E-0	E-02	2 0 E-0		0,0
Blac Start enerator					2				0 2		0 0		-		0 00		-		E-0			
Proposed Project Total Emissions					151.02		113.31		11.96		22.77		0.00		2.21		2.87E-03		3.38E-01		181,027	

Notes:

Short term 1 hr rates except for Lead, turbine heat input and S SD hours are from the Performance Data R, e 20, CP Crane

Turbine Hazardous Air Pollutant Emissions

E Simple Cycle Turbine Emissions Calculation
Summary of HAP Emission Rates Per Turbine

NG-Firing: Maximum CT HAP Emissions

Parameter	Units	
Maximum Heat Input (HH) :	MMBtu/hr	
Maximum Annual Hours:	hrs/yr	2,70

Pollutant	CT Emission Factor* (lb/MMBtu)	CT Total (lb/hr)	CT Total TPY
1,3-Butadiene	E-07	7 E-0	2 E-0
Acetaldehyde	0E-0	E-02	2 E-02
Acrolein	E-0	2 E-0	E-0
Benzene	2E-0	77E-0	E-0
Ethylbenzene	2E-0	27E-02	72E-02
Formaldehyde	7 E-0	2 2E-0	2E-0
Naphthalene	E-0	7E-0	E-0
Polycyclic Aromatic Hydrocarbons (PAHs)	2 2E-0	7 E-0	E-0
Propylene oxide	2 E-0	E-02	E-02
Toluene	E-0	7E-02	E-02
Xylene	E-0	2 E-02	E-02
Maximum Individual HAP			0
Total HAPs			0

Dual Fuel: Maximum CT HAP Emissions

Parameter	Units	Fuel Type	
		NG	FO
Maximum Heat Input (HH) :	MMBtu/hr		
Maximum Annual Hours:	hrs/yr	2,	270

Pollutant	CT Emission Factor NG* (lb/MMBtu)	CT Emission Factor FO† (lb/MMBtu)	CT Total NG (lb/hr)	CT Total FO (lb/hr)	CT Total TPY
1,3-Butadiene	E-07	E-0	7 E-0	0E-0	0 E-0
Acetaldehyde	0E-0		E-02		E-02
Acrolein	E-0		2 E-0		0E-0
Benzene	2E-0	E-0	77E-0	2 0E-02	E-0
Ethylbenzene	2E-0		27E-02		E-02
Formaldehyde	7 E-0	2 E-0	2 2E-0	07E-0	E-0
Naphthalene	E-0	E-0	7E-0	E-02	2 E-0
Polycyclic Aromatic Hydrocarbons (PAHs)	2 2E-0	0E-0	7 E-0	2E-02	2E-0
Propylene oxide	2 E-0		E-02		0E-02
Toluene	E-0		7E-02		2 E-02
Xylene	E-0		2 E-02		0E-02
Arsenic		E-0		E-0	E-0
Beryllium		E-07		E-0	0E-0
Cadmium		E-0		E-0	2 7E-0
Chromium		E-0		E-0	E-0
Lead		E-0		E-0	7 2 E-0
Manganese		7 E-0		0 E-0	07E-02
Mercury		2E-0		7E-0	E-0
Selenium		E-0		7 E-0	2 7E-0
Selenium		2 E-0		E-0	2 E-0
Maximum Individual HAP					0
Total HAPs					0

Pollutant	One CT Worst Case TPY	Pollutant	One CT Worst Case TPY
1,3-Butadiene	0 E-0	Arsenic	E-0
Acetaldehyde	2 E-02	Beryllium	0E-0
Acrolein	E-0	Cadmium	2 7E-0
Benzene	E-0	Chromium	E-0
Ethylbenzene	72E-02	Lead	7 2 E-0
Formaldehyde	2E-0	Manganese	07E-02
Naphthalene	2 E-0	Mercury	E-0
Polycyclic Aromatic Hydrocarbons (PAHs)	2E-0	Selenium	2 7E-0
Propylene oxide	E-02	Selenium	2 E-0
Toluene	E-02	Maximum Individual HAP	0
Xylene	E-02	Total HAPs	0

Diesel Firewater Pump

POTENTIAL EMISSION INVENTORY WORKSHEET										
EMISSION SOURCE TYPE										
I E R A L C M B S I E I E S 00 HP										
FACILITY AND SOURCE DESCRIPTION										
Emission Source Description:					irewater Pump					ld - 7
Emission Control Method s ID o s :					one					
Emission Point Description:					hp Diesel Engine					
EMISSION ESTIMATION EQUATIONS										
Emission l hr	Emission actor g hp-hr	Engine power rating hp	l	g						
Emission l hr	Emission actor l hp-hr	Engine power rating hp								
Emission l hr	Emission actor l MMBtu	Heat Input MMBtu hr								
Emission ton yr	Hourly Emissions l hr	perating Period hrs yr	ton	2,000 l						
INPUT DATA AND EMISSIONS CALCULATIONS										
Permitted Hours:					00 hrs yr					
o o Engines:					Diesel Sul ur Content: 0 00 weight					
Heat Input:					2 7 MMBtu hr HH Diesel Heat Content: 7,000 Btu hp-hr					
Pollutant	Emission actor		Potential Emission Rates		Pollutant	Emission actor	Potential Emission Rates			
	l MMBtu	l -hp-hr	Per nit l hr	Per nit tpy		l MMBtu	Per nit l hr	Per nit tpy		
		0 0	2 7	0	, -Butadiene	E-0	0 E-0	E-0		
C		E-0	2 7	0	Acetaldehyde	7 7E-0	2 E-0	07E-0		
C		2 7E-0	0	0 0	Acrolein	2 E-0	2 E-0	2 E-0		
S ₂		2 0 E-0	0 2	0 0	Ben ene	E-0	2 E-0	0E-0		
PM		2 20E-0	0	0 0	ormaldehyde	E-0	0E-0	E-0		
PM ₀		2 20E-0	0	0 0	aphthalene	E-0	2 7E-0	E-0		
PM ₂		2 20E-0	0	0 0	PAH	E-0	E-0	2 E-0		
Highest HAP			0E-0	E-0	oluene	0 E-0	E-0	7 E-0		
otal HAPs			0 0	0 000	ylenes	2 E-0	7 E-0	E-0		
H ₂ S		7E-0	0 0	0 00						
Summary of GHG Emissions:										
Pollutant	Emission Factor (kg/MMBtu) ²	Emissions (metric tons/yr) ³	Emissions (US tons/yr) ⁴							
CO ₂	7	20 7	22 7							
CH ₄	0E-0	0 00	0 00							
N ₂ O	0E-0	0 000	0 000							
CO ₂ e ⁵	--	20 7	22.84							
SOURCES OF INPUT DATA										
Parameter					Data Source					
Power utput, Heat Content and Hours o operation					By CP Crane					
, C , PM, PM ₀ , PM ₂ , S ₂ and C emission actor					Emission actors ased on a le -, per S EPA AP- 2, Chapter - asoline Diesel Industrial Engines					
H ₂ S					Based on con ersion o S ₂ to S and 00 con ersion o S to H ₂ S					
HAPs					Emission actors ased on a le -2, per S EPA AP- 2, Chapter - asoline Diesel Industrial Engines					
metric ton 02 S ton										
C ₂ e C ₂ , CH ₄ , or ₂ tpy lo al arming Potential actor P										
C ₂ P										
CH P 2										
2 P 2										
NOTES AND OBSERVATIONS										
Assume PM PM ₀ PM ₂										

Emergency Generator

POTENTIAL EMISSION INVENTORY WORKSHEET										
EMISSION SOURCE TYPE										
I E R A L C M B S I E I E S										
FACILITY AND SOURCE DESCRIPTION										
Emission Source Description:					Emergency enerator					ld - 7
Emission Control Method s ID o s :					one					
Emission Point Description:					00 hp Diesel Engine					7
EMISSION ESTIMATION EQUATIONS										
Emission l hr		Emission actor g -hr		Engine power rating l g						
Emission l hr		Emission actor l hp-hr		Engine power rating hp						
Emission l hr		Emission actor l MMBtu		Heat Input MMBtu hr						
Emission ton yr		Hourly Emissions l hr		perating Period hrs yr		ton 2,000 l				
INPUT DATA AND EMISSIONS CALCULATIONS										
Permitted Hours:					00 hrs yr					
esting Hours:					hrs yr					
o o Engines:					Diesel Sul ur Content: 0 00 weight					
Heat Input:					20 MMBtu hr HH					
Diesel Heat Content:					7,000 Btu hp-hr					
Pollutant	Emission actor		Potential Emission Rates		Pollutant	Emission actor l MMBtu	Potential Emission Rates			
	l MMBtu	l -hp-hr	Per nit l hr	Per nit tpy			Per nit l hr	Per nit tpy		
		0 0	0	0	, -Butadiene	E-0	E-0	E-0		
C		E-0	0	0 20	Acetaldehyde	7 7E-0	22E-0	E-0		
C		2 7E-0		0 07	Acrolein	2 E-0	E-0	E-0		
S ₂		2 0 E-0	2	0 0 2	Ben ene	E-0	2E-0	E-0		
PM		2 20E-0	2	0 0	ormaldehyde	E-0	E-0	2 E-0		
PM ₀		2 20E-0	2	0 0	aphthalene	E-0	E-0	7 E-0		
PM ₂		2 20E-0	2	0 0	PAH	E-0	7 0 E-0	E-0		
Highest HAP			E-0	2 E-0	oluene	0 E-0	72E-0	E-0		
otal HAPs			0 0	0 000	ylenes	2 E-0	20E-0	E-0		
H ₂ S		7E-0	0 0 2	7 E-0						
Summary of GHG Emissions:										
Pollutant	Emission Factor (kg/MMBtu) ²	Emissions (metric tons/yr) ³	Emissions (US tons/yr) ⁴							
CO ₂	7		2							
CH ₄	0E-0	0 00	0 00							
N ₂ O	0E-0	0 000	0 000							
CO ₂ e ⁵	--	7	34.35							
SOURCES OF INPUT DATA										
Parameter			Data Source							
Power utput, Heat Content and Hours o operation			By CP Crane							
C , PM, PM ₀ , PM ₂ , S ₂ and C emission actor			Emission actors ased on a le - , per S EPA AP- 2, Chapter - asoline Diesel Industrial Engines							
H ₂ S			Based on con ersion o S ₂ to S and 00 con ersion o S to H ₂ S							
HAPs			Emission actors ased on a le -2, per S EPA AP- 2, Chapter - asoline Diesel Industrial Engines							
metric ton 02 S ton										
C ₂ e C ₂ , CH ₄ , or ₂ tpy lo al arming Potential actor P										
C ₂ P										
CH P 2										
2 P 2										
NOTES AND OBSERVATIONS										
Assume PM PM ₀ PM ₂										

Existing Combustion Turbine 14 MW (summer capability) (No. 2 Fuel Oil)

Pollutant	Days/yr 18 hrs/day 3			Days/yr 17 hrs/day 2.6			Days/yr 25 hrs/day 7.7			Days/yr 15 hrs/day 3.6			Days/yr 27 hrs/day 1			Maximum (2012-2016)		Average (2012-2016)	
	2016			2015			2014			2013			2012			2012		2012	
	tpy	lb/day	lb/hr	tpy	lb/day	lb/hr	tpy	lb/day	lb/hr	tpy	lb/day	lb/hr	tpy	lb/day	lb/hr	tpy	lb/hr	tpy	lb/hr
	0		2 7	0	00 00	2 0 77	2 00	0 00	2	0	00	72	7	2 7	2 7	2 00	2 0 77	7	20
S ₂	0	0	7	0	00	7		27 00		0 7	0	2 0	0 2				2 0	0	
C	0 02	2 22	0 7	0 02	2	0 0	0 0	0	0	0 02	2 7	0 7	0 0	0	0 0	0 0	0 0	0 0	0 7
C	0 00	0	0	0 002	0 2	0 0	0 0	0 0	0 0	0 00	0 0	0	0 00	0 00	0 00	0 0	0	0 00	0 0
PM ₁₀ filterable	0 02	22	07	0 02	2		0 0	2	07	2 0E-02	7	0	0 00	0 0	0 0	0 0		0 0	0 7
PM ₁₀ condensable	0 0		7	0 0 2		0	0 7	7	7	0 0	7		0 00	00	00	0 7	0	0 0	2
PM ₁₀ filterable	0 02	22	07	0 02	2		0E-0	0 02	E-0	0E-0	0 0	0 E-0	0 00	0 0	0 0	0 0		0 027	0
PM _{2.5} filterable	0 027	00	00	0 02	2 7	0	0 0	7	00	2 0E-02		0	0 00	0 0	0 0	0 0	0	0 0	0
Lead	E-0	0 0	E-0	E-0	E-0	7E-0	E-0	2 E-02	E-0	E-0	E-02	7E-0	0 00	0 00	0 00	E-0	7E-0	E-0	2 7 E-0
C ₂	,0	2 ,000	0,		,0	2,7	, 7	2 , 0	, 0	2	2 ,000	, 00	0 00	0 00	0 00	, 7	2,7	, 02	,0
CH ₂	0 0			0E-02	7	72	E-0	2 0	0	00E-02		0 7	0 00	0 00	0 00	0		0 0	
C ₂	0 0		0 7	0 00	0	0 2	0 0 2	2	0	0 0	7	0	0 00	0 00	0 00	0 0	0	0 0	0 2
C ₂ e	,0 2	2 , 70 0	0,	7	, 7	2,	, 0	2 2, 0	, 7		2 , 7	,7	0 00	0 00	0 00	, 0	2,	, 07 0	0
HAPS																			
Benzene	70E-0	E-02	7E-02	E-0	7 E-02	E-02	2E-0	0 E-0	7E-02	A	A	A	A	A	A	2E-0	E-02	70E-0	E-02
Formaldehyde	E-0	2 0 E-0	E-02	E-0	2E-0	7 E-02	70E-0	E-0	E-02	07E-07	0 E-0	E-0	R	R	R	70E-0	7 E-02	2 E-0	E-02
Arsenic	7 0E-0	22E-0	2 7 E-0	0E-0	7 E-0	2 0E-0	2 E-0	2 0E-02	2 7 E-0	2 E-0	2 E-0	E-0	R	R	R	2 E-0	2 0E-0	0 E-0	2 2E-0
Beryllium	2 0 E-0	2 2E-0	7 7 E-0	0E-0	2 2E-0	E-0	7 0E-0	2E-0	7 E-0	E-0	2 7E-0	E-0	R	R	R	E-0	E-0	7 E-0	2 0E-0
1,3-Butadiene	0 E-0	E-02	E-0	0E-0	0 E-02	2 E-0	E-0	0 E-02	7E-0	A	A	A	A	A	A	E-0	2 E-0	E-0	0 E-0
Cadmium	2 E-0	E-0	20E-0	2 7 E-0	2 E-0	2 E-0	E-0	20E-0	E-0	E-0	2 7E-0	E-0	R	R	R	E-0	2 E-0	E-0	0 E-0
Chromium	7 0E-0	22E-0	2 7 E-0	0E-0	7 E-0	2 0E-0	2 E-0	2 0E-02	2 7 E-0	E-0	2 7E-0	E-0	R	R	R	2 E-0	2 0E-0	0 E-0	2 2 E-0
Chromium I	A	A	A	A	A	A	A	A	A	A	A	A	72E- 0	E-0	E-0	72E- 0	E-0	72E- 0	E-0
Manganese	0E-0	E-0	E-0	E-0	E-0	2 07E-0	E-02		E-0	E-0	2E-0	7E-0	R	R	R	E-02	2 07E-0	7 20E-0	0E-0
Mercury	0 E-0	E-0	2 E-0	E-0	E-0	E-0	2 7E-0	2 0E-0	2 E-0	E-0	2 7E-0	E-0	A	A	A	2 7E-0	E-0	E-0	E-0
nickel	0 E-0	E-0	E-0	2 7E-0	E-0	2 E-0	0E-0	0E-0	E-0	E-0	2 7E-0	E-0	R	R	R	0E-0	2 E-0	E-0	0 E-0
naphthalene	2 E-0	2 E-02	70E-0	2 0 E-0	2 E-02	E-0	E-0	E-02	E-0	A	A	A	A	A	A	E-0	E-0	2 E-0	E-0
PAH	2 E-0	2 E-02	E-0	2 2E-0	2 7 E-02	0 E-02	E-0	7 E-02	2E-0	A	A	A	A	A	A	E-0	0 E-02	E-0	0 E-02
Selenium	E-0	7E-02	22E-0	E-0	7 E-02	E-0	00E-0	0E-02	2 E-0	20E-0	2 E-02	E-0	R	R	R	00E-0	E-0	2 E-0	E-0

