

Wilmington Riverfront Transportation Infrastructure Project

Draft Environmental Assessment

Appendix J: Indirect and Cumulative Effects Technical Report

March 29, 2024



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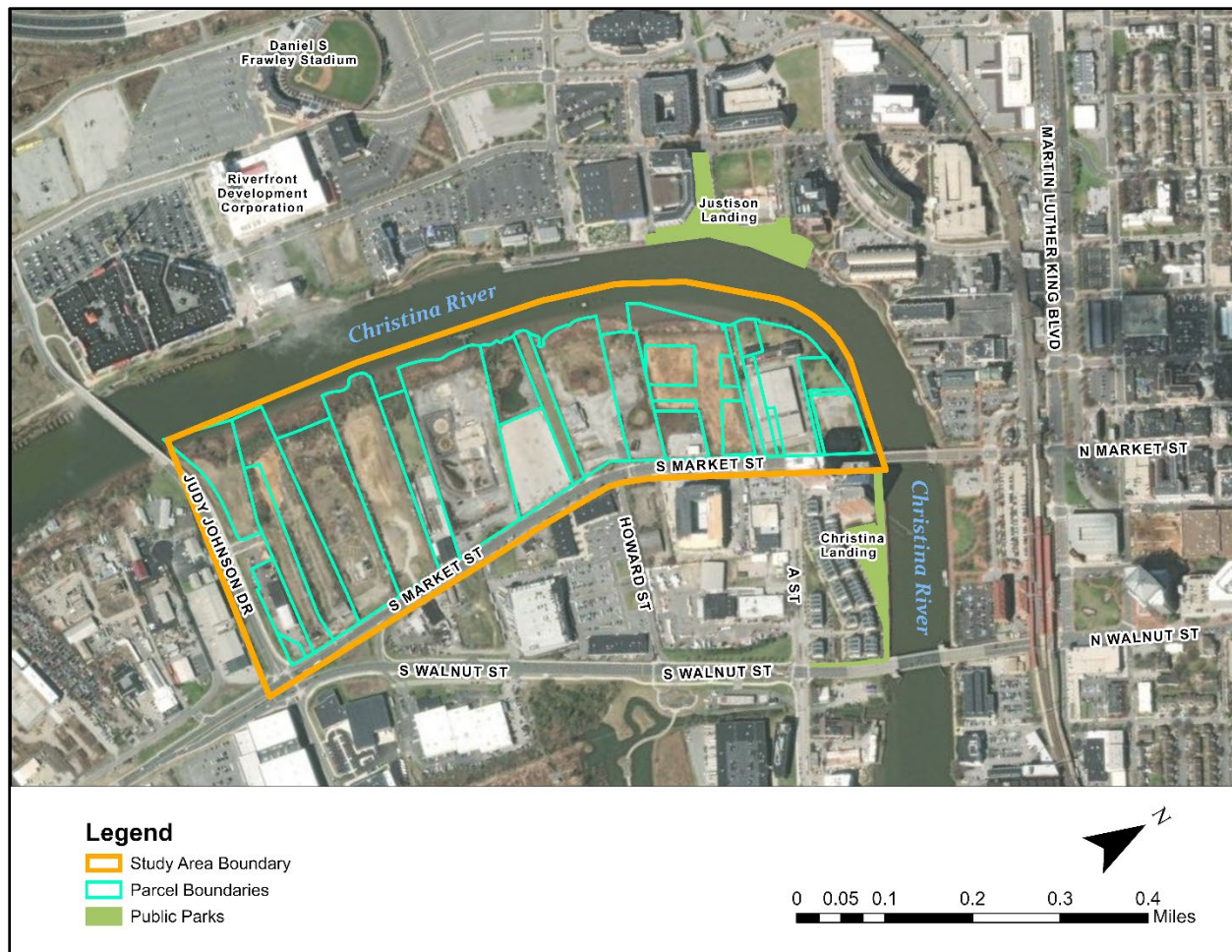
I. Introduction

On November 19, 2021, the City of Wilmington, Delaware was awarded federal funds through a U.S. Department of Transportation FY 2021 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant. The Federal Highway Administration (FHWA), as the lead Federal Agency; the City of Wilmington, as project sponsor and joint lead agency; and in partnership with the Riverfront Development Corporation (RDC), are preparing an Environmental Assessment (EA) for the Wilmington Riverfront Transportation Infrastructure Project (formerly known as the South Market Street Redevelopment Project) in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA, FHWA regulations implementing NEPA, and applicable Federal, state, and local laws and regulations.

The Indirect and Cumulative Effects (ICE) Technical Report was developed to support the Draft EA for the Wilmington Riverfront Transportation Infrastructure Project (Project). The following technical report presents the existing conditions and an assessment of potential indirect and cumulative effects of the Build Alternative to socioeconomic, cultural, and natural resources, as well as noise, air quality, and hazardous materials. The report begins with a description of the Project study area followed by a summary of the Purpose and Need, and a description of the alternatives evaluated.

A. Study Area

The Project is located along the East Christina riverbank in Wilmington, New Castle County, Delaware. The Project's study area is bound by the Christina River on the north and west and by South Market Street on the east and by Judy Johnson Drive (formerly New Sweden Street) in the south. (**Figure 1**).

Figure 1: Wilmington Riverfront Transportation Infrastructure Project Study Area Map

The existing conditions of the Project study area include former industrial buildings and accessory structures, surface parking, former junkyards, miscellaneous uses, and brownfields. This area has been shaped by its history of shipping and manufacturing and was active industrial area until its decline after World War II. The *City of Wilmington's 2028 Comprehensive Plan*¹ defines the land use in the Project study area as waterfront mixed use, and the entire Project study area is within the 100-year floodplain caused by coastal storm surge from the Delaware Bay. The parcels located within the Project study area have limited access for vehicles, pedestrians, and bicycles.

The Christina riverbank on the western and northern boundary of the Project study area is marshy and largely inaccessible. Significant differences of elevation between the high and low tide conditions have created a mud flat condition along the northern and western edges of the Project study area. South Market Street, the eastern project border, is a one-way, four-lane arterial road that extends 0.57 mile along the study area.

¹ <https://www.wilmingtonde.gov/government/city-departments/planning-and-development/wilmington-2028>

The purpose of the Project is to provide transportation infrastructure to further the connectivity of the riverfront area and provide multi-modal resources. The needs of the Project are the following:

- An expanded road network branching from South Market Street west into the Project study area;
- Pedestrian and cyclist accommodation on new roadways and a new set of pedestrian and bicycle pathways that connect to the existing network of pathways surrounding the site along the Christina riverbank; and
- Rehabilitate and create effective stormwater management.

The proposed improvements would replicate the city grid characteristics of the North Market Street corridor, north of the Christina River and southward to the intersection of South Market Street and Judy Johnson Drive (formerly New Sweden Street).

B. Alternatives Considered

The alternatives considered in the EA include a No Build and a Build Alternative and are briefly described below.

1. No Build Alternative

The No Build Alternative assumes the roadway infrastructure; Riverwalk; pedestrian, bicycle and mobility improvements; flood prevention measures and drainage work would not occur. The No Build Alternative does not meet the purpose and need for this Project, as it would not provide transportation infrastructure to further the connectivity of the area; provide multi-modal resources, including pedestrian and cyclist accommodations; nor rehabilitate or create effective stormwater management. However, the No Build Alternative does provide a baseline condition with which to compare the Build Alternative. Therefore, the No Build Alternative is retained for evaluation purposes.

2. Build Alternative

The Build Alternative proposes to construct transportation infrastructure improvements for the South Market Street Riverfront East area of the City. The Build Alternative proposes an expanded road network branching from South Market Street towards the Christina River and replicating the downtown Wilmington grid system to the Project study area (**Figure 2**). Infrastructure improvements are proposed to create continuity of intersection type / spacing and provide key points of access into the Project study area.

The proposed street grid is a balance of defining buildable parcels as well as appropriate infrastructure access for vehicles (local, commuter, public transportation), pedestrians, and bicyclists and will include on street parking. The proposed grid considers major circulation movements, creating three east-west and evenly spaced signalized movements across South Market Street, and connecting the major north-south Market Street and Walnut Street corridors to Orange Street within the limits of the Project study area (from north to south: at A Street, Howard Street, and Jones Street).

Pedestrian routes were also considered while laying out the proposed grid. The Build Alternative proposes to include pedestrian and cyclist accommodations on new roadways and a new set of pedestrian and bicycle pathways that connect to the existing network of pathways surrounding the Project study area (shown in orange in **Figure 2**). The proposed location of the east-west movements at A Street and Howard Street provides direct pedestrian access to and from the South Market Street Bridge, the Walnut Street corridor, the Wilmington Wetland Park, and the Southbridge neighborhood located east of the proposed

Project study area. At the south end of the Project study area, proposed pedestrian and bicycle connections from the proposed street grid connect directly to existing pedestrian and bicycle connections that currently cross the river to the western Riverfront via Judy Johnson Drive and the Senator Margaret Rose Henry Bridge.

Adjacent to the eastern riverbank, a Riverwalk similar to the existing Riverwalk on the western riverbank is proposed to be built as part of the Build Alternative to provide access to this currently inaccessible riverfront. The Riverwalk would be a minimum width of 18 feet and include a dedicated eight-foot bike lane alongside a pedestrian walkway. Under the Build Alternative, connections between the east and west Riverwalks are proposed via the existing Senator Margaret Henry Rose Bridge to the south and the South Market Street bridge to the north.

Under the Build Alternative, the proposed in-water work would include repairing the existing bulkhead which is in current disrepair. The Build Alternative proposes to construct a new bulkhead in front of the existing bulkhead. The new bulkhead would be a higher elevation to allow the new Riverwalk to be constructed at a minimum of 18 inches above the 100-year flood elevation. The tidal influence of the river exposes mud flats in front of the existing bulkhead during the tide cycles. The new bulkhead would be constructed from the landside of the existing bulkhead.

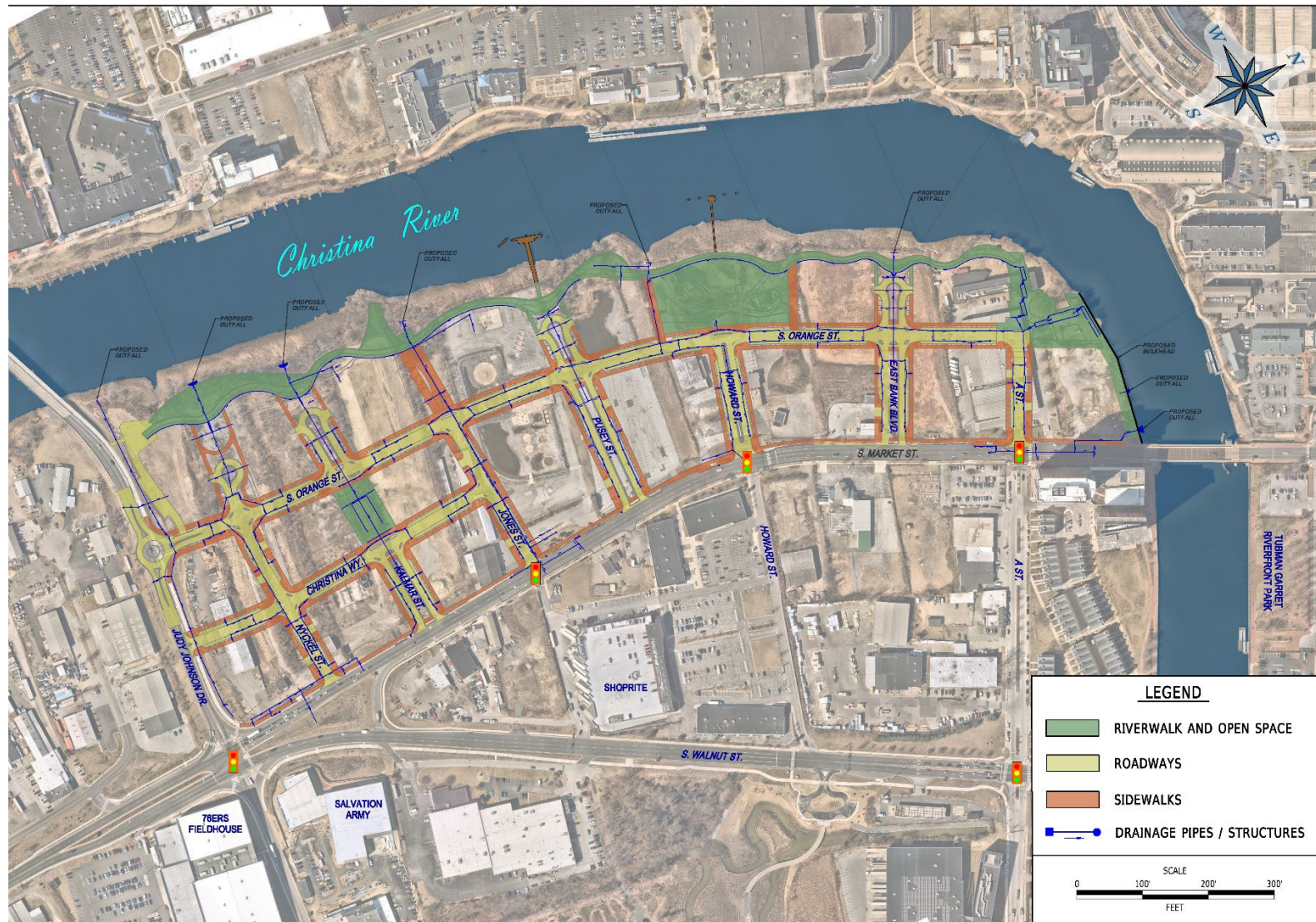
The transportation infrastructure improvements under the Build Alternative also incorporate strategic resiliency solutions to environmental challenges currently faced by the site. The Project study area is expected to be entirely inundated in the case of a 100-year flood event under its current conditions. The Build Alternative would elevate the transportation elements in compliance with the Federal Emergency Management Agency (FEMA) Floodplain Regulations to protect the site from inundation and flood-related damage. While the existing South Market Street roadway will remain at its existing elevation below the 100-year flood event, all other proposed roads would be constructed at elevations above the 100-year flood event except where they would connect with existing streets at lower elevations. Additionally, proposed sidewalks and the Riverwalk would also be at elevations above the 100-year flood event. These Project elements are aligned with the City of Wilmington's strategies to harden infrastructure vulnerable to sea level rise and extreme weather events.

In addition to raising the elevation of the site, it is anticipated that the Project study area would need a two-foot clean cap over contaminated soils, prior to the infrastructure improvements, to prevent contaminated soil erosion and human contact. The soils and groundwater are contaminated; these contaminants have also been found in sediment and surface water along the bank of the Christina River. Multiple Brownfield Redevelopment Agreements and remedial action plans for the Project study area are under development between the City, the RDC, the U.S. Environmental Protection Agency (EPA), and the Delaware Department of Natural Resources and Environmental Control (DNREC), and existing remediation agreements will be followed accordingly.

Currently, the Project study area has 23.3 acres of impervious area. As part of the Build Alternative, all of the existing impervious surface would be removed accordingly. The proposed transportation infrastructure improvements would reduce impervious area to 18.6 acres (a decrease of by 4.7 acres). The Build Alternative proposes to add drainage outfalls to support the proposed transportation infrastructure. The outfalls would be strategically located throughout the Project study area to address ongoing drainage issues and provide adequate conveyance for the proposed transportation infrastructure. All proposed outfalls would be designed to discharge above Mean Low Water elevation of the Christina River at higher

elevations than existing outfalls. In addition to the higher outfall elevation, there would be tide control valves installed at each outfall to eliminate the backup of the tidal water during the tidal fluctuations. The proposed storm drain and trench drain systems would be designed to provide efficient collection of surface runoff and adequate conveyance of stormwater throughout the Project study area. The separation of storm drain networks and proposed construction of new outfalls would provide an overall improvement to the current drainage conditions to the tidally influenced Christina River throughout the Project study area.

Figure 2: Build Alternative Site Plan



II. Legislation and Regulatory Guidance

NEPA applies to all Federally funded transportation projects. Indirect and cumulative effects are an environmental concern within the broad purview of NEPA. NEPA requirements have been defined in the Council on Environmental Quality's (CEQ) NEPA regulations that apply to all Federal agencies. FHWA's policies and regulations for the implementation of NEPA are found at Title 23 Code of Federal Regulations (CFR), Part 771. This ICE analysis was conducted in accordance with NEPA and its implementing CEQ regulations.

The CEQ regulations define indirect and cumulative effects as follows:

"Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to included changes in the patterns of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." (40 CFR § 1508.1(g)(2))

"Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR § 1508.1(g)(3))

III. ICE Analysis Methodology and Approach

The ICE Analysis methodology is described in this section, following these general steps:

1. Collect data and identify resources;
2. Define the ICE Analysis Area boundary;
3. Define the ICE time frame; and
4. Define the analysis approach and methodology.

A. Resource Identification and Data Collection

This ICE analysis relies on the following general types of data:

- General population and employment trends based on Census and geographic data;
- General growth trends based on reports, historic maps, and aerial imagery;
- Planning and forecasting documents concerning past, present, and future economic development; employment; land use; zoning; transportation; and resource protection; and
- The history and origins of the proposed action and previous studies undertaken in its development.

Data collection for this ICE analysis focused on the same socioeconomic, natural, and cultural resources, as well as air quality, noise, and hazardous materials evaluated for direct effects as documented in the EA and other technical reports. Existing data was used to prepare maps and tables showing the resources within the ICE Analysis Area, as described below. Past and present land uses are quantified, along with reasonably foreseeable developments within the future time frame, to identify land use development trends.

B. ICE Analysis Area Boundary

The environmental resources that could be directly affected by the Project were reviewed to identify a geographic boundary for the ICE analysis. The geographic boundary used for this ICE analysis was developed by synthesizing sub-boundaries to create a single ICE Analysis Area boundary. The resources analyzed for indirect and cumulative effects and their sub-boundaries are presented in **Table 1** and further discussed below.

Sub-boundaries considered in development of the ICE Analysis Area boundary included watersheds, Census Tracts, and City of Wilmington Neighborhood Analysis Areas.

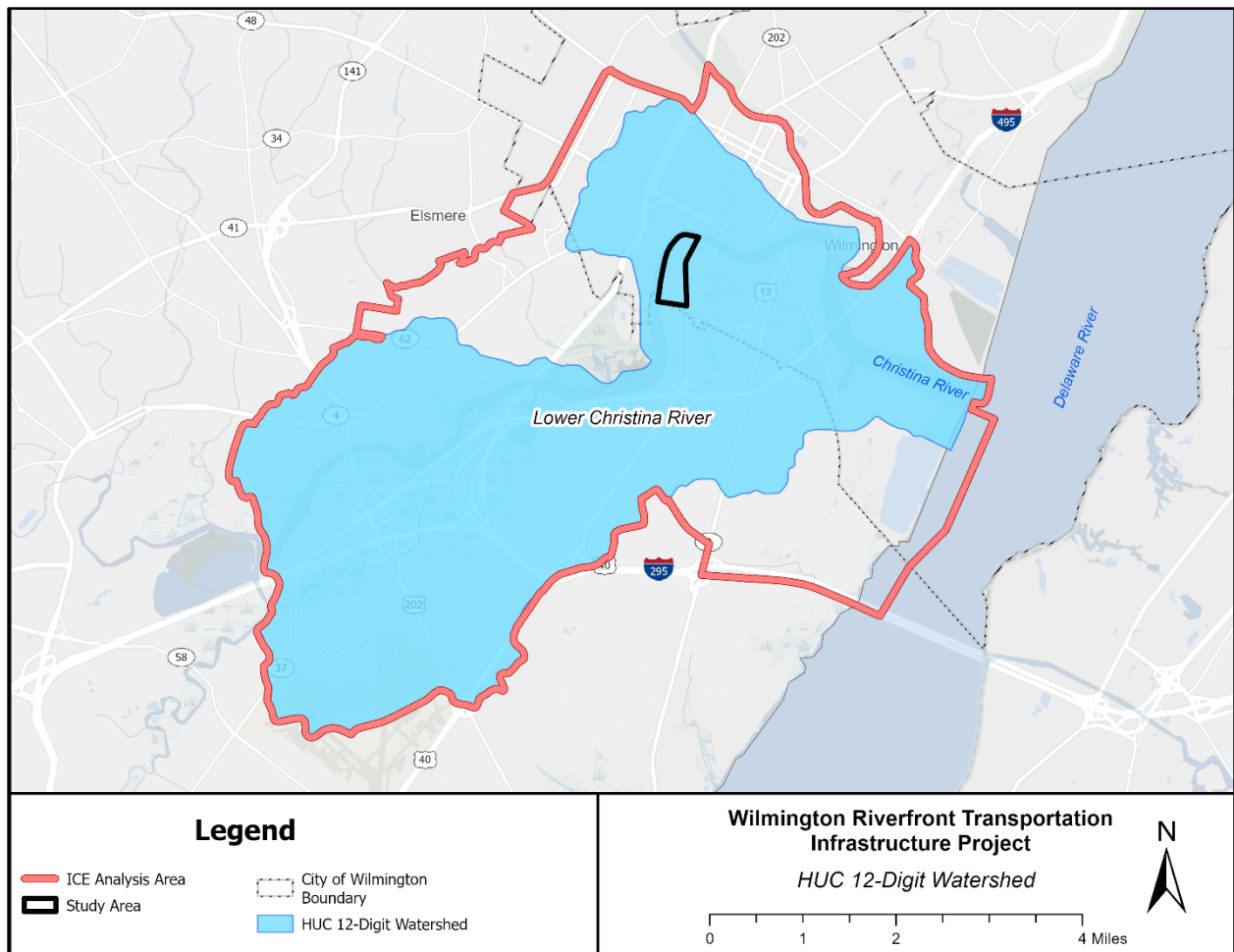
Table 1: Sub-Boundaries for Environmental Resources

Resource	Representative Sub-Boundaries
Natural Resources	
Wetlands	Watersheds
Surface Water	Watersheds
Floodplains	Watersheds
Wildlife, wildlife and aquatic habitat, and threatened or endangered species	Watersheds
Cultural Resources	
Historic structures/districts and archaeological sites	Census Tracts, Neighborhood Analysis Areas
Socioeconomic Resources	
Communities, residences, businesses, facilities	Census Tracts, Neighborhood Analysis Areas
Land use	Census Tracts, Neighborhood Analysis Areas
Environmental Justice (EJ)	Census Tracts, Neighborhood Analysis Areas
Other	
Air Quality	Census Tracts, Neighborhood Analysis Areas
Noise	Census Tracts, Neighborhood Analysis Areas
Hazardous Materials	Census Tracts, Neighborhood Analysis Areas

1. Watersheds

Watershed boundaries from the US Geological Survey (USGS) helped to define the scope of indirect and cumulative effects to natural resources, including wetlands, surface water, floodplains, wildlife, wildlife and aquatic habitat, and threatened or endangered species. The Project study area is bound to the north and west by the Christina River, which drains to the Delaware River east of the Project study area. Watersheds at the 12-digit Hydrologic Unit Code (HUC) were considered in developing the boundary to identify the Project's potential for indirect and cumulative effects to natural resources. As shown in **Figure 3**, the Project study area is located entirely within the Lower Christina River 12-digit HUC watershed.

