IV. ENVIRONMENTAL CONSEQUENCES

Environmental resources will be impacted by the implementation of the Maryland State Highway Administration (SHA) Preferred Alternative (SHA Preferred Alternative), Alternative 5A. These impacts are discussed below. Refer to the *Draft Environmental Impact Statement, U.S. 50 Crossing Study – Ocean City* (**DEIS, April 2008**) for a detailed discussion of all environmental impacts associated with the Alternatives Retained for Detailed Study (ARDS).

A. SOCIOECONOMIC EFFECTS

1. Social Effects

This section presents information on how the SHA Preferred Alternative for the U.S. 50 Crossing Study would affect people and their residences, businesses, neighborhoods and communities, and community facilities and services.

a. Displacement and Property Effects

The SHA Preferred Alternative would displace six residential and two commercial buildings, the fewest displacements for the alternatives that include a new bridge. One of the commercial displacements includes the Shell Gasoline Service Station at the corner of Philadelphia Avenue and U.S. 50. This would be displaced to provide the connection to westbound U.S. 50 from Philadelphia Avenue. The SHA Preferred Alternative would require three acres of right-of-way (ROW) acquisition from 16 separate properties, primarily located on either side of the existing bridge tie-in to Division Street and on the west side of Philadelphia Avenue at North Division Street (see **Figure IV-1**).

b. Relocation Process

Property owners affected by displacement or ROW acquisition will receive relocation assistance in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, revised June 10, 2005, as amended* (**Appendix D**). This act requires that the project shall not proceed into any phase that will cause the relocations of any persons or proceed with any construction project until it has furnished assurances that all displaced persons will be satisfactorily relocated to comparable decent, safe, and sanitary housing within their financial means, or that such housing is in place and has been made available to the displaced person. Payments for cost of moving are also provided. All property owners from whom fee simple and perpetual ROW easements would be obtained would be compensated according to the Uniform Act and paid fair value for the affected property. Given the recent development in Ocean City and the surrounding area, there appears to be sufficient properties available on the market to accommodate any persons displaced by this project.

Legend

- (C) Commercial Displacement
- (R) Residential Displacement

US 50 CROSSING STUDY
MD 611 to MD 378
Worcester County

Alternative 5A
North Parallel Bridge

SHA	MAY 2012	FIGURE IV-1

Title VI Statement

It is the policy of the SHA to ensure compliance with the provisions of Title VI of the Civil Rights Act of 1964 and related civil rights laws and regulations which prohibit discrimination on the grounds of race, color, sex, national origin, age, religion, or physical or mental handicap in all the SHA program projects funded in whole or in part by the Federal Highway Administration (FHWA). The SHA will not discriminate in highway planning, highway design, highway construction, right-of-way acquisitions, or the provision of relocation advisory assistance. This policy has been incorporated in all levels of the highway planning process to ensure that proper consideration may be given to the social, economic, and environmental effects of all highway projects. Alleged discriminatory actions should be addressed for investigation to the Equal Opportunity Section of the SHA, to the attention of Mrs. Jennifer Jenkins, Chief, Office of Equal Opportunity, 707 North Calvert Street, Baltimore, Maryland 21202.

c. Environmental Justice

Based on the information provided by the U.S. Census Bureau, the Ocean City Department of Planning and Community Development, the Worcester County Department of Social Services, the Worcester County Board of Education, Ocean City Elementary School, and public outreach efforts and field reviews conducted by the SHA, no known minority or low-income census block groups with a "meaningfully greater" percentage of minority or low-income populations have been identified within the study area. The SHA anticipated that none of the alternatives would have a disproportionately high and adverse effect to environmental justice populations.

d. Effects on Neighborhoods and Communities

This section reflects a comparison of the effects of the SHA Preferred Alternative on neighborhoods and communities. Effects on communities typically fall into three categories: community cohesion; access and mobility; and quality of life. Air and noise impacts are not considered as part of this analysis. The air and noise analyses are presented in **Section IV.E** and **IV.F**.

Community cohesion refers to a personal recognition of belonging to a neighborhood or community through social interaction. Effects on community cohesion can be seen through changes in interaction among persons and groups, including changes in social relationships and patterns. Impacts on community cohesion can result from the loss or influx of residents due to residential structure displacements or from a physical barrier dividing or isolating a neighborhood or community.

Access and mobility refer to both vehicular and pedestrian access to other residents, businesses, community facilities, and public services within the community. Vehicular access can be affected in a number of ways, including availability of parking, changes in traffic patterns, or closure of roads. Pedestrian access can be affected by the creation or loss of sidewalks or crosswalks in a community. All new sidewalks and pedestrian facilities will be designed in accordance with applicable Americans with Disabilities Act (ADA) requirements.

Quality of life is an aggregate of community cohesion, access, and mobility, as well as health and safety concerns and social changes. Examples of health and safety concerns that can affect quality of life include changes in response times of police, fire, and emergency services. Examples of social change that can affect quality of life include displacements of neighbors, community facilities, or businesses.

The SHA Preferred Alternative would primarily affect the two blocks north of the existing bridge, resulting in the displacement of eight buildings (six residential and two commercial). The residential impacts would occur to the Bay Mist Apartments, located on North Division Street (three buildings with a total of approximately eight to 10 units), the Bridgeview Apartments, located at 206 North Division Street (approximately 10 units), an unnamed condominium building located at 210 North Division Street (six units), and an unnamed apartment building located at 3 St. Louis Avenue (approximately two to four units). Approximately 26 to 30 residential units would be displaced by the SHA Preferred Alternative. The commercial impacts include the Buoy Motel located at 2 St. Louis Avenue and the Shell Gasoline Service Station located at North Division Street and Philadelphia Avenue.

The remaining homes would not be isolated between the new and existing bridges, and traffic patterns and property access routes would be similar to existing conditions.

Parking at the base of the existing bridge would be impacted, but new parking along the new bridge might be possible, depending on the final design of the bridge. Two pay-to-park lots near the intersection of Philadelphia Avenue and Caroline Street would be partially impacted, resulting in the loss of approximately 20 spaces. A separate lot north of the existing bridge, near the intersection of North Division Street and St. Louis Avenue, would also be impacted, resulting in the loss of approximately 10 to 15 spaces. Some on-street parking along Division Street would also be lost (approximately 10 spaces). Approximately 75 parking spaces would be impacted overall but of those only about 35 are not associated with residential or business displacements. This estimate is based on preliminary design layouts, and will likely be revised as the project advances. Loss of parking spaces would translate to loss of future income to the owners of the pay-to-park lots.

The SHA Preferred Alternative would have very little effect on the West Ocean City community, requiring only minor property impacts north of the existing bridge and no residential or commercial displacements in this location.

e. Effects on Community Facilities and Services

Effects on local community facilities are measured by direct impacts (acquisition of property) and indirect impacts (changes in proximity, usage, or access). Noise impacts are not considered as part of this analysis. A separate noise study is being conducted to determine noise impacts.

Several community facilities and services will not be impacted. The Ocean City Elementary School would not be impacted by the SHA Preferred Alternative. No direct or indirect impacts to any religious institutions are anticipated from any of the SHA Preferred Alternative. The SHA Preferred Alternative would not impact the U.S. Coast Guard (USCG) Station that is within the

study area. Coordination with the USCG is ongoing, and will be considered in the ultimate selection of a preferred alternative (**Section VI, page B-54:B-64**). No direct or indirect impacts to the healthcare facilities, the Ocean City Library, located on 14th Street near the intersection with Philadelphia Avenue, Ocean City's City Hall or the U.S. Post Office are expected from the SHA Preferred Alternative.

Public Parks, Recreational Facilities, and Museums

The SHA Preferred Alternative will have no direct or temporary impacts on public parks, recreation facilities, or museums. A study of the existing U.S. 50 Bridge conditions will be conducted to determine the future potential for use to pedestrians or as a recreational facility (fishing pier) closer to the time of construction of the SHA Preferred Alternative.

Emergency Services

Emergency services (fire, police, and emergency medical services (EMS)) were contacted in June 2007. To date, only the Ocean City Police Department has responded and provided feedback (**Section VI, pages C-14: C-25**). The Ocean City Police Department has requested that SHA develop a traffic-management plan and coordinate with them before the project goes to construction. The SHA will continue to coordinate with the Ocean City Police Department and all other emergency services within and adjacent to the study area.

The SHA Preferred Alternative has the potential to facilitate travel between the mainland and the Ocean City peninsula for emergency vehicles responding to calls across the bay. The existing bridge would remain open during the construction of the new bridge, thereby eliminating the need for a significant detour.

Public Transportation

The SHA expects that the SHA Preferred Alternative will benefit the public transportation system, allowing more reliable connections between Ocean City and the western portion of the study area by improving the functionality of the U.S. 50 crossing and possibly reducing or eliminating the number of roadway closures associated with drawbridge openings. The existing bridge will remain in service during construction of the SHA Preferred Alternative, and since temporary road closures are not anticipated, continuous public transportation service will remain throughout the duration of construction.

The SHA Preferred Alternative would affect public parking in the downtown area of Ocean City due to some direct impacts to parking spaces as a result of ROW acquisition (**Section IV A.1.d.**).

2. Economic Effects

a. Regional Employment Effects

Ocean City is one of the most important economic engines in the State of Maryland, providing year round resort, conference, and entertainment destinations. Ocean City's attractions draw visitors from many areas along the eastern coast of the United States and from places beyond. Because of the popularity of this destination, many unique employment opportunities are created

that attract work forces from throughout the region, particularly in the peak summer months. Implementation of the proposed project is unlikely to affect these regional employment characteristics. The project proposes changes to an existing bridge that connects the Ocean City peninsula to the mainland. The economic characteristics of these areas are well established and unlikely to change due to the project's implementation.

b. Local Effects

The construction of a new crossing, as proposed for the SHA Preferred Alternative, is expected to decrease congestion and increase drive-by business opportunities. However, the SHA Preferred Alternative would result in two commercial displacements, which could affect employment options. Because Ocean City is approaching build-out conditions, relocation of these businesses in Ocean City could be difficult. Any altered traffic patterns could affect businesses by relocating the primary traffic patterns away from where the businesses are currently located. Certain businesses would benefit from the relocation of the U.S. 50 entrance into Ocean City by gaining increased visibility and drive-by traffic, while other businesses located at the existing U.S. 50 entrance into Ocean City would lose visibility and drive-by business, and access to these properties would become more circuitous.

c. Tax Base and Property Value Effects

The SHA Preferred Alternative would involve the displacement of residential and commercial buildings and the acquisition of ROW. The displacements would reduce the tax base by converting commercial or residential land to transportation uses. ROW acquisitions would reduce the value of the original parcel by reducing its size and decreasing the value of adjacent properties. The reduction in revenue caused by the displacements and ROW acquisitions would be minimal in comparison to total tax revenue for Ocean City and Worcester County.

3. Land Use Effects

a. Existing and Future Land Use Effects

The SHA Preferred Alternative will convert approximately two acres of commercial land use to transportation land use through the access required for the proposed new bridges in each alternative. Because Ocean City has nearly reached build-out, this type of conversion would be required for almost any transportation improvement that must occur outside the existing transportation corridors. The SHA Preferred Alternative is consistent with local land use plans.

b. Compliance with Smart Growth Initiatives

The Smart Growth Initiative requires state direct funding for highways and economic development to areas that are designated as Priority Funding Areas (PFAs). PFAs consist of existing communities and other locally designated areas as determined by local jurisdictions in accordance with "smart growth" guidelines. They seek to guide development toward existing towns, neighborhoods, and business areas by directing state infrastructure improvements to those

places. The project limits are entirely within the Ocean City PFA. Therefore, the project is in compliance with Smart Growth initiatives.

