

APPENDIX C
AIR QUALITY TECHNICAL REPORT

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CHRISTINA RIVER BRIDGE PROJECT

DELDOT CONTRACT NO.

NEW CASTLE COUNTY, DELAWARE



DELAWARE DEPARTMENT OF TRANSPORTATION

OCTOBER 28, 2011

TABLE OF CONTENTS

I. INTRODUCTION

A. PROJECT PURPOSE AND NEED.....	1
B. RECOMMENDED ALTERNATIVE	
1. Overview.....	1
2. Alternative Description.....	1
3. Riverwalk	2

II. ENVIRONMENTAL ANALYSIS

A. AFFECTED ENVIRONMENT.....	3
1. Clean Air Act Amendments of 1990.....	3
2. National and State Ambient air Quality Standards	3
3. Recent EPA Rules and Guideline	4
4. Criteria Pollutants and Effects.....	5
5. Mobile Source Air Toxics	9
6. Greenhouse Gases.....	9
7. Attainment Status/Regional Air Quality Status	11
8. Ambient Air Quality in the Study Area	12
B. ENVIRONMENTAL CONSEQUENCES	14
1. Pollutants for Analysis.....	14
2. Regional Analysis.....	16
3. Microscale CO Assessment	16
4. PM _{2.5} Assessment	17
5. MSAT Assessment.....	19
6. Greenhouse Gas Assessment	23
7. Construction Impacts on Air Quality.....	23

III. CONCLUSIONS..... 25

IV. REFERENCES..... 26

APPENDICES

- Appendix A: Monitored Ambient Air Quality Data
- Appendix B: Study Area Map

LIST OF TABLES

TABLE 1: National Ambient Air Quality Standards.....	7
TABLE 2: Attainment Classifications and Definitions	11
TABLE 3: Ambient Air Quality Monitoring Data 2006-2008	15
TABLE 4: Christina River Bridge Project Traffic Data.....	18
TABLE 5: National MSAT Emission Trends 1999-2050	20

LIST OF FIGURES

FIGURE 1: Ozone in the Atmosphere.....	5
FIGURE 2: Relative Particulate Matter Size	6
FIGURE 3: Sources of CO.....	8
FIGURE 4: The Greenhouse Effect	10

I. INTRODUCTION

This technical report presents the detailed analysis of air quality for the Recommended Alternative being considered for the Christina River Bridge Project. This report describes the project area and the Recommended Alternative, identifies the pollutants of concern, reviews applicable standards, summarizes existing air quality in the study area and summarizes the project's impact on the study area's air quality.

A. PROJECT PURPOSE AND NEED

The purpose of this project is to ensure that infrastructure enables the Wilmington Riverfront area to continue to effectively redevelop, while accommodating growing transportation demands from increased development.

The area of the Christina River Bridge Project faces a number of challenges that support the need for addressing these transportation improvements, including:

- Economic Development
- Livability
- System Linkage between both sides of the river
- Community Mobility and Multi-modal Access
- Congestion Relief

B. RECOMMENDED ALTERNATIVE

1. Overview

DelDOT is proposing a new fixed steel girder bridge crossing the Christina River within the City of Wilmington Riverfront Redevelopment. The proposed bridge crossing is located south of the Shipyard Shops. The proposed bridge includes two, eleven-foot lanes east and westbound (one lane in each direction), with a three-foot offset to a barrier on each side. On the north side of the bridge, a ten-foot wide pedestrian/bicycle shared use path will be provided with a two-foot offset on each side, and separated from the vehicular lanes by a 44-inch high concrete barrier. On the south side of the bridge, a six-foot wide sidewalk will be provided, also separated from the vehicular lanes by a 44-inch high concrete barrier. This provides an overall bridge width of 54 feet.

2. Alternative Description

The project proposes a skewed crossing of the Christina River to take advantage of the state-owned parcel on the east side just north of the James Court businesses. The east side approach road continues on this parcel to a new signalized intersection at South Market Street. In order to provide alignment access to and from Walnut Street at this

single signalized intersection, existing Walnut Street would be shifted slightly west to remain parallel to Market Street through the new intersection. Bridge access from northbound US 13 would be provided by a left turn lane at the new traffic signal. The existing right in/right out connection at Walnut Street to Garasches Lane would be slightly relocated to allow Garasches Lane traffic to access the bridge crossing via the new signalized intersection. Due to the close proximity of the new intersection to James Court, direct access to businesses on and south of James Court from South Market Street would be eliminated (though access still provided via a left turn at the new intersection and the loop road under the US 13 bridge over the railroad). Proposed work on the east side of the river also includes adding sidewalk on the east side of Walnut Street from the project study area to just south of A Street, in order to provide pedestrian connectivity for communities and businesses to the new bridge crossing and an existing DART bus stop. A pedestrian signal and crosswalk were also added to provide pedestrian access from the east side Walnut Street sidewalk to the ShopRite development.

The western approach roadway would connect to Delmarva Lane via the Shipyard Shops parking lot. Modifications would be required to both the Shipyard Shops and Stadium parking lots in order to limit access points along the alignment. The proposed roadway continues along the existing Delmarva Lane alignment, which connects to Beech Street and provides vehicular access back to Madison Street and Justison Street.

3. Riverwalk

The existing Riverwalk would be interrupted by the proposed bridge crossing. Upon completion of the project, users of the Riverwalk would have two options for continuing on the path. The first option would be on a 600- linear foot boardwalk over the Christina River under the proposed bridge. The second option is for an at-grade pedestrian/cyclist crossing location that would coincide with the T-intersection of a new access road to the Russell W. Peterson Wildlife Refuge. On the south side of the bridge, 560 linear feet of shared use pathways would connect back to the existing Riverwalk from either the at-grade crossing or the boardwalk, providing continued use of the Riverwalk to access the Wildlife Refuge.

II. Environmental Analysis

A. AFFECTED ENVIRONMENT

Air pollution is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or harming human or animal health.

1. Clean Air Act Amendments of 1990

The Clean Air Act (CAA) Amendments of 1990 and the Final Transportation Conformity Rule [40 CFR Parts 51 and 93] direct the U.S. Environmental Protection Agency (EPA) to implement environmental policies and regulations that will ensure acceptable levels of air quality.

The Clean Air Act and the Final Transportation Conformity Rule affect proposed transportation projects. According to Title I, Section 176 (c) 2:

No federal agency may approve, accept, or fund any transportation plan, program, or project unless such plan, program, or project has been found to conform to any applicable State Implementation Plan (SIP) in effect under this act.

The Final Conformity Rule defines conformity as follows:

Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and that such activities will not:

- *Cause or contribute to any new violation of any NAAQS in any area;*
- *Increase the frequency or severity of any existing violation of any NAAQS in any area; or*
- *Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area."*

2. National and State Ambient Air Quality Standards

As required by the Clean Air Act, NAAQS have been established for six major air pollutants. These pollutants, known as criteria pollutants, are carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead. The federal standards are summarized in **Table 1**. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare, and they account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

3. Recent EPA Rules and Guidelines

The Environmental Protection Agency (EPA) has issued a Proposed Rule, a Guidance Clarification, a Final Rule concerning the Conformity Determination of fine and coarse particulates (PM_{2.5} and PM₁₀), and Draft and Final Rules concerning quantitative analysis of PM_{2.5}. Following is a summary of these rules and clarifications:

- o **74 FR 23034 Transportation Conformity Rule PM_{2.5} and PM₁₀ Amendments; Proposed Rule:** EPA proposed amendments to the transportation conformity rule that primarily affect conformity's implementation in PM_{2.5} and PM₁₀ nonattainment and maintenance areas. EPA proposed to update the transportation conformity regulation in light of the October 17, 2006 final rule that strengthened the 24-hour PM_{2.5} air quality standard and revoked the annual PM₁₀ standard. In addition, EPA proposed to clarify the regulations concerning hot-spot analyses to address a remand from the Court of Appeals for the District of Columbia Circuit [Environmental Defense v. EPA, 509 F.3d 553 (DC Cir. 2007)].
- o **Final PM Qualitative Guidance Clarification; June 12, 2009:** On March 29, 2006, the Environmental Protection Agency (EPA) and the Federal Highway Administration (FHWA) issued joint guidance on how to perform qualitative hot-spot analyses in PM_{2.5} and PM₁₀ nonattainment and maintenance areas titled, '*Transportation Conformity Guidance for Qualitative Hot-spot Analysis in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas*' (March 2006 guidance). The guidance provides information for State and local agencies to meet the PM_{2.5} and PM₁₀ hot-spot analysis requirements established in the March 10, 2006, final transportation conformity rule (71 FR 12468). Since issuing the March 2006 guidance, a lawsuit was filed challenging a project's conformity determination, including the project's PM_{2.5} hot-spot analysis that relied on method A (comparison to another location with similar characteristics). Method A is described in question 4.1 of the March 2006 guidance. As part of a settlement agreement on that lawsuit (Environmental Defense, et al. v. USDOT, et al., No. 08-1107 [4th Cir., dismissed Nov. 17, 2008]), FHWA agreed to issue a clarification on a specific schedule, in coordination with EPA, to the March 2006 guidance. This clarification does not supersede the March 2006 guidance or the March 10, 2006 final transportation conformity rule; it only further explains how to implement the existing guidance and the hot-spot analysis requirements in the final rule. The clarification also does not create any new requirements and does not serve as guidance for PM_{2.5} and PM₁₀ quantitative hot-spot analyses.
- o **Final PM Conformity Rule; March 10, 2010**
In this action, EPA amended the transportation conformity rule to finalize provisions that were proposed on May 15, 2009. These amendments primarily affect conformity's implementation in PM_{2.5} and PM₁₀ nonattainment and maintenance areas. EPA updated the transportation conformity regulation in light of an October 17, 2006 final rule that strengthened the 24-hour PM_{2.5} national ambient air quality standard (NAAQS) and revoked the annual PM₁₀

NAAQS. In addition, EPA clarified the regulations concerning hot-spot analyses to address a December 2007 remand from the Court of Appeals for the District of Columbia Circuit. This portion of the final rule applies to PM_{2.5} and PM₁₀ nonattainment and maintenance areas as well as carbon monoxide nonattainment and maintenance areas.