Figure 3: HUC 12-Digit Watershed



Source: Delaware Watersheds 2.0, via Delaware FirstMap

2. Census Tracts

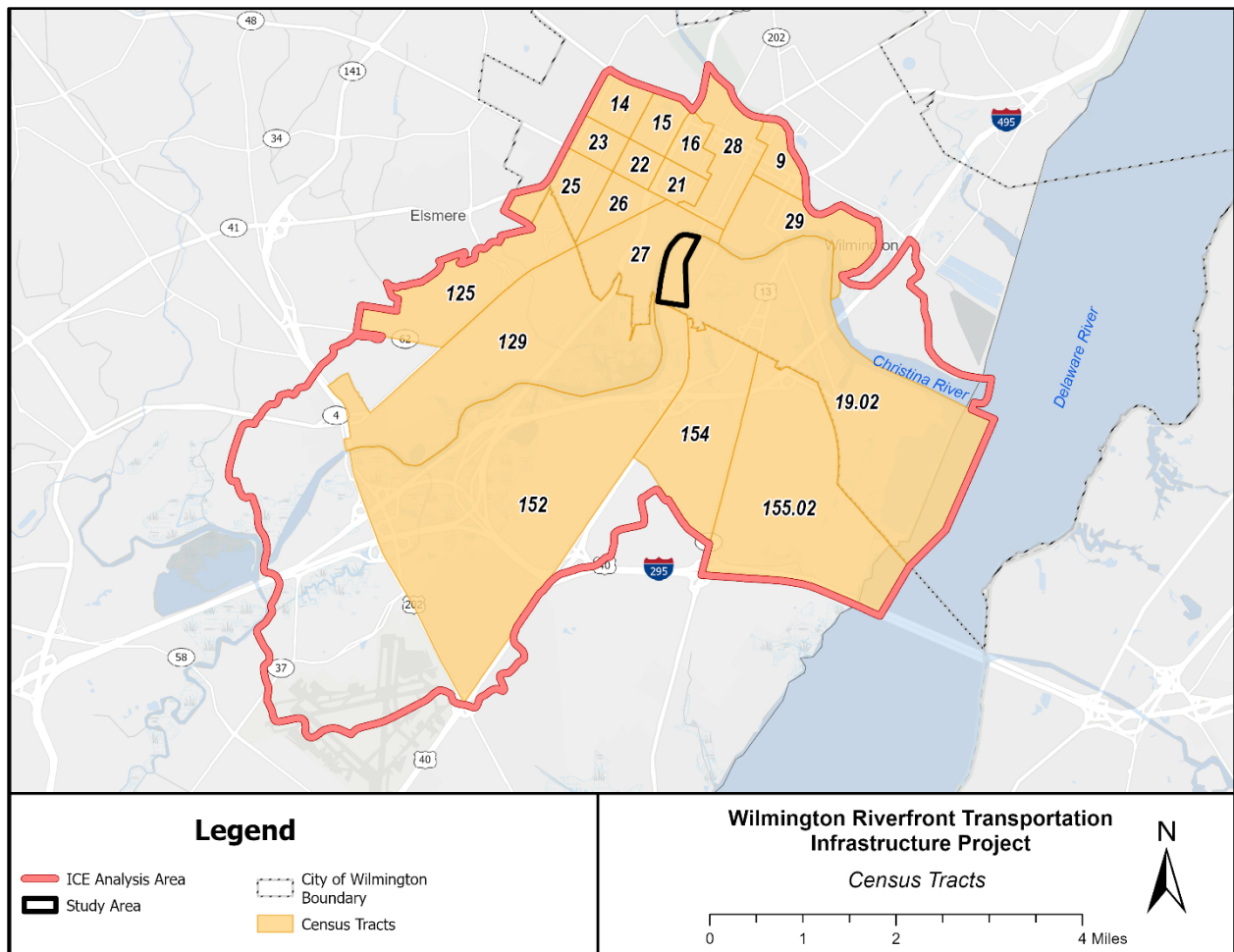
For this ICE analysis, Census Tracts within one mile of the Project study area were identified. This methodology is similar to the approach used for the Project's Socioeconomic Study Area in the *Socioeconomic Technical Report (EA, Appendix B)*; however, Census Tracts were used instead of block groups to account for a larger area. Additionally, the Census Tracts used for this ICE Analysis extend further north and west than the block groups identified for the Socioeconomic Study Area to include surrounding communities such as downtown Wilmington. A larger area ensures that all potential indirect and cumulative effects to socioeconomic resources and nearby populations are encompassed within the ICE Analysis Area. **Figure 4** shows the 18 Census Tracts that are located within one mile of the Project study area. These 18 Census Tracts have a total population of 54,976 according to the 2017-2021 US Census American Community Survey (ACS) Five-Year Estimates. **Table 2** provides the total population for each Census Tract.

Table 2: ICE Analysis Area Census Tracts and Population

Census Tract	Population
9	2,425
14	2,224
15	2,315
16	2,428
19.02	2,079
21	1,330
22	2,776
23	2,324
25	3,041
26	3,850
27	2,703
28	2,151
29	3,670
125	5,357
129	4,700
152	6,059
154	2,937
155.02	2,607
Total	54,976

Source: U.S. Census Bureau (2021) American Community Survey 2017-2021 5-Year Estimates, Table B01003

Figure 4: Census Tracts



Source: US Census Bureau TIGER/Line Shapefiles, Census Tracts

3. Neighborhood Analysis Areas

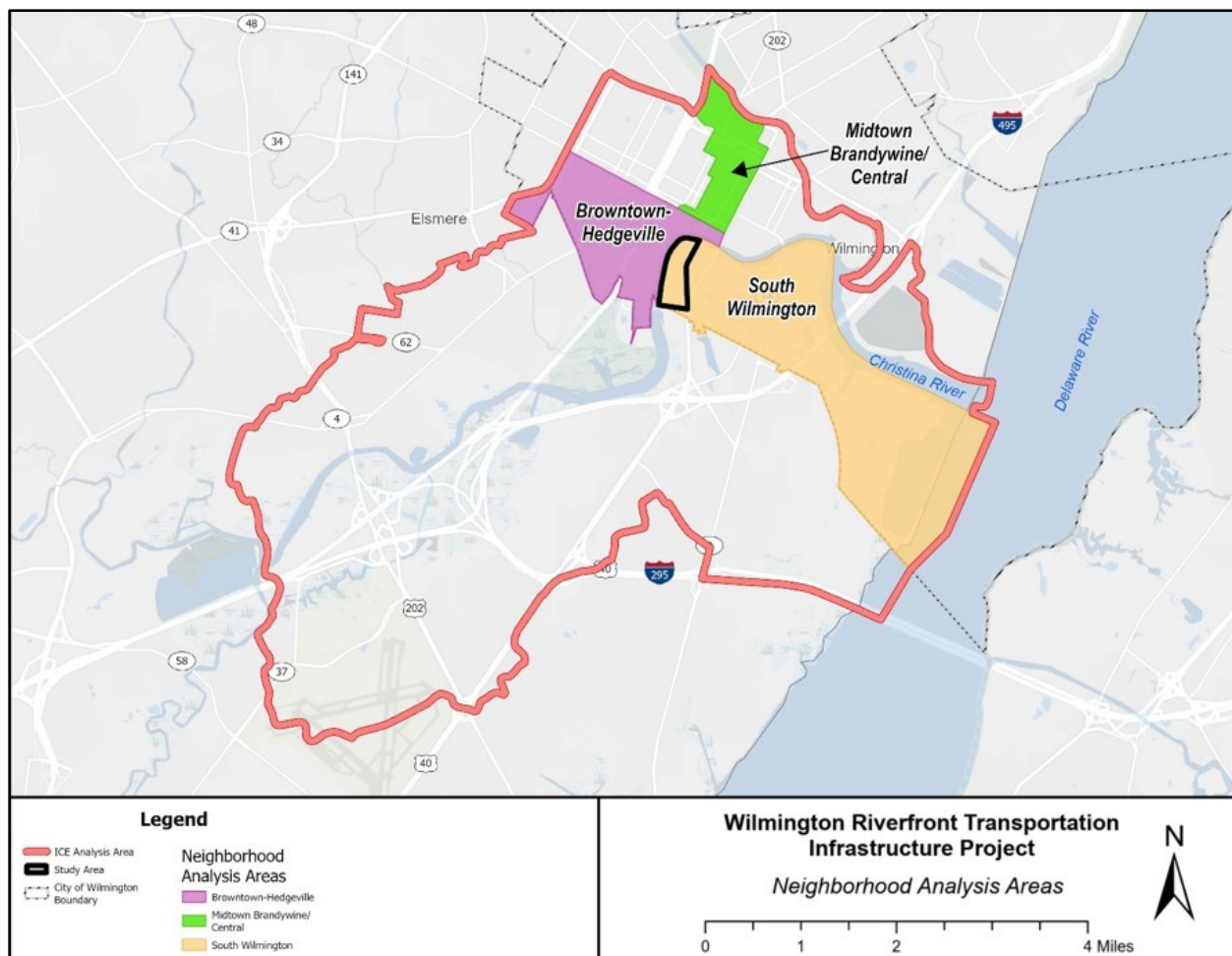
In the *Wilmington 2028: A Comprehensive Plan for Our City and Communities* (City of Wilmington, 2019), the City of Wilmington uses Neighborhood Analysis Areas to identify key issues and relate citywide planning goals at the neighborhood level. Geographic information systems (GIS) data is not readily available for the Neighborhood Analysis Area boundaries; however, the City of Wilmington's Population & Demographics webpage states that these Neighborhood Analysis Areas correspond with Census Tract boundaries (City of Wilmington, n.d.).

Three neighborhoods of particular interest for the Project were considered in the development of the ICE Analysis Area boundary:

- South Wilmington (Census Tract 19.02), which includes the Project study area and the EJ community of Southbridge.
- Browntown-Hedgeville (Census Tracts 25, 26, 27), which is across the Christina River from the Project study area and includes the EJ community of Browntown.
- Midtown Brandywine/Central (Census Tract 28), which includes much of downtown Wilmington and is connected to the Project study area via South Market Street and South Walnut Street.

Figure 5 shows the boundaries of these three Neighborhood Analysis Areas, which were compiled using their corresponding Census Tract boundaries. The three City of Wilmington Neighborhood Analysis Areas of South Wilmington, Browntown-Hedgeville, and Midtown Brandywine/Central were considered in the development of the ICE Analysis Area boundary because of their location within or adjacent to the Project study area and because they capture nearby geographies and populations, including downtown Wilmington and the EJ communities of Southbridge and Browntown-Hedgeville. While these three Neighborhood Analysis Areas were one source of data used in defining the ICE Analysis Area boundary, it is important to note that the ICE Analysis Area includes numerous other neighborhoods and communities beyond these three Neighborhood Analysis Area boundaries.

Figure 5: Neighborhood Analysis Areas



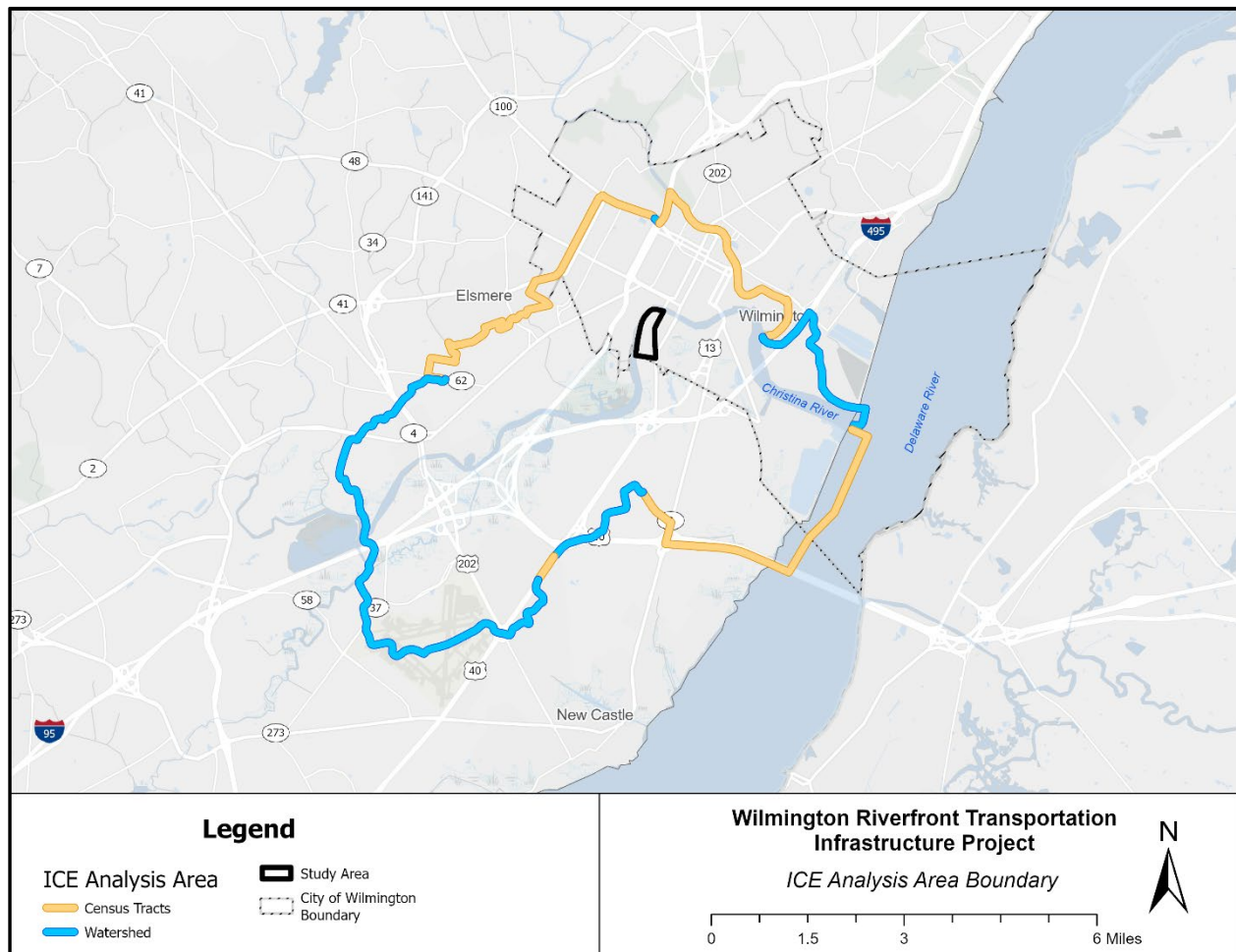
Source: US Census Bureau TIGER/Line Shapefiles, Census Tracts; City of Wilmington Population & Demographics webpage, accessed April 25, 2023

4. Overall ICE Analysis Area Boundary

The ICE Analysis Area boundary, which is shown in **Figure 6**, includes the outermost extents of the Lower Christina River 12-digit HUC watershed and Census Tracts. The City of Wilmington's Neighborhood Analysis Area boundaries are encompassed within the Census Tracts. The overall ICE Analysis Area boundary was developed to cover a large enough geographic area to ensure that all reasonably foreseeable indirect and cumulative effects are adequately captured in this analysis. The ICE Analysis Area

encompasses approximately 12,300 acres, and includes portions of New Castle County, the City of Wilmington, and the Town of Elsmere, as well as the entire Town of Newport.

Figure 6: ICE Analysis Area Boundary



Source: USGS National Hydrography Dataset (NHD) Hydrologic Units via Delaware FirstMap; US Census Bureau TIGER/Line Shapefiles, Census Tracts

C. ICE Time Frame

The temporal boundary, or time frame, of the ICE analysis includes setting a past and future time frame. The temporal boundary is identified based on factors such as data availability, historical events or trends, and the design year for the proposed improvements being evaluated in the EA.

A period of 50 years, from 2000 to 2050, is the ICE time frame (or temporal boundary). Generally, this past time frame was determined based on historical trends and availability of data. As noted in the *Wilmington 2028: A Comprehensive Plan for Our City and Communities* (City of Wilmington, 2019), the City has seen extensive transformation of its downtown and waterfront and attracted new residents over the past 20 years. The plan was published in 2019, which assumes that this trend began around 1999. Additionally, the *South Market Street Master Plan* builds on the successful redevelopment of the west Christina Riverfront, which began in 1996 (Riverfront Development Corporation of Delaware (RDC), 2018). Further, much of the land use and development trend data for the ICE Analysis Area is available beginning in the early 2000s.

The future time frame of 2050 was determined based on the time frame presented in the *South Market Street Master Plan*, which is anticipated to be developed in phases over the next 20 to 30 years. The plan was completed in 2018, thus the build out of the plan's vision could be expected by around 2048. The proposed transportation and infrastructure improvements to be constructed as part of this Project would support the future mixed-use development as laid out in the *South Market Street Master Plan*. Construction of the Project and direct effects resulting from this Project (as identified in the EA) would occur prior to construction that would occur later in time to redevelop the Project study area as laid out in the *South Market Street Master Plan*. Additionally, population and employment projections from the Wilmington Area Planning Council (WILMAPCO) are available through 2050, presenting an accurate depiction of future conditions within the ICE Analysis Area.

D. ICE Analysis Methodology

An ICE analysis requires understanding of past, current, and potential future conditions in the Project study area and the ICE Analysis Area to assess the potential for effects associated with the Project. Consideration of past affects included research and review of published literature and Census information. GIS mapping was obtained or created, and overlays were used to assess trends from the past to the present time frame. Resources identified within the ICE boundary are considered in light of past and present socioeconomic, cultural, and natural environmental conditions and trends. Future conditions based on reasonably foreseeable actions are analyzed to identify potential indirect and cumulative effects resulting from the Project. Following the collection of background research and definition of the ICE boundary and time frame, the ICE Analysis identifies effects to resources from other actions (past, present, and future) including direct effects from the Project. Then, the potential incremental effects of the Project are analyzed in light of past, present, and future effects identified.

IV. Land Use, Population, Employment, and Development Trends in the ICE Analysis Area

This section describes land use, population, employment, and development trends in the ICE Analysis Area. Future development includes planned construction and transportation improvements that are anticipated to be reasonably foreseeable actions within the future ICE time frame. The available data presents a snapshot of past, current, and future land use, population, employment, and development, and is used to better understand future conditions within the ICE Analysis to the best extent practicable.

A. Land Use

The ICE Analysis Area is located partially within the City of Wilmington and extends south of the city limits into New Castle County. A small portion of the Town of Elsmere and the entire Town of Newport also fall within the ICE Analysis Area. Each jurisdiction regulates zoning and enacts land use planning documents to guide future land use and related elements. Relevant documents that guide planning, land use, and development within the ICE Analysis Area include the:

- South Market Street Master Plan²;
- City of Wilmington Comprehensive Plan³;

² <https://riverfronteast.com/>

³ <https://www.wilmingtonde.gov/government/city-departments/planning-and-development/wilmington-2028>

- City of Wilmington Downtown Development District Plan⁴;
- New Castle County Comprehensive Plan⁵;
- Town of Elsmere Comprehensive Plan⁶; and
- Town of Newport Comprehensive Plan⁷.

The State of Delaware's Office of State Planning Coordination also provides research and data concerning land use planning.

1. Past Land Use

Because of the broad nature of the ICE Analysis Area, different land use data sets are available from various jurisdictions, which vary in level of detail, classification scheme, and time frame. Some data is available as GIS data, while other data is discussed qualitatively or presented as maps in comprehensive plan documents. The discussion below corresponds with the availability of data for this ICE analysis.

Prior to the ICE time frame of 2000-2050, industry in the City of Wilmington was stimulated by both World Wars, bringing new industries and population growth (City of Wilmington, 2019). As noted in the *South Market Street Master Plan*, the City's central business district developed north of the Christina River, while the south bank contained manufacturing and industrial uses that declined after the World Wars (RDC, 2018). In the 1950s, automobiles and roadways encouraged suburban living, resulting in population loss; the 1960s and 1970s brought urban renewal projects; and the 1980s saw the relocation of bank and financial institutions to the City (City of Wilmington, 2019). Over the past 20 or so years, Wilmington's downtown and riverfront have experienced revitalization and growth.