4. Effects on Livability Principles and Sustainability

The SHA Preferred Alternative is consistent with the FHWA livability principles and sustainability as described in **Section III.C.7.** This is supported by the following:

The U.S. 50 Crossing Study has maintained as one of its central themes the principle of economic competitiveness of neighborhoods by giving people reliable access to employment centers, educational opportunities and goods and services. SHA has worked extensively with the Ocean City, West Ocean City, and Worcester County officials to address local and regional transportation needs with respect to the development trends and setting of the communities.

The SHA Preferred Alternative will widen the U.S. 50 Bridge to maintain a safe and efficient crossing which provides access to and from the commercial center of Ocean City, and as one of three emergency evacuation routes from the barrier peninsula. The U.S. 50 Bridge is considered functionally obsolete due to its narrow curb-to-curb roadway width, which is substandard for the Average Daily traffic volumes that it carries, particularly during summer months when recreational traffic peaks. The SHA Preferred Alternative will provide a separate facility for pedestrians, bicyclists, and fishermen as compared to the current bridge with 5-foot sidewalks which can potentially create conflicts among the various users. The SHA Preferred Alternative would be designed in coordination with Ocean City to develop an aesthetically pleasing gateway to Ocean City.

These efforts have been specifically addressed to ensure that the project is being developed in concert with the respective and growth elements of each of the comprehensive plans. *The Draft Comprehensive Plan: Town of Ocean City Maryland* (2006) and *The Comprehensive Development Plan of Worcester County* (2006) have identified the study area as a highly developed residential and commercial area. The future land use identified in both plans is to maintain the current land use as it is today. The land use plans have identified improvements in transportation infrastructure as a means to achieve their future land use goals. The SHA Preferred Alternative will address the needs identified in the land use plans by alleviating traffic congestion throughout the study area. The reduced congestion will allow the residents and business owners in Ocean City and West Ocean City to experience an improvement in access to businesses within and surrounding Ocean City. In addition to improving community access, the SHA Preferred Alternative will provide improvements to pedestrian facilities. This will help enhance Ocean City by providing for more walkable neighborhoods.

B. CULTURAL RESOURCES

The requirements of the National Historic Preservation Act of 1966 (NHPA), as amended, are implemented by the regulations in 36 CFR Part 800. The NHPA regulates the Advisory Council on Historic Preservation (ACHP) and establishes the procedures for compliance with Section 106 of the NHPA. If standing and/or archeological historic properties listed in, or determined eligible for listing in, the National Register of Historic Places (NRHP) are identified (36 CFR §800.4),

the sponsoring agency must assess how its project will affect them. Throughout this assessment, the SHA and FHWA should work with the Maryland State Historic Preservation Office (MD SHPO) and consider the views of others, such as representatives of local governments, property owners, members of the public, and the ACHP. The assessment should use the criteria found in the ACHP's regulations and guidance (36 CFR §800.5).

According to the current guidance, "[a]n adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. 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."

In addition, according to the current guidance, examples of adverse effects on historic properties include, but are not limited to:

(i) Physical destruction of or damage to all or part of the property;
(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR Part 68) and applicable guidelines;
(iii) Removal of the property from its historic location;
(iv) Change of the character of the property's use or of physical features within the property's setting that contributes to its historic significance;
(v) Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;
(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
(vii) Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

In considering the potential effects of the project on the identified resources, the agency may make one of the following three determinations:

- No historic properties affected;
- No historic properties adversely affected; or
- Historic properties adversely affected.

In consultation with the MD SHPO, the FHWA and the SHA have identified eight cultural resources, all of which are historic standing structures that are eligible for the NRHP and lie within the U.S. 50 Crossing Study area of potential effects (APE). The MD SHPO's concurred

with the SHA determination of adverse effects on historic properties on December 18, 2007 (**Section VI – Comments and Coordination**).

1. Historic Standing Structures

a. St. Paul's by the Sea Episcopal Church (MIHP No. WO-326)

The St. Paul's by the Sea Episcopal Church is located on the northeast corner of North Baltimore Avenue and 3rd Street. The SHA has determined that the SHA Preferred Alternative will not impact this property or result in adverse effects.

b. Taylor House (MIHP No. WO-331)

The Taylor House is located at the northwest corner of Baltimore Avenue and Talbot Street. The SHA Preferred Alternative will not impact this property or result in adverse effects due to the distance between the proposed project and this property. In addition, the intervening residential and commercial buildings, as well as the distance, prevent physical, audible, atmospheric or visual impacts to the Taylor House.

c. Edwin L. Purnell Store (MIHP No. WO-336)

The Edwin L. Purnell Store is located on the east side of Baltimore Avenue, north of Dorchester Street. The SHA Preferred Alternative will not impact this property or result in adverse effects due to the distance between the proposed project and this property. In addition, the intervening residential and commercial buildings, as well as the distance, prevent physical, audible, atmospheric or visual impacts to this property.

d. Town Market (MIHP No. WO-337)

The Town Market is located on the east side of Baltimore Avenue, north of Dorchester Street. The SHA Preferred Alternative will not impact this property or result in adverse effects due to the distance between the proposed project and this property. In addition, the intervening residential and commercial buildings, as well as the distance, prevent physical, audible, atmospheric or visual impacts to the Town Market.

e. City Hall (MIHP No. WO-341)

The City Hall (formerly the Maryland State Teachers' College) is located on the west side of Baltimore Avenue at 3rd Street. The SHA has determined that the SHA Preferred Alternative will not impact this property or result in adverse effects because of the distance between the new bridge and the historic property.

f. SHA Bridge No. 2300700 (MIHP No. WO-461)

The SHA Preferred Alternative will have an adverse effect on the existing bridge. The SHA will remove the bascule span, which is the key/primary character defining element of the historic property. The physical demolition of a portion of the bridge results in the adverse impact. Under the SHA Preferred Alternative, the new bridge and new road connecting the bridge to Philadelphia Avenue and U.S. 50 will introduce limited new visual impacts. The proposed bridge for the SHA Preferred Alternative is approximately 45 feet from the SHA Bridge No. 2300700 and will be built at the same height as the existing bridge.

g. Emery-Hartman House (MIHP No. WO-553)

Under the SHA Preferred Alternative, the new bridge and new road connecting the bridge to Philadelphia Road and U.S. 50 will introduce limited new visual impacts, but these will not alter any characteristic that qualifies the Emery-Hartman House for the NRHP. Therefore, the SHA has determined that the SHA Preferred Alternative will have no adverse impact to the Emery-Hartman House.

h. Francis Scott Key Motel (MIHP No. WO-555)

The SHA Preferred Alternative will not impact the Francis Scott Key Motel or result in adverse effects due to the distance between the proposed project and this property. In addition, the intervening residential and commercial buildings, as well as the distance, prevent physical, audible, atmospheric or visual impacts to the Town Market.

2. Archeology

No archeological resources eligible for the NRHP would be impacted by the SHA Preferred Alternative.

3. Conclusion

Eight properties within the APE are listed, or eligible for listing, in the NRHP. Based on the analyses conducted, only SHA Bridge No. 2300700 will be adversely affected by the SHA Preferred Alternative. None of the remaining seven NRHP eligible structures will be adversely impacted by the SHA Preferred Alternative.

A Memorandum of Agreement (MOA) was developed among the FHWA, SHA, and the MHT to agree on mitigation for adverse impacts to the existing SHA Bridge No. 2300700. The MOA, dated August 19, 2011 (included in **Section VI**) formalizes the commitment to complete the field identification, evaluation, and treatment of this site as appropriate. The MOA also requires completion of the Section 106 process on all ancillary project activities that occur during final design and right-of-way acquisition.

C. Natural Resources

The following describes the impacts to natural resources as a result of the SHA Preferred Alternative.

1. Climate

Greenhouse gases are trace gases that trap heat in the earth's atmosphere. Naturally occurring greenhouse gases include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone. Other greenhouse gases such as chlorofluorocarbons, hydrofluorocarbons (HFCs), and perfluorocarbons, are created and emitted solely through human activities. The principal greenhouse gases entering the atmosphere because of human activities are CO_2, CH_4, N_2O, and fluorinated gases.

Transportation is a significant source of greenhouse gases. In 2006, transportation sources accounted for approximately one quarter of the total greenhouse gas emissions in the United States. Any process that burns gasoline and diesel fuel releases CO_2 into the air. CH_4 and N_2O emissions also result from fuel combustion, while HFC emissions are associated with motor vehicle air conditioners.

In contrast with trends in other air emissions, greenhouse gas emissions from transportation continue to rise, in large part because travel growth has outpaced improvements in vehicle energy efficiency. Transportation sector emissions have grown at an average rate of about two percent annually since 1990. The sector's emissions have grown considerably faster than those of other sectors, which averaged about 0.8 percent annually during the same period (U.S. DOT Center for Climate Change and Environmental Forecasting, 2008).

To date, no national standards have been established regarding greenhouse gases, nor has EPA established criteria or thresholds for greenhouse gas emissions. EPA issued a proposed endangerment and cause or contribute finding for six greenhouse gases and states that current and projected greenhouse gas concentrations in the atmosphere threaten the public health and welfare. The proposed finding states that certain greenhouse gas emissions from motor vehicles contribute to the atmospheric concentrations of greenhouse gases and to climate change. EPA's findings were finalized on December 7, 2009 and are the first steps towards the potential regulation of greenhouse gas emissions under the Clean Air Act. However, the findings do not have any direct implications on requirements for developing transportation projects at this time.

On February 18, 2010, the Council on Environmental Quality (CEQ) issued draft guidance for public consideration and comment on the ways in which Federal agencies can consider the effects of greenhouse gas emissions and climate change in their evaluation of proposals for Federal actions under National Environmental Policy Act (NEPA). At this time, the draft guidance does not have any direct implications on developing transportation projects because it is in draft form and potentially subject to substantial change.

It is also not useful or informative to make greenhouse gas emission comparisons among the FEIS alternatives. Relative to the global scope of the problem of climate change, any difference

in greenhouse gas emissions between the alternatives are not likely to be significant. The magnitude of the changes in climate caused by these scenarios and any corresponding impacts on environmental resources would be too small to measure, as current analytical tools are not sophisticated enough to accurately reflect such minute differences. Attributing any environmental consequence to the differences in emissions between the alternatives or assessing how each contributes to impacts occurring around the world is not possible in a meaningful way. As a result, the comparison of greenhouse gas emissions resulting from each analysis scenario will not provide information that will be helpful to the public or relevant to project decision-making.

The NEPA process is meant to concentrate on the analyses of issues that can be truly meaningful to the consideration of project alternatives, rather than simply "amassing" data. In the absence of a regional or national framework for considering the implications of a project-level greenhouse gas analysis, such an analysis would not inform project decision-making, while adding to the administrative burden.