Total HAPs 0.03 0.34 0.012 0.25

R - not reported

A - not applicable

PM₁₀ filterable maximum and average values based on emissions from 20 and 20 PM₁₀ emissions factor for 20 and 20 are incorrect hence, values reported from 20 2-20 are not included

Facility Hazardous Air Pollutant Emissions

Pollutant	Proposed Units				Existing Units						Facility Total	
	Three Simple Cycle		Black Start Generator		Firewater Pump		Emergency Generator		Combustion Turbine			
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1,3-Butadiene	E-02	0E-0			0 E-0	E-0	E-0	E-0	0 E-0	E-0	2 2 E-02	0E-0
2-Methylnaphthalene											0 00E 00	0 00E 00
1-Methylchloranthrene											0 00E 00	0 00E 00
7,12-Dimethyl benzo[a]anthracene											0 00E 00	0 00E 00
Acenaphthene											0 00E 00	0 00E 00
Acenaphthylene											0 00E 00	0 00E 00
Acetaldehyde	77E-02	E-02	E-0	77E-0	2 E-0	07E-0	22E-0	E-0			E-02	E-02
Acrolein	7 E-0	0 E-02	E-0	E-0	2 E-0	2 E-0	E-0	E-0			0E-0	0 E-02
Anthracene											0 00E 00	0 00E 00
Benzo[a]anthracene											0 00E 00	0 00E 00
Benzo[e]anthracene	2 E-02	2 E-02	0 E-02	E-0	2 E-0	0E-0	2E-0	E-0	E-02	70E-0	E-02	2 7 E-02
Benzo[a]pyrene											0 00E 00	0 00E 00
Benzo[b]fluoranthene											0 00E 00	0 00E 00
Benzo[g,h,i]perylene											0 00E 00	0 00E 00
Benzo[k]fluoranthene											0 00E 00	0 00E 00
Chrysene											0 00E 00	0 00E 00
Dibenz[a,h]anthracene											0 00E 00	0 00E 00
Dichlorodibenz[e,h]anthracene											0 00E 00	0 00E 00
Ethylbenzene	2E-02	E-02									2E-02	E-02
Fluoranthene											0 00E 00	0 00E 00
Fluorene											0 00E 00	0 00E 00
Formaldehyde	7E-0	E 00	E-0	E-0	0E-0	E-0	E-0	2 E-0	E-02	2 E-0	0E-0	E 00
Heptane											0 00E 00	0 00E 00
Indeno[1,2,3-cd]pyrene											0 00E 00	0 00E 00
Naphthalene	00E-02	7 2 E-0	E-0	E-0	2 7E-0	E-0	E-0	7 E-0	E-0	2 E-0	E-02	7 E-0
PAH	7E-02	7E-0	2 E-0	E-0	E-0	2 E-0	7 0 E-0	E-0	0 E-02	E-0	00E-02	0 E-02
Phenanthrene											0 00E 00	0 00E 00
Propylene oxide	E-02	E-02									E-02	E-02
Pyrene											0 00E 00	0 00E 00
Toluene	E-0	2 0E-0	E-0	E-0	E-0	7 E-0	72E-0	E-0			2E-0	2 0E-0
Xylenes	7 E-02	0 E-0	2 72E-0	E-0	7 E-0	E-0	20E-0	E-0			E-02	0 E-0
Arsenic	2 E-02	70E-0							0 002	0 E-0	E-02	E-0
Beryllium	E-0	7 E-0							2 0E-0	7 E-0	E-0	E-0
Cadmium	E-0	7 E-0							0 00	E-0	7E-0	7 0E-0
Chromium	2 E-02	70E-0							0 002	0 E-0	E-02	0E-0
Cobalt											0 00E 00	0 00E 00
Lead	0E-02	2 E-0									0E-02	2 E-0
Manganese	0 E-0	22E-0							0 0	0 007	0 E 00	2 E-0
Mercury	7E-0	E-0							E-0	E-0	77E-0	2 0 E-0
nickel	2 E-0	7 E-0							0 00 0	E-0	0E-0	7 7E-0
Selenium	2 E-02	E-0							E-0	2 E-0	2E-02	E-0
Maximum Individual HAP				E-0		E-0		2 E-0		7 20E-0		
Total HAPs				20E-0		E-0		2 E-0		2 E-02		2

Sources: E, 20
EC , 20

NSR Applicability Analysis

Proposed Project Emissions

CT Scenario	Description	NO _x		CO		VOC		PM/PM ₁₀ /PM _{2.5}		NH ₃		SO ₂		Lead		H ₂ SO ₄		CO ₂ e	
		Per turbine (tpy)	3 Turbines (tpy)	Per turbine (tpy)	3 Turbines (tpy)	Per turbine (tpy)	3 Turbines (tpy)	Per turbine (tpy)	3 Turbines (tpy)	Per turbine (tpy)	3 Turbines (tpy)	Per turbine (tpy)	3 Turbines (tpy)	Per turbine (tpy)	3 Turbines (tpy)	Per turbine (tpy)	3 Turbines (tpy)	Per turbine (tpy)	3 Turbines (tpy)
100% Load	ormal peration urning		7	02	02 07	0		7	7	0 00	0 00	7 E-0	2	2 E-0	7 E-0	2E-0	E-0	,0	7 ,2 2
	ormal peration urning with S SD	7	0 2		02 0				7	0 00	0 00	7 E-0	2 20	2 E-0	7 E-0	2E-0	7E-0	,	7 , 7
	ormal peration load urning 0 and 0	7	02	7	0 00	2		7	22	0 00	0 00	7 E-0	2 20	2E-0	2 7 E-0	2E-0	7E-0	0,	0, 7
	ormal peration load urning 0 and 0 with S SD		0	0	0		0	7	22	0 00	0 00	7 E-0	2 2	E-0	2 7E-0	E-0	E-0	0, 0	0, 2
75% Load	ormal peration urning	2	27 7	0	0	2		27	0	0 00	0 00	E-0	7	2 E-0	7 E-0	7E-02	2 E-0	,	,
	ormal peration urning with S SD	2	27 7	2	0 7	2 7		2		0 00	0 00	7E-0	7	2 E-0	7 E-0	E-02	2 70E-0	,	,
	ormal peration load urning 0 and 0	2	7	7	0 2	2	72	0		0 00	0 00	E-0	7	2E-0	2 7 E-0	00E-02	2 70E-0	,2 7	,7 0
	ormal peration load urning 0 and 0 with S SD		22		0	2	77	0		0 00	0 00	E-0	77	E-0	2 7E-0	02E-02	2 7 E-0	,	,07
60% Load	ormal peration urning		0	0	0	2		2		0 00	0 00	0 E-0		2 E-0	7 E-0	7 70E-02	2 E-0	,	,
	ormal peration urning with S SD			0	0	0	0			0 00	0 00	0 E-0		2 E-0	7 E-0	7 72E-02	2 2E-0	0,0	20,
	ormal peration load urning 0 and 0	2	2 7	7 00	0	0	0	20		0 00	0 00	0 E-0	2	2E-0	2 7 E-0	7 7 E-02	2 2E-0	,	2 , 0
	ormal peration load urning 0 and 0 with S SD	2 0	2 2	7		2	0	22		0 00	0 00	07E-0	2	E-0	2 7E-0	7 7 E-02	2 E-0	, 7	2 ,72
50% Load	ormal peration urning		0	02	0 07	0	0			0 00	0 00	E-0		2 E-0	7 E-0	7 E-02	2 0 E-0	,2	0 ,7
	ormal peration urning with S SD	7			0	2	0	00		0 00	0 00	E-0		2 E-0	7 E-0	E-02	2 0 E-0	, 7	0 ,0 2
	ormal peration load urning 0 and 0		22	0 7	0	0	70		77	0 00	0 00	E-0		2E-0	2 7 E-0	2E-02	2 0 E-0	, 7	0 ,72
	ormal peration load urning 0 and 0 with S SD	7	70	7	0	2	7	0		0 00	0 00	7E-0		E-0	2 7E-0	E-02	2 0 E-0	,	0,0
Blac Start enerator		2				0 2		0 0		-		0 00		-		E-0			
Proposed Project Total Emissions		151.02		113.31		11.96		22.77		0.00		2.21		2.87E-03		3.38E-01		181,027	

Notes:

Short term 1 hr rates except for Lead, turbine heat input and S₂SD hours are from the Performance Data Report, except 2013 C/P Crane
 2 Lead emissions are calculated using emission factor from AP-2 Section 3, table 2 or natural gas and AP-2 Section 3, table 3 or Distillate oil
 S₂SD emissions are from Prairie Power Alsey Station Compliance Report
 S₂SD - PM₁₀, PM_{2.5}, S₂, H₂S and CO₂e emissions are based on S₂SD MMBtu content and maximum 1 MMBtu values for each pollutant
 Red highlights indicate the worst case emission rate for each pollutant

Proposed Project Emissions and Comparison with the respective SERs

Pollutant	tpy	SER (tpy)	Netting Required
PM	22.77	2	0
PM ₁₀	22.77		es
PM _{2.5}	22.77	0	es
S ₂	2.2	0	0
	0.2	2	es
C		0.0	es
C		2	0
Lead	2.7E-0	0	0
H ₂ S	E-0	7	0
C ₂ e	,027	7,000	es

Notes:

"Significant" means, in reference to a net emissions increase, a significant emissions increase or the potential of a source to emit a regulated NSR pollutant, or a rate of emissions that would equal or exceed any of the following rates (SER-Significant Emission Rates) as shown in table above.

volatile organic compounds or nitrogen oxides: 2 tons per year tpy in Baltimore City or Anne Arundel, Baltimore, Calvert, Carroll, Cecil, Charles, Frederick, Harford, Howard, Montgomery, and Prince Georges counties

volatile organic compounds or nitrogen oxides: 0 tpy in Allegany, Caroline, Dorchester, Garrett, Kent, Queen Anne's, St. Mary's, Somerset, Talbot, Washington, Wicomico, and Worcester counties

C.P. Crane - New Source Review Netting Analysis

Description	NO _x	CO	PM	PM ₁₀	PM _{2.5}	VOC	SO ₂	Lead	H ₂ SO ₄	CO ₂ e
	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)
Three ELM 000 turbine and one Black Start generator Increases	02			22.77	22.77					.027
Baseline Actual Emissions units 2	2,220	2								.777
Contemporaneous Emissions	0.00	0.00		0.00	0.00					0.00
Net Emission Increases/Decreases	-1,101.08	-20.92		-60.39	-13.22					-635,750
New Source Review Significant Emission Rates	2	00			0					7,000
Major Modification (Yes/No)	No	No		No	No					No