In the recent past, land use/land cover (LULC) data for the ICE Analysis Area is available from the State of Delaware for the years 2007, 2012, and 2017. To make this data easier to understand for analysis purposes, the LULC data was summarized into the following high-level categories, with specific components listed after each category, where applicable:

- Airports
- Commercial/Industrial: Communication – antennas; Industrial; Institutional/Governmental; Junk/Salvage Yards; Marinas/Port Facilities/Docks; Orchards/Nurseries/Horticulture; Other Commercial; Other Urban or Built-up Land; Parking Lots; Retail Sales/Wholesale/Professional Services; Transitional (incl. cleared, filled, and graded); Utilities; Warehouses and Temporary Storage
- Forested: Deciduous Forest
- Mixed Urban or Built-up Land
- Railroads
- Rangeland: Herbaceous Rangeland; Mixed Rangeland; Shrub/Brush Rangeland
- Recreational
- Residential: Mixed Residential; Mobile home Parks/Courts; Multi Family Dwellings; Single Family Dwellings

⁴ <https://www.wilmingtonde.gov/home/showpublisheddocument/164/636005879612430000>

⁵ <https://www.newcastlede.gov/350/Comprehensive-Plan>

⁶ <https://townofelsmere.com/wp-content/uploads/2021/08/ElsmereDraftCompPlan-FINAL-SO-7.27.21.pdf>

⁷ <https://newport.delaware.gov/files/2014/05/2014-Comprehensive-Plan-December-2014-1.pdf>

- Roadway: Highways/Roads/Access roads/Freeways/Interstates; Vehicle Related Activities
- Waterways: Bays and Coves; Man-made Reservoirs and Impoundments; Waterways/Streams/Canals; Natural Lakes and Ponds; Non-tidal Open Water; Tidal Shoreline
- Wetlands: Non-tidal Emergent Wetland; Non-tidal Forested Wetland; Non-tidal Scrub/Shrub Wetland; Tidal Emergent Wetland; Tidal Forested Wetland; Tidal Scrub/Shrub Wetland

As shown in **Table 3**, in 2007, the most prevalent LULC categories in the ICE Analysis Area were commercial/industrial (37%), residential (19%), and wetlands (14%). Although the acreage for each LULC category has shifted, the overall percentages of LULC categories have generally remained the same between 2007 and 2017. As discussed in **Section IV.B** below, population during this time frame also generally remained stable. The two most notable changes occurred for commercial/industrial LULC, which decreased from 37% to 34%, and for mixed urban or built-up land LULC, which increased from 3% to 5%. This data generally suggests that land use remained stable between 2007 and 2017, with slight increases in mixed urban or built-up land as jurisdictions seek opportunities to redevelop existing land uses and increase mixed-use development within their boundaries.

Table 3: State of Delaware Past and Present Land Use/Land Cover in the ICE Analysis Area

Land Use/Land Cover Category	2007 (acres)	2012 (acres)	2017 (acres)
Airports	462 (4%)	469 (4%)	465 (4%)
Commercial/Industrial	4,550 (37%)	4,572 (37%)	4,206 (34%)
Forested	325 (3%)	303 (2%)	337 (3%)
Mixed Urban or Built-up Land	342 (3%)	330 (3%)	638 (5%)
Railroads	67 (1%)	67 (1%)	80 (1%)
Rangeland	215 (2%)	208 (2%)	208 (2%)
Recreational	362 (3%)	375 (3%)	374 (3%)
Residential	2,369 (19%)	2,379 (19%)	2,382 (19%)
Roadway	813 (7%)	816 (7%)	822 (7%)
Waterways	1,104 (9%)	1,057 (9%)	1,074 (9%)
Wetlands	1,691 (14%)	1,724 (14%)	1,713 (14%)
Total	12,300 (100%)*		

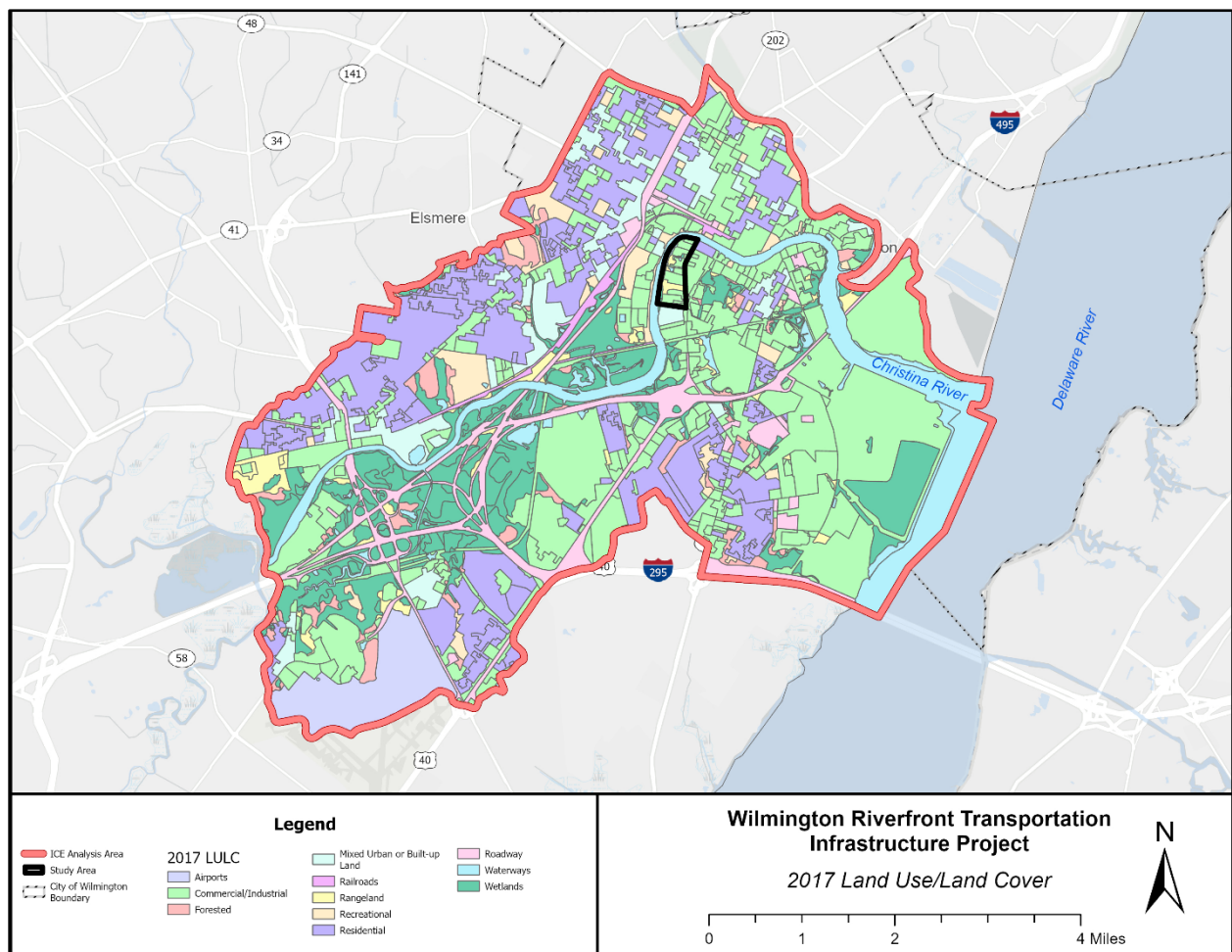
Source: State of Delaware FirstMap, 2007, 2012, and 2017 Land Use/Land Cover *The total percentage may not add up to exactly 100% due to rounding

2. Present Land Use

The most recent LULC data from 2017 that covers the entire ICE Analysis Area is from the State of Delaware and is presented above in **Table 3** and displayed below in **Figure 7**. Current land use consists primarily of commercial/industrial (34%), residential (19%), and wetlands (14%). As shown in **Figure 7**, commercial/industrial land is spread throughout the ICE Analysis Area, with concentrations south of the Christina River, along the Delaware River, and in downtown Wilmington. Residential areas are concentrated in the northwest portion of the ICE Analysis Area, with pockets in downtown Wilmington and south of the Christina River. Wetlands also follow the path of the Christina River and have concentrations around the Interstate 95 (I-95) / I-295 / I-495 Interchange. Mixed urban or built-up land is primarily found in the City of Wilmington. Other land uses are interspersed throughout the ICE Analysis Area.

Additional existing land use data is provided by New Castle County and the City of Wilmington, as discussed in their respective comprehensive plans. Existing land use data for New Castle County is from 2012 and is presented in **Table 4**. Current land use within the ICE Analysis Area is designated as primarily heavy industry zoned, community redevelopment, and medium density residential, followed by low and high density residential. The most recent 2022 update to the County's comprehensive plan does not include an existing land use map but notes that suburban sprawl and residential growth is increasing, particularly in the southern portion of the County, which is more rural. Jobs continue to be concentrated in the northern portion of the County, including in and around the City of Wilmington, creating a mismatch between where residents live and work (New Castle County, 2022b).

Figure 7: 2017 Land Use/Land Cover in the ICE Analysis Area



Source: Delaware FirstMap, 2017 Land Use/Land Cover

Existing land use in the City of Wilmington portion of the ICE Analysis Area corresponds with the Current Land Use Map that is included in the Comprehensive Plan. As shown in **Table 5**, the top land use categories in the City of Wilmington portion of the ICE Analysis Area are industrial (32%), low-medium density residential (16%), and infrastructure (14%). In South Wilmington and along the Christina River waterfront, current land use is primarily designated as industrial, commercial, or vacant land, with pockets of parking, low-medium residential, parks and open space, infrastructure, and institutional land. As noted above in **Section I.A**, the Project study area land uses feature former industrial buildings and accessory structures,

surface parking, former junkyards, miscellaneous uses, and brownfields. The remainder of the ICE Analysis Area in the City of Wilmington is a mix of commercial, mixed use, institutional, and residential land (low-medium and medium-high density), with pockets of infrastructure, parking, and parks and open space land spread throughout. Refer to **Section V** for additional discussion on current land use and existing conditions for environmental resources within the Project study area.

The Town of Elsmere provides land use data in their comprehensive plan, which was last updated in 2021. Only a small portion of the Town is located within the ICE Analysis Area. Current land use in this small area is mostly residential land with pockets of parks and recreation and commercial development along the major roadways (Town of Elsmere, 2021).

The Town of Newport provides land use data in their comprehensive plan, which was last updated in 2014. Single-family residential is the predominant land use in Newport, which also includes a smaller number of multi-family residential properties and a very limited number of mixed-use properties. Newport's housing stock is older but is in good condition with stable neighborhoods. The next highest categories include general commercial and industrial. The Town also includes other types of land use that have a smaller presence, including vacant, institutional/educational, utility, open space, and office (Town of Newport, 2014).

Table 4: Existing Land Use in the New Castle County Portion of the ICE Analysis Area⁸

Land Use Category	Acreage
Community Redevelopment	2,518 (21%)
Heavy Industry (HI) Zoned Land	2,810 (23%)
High Density Residential	185 (2%)
Low Density Residential	681 (6%)
Medium Density Residential	1,692 (14%)
Municipal Land ⁹	4,110 (34%)
Total	11,996 (100%)*

Source: New Castle County GIS, Existing Land Use *The total percentage may not add up to exactly 100% due to rounding

Table 5: Current Land Use in the City of Wilmington Portion of the ICE Analysis Area

Land Use Category	Acreage
Commercial	260 (10%)
Industrial	855 (32%)
Infrastructure	365 (14%)
Institutional/Public Uses	205 (8%)
Low-Medium Density Residential	434 (16%)
Medium-High Density Residential	54 (2%)
Mixed Use	23 (1%)
Park/Open Space	161 (6%)
Parking	100 (4%)

⁸ Land use data in New Castle County does not add up to the exact acreage of the ICE Analysis Area. GIS data excludes portions of the ICE Analysis Area that are in the Delaware River.

⁹ Municipal Land includes portions of the ICE Analysis Area that are in the City of Wilmington, the Town of Elsmere, and the Town of Newport. These municipalities have their own comprehensive plans and/or land use data.

Vacant Land	200 (8%)
Total	2,656 (100%)*

Source: City of Wilmington, Current Land Use *The total percentage may not add up to exactly 100% due to rounding

3. Future Land Use

Future land use in the New Castle County portion of the ICE Analysis Area corresponds with the Future Land Use Map provided in the County's 2022 comprehensive plan update, *NCC2050 Comprehensive Plan*. As shown in **Table 6**, the top land use categories in the New Castle County portion of the ICE Analysis Area are manufacturing (31%), business flex¹⁰ (26%), and residential developed (20%). Less than one acre of the Project study area is located in New Castle County, and its future land use is designated as business flex. Immediately south of the Project study area, future land use is designated as business flex, manufacturing, or resource preservation (including the existing Russell Peterson Wildlife Refuge). The remainder of the ICE Analysis Area in New Castle County is a mix of commercial corridor development, resource preservation, community development areas, and residential¹¹. As noted in the comprehensive plan, future land use will encourage redevelopment of existing areas, directing development to areas that are equipped to handle growth and contain existing or planned infrastructure (New Castle County, 2022b).

Future land use in the City of Wilmington portion of the ICE Analysis Area corresponds with the Future Land Use Map that is included in the *City of Wilmington Comprehensive Plan*. As shown in **Table 7**, the top land use categories in the City of Wilmington portion of the ICE Analysis Area are manufacturing infrastructure (31%), medium density residential (18%), and employment center (12%). In South Wilmington and along the Christina River waterfront, future land use is primarily waterfront mixed use, employment center, and manufacturing, with pockets of waterfront mixed use employment, medium density residential, parks and open space, and institutional land. Areas of waterfront mixed use include the entirety of the Project study area, which is anticipated to undergo major redevelopment through improvements constructed as part of this Project and the overall build out of the *South Market Street Master Plan*. Refer to **Section V.A** for additional detail on how the proposed Project effects future land use in the Project study area. The remainder of the ICE Analysis Area in the City of Wilmington is a mix of downtown mixed use and residential (primarily medium density) with pockets of institutional, neighborhood mixed use, infrastructure, and parks and open space spread throughout.

Future land use in the Town of Elsmere is discussed in their comprehensive plan. Only a small portion of the Town is located within the ICE Analysis Area. Most of the town is developed and there is not much land left for new development. Future opportunities will consist of infill and redevelopment, and land uses will remain largely single-family residential. Future land use in the portion of the town within the ICE Analysis Area will remain residential with pockets of park and recreation land (Town of Elsmere, 2021).

The Town of Newport comprehensive plan discusses land use but does not have a specific section for future land use. The plan notes that future focus will be on updating the zoning code and redeveloping

¹⁰ The *New Castle County Comprehensive Plan 2050* defines "Business Flex" as "areas of existing and potential nonresidential development. These areas are essential to the county's continued economic viability..." (Page 90)

¹¹ "Residential" differs from "residential developed" in that the land is not part of an existing, established development. The New Castle County Comprehensive Plan encourages development in areas where there is existing infrastructure in place.

existing areas. Most of the Town is single-family residential and will remain so in the foreseeable future (Town of Newport, 2014).

Table 6: Future Land Use (2050) in the New Castle County Portion of the ICE Analysis Area¹²

Land Use Category	Acreage
Business Flex	2,031 (26%)
Community Development Areas	197 (3%)
Manufacturing	2,455 (31%)
Residential	195 (2%)
Residential Developed	1,613 (20%)
Resource Preservation	518 (7%)
Type 1 – Commercial Corridor Development	866 (11%)
Total	7,875 (100%)*

Source: New Castle County, Future Land Use 2050*The total percentage may not add up to exactly 100% due to rounding

Table 7: Future Land Use in the City of Wilmington Portion of the ICE Analysis Area

Land Use Category ¹³	Acreage ¹⁴
Downtown Mixed Use	239 (5%)
Employment Center	579 (12%)
High Density Residential	89 (2%)
Institutions	176 (4%)
Low Density Residential	18 (<0.1%)
Manufacturing Infrastructure	1,430 (31%)
Medium Density Residential	819 (18%)
Neighborhood Mixed Use	99 (2%)
Parks and Open Space	462 (10%)
Regional Commercial	8 (<0.1%)
Urban Infrastructure	208 (4%)
Waterfront Mixed Use	440 (9%)
Waterfront Mixed Use Employment	79 (2%)
Total	4,646 (100%)*

Source: City of Wilmington, Future Land Use *The total percentage may not add up to exactly 100% due to rounding

B. Population and Employment

Population data presented in **Table 8** was collected for jurisdictions in the ICE Analysis Area, which include New Castle County, the City of Wilmington, the Town of Elsmere, and the Town of Newport. Population

¹² Land use data in New Castle County does not add up to the exact acreage of the ICE Analysis Area. GIS data excludes portions of the ICE Analysis Area that are in the Delaware River, the Town of Elsmere, and the Town of Newport.

¹³ The land use category names in the GIS data provided by the City of Wilmington differ slightly than those presented in the Comprehensive Plan's Future Land Use Map.

¹⁴ Future land use in the City of Wilmington portion of the ICE Analysis Area adds up to an area that is larger than the total for current land use. The future land use GIS data extends into the Delaware River and has certain locations where land use categories overlap (for example, an area designated as medium density residential also contains land that is designated institutional, etc.).

data was collected from the US Census Bureau Decennial Census (2000-2020) and the ACS Five-Year Estimates (2017-2021). Future population projections (2030-2050) are from the Delaware Population Consortium.

Generally, population within the ICE Analysis Area jurisdictions have remained stable since 2000, with fluctuations resulting in small increases and decreases over time. New Castle County and the Town of Elsmere saw slight increases between 2000 and 2020. Based on the Delaware Population Consortium's population projections, New Castle County and the Town of Elsmere will continue to see population growth between 2015 and 2050 at 5.5% and 2.6%, respectively. The City of Wilmington and the Town of Newport will see negative population growth at -1.7% and -22.6%, respectively (Delaware Population Consortium, 2022b).

Table 8: Population 2000-2050

	2000	2010	2020	2021	2030	2040	2050
New Castle County	500,265	538,479	570,719	567,769	590,820	594,231	586,107
City of Wilmington	72,664	70,851	70,898	70,926	71,574	71,531	70,356
Town of Elsmere	5,743	6,131	6,229	6,167	6,260	6,255	6,184
Town of Newport	1,118	1,055	910	1,224	856	845	825

Source: US Census Bureau Decennial Census (2000-2020); American Community Survey Five-Year Estimates (2017-2021); 2022 Delaware Population Consortium Projections (2015-2050)

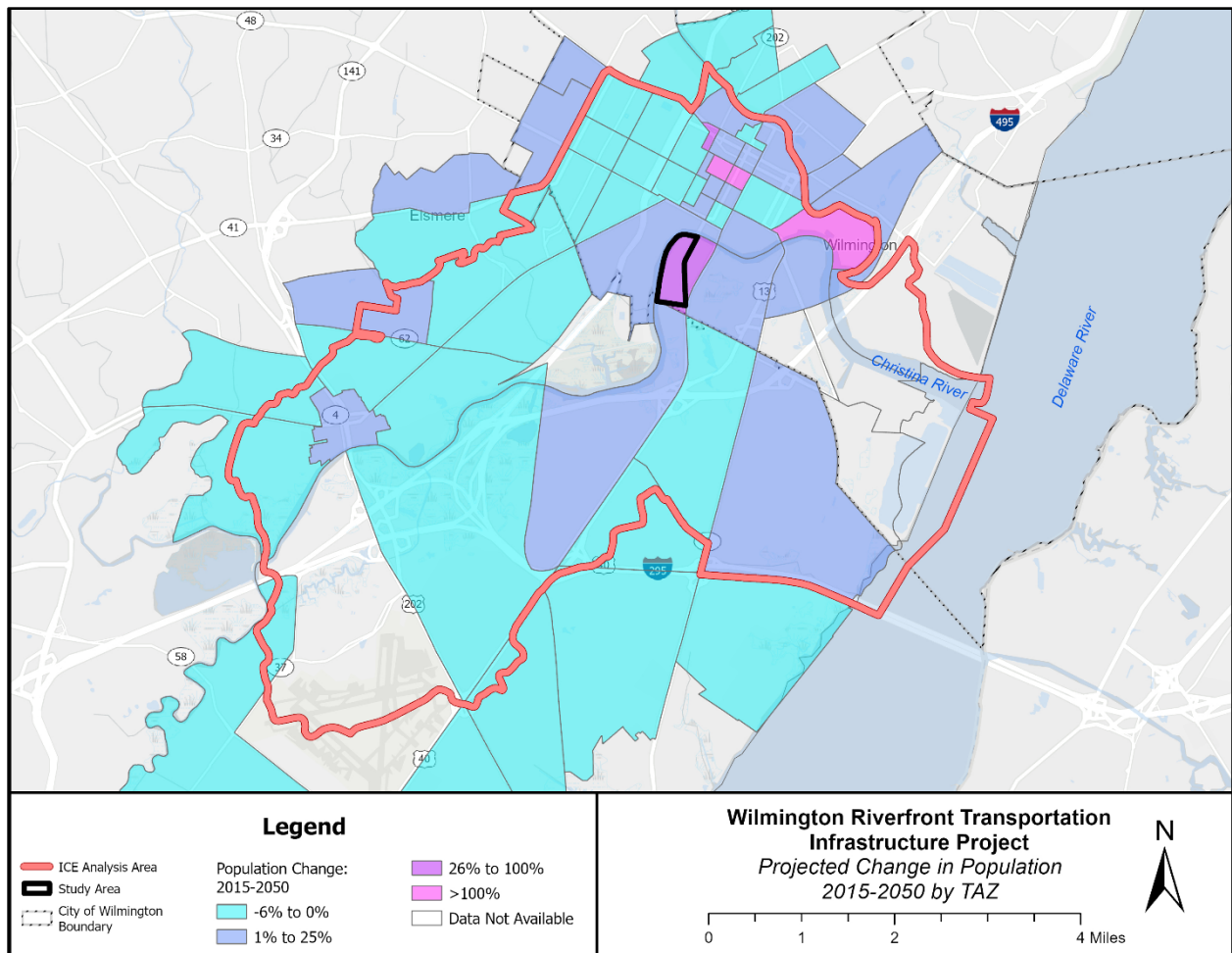
While this data is presented at the county or municipality level, the Delaware Population Consortium also provides 2015-2050 population projection data for Traffic Analysis Zones (TAZs), which are used by state or local officials to tabulate traffic data. The boundaries for this unit of analysis do not fit neatly into the ICE Analysis Area; however, the data provides a more detailed look at areas where population change is anticipated. **Figure 8** shows projected population change between 2015 and 2050 for the TAZs that intersect the ICE Analysis Area. Much of the ICE Analysis Area is anticipated to see zero or negative population growth; however, much of the positive population growth is concentrated in the City of Wilmington, including where the study area is located (Delaware Population Consortium, 2022a).