Greenhouse gases are different from other motor vehicle emissions and appear to require a different approach to address their potential climate impacts. Pollutant emissions of concern last in the atmosphere for up to a few months and are regulated in individual metropolitan areas. CO_2 emissions, on the other hand, remain in the atmosphere far longer - over 100 years and are analytically problematic to conduct a project level cumulative effects analysis for a global-scale problem. Due to the interactions between elements of the transportation system as a whole, project-level emissions analyses would be less informative than ones conducted at regional, state, or national levels.

Because of these concerns, the FHWA concludes that CO_2 emissions cannot be usefully evaluated as part of the U.S. 50 Bridge Project Planning Study in the same way as other vehicle emissions are addressed. Climate change is inherently a global issue. The sources of greenhouse gas emissions that scientists believe are causing the current change in climate are from all over the world, and climate change does not easily lend itself to an analysis at a local level. Further, nothing in NEPA law explicitly requires an analysis of greenhouse gases at the project level and no national standards have been established.

2. Topography, Geology, and Soils Impacts

Topography and Geology

The SHA Preferred Alternative involves cutting and/or filling due to the proposed roadway realignment at the bridge termini and any necessary ramps on the Ocean City side. The cut/fill requirements of the SHA Preferred Alternative will be minimal due to the flat topography of the study area.

Soils

The majority of the soils within the study area have a low erosion potential. Mattapex fine sandy loam, which accounts for less than one percent of the study area, is considered to have a high erosion potential but is located outside of the proposed area of disturbance for any of the alternatives. Soil disturbances would occur predominantly where land grading is necessary to

construct the new roadway approach at the western terminus and to construct the ramps into Ocean City.

The majority of the area of disturbance is urban land and existing impervious surfaces. No hydric soils will be disturbed as part of this project. Best Management Practices (BMPs) will be implemented to decrease erosion effects during and after construction, including structural, vegetative and operational methods. The BMPs are all part of the Maryland Department of Environment (MDE) approved Sediment and Erosion plan that will be developed for this project in the design phase.

The SHA Preferred Alternative will increase impervious surface by nine percent (5.3 acres).

Prime Farmland Soils

There will be no impacts to Prime Farmland Soils or agricultural land as a result of the project.

3. Water Quality Impacts

a. Groundwater Impacts

Potential impacts to groundwater resulting from the proposed project are expected to be minimal. Potential sources of contaminants to groundwater include point sources and non-point sources. Point sources include landfills, underground storage tanks, surface impoundments, injection wells, spills, storage area and similar facilities. This project will include the construction of stormwater quality control facilities, but it is not anticipated that these types of facilities will contribute to groundwater contamination.

Non-point sources include facilities such as animal lots, onsite sewage facilities, agricultural land (fertilizer and pesticide runoff), and urban runoff. The SHA Preferred Alternative includes the conversion of pervious surfaces to impervious surfaces. The increase in impervious surface is expected to be approximately nine percent, most of which is associated with the bridge deck. The minimal conversion to impervious surface on land is expected to have little to no affect on groundwater recharge rates.

b. Surface Water Impacts

The purpose of the proposed project is to provide a transportation solution for the U.S. 50 crossing of the Sinepuxent Bay. The SHA Preferred Alternative includes a new crossing in the vicinity of the existing U.S. 50 Bridge. No other stream crossings are required for this alternative.

The Isle of Wight Bay and Sinepuxent Bay are classified as Use II (Shellfish Harvesting Waters) surface waters by the Maryland Department of Natural Resources (DNR). However, the DNR recommends that the Use I instream work time restriction may be more appropriate to protect anadromous fish species known to occur in Sinepuxent Bay, such as herring, shad, striped bass and perch (**Section VI – Comments and Coordination**). The Use I in-stream work restriction period is March 1 through June 15, inclusive, during any year. A Section 10/404 permit from the

COE and a Tidal Wetlands License from the State of Maryland will be required for any construction in open waters. Because Sinepuxent Bay is considered navigable waters, a U.S. Coast Guard permit is also required.

c. Avoidance and Minimization

The MDE requires stormwater management for highway development projects and the Chesapeake Bay Critical Area Commission (CAC) requires a net reduction in pollutant loadings for any development or redevelopment within the Intensely Developed Area (IDA) of the Critical Area.

Short-term, localized impacts to water quality would be expected from construction activities associated with the SHA Preferred Alternative. Bridge construction activities would be expected to produce temporary increases in turbidity levels and potential release of nutrients into the water column. In accordance with MDE and the U.S. Environmental Protection Agency (EPA) regulations, a National Pollutant Discharge Elimination System (NPDES) stormwater permit for construction activities will be required for the proposed bridge construction project.

A grading plan and erosion and sediment (E&S) control plan will be prepared and implemented in accordance with MDE regulations. The grading and E&S control plans will minimize the potential for impacts to water quality from erosion and sedimentation that would occur before, during, and after construction.

4. Jurisdictional Wetlands and Other Waters of the United States

a. Impacts

Impacts to wetlands are expected to be minor. The SHA Preferred Alternative would permanently impact in 0.02 acre and temporarily impact 0.04 acre of emergent tidal wetlands located along the north side of U.S. 50 on the western shoreline of Sinepuxent Bay.

Approximately 0.84 acre of permanent open tidal waters impacts and 14.11 acres of temporary open tidal waters impacts are anticipated with the SHA Preferred Alternative. The temporary open tidal waters impacts include the barge dredging area and the footings for the bridge pier. The permanent impacts are estimated based on the following assumptions: a pier will be located approximately every 100 feet along the entire length of the proposed bridge; each pier will be as long as the proposed roadway (87 feet) and will be 15 feet wide. The Waters of the United States (WUS) impact assessment also includes the area of WUS filled to construct the roadway and bridge abutments on the west end of the bridge. The bridge itself was not calculated as an impact to WUS since the height of the proposed bridge does not effectively cover the water surface. Disturbance to WUS during construction for the SHA Preferred Alternative would likely be within several hundred feet of the existing bridge and would be considered a temporary impact. The temporary impact to WUS includes the bottom excavation and dredging of approximately 80,000 cubic yards necessary to set the new footings and mobilize construction equipment.

Avoidance and Minimization Efforts

A detailed assessment of the project impacts to wetlands and other WUS has been conducted throughout the planning study in an effort to avoid and minimize impacts to tidal wetlands along Isle of Wight and Sinepuxent Bay. Several of the preliminary alternatives were dropped from consideration due to excessive impacts to the expansive tidal wetlands north and south of U.S. 50. The alignments of the ARDS reflect the efforts taken to minimize impacts to tidal wetlands. The shoreline adjacent to U.S. 50 is predominantly developed and supports only one small tidal wetland near Hooper's Restaurant. Additional measures to minimize impacts to this wetland, such as steep fill slopes, retaining walls and lengthening the bridge will be considered as the design progresses.

Impacts to open waters of Sinepuxent Bay will be minimized by locating the bridge abutments landward of the mean high tide line. Further minimization efforts will include minimizing the number and size of piers necessary for the bridge construction and utilizing construction techniques to minimize temporary construction impacts to open waters.

b. Wetland/Waterways Mitigation/Permits

Based on preliminary estimates, the proposed project would require approximately 0.88 acres of compensatory mitigation. Potential wetland mitigation sites identified in the December 2007 report *Tidal Wetland Mitigation Site Search and Suitability Evaluation for U.S. 50 Bridge Project* were rejected by regulatory and resource agencies. The agencies felt that the potential mitigation sites did not adequately mitigate for the impacts associated with the SHA Preferred Alternative. Instead of conducting a supplementary site search or exploring out of kind options, an alternative approach of contribution to the Maryland Department of Natural Resources Coastal Wetland Initiative (CWI) program or National Park Service (NPS) Assateague wetland enhancement program was discussed and concurred on by the regulatory agencies.

Pursuant to COMAR 26.24.05.01C-1E(2), out of kind creation and enhancement ratios are increased by a factor of two (2). Based on projected cost for one acre of enhancement associated with each program, the SHA, in coordination with MDE and USACE, has proposed to extend this ratio to 8:1 for the project's impacts to tidal wetlands and waters. Therefore, SHA would contribute to either the CWI or NPS Assateague wetland enhancement program at an 8:1 ratio for the project's impacts to tidal wetlands and tidal waters. The goals of both the CWI and NPS tidal wetland enhancement programs is to reestablish hydrology to human-altered high marsh sections of salt marsh complexes; stabilize water levels through recreation of permanent and semi permanent water bodies for aquatic invertebrates, fish, and submerged aquatic vegetation; control of common reed (*Phragmites australis*); and increase the quality and quantity of habitat and food sources for water dependent bird species while enhancing the functionality of low marsh tidal wetlands. With projected cumulative impacts of 0.86 acres to tidal wetlands and tidal waters, SHA would contribute an amount that would enhance 6.88 acres of previously disturbed high marsh communities (**Table IV-1**). The SHA will continue to investigate additional locations where tidal wetland mitigation could occur in the event that contributions to the CWI and NPS enhancement programs are deemed inadequate or unavailable at the time design funding becomes available. Following additional investigations prior to the design phase of study, further consultation with MDE, U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife

Service (USFWS) will determine which site, or sites, best meets the needs of the proposed project's compensatory mitigation requirements.

Table IV-1: Preferred Alternative – Wetland/Waters Impacts and Compensatory Mitigation

	Impacted System	
	Tidal Emergent Wetlands	**Tidal Waters**
Impact (acres)	0.02	0.84*
Mitigation Ratio Required	2:1	1:1
Mitigation Required (acres)	0.04	0.84*
Mitigation Enhancement Ratio Proposed	8:1	8:1
Mitigation Enhancement Proposed (acres)	0.16	6.72

*Based on assumption that only bascule span and support piers of the bridge would be removed. Credit for removal of additional piers could change current impact calculations.

5. Floodplains

The majority of the study area is within the tidal 100-year floodplain of Sinepuxent Bay. The SHA Preferred Alternative would impact 2.2 acres of the 100-year floodplain. The 100-year floodplain has been delineated using the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Maps. The placement of fill in tidal floodplains at the bridge abutments and approaches will not result in increased floodplain elevation or frequency.

Tidal floodplains are not regulated by the MDE as waters of the State. SHA will continue to coordinate with USACE on the permit required for impacts or disturbance to tidal floodplains.

6. Chesapeake and Atlantic Coastal Bays Critical Area

The *Maryland Stormwater Design Manual* (2009 Revisions) and *The Critical Area 10% Rule Guidance Manual* (CAC, 2003) will be used to determine the amount and types of stormwater management facilities needed. The MDE criteria will be based on the revised Chapter 5 of the Manual which utilizes Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP). The criteria set forth in the Critical Area Act require that any development within the IDA be designed with appropriate BMPs to achieve at least a 10 percent reduction of pre-development pollutant (phosphorous) loadings. The additional runoff from the proposed bridges associated with the build alternatives will be factored into the BMPs to ensure all runoff is treated properly by appropriate stormwater facilities. Both manuals will be followed to ensure that both sets of criteria are met with the overall design.

BMPs, as found in the Maryland Stormwater Design Manual, will be used throughout the project to reduce the effects of erosion, sedimentation and pollutant loading on groundwater and the Coastal Bays. These practices could include non-structural and mirco-scale practices, infiltration filtering systems (such as micro-bioretention), and vegetated swales. Should the aforementioned ESD practices not be feasible, then the larger scale practices such as stormwater management ponds, stormwater wetlands, or infiltration basins can be utilized.