- **Draft Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas, May 26, 2010**

EPA announced the availability of a draft transportation conformity guidance document for public comment. The U.S. Department of Transportation (DOT) is EPA's federal partner in implementing the transportation conformity regulation, and EPA coordinated with DOT on the development of this draft guidance.

- **Final Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas, December 2010**

EPA announced the availability of final transportation conformity guidance document for public comment. This guidance will help state and local agencies complete quantitative PM_{2.5} and PM₁₀ hot-spot analyses for project-level transportation conformity determinations of certain highway and transit projects. A hot-spot analysis includes an estimation of project-level emissions, air quality modeling, and a comparison to the relevant national ambient air quality standards (NAAQS) in PM_{2.5} and PM₁₀ nonattainment and maintenance areas. This guidance includes a two-year grace period until December 2012

4. Criteria Pollutants and Effects

Pollutants that have established national standards are referred to as “criteria pollutants.” The sources of these pollutants, their effects on human health and the nation's welfare, and their final deposition in the atmosphere vary considerably. A brief description of each pollutant is provided below.

Ozone (O₃) Ozone is a colorless toxic gas. As shown in **Figure 1**, O₃ is found in both the Earth's upper and lower atmospheric levels. In the upper atmosphere, O₃ is a

Figure 1: Ozone in the Atmosphere



Source: EPA

naturally occurring gas that helps to prevent the sun's harmful ultraviolet rays from reaching the Earth. In the lower layer of the atmosphere, O₃ is man-made. Although O₃ is not directly emitted, it forms in the lower atmosphere through a chemical reaction between hydrocarbons (HC), also referred to as volatile organic compounds or VOCs, and nitrogen oxides (NOx), which are emitted from industrial sources and from automobiles. Substantial O₃ formations

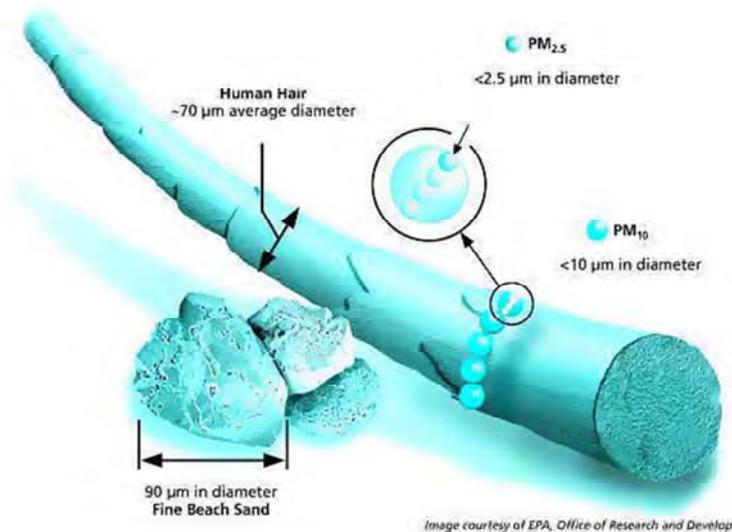
generally require a stable atmosphere with strong sunlight; thus, high levels of O₃ are generally a concern in the summer. Ozone is the main ingredient of smog. Ozone enters the bloodstream through the respiratory system and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. Ozone also damages vegetation by inhibiting its growth

Particulate Matter. Particulate pollution is composed of solid particles or liquid droplets that are small enough to remain suspended in the air. In general, particulate pollution can include dust, soot, and smoke; these can be irritating but usually are not poisonous.

Particulate pollution also can include bits of solid or liquid substances that can be highly toxic. Of particular concern are those particles that are smaller than, or equal to, 10 microns (PM₁₀) and 2.5 microns (PM_{2.5}) in size.

PM₁₀ refers to particulate matter less than 10 microns in diameter, about one-seventh the thickness of a human hair (**Figure 2**). Particulate matter pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when industry and gases emitted from motor vehicles undergo chemical reactions in the atmosphere. Major sources of PM₁₀ include motor vehicles; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Suspended particulates produce haze and reduce visibility.

FIGURE 2: RELATIVE PARTICULATE MATTER SIZE



Source: EPA Office of Air and Radiation
<http://www.epa.gov/oar/particlepollution/basic.html>

Data collected through numerous nationwide studies indicate that most of the PM₁₀ comes from the following:

- Fugitive dust
- Wind erosion
- Agricultural and forestry sources

TABLE 1: NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Period	National and State Standards	
		Primary	Secondary
Carbon Monoxide (CO)	Eight Hours ¹	9 ppm (10 µg/m ³)	No Secondary Standard
	One Hour ¹	35 ppm (40 µg/m ³)	No Secondary Standard
Lead (Pb)	Maximum Quarterly Average	1.5 µg/m ³	Same as Primary Standard
Nitrogen Dioxide (NO ₂)	Annual Arithmetic Mean	0.053 ppm (100 µg/m ³)	Same as Primary Standard
Particulate Matter (PM ₁₀)	Annual Arithmetic Mean ²	50 µg/m ³ / Revoked ²	
	24-Hour ³	150 µg/m ³	
Fine Particulate Matter (PM _{2.5})	Annual Arithmetic Mean ⁴	15 µg/m ³	Same as Primary Standard
	98 th Percentile 24-Hour ⁵	35 µg/m ³	Same as Primary Standard
Ozone (O ₃)	Fourth Highest Eight-Hour Daily Maximum ⁶	0.08 ppm	Same as Primary Standard
	Maximum Daily One-hour Average ⁷ (Applies only in limited areas)	0.12 ppm (235 µg/m ³)	Same as Primary Standard
Sulfur Dioxide (SO ₂)	Annual Arithmetic Mean	80 µg/m ³ (0.03 ppm)	–
	24 Hours ¹	365 µg/m ³ (0.14 ppm)	–
	Three Hours ¹	–	1,300 µg/m ³ / (0.5 ppm)

Source: EPA, "National Primary and Secondary Ambient Air Quality Standards" (49 CFR 50), October 2006.

Notes:

¹ Not to be exceeded more than once per year.

² Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM₁₀ standard in 2006 (effective December 17, 2006).

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

⁴ To attain this standard, the three-year average of the weighted annual mean PM_{2.5} concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.

⁵ To attain this standard, the three-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35µg/m³ (effective December 17, 2006).

⁶ To attain this standard, the three-year average of the fourth-highest daily maximum eight-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

⁷ (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is <1, as determined by Appendix H of 40 CFR 50 – National Primary and Secondary Ambient Air Quality Standards http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr50_main_02.tpl.

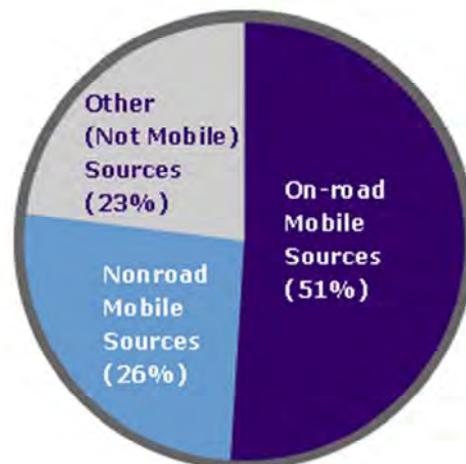
(b) As of June 15, 2005 EPA revoked the one-hour ozone standard in all areas except the 14 eight-hour ozone nonattainment Early Action Compact (EAC) Areas. The project is not located in one of these areas.

Abbreviations: ppm = parts per million, µg/m³ = micrograms per cubic meter.

A small portion of particulate matter is the product of fuel combustion processes. In the case of $PM_{2.5}$, the combustion of fossil fuels accounts for a significant portion of this pollutant. The main health effect of airborne particulate matter is on the respiratory system. $PM_{2.5}$ refers to particulates that are 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair. $PM_{2.5}$ results from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. Like PM_{10} , $PM_{2.5}$ can penetrate the human respiratory system's natural defenses and damage the respiratory tract when inhaled. Whereas particles 2.5 to 10 microns in diameter tend to collect in the upper portion of the respiratory system, particles 2.5 microns or less are so tiny that they can penetrate deeper into the lungs and damage lung tissues.

Carbon Monoxide. Carbon monoxide (CO) is a colorless gas that interferes with the transfer of oxygen to the brain. Carbon monoxide is emitted almost exclusively from the incomplete combustion of fossil fuels. As shown in **Figure 3**, on-road motor vehicle exhaust is the primary source of CO.

FIGURE 3: SOURCES OF CO (EPA)



In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. Carbon monoxide levels are generally highest in the colder months of the year when inversion conditions (when warmer air traps colder air near the ground) are more frequent.

Carbon monoxide concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions. Consequently, CO concentrations are generally predicted on a localized, or microscale, basis.

Nitrogen Dioxide. Nitrogen dioxide (NO_2) is a brownish gas that irritates the lungs. It can cause breathing difficulties at high concentrations. As with O_3 , NO_2 is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. Nitric oxide and NO_2 are collectively referred to as nitrogen oxides (NO_x) and are major contributors to ozone formation. NO_2 also contributes to the formation of $PM_{2.5}$. At atmospheric concentrations, NO_2 is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. An increase in bronchitis in children (two and three years old) has also been observed at concentrations below 0.3 parts per million (ppm).

Lead. Lead (Pb) is a stable element that persists and accumulates both in the environment and in animals. Its principal effects in humans are on the blood-forming, nervous, and renal systems. Lead levels in the urban environment from mobile sources have decreased significantly due to the federally mandated switch to lead-free gasoline. Lead was primarily in gasoline in the form of tetraethyl lead.