The Delaware Population Consortium also provides employment projections for New Castle County. This data is not broken out by municipality. **Table 9** presents the data for New Castle County, which is anticipated to see a 0.6% increase in employment between 2015 and 2050. For a more detailed look at the ICE Analysis Area, employment projection data is also provided by TAZ, which is shown **Figure 9** below. Most of the ICE Analysis Area is expected to see a decrease in employment growth. Downtown Wilmington and the eastern edge of the ICE Analysis Area along the Christina and Delaware Rivers are anticipated to see positive employment growth (Delaware Population Consortium, 2022a).

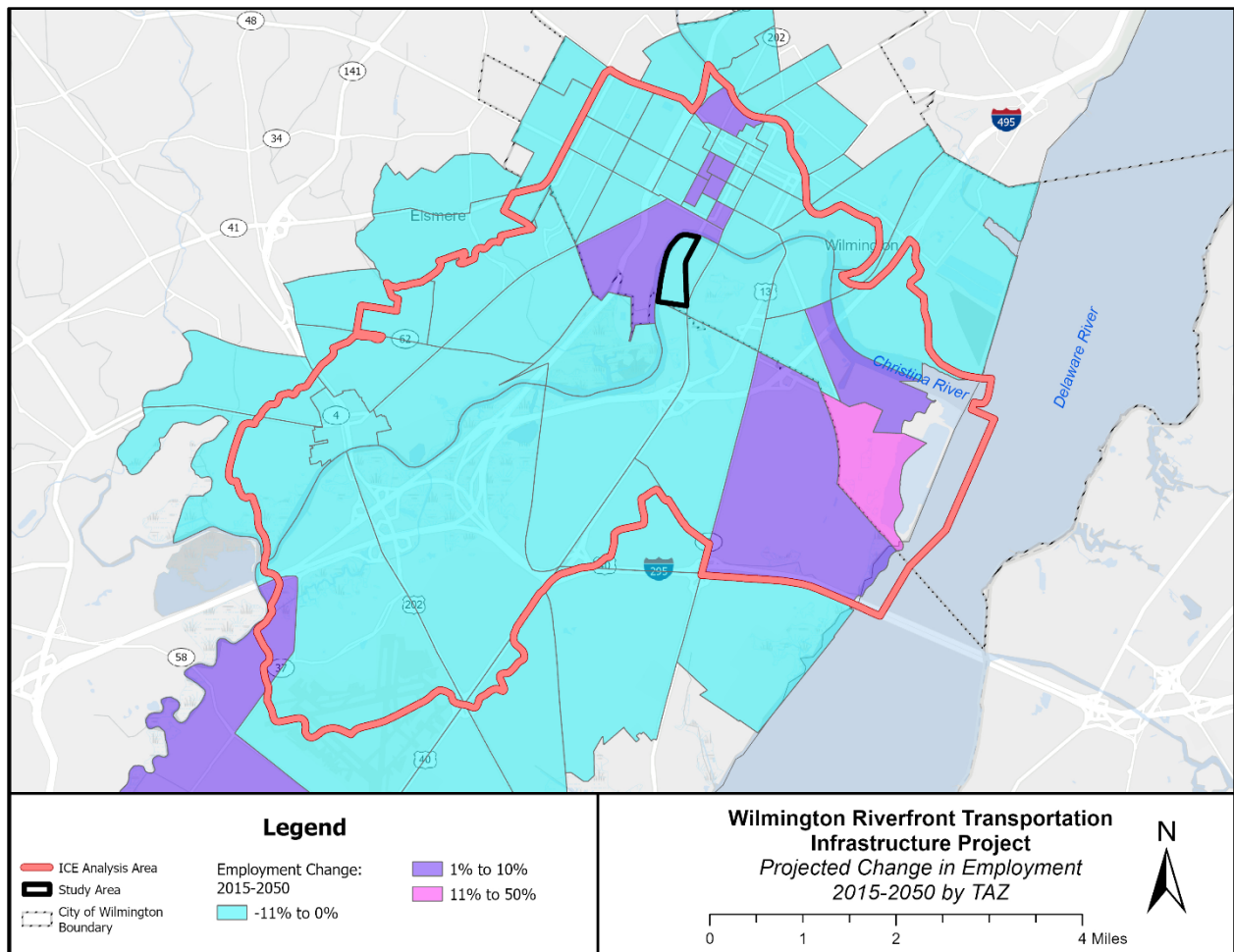
Table 9: Employment Projections for New Castle County

	2015	2020	2030	2040	2050
Employment	275,293	287,833	285,890	280,266	273,531

Source: Delaware Population Consortium, 2022 Projections (2015-2050)

Figure 8: Projected Change in Population, 2015-2050

Source: Delaware Population Consortium, Delaware Traffic Analysis Zone Population Projections 2015 to 2050

Figure 9: Projected Change in Employment, 2015-2050

Source: Delaware Population Consortium, Delaware Traffic Analysis Zone Population Projections 2015 to 2050

C. Future Development in the ICE Analysis Area

1. Residential and Commercial Development Trends

The Delaware Office of State Planning Coordination collects annual building permit and development application information from each county and municipality. Building permit data indicates where activity is occurring, whereas development application data is speculative and provides an idea of where developers are planning to build in the future. This data helps determine the location and intensity of development and identify growth trends over time (Delaware Office of State Planning Coordination, n.d.). Data is most recently available for the years 2008-2021.

Between 2008 and 2021, there were 507 building permits issued in the ICE Analysis Area, with 269 of those being in the City of Wilmington, 237 in New Castle County, and one (1) in the Town of Newport. Of these building permits, 395 were for residential projects, 103 were for non-residential projects, and nine (9) were for mixed-use projects. The most recent data indicates that 32 building permits were issued in 2021, representing a total of 227 new residential units and 77,895 new square feet of non-residential construction (Delaware FirstMap, 2021a). None of the building permits that were issued during this timeframe are located within the Project study area; all permits fall within the ICE Analysis Area.

Between 2008 and 2021, there were 100 development applications approved in the ICE Analysis Area, with 58 of those being in New Castle County and 42 in the City of Wilmington; 53 of these building permits were for residential projects, 46 were for non-residential projects, and one (1) was for a mixed-use project. The most recent data indicates that eight (8) development applications were approved in 2021, representing a total of 204 potential new residential units and 25,438 potential square feet of non-residential construction (Delaware FirstMap, 2021c). During this timeframe, one (1) development application was approved in the Project study area for residential development, representing 109 potential new units.

According to the *2022 Annual Report on State Planning Issues*, statewide residential development has dramatically increased since 2017, peaking in 2020. Following a boom during the COVID-19 pandemic, in 2021, residential permits and applications decreased for the first time in more than a decade. Non-residential development increased in 2019 and 2020 before dropping slightly in 2021. Between 2020 and 2021, New Castle County saw a one year decrease in building permits and development applications for both residential and non-residential development. Because New Castle County is in proximity to major roadways, such as I-95, and job centers, such as the cities of Wilmington and Newark, it maintains the highest percentage of potential square footage for new non-residential projects (Delaware Office of State Planning Coordination, 2022).

Additionally, the State of Delaware maintains GIS data for projects occurring in the City of Wilmington's Downtown Development District, which is entirely within the ICE Analysis Area. Between Fiscal Year (FY) 2015 and 2020, there were 69 new construction, rehabilitation, and revitalization projects listed in the Downtown Development District, many of which have been completed. Four (4) of these projects are listed as Coming Soon, and 29 are listed as Reserved. These future projects include 18 mixed-use, ten (10) residential, and five (5) commercial (Delaware FirstMap, 2022d).

Lastly, the *South Market Street Master Plan*, which details future land use changes for the Project study area is another mixed-use development that is anticipated to be constructed over the next 20-30 years in the ICE Analysis Area. The *South Market Street Master Plan* notes that the 86-acre site is expected to comprise approximately 4.7 million square feet of residential space totaling 4,300 units; 1.9 million square feet of office space; 350,000 square feet of retail space; 8,900 structured parking spaces and 650 on-street parking spaces. In addition, the *South Market Street Master Plan* proposes a network of public green spaces and parks that will total over 13 acres.

Construction of future mixed-use development as laid out in the *South Market Street Master Plan* would not occur as part of this Project. Data on development applications and building permits, as well as specific information pertaining to future classes or types of residential and commercial development, are not currently available or known for development that will occur in the Project study area in the future. The *South Market Street Master Plan* does not specify this level of detail and provides "flexibility for future market conditions" (Page 11); this will be left for the City of Wilmington, the RDC, and future developers to determine.

The available data presents a snapshot of past and potential future development in the ICE Analysis Area. Future residential, commercial, and mixed-use projects within the ICE Analysis Area will continue to be developed in accordance with land use and zoning, as specified in each jurisdiction's comprehensive plan and regulatory framework. The only future development identified that is known to be dependent on the

Project is the future development that will occur from the build out of the *South Market Street Master Plan*.

2. Transportation Projects

WILMAPCO's 2023 *Update to the 2050 Regional Transportation Plan* includes a Constrained Project List, which identifies priority projects for road, transit, bicycle, and pedestrian infrastructure. These financially constrained projects are identified for the short-term (in service by 2023-2028), medium-term (in service by 2029-2039), and long-term (in service by 2040-2050) and are broken out by those that cost more than or less than \$15 million. As shown in **Table 10**, ten (10) projects are proposed in the ICE Analysis Area. Additional financially constrained projects that are not location-specific for New Castle County focus on active transportation, support for new technologies, support for shared ride services, transportation improvement district implementation, and transit service capital improvements. These projects are not included in **Table 10** below. None of the transportation projects listed in **Table 10** are dependent upon the improvements being constructed by this Project.

Table 10: Planned Transportation Projects in the ICE Analysis Area

Project	Mode	Year of Expenditure Cost (in millions \$)	In Service Year
Newport River Trail	Bike/Ped	\$42,213	2030
SR 9: Landers Ln – A St	Multimodal	\$20,837	2026
Wilmington Traffic Calming; 12 th St. Connector	Multimodal	\$10,466	2028
King & Orange Streets: MLK Blvd. – 13 th St.	Multimodal	\$4,725	2024
4 th St.: Walnut St. – Adams	Multimodal	\$3,010	2026
Maryland Ave. / Monroe Street	Multimodal	\$8,978	2030
New Sweden Road Extension (South Wilmington)	Multimodal	\$8,264	2040
Garasches Lane	Multimodal	\$6,333	2030
Rt 9 Neighborhood pathway network	Bike/Ped	\$1,158	2026
I-295, Northbound	Road	\$9,840	2026

Source: WILMAPCO, 2023 Update to the 2050 Regional Transportation Plan

Additional projects identified on DelDOT's Project Portal (DelDOT, n.d.) that are currently under construction or in the design planning stage within the ICE Analysis Area are listed below in **Table 11**. These 19 projects also represent reasonably foreseeable actions that could be anticipated within the identified future ICE timeframe. None of the transportation projects listed in **Table 11** are dependent upon the improvements being constructed by this Project.

Table 11: DelDOT Proposed Projects in the ICE Analysis Area

Project	Status	Anticipated Construction End Date
Rehabilitation of I-95 from I-495 to North of the Brandywine River Bridge	Under Construction	Summer (July – September) 2023
SR 141 Improvements, I-95 to Jay Drive	Under Construction	Spring 2022
BR 1-159 on James Street over Christina River	Under Construction	Spring (April – June) 2024
Pavement and Rehabilitation, North, I, SR4 – W. Newport Pike, 2023	Under Construction	Fall (October – December) 2024
Wilmington Transit Corridors Improvement	Under Construction	Fall (October – December) 2023
Shared Use Path, S. Church St to S. Walnut St	Design Planning	Fall (October – December) 2026
Replacement of BR 1-686 on South Walnut Street	Design Planning	2029
Replacement of BR 1-684 on South Heald Street	Design Planning	Fall (October – December) 2027
Southbridge Streetscape Improvements Phase II	Design Planning	Fall (October – December) 2024
4th Street, Walnut Street to Adams Street	Design Planning	Fall (October – December) 2026
Walnut Street, 3rd Street to 16th Street	Design Planning	Fall (October – December 2026)
H. Fletcher Brown Park Pedestrian Improvements	Design Planning	TBD – construction start date anticipated Spring 2025
New Castle Avenue Area Sidewalk and Streetscapes	Design Planning	TBD
Safe Routes to School McCullough	Design Planning	Fall (October – December) 2023
Rehabilitation of I-495 Bridges	Design Planning	TBD
Rehabilitation of Bridges 1-719, 1-720, 1-738, and 1-739 on I-95	Design Planning	Summer (July – September) 2026
I-295 Northbound, SR141 to US13	Design Planning	2025
Sears Boulevard Extension	Design Planning	TBD
HEP NCC, SR4 at SR62/Boxwood Road/Middleboro Road	Design Planning	2025

V. ICE Analysis

This section presents the results of the ICE analysis. As discussed in **Section III.A** the same socioeconomic, cultural, and natural resources, as well as air quality, noise, and hazardous materials directly affected by the Build Alternative are included in the analysis of indirect and cumulative effects. Each resource-specific sub-section below begins by discussing regulatory context, existing conditions in the Project study area, and direct effects to those resources that would result from the Build Alternative, followed by a discussion on the indirect and cumulative effects.

A. Land Use and Socioeconomic Resources

Existing conditions and direct effects related to land use and other socioeconomic resources are described in the following section, as well as an analysis of indirect and cumulative effects. Refer to the *Socioeconomic Technical Report (EA, Appendix B)* for additional detail on socioeconomic resources within the Project study area.

1. Land Use

Currently, the existing land uses within the Project study area are a mix of industrial, commercial, and vacant brownfields. This is confirmed with the most recent LULC data from the State of Delaware for 2017, as shown in **Figure 7**. Other primary land uses surrounding the Project study area include commercial/industrial, mixed urban or built-up land, wetland, residential, and recreational land uses. The *City of Wilmington Comprehensive Plan* identifies the current zoning in the Project study area as W-4, a waterfront zone. W-4 is defined in the Plan as a waterfront residential commercial district, where medium to high density residential, retail, and office development can take place in the future. The southern end of the Project study area that falls outside of the City of Wilmington's boundary is defined as heavy industrial by New Castle County. Refer to **EA, Appendix B** for a map of zoning in and around the Project study area.

The *South Market Street Master Plan* states that the Project study area is surrounded by a mix of cultural, recreational, residential, office, hotel, and retail uses. The area's existing retail includes the Christina Crossing shopping mall to the east of the Project study area. Included in this complex is the ShopRite grocery store and several restaurants and retail stores. Additionally, east of the Project study area are apartment complexes, including the Luxor Lifestyle Apartments and the River Tower at Christina Landing, as well as the Christina Landing Condominiums. The revitalized Christina Riverfront is located to the west of the Project study area and features mixed use development, including Residences at Justison Landing, the Chase Center on the Riverfront, restaurants, and office spaces. Much of the Project study area features former industrial buildings and accessory structures, surface parking, and brownfields.

Direct effects to land use from the Build Alternative are anticipated to include 13.6 of acres for construction of the Project's proposed transportation improvements. Currently, land use in the Project study area is primarily commercial/industrial. Land use in the area is anticipated to be converted to roadway infrastructure and Riverwalk under the Build Alternative to account for the transportation infrastructure. Zoning in the area was updated by the City of Wilmington from manufacturing zoning to waterfront residential/commercial in order to be consistent with the *City of Wilmington's Comprehensive Plan*.

Additional information on land use in the Project study area can be found in the *Socioeconomic Technical Report (EA, Appendix B)*; additional detail on land use trends in the greater ICE Analysis Area can be found in **Section IV.A**.

Because the Build Alternative is anticipated to have direct effects to land use, indirect and cumulative effects of the Project were analyzed.

Indirect Effects

Under the No Build Alternative, the proposed transportation infrastructure improvements would not be constructed and access to the underutilized properties along the east bank of the Christina River within

the Project study area would not be improved. The primary effect of the No Build Alternative is anticipated to be a slowed pace of infrastructure improvements to further the connectivity of the riverfront area and provide multi-modal resources. As a result, indirect effects of the No Build Alternative could include the Project study area retaining its current land use configuration, which consists of former industrial buildings and accessory structures, surface parking, former junkyards, miscellaneous uses, and brownfields; a new roadway network or pedestrian/bicyclist accommodations would not be constructed in the Project study area. Additionally, as described in greater detail below in **Section V.C** and **Section V.F**, without remediation efforts that would occur for the transportation infrastructure improvements and by the City, the RDC, the US Environmental Protection Agency (EPA), and the Delaware Department of Natural Resources and Environmental Control (DNREC), brownfields and contaminated properties would continue to be present as part of the land use in the Project study area; therefore, indirect effects of the No Build Alternative could also include contaminated soils and contaminants leaching into waterways. The No Build Alternative would not be consistent with the purpose of the Project.

Currently, infrastructure in the Project study area is insufficient to support substantial changes in future land use. The Build Alternative, as described in **Section I.B.2**, includes proposed transportation infrastructure improvements and stormwater management and resiliency solutions. Development on the site in the future could not occur without remediation of contaminated soils. Negative indirect effects of a lack of infrastructure could result in the loss of economic productivity; the inability to attract and retain future population; and a lack of beneficial land uses and transportation options that would result from the Project and the future mixed-use development, including proposed residential, commercial, and open spaces, that will transform the east Riverfront and eventually become an extension of downtown Wilmington.

Future redevelopment in the Project study area would be an indirect effect of the Project. The *South Market Street Master Plan* identifies future land use changes for the Project study area, including the expansion of redevelopment on the east side of the Christina River, which are also reflected in the *City of Wilmington Comprehensive Plan*. The proposed infrastructure improvements under the Build Alternative are anticipated to not prevent future land use changes to occur in accordance with the *City of Wilmington Comprehensive Plan*. The proposed infrastructure improvements outlined in the Build Alternative are not anticipated to conflict with the *South Market Street Master Plan* and the *City of Wilmington Comprehensive Plan* waterfront mixed land use¹⁵, as it envisions the area as a live, work, play environment, with a range of uses to support office, retail, entertainment, housing, public parks, and more. Generally, the *South Market Street Master Plan* (RDC, 2018) is guided by objectives that focus on creating mixed-use development and enhancing the network of public open and green spaces within the Project study area, where none currently exists.

The *City of Wilmington Comprehensive Plan* defines future land use for the Project study area as waterfront mixed use to encourage infill and redevelopment. South Wilmington currently features a high concentration of brownfields and vacancy; therefore, the *City of Wilmington Comprehensive Plan* identifies the Project study area as a key area in Wilmington for development. This area is anticipated to have major land use changes due to the current concentrations of industrial and underutilized land. The

¹⁵ Waterfront mixed use is defined as “medium density residential buildings (with multi-family buildings encouraged to have ground floor retail), office buildings, civic centers and hotels, restaurants, commercial retail/services, nightlife and performance venues, and recreation.” (City of Wilmington, 2019)

proposed Project would allow for future land uses changes, an indirect effect, to occur. As described in the *City of Wilmington Comprehensive Plan* and *The New Castle County Comprehensive Plan*, future land use changes, including land development and redevelopment, will be directed primarily to areas that can support this growth or will have the infrastructure to do so. In the greater ICE Analysis Area, the Towns of Elsmere and Newport also have similar land use-related planning objectives.

As noted in **Section V.A**, direct effects to land use from the Build Alternative are anticipated to include 13.6 acres for construction of the Project's proposed transportation improvements. While plans for the future redevelopment have not been finalized, the future land uses identified in the *South Market Street Master Plan* are anticipated to bring beneficial indirect effects, which would occur later in time, by providing a mix of uses and community resources that do not currently exist or serve the Project study area and its surrounding communities. All land within the Project study area would be subject to remediation and future redevelopment.

As described in greater detail below in **Section V.A.2**, beneficial indirect effects of the Project to land use, which would redevelop brownfields and currently vacant/underutilized property, are also tied to other beneficial direct and indirect effects of the Project to socioeconomic resources such as improved access and connectivity to the existing transportation network and surrounding land uses, increased employment opportunities, and creation of a new neighborhood that would provide community facilities in the Project study area, such as open and commercial space.

Cumulative Effects

Past actions that have impacted land use include the infrastructure and land development activities that have occurred in the ICE Analysis Area throughout the ICE time frame. As noted in **Section IV.B**, population growth in the ICE Analysis Area has remained relatively stable since 2000; however, residential, commercial, mixed-use, and transportation projects have been constructed to accommodate the population and its needs within the ICE Analysis Area. As noted in **Section IV.A.1**, over the past 20 years, the City of Wilmington has experienced revitalization of its downtown and riverfront, which has attracted new residents and improved amenities; this growth and revitalization have also brought about changes to land use within the Project study area and ICE Analysis Area.

While land use has remained relatively stable between 2007 and 2017 in the ICE Analysis Area, **Table 3** shows that there has been a slight increase in mixed urban or built-up land during this timeframe as jurisdictions have sought opportunity to redevelop existing land uses and increase mixed-use development within their boundaries. Present and future reasonably foreseeable actions as identified in **Section IV.C**, such as this Project and future development laid out in the *South Market Street Master Plan*, include land development and infrastructure improvements to accommodate existing and future populations and economic activity.