The SHA Preferred Alternative will impact approximately 2.5 acres of the Critical Area (CA) - Intensely Developed Area (IDA) and approximately 1.2 acres of the 100-foot buffer. The impacts are due to the disturbance required for the tie-in of the bridge to existing U.S. 50 on the west end and to city streets on the east end, including removal of vegetation, placement of fill, and increased impervious area. Mitigation for any disturbance to the CA buffer will be required at 3:1 ratio and mitigation for disturbance to vegetation outside the 100-foot CA buffer will be required at a 1:1 ratio. All mitigation will be shown on a planting plan that identifies species, stocking density and a planting schedule. The SHA will continue coordination of the project with CAC staff during the design phase of the project.

7. Terrestrial and Aquatic Habitat and Wildlife

a. Terrestrial Habitat and Wildlife Impacts

Forest and Significant Tree Impacts

No forests or large or significant trees are located within the study area. Therefore, no forests or large or significant trees would be impacted by the SHA Preferred Alternative.

FIDS Impacts

No forest interior dwelling species (FIDS) habitat is located within the study area. Therefore, no FIDS habitat would be affected by the SHA Preferred Alternative.

Terrestrial Wildlife Impacts

The SHA Preferred Alternative would not affect the passage of wildlife into or out of any habitat areas.

b. Aquatic Habitat and Wildlife/Fisheries Impacts

The SHA Preferred Alternative would have short-term and long-term impacts to finfish in the project area. Construction activities associated with a new bridge would likely cause short-term direct in-water disturbances, such as suspension of sediment. Increased turbidity would likely result in decreased fish utilization while the turbidity persists. Because the coastal bay sediments in the project area are relatively free of contaminants, no toxic releases are expected. Some increases of nutrient levels may occur locally due to sediment disturbance, but this is expected to dissipate quickly due to the strong currents in the area. During the design phase of the project SHA will reevaluate all disturbance related impacts and will coordinate with the agencies regarding potential measures to minimize bottom disturbance during construction.

Dredging may need to occur to mobilize construction equipment on site and bottom excavation would need to occur in order to set the new bridge footings. Short-term suspension of sediment from dredging and/or excavation activities may result in direct impacts to feeding ability of fish and suffocation of fish eggs and larvae, while the dredging activity itself may result in entrainment of some fish eggs and larvae. This disturbance is not expected to be significant because the coastal bays in the vicinity of the inlet are high energy, dynamic areas with very

strong tidal currents. Species living in these habitats are largely adapted to these conditions and the displaced species should rapidly re-populate the area after construction has ceased.

The footings of the SHA Preferred Alternative would permanently impact approximately 0.84 acre of the bay bottom, while excavation for the barge access dredging and footing placement would have short-term impacts to approximately 14.11.acres of the bay bottom. In addition, the excavation may result in long-term impacts including loss of habitat utilized by fish for foraging and nursery area. Construction would also involve activities such as pile driving that would create short-term noise and pressure wave disturbances in the waterway that would cease when construction is complete.

The SHA Preferred Alternative is high enough above the water that increased shading of some of the waterway is not anticipated. The increase of hard structure of the footings would eventually colonize with epibenthic fauna (species living on the bay bottom) and serve as habitat for structure-oriented fish species (e.g. striped bass).

No Submerged Aquatic Vegetation (SAV) occurs in the potential footprints of the SHA Preferred Alternative and recent surveys have indicated that the natural low water clarity makes the area poor SAV habitat (Koch, 2007). As such, the slight deepening of the waterway that is likely to occur due to excavation and construction would not impact this resource or affect the fish species that rely upon it as critical habitat. A summary of the relative risk to each life stage, prey and habitat of each Essential Fish Habitat (EFH) species that may be found in the project area can be found in **Table IV-2**.

The habitat impacts caused by the SHA Preferred Alternative would not reduce the carrying capacity of the coastal bays for finfish. Consequently, the proposed project complies with the provisions of the Magnuson-Stevens Act, as amended. The Magnuson-Stevens Act is the primary law governing marine fisheries management in United States federal waters. SHA conducted an EFH assessment and submitted to NMFS on November 15, 2007. SHA will implement all the recommendations outlined by NMFS, in their letter dated December 17, 2007, regarding protection of the EFH and the species managed under the Magnuson-Stevens Fishery Conservation and Management Act.

c. Avoidance and Minimization

The protection of aquatic habitat and the fish species within the study area is of utmost importance. The impacts to fish are most likely to occur during construction. BMPs, such as turbidity curtains and bubble curtains, may be employed to avoid and minimize the potential for sedimentation/turbidity during construction. In addition, pile driving of hollow steel piles greater than four feet in diameter can cause an oscillation that is lethal to fish. Studies indicated that six pounds per square inch (psi) is the mortality threshold for pressure and that a lower value of four psi is appropriate to account for variations in equipment, driving energy and the environment. If steel pilings over four feet in diameter are required for bridge construction, mitigation such as sound dampening techniques would be required. The driving of piles will be conducted during the appropriate time of year to minimize the effects on fish. Bubble curtains may be used to minimize the shock wave effects of driving piles. Pressure waves below four psi would need to

be maintained during pile driving in order to be protective of fish (Colligan, 2003). Pile driving may also have adverse effects on fish populations and turbidity curtains may be required to prevent fish from entering the area of high pressure waves. NMFS may require time-of-year construction restrictions of April 1st through June 30th to be protective of the young summer flounder. Consultation with the DNR, USFWS and NMFS is ongoing and will continue throughout the planning, design and construction process in an effort to avoid, or minimize, impacts to fish and other important aquatic wildlife.

Table IV-2: Relative Risk to EFH Species as a Result of the Proposed Project

Species	Life stages				Habitat	Prey
	Eggs	Larvae/ Neonate	Juveniles/ Subadult	Adults		
Red Hake	none [1,2]	none [1,2]	low [3,5]	N/A	none / low	temporary, minor
Winter Flounder	N/A	N/A	moderate [3]	low	low [4]	temporary, minor
Windowpane Flounder	none [1]	none [1]	low [3,5]	low [3,5]	low [4]	temporary, minor
Atlantic Sea Herring	N/A	N/A	low [5]	low [5]	None	none
Bluefish	N/A	N/A	low [3,5]	N/A	low [4]	temporary, minor
Atlantic Butterfish	none [2]	N/A	low [3,5]	low [3,5]	None	temporary, minor
Summer Flounder	N/A	high [3,6]	low [3,5]	low [3,5]	Low	temporary, minor
Scup	N/A	N/A	low [3,6]	low [2,5]	low [4]	temporary, minor
Black Sea Bass	N/A	N/A	moderate [3]	low [2,5]	low [4]	temporary, minor
Surf Clam	N/A	N/A	none [2]	N/A	None	none
King Mackerel	low [1,2]	low [1,2]	low [3,5,7]	low [3,5,7]	None	none
Spanish Mackerel	low [1,2]	low [1,2]	low [3,5,7]	low [3,5,7]	low [4]	none
Cobia	none [2]	none [2]	low [3,5]	low [3,5]	low [4]	low
Red Drum	low [2]	low [2]	low [2,5]	low [2,5]	None	low
Sand Tiger Shark	N/A	N/A	low [5]	none [2,5]	temporary, low [8]	temporary, minor
Atlantic Angel Shark	N/A	low [5]	low [5]	low [5]	temporary, low [8]	temporary, minor
Dusky Shark	N/A	low [5]	low [5]	N/A	temporary, low [8]	temporary, minor
Sandbar Shark	N/A	low [5]	low [5]	none [2,5]	temporary, low [8]	temporary, minor

Key:
1 – spawning occurs offshore, very early life stages not found in coastal bays
2 – life stage rare/non-existent in project area
3 – life stage known to occur in project area
4 – minor, short-term habitat impacts during construction
5 – highly mobile species/life stage; species able to avoid project area during construction
6 – immobile life stage; life stage unable to avoid project area during construction
7 – low abundance of this species/life stages
8 – inshore habitat usage poorly understood

8. Rare, Threatened and Endangered Species

a. Impacts

Colonial Nesting Waterbirds

Skimmer Island, located north of the existing U.S. 50 Bridge, provides nesting habitat for the state listed endangered royal tern (*Thalasseus maximus*) and black skimmer (*Rhynchops niger*) and several other colonial nesting waterbird species of conservation interest. There are no anticipated direct impacts to Skimmer Island, or to the rare, threatened and endangered (RTE) species or their nesting habitat from any of the alternatives. However, potential indirect impacts may include increased potential for conflicts between traffic and birds in flight, the potential migration of Skimmer Island to the south, which would place Skimmer Island closer to the existing and/or new bridges, the potential erosion of Skimmer Island due to changes in the Bay's hydraulics and disturbance to the colonial nesting waterbirds during construction.

Skimmer Island and similar landforms may be steadily migrating to the south, leading to concerns that Skimmer Island may eventually move underneath or south of the existing U.S. 50 Bridge. The SHA recognizes our responsibility to consider the project's future actions under the provisions of Title 08 in COMAR regarding the potential to "jeopardize the continued existence" of the colonial nesting bird species utilizing Skimmer Island and protected by Natural Resources Article 10-2A.

The DNR has expressed concern that the existing bridge and past scour protection measures have already affected the hydrodynamics of Sinepuxent Bay and may be causing the erosion and possible migration of Skimmer Island to the south. Therefore, the SHA conducted a detailed study of the sand migration and hydraulic patterns in the Bay. The Sand Migration/Hydrodynamic Model CMS-M2D Version 3.2 predicted the effect of the No-Build Alternative and SHA Preferred Alternative on the sand migration patterns of Skimmer Island and shoals in the Bay. The model also examined the impacts of bridge changes on Skimmer Island and the flood shoals/channels. For the SHA Preferred Alternative, the model assumed the piers for the proposed bridges were spaced at 150 feet.

The model includes information that Skimmer Island formed partially underneath the U.S. 50 bridge and has migrated to the north from 1952 until the bridge was armored (for scour protection) in the late 1980's. This movement and evolution was primarily due to the effects of the Ocean City inlet and effects of the bridge. Further review of the evolution of Skimmer Island indicates that it is now getting smaller, but increasing in elevation, allowing Skimmer Island to become vegetated. The DNR is planning to deposit sand on Skimmer Island to counteract the erosion of the island. DNR added approximately 10,000 cubic feet of sand to Skimmer Island in March 2011. The data suggests that Skimmer Island is now migrating to the south, and may migrate to the bridge in 20 to 25 years. The affects of the existing conditions and SHA Preferred Alternative on the migration of Skimmer Island are summarized in **Table IV-3**. Future studies considering the potential effects to Skimmer Island will be conducted during the design phase of the project. Prior to a decision, SHA will consult the appropriate agencies and coordinate actions with impacts to Skimmer Island.

