Chesapeake BAY CROSSING STUDY
TIER 2 NEPA

BIOLOGICAL ASSESSMENT

NORTHERN LONG-EARED AND TRICOLORED BAT

MDTA Maryland Transportation Authority

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ABBREVIATIONS AND ACRONYMS

ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ADT	Average Daily Traffic
AET	All Electronic Tolling
APE	Area of Potential Effects
ARDS	Alternatives Retained for Detailed Study
BA	Biological Assessment
BCS	Bay Crossing Study
BMP	Best Management Practices
CAV	Connected and Automated Vehicle
CBCAA	Chesapeake Bay Critical Area Act
CWA	Clean Water Act
DBH	Diameter at breast height

DEIS	Draft Environmental Impact Statement
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESC	Erosion and Sediment Control
EV	Electric Vehicle
FAST (Act)	Fixing America's Surface Transportation
FCA	Forest Conservation Act
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GGRA	Greenhouse Gas Emissions Reduction Act
GHG	Greenhouse Gas
ICE	Indirect and Cumulative Effects
ICM	Interagency Coordination Meetings
JPA	Joint Permit Application
LOD	Limits of Disturbance
LOS	Level of Service
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDOT	Maryland Department of Transportation
MDTA	Maryland Transportation Authority
MHT	Maryland Historical Trust
MTA	Maryland Transit Administration
NEPA	National Environmental Policy Act
NETR	Natural Environment Technical Report
NLEB	Northern long-eared bat
NOI	Notice of Intent
OSHA	Occupational Safety and Health Administration
RCP	Reinforced concrete pipe
ROD	Record of Decision
RPU	Representation Units
SAV	Submerged Aquatic Vegetation
SSPRAs	Sensitive Species Project Review Areas
SWM	Stormwater management
TCB	Tricolored bat
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VMT	Vehicle Miles Traveled
VPD	Vehicles Per Day
WNS	White-nose syndrome
WOTUS	Waters of the U.S.
WOC	Water Quality Certification
ZEV	Zero Emission Vehicle

1 INTRODUCTION

The Chesapeake Bay Crossing Study (Bay Crossing Study) is a two-tiered engineering and environmental study being advanced by the Maryland Transportation Authority (MDTA) and Federal Highway Administration (FHWA). The Bay Crossing Study is addressing existing and future transportation issues at the William Preston Lane, Jr. Memorial Bridge (Bay Bridge) and its approaches along U.S. 50/301. Each tier of the Bay Crossing Study involves development of an Environmental Impact Statement (EIS), in compliance with the National Environmental Policy Act (NEPA), to describe potential significant environmental effects and inform the evaluation of alternatives. Tier 1 of the Bay Crossing Study (Tier 1 Study) was completed in April 2022. At that time, FHWA issued a combined Final Environmental Impact Statement/Record of Decision (FEIS/ROD) identifying Corridor 7, the corridor that includes the Bay Bridge and its approaches, as the Selected Corridor Alternative for further evaluation. Tier 2 of the Bay Crossing Study (Tier 2 Study) was launched in June 2022 to focus on a project-level (site-specific) analysis within the Tier 1 Selected Corridor Alternative (Corridor 7).

The Tier 2 NEPA process was initiated formally with the publication of a Notice of Intent (NOI) to prepare an EIS in the Federal Register on November 15, 2024. The MDTA identified the Alternatives Retained for Detailed Study (ARDS), which are the NEPA range of reasonable alternatives for evaluation in the Tier 2 Study EIS. Since then, the MDTA Recommended Preferred Alternative (RPA) was identified as Alternative C, a build alternative that includes construction of two new spans as well as demolition of the existing bridge spans. A Natural Environment Technical Report (NETR) and Draft EIS (DEIS) were prepared by the MDTA and FHWA and made available for the public in January 2026. After reviewing public and agency input on the DEIS and the MDTA RPA, the MDTA requested cooperating agency concurrence on Alternative C as the Preferred Alternative. Concurrence from all cooperating agencies on the Preferred Alternative was received as of May 2026.

This Biological Assessment (BA) evaluates the potential effects of the Preferred Alternative on bat species that are federally listed or proposed for listing under the Endangered Species Act (ESA). Specific project design elements will be developed, as the project progresses, that avoid or minimize adverse effects to listed or proposed species. The project area lies within the range of one federally endangered species, the northern long-eared bat (*Myotis septentrionalis*) (NLEB). The project also lies within the range of the tricolored bat (*Perimyotis subflavus*) (TCB), which is federally proposed for listing as endangered. Critical habitat has not been designated for NLEB and TCB; therefore, it is not discussed further in this BA.

The monarch butterfly (*Danaus plexippus*) is federally proposed for listing as threatened and could occur within the project area. FHWA, in coordination with the U.S. Fish and Wildlife Service (USFWS), has determined that this project is not likely to jeopardize the continued existence of the monarch butterfly. The determination is based on the limited magnitude of the potential effect on monarch butterflies and their wide-ranging distribution. If the monarch butterfly is listed, FHWA will consult with USFWS.