While population growth is anticipated to decline in the City of Wilmington between 2015 and 2050, there are pockets of the City and ICE Analysis Area, including the Project study area and parts of downtown, which are anticipated to see positive growth (**Figure 8**). Land use changes associated with development and redevelopment will be directed primarily to areas that can support this growth or will have the infrastructure to do so, as noted in the *City of Wilmington Comprehensive Plan* and the *New Castle County Comprehensive Plan*.

The proposed action is not anticipated to have cumulative induced growth effects, as it is confined to a defined, small area which is bound to the west and north by the Christina River and surrounded by existing, established neighborhoods (including downtown Wilmington) that are built out and do not have undeveloped land available for development. There is no undeveloped land shown on **Figure 7** immediately surrounding the Project study area or in adjacent communities; the Project study area itself is currently underutilized but is anticipated to be redeveloped in the future as described in the *South Market Street Master Plan*. As noted previously, the comprehensive plans for the City of Wilmington and New Castle County are focused on increasing infill and redevelopment by directing development where planned or existing infrastructure can support land use and related changes.

The Build Alternative proposes to provide transportation infrastructure improvements in the Project study area where planned growth from the *South Market Street Master Plan* would be directed to in the future. Land designated for resource preservation within the ICE Analysis Area, such as the existing Russell Peterson Wildlife Refuge which is south of the Project study area on the west bank of the Christina River, would not be affected by the Project and would retain its status as protected land. Areas within the ICE Analysis Area that are designated for resource preservation would not be encroached upon or converted to other land uses as a result of the Project. All direct and indirect effects associated with the Project and future redevelopment would be consistent with zoning regulations and comprehensive plans as established by the City of Wilmington and New Castle County.

Future construction of mixed-use development in the Project study area, an indirect effect of the Project, is anticipated to bring beneficial land uses to former industrial sites that are currently underutilized. As noted on page 26 of the *South Market Street Master Plan*, more recent development in the surrounding area, including the Residences at Christina Landing, the Shoprite grocery store, and the redevelopment of the west Riverfront have been key in bringing residents south of the Christina River. Building on past and present development and land use changes occurring in the Project study area and surrounding communities, the Project and future development would continue to bring beneficial land uses and related effects including increased mobility and safety for all users, including vehicles (and transit), pedestrians, and bicyclists, and mixed-use development that would provide residential, commercial, and open spaces where none currently exists today.

Lastly, the *City of Wilmington Comprehensive Plan* identifies the South Wilmington waterfront and South Market Street as an important area of transition which would benefit from extensive coordination between the City and New Castle County. The mixed-use development, in conjunction with other developments such as the South Wilmington Wetland Park and 76er multi-use facility, present an opportunity to update zoning and encourage mixed-used development and beneficial land use changes for South Wilmington and the adjacent area, which is currently zoned for manufacturing.

As noted above, past, present, and future land use changes and development have and will continue to occur within the ICE Analysis Area to support and accommodate existing and future populations. Planning approaches by the City of Wilmington and New Castle County focus on infill and redevelopment in existing communities and where planned or existing infrastructure can support growth and land use changes. The proposed construction of transportation infrastructure associated with this Project and future development that is anticipated to occur in the Project study area are anticipated to promote beneficial land uses and make use of land that is currently underutilized in an urban and primarily built out

surrounding environment. The only planned development in the ICE Analysis Area that is dependent upon the completion of the Project is the build out of the *South Market Street Master Plan*. As such, the incremental effect of the Project on land use, considered in light of past, present, and future actions, is anticipated to be minimal; overall, the Project would improve infrastructure in the Project study area and would not conflict with planned future mixed use development, as detailed in the *South Market Street Master Plan*.

2. Socioeconomic Resources

To assess direct effects to socioeconomic resources including demographics, businesses and economy, employment, mobility, housing, neighborhoods and communities, and EJ, the *Socioeconomic Technical Report (EA, Appendix B)* defines the Project's Socioeconomic Study Area as eleven (11) block groups that surround the Project study area. The Socioeconomic Study Area contained a total population of 15,280 based on ACS 2017-2021 Five-Year Estimates.

There are four active businesses in the Project study area, which include a gas station, a hardware store, and two commercial businesses. The hardware store operates on a property owned by the RDC; the RDC maintains an agreement with the owner to continue leasing the property until June 2024, at which time the owner will retire. The two commercial businesses lease their building from a property management company, which has an agreement with the RDC to redevelop its property. The gas station currently owns the property that they operate on.

At a high level, major industries within the Project Socioeconomic Study Area include sales and office occupations; production, transportation, and material moving occupations; healthcare practitioners and technical occupations; and management, business, and finance occupations.

Based on 2017-2021 ACS Five-Year Estimates, a majority of workers within the Socioeconomic Study Area drive along to work, followed by utilizing public transportation, working from home, carpooling, and walking. A majority of households in the Socioeconomic Study Area have one vehicle available, followed by two vehicles available, no vehicles available, and three or more vehicles available. In their 2019 *Transportation Justice Plan*¹⁶, WILMAPCO identifies areas with mobility constrained populations, and defines *significant* and *moderate* mobility-constrained populations, which include seniors, people with disabilities, and zero-car households. Both *severe* and *moderate* mobility-constrained populations are located within the Socioeconomic Study Area. There are 123 bus stops and 11 bus routes that are located in and service the Socioeconomic Study Area; five (5) of those bus stops are located within the Project study area.

The Socioeconomic Study Area has a higher percentage of renter occupied housing than owner occupied housing. There is no existing housing or affordable housing within the Project study area; however, there are three locations that offer affordable housing in the Socioeconomic Study Area.

Neighborhoods in the Socioeconomic Study Area include Browntown, Hedgeville, and Southbridge. Southbridge is a minority neighborhood located east of the Project study area; Browntown and Hedgeville are minority neighborhoods located west of the I-95 corridor, separated from the Project study area by I-95 and the Christina River. Community facilities such as places of worship, food banks/pantries, service

¹⁶ http://www.wilmapco.org/EJ/WILMAPCO_2019_TJ_Plan.pdf

organizations/community centers, and parks/recreation facilities are located within the Socioeconomic Study Area; however, there are no community facilities currently within the Project study area.

An EJ analysis was conducted for this Project in accordance with Executive Order (EO) 12898: *Federal Actions to Address the Environmental Justice in Minority and Low-Income Populations*, US Department of Transportation (US DOT) Order 5610.2C: *US DOT Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, and FHWA Order 6640.23A: *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. EO 14096: *Revitalizing Our Nation's Commitment to Environmental Justice for All*, was considered in the analysis. All 11 block groups in the Socioeconomic Study Area are considered EJ populations (low-income, or both minority and low-income populations). Additional data sources including WILMAPCO's *Transportation Justice Plan* and the EPA's EJSCREEN tool were consulted to provide supplemental data on EJ populations within the Socioeconomic Study Area.

Quantifiable direct effects resulting from the Project and proposed transportation infrastructure improvements are anticipated to include one business displacement of the gas station. The owner of the hardware store is in the process of liquidating the company in order to retire, and thus would not be considered a business displacement as a result of the Project. The property management company that currently leases property to the two commercial businesses within the Project study area is not expected to continue to renew the leases. The two business lessees are not considered business displacements as the leases would end with or without the proposed improvements. The property management company has an agreement with the RDC to redevelop their property in the future. Additionally, construction of the Build Alternative is anticipated to have beneficial impacts on employment in the area. Construction of the infrastructure improvements proposed with the Build Alternative are anticipated to create approximately 200 construction-related jobs.

Qualitative direct effects of the Build Alternative are anticipated to include beneficial effects such as improving mobility and offering new, convenient options for accessing jobs, local economic destinations, and regional transit services; creation of construction-related jobs; providing key points into the Project study area; and improving mobility, accessibility, and safety for all users due to the proposed replication of the Wilmington street grid in the Project study area, pedestrian and cyclist accommodations, and a new Riverwalk. Generally, the No Build Alternative would not involve any Project-related construction, therefore, business displacements or other effects to socioeconomic resources would not result; the primary effect of the No Build Alternative is anticipated to be a slowed pace of infrastructure improvements to further the connectivity of the riverfront area and provide multi-modal resources.

Refer to the *Socioeconomic Technical Report (EA, Appendix B)* for additional information on how the Socioeconomic Study Area was defined; detailed socioeconomic conditions related to businesses and economy, mobility, housing, neighborhoods and communities, and EJ within the Project's Socioeconomic Study Area; and greater discussion on direct effects to these resources.

Because the Build Alternative is anticipated to have direct effects to socioeconomic resources, indirect and cumulative effects were analyzed.

Indirect Effects

The primary long-term effect of the No Build Alternative may be a slowed pace of infrastructure improvements to further the connectivity of the riverfront area and provide multi-modal resources.

Therefore, under the No Build Alternative, there would be no roadway network or pedestrian/cyclist accommodations constructed in the Project study area, which is anticipated to undergo land use changes in the future, as detailed in the *South Market Street Master Plan*. Under the No Build Alternative, the planned future redevelopment, which is anticipated to be an indirect effect of the Project, would not have adequate transportation infrastructure already in place at the time construction starts. Without future redevelopment in the Project study area, it is anticipated that there would be limited growth and construction of new businesses, communities, housing units, and community facilities. Indirect effects of the No Build Alternative are anticipated to have negative effects for all communities in the Project study area, regardless of race or income. Under the No Build Alternative, there would be no disproportionately high or adverse effect to EJ populations; however, the positive effects of the Project are not anticipated to be realized, such as the proposed transportation infrastructure improvements, the Riverwalk, and bicycle and pedestrian accommodations. Overall connectivity and mobility in the area would be anticipated to remain the same. Additionally, the No Build Alternative is not anticipated to address existing flooding conditions within the Project study area, and brownfields may be remediated at a slower pace. Generally, the No Build Alternative is anticipated to result in negative indirect effects to the Project study area and surrounding communities.

Generally, as noted in the *Socioeconomic Technical Report (EA, Appendix B)*, beneficial effects to socioeconomic resources are anticipated to result from future construction and redevelopment of the Project study area as laid out in the *South Market Street Master Plan*. This future construction and redevelopment is considered an indirect effect of the Project, as it is anticipated to take place further in time after construction of the Project's proposed improvements are completed. As discussed in more detail below and in the *Socioeconomic Technical Report (EA, Appendix B)*, beneficial direct effects resulting from the Project and indirect effects associated with future redevelopment include:

- The potential to provide economic benefits by improving mobility and offering new, convenient options for accessing jobs, local economic destinations and regional transit services;
- Attracting businesses and office space, which could increase employment dependent on development that would occur after the Project is constructed;
- Creating construction-related jobs;
- Improving mobility and accessibility in the Project study area for vehicles, cyclists, pedestrians, and transit users through the replication of the downtown Wilmington street grid, pedestrian and cyclist accommodations, and the Riverwalk;
- Increasing the number of housing units in the Project study area, as proposed in the *South Market Street Master Plan*;
- Providing community facilities such as open space and additional commercial/retail space; and
- Improving livelihood, quality of life, and health of the surrounding community, specifically through future mixed-use development that would bring commercial, residential, and retail uses, as well as enhanced bicycle, pedestrian, and transit facilities, as well as open/green space.

The Build Alternative, which is defined in **Section I.B.2**, proposes to construct transportation infrastructure improvements, including a comprehensive network of bicycle and pedestrian linkages and expansion of the network of streets on site. This proposed infrastructure is anticipated to support vehicles (including public transportation), pedestrians, and bicyclists. Beneficial indirect effects of the Build Alternative include increased access and connectivity to the existing transportation network, downtown Wilmington, and beyond. The replication of the street grid in the Project study area, paired with the

proposed future mixed-use development that would be an indirect effect of the Project, is anticipated to result in inviting, pedestrian-friendly streets and public spaces. Proposed traffic calming devices, including new signalized intersections and slower speed limits, would ensure that South Market Street and South Walnut Street are transformed to support a more urban, walkable, and pedestrian-friendly environment.

The existing Margaret Rose Bridge on New Sweden Street at the southern end of the Project study area provides vehicular, bicycle, and pedestrian access on either side of the Riverfront. Adjacent to the eastern riverbank, a Riverwalk similar to the existing Riverwalk on the western riverbank is proposed to be constructed under the Build Alternative to provide access to the currently inaccessible riverfront within the Project study area. As part of the *South Market Street Master Plan*, a future pedestrian bridge is proposed to be constructed to provide another option that would link the Project study area with the west Riverfront to enhance connectivity for pedestrians on both sides of the river. At the west Riverfront, pedestrians could connect to the Jack A. Markell Trail, which runs through the Russell Peterson Wildlife Refuge and extends south to the City of New Castle; a future project identified in **Table 10**, the Newport River Trail, would connect to the Jack A. Markell Trail, providing another option for pedestrians and bicyclists traveling between the Project study area and other portions of the ICE Analysis Area. Additionally, the *South Market Street Master Plan* identifies future new bus stops, a future new stop on the River Taxi, and a future proposed shuttle loop to the Joseph R. Biden train station (Amtrak and Southeastern Pennsylvania Transportation Authority (SEPTA)), which is anticipated to further connect the Project study area and improve access for those without cars and with limited transportation access to downtown Wilmington and beyond.

In its current condition, the Project study area is underutilized; therefore, indirect effects of the Project, including future build out of the *South Market Street Master Plan*, are anticipated to be beneficial to community cohesion. The *South Market Street Master Plan* proposes to create a new neighborhood with mixed-use development, including proposed residential, commercial, retail, and open spaces, where none currently exists in the Project study area. Transportation improvements, as noted above, are anticipated to enhance access and connectivity within the Project study area and beyond. Community facilities and services, such as open spaces and potential new commercial/retail opportunities constructed as part of the planned future redevelopment would be accessible to the surrounding communities. Community facilities do not currently exist within the Project study area and are therefore anticipated to be a beneficial indirect effect of the Project. While it is unknown what specific retail and commercial offerings may come to the Project study area once future redevelopment occurs, the *South Market Street Master Plan* states that a combination of destination retail (restaurants, cafes, markets, etc.) and convenience retail, which would meet the daily needs of neighborhood residents, could be expected.

The Project is not expected to result in induced commercial or residential development outside of what occurs in the future within the Project study area as part of the build out of the *South Market Street Master Plan*. As discussed above in **Section IV.C.1**, all other reasonably foreseeable commercial and residential future development is distributed throughout the ICE Analysis Area in the City of Wilmington and New Castle County. Only one development application has been approved in the Project study area; most of the issued building permits and approved development applications are located in parts of the ICE Analysis Area that are not immediately adjacent to the Project study area. The eventual extension of downtown Wilmington to include the Christina Riverfront is not anticipated to encroach upon existing communities or draw more growth to other established communities within the ICE Analysis Area. Future

redevelopment that is currently known for the Project study area is not anticipated to extend past the area identified in the *South Market Street Master Plan*.

As noted above in **Section V.A.1**, the Project and surrounding area is located within an already built out and developed urban environment; future land development activity occurring in the City of Wilmington and New Castle County is anticipated to focus around infill and redevelopment of existing neighborhoods, as well as development in areas with planned or existing infrastructure. The degree to which new growth would occur cannot be determined with certainty; however, as noted in **Section IV.B**, generally, population within the ICE Analysis Area jurisdictions has remained stable since 2000, and population within the City of Wilmington as a whole is anticipated to see negative growth between 2015 and 2050. **Figure 8** shows that population growth is projected to occur within the Project study area, where redevelopment is anticipated to occur, and in downtown Wilmington; some population growth in smaller percentages is anticipated across the ICE Analysis Area and in communities surrounding the Project study area. Much of the ICE Analysis Area, including the Project study area and surrounding communities, is also anticipated to see negative employment growth between 2015 and 2050, as shown in **Figure 9**.

The Build Alternative and indirect effects associated with the future build out of the *South Market Street Master Plan* are anticipated to have beneficial direct and indirect effects to businesses and the economy, including the creation of approximately 200 construction-related jobs in the community. It is unknown at this time what commercial/retail offerings are anticipated to be offered by future redevelopment, and whether they would be accessible to and serve the needs of existing populations adjacent to the Project study area.

Additionally, the Project may potentially result in increased property values as an indirect effect from the Project, but the specific effects to the surrounding communities, including to EJ populations near the Project study area, are not known at this time. It is also unknown whether affordable housing would be provided as part of planned future development. There is the potential for rising property values that may have a negative indirect effect on surrounding EJ populations if housing costs, rent, mortgages, and property taxes increase. Potential increased property values may lead to rising costs in housing, rent, and property taxes that could result in a shift of demographics.

Cumulative Effects

Past, present, and future actions have had and could continue to have both beneficial and adverse effects to socioeconomic resources. For example, although it occurred outside of the ICE timeframe, the construction of I-95 in the 1960s, not unlike other highway and urban renewal projects across the United States during this period, cut through existing communities in downtown Wilmington, dividing a “once cohesive neighborhood fabric”; adverse effects of this action are still visible today as these neighborhoods, which now consist of primarily minority and low-income residents, are still divided by I-95 (WILMAPCO, 2023b). However, past and present growth and development has also improved local economies and led to the provision of community facilities, transportation infrastructure, and recreational resources benefitting residences and businesses. Construction and expansion of transportation facilities has facilitated economic growth by providing access to employment and community facilities and allowing for efficient movement of goods and services. The construction of appropriate transportation infrastructure within the Project study area, which is underutilized and does not contain residential populations, residential properties, or community facilities, is not anticipated to have a negative impact on the ICE Analysis Area and communities adjacent to the Project study area. In conjunction with the

Project's proposed improvements, many of the future reasonably foreseeable actions, such as the transportation projects listed in **Table 10** and **Table 11**, would provide beneficial effects to the ICE Analysis Area by increasing safety, accessibility, and provision of pedestrian and bicycle infrastructure, etc. that will improve transportation conditions.

The Project is not expected to result in disproportionately high or adverse impacts to EJ populations within the Project's Socioeconomic Study Area or the ICE Analysis Area. EJ communities within the Project study area, and those such as Southbridge and Browntown-Hedgeville (separated from the study area by I-95 and the Christina River) that are not located within the Project study area, but are located nearby, could benefit from the improvements and future redevelopment associated with the *South Market Street Master Plan*. As described in greater detail in the *Socioeconomic Technical Report (EA, Appendix B)*, public outreach to EJ communities occurred for the Project, and comments received generally expressed support and excitement for the Project and redevelopment of the South Market Street area. Residential relocations in EJ communities are not anticipated to occur; however, one business displacement is anticipated to result from the Build Alternative as discussed above.

Overall, the Build Alternative is anticipated to indirectly facilitate and increase economic growth and employment by providing infrastructure that would allow for the future development of the South Market Street area; future planned infill and development that is anticipated to occur has the opportunity to create new economic and employment opportunities within EJ populations. Specifically, the Project is anticipated to create approximately 200 construction-related jobs for the local economy. Additionally, community facilities do not currently exist within the Project study area therefore negative direct effects of the Project are not anticipated to result to these resources; the Project, through the proposed Riverwalk and future redevelopment, are anticipated to increase the amount of open space and commercial/retail offerings available in the Project study area, which could be used by residents of these neighborhoods. It is not known at this time what specific businesses and community services would be included once future redevelopment occurs, or whether they would be accessible to or serve the needs of surrounding EJ populations. Additionally, the makeup of demographics in communities surrounding the Project study area may shift over time with potentially rising property values. Potential rising housing costs, if experienced, could add undue burden to EJ populations, which over time could incrementally add to the overall cumulative effects felt by these populations.

Transportation improvements proposed as part of the Build Alternative (**Section I.B.2**) and future improvements proposed in the *South Market Street Master Plan* (new bus stops, stop on the River Taxi, and shuttle loop to the Joseph R. Biden Train Station), specifically those related to pedestrians, bicyclists, and transit, are expected to improve access and connectivity for those who are mobility constrained or do not have access to cars. While past, present, and future projects have and are likely to have impacts to potential EJ populations, the Build Alternative is not expected to contribute substantially to the incremental impact on these populations. Overall, the Project and future redevelopment are anticipated to improve livability and community benefits by improving mobility and offering new, convenient options for accessing jobs, local economic destinations and regional transit services; clean-up of brownfields; addressing flooding and drainage issues; redevelopment of the area; improving air quality; and improving community connectivity. Additional detail on the EJ analysis is provided in the *Socioeconomic Technical Report (EA, Appendix B)*.

To further support investment in the EJ communities, specifically Southbridge, the City's Office of Economic Development will work with the University of Delaware's Local Government Grant Assistance Program and the Southbridge Civic Association in identifying and applying for grant funding in support of the improvements identified in the *Southbridge Transportation Action Plan*. Additionally, the City and the RDC will continue to investigate funding to plan, design and construct a pedestrian connection from the Southbridge Community to the Wetland Park between C Street and South Church Street.

B. Cultural Resources

Under Section 106 of the National Historic Preservation Act (NHPA), Federal agencies are required to take into account the effects of their undertakings on historic properties that are listed on or determined eligible for listing on the National Register of Historic Places (NRHP). Through the Section 106 process, avoidance, minimization, or mitigation measures are identified to resolve any unavoidable adverse effects to historic properties. 36 CFR 800.5(1) notes that adverse effects "may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative."

FHWA determined that because of the nature and scope of this undertaking, the Project has the potential to cause effects to historic properties in the Project study area. Thus, FHWA, as the lead federal agency, initiated consultation with the Delaware State Historic Preservation Officer (DE SHPO) in compliance with Section 106 of the NHPA of 1966, as amended (54 USC 306108) and its implementing regulations under 36 CFR Part 800.

FHWA and the City of Wilmington, in consultation with DE SHPO, defined the Area of Potential Effects (APE) and architectural historians conducted a survey of resources within the Architectural APE that were 40 years or older to investigate their eligibility for the NRHP. The architectural survey identified a total of 28 architectural properties within the Architectural APE. Overall, of the 28 architectural resources within the APE, seven were determined eligible for the NRHP, 15 were determined not eligible for the NRHP, and six of the previously identified resources have been demolished.