Table IV-3: Anticipated Impacts Determined by the Sand Migration Modeling

	Sedimentation	Hydraulics	Shorelines	Navigation
Existing Conditions	Skimmer Island slowly migrating west southwest, deposition west of the west channel, east channel widens, flood shoal accumulations south of bridge will be driven north by ocean swells, and deposition in channels south of bridge	High velocity flows continue east of channel. During flood tide, high velocity flows also occur in the central flood shoal, diverging at the existing scour protection rock beneath the bridge.	Slow sediment deposition along western shoreline. East channel deepens along bulkhead. Continued entry and reflection of ocean swell south of bridge.	Continued high flows in east channel and difficulties under draw span. Deposition in west channels south of bridge.
Preferred Alternative	Same as the existing conditions, except this alternative slightly reduces sediment driven north of bridge by ocean swell.	Slightly lowered currents south of existing bridge and in the east and west channels. Increased current south and east of Skimmer Island, in the main channel beneath the draw span, and between the new bridge supports.	Same as the existing conditions.	Same as the existing conditions

The results of the modeling indicate that the existing rock scour protection of the existing bridge provides a primary control over the hydraulics and sedimentation processes in the area. The existing bridge pilings also play a significant role in controlling hydraulics and sedimentation. The SHA Preferred Alternative would affect the hydraulics and sedimentation within a local vicinity (1,500 feet from new construction) of the proposed new bridge, but the far-field conditions will continue and evolve in a manner similar to the No-Build Alternative.

Continued coordination with DNR will be conducted to ensure that the design and ultimate construction will not adversely affect the State-listed endangered species or their habitat. If adverse impacts are unavoidable, the SHA will coordinate with DNR to ensure that appropriate mitigation is used.

Marine Turtles

Impacts to Individuals

Sea turtles are generally only found in the coastal bays during warmer months and are generally incidental, summer transients. Of the five Federally threatened and endangered sea turtle species of concern (green, hawksbill, Kemp's ridley, leatherback, and loggerhead turtles), loggerheads are most likely to be found in the coastal bays based on stranding data (Kimmel, 2004). From

1991 to 2003, 161 loggerhead sea turtles were stranded along Maryland's Atlantic Coast; nine of these individuals were stranded within the Sinepuxent or Isle of Wight Bays (Kimmel, 2004). Only 11 sea turtle strandings, comprised of loggerhead, Kemp's ridley, and green, have been recorded in the Sinepuxent and Isle of Wight Bays from 1991 to 2003 (Kimmel, 2004).

Construction activities associated with the SHA Preferred Alternative would likely dissuade sea turtles from utilizing the area during construction. However, the increased number of boats and vessel traffic during the construction period may result in increased collisions between sea turtles and boats or equipment. Based on consultations with NMFS staff, driving large diameter (greater than 48-inch) steel piles is unlikely to have a lethal effect on sea turtles but would likely cause them to avoid the construction area (Crocker, 2007). These impacts are expected to be negligible since sea turtles are more commonly found along the ocean coast of Maryland than within the Coastal Bays. Stranding data indicates that a substantially higher number of individuals were found along the ocean coasts than were found within the coastal bays over the 13-year study period (Kimmel, 2004).

Impacts to Habitat

Since there is no designated critical habitat within the project area, no impacts to sea turtle critical habitat are anticipated. No nesting for sea turtles is known to occur in Maryland waters or along the Maryland coastline (NMFS and USFWS 1991a, 1991b, 1992, 1993; USFWS and NMFS 1992). Hawksbill turtles are found rarely north of Florida and are unlikely to be using the project area. Therefore, no impacts to hawksbill habitat are anticipated. However, the coastal bays may be used as developmental and foraging habitat by other species of sea turtles in the summer months. A Biological Assessment, in accordance with Section 7 consultation, was completed in August 2007 to determine the presence of, and potential impact to, marine turtles within the Coastal Bays. NMFS concurred with FHWA's determination that the preferred alternative for improving the U.S. 50 Crossing is not likely to adversely affect any listed species under NMFS jurisdiction. Therefore no further consultation is required at this time. The SHA will continue to coordinate with NMFS regarding potential impacts to marine turtles during the design and construction phase.

Aquatic Species

The only Maryland DNR listed aquatic species known to exist in the Maryland coastal bays is the spotfin killifish (*Fundulus luciae*). The current status of the spotfin killifish is rare, and it is actively tracked by the DNR Wildlife Heritage Service. The SHA Preferred Alternative is expected to have minimal, if any, direct impacts to spotfin killifish since their preferred habitat is intertidal marshes. Temporary impacts to water quality (increased turbidity) temporarily reduce the local abundance of prey species including phytoplankton, zooplankton and small benthic organisms. Destruction of near shore habitat including tidal wetlands may reduce habitat and foraging areas for spotfin killifish.

b. Avoidance and Minimization

As part of the development of the SHA Preferred Alternative, several measures have been introduced in order to avoid or minimize the impacts to the natural environment. Avoidance and minimization efforts include, but are not limited to, lengthening the bridge structure, using steeper fill slopes and retaining walls, minimizing the proposed bridge width, potentially

utilizing the existing historic bridge for pedestrian and fishing, minimizing the approach roadway improvements, and modeling the hydrodynamic characteristics to ensure minimum affects to the flow dynamics of the Bay.

Colonial Nesting Waterbirds

The sand migration model will be used to modify the pier placement locations and/or adjust the pier spacing in an effort to direct the flows in such a way that Skimmer Island and other shoal systems are not affected by the project. Other options under consideration to reverse the possible migration and degradation of Skimmer Island may include the removal of some of the scour protection under the existing bridge to reduce the "weir" effect and provide increased sand availability to Skimmer Island. These design efforts may result in increased habitat for the colonial nesting bird species of concern and the stabilization of Skimmer Island (i.e. halting the southern migration). The SHA will continue to refine the bridge pier spacing/size options and scour protection options in an effort to avoid and minimize impacts to Skimmer Island.

Marine Turtles

Construction activities are only a short-term disturbance that would affect an area of approximately 200,000 square feet. Potential impacts to sea turtles as a result of construction will be minimized by avoiding in-water construction, to the maximum extent practicable, from April 1st to November 30th. Sea turtles are typically found in the coastal bays during warmer months and are incidental, summer transients. Construction mitigation, such as sound dampening techniques may reduce the effects of pile driving which can cause the marine turtles to leave the area. Consequently, the permanent bridge in-water structures are not anticipated to have an impact on sea turtles.

Aquatic Species

The protection of aquatic habitat and the fish species within the study area is of utmost importance. The impacts to fish are most likely to occur during construction. Pile driving of hollow steel piles greater than four feet in diameter can cause an oscillation that is lethal to fish. If larger sized piles are required, construction mitigation (sound dampening techniques) will be employed. BMPs such as turbidity curtains and bubble curtains may be employed to avoid and minimize the potential for sedimentation/turbidity during construction. In addition, the driving of piles may be restricted during the period between April 1st and June 30th to minimize the affects on fish. Bubble curtains may be used to minimize the shock wave effects of driving piles. Consultation with the DNR, USFWS and NMFS is ongoing and will continue throughout the planning, design and construction process in an effort to avoid, or minimize, impacts to fish and other important aquatic wildlife.

9. Maryland's Green Infrastructure Impacts

Because the study area does not contain any green infrastructure network components, there are no impacts to Maryland's Green Infrastructure associated with the SHA Preferred Alternative. During the mitigation design phase, SHA will consider the green infrastructure network when selecting potential mitigation sites in order to get the greatest ecological benefit from the mitigation project.

D. HAZARDOUS MATERIALS/WASTE IMPACTS

1. Potential Hazardous Materials Site Impacts

Several inventoried hazardous materials sites have the potential to be impacted by the SHA Preferred Alternative. Depending on the design and depth of required grading, subsurface water pipes, foundations, aboveground storage tanks (ASTs), and associated soil and groundwater could be impacted. Further investigation into the specific location of reported permanently out-of-use ASTs in relation to proposed U.S. 50 Bridge construction activities is recommended before property is purchased and construction is initiated.

2. Discussion of Potentially Impacted Site

It is anticipated that the SHA Preferred Alternative will have minimal property impacts to Site 7, located on the northwest side of the U.S. 50 Bridge on U.S. 50 (Ocean Gateway Highway). Two drinking water wells were observed on the south side of the main building during the site visit, as were two ASTs. The diesel AST is used to fuel the on-site emergency generator and boiler. The second AST (about 500 gallons) contains gasoline to fill boats and jet skis.
This facility is listed in the OCPCASES database, which indicates that there was a release from an AST at the property. No cleanup was reported. In addition, this facility is identified as an un-mappable site in the Emergency Response Notification System (ERNS) database: information indicates that a spill occurred on June 4, 1996, which affected the Bay. The source was a boiler/unserviced fuel line. Due to the improvements planned for the U.S. 50 Bridge, it is probable that this property will be impacted by the SHA Preferred Alternative.

E. AIR QUALITY

1. Methodology

To determine whether the U.S. 50 Crossing Study – Ocean City project meets the requirements of the federal Clean Air Act (CAA), an air quality impact assessment was conducted. The complete analysis is documented in the *Air Quality Technical Report* (published separately) and was submitted to the Air and Radiation Management Administration of the MDE and the EPA.

Air Quality Receptor Sites for this project were selected to ensure adequate coverage of the project area. Both free-flow and queuing analysis sites were used to predict existing and future air-quality-indicator pollutant levels. Free-flow receptor sites were generally placed adjacent to portions of the roadway that experience steady-state traffic flow and represent areas of potential human use within the project area. The Queuing Analysis receptor sites were selected to represent a modeling array in close proximity to the three worst-case intersections in the project area anticipated to experience future LOS of class “D” or lower.

2. Predicted Results of Micro-scale Analysis

Carbon Monoxide (CO)

None of the receptor sites in the project area yielded worst-case CO emissions in excess of the 1-hour National Ambient Air Quality Standards (NAAQS) of 35 parts per million (ppm) or 8-hour NAAQS of 9.0 ppm. Predicted CO concentrations were consistent through all cases, with the highest future concentrations found (as anticipated) near intersections at the queuing analysis receptors.

The 8-hour concentration levels were derived from the computer modeled 1-hour concentrations. Following the computation of the 1-hour concentration levels (using the MOBILE 6.2 and CAL3QHC models); a persistence factor is applied to the CO emission levels.

This persistence factor accounts for atmospheric dispersion over time, and is represented as a 0.7 multiplier in accordance with EPA modeling guidelines. The maximum calculated 1-hour and 8-hour CO concentrations are as follows:

- 6.7 ppm (1-hour) / 4.7 ppm (8-hour) for the existing facility (2004);
- 5.4 ppm (1-hour) / 3.8 ppm (8-hour) for No-Build (2030);
- 5.4 ppm (1-hour) / 3.8 ppm (8-hour) for the SHA Preferred Alternative.

Table IV-4 shows the individual 1-hour and 8-hour queue analysis CO concentration levels at each receptor site for the No-Build and SHA Preferred Alternative.