Capacity factor 0

Indicates netting is not required



Baseline Actual Emission Calculation

Year	Month	Heat Input			NO _x		CO		VOC		PM Unit 1				PM Unit 2				PM		PM ₁₀		PM _{2.5}		SO ₂		CO ₂ e			
		Heat Input MMBtu	Heat Input Unit 2	24-Month Rolling Ann Avg MMBtu	Total Tons	24-Month Rolling Ann Avg Tons	Total Tons	24-Month Rolling Ann Avg Tons	Total Tons	Unit 1 Tons	Unit 2 Tons	Total Tons	24-Month Rolling Ann Avg Tons	Method 5 Tons	Method 2 Tons	Method 5 Tons	Method 2 Tons	Total PM Tons	24-Month Rolling Ann Avg Tons	PM ₁₀ (67% of PM) Tons	PM _{2.5} (19% of PM) Tons	24-Month Rolling Ann Avg Tons	Total Tons	24-Month Rolling Ann Avg Tons	Total Tons					
2012	January	115,873	261,382	97,255.10	71.0		71.007		6.99		0.0007	0.001	0.171		0.007	0.017	0.021	0.012	0.024	0.033	5.703	3.821	1.654	71.14		99879.59				
2012	February	118,939	99,126	137,171.50	72.01		72.009		6.81		0.0007	0.001	0.065		0.007	0.017	0.021	0.012	0.024	0.033	2.163	1.450	1.740	71.82		11123.22				
2012	March	40,508	0	40,508.20	8.2		8.2		0.0007	0.001	0.001	0.001	0.024		0.007	0.017	0.021	0.012	0.024	0.033	0.048	0.126	0.141	7.69		4282.18				
2012	April	90,640	91,845	182,484.50	32.1		32.098		2.78		0.0007	0.001	0.078		0.007	0.017	0.021	0.012	0.024	0.033	2.603	1.744	0.755	34.61		19720.65				
2012	May	424,484	849,213	1,474,461.70	286.7		286.7		14.22		0.0007	0.001	0.661		0.007	0.017	0.021	0.012	0.024	0.033	21.402	14.407	4.736	209.30		155760.04				
2012	June	378,660	322,367	701,346.60	216.1		216.1		7.28		0.0007	0.001	0.294		0.007	0.017	0.021	0.012	0.024	0.033	8.867	6.611	2.861	153.40		74138.72				
2012	July	888,092	1,027,141	1,914,132.70	411.9		411.9		80.226		0.0007	0.001	0.825		0.007	0.017	0.021	0.012	0.024	0.033	27.616	18.301	8.009	408.24		203514.10				
2012	August	411,022	698,387	1,109,408.80	230.6		230.6		49.022		0.0007	0.001	0.499		0.007	0.017	0.021	0.012	0.024	0.033	16.456	11.025	4.772	217.294		117274.64				
2012	September	493,005	369,528	862,532.60	174.2		174.2		13.111		0.0007	0.001	0.357		0.007	0.017	0.021	0.012	0.024	0.033	12.013	8.049	1.484	100.29		51178.12				
2012	October	106,929	176,768	297,716.40	55.1		55.128		5.128		0.0007	0.001	0.110		0.007	0.017	0.021	0.012	0.024	0.033	3.693	2.474	1.071	57.27		28306.20				
2012	November	468,371	232,745	701,116.00	139.4		139.443		12.22		0.0007	0.001	0.280		0.007	0.017	0.021	0.012	0.024	0.033	9.461	6.339	2.744	170.42		74114.23				
2012	December	904,213	330,027	1,234,240.40	245.8		245.8		26.36		0.0007	0.001	0.481		0.007	0.017	0.021	0.012	0.024	0.033	16.296	10.918	4.726	486.53		130469.91				
2013	January	353,028	256,108	609,136.00	126.6		126.6		129.50		0.0007	0.001	0.252		0.007	0.017	0.021	0.012	0.024	0.033	8.462	5.670	2.454	117.13		54393.59				
2013	February	133,755	116,464	250,218.90	49.1		49.088		8.79		0.0007	0.001	0.105		0.007	0.017	0.021	0.012	0.024	0.033	3.527	2.363	1.023	85.03		26450.30				
2013	March	73,158	471,039	544,194.80	115.8		115.557		3.76		0.0007	0.001	0.261		0.007	0.017	0.021	0.012	0.024	0.033	8.650	5.796	2.509	108.57		57326.56				
2013	April	0	139,138	139,137.50	31.0		30.974		0.69		0.0007	0.001	0.070		0.007	0.017	0.021	0.012	0.024	0.033	2.296	1.538	0.666	39.12		15708.03				
2013	May	204,941	294,099	499,040.20	116.6		116.6		22.457		0.0007	0.001	0.219		0.007	0.017	0.021	0.012	0.024	0.033	7.312	4.899	2.120	99.94		52753.53				
2013	June	221,056	375,113	697,049.70	165.8		165.8		11.367		0.0007	0.001	0.300		0.007	0.017	0.021	0.012	0.024	0.033	10.053	6.755	2.915	151.95		73583.76				
2013	July	570,285	654,763	1,225,048.10	275.5		275.5		85.007		0.0007	0.001	0.527		0.007	0.017	0.021	0.012	0.024	0.033	17.647	11.823	5.118	560.12		170498.29				
2013	August	131,372	352,293	483,664.50	110.0		110.0		21.765		0.0007	0.001	0.222		0.007	0.017	0.021	0.012	0.024	0.033	7.389	4.951	2.143	129.61		51127.49				
2013	September	402,588	703,841	1,112,408.70	294.3		294.3		8.91		0.0007	0.001	0.136		0.007	0.017	0.021	0.012	0.024	0.033	17.333	11.767	5.085	449.98		121935.36				
2013	October	330,084	344,183	674,866.60	142.9		142.935		6.24		0.0007	0.001	0.288		0.007	0.017	0.021	0.012	0.024	0.033	9.647	6.464	2.798	273.29		71339.07				
2013	November	692,871	598,429	1,291,700.80	270.2		270.201		18.01		0.0007	0.001	0.542		0.007	0.017	0.021	0.012	0.024	0.033	18.195	12.191	5.277	650.50		130455.14				
2013	December	175,074	668,791	843,865.10	126.9		126.9		8.44		0.0007	0.001	0.296		0.007	0.017	0.021	0.012	0.024	0.033	9.843	6.595	2.855	146.11		66125.87				
2014	January	1,065,540	886,769	1,952,308.50	427.3		427.308		12.96		0.0007	0.001	0.816		0.007	0.017	0.021	0.012	0.024	0.033	27.418	18.370	7.951	646.49		290376.49				
2014	February	460,740	523,881	984,621.10	225.9		225.930		12.01		0.0007	0.001	0.423		0.007	0.017	0.021	0.012	0.024	0.033	14.140	9.487	4.106	193.79		103997.75				
2014	March	245,792	638,554	904,146.10	201.7		201.7		8.80		0.0007	0.001	0.415		0.007	0.017	0.021	0.012	0.024	0.033	13.812	9.254	4.006	130.81		95577.11				
2014	April	100,392	223,828	324,220.60	64.6		64.588		4.00		0.0007	0.001	0.147		0.007	0.017	0.021	0.012	0.024	0.033	4.898	3.282	1.420	46.52		34773.33				
2014	May	0	412,740	412,740.40	34.5		34.5		4.53		0.0007	0.001	0.206		0.007	0.017	0.021	0.012	0.024	0.033	8.807	4.561	1.974	77.07		41609.14				
2014	June	0	736,284	736,283.50	76.5		76.5		33.133		0.0007	0.001	0.368		0.007	0.017	0.021	0.012	0.024	0.033	12.149	8.140	3.523	161.67		77832.48				
2014	July	0	254,866	254,865.80	30.0		30.0		2.64		0.0007	0.001	0.127		0.007	0.017	0.021	0.012	0.024	0.033	4.224	2.818	1.220	54.50		26942.15				
2014	August	31,036	362,958	393,993.70	3.1		3.1		9.21		0.0007	0.001	0.092		0.007	0.017	0.021	0.012	0.024	0.049	4.365	2.924	1.266	82.81		20506.59				
2014	September	35,518	136,387	171,704.40	16.8		16.8		7.727		0.0007	0.001	0.081		0.007	0.017	0.021	0.012	0.024	0.049	3.763	2.521	1.091	35.04		38530.32				
2014	October	43,177	52,621	95,795.80	22.6		22.6		13.898		0.0007	0.001	0.043		0.007	0.017	0.021	0.012	0.024	0.049	1.875	1.327	0.544	22.34		10420.91				
2014	November	92,876	0	92,876.50	3.24		3.24		20.839		0.0007	0.001	0.033		0.007	0.017	0.021	0.012	0.024	0.049	1.115	0.747	0.323	18.24		9817.98				
2014	December	77,281	52,621	109,925.70	21.8		21.82		2.45		0.0007	0.001	0.051		0.007	0.017	0.021	0.012	0.024	0.049	1.287	0.896	0.396	18.76		10731.85				
2015	January	102,916	274,851	477,766.95	133.2		133.184		10.001		0.0007	0.001	0.239		0.007	0.017	0.021	0.012	0.024	0.049	10.213	6.843	2.962	188.02		105603.90				
2015	February	806,396	837,963	1,644,359.40	413.9		413.870		58.65		0.001	0.001	0.822		0.012	0.008	0.03	0.019	0.02	0.049	28.594	19.158	8.292	340.51		178822.34				
2015	March	218,156	284,030	502,186.30	73.8		73.752	124.6	154.3	119.2	0.001	0.001	0.251	3.6	0.012	0.008	0.03	0.019	0.02	0.049	9.140	6.124	2.651	113.64	200.3	53086.85	82982.8			
2015	April	0	262,055	262,054.60	59.6		59.639	129.9	4.26	121.0	0.001	0.001	0.131	3.6	0.012	0.008	0.03	0.019	0.02	0.049	6.420	4.240	1.862	35.9	61.37	2611.4	83518.0			
2015	May	3,318	147,548	150,866.50	7.26		7.265	65.65	10.9	1637.1	0.001	0.001	0.076	3.5	0.012	0.008	0.03	0.019	0.02	0.049	3.648	122.1	2.444	81.8	1.058	35.4	26.52	2574.7	15948.45	81677.4
2015	June	8,080	508,889	517,069.30	7.66		7.666	65.45	64.2	1586.3	0.001	0.001	0.249	4.4	0.012	0.008	0.03	0.019	0.02	0.049	14.021	124.1	9.394	81.2	4.066	36.0	131.78	2332.6	6100.51	81046.3
2015	July	10,152	367,009	483,160.20	46.4		46.171	127.84	10.014	1211.8	0.001	0.001	0.222	1.4	0.012	0.008	0.03	0.019	0.02	0.049	7.531	10.82	5.335	80.19	2.828	34.8	80.19	228.0	46847.2	76109.05
2015	August	76,393	138,198	262,120.20	27.47		27.47	285.20	19.23	131.8	0.001	0.001	0.313	0.1	0.012	0.008	0.03	0.019	0.02	0.049	14.416	12.37	6.659	82.9	4.181					

NO_x Actual Emissions Data Provided by C.P. Crane

Year	Month	Unit 1				Unit 2			
		Tons	Daily Avg lbs/mmBTU	Gross MW	lbs/MWg	Tons	Daily Avg lbs/mmBTU	Gross MW	lbs/MWg
2012	January	27.1	0.460	11,247	4.81	43.9	0.315	21,138	4.16
2012	February	8.0	0.332	3,729	4.30	15.0	0.222	7,272	4.12
2012	March	8.2	0.331	5,269	3.13	0.0	#DIV/0!	0	#DIV/0!
2012	April	16.4	0.312	8,571	3.83	15.7	0.232	6,462	4.85
2012	May	123.5	0.363	59,005	4.19	163.2	0.367	69,776	4.68
2012	June	74.9	0.426	34,919	4.29	58.7	0.323	24,271	4.84
2012	July	181.7	0.400	87,159	4.17	230.2	0.429	84,697	5.44
2012	August	87.7	0.382	39,560	4.43	142.9	0.386	55,933	5.11
2012	September	100.0	0.401	46,554	4.30	74.2	0.389	29,509	5.03
2012	October	32.6	0.421	15,495	4.21	22.5	0.362	8,627	5.21
2012	November	88.3	0.382	45,670	3.87	51.2	0.377	18,611	5.50
2012	December	191.9	0.424	85,003	4.51	53.9	0.328	24,060	4.48
2013	January	73.6	0.408	33,677	4.37	56.0	0.389	20,029	5.59
2013	February	26.8	0.380	13,186	4.07	22.3	0.332	9,092	4.90
2013	March	15.5	0.405	6,394	4.83	100.1	0.392	38,099	5.25
2013	April	0.0	#DIV/0!	0	#DIV/0!	31.0	0.421	10,940	5.66
2013	May	42.6	0.352	19,465	4.37	74.1	0.375	23,921	6.19
2013	June	67.8	0.396	30,936	4.38	98.0	0.462	29,476	6.65
2013	July	120.9	0.397	56,808	4.26	154.6	0.549	54,714	5.65
2013	August	29.6	0.426	11,365	5.20	80.4	0.372	27,943	5.75
2013	September	84.5	0.401	39,566	4.27	209.7	0.492	65,688	6.39
2013	October	69.9	0.423	33,561	4.17	73.0	0.390	27,045	5.40
2013	November	131.7	0.372	63,964	4.12	138.5	0.441	50,335	5.50
2013	December	32.4	0.388	15,645	4.15	94.4	0.373	38,576	4.90
2014	January	215.5	0.406	98,723	4.37	211.8	0.477	78,438	5.40
2014	February	92.0	0.393	46,367	3.97	133.9	0.427	44,891	5.97
2014	March	56.2	0.447	24,789	4.53	147.6	0.389	56,523	5.22
2014	April	22.6	0.376	8,944	5.05	42.0	0.388	17,723	4.74
2014	May	0.0	#DIV/0!	0	#DIV/0!	34.5	0.231	31,013	2.23
2014	June	0.0	#DIV/0!	0	#DIV/0!	76.5	0.266	56,819	2.69
2014	July	0.0	#DIV/0!	0	#DIV/0!	30.0	0.208	18,605	3.23
2014	August	0.5	0.344	2,591	0.38	2.6	0.346	12,694	0.41
2014	September	2.0	0.311	3,542	1.11	14.8	0.256	9,061	3.27
2014	October	6.2	0.328	4,145	2.99	7.7	0.235	3,696	4.17
2014	November	20.9	0.403	8,173	5.12	0.0	#DIV/0!	0	#DIV/0!
2014	December	16.6	0.420	6,556	5.05	5.4	0.390	1,279	8.39
2015	January	22.7	0.415	8,084	5.61	110.5	0.503	28,084	7.87
2015	February	158.5	0.391	70,550	4.49	255.4	0.545	66,454	7.69
2015	March	54.3	0.450	18,087	6.01	77.4	0.508	21,778	7.11
2015	April	0.0	#DIV/0!	0	#DIV/0!	59.6	0.414	20,715	5.76
2015	May	0.4	0.236	0	#DIV/0!	10.6	0.243	9,481	2.23
2015	June	1.1	0.288	282	7.81	63.1	0.239	44,016	2.87
2015	July	7.4	0.274	7,491	1.97	39.0	0.220	27,753	2.81
2015	August	30.3	0.316	28,739	2.11	31.7	0.249	24,281	2.61
2015	September	34.0	0.290	34,068	2.00	20.5	0.277	16,954	2.42
2015	October	0.0	#DIV/0!	0	#DIV/0!	24.9	0.431	9,622	5.18
2015	November	0.0	#DIV/0!	0	#DIV/0!	0.0	0.017	0	#DIV/0!
2015	December	0.0	#DIV/0!	0	#DIV/0!	11.7	0.315	5,283	4.45
2016	January	60.4	0.361	31,549	3.83	53.8	0.437	27,458	3.92
2016	February	49.9	0.383	24,034	4.15	28.4	0.378	16,078	3.53
2016	March	1.2	0.400	213	11.71	1.2	0.405	285	8.48
2016	April	0.0	#DIV/0!	0	#DIV/0!	0.0	#DIV/0!	0	#DIV/0!
2016	May	4.7	0.276	2,785	3.40	0.0	#DIV/0!	0	#DIV/0!
2016	June	12.3	0.278	9,389	2.61	14.7	0.234	14,430	2.03
2016	July	26.1	0.307	26,755	1.95	46.5	0.229	45,626	2.04
2016	August	30.5	0.277	23,891	2.55	43.5	0.257	39,126	2.22
2016	September	30.0	0.267	25,098	2.39	29.7	0.272	39,807	1.49
2016	October	7.9	0.432	2,995	5.29	37.6	0.454	14,025	5.36
2016	November	1.3	0.366	321	7.97	46.9	0.586	17,418	5.39
2016	December	31.4	0.425	13,959	4.51	46.4	0.472	19,701	4.71
2017	January	10.6	0.343	3,730	5.68	49.0	0.431	18,693	5.24
2017	February	0.0	#DIV/0!	0	#DIV/0!	23.3	0.379	8,093	5.75
2017	March	1.6	0.536	244	13.50	49.2	0.444	20,477	4.81
2017	April	0.0	#DIV/0!	0	#DIV/0!	0.0	#DIV/0!	0	#DIV/0!
2017	May	0.0	#DIV/0!	0	#DIV/0!	3.9	0.267	4,792	1.64
2017	June	0.0	#DIV/0!	0	#DIV/0!	17.8	0.271	16,316	2.18
2017	July	55.1	0.268	43,283	2.55	8.5	0.216	9,482	1.80