The Archaeological APE was defined as the Project study area, and archaeologists conducted a Phase IA archaeological assessment to review previously recorded archaeological site data, identify previous surveys in the Project vicinity, locate areas with the potential to have unrecorded archaeological sites, and provide recommendations regarding additional archaeological investigations that may be necessary to identify archaeological resources prior to ground disturbing activities. It was determined that the Project study area has potential to contain intact archaeological resources; Phase I survey is recommended for four survey areas measuring a total 29.8 acres within the Project study area.

Additional information is provided in the *Architectural Evaluation-Level Survey Technical Report (EA, Appendix F)* and the *Phase IA Archaeological Assessment (EA, Appendix G)*.

In coordination and consultation with the DE SHPO, it was determined that the Build Alternative would not adversely affect any of the characteristics of the historic properties that qualify the properties for inclusion in the NRHP in a manner that would diminish the integrity of the properties' locations, design, setting, materials, workmanship, feeling, or association. All above-ground historic properties are outside of the Project's limits of disturbance (LOD), and the Project would not result in immediate physical impacts to the resources. The Project has the potential to adversely affect archaeological historic properties, should they be present within the below-ground APE. Therefore, FHWA has developed a Project

Programmatic Agreement (PPA) to stipulate the completion of a phased identification of archaeological historic properties (refer to **EA, Appendix H**). The PPA includes stipulations for the completion of archaeological identification surveys, and as needed, evaluation of archaeological sites and mitigation of archaeological historic properties. The PPA also includes stipulations for the Section 106 review of Project fill sources, for which the Project has the potential to adversely affect archaeological historic properties. Therefore, potential indirect and cumulative effects are analyzed below.

1. Indirect Effects

Potential indirect effects could occur to cultural resources resulting from future increased population growth and development in the APE and Archaeological APE, which could occur as future redevelopment of the Project study area occurs as described in the *South Market Street Master Plan*. However, the APE and Archaeological APE are located within a previously disturbed, developed urban environment that primarily features properties historically associated with transportation, manufacturing, and industry. As noted in the *Architectural Evaluation-Level Survey Technical Report (EA, Appendix F)*, the majority of properties identified within the APE are located along the southern half of the APE on either side of South Market Street; several warehouses are north of the Christina River and the four shipyard-affiliated resources are on the western waterfront. These properties are generally in good condition, and properties that have been rehabilitated or renovated are sited north and west of the Christina River. Properties along South Market Street are generally in good to poor condition, with several of them vacant or unused; observed threats to these properties include deterioration and proposed redevelopment.

Through future redevelopment of the Project study area, more intensive land uses could lead to destruction or degradation of these resources, if older structures are cleared to make way for new construction. Archaeological sites could also be impacted by new construction accompanying land development. Thus, land development can lead to destruction or altering the integrity of historically important characteristics of archaeological and historic architectural properties.

2. Cumulative Effects

Past actions that have affected cultural resources include infrastructure and land development projects that have occurred in the APE, Archaeological APE, and ICE Analysis Area. The APE and Archaeological APE are in a previously disturbed, developed urban environment that has seen a relatively stable population and more recent revitalization and growth of Wilmington's downtown and riverfront in the past 20 years (City of Wilmington, 2019). This has resulted in some destruction or degradation of historic properties for new construction or changes in land use. As noted in the *Architectural Evaluation-Level Survey Technical Report (EA, Appendix F)*, the west Christina riverfront underwent redevelopment beginning in 1996, and as a result many abandoned and dilapidated industrial buildings were demolished or restored. Historic properties within the APE have also been renovated or rehabilitated. The four NRHP-eligible Dravo Cranes have been incorporated into the Riverwalk, a government-funded revitalization effort along the formerly industrial waterfront.

Present and future actions, including transportation projects and land development activity, may continue to affect cultural resources to some extent; however, for Federally funded transportation projects, existing protective regulations and consultation requirements associated with Section 106 would minimize and mitigate for such effects, reducing the overall net effect to historic properties.

The only development within the APE and Archaeological APE that is dependent on completion of the Build Alternative is the future redevelopment associated with the *South Market Street Master Plan*. However, the future redevelopment of the Project study area is concentrated within a small portion of the ICE Analysis Area and is not anticipated to have as much effect to cultural resources as previous actions, including those that occurred prior to and within the ICE time frame. The Build Alternative would have no adverse effects to historic architectural resources, and effects to archaeological resources have not yet been determined. The PPA (**EA, Appendix H**) documents additional work and commitments that would be required following the NEPA decision, including the Section 106 review of Project fill sources, for which the Project has the potential to adversely affect archaeological historic properties.

As noted in **Section IV.B**, many portions of the ICE Analysis Area are anticipated to see future population decrease, and much of the future population growth in the ICE Analysis Area is anticipated to occur within the Project study area where potential direct effects (to archaeological resources) could occur, in downtown Wilmington, and several other locations (**Figure 8**). Future development within the ICE Analysis Area is also anticipated to primarily focus on redevelopment in locations where development has already occurred, or where there is existing or planned infrastructure to support this growth (City of Wilmington, 2019; New Castle County, 2022b). Effects to cultural resources have likely been experienced in these previously disturbed areas over time as development has occurred. While the Build Alternative is subject to compliance with Section 106 regulations that limit the direct effect of the Project on cultural resources, potential effects would occur in urban areas that have been previously disturbed and developed. In light of past, present, and future actions in the ICE Analysis Area, the Build Alternative is not expected to contribute substantially to the incremental effect on cultural resources.

C. Natural Resources

Direct effects to natural resources are summarized in **Table 12** and discussion of potential indirect and cumulative effects follows. Refer to the *Natural Resources Technical Report (EA, Appendix I)* for more detailed discussion of each resource.

1. Waters of the US and Subaqueous Lands, Including Wetlands

Jurisdictional Waters of the US (WOTUS), which includes wetlands and surface waters, are afforded regulatory protection under Section 404 of the Clean Water Act. The US Environmental Protection Agency (EPA) and US Army Corps of Engineers (USACE) share responsibility for implementing Section 404, which specifically regulates dredge and fill activities affecting WOTUS. The DNREC Wetlands and Subaqueous Lands Section also regulates activities in Delaware's wetlands, waterways, and subaqueous lands that may require a permit under state law.

The Project study area is bound to the north and west by the Christina River, which drains to the Delaware River east of the study area. The Project study area is entirely located within the Lower Christina River 12-digit HUC watershed (**Figure 3**). The greater ICE Analysis Area also includes portions of the Broad Duke Canal-Delaware River, Delaware Bay-Deep, Lower Brandywine Creek, and Little Mill Creek 12-digit HUC watersheds.

Environmental scientists conducted a wetland delineation to identify wetlands, waters, and subaqueous lands within the Project study area from November 2018 through May 2022. Three tidal waters; one non-tidal, perennial WOTUS; one estuarine emergent wetland; one palustrine emergent wetland; two DNREC mapped tidal mudflats; three DNREC state mapped tidal marsh areas; and five DNREC subaqueous lands

were delineated within the Project study area. Additional information can be found in the *Natural Resources Technical Report (EA, Appendix I)*.

As shown in **Table 12**, the Build Alternative is anticipated to directly affect approximately 0.8 acres of USACE waters, 1.0 acres of USACE wetlands, 0.3 acres of DNREC tidal marsh wetlands, 1.1 acres of DNREC tidal mudflat wetlands, and 0.2 acres of DNREC subaqueous lands. Direct effects to wetlands and waters associated with construction of the Project include grading, riprap installation, and construction-related access. Direct effects may lead to a decrease in available wetland and waters habitat within the Project study area and ultimately a decrease in plant and animal species inhabiting these areas.

The full ICE Analysis Area contains approximately 2,800 acres of wetlands according to National Wetlands Inventory (NWI) mapping.

Table 12: Quantifiable Natural Resources Direct Effects

Resource	Temporary (acres)	Permanent (acres)	Total (acres)
DNREC Tidal Marsh Wetlands	0.2	0.1	0.3
DNREC Tidal Mudflat Wetlands	0.9	0.3	1.1
DNREC Subaqueous Lands	0.1	0.1	0.2
USACE Wetlands	0.7	0.3	1.0
USACE Waters	0.5	0.3	0.8

Because the Build Alternative is anticipated to directly affect waters and wetlands as shown in **Table 14**, indirect and cumulative effects of the Project were analyzed.

Indirect Effects

Indirect effects to wetlands and waters could result from remediation and future development of the parcels adjacent to the transportation infrastructure improvements and from roadway runoff, sedimentation, and changes to hydrology. Indirect effects are anticipated to lead to a decrease in available wetland and waters habitat within the Project study area and could ultimately lead to a decrease in plant and animal species inhabiting these areas. The Project study area is contained to a small area within the Lower Christina River 12-digit HUC watershed and is not likely to result in indirect effects further downstream along the Christina River or where the Christina River drains to the Delaware River east of the Project study area.

Wetland and stream effects from the Build Alternative are unavoidable. These unavoidable effects have been minimized to the extent practicable while still achieving the contaminant cleanup goals for the proposed transportation infrastructure improvements and meeting DNREC stormwater regulations. Any effects to wetlands and waters would be regulated by and would require permitting from the USACE and DNREC. Specific details on permits that would be required are included in the *Natural Resources Technical Report (EA, Appendix I)* and EA. Indirect effects would be minimized by the required permitting process, which would identify avoidance, minimization, and mitigation as needed to offset wetland losses.

Cumulative Effects

Past land use development and transportation projects have had effects on wetlands and waters, particularly those that occurred prior to the passage of state and Federal laws that regulate wetland and water effects. Since laws were implemented, effects to wetlands have largely been offset by required

mitigation, including construction of new wetlands. Loss of natural wetland acreage within the ICE Analysis Area was likely lost prior to the ICE time frame, which begins in 2000. The LULC data presented in **Table 3** shows that wetlands and waterways in the ICE Analysis Area have remained relatively stable, with small increases of acreage for wetlands between 2007 and 2017. In summer 2022, construction of the South Wilmington Wetlands Park, just east of the Project study area, was completed to enhance and restore wetlands within the ICE Analysis Area.

As shown in **Table 12**, the Build Alternative is anticipated to have direct effects to wetlands and waters, most of which would be temporary. Effects would be required for grading, riprap installation, and construction-related access. Direct effects to wetlands and waterways would be regulated by the USACE and DNREC.

The Build Alternative is anticipated to contribute a relatively minor incremental effect towards the long-term trend of wetland loss, which has more recently slowed due to protective legislation. The incremental effect would be minimized by the required permitting process, which would identify avoidance, minimization, and mitigation, as appropriate. Additional information on permitting is included in the *Natural Resources Technical Report (EA, Appendix I)* and EA.

2. Surface Waters and Watershed Characteristics

Section 401 and Section 402 of the Clean Water Act regulate water quality and the introduction of contaminants to waterbodies. The Project requires a Section 401 water quality certification from DNREC indicating that anticipated discharges from the Project will comply with state water quality standards. In general, the National Pollutant Discharge Elimination System (NPDES) stormwater program requires permits for discharge from construction activities that disturb one or more acres, and discharges from smaller sites that are part of a larger common plan of development.

In compliance with Clean Water Act Sections 303(d), 305(b), and 314 and the Safe Drinking Water Act (SDWA), states develop a prioritized list of waterbodies that currently do not meet water quality standards. DNREC uses monitoring data to compare waterbody conditions to water quality standards and determine which streams should be listed. Surface drinking water is also protected under Section 401 and Section 402 of the Clean Water Act.

According to the DNREC 7401 Surface Water Quality Standards, the categories of beneficial use of each Delaware watershed must be maintained and protected through application of appropriate criteria.

The Project study area is located within the Christina River Watershed which is part of the larger Piedmont Drainage Basin. The Christina River covers about 50,000 acres and is the most urbanized watershed within the Piedmont Drainage Basin, flowing 35 miles west within an urban corridor from the Delaware River. Historically, industrialization along the Christina River negatively impacted habitat health and water quality; however, increased efforts to restore wetlands and waters throughout the watershed provides a wide range of benefits to residents and wildlife. The Christina River's tidal stretch begins at its confluence with the Delaware River and ends around Christiana, Delaware. Diverse wetlands, including non-tidal, riverine, and estuarine tidal marsh classifications, are located along the Christina River. The mid-Christina River waterbody is categorized as impaired.

The Build Alternative is anticipated to directly affect surface waters and watershed characteristics due to effects to tidal and perennial channels and the Christina River. However, the three channels the Project is

anticipated to affect have a drainage area of 0.03 square miles and provide an insignificant contribution of water flow to the Christina River, which has a drainage area of 565 square miles. Currently, the Project study area has 23.3 acres of impervious area. As part of the Build Alternative, all of the existing impervious surface would be removed. The proposed transportation improvements are anticipated to reduce impervious area to 18.6 acres, a decrease of 4.7 acres, which could reduce the amount and intensity of stormwater runoff entering surface water features within the Project study area.

Because the Build Alternative is anticipated to directly affect surface waters and watershed characteristics, indirect and cumulative effects of the Project were analyzed.

Indirect Effects

The Project and future redevelopment are anticipated to affect surface waters and watershed characteristics due to direct and indirect effects to tidal and perennial channels and the Christina River. However, the three channels the Project would affect provide an insignificant contribution of water flow to the Christina River. Site drainage would continue to convey water that currently flows into these channels to the Christina River.

Construction of future development is also anticipated to increase the amount of impervious surface area within the watershed, which could increase the amount and intensity of stormwater runoff entering surface water features within the Project study area. The Project's Build Alternative would reduce impervious area from 23.3 acres to 18.6 acres; however, as future development occurs on the Project study area, there would likely be an overall increase in impervious area, which could indirectly impact stormwater runoff.

Pollutants such as oil, grease, sediment, heavy metals, and petroleum that have been transported from impervious surfaces via stormwater runoff could be released into waterbodies around the Project study area. Without proper construction controls, contaminated soils and runoff would enter nearby surface waters. There is evidence indicating that even low levels of some contaminants of emerging concern in the environment may affect wildlife, but no indication that they pose a threat to human health from consuming water treated to current EPA standards.

In accordance with the Delaware 5101 Sediment and Stormwater Regulations, the quality and quantity requirement would be met through brownfield remediation and conveyance structure use. Stormwater best management practices (BMPs) would not be used. As detailed in the remedial action plans, a minimum 18 inch thick, clean fill cap will be used to prevent contaminated soil erosion and human contact in the transportation infrastructure improvement area. Hazardous material testing requirements will ensure that the clean fill used during construction is not contaminated. A closed storm drainpipe and short surface drainage swales will be used for the non-erosive conveyance. The surface drainage ditches are placed in clean fill to prevent stormwater runoff contamination.

These mitigations options would facilitate the flow and discharge of stormwater into the Christina River and reduce the possibility of direct or indirect effects of increased pollution and erosion. There are multiple Brownfield Development Agreements and remedial action plans in place for this Project. As discussed regarding floodplains below, resiliency solutions are proposed to be incorporated into the Build Alternative to further ensure efficient collection of surface runoff and adequate conveyance of stormwater throughout the Project study area to meet current and future needs.

Cumulative Effects

Within the ICE Analysis Area, past land use practices and development have had effects on surface waters, watershed characteristics, and relative health of surface waters despite existing regulations and policies. Of particular concern to surface waters are the interrelated effects of loss of native vegetative cover and increased stormwater flows, flooding, land surface and stream channel erosion, and sediment disposition during and after development. These combined negative effects typically accompany increases in land surface imperviousness over time. Additionally, the Project study area was formerly used for industrial purposes, and as a result, the surface waters and water quality have likely been impacted by contamination and pollutants in the past.

The Build Alternative is anticipated to affect surface waters and watershed characteristics. Quality and quantity requirements would be met through brownfield remediation and conveyance structure use.

Adverse effects on stream and water quality are likely to continue from development. Future redevelopment in the Project study area would likely increase the amount of impervious surface in the area. The ICE Analysis Area, which primarily consists of developed urban and suburban land uses, already has impervious surfaces which have been introduced through past and present transportation and land development actions. Overall, future development would likely result in lesser effects than past activities, due to state and local regulations pertaining to imperviousness, tree and forest requirements, floodplain buffers, stormwater, and sediment and erosion control measures designed to minimize impacts to surface waters and general watershed health.

The Project and future redevelopment would be contained to a small area compared to the approximately 12,300 acre ICE Analysis Area and would therefore contribute a relatively small incremental effect to an increase in impervious surfaces and stormwater runoff. As noted below in the discussion regarding floodplains, resiliency improvements proposed as part of the Project would also ensure efficient collection of surface runoff and adequate conveyance of stormwater throughout the Project study area.

3. Floodplains

Floodplains provide numerous natural and beneficial functions including flood moderation; water impurity and sediment filtration; groundwater recharge; habitat for fish, terrestrial wildlife, and plants; outdoor recreation space; and open space for agriculture, aquaculture, and forestry. Floodplains naturally and economically help to maintain water quality and reduce flood property damage by providing floodwater storage and decreasing water flow velocity and sedimentation.

Any actions (including construction) in base floodplains (i.e., 100-year floodplain) must comply with FHWA's regulation 23 CFR 650 Subpart A. 23 CFR 650 Subpart A prescribes FHWA policies and procedures for the location and hydraulic design of highway encroachments in floodplains. 23 CFR 650 Subpart A includes the FHWA policy of avoiding longitudinal and significant encroachment into the floodplain and minimizing adverse impacts to base floodplains while preserving natural and beneficial floodplain values and remaining consistent with the intent of the Federal Emergency Management Agency (FEMA) administered National Flood Insurance Program (NFIP). As administrator of the NFIP, FEMA has regulatory authority (i.e., 44 CFR 60.3) where they may designate special flood hazard areas and requires NFIP communities to regulate activities within such designated special flood hazard areas. As a community within the NFIP, the City of Wilmington follows those standards and requirements for activities in special flood hazard areas. Specifically, the City has promulgated a floodplain management ordinance applicable

to all development and new construction. The City of Wilmington Code of Ordinance (Sec. 48-572) states that construction is not permitted within special flood hazard areas without approval and new construction must be built 18 inches above the 100 year floodplain.

Floodplains within the Project study area were identified using the NFIP developed Flood Insurance Rate Map (FIRM) number 10003C0156L, effective January 22, 2020 (Refer to **Appendix A** of **EA**, **Appendix I**). The FIRM depicts that most of the Project study area is within Special Flood Hazard Area Zone AE (EL 9). The “Zone AE” indicates that area is subject to inundation by the 1% annual chance flood event (e.g., base floodplain). The (EL 9) indicates that those base flood elevations are 9 feet. Two small portions, (1) the northeast tip of the Project study area, and (2) a small area in the middle of the Project study area, are either within the 0.2% Annual Change Flood Hazard (i.e., 500-year floodplain) or an area of 1% annual change flood with average depth less than one foot or with average depth less than one foot or with drainage areas of less than one square mile. Another small area of the Project study is not within any mapped base floodplain.

The Build Alternative does include longitudinal encroachments of the FEMA 100-year floodplain. Any Build Alternative that would include transportation infrastructure improvements in the Project study area is anticipated to result in longitudinal encroachment, therefore attempting avoidance is not practicable in this location. The risks associated with Project encroachment into the floodplain are minimal. The Project includes fill to raise the transportation infrastructure 18 inches above the 100-year floodplain in accordance with City of Wilmington floodplain development code. In other words, the elevation of the new infrastructure would no longer be in the base floodplain, and not subject to flooding during the 100-year storm. The Project would support base floodplain development and per City code, the development would also be elevated 18 inches above the 100-year floodplain and not subject to flooding during a 100-year storm. Placing fill within a 100-year floodplain can cause an increase in floodplain elevations of other locations in the vicinity of the Project. To consider this flood risk, the Project team conducted hydraulic/hydrodynamic modeling of this entire vicinity. The modeling demonstrated that the proposed transportation infrastructure improvements and anticipated development (i.e., fill associated with the Project and anticipated development) do not increase base flood elevations. For additional detail on floodplains and modeling, refer to the Natural Resources Technical Report (**EA**, **Appendix I**).

The full ICE Analysis Area contains approximately 3,900 acres of FEMA’s 100-year floodplains according to FEMA’s USA Flood Hazard Areas GIS layer.

Because the Build Alternative would directly affect 51.9 acres of the 100-year floodplain, indirect and cumulative effects of the Project were analyzed.

Indirect Effects

Development and fill in the floodplain may alter flooding dynamics by reducing flood storage capacity and/or increasing the velocity of flood flows.

Indirect effects from the Build Alternative are anticipated to be negligible. The transportation infrastructure improvements proposed under the Build Alternative incorporate strategic resiliency solutions. The Project study area is expected to be entirely inundated in the case of the 100-year flood event under its current condition. The Build Alternative proposes to elevate the transportation elements in compliance with the City of Wilmington floodplain development code to protect the site from inundation and flood-related damage. While the existing South Market Street roadway will remain at its

existing elevation below the 100-year flood, all other proposed roads are proposed to be constructed at elevations above the 100-year flood except when connecting to existing streets at lower elevations. Additionally, proposed sidewalks and the Riverwalk would also be at elevations above the 100-year flood event. These Project elements are aligned with the City of Wilmington strategies to harden infrastructure vulnerable to sea level rise and extreme weather events.

The floodplain effect modeling included proposed development adjacent to the transportation infrastructure and found that the proposed development would not affect 100-year floodplain elevations. Additionally, indirect effects to floodplains downstream of the Project study area would not be anticipated.

A floodplain approval from the City of Wilmington will be required for the Project during final design. Floodplain applications are reviewed by the Floodplain Administrator, who interprets floodplain boundaries and proposed construction activities to assess impacts and provide approval of the Project. Additional information can be found in the *Natural Resources Technical Report (EA, Appendix I)* and EA. Stormwater management requirements for the Project require a minimum 18 inches of clean cap for the proposed transportation infrastructure improvements and non-erosive conveyance implemented. The clean cap will elevate the roadways and developable areas by 18 inches or more above the 100-year floodplain, in accordance with City of Wilmington code. This will protect life and property in the future.