Sulfur Dioxide. Sulfur dioxide (SO₂) is a product of high-sulfur fuel combustion. The main sources of SO₂ are coal and oil used in power stations, industry, and domestic heating. Industrial chemical manufacturing is another source of SO₂. Sulfur dioxide is an irritant gas that attacks the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. Sulfur dioxide can also yellow plant leaves and corrode iron and steel.

5. Mobile Source Air Toxics

In addition to the criteria pollutants for which there are NAAQS, EPA also regulates air toxics. Toxic air pollutants are those pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries). The CAA identified 188 air toxics. In 2001 EPA identified a list of 21 Mobile Source Air Toxics (MSAT) and highlighted six of these MSATs as priority MSATs. Since 2001, EPA has conducted an extensive review of the literature to produce a list of the compounds identified in the exhaust or evaporative emissions from on-road and non-road equipment, as well as alternative fuels. This list currently includes approximately 1,000 compounds, many emitted in trace amounts.

In February 2007, EPA finalized a rule to reduce hazardous air pollutants from mobile sources (*Control of Hazardous Air Pollutants from Mobile Sources*, February 9, 2007). The rule limits the benzene content of gasoline and reduces toxic emissions from passenger vehicles and gas cans. EPA estimates that in 2030 this rule would reduce total emissions of MSATs by 330,000 tons and VOC emissions (precursors to ozone and PM_{2.5}) by more than one million tons.

EPA's existing programs will reduce MSATs by more than one million tons from 1999 levels. In addition to controlling pollutants, such as hydrocarbons, particulate matter, and nitrogen oxides, EPA's recent regulations controlling emissions from highway vehicles and non-road equipment will result in large air toxic reductions. Furthermore, EPA has programs under development that would provide additional benefits from further controls for small non-road gasoline engines and diesel locomotive and marine engines. Finally, EPA has developed a variety of programs to reduce risk in communities, such as Clean School Bus USA, the Voluntary Diesel Retrofit Program, Best Workplaces for Commuters, and National Clean Diesel Campaign.

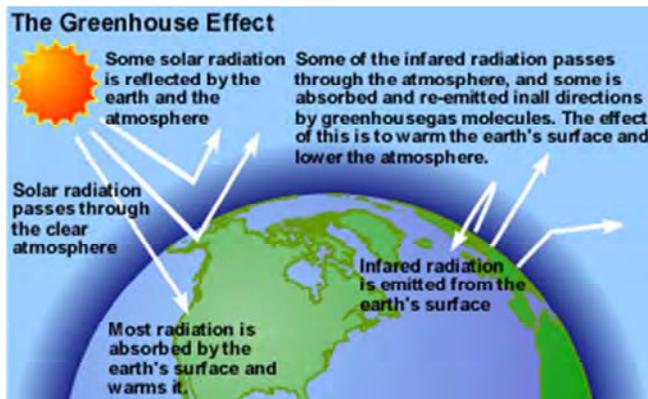
6. Greenhouse Gases

Gases that trap heat in the atmosphere are often referred to as greenhouse gases. Greenhouse gases are necessary to life, as we know it, because they keep the planet's surface warmer than it otherwise would be. This is referred to as the Greenhouse Effect

(Figure 4). As concentrations of greenhouse gases are increasing, however, the Earth's temperature appear to be increasing. According to National Oceanic and Atmospheric Administration (NOAA) and National Aeronautics and Space Administration (NASA) data, the Earth's average surface temperature has increased by about 1.2 to 1.4°F in the last 100 years. Eleven of the last twelve years rank among the twelve warmest years on record (since 1850), with the warmest two years being 1998 and 2005. Some of the warming in recent decades is possibly the result of human activities. Other aspects of the climate are also changing, such as rainfall

FIGURE 4: THE GREENHOUSE EFFECT

patterns, snow and ice cover, and sea level.



Some greenhouse gases, such as carbon dioxide, occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are described below.

Source: EPA

Carbon Dioxide (CO₂). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (or “sequestered”) when it is absorbed by plants as part of the biological carbon cycle.

Methane (CH₄). Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

Nitrous Oxide (N₂O). Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

Fluorinated Gases. Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances (e.g., chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases (High GWP gases).

Greenhouse gases differ in their ability to trap heat. For example, one ton of emissions of CO₂ has a different effect than one ton of emissions of methane. To compare emissions of different greenhouse gases, a weighting factor called a Global Warming Potential (GWP) is often used. To use a GWP, the heat-trapping ability of one metric ton (1,000 kilograms) of CO₂ is taken as the standard, and emissions are expressed in terms of CO₂ equivalent, but can also be expressed in terms of carbon equivalent.

7. Attainment Status/Regional Air Quality Conformity

Section 107 of the 1977 Clean Air Act Amendment requires that EPA publish a list of all geographic areas in compliance with the NAAQS, as well as those areas not in attainment of the NAAQS. The designation of an area is made on a pollutant-by-pollutant basis. EPA’s area designations are shown in **Table 2**.

TABLE 2: ATTAINMENT CLASSIFICATIONS AND DEFINITIONS

Attainment	Unclassified	Maintenance	Nonattainment
Area is in compliance with the NAAQS.	Area has insufficient data to make a determination and is treated as being in attainment.	Area once classified as nonattainment but has since demonstrated attainment of the NAAQS.	Area is not in compliance with the NAAQS.

The project area, which encompasses both Wilmington and New Castle County is classified as attainment for CO, as nonattainment areas for PM_{2.5}, and as moderate nonattainment areas for O₃. EPA has revoked the annual PM₁₀ standard and revised the PM_{2.5} 24-hour standard from 65 to 35 ug/m³. On July 14, 2011, the Wilmington Area Planning Council (WILMAPCO) reaffirmed the PM_{2.5} Air Quality Conformity Determination of the 2040 Regional Transportation Plan and the FY 2012-2015 Transportation Improvement Program for New Castle County, Delaware.

Wilmington and New Castle County are part of WILMAPCO. WILMAPCO is the federally designated Metropolitan Planning Organization (MPO) for the Wilmington region and, as such, is the regional transportation planning agency for Cecil County, Maryland and New Castle County, Delaware. WILMAPCO is charged with planning and coordinating how to invest federal transportation agencies, state and local governments and the public to ensure that the transportation investments being made will satisfy the needs of residents and employers. WILMAPCO’s role is to educate and involve the public in the transportation decision-making and funding process. Also as the MPO, WILMAPCO is directly responsible for making sure that any money spent on existing and future transportation projects and programs is based on a continuing, cooperative and comprehensive planning process. All transportation projects that receive federal funding in the Wilmington region go through this planning process.

WILMAPCO provides policy direction and oversight in the development of a federally mandated Transportation Improvement Program (TIP), the Long Range Transportation Plan (LRTP), and the transportation element of the State Air Quality Implementation Plan (SIP).

The WILMAPCO Transportation Improvement Program (TIP) serves as a 4-year

transportation planning document. For all planned capital transportation investments, the TIP lists project descriptions, scopes, justification and anticipated schedules for the next four years. The document is separated into Delaware Statewide, New Castle County and Cecil County specific projects. Within each of the county breakouts, the projects are sorted by the type of investment:

- System Preservation – Bridge Repair, Pavement Rehabilitation, Equipment, etc.
- System Management – Intersection Improvements, Safety Improvements, Aesthetic/Streetscape Improvements, etc.
- System Expansion – Major Roadway Widening, New Road Construction

A LRTP is a long-range transportation plan guiding transportation system improvements for the region. Every four years, MPOs must update their long-range transportation plan with at least a 20-year planning horizon. This long-range plan must be financially reasonable and conform to air-quality standards. Significantly, no transportation projects in the region may be funded with federal money unless the projects are found in an approved long-range transportation plan. The long-range plan for WILMAPCO is called the Regional Transportation Plan, or RTP. WILMAPCO's 2040 RTP Update¹ was adopted in January 2011. Federal policies that shaped past transportation Plans expired in September 2009, and have been kept alive by continuing resolutions. Given the absence of new federal legislation, WILMAPCO decided against major Plan modifications. Instead, the 2040 RTP simply addresses the core federal requirements. It is best thought of as an update to the 2030 RTP, adopted in March 2007. Federal approval of the 2040 RTP Update was received in March 2011.

The TIP represents a continued shift from the traditional highway building emphasis of prior years to a more multi-modal approach to transportation planning and programming. Many of the projects provide an increase in transit facilities, an expansion in the network of sidewalks, bike paths and greenways, and an improvement in the appearance of all transportation designs. The mandates of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the Clean Air Act and its Amendments and, most importantly, the vision for this region, require that more emphasis be placed on system preservation and management. This TIP is consistent with the vision of WILMAPCO's 2040 Regional Transportation Plan, which is the LRTP for the area. The 2012-2015 TIP² was approved on March 10, 2011 and amended on September 8, 2011. The Christina River Bridge Project is included in the 2012-2015 TIP as Project No. 2-59.

8. Ambient Air Quality in the Study Area

a. Local Meteorology

The nature of the surrounding atmosphere is an important element in assessing the

¹ 2040 Regional Plan Update, Wilmington Area Planning Council (WILMAPCO), January 2011

² FY 2012-2015 Transportation Improvement Program, Wilmington Area Planning Council (WILMAPCO), Approved March 10, 2011 Amended September 8, 2011

ambient air quality of an area. Located on the Mid-Atlantic coast, Wilmington sits at the mouth of the Delaware River, which empties directly into the Delaware Bay. The city is protected from harsh weather variations year-round by the Delaware Bay and Atlantic Ocean to the east and the Appalachian Mountains to the west.

Since the region is near the average path of the low-pressure systems that move across the country, changes in wind direction are frequent and contribute to the changeable character of the weather. Rainfall distribution throughout the year is rather uniform; however, the greatest intensities are confined to the summer and early fall months, the season for hurricanes and thunderstorm activity. Precipitation averages at 42.8 inches annually (www.usclimatedata.com).