Non Compliance

Month	Day	Year	Unit 1 (lb)	Unit 1 (ton)
6	4	2012	13924.8	6.96
8	27	2014	1795	0.90
8	28	2014	13175	6.59
9	29	2014	8198.6	4.10
7	29	2015	5029.6	2.51
8	16	2015	549.6	0.27
8	17	2015	9409.7	4.70
8	25	2015	6537.3	3.27
8	27	2015	13458.4	6.73
9	7	2015	1582.1	0.79
9	8	2015	12639.3	6.32
9	14	2015	12183.3	6.09
6	19	2016	1599.6	0.80
7	4	2016	1814.5	0.91
7	11	2016	455.8	0.23
7	13	2016	12428.6	6.21
7	14	2016	10468.1	5.23
8	10	2016	682.7	0.34
8	11	2016	2786.9	1.39
9	5	2016	521.7	0.26
7	9	2017	704.7	0.35
7	10	2017	2742.4	1.37

Non Compliance

Month	Day	Year	Unit 1 (lb)	Unit 1 (ton)
7	19	2013	33850.9	16.93
7	20	2013	27843.5	13.92
7	21	2013	24180.6	12.09
5	7	2014	7111.5	3.56
5	11	2014	9800.7	4.90
5	13	2014	10806	5.40
5	26	2014	7919	3.96
6	1	2014	8409.6	4.20
6	10	2014	756.5	0.38
6	11	2014	9311	4.66
6	17	2014	11617.7	5.81
6	23	2014	9534.5	4.77
8	18	2014	9960.3	4.98
8	20	2014	12539.5	6.27
8	21	2014	24595.5	12.30
8	22	2014	15194.8	7.60
9	2	2014	4101.2	2.05
9	11	2014	6803.4	3.40
5	10	2015	1561.5	0.78
5	11	2015	12127.8	6.06
5	18	2015	5510.4	2.76
6	5	2015	10524.5	5.26
7	29	2015	5993	3.00
8	23	2015	3099.1	1.55
8	26	2015	9448.3	4.72
8	30	2015	7117.6	3.56
9	13	2015	1096.8	0.55
6	6	2016	3406.4	1.70
6	20	2016	4054.4	2.03
8	9	2016	4980	2.49
8	31	2016	11360.2	5.68
9	6	2016	7821	3.91
9	12	2016	4464.6	2.23
9	13	2016	11397.8	5.70
9	23	2016	12848.2	6.42
9	24	2016	8547.8	4.27
9	28	2016	3674.1	1.84
5	17	2017	7638.4	3.82
6	27	2017	2040.1	1.02
6	28	2017	16875.2	8.44
7	26	2017	328.8	0.16
7	27	2017	9963.9	4.98

Highlighted cells indicate that from the monthly data, emissions from the days of non compliance has been subtracted

CO Actual Emissions Data Provided by C.P. Crane

Year	Month	Unit 1				Unit 2			
		Tons	Heat Input (MMBTu)	Gross MW	lbs/mmBTU	Tons	Heat Input (MMBTu)	Gross MW	lbs/mmBTU
2012	January	1.1	115,873	11,247	0.02	5.9	261,382	21,138	0.05
2012	February	0.8	43,989	3,729	0.04	1.1	99,126	7,272	0.02
2012	March	0.8	40,508	5,269	0.04	0.0	0	0	#DIV/0!
2012	April	1.1	90,640	8,571	0.02	1.7	91,845	6,462	0.04
2012	May	6.9	624,188	59,005	0.02	7.3	849,213	69,776	0.02
2012	June	3.5	378,980	34,919	0.02	3.8	322,367	24,271	0.02
2012	July	13.1	888,992	87,159	0.03	12.8	1,027,141	84,697	0.02
2012	August	5.3	411,022	39,560	0.03	5.7	698,387	55,933	0.02
2012	September	5.2	493,005	46,554	0.02	7.9	369,528	29,509	0.04
2012	October	1.0	160,929	15,495	0.01	2.7	106,788	8,627	0.05
2012	November	7.9	468,371	45,670	0.03	4.4	232,745	18,611	0.04
2012	December	12.6	904,213	85,003	0.03	13.7	330,027	24,060	0.08
2013	January	7.4	353,028	33,677	0.04	16.3	256,108	20,029	0.13
2013	February	2.3	133,755	13,186	0.03	1.5	116,464	9,092	0.03
2013	March	0.6	73,156	6,394	0.02	7.7	471,039	38,099	0.03
2013	April	0.0	0	0	#DIV/0!	0.7	139,138	10,940	0.01
2013	May	2.5	204,941	19,465	0.02	1.6	294,099	23,921	0.01
2013	June	2.7	321,936	30,936	0.02	2.5	375,113	29,476	0.01
2013	July	7.8	570,285	56,808	0.03	0.7	654,763	54,714	0.00
2013	August	1.0	131,372	11,365	0.02	2.4	352,293	27,943	0.01
2013	September	4.4	402,568	39,566	0.02	4.5	769,841	65,688	0.01
2013	October	2.2	330,684	33,561	0.01	4.1	344,183	27,045	0.02
2013	November	11.0	692,871	63,964	0.03	7.1	598,829	50,335	0.02
2013	December	4.0	175,674	15,645	0.05	5.4	468,791	38,576	0.02
2014	January	21.0	1,065,540	98,723	0.04	11.9	886,769	78,438	0.03
2014	February	8.2	460,740	46,367	0.04	3.8	523,081	44,891	0.01
2014	March	1.2	245,792	24,789	0.01	7.6	658,354	56,523	0.02
2014	April	1.6	100,392	8,944	0.03	2.5	223,828	17,723	0.02
2014	May	0.0	0	0	#DIV/0!	4.5	412,540	31,013	0.02
2014	June	0.0	0	0	#DIV/0!	9.0	736,284	56,819	0.02
2014	July	0.0	0	0	#DIV/0!	2.6	254,866	18,605	0.02
2014	August	0.3	31,036	2,591	0.02	0.9	162,958	12,694	0.01
2014	September	0.6	35,518	3,542	0.04	2.6	136,187	9,061	0.04
2014	October	1.0	43,177	4,145	0.05	1.2	55,402	3,696	0.04
2014	November	1.3	92,876	8,173	0.03	0.0	0	0	#DIV/0!
2014	December	1.9	77,281	6,556	0.05	0.6	24,244	1,279	0.05
2015	January	3.2	102,916	8,084	0.06	12.2	374,851	28,084	0.06
2015	February	31.7	806,396	70,550	0.08	27.0	837,963	66,454	0.06
2015	March	10.0	218,166	18,087	0.09	5.4	284,030	21,778	0.04
2015	April	0.0	0	0	#DIV/0!	4.3	262,055	20,715	0.03
2015	May	0.1	3,318	0	0.06	6.3	147,548	9,481	0.09
2015	June	0.2	8,080	282	0.05	8.3	568,989	44,016	0.03
2015	July	2.8	76,152	7,491	0.07	6.0	367,009	27,753	0.03
2015	August	9.7	310,593	28,739	0.06	9.6	316,198	24,281	0.06
2015	September	9.24	343,752	34,068	0.05	4.5	173,482	16,954	0.05
2015	October	0.0	0	0	#DIV/0!	2.6	96,818	9,622	0.05
2015	November	0.0	0	0	#DIV/0!	0.0	163	0	0.05
2015	December	0.0	0	0	#DIV/0!	0.3	53,655	5,283	0.01
2016	January	14.6	325,048	31,549	0.09	11.7	241,433	27,458	0.10
2016	February	6.1	245,769	24,034	0.05	7.4	144,795	16,078	0.10
2016	March	0.4	5,712	213	0.14	0.2	4,022	285	0.09
2016	April	0.0	0	0	#DIV/0!	0.0	0	0	#DIV/0!
2016	May	0.6	33,900	2,785	0.04	0.0	0	0	#DIV/0!
2016	June	1.6	102,739	9,389	0.03	6.1	133,470	14,430	0.09
2016	July	5.1	284,229	26,755	0.04	13.9	394,242	45,626	0.07
2016	August	2.8	253,258	23,891	0.02	8.4	384,487	39,126	0.04
2016	September	4.9	258,999	25,098	0.04	11.1	367,217	39,807	0.06
2016	October	0.2	33,134	2,995	0.01	2.6	127,745	14,025	0.04
2016	November	0.1	6,907	321	0.04	2.1	151,486	17,418	0.03
2016	December	3.6	152,060	13,959	0.05	3.9	179,706	19,701	0.04
2017	January	2.2	40,660	3,730	0.11	4.5	178,712	18,693	0.05
2017	February	0.0	0	0	#DIV/0!	2.6	78,539	8,093	0.07
2017	March	0.8	6,385	244	0.26	12.8	194,977	20,477	0.13
2017	April	0.0	0	0	#DIV/0!	0.0	0	0	#DIV/0!
2017	May	0.0	0	0	#DIV/0!	0.4	54,381	4,792	0.01
2017	June	0.0	0	0	#DIV/0!	7.1	191,090	16,316	0.07
2017	July	13.9	459,984	43,283	0.06	3.6	104,204	9,482	0.07

Non Compliance

Month	Day	Year	Unit 1 (lb)	Unit 1 (ton)
6	24	2015	2350.8	1.18
6	25	2015	341.2	0.17
7	30	2015	6554.2	3.28
9	3	2015	6212	3.11
1	27	2016	587.3	0.29
11	14	2016	1066.9	0.53

			Unit 2 (lb)	Unit 2 (ton)
12	13	2012	202.2	0.10
1	30	2013	1188.9	0.59
2	23	2013	287.8	0.14
12	17	2016	219.8	0.11

Highlighted cells indicate that from the monthly data, emissions from the days of non compliance has been subtracted