Impervious surface is expected to increase overall as future development occurs in the Project study area. As part of the improvements associated with this Project, the Build Alternative would also add additional drainage outfalls to support the proposed transportation infrastructure improvements. The outfalls would be strategically located throughout the Project study area to address ongoing drainage issues and provide adequate conveyance for the proposed transportation infrastructure. The proposed storm drain and trench drain systems would be designed to provide efficient collection of surface runoff and adequate conveyance of stormwater throughout the Project study area. These proposed solutions would provide an overall improvement to the current drainage conditions to the tidally influenced Christina River throughout the Project study area.

As part of the Project and future redevelopment as detailed in the *South Market Street Master Plan*, open and recreational spaces would be constructed along the riverfront and throughout the Project study area as part of the stormwater management strategy. While not proposed as part of construction for this Project, future stormwater BMPs, including greenways, bioretention swales, vegetated green roofs, and street tree bioretention trenches have been incorporated into the *South Market Street Master Plan* to improve the ability of the site to detain water during storm events and reduce flooding. Additional BMPs, such as a below grade cistern, raingardens, and tidal intrusions may also be implemented as part of future redevelopment as laid out in the *South Market Street Master Plan*, resulting in beneficial indirect effects to flooding conditions. As future redevelopment progresses, page 124 of the *South Market Street Master Plan* indicates that further study would be required to “better determine the size and detailing of the various BMPs documented in relation to the volume of development and impervious surfaces.”

Additionally, according to the *South Market Street Master Plan*, future buildings that are constructed would be set at a minimum 1'-6" above the established floodplain elevation (9'0" above sea level) to meet FEMA requirements. The ground floor slabs of all occupied buildings would be set at 11'6", which would exceed FEMA requirements.

Generally, indirect effects to floodplains would be minimized through adherence to existing regulatory requirements and permitting. Additional information on regulatory requirements and permitting is included in the *Natural Resources Technical Report (EA, Appendix I)* and EA. Flooding and stormwater management conditions would be improved at the site as a result of the Project and as build out of the *South Market Street Master Plan* progresses.

Cumulative Effects

The Build Alternative is anticipated to encroach on the 100-year floodplain. As noted above, the Project proposes to raise the elevation of the proposed transportation infrastructure improvements and incorporate other improvements to minimize flooding. Stormwater management for the Project would be met by brownfield remediation and non-erosive conveyance; however, additional resiliency solutions and stormwater BMPs may be implemented at a later date through future redevelopment as laid out in the *South Market Street Master Plan* progresses.

The Project would align with the vision and recommendations set out in *Resilient Wilmington: Preparing Today for Tomorrow's Climate Risks* (City of Wilmington, 2022), which was prepared to assess Wilmington's current and future climate change risk and develop recommendations to mitigate and prepare for the effects of climate change. The proposed Project and future redevelopment would exceed City regulations that require the lowest floor of new buildings constructed in the floodplain to be at or above base flood elevation plus 18 inches. Additionally, specific recommendations related to waterfront development noted in the plan apply to the Project and the future redevelopment, such as incorporating site-scale measures like shoreline protection; updating standards including zoning and building codes to require larger setbacks from flood-prone areas, higher elevations, etc.; and higher standards for on-site retention of stormwater and incorporation of green infrastructure.

The incremental effect of the Build Alternative to floodplains, in light of past, present, and future effects, is expected to be relatively minimal due to existing regulatory controls and regulations, as well as an increased focus by the City of Wilmington to plan for and address the future effects of climate change.

4. Vegetation, Wildlife, Sensitive Species, and Habitat

The City of Wilmington regulates trees present within the road right-of-way, City Parks, and City owned parcels. Terrestrial wildlife in the Project study area is protected under several state and Federal provisions. The protection of all migratory birds is governed by the Migratory Bird Treaty Act, the bald eagle is protected under the Bald and Golden Eagle Protection Act, and the conservation of terrestrial wildlife in Delaware is managed by the implementation of state wildlife action plans (SWAPs) as initiated by the US Fish and Wildlife Service (USFWS).

Data on wildlife habitat and documented wildlife species within the Project study area were collected through analysis of aerial imagery of vegetative cover, incidental observations of wildlife species and related habitat made during various natural resource field investigations (e.g., wetland delineations), and data provided by the resource agencies. Composition of terrestrial wildlife species is limited by the highly urbanized and disturbed environments within the Project study area. The majority of the Project study area contains barren land, old fields, disturbed hedgerows/small forests, and tidal shorelines. The smaller remnant forest patches and old fields within the Project study area are primarily disturbed and contain numerous invasive vines, shrubs, and trees; surrounded by development, these provide marginal habitat for edge adapted and disturbance tolerant wildlife.

Terrestrial habitats identified within the Project study area include: barren lands, disturbed hedgerows/marginal forests, open fields, and urban and maintained areas. The majority of the vegetated area is contained within wetlands. Urban and maintained areas, as well as barren land, are the most common terrestrial habitats within the Project study area. There are some trees present based on aerial imagery, but they are contained within disturbed areas.

Section 7 of the Endangered Species Act of 1973 requires all Federal agencies to use their authorities to conserve endangered and threatened species in consultation with the USFWS and/or the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). The Delaware DNREC regulates activities that impact plants and wildlife, including their habitats under the Delaware Administrative Code, and maintains a list of state rare, threatened, and endangered species.

NOAA Section 7 mapping tools were used to assess potential impacts to protected marine species and the Information for Planning and Consultation (IPaC) tool was used to assess the potential presence of Federally listed species under the jurisdiction of the USFWS. The Federally listed Atlantic sturgeon and the shortnose sturgeon may be found in the Christina River in the Project study Area, as well as the Monarch butterfly. DNREC indicated in a letter dated September 6, 2023, that there are no records of state-rare or Federally listed plants, animals, or natural communities within the Project study area.

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and the Fish and Wildlife Coordination Act (FWCA) protect some of the fish and shellfish species that inhabit the Christina River. Under the MSFCMA, Essential Fish Habitat (EFH) is protected from adverse effects. Under the Delaware Administrative Code, erosion sediment control practices are required to follow standards that protect aquatic biota, wetlands, and nearshore shallow water habitat.

Field crews made observations of aquatic life within the Christina River, tidal wetlands, and tidal tributaries during investigations of the Project study area. The presence of aquatic life in smaller channels and wetlands was less common and centered around those areas where surface water appeared to be the most constant. NOAA EFH mapping was also reviewed to identify fish species with essential fish habitat within the Project study area. Essential Fish Habitat (EFH) was identified within the Christina River portion of the Project study area, and EFH Mapper results were provided to FHWA for consultation.

Because the Build Alternative is anticipated to have direct effects to vegetation, wildlife, sensitive species, and habitat, indirect and cumulative effects of the Project were analyzed.

Indirect Effects

Construction of the Project is anticipated to have little effect on vegetation since there is such a low cover of plants in the large areas of barren land and urban and maintained areas that currently exist within the Project study area. Construction of the Project would involve the removal of the remaining vegetation as there are several areas where hazardous materials need to be mitigated. The Build Alternative is anticipated to result in displacement of some edge specialized species, but a substantial loss of wildlife habitat due to construction of the Project would not result since there is currently a lack of wildlife habitat in the Project study area.

Since the area needed for the proposed transportation infrastructure improvements is proposed to be capped with a minimum of 18 inches of soil prior to development, it is not expected that there would be any remaining marginal forest habitat within the transportation infrastructure improvements area.

Indirect effects of construction for future development on the Project study area could involve some less motile wildlife being killed during construction and other more motile species shifting away from the new construction, potentially into already occupied territories requiring further movement into unoccupied suitable habitat, if available. The abatement of hazardous materials should improve wildlife habitat where it can recolonize. Proposed green space and tree plantings would provide habitat for wildlife, reduce the amount of invasive exotic species, reduce the amount of runoff from impervious surfaces, help provide cooling, and filter groundwater. In addition, the use of erosion and sediment control BMPs would help to minimize pollutant runoff into surrounding wildlife habitat.

Indirect effects to the candidate species, monarch butterfly, are expected to be minimal because the development parcels adjacent to the proposed transportation improvements contain no suitable monarch habitat. During construction, noise effects from pile driving have potential to affect the Federally listed Atlantic sturgeon and short nose sturgeon; however, the short duration of pile driving and production rate would cause minimal disturbance. Pile driving would take place on the intertidal shoreline of the Christina River and noise may be attenuated by the shallow water or no water pile driving conditions. In addition, in-water work would not take place from March 1 to June 30. Through programmatic consultation on July 17, 2023, the NOAA Greater Atlantic Regional Fisheries office (GARFO) agreed that the Project will not adversely affect the species. The construction of future development is not anticipated to result in indirect effects to sturgeons located in the Christina River downstream of the Project study area because that construction will occur inland.

To minimize effects to rare, threatened, and endangered species, various project design criterion (PDC) would be implemented. PDCs are impact minimization tactics that aim to control underwater noise, impingement/entrainment and entanglement, water quality/turbidity, habitat alteration and vessel traffic. Additional detail on proposed PDCs can be found in the *Natural Resources Technical Report (EA, Appendix I)* and its appendices.

The proposed construction may affect aquatic biota due to direct and indirect effects to tidal waters and wetlands. Permanent effects to aquatic biota may include mortality of aquatic organisms during construction and permanent loss of natural habitat from grading to cap hazardous materials and to create stable outfalls. Aquatic life passage is not anticipated to be affected by construction since the affected channels do not extend beyond the Project study area. Temporary effects to aquatic biota could result from minor sediment discharges during construction, however these impacts will be limited by erosion and sediment control BMPs. Indirect effects to aquatic biota downstream from the Project or construction of future development in the Project study area are not anticipated. GARFO determined that the Project is not in compliance with all programmatic EFH conservation requirements, however the adverse effects to EFH are not substantial. Project approval was granted by NMFS on July 27, 2023. (Refer to the *Natural Resources Technical Report (EA, Appendix I)* for additional information.)

Cumulative Effects

Past land development and transportation projects have affected wildlife and wildlife habitat in the ICE Analysis Area, some of which may have occurred prior to the ICE time frame. Generally, the ICE Analysis Area is developed and consists primarily of urban and suburban land uses, where wildlife habitat may be limited or fragmented as a result of development and past land disturbance. As noted above, the Project study area is a former industrial site that is highly urbanized and contains disturbed environments that consist of barren land, old fields, disturbed hedgerows/small forests, and tidal shorelines. The smaller

remnant forest patches and old fields within the Project study area are primarily disturbed and contain numerous invasive species providing marginal habitat for edge adapted and disturbance tolerant wildlife. There is little vegetation in the Project study area, which was previously used for industrial purposes and is currently underutilized and mostly vacant. Additionally, aquatic habitat and biota within the Project study area have been historically affected by population growth, industrial and urban development, and harvesting of natural resources.

As part of the Build Alternative, proposed open and green space would be added, and remediation efforts for hazardous materials are anticipated to improve habitat in the Project study area. The Project will include tree plantings and additional green space that would create habitat for wildlife where limited habitat currently exists, reduce the amount of invasive exotic species, reduce the amount of runoff from impervious surfaces, help provide cooling, and filter groundwater. In addition, the use of erosion and sediment control BMPs is anticipated to help minimize pollutant runoff into surrounding wildlife habitat. The Build Alternative is not anticipated to affect any unique or sensitive areas.

The Build Alternative would not contribute incrementally to the overall cumulative effect on vegetation, wildlife, sensitive species, and wildlife habitat, given a lack of vegetation and wildlife habitat located within the previously disturbed and contaminated former industrial Project study area. These cumulative effects will be reduced by applicable Federal, state, and local laws and regulations.

D. Noise

Federal requirements for completing a highway noise analysis are derived from NEPA, and are established in Title 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise*. Highway noise abatement procedures, coordination requirements, and design noise levels in 23 CFR 772 constitute the noise standards mandated by 23 USC 109(i). The City of Wilmington does not have a transportation noise policy that is in conformance with 23 CFR 772, therefore the Delaware Department of Transportation's (DelDOT) Noise Policy, which has been approved by FHWA, was employed for the Project's noise analysis.

To fulfill the requirements of 23 CFR 772, a Project noise analysis was completed, and the methods, results, and conclusions are provided in the *Noise Technical Report (EA, Appendix D)*. The results of noise modeling indicate that 24 receptors, representing 24 existing residential noise-sensitive land uses will be impacted by traffic-generated noise. The effects in the entire Project study area fall under Noise Abatement Criteria (NAC) Category B, all resulting from noise levels that meet or exceed the 66 decibels A (dBA) for the design year. There are no significant increases of 12 dBA or more associated with the Project. Common Noise Environment (CNE) B-01 (The River Towers at Christina Landing) is the only impacted CNE with design year noise levels that meet 66 dBA. 23 CFR 772 and the *Noise Technical Report (EA, Appendix D)* do not address the potential indirect and cumulative effects.

Undeveloped land, which includes much of the Project study area, falls under activity Category G in 23 CFR Part 772 Noise Abatement Criteria. This category applies to all lands that are undeveloped and do not have any development plans which have been issued bona-fide building permits by the effective date of public knowledge of the project. No mitigation will be considered for this land use category, but predicted noise levels, conveyed as distances from the edge of roadway for noise levels to reach impact criteria for various land uses, are provided so that local planning officials may consider them when permitting future development.

Because the Build Alternative is anticipated to have direct effects to noise, indirect and cumulative effects of the Project were analyzed.

1. Indirect Effects

The noise analysis conducted for the Project accounts for indirect effects because the existing, No-Build, and Build traffic data used for modeling anticipates reasonably foreseeable actions such as those from the future build out of the *South Market Street Master Plan*.

During construction of the Project, temporary noise effects are expected to occur in the Project study area. Areas around the construction zone are anticipated to experience varied periods and degrees of noise that differ from that of surrounding ambient community noise levels. Construction is anticipated to have a direct effect on the receptors located close to the construction site and have an indirect effect on receptors located near roadways where traffic flow characteristics are altered due to re-routing of vehicles from the construction area. Sources of noise could include earth-moving equipment, vibratory rollers, pavers, trucks, pile-drivers, jackhammers, and compressors. In most cases, the effect of increased noise levels associated with construction equipment is limited to within 300 feet of the source.

Project construction and construction of future development in the Project study area will be required to adhere to the City of Wilmington's municipal code on construction noise, Chapter 11 – Environment, Article III – Noise Control and Abatement, which provides restrictions on construction equipment and related activities, as well as defines construction operation times.

Some measures that may be employed to minimize the temporary construction noise include:

- All equipment shall comply with pertinent equipment noise standards of the EPA and have sound-control devices no less effective than those provided on the original equipment.
- No equipment may have unmuffled exhaust.
- Locate stationary construction equipment as far from nearby noise-sensitive properties as feasible.
- Shut off idling equipment.
- Schedule loud construction operations to avoid periods when noise annoyance is likely.
- Notify nearby residents whenever extremely noisy work will be occurring.
- Install temporary or portable acoustic barriers around stationary construction noise sources.
- Operate electrically powered equipment using line voltage power or solar power.

It is anticipated that trucks traveling to and from the Project site during construction would access the area via Interstate 495 (I-495), US Business 13/ South Market Street and Judy Johnson Drive. The construction plan would detail the construction of the main north-south spine road through the Project site first, currently identified as Orange Street which will be used as a temporary construction haul road. Construction trucks and vehicles would access Orange Street from Judy Johnson Drive, travel through the site, and exit via South Market Street. This approach would limit the indirect effects of construction-related traffic to existing regional roadways and minimize Project-related construction traffic and noise traveling through adjacent residential communities.

Once construction of the proposed improvements is complete, construction is anticipated to begin on the future mixed-use redevelopment of the Project study area, including residential, retail/commercial, and open space. Indirect effects of this construction are expected to result in similar temporary noise effects,

which would vary in tempo and intensity throughout the duration of construction. Much of this construction noise is anticipated to be contained within the Project study area. The *South Market Street Master Plan* is divided into 27 blocks with a mix of uses distributed throughout the site and is intended to be developed in phases; construction noise would not likely occur simultaneously across the entire Project study area during construction.

Once the future build out of the *South Market Street Master Plan* is complete, the redevelopment and activity that occurs from residents and visitors to the commercial and open spaces may introduce noise that was not previously at the Project study area. As noted on page 34 of the *South Market Street Master Plan*, the site is divided into 27 blocks with a mix of uses distributed throughout, which is “essential to create a dynamic, live-work-play community.” Any noise resulting from this mix of proposed land uses is anticipated to be distributed throughout the site and would not be in one concentrated area. Additionally, the Project study area is located in an urban environment in proximity to downtown Wilmington, the already redeveloped west Christina Riverfront, and various transportation facilities that already produce varying levels of noise. Therefore, the indirect effects due to potential increased population and activity on the site are anticipated to be minimal.

As noted above, the predicted noise levels for the undeveloped land are used by local planning officials to consider them when permitting future development. As future development progresses, these numbers would be considered in permitting the *South Market Street Master Plan*, and all future development that occurs would be consistent with the City of Wilmington’s noise policies and/or regulations.

2. Cumulative Effects

The Project is anticipated to have direct effects to 24 receptors representing 24 existing residential noise-sensitive land uses and is anticipated to result in temporary construction-related noise. As noted above, the Project is located within an urban environment that is close to downtown Wilmington, the already redeveloped west Christina Riverfront, and various transportation facilities. Additionally, the Project study area was formerly used for industrial purposes, and likely experienced various degrees of noise in the past while industrial operations were being carried out.

Past, present, and future residential, commercial, and transportation development within the ICE Analysis Area has occurred and will continue to occur. These developments have and will continue to introduce varying degrees of noise to the urban and suburban environments within the Project study area and the larger ICE Analysis Area. Generally, the noise analysis conducted for the Project accounts for cumulative effects because the existing, No-Build, and Build traffic data used for modeling incorporates past actions that have happened and anticipates reasonably foreseeable future actions such as the build out of the *South Market Street Master Plan* and other potential transportation improvements. As noted above in **Section IV.A.1**, much of the future development in the ICE Analysis Area will be focused on future redevelopment in areas where infrastructure is planned or already exists. The incremental effect of the Build Alternative to noise, in light of past, present, and future effects, is expected to be relatively minimal due to existing regulatory controls and regulations, as well as the already developed urban environment that it is located in.

E. Air Quality and Greenhouse Gas Analysis

1. Air Quality

Federal requirements for air quality analyses for transportation projects derive from NEPA and, where applicable, the Federal Transportation Conformity Rule (40 CFR Parts 51 and 93) for Ozone (O₃) and Particulate Matter (PM_{2.5}). NEPA guidance for air quality analyses for transportation projects are found on the FHWA website for planning and the environment.

As required by the Clean Air Act, the US EPA sets the National Ambient Air Quality Standards (NAAQS) for airborne pollutants that have adverse effects on human health and the environment. The NAAQs are a set of baseline standards for which state governments can choose to impose stricter standards.

The Project is included in WILMAPCO's currently conforming transportation plan (2023 Update: 2050 Regional Transportation Plan) and WILMAPCO's FY 2025-2028 Transportation Improvement Plan (TIP). Based on the criteria specified in the Transportation Conformity Rule and associated guidance, the implementation of the proposed Project is not considered to be one of "air quality concern" for fine particulate matter. Therefore, the Clean Air Act and 40 CFR 93.116 requirements for PM_{2.5} were met without a hot-spot analysis, since such projects have been found not to be of air quality concern under 40 CFR 93.123(b)(1). The analysis also addresses mobile air source toxics (MSATs) qualitatively and greenhouse gas (GHG) quantitatively, although neither are subject to transportation conformity requirements.

The EPA Greenbook¹⁷, which lists non-attainment, maintenance, and attainment areas shows that New Castle County is located in an area designated as an attainment area for all NAAQS except the 2008 and 2015 eight-hour O₃ as well as being designated a maintenance area for the 2006 PM_{2.5} standard.

Additional information is provided in the *Air Quality Technical Report (EA, Appendix E)*.

Because the Build Alternative is anticipated to have direct effects to air quality, indirect and cumulative effects of the Project were analyzed.

Indirect Effects

The Project team conducted assessments for CO and PM_{2.5}, qualitative analyses for MSAT, quantitative analyses for GHG impacts, and the regional conformity analysis for ozone. The results of these analyses could be considered indirect effects because they look at air quality impacts attributable to the Project that occur in the future and later in time. These analyses demonstrate that in the future: 1) air quality impacts from PM_{2.5} will not cause or contribute to violations of the PM_{2.5} NAAQS, 2) MSAT emissions will be significantly lower than they are today, and 3) conformity of the transportation and plan to the air quality state implementation plan (SIP) will be met, as the Project is included in WILMAPCO's FY 2025-2028 Transportation Improvement Plan (TIP).

Construction of the Project is anticipated to cause temporary increases in emissions which may be caused by heavy equipment and vehicle travel to and from the site, as well as from fugitive sources. The distance fugitive dust particles drift from their source depends on their size, emission height, and wind speed,

¹⁷ https://www3.epa.gov/airquality/greenbook/anayo_de.html

which could result in indirect effects from construction. Defined areas of the Project study area have also been impacted by contaminants from current and past site operations.

It is anticipated that trucks traveling to and from the Project site during construction would access the area via I-495, US Business 13/ South Market Street and Judy Johnson Drive. The construction plan would detail the construction of the main north-south spine road through the Project site first, currently identified as Orange Street which will be used as a temporary construction haul road. Construction trucks and vehicles would access Orange Street from Judy Johnson Drive, travel through the site, and exit via South Market Street. This approach would limit the indirect effects of construction-related traffic to existing regional roadways and minimize Project-related construction traffic traveling through adjacent residential communities.