In summer, the area is under the influence of the large semi-permanent high-pressure system commonly known as the Bermuda High and centered over the Atlantic Ocean. This pressure system brings warm humid air to the area. The proximity of large water areas and the inflow of southerly winds contribute to high relative humidity during much of the year. January is the coldest month, and July, the warmest. Snowfall occurs on about twelve days per year on the average. Snow is can be mixed with rain and sleet, and snow seldom remains on the ground for more than a few days. Glaze or freezing rain occurs generally in January or February. Freezing temperatures generally do not occur after mid-April or before the end of October.

Precipitation helps cleanse the atmosphere of pollutants. Very small particles in the atmosphere act as condensation nuclei, triggering the formation of raindrops, while larger particles are literally washed from the air during precipitation events. Precipitation also prevents the drying of the ground, alleviating the formation of fugitive dust; however, precipitation can combine with the oxides of sulfur and nitrogen to produce another form of pollution, namely acid rain.

The annual prevailing wind direction is from the west. Winter and spring months have the highest average wind speed. Destructive velocities are rare and occur mostly during summer thunderstorms. Only rarely have hurricanes in the vicinity caused widespread damage, then primarily through flooding. There have been nine hurricanes in Delaware over the past 100 years.

b. Monitored Air Quality

The Division of Air Quality, within the Delaware Department of Natural Resources and Environmental Control (DNREC) is responsible for implementing and enforcing regulations to ensure that the air Delaware citizens breathe is clean and healthful. This mission is accomplished through several methods, including air pollution monitoring.

The closest air monitoring station for the Wilmington area is located at the corner of Martin Luther King Jr. Blvd. & Justison St. in the City of Wilmington. This monitoring site was established in January 1998 as a replacement for the site that had been located at the corner of 12th and King Streets for over 20 years. As a result of being close to several major thoroughfares, measurements at the site are heavily affected by motor vehicle emissions, as are nearby populated areas. Much of the focus of the data collection at the site has been on fine particles and urban air toxics compounds. Many

of the measurements are made using manual sampling methods with a subsequent laboratory analysis. As a result, much of the data collected at this site is not available on the DNREC web page (http://www.dnrec.state.de.us/air/aqm_page/airmont/wilm.html) in real-time. Ozone (O₃) is not monitored at this location because of the well known scavenging effect that nitric oxide (NO) emissions from motor vehicle tail pipes has on nearby ground-level ozone concentrations. The parameters monitored include:

- Selected volatile organic compounds (VOC's) that are considered hazardous air pollutants (air toxics)
- Particulate matter (less than 2.5 Microns) - PM_{2.5}
- Particulate matter (less than 10 Microns) – PM₁₀
- Black carbon
- Oxides of nitrogen – NO₂, NO, NO_x
- Oxides of sulfur – SO₂, SO_x
- Carbon monoxide – CO
- Carbonyls
- Metals
- Wind speed, wind direction, temperature, rainfall

The closest station that monitors ozone is the Bellafonte Station on the grounds of Bellevue State Park, and is used for a year-round ozone monitoring. The Bellefonte area was originally selected for ozone monitoring in 1979 because it is far enough downwind of center city Wilmington during the summer months to capture the maximum contributions of Wilmington's emissions on ground-level ozone concentrations. The previous two sites were discontinued for ozone monitoring because of a change in land use near the sites. The parameters monitored at this station include ozone and sulfur dioxide.

Monitored air quality data within or near the study area for the years 2006-2008 is presented in **Table 3**. Further monitoring information is located in Appendix A.

B. ENVIRONMENTAL CONSEQUENCES

1. Pollutants for Analysis

Pollutants that can be traced principally to motor vehicles are relevant to the evaluation of the project's impacts; these pollutants include CO, HC, NO_x, O₃, PM₁₀, PM_{2.5}, and MSAT. Transportation sources account for a small percentage of regional emissions of sulfur oxides (SO_x) and lead (Pb); thus, a detailed analysis is not required.

Hydrocarbons (HC/VOC) and NO_x emissions from automotive sources are a concern primarily because they are precursors in the formation of ozone and particulate matter. Ozone is formed through a series of reactions that occur in the atmosphere in the presence of sunlight. Since the reactions are slow and occur as the pollutants are diffusing downwind, elevated ozone levels often are found many miles from the sources of the precursor pollutants. Therefore, the effects of HC and NO_x emissions generally are examined on a regional or "mesoscale" basis.

TABLE 3: AMBIENT AIR QUALITY MONITORING DATA 2006-2008

			Wilmington MLK Blvd. & Justison St.			Wilmington-Bellefonte Bellevue State park		
			2006	2007	2008	2006	2007	2008
Carbon Monoxide (CO) [ppm]	1-Hour	Maximum	1.5	1.5	1.4	-	-	-
		2nd Maximum	1.4	1.4	1.0	-	-	-
		# of Exceedances	0	0	0	-	-	-
	8-Hour	Maximum	1.2	1.2	0.9	-	-	-
		2nd Maximum	1.1	1.2	0.8	-	-	-
		# of Exceedances	0	0	0	-	-	-
Particulate Matter [ug/m ³]	PM _{2.5}	98th Pct. 24-Hour	37.7/39.5 ¹	32.9/32.5	35.0/34.3	-	-	-
		# of Exceedances	1/1	0/0	0/0	-	-	-
		Mean Annual	14.54/15.28 ¹	14.09/14.69	14.19/13.63	-	-	-
		# of Exceedances	0/1	0/0	0/0	-	-	-
Ozone (O ₃) [ppm]	1-Hour	First Highest	-	-	-	0.101	0.137 ¹	0.122
		Second Highest	-	-	-	0.097	0.097	0.094
		Third Highest	-	-	-	0.096	0.096	0.093
		Fourth Highest	-	-	-	0.095	0.091	0.087
		# of Exceedances	-	-	-	0	1	0
	8-Hour	First Highest	-	-	-	0.088 ¹	0.113 ¹	0.099 ¹
		Second Highest	-	-	-	0.084 ¹	0.079 ¹	0.083 ¹
		Third Highest	-	-	-	0.082 ¹	0.078 ¹	0.079 ¹
		Fourth Highest	-	-	-	0.082 ¹	0.077 ¹	0.077 ¹
		# of Days Standard Exceeded	-	-	-	11	10	5
Nitrogen Dioxide (NO ₂) [ppm]		1-Hour Maximum	0.095	0.075	0.060	-	-	-
		1-Hour Second Maximum	0.093	0.073	0.060	-	-	-
		Annual Mean	.018	0.018	0.015	-	-	-
		# of Days Standard Exceeded	0	0	0	0	0	0
Sulfur Dioxide (SO ₂) [ppm]		1-Hour Maximum	0.062	0.060	0.064	0.163	0.081	0.072
		3-Hour Maximum	0.039	0.038	0.041	0.101	0.046	0.042
		24-Hour Maximum	0.005	0.019	0.016	0.022	0.013	0.021
		Annual Mean	0	0.005	0.003	.005	0.005	0.005

¹ Exceeds NAAQSSource: EPA Office of Air Quality Planning and Standards (AIRSData); <http://www.epa.gov/air/data/geosel.html>

PM_{2.5} impacts are both regional and local. A significant portion of particulate matter, especially PM₁₀, comes from disturbed vacant land, construction activity, and paved road dust. PM_{2.5} also comes from these sources. Motor vehicle exhaust, particularly from diesel vehicles, is also a source of PM₁₀ and PM_{2.5}. PM₁₀, and especially PM_{2.5}, can also be created by secondary formation from precursor elements such as SO₂, NO_x, VOCs, and ammonia (NH₃). Secondary formation occurs due to chemical reaction in the atmosphere generally downwind some distance from the original emission source. Thus it is appropriate to predict concentrations of PM₁₀ and PM_{2.5} on both a regional and a localized basis.

Carbon monoxide impacts are generally localized. Even under the worst meteorological conditions and most congested traffic conditions, high concentrations are limited to a relatively short distance (300 to 600 feet) of heavily traveled roadways. Vehicle emissions are the major sources of CO. Although the project could change traffic patterns within the project area, the area is in a CO Attainment Area and a detailed CO analysis is not required. Therefore, only a description of existing CO levels and a qualitative discussion of the effects of the project is presented.

MSAT impacts are both regional and local. Through the issuance of EPA's Final Rule, Control of Emissions of Hazardous Air Pollutants from Mobile Sources (66 FR 17229), it was determined that many existing and newly promulgated mobile source emission control programs would result in a reduction of MSATs. FHWA projects that even with a 64 percent increase in Vehicle Miles Traveled (VMT), the programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 47 percent to 60 percent, and will reduce on-highway diesel PM emissions by 94 percent. As a result, EPA has concluded that no further motor vehicle emission standards or fuel standards were necessary to further control MSATs.

2. Regional Analysis

A regional or mesoscale analysis of a project determines a project's overall impact on regional air quality levels. This analysis uses regional VMT and Vehicle Hours Traveled (VHT) within the region with and without the project to determine daily "pollutant burden" levels. The mesoscale analysis is performed by WILMAPCO. As previously discussed, this analysis demonstrated that the TIP and RTP conformed to the requirements of the Clean Air Act and Amendments.

3. Microscale CO Assessment

The Christina River Bridge Project Study Area is in New Castle County, which is designated as "Attainment" for Carbon Monoxide (CO). Code of Federal Regulations Title 40, Part 93-Subpart A (40CFR93A) implements section 176(c) of the Clean Air Act (CAA), as amended (42 U.S.C. 7401 *et seq.*), and the related requirements of 23 U.S.C. 109(j), with respect to the conformity of transportation plans, programs, and projects which are developed, funded, or approved by the United States Department of Transportation (DOT), and by metropolitan planning organizations (MPOs) or other recipients of funds under title 23 U.S.C. or the Federal Transit Laws (49 U.S.C. Chapter 53). Paragraph 40CFR02.102 (b) Geographic Applicability states that the provisions of

the subpart apply in all nonattainment and maintenance areas for transportation-related criteria pollutants for which the area is designated nonattainment or has a maintenance plan. Since the study area is in a CO Attainment area, conformity determination is not required.