Table IV-4: Modeled Queuing Analysis CO Emissions in ppm

Receptor ID	Existing (2004)			No-Build (2030)			Alternative 5A (2030)	
	1-hour	8-hour		1-hour	8-hour		1-hour	8-hour
U.S. 50/ Route 611								
1	5.2	3.6		4.6	3.2		4.6	3.2
2	4.8	3.4		4.3	3.0		4.3	3.0
3	4.7	3.3		4.0	2.8		4.0	2.8
4	4.8	3.4		4.4	3.1		4.4	3.1
5	4.4	3.1		4.4	3.1		4.4	3.1
6	**5.7**	**4.0**		**5.2**	**3.6**		**5.2**	**3.6**
7	5.1	3.6		4.4	3.1		4.4	3.1
8	5.6	3.9		4.5	3.2		4.5	3.2
9	5.3	3.7		4.8	3.4		4.8	3.4
10	4.9	3.4		4.6	3.2		4.6	3.2
11	4.8	3.4		4.4	3.1		4.4	3.1
12	4.7	3.3		4.3	3.0		4.3	3.0
13	4.5	3.2		4.2	2.9		4.2	2.9
14	4.7	3.3		4.4	3.1		4.4	3.1
15	4.6	3.2		4.3	3.0		4.3	3.0
16	5	3.5		4.4	3.1		4.4	3.1
17	4.6	3.2		4.2	2.9		4.2	2.9
18	4.4	3.1		4	2.8		4	2.8
19	5	3.5		4.4	3.1		4.4	3.1

Table IV-4: Modeled Queuing Analysis CO Emissions in ppm

Receptor ID	Existing (2004)			No-Build (2030)			Alternative 5A (2030)	
	1-hour	8-hour		1-hour	8-hour		1-hour	8-hour
20	4.8	3.4		4.4	3.1		4.4	3.1
U.S. 50/Golf Course Road								
1	6.3	4.4		4.7	3.3		4.7	3.3
2	5.7	4.0		4.3	3.0		4.3	3.0
3	5.4	3.8		4	2.8		4	2.8
4	5.9	4.1		4.4	3.1		4.4	3.1
5	5.7	4.0		4.4	3.1		4.4	3.1
6	**6.7**	**4.7**		**5.2**	**3.6**		**5.2**	**3.6**
7	6.2	4.3		4.8	3.4		4.8	3.4
8	6.5	4.6		4.5	3.2		4.5	3.2
9	6.7	4.7		4.8	3.4		4.8	3.4
10	6.5	4.6		4.6	3.2		4.6	3.2
11	6.1	4.3		4.5	3.2		4.5	3.2
12	6	4.2		4.3	3.0		4.3	3.0
13	5.5	3.9		4.1	2.9		4.1	2.9
14	6.2	4.3		4.4	3.1		4.4	3.1
15	6.1	4.3		4.3	3.0		4.3	3.0
16	6.2	4.3		4.5	3.2		4.5	3.2
17	5.6	3.9		4.3	3.0		4.3	3.0
18	5.3	3.7		4.1	2.9		4.1	2.9
19	6.2	4.3		4.5	3.2		4.5	3.2
20	6	4.2		4.5	3.2		4.5	3.2
U.S. 50/ Philadelphia Ave (MD 528)								
1	4.4	3.1		4.2	2.9		4.2	2.9
2	4.3	3.0		4.1	2.9		4.1	2.9
3	4	2.8		3.8	2.7		3.8	2.7
4	4.2	2.9		4	2.8		4	2.8
5	4	2.8		3.9	2.7		3.9	2.7
6	5.4	3.8		5.1	3.6		5.1	3.6
7	5.3	3.7		5.1	3.6		5.1	3.6
8	5.1	3.6		4.9	3.4		4.9	3.4
9	5.1	3.6		4.6	3.2		4.6	3.2
10	4.9	3.4		4.5	3.2		4.5	3.2
11	5	3.5		4.6	3.2		4.6	3.2
12	4.4	3.1		4.2	2.9		4.2	2.9
13	4.1	2.9		4	2.8		4	2.8
14	5.3	3.7		4.9	3.4		4.9	3.4
15	5.5	3.9		5.2	3.6		5.2	3.6
16	**5.9**	**4.1**		5.2	3.6		5.2	3.6
17	5.4	3.8		4.9	3.4		4.9	3.4
18	5.1	3.6		4.6	3.2		4.6	3.2
19	5.8	4.1		**5.4**	**3.8**		**5.4**	**3.8**
20	5.1	3.6		4.9	3.4		4.9	3.4

Table IV-4: Modeled Queuing Analysis CO Emissions in ppm

Receptor ID	Existing (2004)		No-Build (2030)		Alternative 5A (2030)	
	1-hour	8-hour	1-hour	8-hour	1-hour	8-hour
Baltimore Ave (MD 378) and 3rd St						
1	N/A		N/A		N/A	
2	N/A		N/A		N/A	
3	N/A		N/A		N/A	
4	N/A		N/A		N/A	
5	N/A		N/A		N/A	
6	N/A		N/A		N/A	
7	N/A		N/A		N/A	
8	N/A		N/A		N/A	
9	N/A		N/A		N/A	
10	N/A		N/A		N/A	
11	N/A		N/A		N/A	
12	N/A		N/A		N/A	
13	N/A		N/A		N/A	
14	N/A		N/A		N/A	
15	N/A		N/A		N/A	
16	N/A		N/A		N/A	
17	N/A		N/A		N/A	
18	N/A		N/A		N/A	
19	N/A		N/A		N/A	
20	N/A		N/A		N/A	
Philadelphia Ave(MD 528)/ Talbot Ave						
1	N/A		N/A		N/A	
2	N/A		N/A		N/A	
3	N/A		N/A		N/A	
4	N/A		N/A		N/A	
5	N/A		N/A		N/A	
6	N/A		N/A		N/A	
7	N/A		N/A		N/A	
8	N/A		N/A		N/A	
9	N/A		N/A		N/A	
10	N/A		N/A		N/A	
11	N/A		N/A		N/A	
12	N/A		N/A		N/A	
13	N/A		N/A		N/A	
14	N/A		N/A		N/A	
15	N/A		N/A		N/A	
16	N/A		N/A		N/A	
17	N/A		N/A		N/A	
18	N/A		N/A		N/A	
19	N/A		N/A		N/A	
20	N/A		N/A		N/A	

The NAAQS Primary Standards for Carbon Monoxide: **1-hour**: 35 ppm and **8-hour:** 9ppm

Worcester County has been designated as not in "non-attainment" of the NAAQS for $PM_{2.5}$. Therefore, this project is exempt from regional or micro-scale $PM_{2.5}$ analysis.

$PM_{2.5}$ Conformity Determination

The EPA issued amendments to the Transportation Conformity Rule in March 2006 to address localized impacts of $PM_{2.5}$. These rules require the assessment of localized impacts of federally-funded transportation projects in $PM_{2.5}$ non-attainment areas for projects considered to be "projects of air quality concern."

Worcester County has been designated as not in "non-attainment" of the NAAQS for $PM_{2.5}$. Therefore, this project is exempt from regional or micro-scale $PM_{2.5}$ analysis.

Mobile Source Air Toxics (MSAT) Analysis

The FHWA *Guidance on Air Toxic Analysis in NEPA Documents* requires analysis of MSATs under specific conditions. The EPA has designated six prioritized MSATs, which are known or probable carcinogens or can cause chronic respirator effects. The six prioritized MSATs are: Benzene; Acrolein; Formaldehyde; 1, 3-Butadiene, Acetaldehyde; and Diesel Exhaust (Diesel Exhaust Gases and Diesel Particulate Matter). The U.S. 50 Project, which has a maximum design year (2030) ADT of 61,900 (Summer Traffic Peak; NonPeak season AADT is predicted to be 20,500), would be considered in the category: *"Projects with Low Potential MSAT Effects"*, as described in the referenced guidance. An example of this type of project is a minor widening project, where design year traffic (AADT) is not projected to exceed 150,000. Projects in this category may require a qualitative MSAT analysis.

The U.S. 50 Project will not result in any meaningful changes in traffic volumes, vehicle mix, or any other factor that would cause an increase in emissions impacts. As such, FHWA has determined that this project will generate minimal air quality impacts for the Clean Air Act criteria pollutants and has not been linked with any special MSAT concerns. However, based on existing FHWA guidance a qualitative MSAT analysis is necessary.

Included herein is a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the various alternatives. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

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

The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variable determining emissions of MSATs in the context of highway projects. The tools to

predict how MSATs disperse are also limited. Even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude reaching meaningful conclusions about project-specific health impacts. Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses. The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants.

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the build alternatives.

For the SHA Preferred Alternative, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT. Although the traffic data provided by the SHA does not indicate a difference between the build traffic volumes and truck percentages and the No-Build or rehabilitation traffic volumes and truck percentages, the VMT within the entire study area for the SHA Preferred Alternative may be slightly greater because these alternatives will marginally reduce congestion and increase efficiency of the roadway, and may potentially attract additional trips from elsewhere in the transportation network. This slight increase in VMT may lead to slightly higher MSAT emissions along the U.S. 50 Project corridor. The emissions increase due to increased VMT is offset by lower MSAT emission rates due to increased speeds, since according to EPA's MOBILE6 emissions model, emissions of all of the priority MSATs, except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

A new U.S. 50 Bridge crossing as proposed under the SHA Preferred Alternative will have the effect of moving some traffic closer to nearby homes and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher than the No-Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the edge of the proposed facility where the travel lanes shift toward the residences and businesses. However, as discussed above, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be accurately quantified due to the inherent deficiencies of current models.

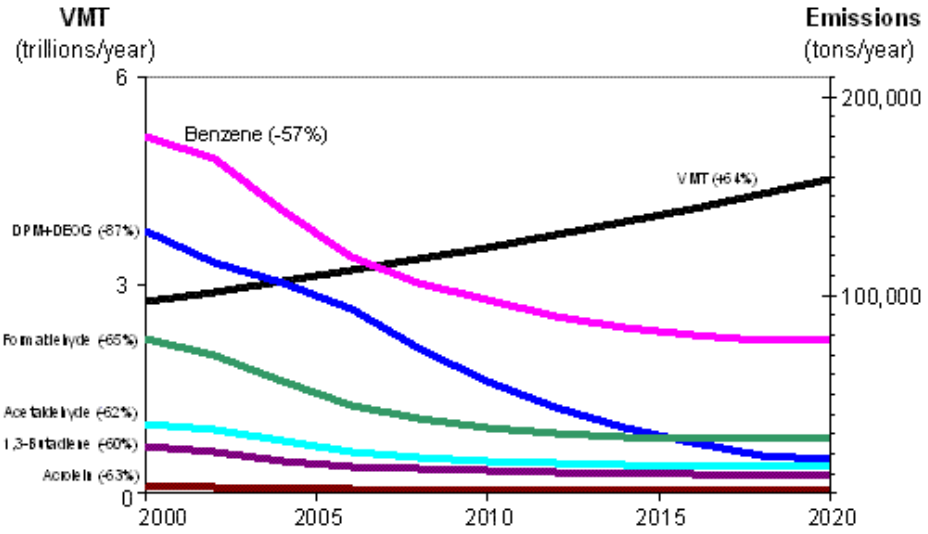
In sum, when a highway moves closer to receptors, the localized level of MSAT emissions could be higher relative to the No-Build Alternative, but this could be offset by increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs will be lower in other locations when traffic shifts away from them. Furthermore, at the project location and regionally, MSAT concentrations will decrease in future years due to EPA's vehicle

emission and fuel regulations. Please refer to **Table IV-5** for a graphical representation of this emissions trend over time.

3. Construction Impacts

Temporary air quality impacts in the project area are possible due to construction activities. These short-term impacts can be minimized through adherence to accepted construction site air control measures in the handling of materials and as part of any potential demolition. Fugitive dust controls such as water spraying of access roads and stockpiles and the employment of dust covers on vehicles transporting dust-emitting materials has been shown to be effective in controlling emissions.