SO₂ Actual Emissions Data Provided by C.P. Crane

Year	Month	Unit 1				Unit 2			
		Tons	Heat Input (MMBTu)	Gross MW	lbs/mmBTU	Tons	Heat Input (MMBTu)	Gross MW	lbs/mmBTU
2012	January	20.238	115873.200	11247	0.35	50.9003	261381.9	21138	0.39
2012	February	8.383	43988.900	3729	0.38	19.4361	99125.8	7272	0.39
2012	March	7.693	40508.200	5269	0.38	0	0.0	0	#DIV/0!
2012	April	17.029	90640.000	8571	0.38	17.5772	91844.5	6462	0.38
2012	May	122.645	624188.400	59005	0.39	176.458	849213.3	69776	0.42
2012	June	81.867	378980.000	34919	0.43	71.5341	322366.6	24271	0.44
2012	July	183.079	888992.000	87159	0.41	225.1605	1027140.7	84697	0.44
2012	August	94.116	411022.300	39560	0.46	162.4957	698386.5	55933	0.47
2012	September	113.111	493005.100	46554	0.46	88.17455	369527.5	29509	0.48
2012	October	34.022	160928.900	15495	0.42	23.24725	106787.5	8627	0.44
2012	November	117.431	468370.800	45670	0.50	53.18945	232745.2	18611	0.46
2012	December	413.330	904213.400	85003	0.91	73.59595	330027.0	24060	0.45
2013	January	69.779	353028.000	33677	0.40	47.3512	256108.0	20029	0.37
2013	February	30.102	133755.300	13186	0.45	54.92685	116463.6	9092	0.94
2013	March	13.102	73156.000	6394	0.36	91.2684	471038.8	38099	0.39
2013	April	0.000	0.000	0	#DIV/0!	39.12115	139137.5	10940	0.56
2013	May	38.480	204941.100	19465	0.38	61.4604	294099.1	23921	0.42
2013	June	77.929	321936.400	30936	0.48	138.0209	375113.3	29476	0.74
2013	July	152.607	570284.900	56808	0.54	407.5137	654763.2	54714	1.24
2013	August	27.515	131371.500	11365	0.42	202.0958	352293.0	27943	1.15
2013	September	110.068	402568.100	39566	0.55	439.5126	769840.6	65688	1.14
2013	October	80.031	330684.000	33561	0.48	193.255	344182.6	27045	1.12
2013	November	196.415	692871.400	63964	0.57	359.2802	598829.4	50335	1.20
2013	December	36.295	175674.100	15645	0.41	108.8163	468791.4	38576	0.46
2014	January	265.965	1065539.600	98723	0.50	380.5245	886768.9	78438	0.86
2014	February	146.370	460740.100	46367	0.64	247.4171	523081.0	44891	0.95
2014	March	92.408	245791.700	24789	0.75	238.4045	658354.4	56523	0.72
2014	April	10.161	100392.300	8944	0.20	36.3553	223828.3	17723	0.32
2014	May	0.000	0.000	0	#DIV/0!	77.07325	412540.4	31013	0.37
2014	June	0.000	0.000	0	#DIV/0!	161.6726	736283.5	56819	0.44
2014	July	0.000	0.000	0	#DIV/0!	54.50305	254865.8	18605	0.43
2014	August	8.453	31036.100	2591	0.54	74.45225	162957.6	12694	0.91
2014	September	6.858	35517.700	3542	0.39	28.18255	136186.7	9061	0.41
2014	October	9.677	43177.100	4145	0.45	12.56355	55401.7	3696	0.45
2014	November	18.237	92875.500	8173	0.39	0	0.0	0	#DIV/0!
2014	December	15.417	77281.300	6556	0.40	4.3441	24244.4	1279	0.36
2015	January	24.926	102915.600	8084	0.48	164.0987	374850.9	28084	0.88
2015	February	163.585	806396.300	70550	0.41	176.9291	837963.1	66454	0.42
2015	March	47.699	218166.200	18087	0.44	65.9368	284030.1	21778	0.46
2015	April	0.000	0.000	0	#DIV/0!	61.3722	262054.6	20715	0.47
2015	May	0.396	3318.100	0	0.24	26.12655	147548.4	9481	0.35
2015	June	1.137	8079.900	282	0.28	130.6461	568989.4	44016	0.46
2015	July	14.036	76151.800	7491	0.37	66.6571	367009.1	27753	0.36
2015	August	61.653	310593.200	28739	0.40	154.0011	316198.0	24281	0.97
2015	September	68.084	343752.400	34068	0.40	36.47065	173481.8	16954	0.42
2015	October	0.000	0.000	0	#DIV/0!	19.2842	96817.7	9622	0.40
2015	November	0.000	0.000	0	#DIV/0!	0	163.2	0	0.00
2015	December	0.000	0.000	0	#DIV/0!	44.03765	53654.9	5283	1.64
2016	January	56.804	325048.000	31549	0.35	41.7559	241432.5	27458	0.35
2016	February	44.746	245769.100	24034	0.36	26.1586	144795.2	16078	0.36
2016	March	0.796	5712.400	213	0.28	0.4742	4021.7	285	0.24
2016	April	0.000	0.000	0	#DIV/0!	0	0.0	0	#DIV/0!
2016	May	6.022	33900.200	2785	0.36	0	0.0	0	#DIV/0!
2016	June	18.613	102738.600	9389	0.36	24.9708	133469.9	14430	0.37
2016	July	61.608	284229.100	26755	0.43	90.9799	394242.3	45626	0.46
2016	August	50.138	253257.500	23891	0.40	86.88335	384486.6	39126	0.45
2016	September	98.497	258999.100	25098	0.76	153.583	367216.5	39807	0.84
2016	October	17.778	33134.300	2995	1.07	63.58645	127745.3	14025	1.00
2016	November	3.404	6906.500	321	0.99	87.42835	151486.3	17418	1.15
2016	December	55.143	152059.700	13959	0.73	61.95205	179705.6	19701	0.69
2017	January	12.879	40660.200	3730	0.63	56.60015	178712.4	18693	0.63
2017	February	0.000	0.000	0	#DIV/0!	24.07755	78538.7	8093	0.61
2017	March	1.190	6384.700	244	0.37	54.78925	194976.8	20477	0.56
2017	April	0.000	0.000	0	#DIV/0!	0	0.0	0	#DIV/0!
2017	May	0.000	0.000	0	#DIV/0!	13.97845	54380.9	4792	0.51
2017	June	0.000	0.000	0	#DIV/0!	59.1261	191089.8	16316	0.62
2017	July	127.351	459984.100	43283	0.55	28.42495	104204.3	9482	0.55

Non Compliance
None

CO₂ Actual Emissions Data Provided by C.P. Crane

Year	Month	Unit 1						Unit 2							
		CO ₂ Tons	Heat Input (MMBtu)	CH ₄ Emission factor (kg/MMBtu)	CH ₄ Tons	N ₂ O Emission factor (kg/MMBtu)	N ₂ O Tons	CO ₂ e	CO ₂ Tons	Heat Input (MMBtu)	CH ₄ Emission factor (kg/MMBtu)	CH ₄ Tons	N ₂ O Emission factor (kg/MMBtu)	N ₂ O Tons	CO ₂ e
2012	January	12,152.90	115,873	1.10E-02	1.4	1.60E-03	0.2	12,248.94	27,414.00	261,382	1.10E-02	3.2	1.60E-03	0.5	27,630.65
2012	February	4,613.70	43,989	1.10E-02	0.5	1.60E-03	0.1	4,650.16	10,396.10	99,126	1.10E-02	1.2	1.60E-03	0.2	10,478.26
2012	March	4,248.60	40,508	1.10E-02	0.5	1.60E-03	0.1	4,282.18	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00
2012	April	9,506.70	90,640	1.10E-02	1.1	1.60E-03	0.2	9,581.83	9,632.70	91,845	1.10E-02	1.1	1.60E-03	0.2	9,708.83
2012	May	65,464.40	624,188	1.10E-02	7.6	1.60E-03	1.1	65,981.76	89,064.40	849,213	1.10E-02	10.3	1.60E-03	1.5	89,768.28
2012	June	39,747.60	378,980	1.10E-02	4.6	1.60E-03	0.7	40,061.72	33,809.80	322,367	1.10E-02	3.9	1.60E-03	0.6	34,077.00
2012	July	93,238.40	888,992	1.10E-02	10.8	1.60E-03	1.6	93,975.25	107,727.50	1,027,141	1.10E-02	12.5	1.60E-03	1.8	108,578.86
2012	August	43,107.70	411,022	1.10E-02	5.0	1.60E-03	0.7	43,448.38	73,247.40	698,387	1.10E-02	8.5	1.60E-03	1.2	73,826.26
2012	September	51,706.30	493,005	1.10E-02	6.0	1.60E-03	0.9	52,114.93	38,756.90	369,528	1.10E-02	4.5	1.60E-03	0.7	39,063.19
2012	October	16,878.30	160,929	1.10E-02	2.0	1.60E-03	0.3	17,011.69	11,200.00	106,788	1.10E-02	1.3	1.60E-03	0.2	11,288.51
2012	November	49,123.10	468,371	1.10E-02	5.7	1.60E-03	0.8	49,511.31	24,410.00	232,745	1.10E-02	2.8	1.60E-03	0.4	24,602.91
2012	December	94,833.90	904,213	1.10E-02	11.0	1.60E-03	1.6	95,583.37	34,613.00	330,027	1.10E-02	4.0	1.60E-03	0.6	34,886.55
2013	January	37,025.20	353,028	1.10E-02	4.3	1.60E-03	0.6	37,317.81	26,860.50	256,108	1.10E-02	3.1	1.60E-03	0.5	27,072.78
2013	February	14,028.50	133,755	1.10E-02	1.6	1.60E-03	0.2	14,139.36	12,214.40	116,464	1.10E-02	1.4	1.60E-03	0.2	12,310.93
2013	March	7,672.70	73,156	1.10E-02	0.9	1.60E-03	0.1	7,733.34	49,402.80	471,039	1.10E-02	5.7	1.60E-03	0.8	49,793.22
2013	April	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	14,592.70	139,138	1.10E-02	1.7	1.60E-03	0.2	14,708.03
2013	May	21,494.90	204,941	1.10E-02	2.5	1.60E-03	0.4	21,664.77	30,845.00	294,099	1.10E-02	3.6	1.60E-03	0.5	31,088.77
2013	June	33,764.60	321,936	1.10E-02	3.9	1.60E-03	0.6	34,031.44	37,113.00	375,113	1.10E-02	4.5	1.60E-03	0.7	36,621.82
2013	July	59,811.20	570,285	1.10E-02	6.9	1.60E-03	1.0	60,283.89	68,671.70	654,763	1.10E-02	7.9	1.60E-03	1.2	69,214.41
2013	August	13,777.80	131,372	1.10E-02	1.6	1.60E-03	0.2	13,886.69	36,948.80	352,293	1.10E-02	4.3	1.60E-03	0.6	37,240.80
2013	September	42,222.10	402,568	1.10E-02	4.9	1.60E-03	0.7	42,555.77	80,741.40	769,841	1.10E-02	9.3	1.60E-03	1.4	81,379.49
2013	October	34,681.80	330,684	1.10E-02	4.0	1.60E-03	0.6	34,955.89	36,097.90	344,183	1.10E-02	4.2	1.60E-03	0.6	36,383.18
2013	November	72,669.30	692,871	1.10E-02	8.4	1.60E-03	1.2	73,243.59	62,805.20	598,829	1.10E-02	7.3	1.60E-03	1.1	63,301.55
2013	December	18,424.60	175,674	1.10E-02	2.1	1.60E-03	0.3	18,570.21	49,167.10	468,791	1.10E-02	5.7	1.60E-03	0.8	49,555.66
2014	January	111,753.80	1,065,540	1.10E-02	12.9	1.60E-03	1.9	112,636.98	93,004.50	886,769	1.10E-02	10.8	1.60E-03	1.6	93,739.51
2014	February	48,322.30	460,740	1.10E-02	5.6	1.60E-03	0.8	48,704.19	54,860.00	523,081	1.10E-02	6.3	1.60E-03	0.9	55,293.56
2014	March	25,778.50	245,792	1.10E-02	3.0	1.60E-03	0.4	25,982.23	69,049.20	658,354	1.10E-02	8.0	1.60E-03	1.2	69,594.88
2014	April	10,529.30	100,392	1.10E-02	1.2	1.60E-03	0.2	10,612.51	23,475.30	223,828	1.10E-02	2.7	1.60E-03	0.4	23,660.82
2014	May	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	43,267.20	412,540	1.10E-02	5.0	1.60E-03	0.7	43,609.14
2014	June	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	77,222.20	736,284	1.10E-02	8.9	1.60E-03	1.3	77,832.48
2014	July	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	26,730.90	254,866	1.10E-02	3.1	1.60E-03	0.4	26,942.15
2014	August	3,254.90	31,036	1.10E-02	0.4	1.60E-03	0.1	3,280.62	17,090.90	162,958	1.10E-02	2.0	1.60E-03	0.3	17,225.97
2014	September	3,725.10	35,518	1.10E-02	0.4	1.60E-03	0.1	3,754.54	14,282.90	136,187	1.10E-02	1.7	1.60E-03	0.2	14,395.78
2014	October	4,528.60	43,177	1.10E-02	0.5	1.60E-03	0.1	4,564.39	5,810.60	55,402	1.10E-02	0.7	1.60E-03	0.1	5,856.52
2014	November	9,741.00	92,876	1.10E-02	1.1	1.60E-03	0.2	9,817.98	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00
2014	December	8,105.20	77,281	1.10E-02	0.9	1.60E-03	0.1	8,169.26	2,542.50	24,244	1.10E-02	0.3	1.60E-03	0.0	2,562.60
2015	January	10,793.70	102,916	1.10E-02	1.2	1.60E-03	0.2	10,879.00	39,314.20	374,851	1.10E-02	4.5	1.60E-03	0.7	39,624.90
2015	February	84,573.80	806,396	1.10E-02	9.8	1.60E-03	1.4	85,242.19	87,885.60	837,963	1.10E-02	10.2	1.60E-03	1.5	88,580.15
2015	March	22,881.10	218,166	1.10E-02	2.6	1.60E-03	0.4	23,061.93	29,789.50	284,030	1.10E-02	3.4	1.60E-03	0.5	30,024.92
2015	April	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	27,485.10	262,055	1.10E-02	3.2	1.60E-03	0.5	27,702.31
2015	May	347.80	3,318	1.10E-02	0.0	1.60E-03	0.0	350.55	15,475.60	147,548	1.10E-02	1.8	1.60E-03	0.3	15,593.90
2015	June	847.50	8,080	1.10E-02	0.1	1.60E-03	0.0	854.20	59,675.70	568,989	1.10E-02	6.9	1.60E-03	1.0	60,147.31
2015	July	7,986.40	76,152	1.10E-02	0.9	1.60E-03	0.1	8,049.52	38,491.00	367,009	1.10E-02	4.5	1.60E-03	0.6	38,795.20
2015	August	32,575.20	310,593	1.10E-02	3.8	1.60E-03	0.5	32,832.64	33,162.70	316,198	1.10E-02	3.8	1.60E-03	0.6	33,424.78
2015	September	36,052.50	343,752	1.10E-02	4.2	1.60E-03	0.6	36,337.42	18,194.10	173,482	1.10E-02	2.1	1.60E-03	0.3	18,337.89
2015	October	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	10,154.40	96,818	1.10E-02	1.2	1.60E-03	0.2	10,234.65
2015	November	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	16.90	163	1.10E-02	0.0	1.60E-03	0.0	17.04
2015	December	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	5,627.30	53,655	1.10E-02	0.7	1.60E-03	0.1	5,671.77
2016	January	34,091.50	325,048	1.10E-02	3.9	1.60E-03	0.6	34,360.92	25,321.30	241,433	1.10E-02	2.9	1.60E-03	0.4	25,521.41
2016	February	25,776.10	245,769	1.10E-02	3.0	1.60E-03	0.4	25,979.81	15,186.10	144,795	1.10E-02	1.8	1.60E-03	0.3	15,306.11
2016	March	599.20	5,712	1.10E-02	0.1	1.60E-03	0.0	603.93	421.60	4,022	1.10E-02	0.0	1.60E-03	0.0	424.93
2016	April	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00
2016	May	3,555.60	33,900	1.10E-02	0.4	1.60E-03	0.1	3,583.70	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00
2016	June	10,775.00	102,739	1.10E-02	1.2	1.60E-03	0.2	10,860.16	13,997.90	133,470	1.10E-02	1.6	1.60E-03	0.2	14,108.53
2016	July	29,810.20	284,229	1.10E-02	3.4	1.60E-03	0.5	30,045.79	41,347.80	394,242	1.10E-02	4.8	1.60E-03	0.7	41,674.57
2016	August	26,561.50	253,258	1.10E-02	3.1	1.60E-03	0.4	26,771.41	40,324.30	384,487	1.10E-02	4.7	1.60E-03	0.7	40,642.99
2016	September	27,163.30	258,999	1.10E-02	3.1	1.60E-03	0.5	27,377.97	38,512.70	367,217	1.10E-02	4.5	1.60E-03	0.6	38,817.07
2016	October	3,475.20	33,134	1.10E-02	0.4	1.60E-03	0.1	3,502.66	13,398.70	127,745	1.10E-02	1.5	1.60E-03	0.2	13,504.58
2016	November	724.40	6,907	1.10E-02	0.1	1.60E-03	0.0	730.12	15,887.50	151,486	1.10E-02	1.8	1.60E-03	0.3	16,013.06
2016	December	15,948.20	152,060	1.10E-02	1.8	1.60E-03	0.3	16,074.24	18,848.00	179,706	1.10E-02	2.2	1.60E-03	0.3	18,996.95
2017	January	4,264.80	40,660	1.10E-02	0.5	1.60E-03	0.1	4,298.50	18,744.00	178,712	1.10E-02	2.2	1.60E-03	0.3	18,892.13
2017	February	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	8,237.80	78,539	1.10E-02	1.0	1.60E-03	0.1	8,302.90
2017	March	669.60	6,385	1.10E-02	0.1	1.60E-03	0.0	674.89	20,450.00	194,977	1.10E-02	2.4	1.60E-03	0.3	20,611.61
2017	April	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00
2017	May	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	5,703.10	54,381	1.10E-02	0.7	1.60E-03	0.1	5,748.17
2017	June	0.00	0	1.10E-02	0.0	1.60E-03	0.0	0.00	20,041.10	191,090	1.10E-02	2.3	1.60E-03	0.3	20,199.49
2017	July	48,243.40	459,984	1.10E-02	5.6	1.60E-03	0.8	48,624.66	10,928.30	104,204	1.10E-02	1.3	1.60E-03		

Appendix C

Air Dispersion Modeling Protocol

C.P. Crane Combustion Turbine Repowering Project

Air Quality Impact Analysis Modeling Protocol

C.P. CRANE, LLC
Chase, Maryland


February 2018
ECT No. 170604-0300

Document Review

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc.'s (ECT's) Document Review Policy No. 9.03. ECT documents undergo technical/peer review prior to dispatching these documents to an outside entity.