A review of data provided, including updated traffic data shown in Table 4, demonstrates that Christina River Bridge Project will not result in significant traffic volumes, or changes in vehicle mix or other factors that would cause an increase in emissions relative. As shown in the previous section of this report, the maximum 2008 1-hour monitored CO concentrations at the station at MLK Boulevard & Justison Street, which is located in the study area, is 1.4 parts per million (ppm). This concentration is only 4.0 percent of the 1-hour CO NAAQS of 35.0 ppm. The maximum 2008 8-hour monitored CO concentration is 0.9 ppm, which is only 1.0 percent of the 8-hour NAAQS of 9.0 ppm.

In conclusion, the Christina River Bridge Project will not cause or contribute to a new violation of the CO NAAQS. The monitored data shows a steady decrease in monitored CO concentrations. This decrease in monitored concentrations is expected to continue as vehicle emission control technology and fuel efficiency continues to improve and older cars are retired.

4. PM_{2.5} Assessment

A PM_{2.5} conformity analysis must be conducted for the recommended alternative during the previously mentioned grace period using qualitative methods following the guidelines in EPA's *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas (March 29, 2006, referred to as "PM_{2.5/10} Guidance")*. However, a PM_{2.5} hot-spot analysis should be conducted according to this qualitative guidance **only** if the project is a Project of Air Quality Concern, defined in 40 CFR 93.123(b)(1) as follows:

- i. New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;
- ii. Projects affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles;
- iii. New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
- iv. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
- v. Projects in or affecting locations, areas, or categories of sites which are identified in the PM_{2.5} or PM₁₀ applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

Examples of projects of air quality concern that would be covered by 40 CFR 93.123(b)(1)(i) and (ii) include the following:

- A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) where 8 percent or more of such AADT is diesel truck traffic;
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus, or intermodal terminal;
- Expansion of an existing highway or other facility that affects a congested intersection (operated at LOS D, E, or F) that has a significant increase in the number of diesel trucks; and

The above AADT's and truck percentages are not to be considered "thresholds", but should be used as general guidance on whether the number of trucks is to be considered as significance.

TABLE 4: CHRISTINA RIVER BRIDGE PROJECT TRAFFIC DATA

	2030 Build: Christine River Bridge	2030 Build: Walnut Street, South of A Street	2030 Build: Market Street, South of A Street	2030 Build: Justison Street, South of Beech Street
ADT volumes	9,500	28,750	25,250	11,500
Percent Trucks	3.5%	7.0	7.0	3.5
Daily Truck Volumes	333	2,013	1768	403

Determination as to whether the project is a Project of Air Quality Concern will be finalized by Interagency Consultation. To assist with the Interagency Consultation, DelDOT has prepared the following assessment of the proposed improvements:

- The Christina River Bridge Project is considered under 40 CFR 93.123(b)(1)(i), as amended, which includes *"New or expanded highway projects that have a significant number of or significant increase in diesel vehicles."*
- The proposed improvements are designed to increase mobility within the study area; they are not anticipated to induce traffic. A review of the data in **Table 4** demonstrates that there will not be a significant number of trucks on the roads primarily affected by the project.
- As shown in **Table 4**, the maximum ADT on a local road will be 28,750 and the maximum truck percentage will be 7% on the local roads.
- The maximum number of trucks on a local road will be 2,013, which not a significant amount.

- Section 176(c) of the Clean Air Act and the federal conformity rule require that transportation plans and programs conform to the intent of the state implementation plan (SIP) through a regional emissions analysis in PM_{2.5} nonattainment areas. The WILMAPCO Air Quality Subcommittee has reviewed all projects found in the FY 2012-15 TIP and 2040 RTP and discussed their air quality impacts. The group found that these projects do not trigger new regional emissions analyses. No new regionally-significant projects were added in the FY 2012-15 TIP and 2040 RTP and the modeled horizon years of existing regionally-significant projects remained intact. Therefore, the FY 2012-15 TIP and 2040 RTP conformity determination will rely on the FY 2011-14 TIP / 2040 RTP regional emissions analyses, adopted by the WILMAPCO Council on January 13, 2011. Additionally, in compliance with federal regulations regarding fine particulate matter (PM_{2.5}) the Delaware Valley Regional Planning Commission (DVRPC) Board reaffirmed their PM_{2.5} conformity analysis on January 27, 2011.

Based on review and analysis as discussed above, it is determined that the Christina Road Bridge Project meets the Clean Air Act and 40 CFR 93.109 requirements. These requirements are met for particulate matter without a project-level PM_{2.5} hot-spot analysis, since the project has **not been found to be a project of air quality concern** as defined under 40 CFR 93.123(b)(1). Since the project meets the Clean Air Act and 40 CFR 93.109 requirements, the project will not cause or contribute to a new violation of the PM_{2.5} NAAQS, or increase the frequency or severity of a violation.

5. MSAT Assessment

The Federal Highway Administration (FHWA) *Guidance on Air Toxic Analysis in NEPA Documents*³ requires analysis of Mobile Source Air Toxics (MSAT) under specific conditions. The EPA has designated six prioritized MSATs, which are known or probable carcinogens or can cause chronic respiratory effects. The six prioritized MSATs are: benzene; acrolein; formaldehyde; 1,3-butadiene, acetaldehyde; and diesel exhaust (diesel exhaust gases and diesel particulate matter). The 2030 Christina Bridge traffic volume (ADT) is 9,500 which is less than 140,000. The Christina River Bridge Project would be a “*minor widening project[s] and new interchange[s], such as those that replace(s) a signalized intersection on a surface street*” ... “*that serves to improve operations of highway.....without adding substantial new capacity or creating a facility that is likely to meaningfully increase emissions*”⁴. Therefore, the Christina River Bridge Project would be considered a **Project with Low Potential MSAT Effects**.

a. Project Specific MSAT Information

The new roadway proposed in the Recommended Alternative will have the effect of moving some traffic closer to nearby buildings and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher under Recommended Alternative than the No-Build Alternative. Although the magnitude and the duration of these potential increases cannot be accurately quantified due to the inherent deficiencies of current models, based on the DelDOT traffic volumes (ADT) and

³ Interim Guidance on Air Toxic Analysis in NEPA Documents

⁴ *ibid*

truck percentages, the Christina River Bridge project will not result in any meaningful changes in traffic volumes, vehicle mix, or any other factor that would cause a significant increase in emissions impacts. As such, this project will generate minimal air quality impacts for the Clean Air Act criteria pollutants and has not been linked with any special MSAT concerns. In addition, emissions would likely be lower in the design year than present levels as a result of EPA's national control programs that are projected to reduce MSAT emissions by 33 to 94 percent between 1999 and 2050 (**Table 5**). Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Table 5:

NATIONAL MSAT EMISSION TRENDS 1999 - 2050 FOR VEHICLES OPERATING ON ROADWAYS
USING EPA'S MOBILE6.2 MODEL

Pollutant/VMT	Pollutant Emissions (tons) and Vehicle-Miles Traveled (VMT) by Calendar Year												Reduction 1999 to 2050
	1999	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	
Acrolein	2570	2430	1500	1000	814	775	783	824	889	970	1060	1160	-55%
Benzene	102000	98400	66700	38000	29200	27000	27200	28700	31000	33900	37000	40500	-60%
1,3-Butadiene	14400	13800	8620	5410	4640	4360	4390	4630	5010	5460	5970	6520	-55%
Diesel PM	139000	128000	91900	50000	22100	11400	8240	7080	6480	7070	7720	8440	-94%
Formaldehyde	50900	48800	30300	21400	18700	17800	18100	19000	20500	22400	24500	26800	-47%
Naphthalene	4150	4030	2610	1990	1770	1780	1890	2030	2200	2400	2620	2870	-31%
Polycyclic Organic Matter	561	541	343	259	231	233	246	265	286	313	341	373	-33%
Trillions VMT	2.69	2.75	2.94	3.24	3.55	3.88	4.24	4.63	5.05	5.51	6.02	6.58	145%

Source: EPA

b. Unavailable or Incomplete Information

Available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the Recommended Alternative. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling to estimate ambient concentrations resulting from the estimated emissions, exposure modeling to estimate human exposure to the estimated concentrations, and then a final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

- **Emissions.** The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE6.2 is a trip-based model—emission factors are projected based on a typical trip of 7.5 miles and on

average speeds for this typical trip. This means that MOBILE6.2 does not have the ability to predict emission factors for a specific vehicle-operating condition at a specific location at a specific time. Because of this limitation, MOBILE6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis. These deficiencies compromise the capability of MOBILE6.2 to estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

- **Dispersion.** The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The National Cooperative Highway Research Program recently finished research on best practices in applying models and other technical methods in the analysis of MSATs. This work focuses on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Analysis recommendations based on this research have not yet been issued by EPA. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.
- **Exposure Levels and Health Effects.** Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupported assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. Considerable uncertainties are also associated with the existing estimates of toxicity of the various MSATs because of factors such as low-dose extrapolation and translation of occupational exposure data to the general

population. Because of these shortcomings, any calculated difference in health impacts among the alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

c. Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emission types, a variety of studies show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of, or benchmark for, local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or state level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at <http://www.epa.gov/iris>.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes – particularly respiratory problems⁵. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, the studies do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

⁵ South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 studies on the relationship between health and air quality; NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.

d. Relevance of Unavailable or Incomplete Information

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

e. MSAT Summary

This section has provided a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that the Recommended Alternative may increase exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain. Because of this uncertainty, the health effects from these emissions cannot be estimated.