Table IV-5: U.S. Annual Vehicle Miles Traveled vs. MSAT Emissions, 2000-2020



Source: Memorandum - Interim Guidance on Air Toxic Analysis in NEPA Documents, U.S. Department of Transportation, Federal Highway Administration, February 2006.

F. NOISE

1. Impact Analysis

An impact analysis was performed in compliance with the FHWA and the SHA methodologies. Noise abatement criteria (NAC) for various land uses have been established by the FHWA in Title 23 of the Code of Federal Regulations, Part 772 (23 CFR 772) *Procedures for Abatement of Highway Traffic Noise and Construction Noise* and the SHA *Sound Barrier Policy* (May 1998). The NAC for land uses occurring in the study area (Category B: picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals) is 67 dBA (A-Weighted decibel scale) Leq.

According to the procedures described in 23 CFR, Part 772, noise impacts occur when predicted traffic noise levels for the design year approach or exceed the NAC prescribed for a particular

land use category, or when the predicted noise levels are substantially higher than the existing ambient noise levels. The SHA and FHWA define approach as 66 dBA for Category B, and use a 10 dBA increase to define a substantial increase (**Table IV-6**). This analysis was completed in accordance with federal procedures and evaluated in accordance with SHA's Sound Barrier Policy. This project was analyzed under the previous version of 23 CFR 772. Revisions to the SHA Noise Policy became effective July 13, 2011, however that postdates the analysis that was performed for this project. Any future reevaluations of the FEIS will include a reanalysis of the noise conditions/impacts consistent with the revised noise policy guidelines in effect at that time.

Table IV-6: FHWA Noise Abatement Criteria

Activity Group	1-Hour Equivalent Level ($L_{eq}(h)$, dBA)	Description
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purposes.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	-	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

FHWA Noise Abatement Criteria (NAC), 23 CFR, Part 772
Hourly A-Weighted Sound Level in Decibels (dBA)

Prediction modeling was performed to assess projected 2030 design year noise levels and to assess noise abatement alternatives. All prediction modeling was performed using TNM v2.5. Predicted design year noise levels indicated that traffic noise impacts for the Future "Build" scenarios occurs in areas with a dominant local roadway contribution. The biggest contributor to future traffic noise impacts is the traffic being placed on the local roadway network. The existing and proposed bridge structure provides screening that shields the majority of the community from direct line-of-sight to the highest traffic volumes. It should be noted that the existing bridge will be retained for recreational use, but restricted from vehicular traffic.

The predicted 2030 No-Build traffic noise levels range from a low of 49 dBA (Site 1-3) to a high of 69 dBA (Site 3-3).

The predicted year 2030 traffic noise levels for the SHA Preferred Alternative range from a low of 50 dBA (Site 1-3) to a high of 68 dBA (Site 3-3).

Table IV-7 provides summary data of the traffic noise levels predicted in the project area.

Table IV-7: Traffic Noise Level Summary

Receptor Site	Dwelling Units	Existing Noise Level (dBA)	Future "No Build" Noise Level (dBA)	Alternative 5A Noise Levels (dBA)
NSA 1				
1-1	6	57	58	56
1-2	6	52	53	53
1-3	6	48	49	50
1-4	10	62	63	59
1-5	10	65	66	64
NSA 2				
2-1	17	59	60	59
2-2	12	64	66	63
2-3	11	54	57	57
2-4	11	60	64	64
2-5	10	54	57	58
2-6	11	62	65	65
NSA 3				
3-1	4	58	59	56
3-2	4	65	66	60
3-3	4	67	69	68
3-4	6	49	52	52
3-5	4	50	53	54
3-6	6	54	60	61
NSA 4				
4-1	10	62	66	66

Shaded cells indicate noise levels exceeding FHWA/ SHA noise impact criteria.

A detailed description of each Noise Sensitive Areas (NSAs) is located in **Section III.F.1** and the location of each NSA is identified on **Figure III-12**.

2. Feasibility and Reasonableness of Noise Control

Several factors for evaluating and determining the feasibility and reasonableness of noise abatement are defined in the SHA *Sound Barrier Policy*. The elements of SHA's sound barrier **feasibility** criteria address the following questions:

- Can a noise reduction of at least 3 dBA be achieved at the location(s) warranting abatement (impacted residences)?
- Can highway traffic noise at receptors with the highest noise levels (first row receptors) be reduced by 7 to 10 dBA as a result of the construction of a sound barrier?
- Will construction of a sound barrier restrict access to vehicular or pedestrian traffic?
- Will construction of a sound barrier cause safety or maintenance problems?
- Can a sound barrier be constructed given topography, drainage or utilities?
- Are there other non-highway noise sources in the area that would reduce or limit the effectiveness of a sound barrier?

Reasonableness is based on a number of factors, including:

- Do a minimum of 75 percent of the impacted residents approve the proposed sound barrier?
- If existing noise levels are expected to increase by 10 dBA or more, are they less than 57 dBA?
- Will design year "Build" noise levels be equal to or greater than 3 dBA over design year "No-Build" noise levels?
- Will the cumulative increase in design year noise levels as a result of prior improvements to the highway be equal to or greater than 3 dBA?
- Will design year noise levels equal or exceed 72 dBA?
- Will the sound barrier cost per benefited residence exceed $100,000?
- Will the relative size and appearance (aesthetics) of the proposed sound barrier have a negative visual impact?
- Will the construction of a sound barrier result in an impact to Section 4(f) resources?
- Are there local controls on noise sensitive development adjacent to state highways?
- Are there any special circumstances, such as historical significance and/or cultural barrier that would be affected negatively by the construction of a sound barrier?

Only sound barriers that are determined to be feasible and reasonable will be approved for consideration. If any of the feasibility and reasonableness criteria cannot be satisfied, a sound barrier may be considered not feasible and/or not reasonable.

Results

As build noise levels at NSAs 3 and 4 approached or exceeded the FHWA noise abatement criteria, the evaluation of the noise abatement measures was warranted for the SHA Preferred Alternative. The feasibility and reasonableness of noise abatement was investigated for both NSAs even though a barrier analysis was not performed.

Feasible mitigation for NSA 3 could not be developed due to maintenance of local vehicular and pedestrian access. Receptor Site 3-3 is located adjacent to the residential structure at the corner of U.S. 50 and Philadelphia Avenue. Potential mitigation designed to protect this NSA would require a vertical barrier to be placed between the community and Philadelphia Avenue. The physical space available for potential barrier placement would displace the pedestrian walkway and encroach upon the Philadelphia Avenue travel lanes. It is also unclear if this adjacent parking lot could be considered as the area of frequent outdoor human activity for the adjacent residence. The other predicted noise levels in the NSA 3 community are sufficiently low to indicate that these impacts are localized to the northeastern corner of this NSA.

Feasible mitigation also could not be developed for NSA 4 due to maintenance of local vehicular and pedestrian access. Site 4-1 represents the Ocean City Baptist Church along Division Street, which maintains direct access to Division Street. The local traffic on Division Street, Baltimore Avenue and Philadelphia Avenue represent the dominant traffic noise source, not the elevated bridge structure carrying U.S. 50 across Sinepuxent Bay. Potential mitigation designed to protect

this NSA would require a vertical barrier to be placed between the church parking lot and Division Street, blocking the entrance to the parking lot. This would serve to block vehicular and pedestrian access to the church property.

Reasonableness criteria also not met given that predicted Future "Build" noise levels will not exceed Future "No-Build" noise levels by 3 dBA or more in any of the four NSAs, and in many cases are lower due to the shadow zone created by a higher bridge structure. Because there have been no capacity increases made to the bridge since the original construction, a cumulative effects analysis does not apply. Therefore, mitigation consideration does not meet SHA feasibility or reasonableness criteria.

There are several other issues affecting the desirability of mitigation that should also be considered. The "scenic byway" designation of the U.S. 50 corridor entering Ocean City raises issues of sound walls that would potentially block the view-shed entering the town. This is compounded by the desires of the town to maintain U.S. 50 as a "Gateway" access point to Ocean City, which would typically require a clear line-of-sight to maintain the scenic view entering Ocean City.

In summary, while there are traffic noise impacts associated with the SHA Preferred Alternative, mitigation consideration does not meet SHA feasibility or reasonableness criteria for either of the impacted NSAs. No traffic noise mitigation is currently proposed for this project.

3. Construction Noise

Land uses that would be sensitive to vehicular noise would also be sensitive to construction noise. Although highway and bridge construction is a short-term phenomenon, it can cause noise impacts. The extent and severity of the noise impact would depend upon the phase of construction and the noise characteristics of the construction equipment in use. Construction would have direct impact on receptors located close to the construction site, and an indirect impact on receptors located near roadways whose traffic flow characteristics are altered during construction.

G. VISUAL AND AESTHETIC QUALITY

U.S. 50 is and would remain a four-lane highway within the project limits, with characteristics similar to many of the nation's urban highways. The SHA Preferred Alternative would alter the visual landscape by constructing a new bridge. The proposed typical section of the new bridge would be 87 feet, 4 inches, an increase of approximately 22 feet over the existing structure.

The construction of a new bridge, as proposed under the SHA Preferred Alternative, would change the visual characteristics of the surrounding community. The new bridge will be the same height (30 feet of clearance) as the existing bridge. Although specific views would vary from property to property, the new bridge could alter or partially obstruct views of downtown Ocean City from the western portion of the study area.

Despite the introduction of newer and larger visual elements associated with the SHA Preferred Alternative, the modified views would not be inconsistent with the surrounding community, considering the intensely developed landscape of apartments, hotels, resorts, and other features throughout the Town of Ocean City. Recent development trends have resulted in many larger and taller condominium and hotel buildings, creating a dynamic visual environment that seems to change with regularity. Tall buildings now dominate the Ocean City landscape, and are visible from the portions of the study area west of Sinepuxent Bay. It is expected that after construction of the new bridge, the structure would blend in with the exciting and diverse aesthetic environment of Ocean City, and would be used to create a gateway entrance to the resort town.

Aesthetic treatments for the Gateway area will be investigated and coordinated with Ocean City once the detailed design work begins. Aesthetic treatments will be incorporated into the ultimate design of the bridge to make it more visually pleasing to adjacent homes, businesses, and roadway commuters, and more consistent with the overall landscape of Ocean City.