Prevention and mitigation measures could be taken to minimize the potential particulate matter pollution problem, including measures during site preparation and construction. To reduce emissions generated by the Project, the contractor should consider BMPs for reducing construction emissions and improving energy efficiency during construction and employing operational and equipment strategies. Measures to minimize and mitigate hazardous materials and dust within the Project study area could also be implemented. All construction activities are to be performed per the DelDOT *Standard Specifications for Road and Bridge Construction*, which require compliance with all applicable local, state, and Federal regulations.

Regarding indirect effects associated with future mixed-use development, including commercial, retail, residential, and recreational land uses within the Project study area, EPA conducted a study comparing the environmental performance of brownfield redevelopments with their greenfield counterparts in five municipal areas in the United States.¹⁸ The brownfield redevelopments generally showed significant environmental benefits, including lower vehicle use and reduced carbon dioxide and air pollutant emissions. On average, neighborhoods on former brownfield sites had higher development density, better travel accessibility, and improved transit access.

There are clear environmental health benefits associated with compact development, such as what is planned for the Project and future redevelopment as laid out in the *South Market Street Master Plan*. While the plans for future redevelopment have not yet been finalized, it is anticipated that the indirect air quality effects of future redevelopment which are anticipated to include compliance with PM_{2.5} NAAQS, lower MSAT emissions, and SIP compliance may be beneficial for the Project study area and greater ICE Analysis Area. The future redevelopment of brownfields would reduce infrastructure needs, lower energy consumption, preserve green spaces, and encourage energy-efficient residences, which will have a significant and positive impact on air quality and emissions. Therefore, no substantial indirect effects to air quality are anticipated from the Build Alternative.

Cumulative Effects

Regarding the potential for cumulative effects, EPA's air quality designations for the region reflect, in part, the accumulated mobile source emissions from past and present actions. The regional conformity analysis conducted by WILMAPCO represents a cumulative effects assessment for purposes of regional air quality.

¹⁸ EPA, Air and Water Quality Impacts of Brownfields Redevelopment: A Study of Five Communities; EPA 560-7-10-232, (April 2011), <https://www.epa.gov/sites/default/files/2015-09/documents/bfenvirionimpacts042811.pdf>

The most recent conformity analysis was completed for the 1997 ozone standard and PM_{2.5} standard, including an updated conformity finding on March 2023. The analysis demonstrated that the transportation plan and program are in conformance with the SIP and the Project is not anticipated to cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the NAAQS established by EPA. Therefore, the cumulative effects of the Project are not expected to be significant and will not cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the NAAQS established by the EPA.

2. Greenhouse Gas Analysis and Climate Change

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the Earth's climate system. The Intergovernmental Panel on Climate Change (IPCC), established by the United Nations and World Meteorological Organization in 1988, is devoted to GHG emissions reduction and climate change research and policy. Climate change in the past has generally occurred gradually over millennia, or more suddenly in response to cataclysmic natural disruptions. The research of the IPCC and other scientists over recent decades, however, has attributed an accelerated rate of climatological changes over the past 150 years to GHG emissions generated from human activities, including but not limited to the production and use of fossil fuels, industry, and agriculture. The impacts of climate change are being observed in the form of sea level rise, drought, more intense heat, extended and severe fire seasons, and historic flooding from changing storm patterns.

Human activities generate GHGs consisting primarily of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride, and various hydrofluorocarbons. CO₂ is the most abundant GHG; although CO₂ is a naturally occurring and necessary component of Earth's atmosphere, fossil fuel combustion is the main source of additional, human-generated CO₂ that is the main driver of climate change. In the United States, the primary GHGs produced by the transportation sector are CO₂, CH₄, and N₂O. CO₂ emissions are a product of gasoline or diesel fuel combustion in internal combustion engines, along with relatively small amounts of CH₄ and N₂O. Vehicles with internal combustion engines are a significant source of GHG emissions of the transportation section and contribute to global climate change. GHGs are also emitted in the extraction and refining of transportation fuels, the construction and maintenance of transportation infrastructure, and the manufacture and delivery of vehicles.

The CEQ published interim guidance on January 9, 2023, regarding how to evaluate GHG emissions and climate change under NEPA. According to the interim guidance, when conducting climate change analyses in NEPA reviews, agencies should consider the potential effects of a proposed action on climate change, including by assessing both GHG emissions and reductions from the proposed action, as well as the effects of climate change on a proposed action and its environmental impacts. The CEQ interim guidance does not establish any particular quantity of GHG emissions as "significantly" affecting the quality of the human environment (CEQ 2023).

Currently, the Wilmington Riverfront area's infrastructure and transportation systems contribute to a small level of emissions, characterized by moderate vehicular traffic and limited availability of public transit options. The 2020 existing year, of which condition accounts for 11,309 average daily vehicle miles traveled (VMT), total annualized CO₂ equivalent (CO₂e) emissions is equal to 2,743 metric tons. At a state level, the transportation sector was the largest source of GHG emissions in Delaware in 2018, at 30% of the total GHG emissions. This existing condition sets a benchmark for evaluating the Project's potential to

increase or decrease greenhouse gas emissions, taking into account current emission levels and sources within the Project study area. The GHG and climate change impact analysis for the Project in accordance with the CEQ (2023) interim guidance is found in **Appendix B** of the *Air Quality Technical Report (EA, Appendix E)*.

Because the Build Alternative is anticipated to have effects to GHG emissions and climate change, cumulative effects of the Project were analyzed.

Project GHG Emissions and Effects

The effects from the Build Alternative on GHG emissions are multifaceted. By enhancing transportation infrastructure, the Project could lead to immediate changes in traffic patterns, potentially reducing congestion and improving vehicle efficiency, which in turn could lower emissions. However, construction activities associated with the Project are likely to result in an increase in emissions over time due to the additional traffic that will result from the proposed future development, which will travel the additional new alignment roadway built under the Project to serve the area. Additionally, the use of construction equipment and vehicles may result in increased GHG emissions of the Project.

The Project's GHG emissions stem from construction, operational, and maintenance (O&M) activities, as well as from vehicle operations. The most significant source of emissions is from construction and O&M results from the material energy use and emissions, material transportation, and construction process during the construction phase, in addition to vehicle delays resulting from modification of traffic.

GHG emissions from vehicle operation were also calculated by multiplying the vehicle tailpipe emissions by a 1.27 factor to account for the upstream GHG emissions associated with fuel extraction, production, and transportation. The overall well-to-wheel GHG emissions are the sum of the tailpipe emissions and the upstream emissions. When compared to the No Build Alternative in future years, the Build Alternative has increased emissions. The Build Alternative would increase GHG operation emissions by 1,417 metric tons of CO₂e (MT CO₂e) (76 percent) in 2040, and 1,411 MT CO₂e (75 percent) in 2060 compared to the No Build Alternative. The comparative increase between the No Build and Build Alternatives is primarily the result of new alignment roadway that is accounted for in the increased VMT. Summaries of the operational well- to-wheel GHG emissions of the existing condition and project alternatives are in the GHG Analysis (**Appendix E**).

GHG emissions stem from the Project's influence on development patterns, land use changes, and long-term transportation behaviors. The effects of the proposed infrastructure improvements would lead to increased density and higher vehicular traffic over time. This growth could result in greater energy consumption and emissions unless offset by sustainable development practices, such as increased use of public transit and the promotion of walking and cycling.

The design of the Build Alternative includes strategies to withstand the effects of climate change, such as incorporating pedestrian and cyclist accommodations to enhance connectivity and reduce carbon footprint; constructing a multi-use Riverwalk and park/open space areas for increased green space and public access to the riverfront; implementing infrastructure improvements to support sustainable future development; and elevating transportation elements to protect against flood-related damage. Proposed minimization strategies to address GHG emissions include: the implementation of construction best practices to reduce emissions, the integration of sustainable transportation options to lower future emissions, and the use of green infrastructure to enhance carbon sequestration. Efforts to minimize and

mitigate emissions are aligned with broader environmental objectives, ensuring that the Project contributes positively to the region's sustainability and resilience against climate change. Mitigating GHG emissions is vital for addressing climate change.

Cumulative Effects

Cumulative effects take into account the Project's emissions in the context of past, present, and reasonably foreseeable future actions. These include other planned developments and infrastructure projects in the Wilmington Riverfront area and their combined impact on GHG emissions. Evaluating cumulative effects requires a comprehensive approach that considers the incremental impact of the Project alongside other initiatives, assessing how these combined efforts contribute to or mitigate against regional and national greenhouse gas reduction targets. Cumulative Project GHG emissions were estimated by adding the Project construction emissions during the construction phase, and the O&M and vehicle operation emissions during 2030 and 2060. Year-by-year GHG emissions from vehicle operation between 2030 and 2060 were estimated by linearly interpolating the vehicle emissions. A 190% increase of GHG emissions is largely due to the traffic growth resulting from the planned development and infrastructure, and the VMT that travels the new alignment roadway of the Project. The cumulative social cost of GHG emissions (SC-GHG) of the Project is also summarized in the EA and GHG Analysis (**Appendix E**). The SC-GHG of the Build Alternative is anticipated to be about 188 percent higher than the No Build Alternative for the 2040 emission year, and about 187 percent higher than the No Build Alternative for the 2060 emission year.

F. Hazardous Materials

Over the past 25 years, the properties within the Project study area along with others in the Wilmington Riverfront area have been investigated with the oversight of DNREC and EPA to identify potential environmental issues and assess the best path forward for additional investigation and/or remediation for these properties where appropriate. More recently, the Project study area has been divided into certified brownfield sites and undergone Brownfield Remedial Investigations based on the proposed future land uses identified in the *South Market Street Master Plan* and *City of Wilmington Comprehensive Plan*. As part of the NEPA evaluation, a hazardous materials survey of the Project study area was conducted to assess the properties within the Project study area and the surrounding properties for the potential presence of environmental concerns that may require environmental planning during the engineering phase, remediation, and/or management during construction of the Build Alternative. The assessment was accomplished by performing an environmental database search, reviewing publicly available previous environmental reports and regulatory information, reviewing historic maps and aerial photographs, conducting visual observations, and summarizing status and required remedial actions for each site of potential concern.

The Build Alternative is anticipated to encounter areas of hazardous materials. There are 16 properties (23 sites) of potential environmental concern within the Project study area. The results of the survey found that three of the 23 sites have a low potential for hazardous materials to be present, 17 of the 23 sites have a moderate potential for hazardous materials to be present, and four of the 23 sites have a significant potential for hazardous materials to be present (red sites). Additional information on each potential site of concern is found in the *Hazardous Materials Survey Report*.

This Project complies with all aspects and amendments of the Resource Conservation and Recovery Act (RCRA), which was enacted in 1976 and sets the standards for providing technical and financial assistance

for the development of management plans and facilities for the recovery of energy and other resources from discarded materials and for the safe disposal of discarded materials and to regulate the management of hazardous waste.

Multiple Brownfield Development Agreements and remedial action plans for the Project study area are either in place with ongoing cleanup initiatives or are under development between the City, the RDC, the EPA, and the DNREC. The City, the RDC, the EPA, and the DNREC assume the responsibility of remediating the hazardous materials within the Project study area. These agreements are separate from this Project and would be followed subsequently. Additional details on the specifics on these additional remedial agreements can be found in the *Hazardous Materials Survey Technical Report (EA, Appendix C)*.

Because the Build Alternative is anticipated to have direct effects to hazardous materials, indirect and cumulative effects of the Project were analyzed.

1. Indirect Impacts

The Project study area is located on a site that includes certified brownfields, former oil/petroleum storage, fill sites, underground tanks, scrap metal collection/processing, auto storage, and tank trailer cleaning. Defined areas of the Project study area were determined to have been impacted by metals, volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), and/or polychlorinated biphenyl (PCB) from current and past site operations at varying levels of concentrations.

Since all sites within the Project study area are adjacent to each other, effects may include leaching of chemicals from one contaminated site to adjacent properties during construction of the Project or construction of the future redevelopment. Additionally, many of the contaminants have been found in the local groundwater, and indirect effects could include additional contamination resulting from leaching of these contaminants from the soil into the groundwater. Indirect effects of the No Build Alternative could include contaminated soils, as well as leaching of chemicals to adjacent properties and into the groundwater.

It is anticipated the Project study area will need a clean cap over contaminated soils. Highly contaminated soils would be removed, and fill would be placed to cover remaining contaminated soils. Since the Project study area contains certified brownfield sites and other contaminated areas, a remedial action plan will be implemented to prevent contaminated soil erosion and human contact with contaminated soil. The plan will include the addition of a minimum of 18 inches of clean soil over areas where the Build Alternative's proposed transportation infrastructure improvements would go. Hazardous material testing requirements would ensure that the clean fill used during construction is not contaminated. Erosion and sediment control practices to remediate the existing brownfields and to provide non-erosive conveyance would prevent contaminated soil from entering the Christina River and indirect effects associated with contaminants traveling downstream into the surrounding community from the Project study area.

When Project design is underway, design plans may be reviewed to identify opportunities to avoid or minimize effects to hazardous materials. Asbestos and lead-based paint surveys and hazardous materials assessments would be conducted for properties where they have not been completed, and an abatement and disposal plan would be developed. Project construction documents would also include a Contaminated Materials Management Plan (CMMP), Health and Safety Plan (HASP), and Environmental Specifications. The CMMP would outline the approach for managing hazardous materials at the Project

site, including prevention of spills and contingency plans to protect the Christina River, approach for stockpiling, testing and proper disposal of excavated materials, approach for treatment and disposal of groundwater, and procedures for handling underground storage tanks, piping, or other structures to minimize effects to the surrounding community and environment.

Remediation required for the proposed transportation infrastructure improvements that would occur as part of this Project and remediation carried out by the City of Wilmington, the RDC, the EPA, and the DNREC would ensure that the site is prepared and indirect effects from hazardous materials would be mitigated. While specific future redevelopment plans have not been finalized, all remedial measures would match the appropriate standards of future land use and would follow all applicable environmental laws and regulations.

Prior to acquisition by RDC, properties would be surveyed and divided into new parcels before entering into DNREC's Brownfield Development Program. This would allow for the Final Plan of Remedial Action (FRPA) to align with the proposed end use at the site. Remedial decisions would be made in cooperation with DNREC and would be risk-based decisions based on future use. Additional information on this process can be found in the *Hazardous Materials Survey Technical Report (EA, Appendix C)*.

2. Cumulative Impacts

The results of the hazardous materials survey found that three sites have low potential, 17 sites have moderate potential, and four sites have significant potential for hazardous materials to be present. As noted above, the Project is located on a site that includes certified brownfields, former oil/petroleum storage, fill sites, underground tanks, scrap metal collection/processing, auto storage, and tank trailer cleaning. Additionally, the site was formerly used for industrial purposes, including shipping and manufacturing, and has experienced contamination in its past.

Past, present, and future residential, commercial, and transportation development within the ICE Analysis Area has occurred and will continue to occur. These developments have and will continue to occur in areas that may contain contamination or hazardous materials, specifically in locations where former industrial activity has occurred. Remediation carried out by the City, the RDC, the EPA, and the DNREC would improve the Project study area. Future redevelopment is anticipated to bring beneficial land uses and future economic activity to the Project study area, which currently contains vacant, underutilized properties.

All remedial measures would match the appropriate standards of future land use and would comply with all applicable environmental laws and regulations. The incremental effect of the Build Alternative to hazardous materials, in light of past, present, and future impacts, is expected to be relatively minimal due to the due diligence that is being conducted and the proposed remedial actions that would occur during construction of the Project.

VI. Summary and Conclusion

This section provides a summary of the information presented in this *ICE Technical Report*, including the ICE Analysis for each resource discussed in **Section V**. Overall, the Build Alternative for the Project is anticipated to have direct effects to socioeconomic, cultural, and natural resources, hazardous materials, air quality, and noise. These would include direct effects to communities, EJ populations, businesses, land use, archaeological sites, wetlands and waterways, floodplains, noise, air quality, and hazardous

materials. Because direct effects are anticipated to result from the Project to these resources, indirect and cumulative effects were analyzed. Overall, the Project proposes to provide transportation infrastructure improvements. These improvements would lay the groundwork for future indirect effects of the Project, which include beneficial impacts to land use and the communities in and around the Project study area through future redevelopment as laid out in the *South Market Street Master Plan*. The Build Alternative, as described in **Section I.B.2**, proposes transportation infrastructure improvements, stormwater management and resiliency solutions, and remediation of contaminated soils where transportation infrastructure improvements are proposed.

Existing land use in the ICE Analysis Area includes a mix of commercial/industrial, residential, and wetlands land uses, along with waterways, roadways, mixed urban or built-up land, and smaller concentrations of other uses. The New Castle County, City of Wilmington, Town of Newport, and Town of Elsmere comprehensive plans focus on directing development to areas that are equipped to handle growth or contain existing/planned infrastructure, as well as redeveloping existing neighborhoods. The only planned development in the ICE Analysis Area that is dependent upon the completion of the Project is the build out of the *South Market Street Master Plan*.

Direct effects of the Build Alternative on environmental resources are summarized above in each resource-specific sub-section of **Section V**, as well as a more detailed discussion on indirect and cumulative effects. Potential indirect effects from the Build Alternative are anticipated to be primarily related to the conversion of former industrial, underutilized properties to a mixed-use, pedestrian-friendly development along the east Christina riverfront that would add residential, commercial, and open space and improve connectivity and mobility for vehicles (including public transportation), pedestrians, and bicyclists. Induced growth surrounding the Project study area is unlikely to result, as much of the surrounding area, including downtown Wilmington and the west Christina riverfront, is already a developed urban environment and contains established neighborhoods and communities. Additionally, the City of Wilmington and much of the ICE Analysis Area is anticipated to see negative population and employment growth between 2015 and 2050 (**Section IV.B**).

The Project proposes to provide infrastructure, including appropriate transportation infrastructure, such as the replication of the street grid, pedestrian/bicycle accommodations, and a Riverwalk within the Project study area. The need of the Project has arisen to further the connectivity of the riverfront area and provide multi-modal resources. In the Project study area, future land use changes and redevelopment of the east Christina Riverfront are anticipated to occur as laid out in the *South Market Street Master Plan*. The indirect land use, community, and mobility effects from the Project are expected to be beneficial to the Project study area and the surrounding area. Indirect effects of the Project, which would include the build out of the *South Market Street Master Plan*, are also anticipated to bring beneficial land uses to the Project study area to maximize the potential of what is currently underutilized property.

Indirect effects to cultural resources could occur from future redevelopment as more intensive land uses could lead to destruction or degradation of cultural resources if older structures are cleared to make way for new construction. Land development can lead to destruction or altering the integrity of historically important characteristics of archaeological and historic architectural properties. The Build Alternative would have no adverse effect to historic architectural resources; effects to archaeological resources have yet to be determined but will be resolved through the execution of a PPA (**EA, Appendix H**).

There would be potential for indirect effects to natural resources, including wetlands, waterways, and floodplains, including a potential increase in impervious area as future development progresses; however, the Project and future development are also anticipated to improve conditions by raising the site above the floodplain, implementing additional resiliency solutions, and meeting quantity and quality requirements through brownfield remediation and non-erosive conveyance, erosion and sediment control. Indirect effects to vegetation, wildlife, sensitive species, and habitat are expected to be limited due to the nature of the Project study area. Overall, effects to these resources would also be minimized by regulatory requirements and permitting. Details on the regulatory requirements and permitting needed for the Project can be found in the *Natural Resources Technical Report (EA, Appendix I)* and EA.

Effects resulting from noise are anticipated to primarily occur temporarily during construction of the Project and construction of the future mixed-use development. Indirect effects of future development on the site may introduce new sources of noise, but these levels are expected to be minimal considering the Project study area is located within a developed, urban environment. All development that occurs would be permitted and would be consistent with the City of Wilmington's noise policies and/or regulations.

Indirect effects resulting from construction of the Project and future redevelopment related to hazardous materials could include leaching of chemicals from one contaminated site to adjacent properties or groundwater. Remediation and capping of the contaminated soils required for the proposed transportation infrastructure improvements as part of this Project and remediation carried out by the City, the RDC, the EPA, and the DNREC would ensure that the site is prepared and indirect effects from hazardous materials would be mitigated.

Indirect and cumulative effects to air quality from the Build Alternative are not anticipated to cause or contribute to any violation of the NAAQS. Furthermore, the Build Alternative is accounted for in the annual conformity analysis conducted by WILMAPCO, which represents a cumulative effects assessment for purposes of regional air quality. Therefore, no substantial indirect or cumulative effects to air quality are anticipated from the Build Alternative. Indirect and cumulative effects to GHG emissions from the Build Alternative would include increased GHG emissions, primarily due to the construction and O&M, as well as from the VMT that travels the new alignment roadway.

To conclude, past development and transportation projects have had effects to socioeconomic, cultural, and natural resources, as well as noise and hazardous materials within the ICE Analysis Area. Reasonably foreseeable present and future projects will likely continue to affect these resources; however, effects would be lower due to the combined effects of laws and regulations that protect resources; the highly developed, urban Project setting; and zoning/land use regulations and planning processes established by the ICE Analysis Area jurisdictions.

The incremental effects of the Project, considered in light of the past, present, and future actions affecting the environment are anticipated to be minimal. The Project proposes to provide infrastructure that would be constructed to further the connectivity of the riverfront area and provide multi-modal resources. Ultimately, the proposed improvements would serve the area, which is anticipated to experience future redevelopment of underutilized, former industrial properties that are located in a developed, urban setting. As described in the *South Market Street Master Plan*, the Project study area is expected to eventually be transformed into a mixed-use, pedestrian-friendly environment that would benefit the Project study area and surrounding community. The Project study area is relatively small and contained, compared to the approximately 12,300 acres in the greater ICE Analysis Area. Therefore, the incremental

effect of the Project is not expected to be substantial compared to other projects that have occurred within the ICE Analysis Area.

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