6. Greenhouse Gas Assessment

Carbon Dioxide (CO₂) emission estimates are based on the amount of direct energy required. The direct energy values represent the energy required for vehicle propulsion. This energy is a function of traffic characteristics such as volume, speed, distance traveled, vehicle mix, and thermal value of the fuel being used. A review of traffic data for the project reveals that CO₂ emission burdens under the Recommended Alternative will most likely result in almost no change as compared to the existing conditions.

7. Construction Impacts on Air Quality

In general, construction-related effects of the project would be limited to short-term increased fugitive dust and mobile-source emissions during construction. State and local regulations regarding dust control and other air quality emission reduction controls should be followed.

a. Fugitive Dust

Fugitive dust is airborne particulate matter, generally of a relatively large particulate size. Construction-related fugitive dust would be generated by haul trucks, concrete trucks, delivery trucks, and earth-moving vehicles operating around the construction sites. This fugitive dust would be caused by particulate matter that is re-suspended ("kicked up") by vehicle movement over paved and unpaved roads, dirt tracked onto paved surfaces from unpaved areas at access points, and material blown from uncovered haul trucks.

Generally, the distance that particles drift from their source depends on their size, the emission height, and the wind speed. Small particles (30 to 100 micron range) can

travel several hundred feet before settling to the ground. Most fugitive dust, however, is comprised of relatively large particles (that is, particles greater than 100 microns in diameter). These particles are responsible for the reduced visibility often associated with this type of construction. Given their relatively large size, these particles tend to settle within 20 to 30 feet of their source.

To minimize the amount of construction dust generated, prevention and mitigation measures can be taken to minimize the potential particulate pollution problem, such as:

- **Site Preparation:**

- Minimize land disturbance
- Use watering trucks to minimize dust
- Cover trucks when hauling dirt
- Stabilize the surface of dirt piles if they are not removed immediately
- Use windbreaks to prevent accidental dust pollution
- Limit vehicular paths and stabilize temporary roads

- **Construction**

- Cover trucks when transferring materials
- Use dust suppressants on unpaved traveled paths
- Minimize unnecessary vehicular and machinery activities
- Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road.

b. Mobile Source Emissions

Since CO emissions from motor vehicles generally increase with decreasing vehicle speed, disruption of traffic during construction (such as a temporary reduction of roadway capacity and increased queue lengths) could result in short-term, elevated concentrations of CO. To minimize the amount of emissions generated, every effort should be made during construction to limit disruption to traffic, especially during peak travel hours.

III. CONCLUSIONS

The purpose and need of the project focuses on meeting the current and future regional transportation needs of the area. The project is not predicted to cause or exacerbate a violation of the NAAQS. The project is not expected to measurably increase regional emission burdens or MSAT levels. The project is also not expected to cause a violation of the PM_{2.5} standard. There will not be significant increases in Greenhouse Gases. Construction-related effects of the project would be limited to short-term increased fugitive dust and mobile-source emissions during construction. State and local regulations regarding dust control and other air quality emission reduction controls should be followed.

IV. REFERENCES

Wilmington Area Planning Council (WILMAPCO) *Regional Transportation Plan*;
<http://www.wilmapco.org/rtp/>

Wilmington Area Planning Council (WILMAPCO) *Transportation Improvement Program*; <http://www.wilmapco.org/tip/>

Wilmington Area Planning Council (WILMAPCO) *Monitoring Sites*;
http://www.dnrec.state.de.us/air/aqm_page/airmont/Air.asp

U.S. Environmental Protection Agency (EPA). 2006. *Transportation Conformity Guidance for Qualitative Hot-spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas*. EPA420-B-06-902.

U.S. Environmental Protection Agency (EPA). 2007. *Climate Change*. URL:
http://www.epa.gov/climatechange/emissions/state_ghginventories.html.

U.S. Environmental Protection Agency (EPA) *AIRSData*. Office of Air Quality Planning and Standards. URL: <http://www.epa.gov/air/data/geosel.html>

U.S. Federal Highway Administration (FHWA). 2006. *Interim Guidance on Air Toxic Analysis in NEPA Documents*. February 3.

Appendix A: Monitored Ambient Air Quality Data

Monitored Data

CO



AirData

AirData - Monitor Values Report - Criteria Air Pollutants
Generated on Wednesday, October 12, 2011

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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Carbon Monoxide

Year: 2006

EPA Air Quality Standards:

Carbon Monoxide: 35 ppm (1-hour average), 9 ppm (8-hour average)

ppm = parts per million

2 Rows

See [Disclaimer](#)

		CO (ppm)													
		1-Hour Values			8-Hour Values				Monitor Number	Site ID	Site Address	City	County	State	EPA Region
Row #	# Obs	1st Max	2nd Max	# Exceed	1st Max	2nd Max	# Exceed								
SORT		▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾	▾ ▾
1	8,507	1.5	1.4	0	1.2	1.1	0	1	100031008	Route 9, Delaware City		New Castle Co	DE	03	
2	8,574	3.0	2.9	0	2.2	2.2	0	1	100032004	MIK Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
Grand Total				0			0								

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AirData

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AirData - Monitor Values Report - Criteria Air Pollutants
 Generated on Wednesday, October 12, 2011

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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware
Pollutant: Carbon Monoxide
Year: 2007

EPA Air Quality Standards:
 Carbon Monoxide: 35 ppm (1-hour average), 9 ppm (8-hour average)

ppm = parts per million

2 Rows
 See [Disclaimer](#)

Row #	CO (ppm)								Monitor Number	Site ID	Site Address	City	County	State	EPA Region
	1-Hour Values				8-Hour Values										
	# Obs	1st Max	2nd Max	# Exceed	1st Max	2nd Max	# Exceed	# Exceed							
SORT	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼
1	8,438	1.5	1.4	0	1.2	1.2	0	1	100031008	Route 9, Delaware City		New Castle Co	DE	03	
2	8,552	5.2	2.6	0	1.9	1.8	0	1	100032004	Mik Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
Grand Total				0			0								

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AirData

AirData - Monitor Values Report - Criteria Air Pollutants
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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Carbon Monoxide

Year: 2008

EPA Air Quality Standards:

Carbon Monoxide: 35 ppm (1-hour average), 9 ppm (8-hour average)

ppm = parts per million

2 Rows

See [Disclaimer](#)

		CO (ppm)													
		1-Hour Values			8-Hour Values				Monitor Number	Site ID	Site Address	City	County	State	EPA Region
Row #	# Obs	1st Max	2nd Max	# Exceed	1st Max	2nd Max	# Exceed								
	▲ ▼														
1	7,030	1.4	1.0	0	0.9	0.8	0	1	100031008	Route 9, Delaware City		New Castle Co	DE	03	
2	7,171	2.0	2.0	0	1.3	1.1	0	1	100032004	Mik Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
Grand Total				0			0								

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Monitored Data

NO₂



AirData

AirData - Monitor Values Report - Criteria Air Pollutants
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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware
Pollutant: Nitrogen Dioxide
Year: 2006

EPA Air Quality Standards:
Nitrogen Dioxide: 0.053 ppm (annual mean)

ppm = parts per million

1 Rows
See [Disclaimer](#)

Row #	NO2 (ppm)						Monitor Number	Site ID	Site Address	City	County	State	EPA Region
	1-Hour Values			Annual		# Exceed							
	# Obs	1st Max	2nd Max	Mean									
SORT	▲▼	▲▼	▲▼	▲▼	▲▼								
1	7,595	0.095	0.093	0.018		0	1	100032004	Mlk Blvd And Justison St.	Wilmington	New Castle Co	DE	03
Grand Total							0						

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Readers are cautioned not to infer a qualitative ranking order of geographic areas based on AirData



AirData

AirData - Monitor Values Report - Criteria Air Pollutants
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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Nitrogen Dioxide

Year: 2007

EPA Air Quality Standards:

Nitrogen Dioxide: 0.053 ppm (annual mean)

ppm = parts per million

1 Rows

See [Disclaimer](#)

Row #	NO2 (ppm)					Monitor Number	Site ID	Site Address	City	County	State	EPA Region
	1-Hour Values		Annual									
	# Obs	1st Max	2nd Max	Mean	# Exceed							
SORT	▲▼	▲▼	▲▼	▲▼	▲▼							
1	5,535	0.075	0.073	0.017	0	1	100032004	Mik Blvd And Justison St.	Wilmington	New Castle Co	DE	03
Grand Total					0							

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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Nitrogen Dioxide

Year: 2008

EPA Air Quality Standards:

Nitrogen Dioxide: 0.053 ppm (annual mean)

ppm = parts per million

1 Rows

See [Disclaimer](#)

Row #	NO2 (ppm)					Monitor Number	Site ID	Site Address	City	County	State	EPA Region
	1-Hour Values		Annual									
	# Obs	1st Max	2nd Max	Mean	# Exceed							
SORT	▲▼	▲▼	▲▼	▲▼	▲▼							
1	6,953	0.060	0.060	0.015	0	1	100032004	Mik Blvd And Justison St.	Wilmington	New Castle Co	DE	03
Grand Total					0							

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Monitored Data

Ozone



AirData

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AirData - Monitor Values Report - Criteria Air Pollutants
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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Ozone

Year: 2006

EPA Air Quality Standards:

Ozone: 0.12 ppm (1-hour average), 0.075 ppm (8-hour average)

ppm = parts per million

6 Rows

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		O3 (ppm)																							
		1-Hour Values							8-Hour Values																
Row #	1st Max	2nd Max	3rd Max	4th Max	# Exceed Actual	# Exceed Estimated	Required Days	# Days	% Days	Missing Days	1st Max	2nd Max	3rd Max	4th Max	Days > Std	Required Days	# Days	% Days	Monitor Number	Site ID	Site Address	City	County	State	EPA Region
SORT	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑					
1	0.107	0.104	0.094	0.093	0	0.0	214	205	96	2	0.089	0.088	0.086	0.085	11	214	205	96	1	100010002	State Road 384, Killens Pond Rd		Kent Co	DE	03
2	0.113	0.103	0.099	0.097	0	0.0	214	200	93	0	0.095	0.089	0.084	0.081	6	214	199	93	1	100031007	Lums Pond State Park		New Castle Co	DE	03
3	0.105	0.099	0.095	0.094	0	0.0	214	207	97	2	0.093	0.090	0.081	0.081	7	214	204	95	1	100031010	Brandywine Creek State Park		New Castle Co	DE	03
4	0.101	0.097	0.096	0.095	0	0.0	214	214	100	0	0.088	0.084	0.082	0.082	11	214	214	100	1	100031013	Bellevue State Park	Wilmington	New Castle Co	DE	03
5	0.107	0.101	0.098	0.097	0	0.0	214	213	100	1	0.089	0.083	0.083	0.082	8	214	211	99	1	100051002	350 Virginia Ave Seaford	Seaford	Sussex Co	DE	03
6	0.101	0.099	0.096	0.092	0	0.0	214	205	96	1	0.088	0.087	0.085	0.080	8	214	204	95	1	100051003	Univ. Of De College Of Marine Studies	Lewes	Sussex Co	DE	03
Grand Total						0.0									51										

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AirData - Monitor Values Report - Criteria Air Pollutants
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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Ozone

Year: 2007

EPA Air Quality Standards:

Ozone: 0.12 ppm (1-hour average), 0.075 ppm (8-hour average)

ppm = parts per million

6 Rows

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Row #	O3 (ppm)											Monitor Number	Site ID	Site Address	City	County	State	EPA Region							
	1-Hour Values						8-Hour Values																		
	1st Max	2nd Max	3rd Max	4th Max	# Exceed Actual	# Exceed Estimated	Required Days	# Days	% Days	Missing Days	1st Max								2nd Max	3rd Max	4th Max	Days ≥ Std	Required Days	# Days	% Days
1	0.089	0.089	0.088	0.087	0	0.0	214	211	99	1	0.079	0.078	0.078	0.078	4	214	211	99	1	100010002	State Road 384, Killens Pond Rd		Kent Co	DE	03
2	0.131	0.108	0.101	0.100	1	1.0	214	213	100	0	0.107	0.086	0.084	0.081	9	214	211	99	1	100031007	Lums Pond State Park		New Castle Co	DE	03
3	0.136	0.119	0.108	0.104	1	1.0	214	204	95	2	0.117	0.088	0.087	0.086	10	214	202	94	1	100031010	Brandywine Creek State Park		New Castle Co	DE	03
4	0.137	0.097	0.096	0.091	1	1.0	214	214	100	0	0.113	0.079	0.078	0.077	10	214	213	100	1	100031013	Bellevue State Park	Wilmington	New Castle Co	DE	03
5	0.110	0.100	0.096	0.092	0	0.0	214	211	99	1	0.084	0.084	0.081	0.081	8	214	210	98	1	100051002	350 Virginia Ave Seaford	Seaford	Sussex Co	DE	03
6	0.094	0.093	0.090	0.088	0	0.0	214	109	51	1	0.081	0.081	0.080	0.080	10	214	109	51	1	100051003	Univ. Of De College Of Marine Studies	Lewes	Sussex Co	DE	03
Grand Total							3.0						51												

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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware
Pollutant: Ozone
Year: 2008

EPA Air Quality Standards:
Ozone: 0.12 ppm (1-hour average), 0.075 ppm (8-hour average)

ppm = parts per million

6 Rows
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Row #	O3 (ppm)										Monitor Number	Site ID	Site Address	City	County	State	EPA Region								
	1st Max	2nd Max	3rd Max	4th Max	# Exceed Actual	# Exceed Estimated	Required Days	# Days	% Days	Missing Days								1st Max	2nd Max	3rd Max	4th Max	Days > Std	Required Days	# Days	% Days
1	0.103	0.093	0.089	0.087	0	0.0	214	213	100	1	0.084	0.083	0.081	0.081	8	214	213	100	1	100010002	State Road 384, Killens Pond Rd		Kent Co	DE	03
2	0.105	0.093	0.093	0.088	0	0.0	214	213	100	1	0.094	0.084	0.082	0.078	5	214	212	99	1	100031007	Lums Pond State Park		New Castle Co	DE	03
3	0.126	0.096	0.096	0.094	1	1.0	214	206	96	1	0.107	0.089	0.088	0.082	8	214	203	95	1	100031010	Brandywine Creek State Park		New Castle Co	DE	03
4	0.122	0.094	0.093	0.087	0	0.0	214	214	100	0	0.099	0.083	0.079	0.077	5	214	214	100	1	100031013	Bellevue State Park	Wilmington	New Castle Co	DE	03
5	0.096	0.094	0.089	0.089	0	0.0	214	211	99	0	0.091	0.085	0.081	0.081	8	214	211	99	1	100051002	350 Virginia Ave Seaford	Seaford	Sussex Co	DE	03
6	0.095	0.090	0.087	0.085	0	0.0	214	214	100	0	0.090	0.083	0.080	0.079	6	214	214	100	1	100051003	Univ. Of De College Of Marine Studies	Lewes	Sussex Co	DE	03
Grand Total											40														

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Monitored Data

PM_{2.5}



AirData

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AirData - Monitor Values Report - Criteria Air Pollutants
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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware
Pollutant: Particles < 2.5 micrometers diameter
Year: 2006

EPA Air Quality Standards:
Particles < 2.5 micrometers diameter: 35 µg/m3 (24-Hour Average), 15.0 µg/m3 (annual mean)

µg/m3 = micrograms per cubic meter

8 Rows
See [Disclaimer](#)

Row #	PM2.5 (µg/m3)											Site ID	Site Address	City	County	State	EPA Region
	24-Hour Values							Annual		Monitor Number							
	# Obs	1st Max	2nd Max	3rd Max	4th Max	98th Pct	# Exceed	Mean	# Exceed								
SORT	▲▼	▲▼	▲▼	▲▼	▲▼	▲▼											
1	115	46.5	30.8	30.7	29.9	30.7	0	11.92	0	1	100010002	State Road 384, Killens Pond Rd		Kent Co	DE	03	
2	115	42.8	32.1	29.9	28.3	29.9	0	11.90	0	1	100010003	Water St. Dover	Dover	Kent Co	DE	03	
3	108	38.0	34.9	30.9	28.6	30.9	0	12.32	0	1	100031003	River Road Park, Bellefonte		New Castle Co	DE	03	
4	116	37.2	36.6	28.8	27.5	28.8	0	11.43	0	1	100031007	Lums Pond State Park		New Castle Co	DE	03	
5	105	40.3	39.4	30.5	28.5	30.5	0	12.70	0	1	100031012	Univ. De North Campus	Newark	New Castle Co	DE	03	
6	320	48.2	46.4	43.0	40.6	37.7	1	14.54	0	1	100032004	Mlk Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
7	57	41.1	39.5	32.1	31.9	39.5	1	15.28	1	2	100032004	Mlk Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
8	119	46.6	33.9	33.3	32.4	33.3	0	12.82	0	1	100051002	350 Virginia Ave Seaford	Seaford	Sussex Co	DE	03	
Grand Total							2		1								

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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Particles < 2.5 micrometers diameter

Year: 2007

EPA Air Quality Standards:

Particles < 2.5 micrometers diameter: 35 µg/m3 (24-Hour Average), 15.0 µg/m3 (annual mean)

µg/m3 = micrograms per cubic meter

8 Rows

See [Disclaimer](#)

Row #	PM2.5 (µg/m3)										Site ID	Site Address	City	County	State	EPA Region	
	24-Hour Values							Annual									Monitor Number
	# Obs	1st Max	2nd Max	3rd Max	4th Max	98th Pct	# Exceed	Mean	# Exceed								
SORT	↑	↓	↑	↓	↑	↓											
1	117	38.0	34.6	30.9	30.4	30.9	0	12.13	0	1	100010002	State Road 384, Killens Pond Rd		Kent Co	DE	03	
2	119	38.7	34.0	30.2	29.9	30.2	0	12.10	0	1	100010003	Water St. Dover	Dover	Kent Co	DE	03	
3	107	37.8	33.5	32.3	32.2	32.3	0	13.43	0	1	100031003	River Road Park, Bellefonte		New Castle Co	DE	03	
4	118	33.3	32.6	29.6	28.5	29.6	0	12.45	0	1	100031007	Lums Pond State Park		New Castle Co	DE	03	
5	115	35.2	33.0	31.0	29.5	31.0	0	13.38	0	1	100031012	Univ. De North Campus	Newark	New Castle Co	DE	03	
6	307	41.4	41.2	40.5	39.5	32.9	0	14.09	0	1	100032004	Mik Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
7	65	35.2	32.5	29.8	28.7	32.5	0	14.69	0	2	100032004	Mik Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
8	119	44.9	34.3	32.5	32.2	32.5	0	13.21	0	1	100051002	350 Virginia Ave Seaford	Seaford	Sussex Co	DE	03	
Grand Total							0		0								

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AirData - Monitor Values Report - Criteria Air Pollutants
Generated on Thursday, October 13, 2011

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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware
Pollutant: Particles < 2.5 micrometers diameter
Year: 2008

EPA Air Quality Standards:
Particles < 2.5 micrometers diameter: 35 µg/m3 (24-Hour Average), 15.0 µg/m3 (annual mean)