This document has been authored and reviewed by the following employees:

Joshua Ralph


Author


Signature

February 27, 2018

Date

Thomas O. Pritcher

Peer Review


Signature

February 27, 2018

Date

Table of Contents

<u>Section</u>	<u>Page</u>
1.0 Introduction	1-1
2.0 Project Overview	2-1
2.1 Project Location	2-1
2.2 Project Description	2-1
3.0 Models Proposed and Modeling Techniques	3-1
3.1 Models Proposed	3-1
3.2 NO ₂ Ambient Impact Analysis	3-2
4.0 Terrain Consideration	4-1
5.0 Building Wake Effects	5-1
6.0 Receptor Grids	6-1
7.0 Meteorological Data	7-1
8.0 Representative Background Ambient Concentrations	8-1
9.0 Model Results	9-1
9.1 Presentation of Model Results	9-1
10.0 References/Bibliography	10-1

APPENDICES

Appendix—Conceptual Site Layout

List of Tables

<u>Table</u>	<u>Page</u>
2-1 National Ambient Air Quality Standards	2-5
8-1 Proposed Background Concentrations	8-2

List of Figures

<u>Figure</u>	<u>Page</u>
2-1 General Site Location Map	2-3
2-2 Aerial Photograph of Project Site and Vicinity	2-4

List of Acronyms and Abbreviations

$\mu\text{g}/\text{m}^3$	microgram per cubic meter
AERMAP	AERMOD terrain preprocessing program
AERMET	AERMOD meteorological preprocessing program
AERMOD	AMS/EPA Regulatory Model
AMS	American Meteorological Society
AQS	Air Quality System
BPIP	EPA's Building Profile Input Program
BPIPPRM	EPA's Building Profile Input Program for plume rise model enhancements
BWI	Baltimore/Washington International Thurgood Marshall Airport
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CPCN	certificate of public convenience and necessity
CT	combustion turbine
ECT	Environmental Consulting & Technology, Inc.
EPA	U.S. Environmental Protection Agency
ft	foot
ft-msl	foot above mean sea level
GAQM	Guideline for Air Quality Models
GeoTIFF	geo-referenced tagged image file format
GEP	good engineering practice
GHG	greenhouse gas
hr/yr	hour per year
km	kilometer
MDE	Maryland Department of the Environment
NAAQS	national ambient air quality standard
NED	National Elevation Dataset
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NWS	National Weather Service
PM	particulate matter
PM_{10}	particulate matter equal to or less than 10 microns
$\text{PM}_{2.5}$	particulate matter less than or equal to 2.5 microns
ppb	part per billion
PRIME	plume rise model enhancements
SO_2	sulfur dioxide
ULSD	ultra-low-sulfur diesel
USGS	U.S. Geological Survey
WBAN	Weather-Bureau-Army-Navy

1.0 Introduction

C.P. Crane, LLC (C.P. Crane) is proposing to modify the C.P. Crane power plant site located in Baltimore County, Maryland. The project involves adding three General Electric (GE) LM6000 combustion turbines (CTs) in simple cycle service in conjunction with shutting down the existing coal-fired units.

The planned project at the C.P. Crane power plant will result in the permanent shutdown of two existing coal-fired generating units and installation of three CTs of the aero-derivative type and associated ancillary equipment. The proposed CTs will fire natural gas as their primary fuel and will also be capable of firing ultra-low sulfur distillate (ULSD) fuel oil in situations when natural gas is not available in sufficient quantities. The CTs are expected to serve as peaking units and operate at an annual average capacity factor of up to 30 percent. The CTs design will allow them to start up and shut down quickly and at multiple times per day, if circumstances warrant.

The Maryland Department of the Environment (MDE) requested submittal of an air quality impact analysis modeling protocol for agency review and approval prior to the start of modeling. Accordingly, Environmental Consulting & Technology, Inc. (ECT), prepared this modeling protocol for the project air quality impact analysis for agency review and comments.

This modeling protocol addresses the following major topics:

- General project information, including project description, and location.
- Pollutants to be evaluated.
- Modeled emissions sources.
- Dispersion models and model options.
- Building wake effects (downwash).
- Receptor grids, including terrain considerations.
- Meteorological data.
- Representative Ambient Background Concentrations
- Format of model results.

Following this introduction, this project modeling protocol is organized as follows:

- Section 2.0—Project Overview.
- Section 3.0—Models Proposed and Modeling Techniques.
- Section 4.0—Terrain Consideration.
- Section 5.0—Building Wake Effects.
- Section 6.0—Receptor Grids.
- Section 7.0—Meteorological Data.
- Section 8.0— Representative Ambient Background Concentrations.
- Section 9.0—Model Results.
- Section 10.0—References/Bibliography.

2.0 Project Overview

2.1 Project Location

The C.P. Crane facility is located in eastern Baltimore County, along the Chesapeake Bay approximately 20 kilometers (km) east of Baltimore. Figure 2-1 illustrates the location of the project within the state of Maryland and within Baltimore County. Figure 2-2 provides an aerial photograph showing the location of the project. A conceptual site layout is provided in the appendix.

2.2 Project Description

Based on the preliminary New Source Review (NSR) applicability analysis, the proposed project is expected to be a minor source modification with regards the federal NSR regulations. The preliminary NSR applicability analysis suggests that the proposed project will not result in a significant increase in emissions of a NSR pollutant, with a possible exception for Greenhouse Gas (GHG) emissions. Please note that GHG emissions have been categorized as an “anyway” pollutant and require another NSR pollutant to be subject to NSR review before NSR review applies to GHG emissions. Therefore, GHG emissions are not expected to be subject to NSR review for the proposed project.

In support of the Certificate of Public Convenience and Necessity (CPCN) and Permit to Construct applications for the proposed project, an air quality impact modeling, facility-only National Ambient Air Quality Standards (NAAQS) analysis will be provided in the Environmental Review Document (ERD). Table 2-1 shows the air pollutants/averaging periods that will be addressed in the C. P. Crane’s compliance demonstration.

The application will provide a demonstration through air dispersion modeling utilizing agency approved meteorological data that the post-project emission rates for criteria air pollutants are in compliance with the NAAQS. Specifically, the NAAQS modeling analysis will consist of the

existing sources remaining in operation, the proposed new emission sources, and a representative, agency-approved ambient background concentration. Please note that nearby, off-site emission sources are not proposed for this analysis.

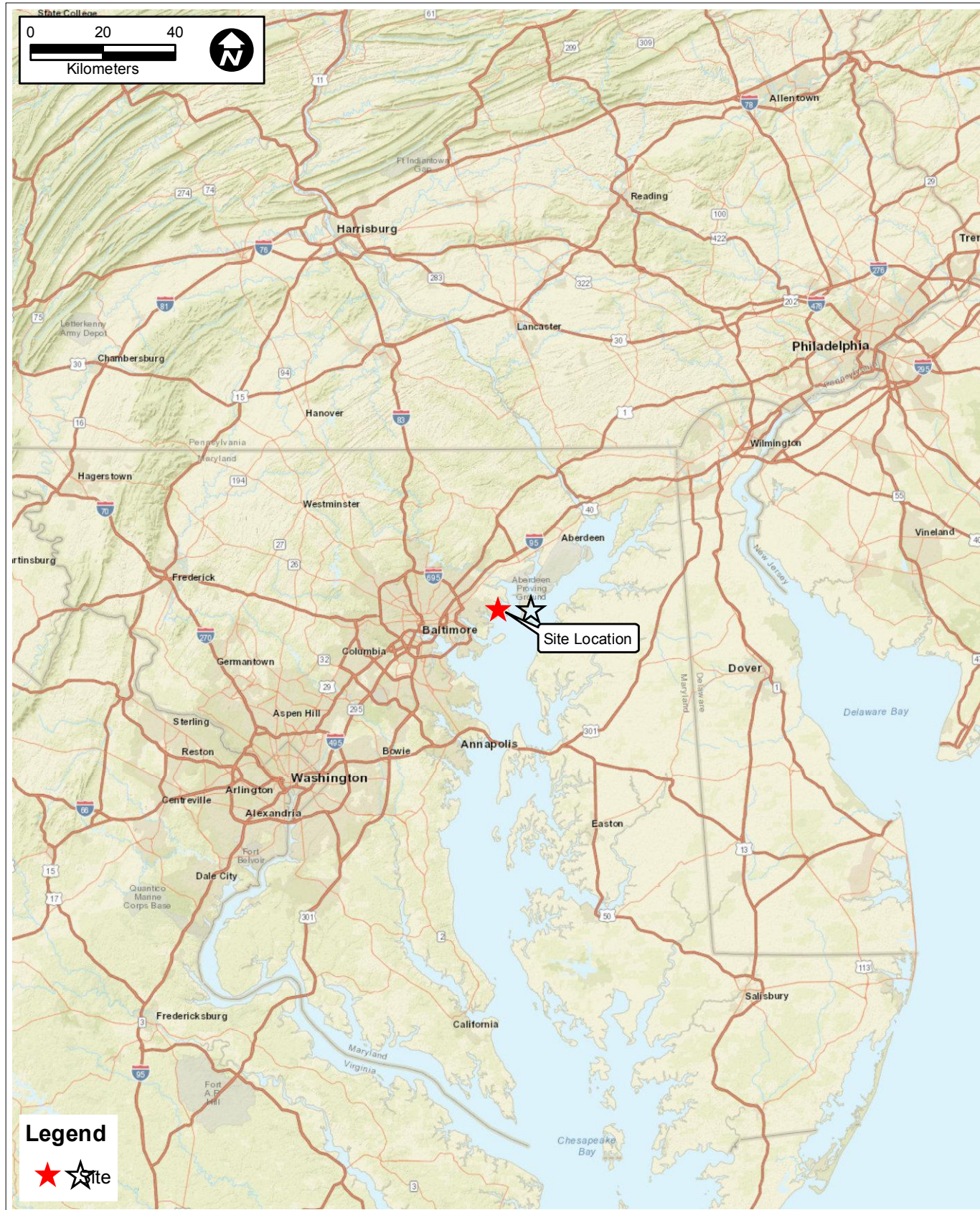


FIGURE 2-1.
GENERAL SITE LOCATION MAP

Sources: Esri Basemap, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

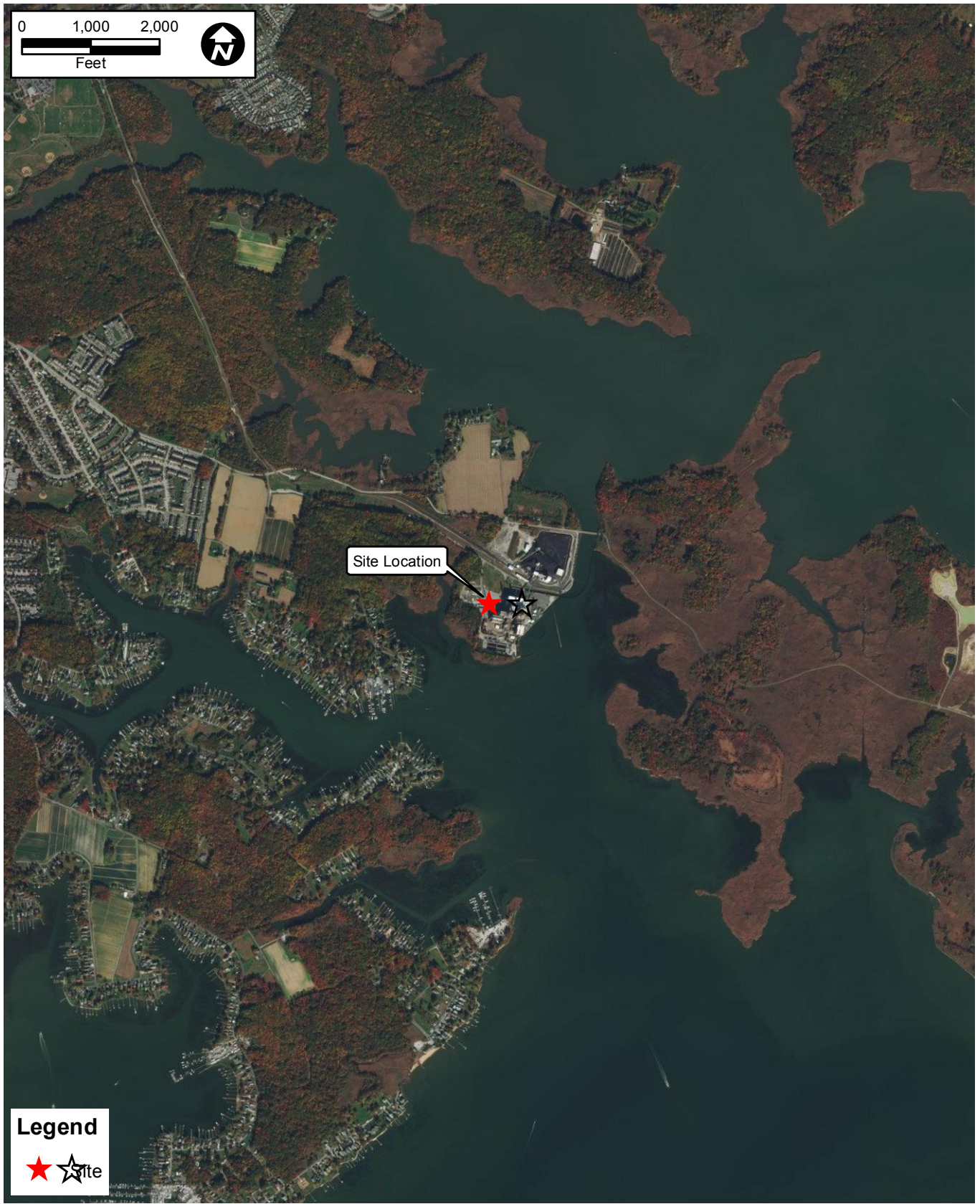


FIGURE 2-2.
AERIAL IMAGERY OF PROJECT SITE AND VICINITY

Sources: Esri Basemap, ECT 2018.