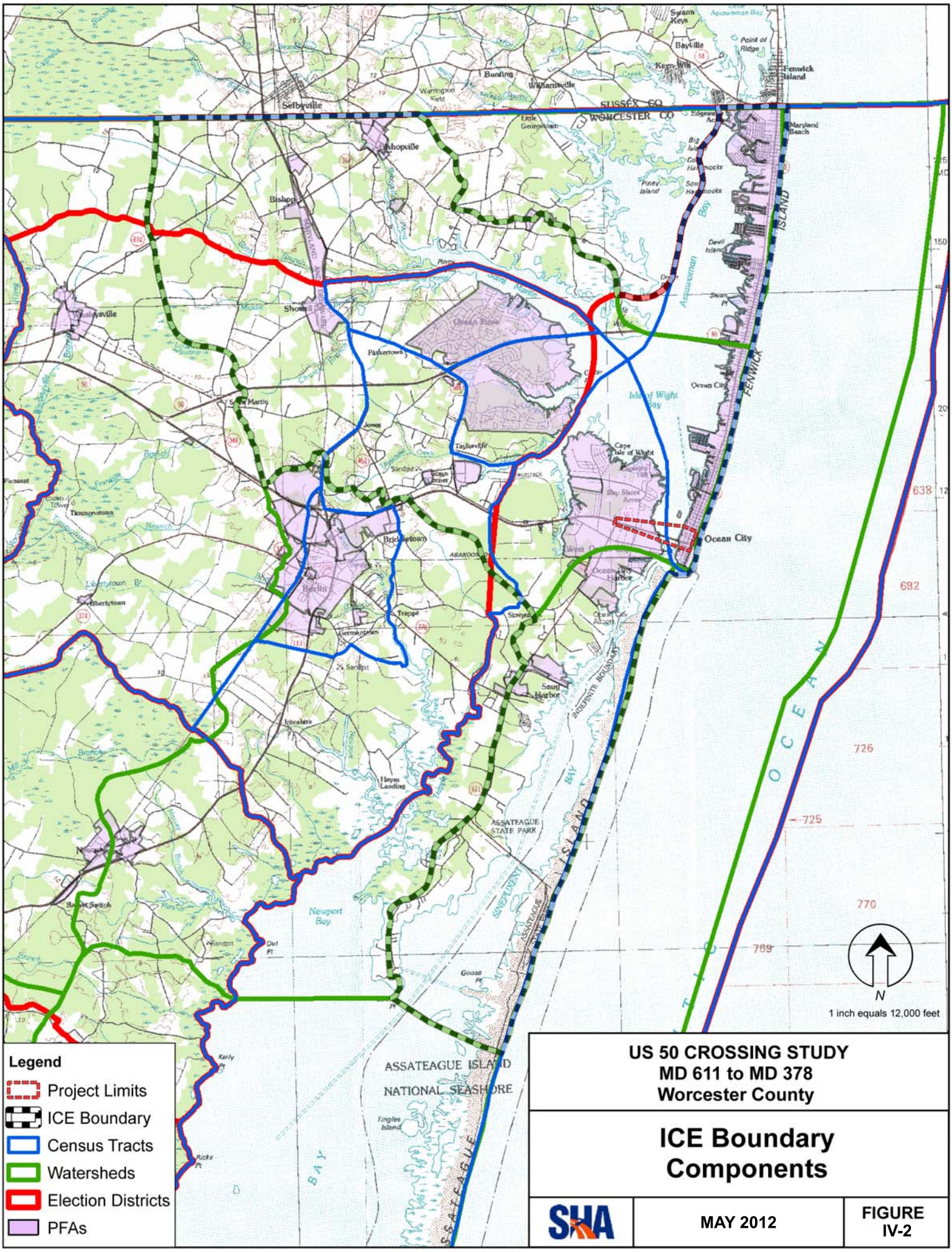
H. INDIRECT AND CUMULATIVE EFFECTS ANALYSIS

An Indirect and Cumulative Effects (ICE) Analysis has been prepared for this project. The ICE Analysis was developed in compliance with the current SHA ICE guidelines specified for Environmental Assessments and Environmental Impact Statements, the National Environmental Policy Act (NEPA), and the Council on Environmental Quality (CEQ) regulation 40 CFR 1508.25(c). The resources evaluated for indirect and cumulative effects include socioeconomic, cultural, and natural resources.

Temporal and geographic boundaries were derived to encompass all resources that may be affected. The temporal boundary extends from 1970 to 2030. The temporal boundary was developed based upon information availability, population trends, and key events in the study area over the past 75 years. The year 1970 was selected as the past time frame limit based upon past events, such as the completion of the Chesapeake Bay Bridge in 1952 and the completion of the Chesapeake Bay tunnel in 1964, population changes (**Table IV-8**), and a limited availability of natural and socioeconomic resource information prior to the passage of NEPA in 1970. The future time frame was determined from the project's design year of 2030. Using the environmental resources (socioeconomic, natural, and cultural) that would be affected by direct and indirect impacts of the project as a guide, multiple resource boundaries were reviewed to determine the appropriate geographic sub-boundaries that would create the geographic boundary. The sub-boundaries included census tract boundaries, election districts, Priority Funding Area (PFA) boundaries, and watershed boundaries. The overall ICE boundary is shown in **Figure IV-2**. Based on readily available data from State and County sources, the resources were mapped using GIS mapping techniques and analyzed to determine the nature and extent of indirect and cumulative effects created by the proposed project.

Table IV-8: Study Area Population Size, 1940-2000

Area	1940	1950	1960	1970	1980	1990	2000
Worcester County	**21,245**	**23,148**	**23,733**	**24,442**	**30,889**	**35,028**	**46,543**
10-year increase	-	*8.9%*	*2.5%*	*3.0%*	*26.4%*	*13.4%*	*32.9%*
Ocean City, Election District 10	**2,037**	**2,508**	**2,712**	**3,510**	**7,354**	**7,936**	**11,684**
10-year increase	-	*23.1%*	*8.1%*	*29.4%*	*109.5%*	*7.9%*	*47.2%*


Legend
Project Limits
ICE Boundary
Census Tracts
Watersheds
Election Districts
PFAs
N
1 inch equals 12,000 feet
US 50 CROSSING STUDY
MD 611 to MD 378
Worcester County
ICE Boundary Components
SHA
MAY 2012
FIGURE IV-2

1. Summary of Potential Indirect and Cumulative Effects

Socio-economic Resources

Indirect and cumulative effects to the socio-economic resources within the ICE boundary are anticipated as a result of the U.S. 50 Bridge over Sinepuxent Bay project and other development projects within the area. However, these indirect and cumulative effects are anticipated to be minor due to the existing high level of development near the project location and the existing Smart Growth laws and land use plans and zoning regulations of Worcester County and Ocean City.

The greatest potential for cumulative effects to communities in the ICE boundary relate to the effects of the frequency of the number of draw span openings associated with the SHA Preferred Alternative. The SHA Preferred Alternative provides an additional bridge (the existing U.S. 50 Bridge) for pedestrians, cyclists and fisherman and doesn't require as many draw span openings due to a higher span, therefore the SHA Preferred Alternative would have a positive effect on the attraction to Ocean City and the surrounding communities as a tourist destination or place to live. Also, the SHA Preferred Alternative could have indirect effects to the area partially isolated between the existing bridge and proposed bridge. The access to businesses near the bridge may be slightly altered and therefore will decrease the traffic flow in this area. This could have a slightly negative effect to the patronage of the businesses in this area.

The cumulative effects resulting from increased safety from the SHA Preferred Alternative would likely encourage some additional development and/or redevelopment in the area. However, future effects to communities and businesses will be limited through the existing Smart Growth laws and zoning regulations in place by Worcester County and Ocean City. No future development projects are dependent on or would benefit from the completion of the U.S. 50 Bridge project.

Cultural Resources

The SHA Preferred Alternative will have no indirect effects on cultural resources within the ICE boundary. The SHA Preferred Alternative proposes using a change in the use of the SHA Bridge No. 2300700. The SHA Bridge No. 2300700 will no longer carry vehicular traffic. This could result in minor indirect effects associated with reduced user and/or proximity impacts to this property. Refer to **Section IV.B.1.f.** for additional information concerning the SHA Preferred Alternative's adverse affects to the SHA Bridge No. 2300700

A majority of the ICE Boundary has been built-out, meaning that few undeveloped areas remain and redevelopment will become increasingly important. Therefore, cultural resources within these areas have a greater potential of being affected. However, cumulative effects to historic sites and structures associated with publicly-built impacts are expected to be minimal due to established laws and regulations designed to protect cultural resources. They include the following:

- The Department of Transportation Act of 1966
- The National Historic Preservation Act 1966, as amended; 36 CFR Part 800 – Protection of Historic Properties; Executive Order 11593

- The Maryland Historic Trust Act of 1990 (Article 83B, §§ 5-607, 5-617, to 5-619, and 5-623 of the Annotated Code of Maryland)

Cumulative effects to cultural resources associated with other planned development or transportation projects are expected to be minor due to existing laws and regulations protecting these resources.

Natural Resources

Based on *Ocean City's Comprehensive Plan* (Town of Ocean City, 2006), *Worcester County's Comprehensive Development Plan* (Worcester County, 2006), and the goals and objectives of the *Maryland Coastal Bays Comprehensive Management Plan* (Maryland Coastal Bays Program, 2000), local government officials are fully aware that the strengths of the regional economy (e.g., tourism, and agriculture) were built upon the richness of the area's natural resources. Moreover, the future viability of the economy will rely upon sustaining the quantity and quality of natural resources in the face of anticipated population growth.

Surface Waters

The SHA Preferred Alternative would have indirect impacts to surface waters as a result of the additional runoff resulting from a nine percent increase in impervious surface. To minimize these impacts, stormwater management facilities will be constructed to treat runoff from the new structure. Future planned development within the ICE boundary will result in cumulative effects to surface waters; however these effects are expected to be minor, as local, state, and federal laws continue to lessen the impacts of development activities through stormwater management, erosion and sediment control, and other best management practices.

Ground Water

Due to the lack of significant fresh water on the peninsula, Ocean City is dependent on 23 production wells divided between two aquifers (the Manokin and the Ocean City) for its water supply. No indirect impacts to groundwater are anticipated due to implementation of the SHA Preferred Alternative, as no future development plans are dependent upon the project and stormwater treatment facilities would compensate for project related impacts.

The SHA Preferred Alternative is not expected to impact ground water resources due to the implementation of best management practices and stormwater treatment requirements. However, future planned development within the ICE boundary will result in impacts to ground water, as new areas of development will require access to limited ground water supplies, and decrease the infiltration of ground water due to increases in impervious surfaces. Collectively, future development and transportation improvements would be expected to decrease the quality and availability of ground water within the ICE boundary. However, both Ocean City and Worcester County are aware of the potential impacts to ground water and are developing strategies to minimize the potential for impacts. Examples of such strategies include better well location and distribution plans, limiting surface containment risks, and controlling the amounts and locations of impervious surfaces.

Habitat

The SHA Preferred Alternative would contribute (wetland impacts) to the cumulative effect to these resources, although it is expected to be minor. Future planned development within the ICE boundary would place additional stresses on the natural environment as new developments and transportation improvements are realized, however; these impacts are expected to be minor due to local, state, and federal regulations designed to protect environmental resources and habitat areas. Local, county and state regulations will help to protect the natural environment and habitats within the ICE boundary.

2. ICE Mitigation

The SHA Preferred Alternative has the potential to change the hydrodynamics and pattern of sand migration in the bay due to the additional bridge piers and supports. These changes could indirectly impact aquatic habitats, fisheries, and the endangered waterbird colony on Skimmer Island.

Because of the high level of residential and commercial development in the ICE study area and the existing Smart Growth laws, land use plans, and zoning regulations of Worcester County and Ocean City, it is anticipated that only minor indirect and cumulative effects would result from implementation of this project.

Because of the build-out nature of the project area, the SHA Preferred Alternative is expected to have little to no indirect or cumulative effects on the cultural, socioeconomic and natural resources in the study area. The SHA Preferred Alternative may have a slight indirect impact to surface waters due to the increase in impervious surface area; therefore, it is recommended that the BMPs implemented during construction will minimize the impacts.