µg/m3 = micrograms per cubic meter

8 Rows
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		PM2.5 (µg/m3)														
		24-Hour Values						Annual		Monitor Number	Site ID	Site Address	City	County	State	EPA Region
Row #	# Obs	1st Max	2nd Max	3rd Max	4th Max	98th Pct	# Exceed	Mean	# Exceed							
SORT	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼
1	89	30.8	29.6	27.6	22.8	29.6	0	11.97	0	1	100010002	State Road 384, Killens Pond Rd		Kent Co	DE	03
2	87	30.5	29.7	28.7	26.5	29.7	0	11.91	0	1	100010003	Water St. Dover	Dover	Kent Co	DE	03
3	76	36.3	31.6	30.1	29.1	31.6	0	13.76	0	1	100031003	River Road Park, Bellefonte		New Castle Co	DE	03
4	82	32.6	29.7	28.1	27.2	29.7	0	12.17	0	1	100031007	Lums Pond State Park		New Castle Co	DE	03
5	85	34.3	31.5	28.6	25.7	31.5	0	13.03	0	1	100031012	Univ. De North Campus	Newark	New Castle Co	DE	03
6	247	39.3	38.1	35.3	35.3	35.0	0	14.19	0	1	100032004	Mlk Blvd And Justison St.	Wilmington	New Castle Co	DE	03
7	45	34.3	28.1	27.2	22.3	34.3	0	13.63	0	2	100032004	Mlk Blvd And Justison St.	Wilmington	New Castle Co	DE	03
8	90	30.8	27.2	27.0	25.0	27.2	0	12.87	0	1	100051002	350 Virginia Ave Seaford	Seaford	Sussex Co	DE	03
Grand Total							0		0							

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Monitored Data

SO₂



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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Sulfur Dioxide

Year: 2006

EPA Air Quality Standards:

Sulfur Dioxide: 0.5 ppm (3-hour average), 0.14 ppm (24-hour average), 0.030 ppm (annual mean)

ppm = parts per million

4 Rows

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		SO2 (ppm)																	
		1-Hour Values			3-Hour Values			24-Hour Values			Annual		Monitor	Site ID	Site Address	City	County	State	EPA Region
Row #	# Obs	1st Max	2nd Max	1st Max	2nd Max	# Exceed	1st Max	2nd Max	# Exceed	Mean	# Exceed	Number							
	↕	↕	↕	↕	↕	↕													
1	8,424	0.072	0.049	0.040	0.034	0	0.015	0.012	0	0.003	0	1	100031007	Lums Pond State Park		New Castle Co	DE	03	
2	8,573	0.206	0.163	0.158	0.119	0	0.063	0.054	0	0.007	0	1	100031008	Route 9, Delaware City		New Castle Co	DE	03	
3	8,631	0.163	0.111	0.101	0.053	0	0.022	0.019	0	0.005	0	1	100031013	Bellevue State Park	Wilmington	New Castle Co	DE	03	
4	8,600	0.062	0.058	0.039	0.035	0	0.016	0.016	0	0.005	0	1	100032004	Mik Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
Grand Total						0			0		0								

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Readers are cautioned not to infer a qualitative ranking order of geographic areas based on AirData reports. Air pollution levels measured in the vicinity of a particular monitoring site may not be representative of the prevailing air quality of a county or urban area. Pollutants emitted from a particular source may have little impact on the immediate geographic area, and the amount of pollutants emitted does not indicate whether the source is complying with applicable regulations.



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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware

Pollutant: Sulfur Dioxide

Year: 2007

EPA Air Quality Standards:

Sulfur Dioxide: 0.5 ppm (3-hour average), 0.14 ppm (24-hour average), 0.030 ppm (annual mean)

ppm = parts per million

4 Rows

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Row #	SO2 (ppm)											Monitor Number	Site ID	Site Address	City	County	State	EPA Region
	1-Hour Values			3-Hour Values			24-Hour Values			Annual								
# Obs	1st Max	2nd Max	1st Max	2nd Max	# Exceed	1st Max	2nd Max	# Exceed	Mean	# Exceed								
1	7,060	0.033	0.031	0.022	0.021	0	0.011	0.010	0	0.003	0	1	100031007	Lums Pond State Park		New Castle Co	DE	03
2	8,090	0.099	0.092	0.091	0.040	0	0.023	0.012	0	0.005	0	1	100031008	Route 9, Delaware City		New Castle Co	DE	03
3	5,877	0.081	0.071	0.046	0.045	0	0.013	0.013	0	0.005	0	1	100031013	Bellevue State Park	Wilmington	New Castle Co	DE	03
4	8,666	0.060	0.058	0.038	0.037	0	0.019	0.014	0	0.004	0	1	100032004	Mlk Blvd And Justison St.	Wilmington	New Castle Co	DE	03
Grand Total						0				0	0							

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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Delaware
Pollutant: Sulfur Dioxide
Year: 2008

EPA Air Quality Standards:

Sulfur Dioxide: 0.5 ppm (3-hour average), 0.14 ppm (24-hour average), 0.030 ppm (annual mean)

ppm = parts per million

4 Rows

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SO2 (ppm)																			
Row #	1-Hour Values			3-Hour Values			24-Hour Values			Annual		Monitor Number	Site ID	Site Address	City	County	State	EPA Region	
	# Obs	1st Max	2nd Max	1st Max	2nd Max	# Exceed	1st Max	2nd Max	# Exceed	Mean	# Exceed								
SORT	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾	▾
1	896	0.015	0.015	0.011	0.010	0	0.005	0.004	0	0.002	0	1	100031007	Lums Pond State Park		New Castle Co	DE	03	
2	7,230	0.182	0.146	0.154	0.076	0	0.050	0.022	0	0.005	0	1	100031008	Route 9, Delaware City		New Castle Co	DE	03	
3	6,290	0.072	0.068	0.042	0.042	0	0.021	0.018	0	0.005	0	1	100031013	Bellevue State Park	Wilmington	New Castle Co	DE	03	
4	7,146	0.064	0.057	0.041	0.031	0	0.016	0.014	0	0.003	0	1	100032004	Mik Blvd And Justison St.	Wilmington	New Castle Co	DE	03	
Grand Total						0			0		0								

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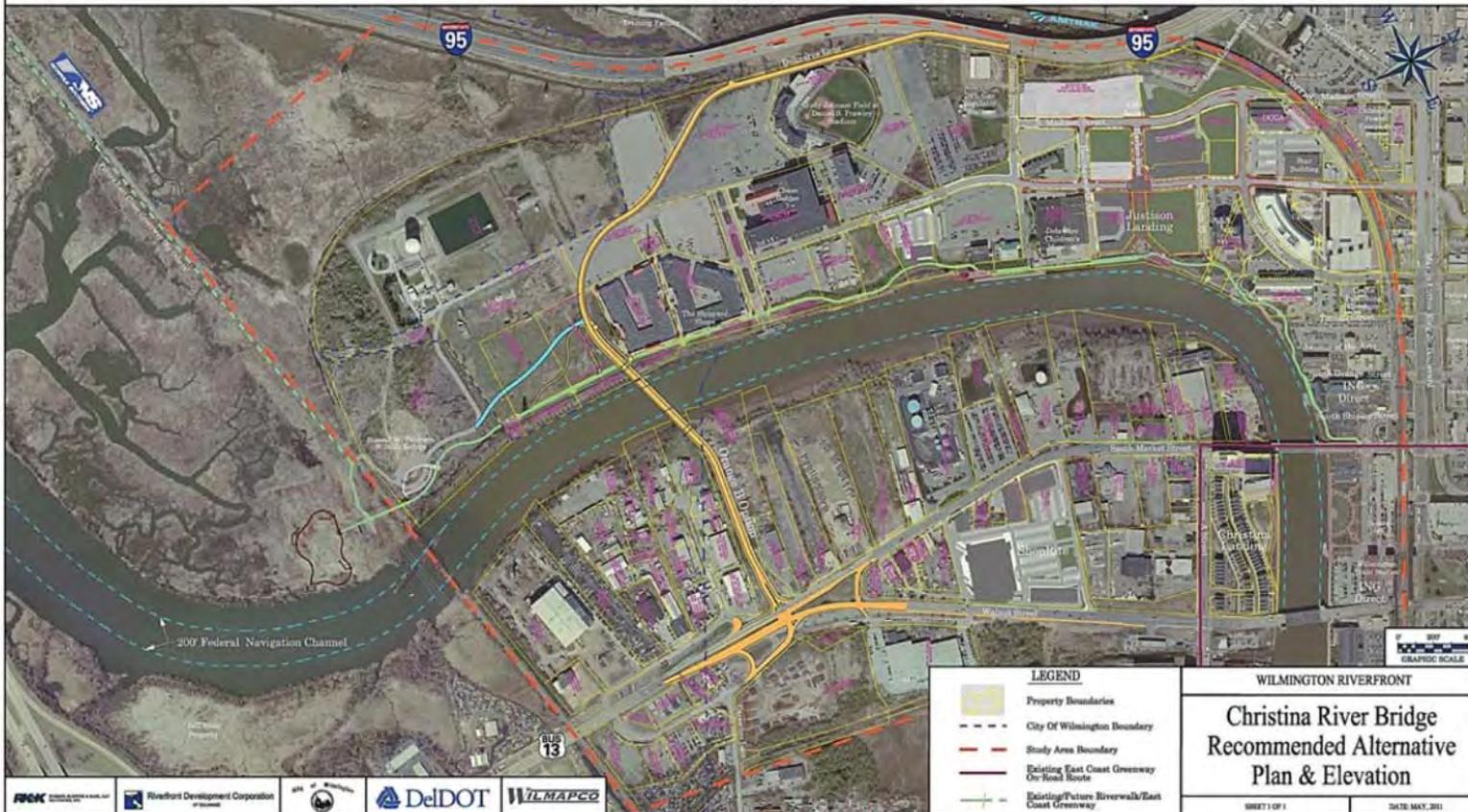
Appendix B: Study Area Map

CHRISTINA RIVER BRIDGE PROJECT

RECOMMENDED ALTERNATIVE PLAN & ELEVATION



ELEVATION



LEGEND	
	Property Boundaries
	City Of Wilmington Boundary
	Study Area Boundary
	Existing East Coast Greenway Or-Road Routes
	Existing/Future Riverwalk/East Coast Greenway

WILMINGTON RIVERFRONT

**Christina River Bridge
Recommended Alternative
Plan & Elevation**

SHEET 1 OF 1 DATE: MAY, 2011