ECT Environmental
Consulting &
Technology, Inc.

Table 2-1. National Ambient Air Quality Standards

Pollutant (units)	Averaging Periods	NAAQS
SO ₂ (ppb)	1-hour*	75
	3-hour†	500
PM ₁₀ (µg/m ³)	24-hour§	150
PM _{2.5} (µg/m ³)	24-hour**	35
	Annual††	12
CO (ppm)	1-hour†	35
	8-hour†	9
NO ₂ (ppb)	1-hour	100¥¥
	Annual‡	53
Lead (µg/m ³)	Rolling 3-month average	0.15

Note: ppmv = part per million by volume.

ppb = part per billion.

µg/m³ = microgram per cubic meter.

ppm = part per million.

*Standard based on three-year average of the 99th percentile of the annual distribution of 1-hour daily maximum SO₂ concentrations.

†Not to be exceeded more than once per calendar year.

‡Arithmetic mean.

§The standards are attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m³, as determined in accordance with 40 CFR 50 Appendix K, is equal to or less than one.

**98th percentile concentration, as determined in accordance with 40 CFR 50 Appendix N.

††Arithmetic mean concentration, as determined in accordance with 40 CFR 50 Appendix N.

¥¥Standard based on three-year average of the 98th percentile of the annual distribution of 1-hour daily maximum NO₂ concentrations.

Source: 40 CFR 50.

3.0 Models Proposed and Modeling Techniques

3.1 Models Proposed

Air quality models are applied at two levels: screening and refined. At the screening level, models provide conservative estimates of impacts to determine whether more detailed modeling is required. Screening modeling can also be used to identify worst-case operating scenarios for subsequent refined modeling analysis.

The refined level consists of techniques that provide more advanced technical treatment of atmospheric processes. Refined modeling requires more detailed and precise input data but also provides improved estimates of source impacts. For the air quality impact analysis, the current version of the U.S. Environmental Protection Agency (EPA)-approved American Meteorological Society (AMS)/EPA Regulatory Model (AERMOD) system, together with a set of five years of hour-by-hour National Weather Service (NWS) meteorological data, will be used to obtain refined impact predictions for short-term periods (i.e., periods equal to or less than 24 hours), as well as annual average concentrations.

Recommended procedures for conducting air quality impact assessments are contained in EPA's Guideline for Air Quality Models (GAQM) (EPA, 2017). The GAQM is codified in Appendix W of Title 40, Part 51, Code of Federal Regulations (CFR). In the November 9, 2005, Federal Register, EPA approved the use of AERMOD as a GAQM Appendix A preferred model effective December 9, 2005. AERMOD is recommended for use in a wide range of regulatory applications, including both simple and complex terrain. The AERMOD system consists of meteorological and terrain preprocessing programs (AERMET and AERMAP, respectively) and the dispersion aspects of AERMOD. The current EPA-approved versions of AERMOD (Version 16216r dated January 17, 2017) and AERMAP (Version 11103 dated April 13, 2011) will be used to assess project air quality impacts. AERMOD will be run using the most recent

version of the Providence Engineering and Environmental Group, LLC, BEEST suite (BEEST), currently Version 11.10, interface for EPA's AERMOD.

Procedures applicable to the AERMOD system specified in the latest version of the AERMOD User's Guide (December 2016), AERMOD Implementation Guide (updated December 2016), the Addendums to the User's Guide, and the current GAQM will be followed. In particular, the AERMOD control pathway MODELOPT keyword parameters DFAULT and CONC will be selected. Selection of the parameter DFAULT, which specifies use of the regulatory default options, is recommended by the GAQM. The CONC option specifies the calculation of concentrations. Since the proposed project will be located in rural Baltimore County, the AERMOD options regarding urban area increased surface heating (URBANOPT keyword), pollutant exponential decay (HALFLIFE and DCAYCOEF keywords), and flagpole receptors (FLAGPOLE keyword) will not be employed.

3.2 NO₂ Ambient Impact Analysis

For the 1-hour and annual average NO₂ refined modeling, the default Tier 2/ambient ratio method (ARM2) NO_x conversion option will be used in accordance with 40 CFR Part 51, EPA guidance revised in 2017. The national default for ARM2 has a minimum ambient NO₂/NO_x ratio of 0.5 and a maximum ambient ratio of 0.9 which will be used as discussed in EPA NO₂ modeling guidance.

It is not anticipated that a Tier 3 NO_x conversion option will be necessary (e.g., the Plume Volume Molar Ratio Method) for this modeling analysis. Therefore, additional documentation in support of its use is not provided in this protocol.

Additionally, as identified in the EPA's March 1, 2011, 1-hour NO₂ modeling guidance memorandum, emissions sources that operate intermittently will not be included in the modeling analysis.

4.0 Terrain Consideration

The GAQM defines flat terrain as terrain equal to the elevation of the stack base, simple terrain as terrain lower than the height of the stack top, and complex terrain as terrain exceeding the height of the stack being modeled. As previously discussed in Section 4.1, AERMOD is capable of developing estimates of air quality impacts for the three types of terrain.

The elevation of the project site is approximately 10 feet above mean sea level (ft-msl). U.S. Geological Survey (USGS) National Elevation Dataset (NED) terrain data in geo-referenced tagged image file format (GeoTIFF) were examined for terrain features within the expected project impact area. Based on this examination, terrain in the vicinity of the project site is classified as ranging from flat to complex terrain.

In accordance with the GAQM recommendations for AERMOD, each modeled receptor will be assigned a terrain elevation based on USGS NED data and use of AERMAP, the AERMOD terrain preprocessor program. AERMAP will be used in accordance with the latest version of the AERMAP User's Guide (March 2011) (EPA, 2011) and EPA's GAQM.

5.0 Building Wake Effects

The Clean Air Act (CAA) Amendments of 1990 require the degree of emissions limitation required for control of any pollutant not be affected by a stack height that exceeds good engineering practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (40 CFR 51). The stack heights for the project emissions sources will comply with EPA stack height regulations.

While the GEP stack height rules address the maximum stack height that can be employed in a dispersion model analysis, stacks having heights lower than GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. AERMOD evaluates the effects of building downwash based on the plume rise model enhancements (PRIME) building downwash algorithms. For the project's ambient impact analysis, the complex downwash analysis implemented by AERMOD will be performed using the current version of EPA's Building Profile Input Program (BPIP) for PRIME (BPIPPRM) (Version 04274 [September 30, 2004]). The EPA BPIPPRM program will be used to determine the area of influence for each building/structure, whether a particular stack is subject to building downwash, the area of influence for directionally dependent building downwash, and to generate the specific building dimension data required by the model. BPIPPRM output consists of an array of 36 direction-specific (10- to 360-degree) building heights (BUILDHGT keyword), lengths (BUILDLIN keyword), widths (BUILDWID keyword), and along-flow (XBADJ keyword) and across-flow (YBADJ keyword) distances for each stack suitable for use as input to AERMOD.

6.0 Receptor Grids

Receptors will be placed at locations considered to be *ambient air*, defined as “that portion of the atmosphere, external to buildings, to which the general public has access.” The nearest locations of general public access will be at the existing fence line and the water front boundary.

The following receptors will be used to assess the air quality impact of the proposed facility:

- Fence Line Receptors—Receptors placed along the existing fence line and water front boundary spaced 25 meters apart.
- Fine Grid Receptors—Receptors at 100-meter spacings starting at the fence line and extending to approximately 10,000 meters.

7.0 Meteorological Data

The EPA AERMET and AERSURFACE meteorological data preprocessing programs were used to generate the meteorological data required by AERMOD. The AERMET meteorological preprocessing program creates two files that are used by AERMOD (i.e., surface and profile files). The surface file contains boundary layer parameters including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convectively generated boundary layer height, stable boundary layer height, and surface heat flux. The profile file contains multilevel data of windspeed, wind direction, and temperature.

AERMET passes observed meteorological parameters to AERMOD, including wind direction and speed (at multiple heights, if available), temperature, and, if available, measured turbulence. AERMOD uses this information to calculate concentrations in a manner that accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological processor requires the determination of three surface characteristics: surface roughness length (z_o), albedo (r), and Bowen ratio (B_o). Surface roughness length is related to the height of obstacles to the wind flow and is the height at which the mean horizontal wind speed is zero based on a logarithmic profile. Surface roughness length influences the surface shear stress and is an important factor in determining the magnitude of mechanical turbulence and the stability of the boundary layer. Albedo is the fraction of total incident solar radiation reflected by the surface back to space without absorption. The daytime Bowen ratio, an indicator of surface moisture, is the ratio of sensible heat flux to latent heat flux and, together with albedo and other meteorological observations, is used for determining planetary boundary layer parameters for convective conditions driven by the surface sensible heat flux. The EPA AERSURFACE program was developed to aid users in obtaining realistic and reproducible surface characteristic values, including albedo, Bowen ratio, and surface roughness length, for input to AERMET. The program uses publicly available national land

cover datasets and look-up tables of surface characteristics that vary by land cover type and season.

The meteorological data proposed for use in the air quality modeling consists of the most recent five years of NWS data from the from Baltimore/Washington International Thurgood Marshall Airport (BWI) surface meteorological station and the Sterling, Virginia, upper air station. The surface meteorological NWS site (Weather-Bureau-Army-Navy [WBAN] Station No. 93721) is located at the BWI approximately 32 km southeast of the project site. ECT would like to request that MDE provide the processed meteorological data files, if possible. If not, ECT will contract Lakes Environmental to provide the processed (AERMOD ready) meteorological data files.

8.0 Representative Background Ambient Concentrations

Background concentrations representative of the Project modeling domain were obtained from the most recent years of certified monitoring data (2014 through 2016) from the EPA Air Data website (<https://www.epa.gov/outdoor-air-quality-data>). Background concentrations of NO₂, SO₂, CO, and PM_{2.5} are based on the Essex monitor data, whereas background concentrations of PM₁₀ are based on the Glen Burnie monitor data and lead background concentrations are based on the Beltsville monitor data. The CO 1-hour and 8-hour background concentration is the highest concentration from the three years of monitor values. The NO₂ 1-hour background concentration is the average of the three-year 98th percentile monitor value. The NO₂ annual background concentration is the highest concentration from the three years of monitor values. The SO₂ 1-hour background concentration is the average of the three-year 99th percentile monitor value. The SO₂ 3-hour background concentration is the highest concentration from the three years of monitor values. The PM₁₀ 24-hour background concentration is the highest concentration from the three years of monitor values. The PM_{2.5} 24-hour background concentration is the three-year average of the 98th percentile. The PM_{2.5} annual background concentration value is the three-year average of the weighted arithmetic mean monitor value. For lead, since the only Maryland monitor was reporting 0.0 for the maximum 3-month average, the average of the fourth maximum monitor value is being conservatively used. A summary of the ambient background concentrations to be used in the NAAQS compliance assessment is provided in Table 8-1.

Table 8-1. Proposed Background Concentrations

Pollutant	Averaging Period	Proposed Background Concentration ($\mu\text{g}/\text{m}^3$)
NO ₂	1 hour	90.24
	Annual	29.92
PM _{2.5}	24-hour	22.67
	Annual	9.47
PM ₁₀	24-hour	35.00
CO	1 hour	5,257.14
	8-hour	1,888.89
SO ₂	1-hour	49.65
	3-hour	114.92
Lead	Rolling 3-Month	0.004

Source: EPA Air Data Website (<https://www.epa.gov/outdoor-air-quality-data>)
ECT, 2018.

9.0 Model Results

9.1 Presentation of Model Results

The primary objective of the analysis is to demonstrate that the post-project emissions from the facility will demonstrate compliance with the NAAQS. Refined modeling results obtained from the AERMOD system will be summarized in tabular format. For the NAAQS analysis, the model results tables will indicate, for each pollutant, the year of meteorology, applicable averaging period, modeled impact, background concentration, and total analysis impact (modeled impact plus background concentration).

The ambient impact analysis report will include methods and data used in conducting the dispersion modeling study. Building downwash, dispersion model input and output, and meteorological data files will be provided (on digital media) with the analysis.

10.0 References/Bibliography

- U.S. Environmental Protection Agency (EPA). 1985. Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations [Revised]). EPA 450/4 80 023R. Research Triangle Park, North Carolina.
- . 2016. User's Guide for the American Meteorological Society (AMS)/EPA Regulatory Model (AERMOD). EPA-454/B-03-001. Research Triangle Park, North Carolina.
- . 2016. User's Guide for the AERMOD Meteorological Preprocessor (AERMET). EPA-454/B-03-002. Research Triangle Park, North Carolina.
- . 2015. Addendum User's Guide for AERMOD. EPA-454/B-03-001. Research Triangle Park, North Carolina.
- . 2011. Addendum User's Guide for AERMAP. EPA-454/B-03-003. Research Triangle Park, North Carolina.
- . 2015. Addendum User's Guide for AERMET. EPA-454/B-03-002. Research Triangle Park, North Carolina.
- . 2017. Guideline on Air Quality Models (GAQM) (Revised). (Appendix W, 40 CFR 51).

Appendix

Conceptual Site Layout

Maryland Department of the Environment

Comments on C.P. Crane, LLC

C.P. Crane Combustion Turbine Repowering Project

Air Quality Impact Analysis Modeling Protocol, dated February 2018

March 29, 2018

1. Emission Source Summary

Please provide a list of emission sources that will be included in the dispersion modeling. This list will be preliminary due to the uncertainties with regard to what emission sources might remain operational at the site.

2. Start-up and Shut-down Conditions

Since the CTs are allowed to have relatively frequent start-ups and shut-downs by design, please include descriptions of start-up and shut-down conditions for the CTs and how these emission scenarios will be accounted for in modeling.

3. Section 3.1 Models Proposed

In the modeling report include analysis to demonstrate rural is the proper land use classification.

4. Section 3.2 NO₂ Ambient Impact Analysis – Intermittent Sources

Please also include a statement of what emission sources would be considered intermittent sources and would be excluded from 1-hour NO₂ modeling.

5. Section 4.0 Terrain Consideration – NED Data Resolution

Please specify the resolution of the NED terrain data that will be used in association with AERMAP.

6. Section 8.0 Representative Background Ambient Concentrations

Include AQS # of any monitors being discussed in the modeling report.

May 4, 2018
ECT No.: 170604.0300

Ms. Susan Gray
Deputy Director, Power Plant Assessment Division
Department of Natural Resources
580 Taylor Avenue, B-3
Annapolis, Maryland 21401

Re: Response to MDE Comments on Air Dispersion Modeling Protocol
C.P. Crane Combustion Turbine Repowering Project
Baltimore County, MD

Dear Ms. Gray:

On behalf of C.P. Crane, please accept the following responses to your technical questions received March 29, 2018. For ease of understanding, your questions are repeated and followed by our response.

1. Emission Source Summary:

Please provide a list of emission sources that will be included in the dispersion modeling. This list will be preliminary due to the uncertainties with regard to what emission sources might remain operational at the site.

Response:

The following emission sources will be included in the dispersion modeling:

Proposed Project

- Three (3) proposed General Electric LM6000 combustion turbines
- One (1) proposed black start generator (See Project Design Update Below)

Existing, On-site Emission Sources

- One (1) existing combustion turbine
- One (1) existing emergency generator
- One (1) existing fire water pump

2. Start-up and Shut-down Conditions:

Since the CTs are allowed to have relatively frequent start-ups and shut-downs by design, please include descriptions of start-up and shut-down conditions for the CTs and how these emission scenarios will be accounted for in modeling.

Response:

Startup/shutdown modeling will be conducted for the short-term pollutants and averaging periods that have the potential for elevated emissions combined with lower plume rise during startup/ shutdown conditions. Since emissions are higher for startup operations than shutdown, the more conservative startup emissions will be modeled. Also, only NO_x and CO emissions will be modeled during startup, since emissions of SO₂, PM₁₀ and PM_{2.5} are higher during normal operation. Therefore, the pollutants and averaging periods that will be evaluated include 1-hour NO₂, 1-hour CO and 8-hour CO.

For purposes of modeling ambient impacts from startups, short-term emissions rates developed for startup operations for the proposed CTs take into account the time from ignition to compliance. The startup of the CTs has a duration of approximately 10 minutes. The emissions are calculated per startup event. Therefore, to conservatively quantify short-term average emissions rates for startup events, it has been assumed the CTs are at 100-percent load for the balance of the averaging period when it is not in startup mode. The startup event and the balance of the averaging period at 100-percent will be modeled as separate stacks which will be source grouped together to get the overall concentration. The table below summarizes the maximum short-term average emissions rates developed in this manner.

An example calculation for the 1-hour NO₂ 100-percent load emission rate for the balance of the averaging period when it is not in startup mode is provided below.

NO_x Emission Rate at 100-percent load: 35.45 lb/hr

Remaining time in averaging period (after startup): 50 minutes

$$35.45 \text{ lb/hr} * 50/60 = 29.54 \text{ lb/hr}$$

Annual emissions resulting from startup/shutdown operations for the proposed CTs are based on 250 startups per year, of which 25 startups could be on ULSD.

Scenario	Units	One Unit (per event)	Startup		100% Load	
			Per Hour		Per Hour	
			1-hour Average	8-hour Average	1-hour Average	8-hour Average
Natural Gas						
Time from ignition until compliance	minutes	10				
Estimated exit velocity	fps		88.15	88.15	100.78	100.78
Estimated stack temperature	°F		717.00	717.00	837.00	837.00
NOx	lb		3.60	N/A	29.54	N/A
CO	lb		3.20	0.80	21.58	24.81
Fuel Oil						
Time from ignition until compliance	minutes	10				
Estimated exit velocity	fps		86.88	86.88	102.04	102.04
Estimated stack temperature	°F		722.00	722.00	833.00	833.00
NO _x	lb		12.80	N/A	49.16	N/A
CO	lb		11.60	2.90	25.65	29.50

3. Section 3.1 Models Proposed:

In the modeling report include analysis to demonstrate rural is the proper land use classification.

Response:

This information will be provided in the modeling report.

4. Section 3.2 NO₂ Ambient Impact Analysis – Intermittent Sources:

Please also include a statement of what emission sources would be considered intermittent sources and would be excluded from 1-hour NO₂ modeling.

Response

Due to their limited (non-emergency) operations, and their random schedule that cannot be controlled, the emergency generator and fire water pump are considered intermittent sources with regards to the 1-hour NO₂ modeling. Similarly, the existing combustion turbine has demonstrated historical limited usage and its expected future operation is random and not predictive. As a result, these sources will be excluded from the 1-hour NO₂ modeling analysis.

5. Section 4.0 Terrain Consideration – NED Data Resolution:

Please specify the resolution of the NED terrain data that will be used in association with AERMAP.

Response:

This information will be provided in the modeling report.

6. Section 8.0 Representative Background Ambient Concentrations:

Include AQS # of any monitors being discussed in the modeling report.

Response:

This information will be provided in the modeling report.

Project Design Update:

The project design has been updated to include a black start generator. The black start generator will not be used to produce electricity for the grid and will only be used to start the proposed combustion turbines when there is no electricity on the grid. Since its operation will be random and not predictive the black start generator will be considered an intermittent source with regards to the 1-hour NO₂ modeling and excluded from the 1-hour NO₂ modeling analysis.

Susan Gray
Department of Natural Resources
May 4, 2018
Page 5

Upon completion of your review of the responses provided, please do not hesitate to contact us at (919) 861-8888 if you have any additional questions or comments.

Sincerely,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.

A handwritten signature in blue ink that reads "Joshua Ralph".

Joshua Ralph
Staff Engineer III
jralph@ectinc.com

A handwritten signature in blue ink that reads "Thomas Pritcher".

Thomas Pritcher
National Air Quality Service Line Director
tpritcher@ectinc.com

Appendix D

Dispersion Modeling Files

(Provided in electronic format)

Appendix E

Acid Rain Permit Application

STEP 3**Permit Requirements****Read the standard requirements.**

- (1) The designated representative of each affected source and each affected unit at the source shall:
 - (i) Submit a complete Acid Rain permit application (including a compliance plan) under 40 CFR part 72 in accordance with the deadlines specified in 40 CFR 72.30; and
 - (ii) Submit in a timely manner any supplemental information that the permitting authority determines is necessary in order to review an Acid Rain permit application and issue or deny an Acid Rain permit;
- (2) The owners and operators of each affected source and each affected unit at the source shall:
 - (i) Operate the unit in compliance with a complete Acid Rain permit application or a superseding Acid Rain permit issued by the permitting authority; and
 - (ii) Have an Acid Rain Permit.

Monitoring Requirements

- (1) The owners and operators and, to the extent applicable, designated representative of each affected source and each affected unit at the source shall comply with the monitoring requirements as provided in 40 CFR part 75.
- (2) The emissions measurements recorded and reported in accordance with 40 CFR part 75 shall be used to determine compliance by the source or unit, as appropriate, with the Acid Rain emissions limitations and emissions reduction requirements for sulfur dioxide and nitrogen oxides under the Acid Rain Program.
- (3) The requirements of 40 CFR part 75 shall not affect the responsibility of the owners and operators to monitor emissions of other pollutants or other emissions characteristics at the unit under other applicable requirements of the Act and other provisions of the operating permit for the source.

Sulfur Dioxide Requirements

- (1) The owners and operators of each source and each affected unit at the source shall:
 - (i) Hold allowances, as of the allowance transfer deadline, in the source's compliance account (after deductions under 40 CFR 73.34(c)), not less than the total annual emissions of sulfur dioxide for the previous calendar year from the affected units at the source; and
 - (ii) Comply with the applicable Acid Rain emissions limitations for sulfur dioxide.
- (2) Each ton of sulfur dioxide emitted in excess of the Acid Rain emissions limitations for sulfur dioxide shall constitute a separate violation of the Act.
- (3) An affected unit shall be subject to the requirements under paragraph (1) of the sulfur dioxide requirements as follows:
 - (i) Starting January 1, 2000, an affected unit under 40 CFR 72.6(a)(2); or
 - (ii) Starting on the later of January 1, 2000 or the deadline for monitor certification under 40 CFR part 75, an affected unit under 40 CFR 72.6(a)(3).
- (4) Allowances shall be held in, deducted from, or transferred among Allowance Tracking System accounts in accordance with the Acid Rain Program.
- (5) An allowance shall not be deducted in order to comply with the requirements under paragraph (1) of the sulfur dioxide requirements prior to the calendar year for which the allowance was allocated.
- (6) An allowance allocated by the Administrator under the Acid Rain Program is a limited authorization to emit sulfur dioxide in accordance with the Acid Rain Program. No provision of the Acid Rain Program, the Acid Rain permit application, the Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8 and no provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization.
- (7) An allowance allocated by the Administrator under the Acid Rain Program does not constitute a property right.

Nitrogen Oxides Requirements

The owners and operators of the source and each affected unit at the source shall comply with the applicable Acid Rain emissions limitation for nitrogen oxides.

STEP 3, Cont'd.**Excess Emissions Requirements**

- (1) The designated representative of an affected source that has excess emissions in any calendar year shall submit a proposed offset plan, as required under 40 CFR part 77.
- (2) The owners and operators of an affected source that has excess emissions in any calendar year shall:
 - (i) Pay without demand the penalty required, and pay upon demand the interest on that penalty, as required by 40 CFR part 77; and
 - (ii) Comply with the terms of an approved offset plan, as required by 40 CFR part 77.

Recordkeeping and Reporting Requirements

- (1) Unless otherwise provided, the owners and operators of the source and each affected unit at the source shall keep on site at the source each of the following documents for a period of 5 years from the date the document is created. This period may be extended for cause, at any time prior to the end of 5 years, in writing by the Administrator or permitting authority:
 - (i) The certificate of representation for the designated representative for the source and each affected unit at the source and all documents that demonstrate the truth of the statements in the certificate of representation, in accordance with 40 CFR 72.24; provided that the certificate and documents shall be retained on site at the source beyond such 5-year period until such documents are superseded because of the submission of a new certificate of representation changing the designated representative;
 - (ii) All emissions monitoring information, in accordance with 40 CFR part 75, provided that to the extent that 40 CFR part 75 provides for a 3-year period for recordkeeping, the 3-year period shall apply.
 - (iii) Copies of all reports, compliance certifications, and other submissions and all records made or required under the Acid Rain Program; and,
 - (iv) Copies of all documents used to complete an Acid Rain permit application and any other submission under the Acid Rain Program or to demonstrate compliance with the requirements of the Acid Rain Program.
- (2) The designated representative of an affected source and each affected unit at the source shall submit the reports and compliance certifications required under the Acid Rain Program, including those under 40 CFR part 72 subpart I and 40 CFR part 75.

Liability

- (1) Any person who knowingly violates any requirement or prohibition of the Acid Rain Program, a complete Acid Rain permit application, an Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8, including any requirement for the payment of any penalty owed to the United States, shall be subject to enforcement pursuant to section 113(c) of the Act.
- (2) Any person who knowingly makes a false, material statement in any record, submission, or report under the Acid Rain Program shall be subject to criminal enforcement pursuant to section 113(c) of the Act and 18 U.S.C. 1001.
- (3) No permit revision shall excuse any violation of the requirements of the Acid Rain Program that occurs prior to the date that the revision takes effect.
- (4) Each affected source and each affected unit shall meet the requirements of the Acid Rain Program.
- (5) Any provision of the Acid Rain Program that applies to an affected source (including a provision applicable to the designated representative of an affected source) shall also apply to the owners and operators of such source and of the affected units at the source.
- (6) Any provision of the Acid Rain Program that applies to an affected unit (including a provision applicable to the designated representative of an affected unit) shall also apply to the owners and operators of such unit.
- (7) Each violation of a provision of 40 CFR parts 72, 73, 74, 75, 76, 77, and 78 by an affected source or affected unit, or by an owner or operator or designated representative of such source or unit, shall be a separate violation of the Act.

C.P. Crane, LLC

STEP 3, Cont'd.**Effect on Other Authorities**

No provision of the Acid Rain Program, an Acid Rain permit application, an Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8 shall be construed as:

- (1) Except as expressly provided in title IV of the Act, exempting or excluding the owners and operators and, to the extent applicable, the designated representative of an affected source or affected unit from compliance with any other provision of the Act, including the provisions of title I of the Act relating to applicable National Ambient Air Quality Standards or State Implementation Plans;
- (2) Limiting the number of allowances a source can hold; provided, that the number of allowances held by the source shall not affect the source's obligation to comply with any other provisions of the Act;
- (3) Requiring a change of any kind in any State law regulating electric utility rates and charges, affecting any State law regarding such State regulation, or limiting such State regulation, including any prudence review requirements under such State law;
- (4) Modifying the Federal Power Act or affecting the authority of the Federal Energy Regulatory Commission under the Federal Power Act; or,
- (5) Interfering with or impairing any program for competitive bidding for power supply in a State in which such program is established.

STEP 4**Certification**

Read the certification statement, sign, and date.

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Name Mark Kubow	
Signature	Date May 24, 2018