The Preferred Alternative is in the early stages of design. As the design progresses through NEPA and into final design, the MDTA, in coordination with FHWA, will continue to consult with USFWS to develop a bridge design and construction means and methods that avoid and minimize impacts and ensure the protection of listed species.

In accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 United States Code [USC] 1531 *et seq.*), the MDTA has prepared this BA to analyze the potential effects on bat species listed or proposed for listing under the ESA.

2 CONSULTATION HISTORY

- In November 2023, an official species list was generated using the USFWS Information for Planning and Consultation (IPaC) website. This official species list has been regenerated multiple times to ensure relevance and was last generated April 6, 2026.

- In November 2024, USFWS reviewed and provided comments on the Notice of Intent (NOI) for FHWA to prepare an EIS for the Tier 2 Study (proposed project). Copies of the correspondence are provided in **Appendix A**. Additional coordination and agency meetings occurred through the DEIS phase of the project. USFWS provided comments on the NETR and DEIS.

- On August 11, 2025, a draft of the DEIS was provided to the cooperating and participating Agencies, including USFWS, for review.

- On September 19, 2025, the MDTA began species surveys coordinated with USFWS, which will continue to be conducted, as needed, during final design to provide the most accurate and representative information as well as coordination with the Maryland Department of Natural Resources (MDNR). USFWS reviewed the bat forest habitat assessment and indicated that the project may be outside the scope of the *Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana Bat, Northern Long-eared Bat, and Tricolored Bat* (PBO/PCO) due to forest clearing acreages.

- On October 9, 2025, USFWS individually reviewed the project and determined that the project may affect but is not likely to adversely affect NLEB and TCB.
- On November 28, 2025, a draft of the Northern Long-Eared and Tricolored Bat Biological Assessment was provided to USFWS for review.
- On December 11, 2025, USFWS provided comments on the draft of the Northern Long-Eared and Tricolored Bat Biological Assessment.
- On February 23, 2026, the revised Northern Long-Eared and Tricolored Bat Biological Assessment was provided to USFWS.
- On March 4, 2026, USFWS reviewed and concurred with the not likely to adversely affect determination of the Northern Long-Eared and Tricolored Bat Biological Assessment.
- On May 13, 2026, consultation was reinitiated with an updated draft of the Northern Long-Eared and Tricolored Bat Biological Assessment provided to USFWS due to refinements of the Preferred Alternative and updated natural resource impacts.

3 PROPOSED ACTION

The Bay Bridge is a two-span structure that crosses the Chesapeake Bay from Anne Arundel County on the Western Shore to Queen Anne's County on the Eastern Shore. The original span opened in 1952, and the second span opened in 1973. Today, the two-lane original span typically carries eastbound traffic, and the three-lane second span typically carries westbound traffic. However, lanes on the bridge can be reversed to accommodate periods of heavy traffic. The approaches along U.S. 50/301 on each shore have six lanes (three lanes for each travel direction).

A wide range of engineering and environmental considerations were evaluated for one no-build alternative and six build alternatives as detailed in the DEIS. Alternative A (no-build) is not the Preferred Alternative because it would not meet the Tier 2 Study purpose and need. Alternative A (no-build) would not increase roadway capacity or mobility, correct roadway deficiencies, or provide the navigational clearance established by the U.S. Coast Guard. Alternative A (no-build) would also require substantial maintenance and related lane closures that would worsen congestion over time and compound existing traffic congestion, mobility, and roadway deficiency issues.

Each of the six build alternatives meet the Tier 2 Study's purpose and need and would therefore be reasonable to implement. However, the build alternatives differ in the degree of transportation benefit they would provide as well as likely environmental impacts and cost.

The Preferred Alternative, has the least impact to most natural, cultural, and socioeconomic resources compared to the other build alternatives. The Preferred Alternative would result in the least impact to forests, bridges, overpasses, culverts, buildings, historic properties, and park properties. The anticipated impacts from the build alternatives are discussed in detail in the NETR and DEIS.

The Preferred Alternative (**Figure 3-1**) would replace the existing Bay Bridge spans with two new bridge spans and would consist of six lanes along U.S. 50/301 on the Western Shore (three per direction), eight lanes on a new bridge (four per direction), and six lanes along U.S. 50/301 on the Eastern Shore (three per direction). The two new bridge spans would include one span to the south and one span in between the location of the existing bridge spans. The approach roadways would remain on the existing roadway alignment, except where necessary to connect to the new bridge spans. Thus, the five existing bridge lanes would be increased to eight bridge lanes; however, the number of lanes on the Western Shore and Eastern Shore would not change and would remain at six total travel lanes beyond the immediate tie-ins to the new bridge spans. The Preferred Alternative could include a bicycle/pedestrian shared use path (SUP) along a new bridge. The MDTA has identified SUP connections to existing and proposed trails and recreational facilities on the Eastern Shore and Western Shore.

The Tier 2 Study is currently in preliminary engineering; therefore, construction means and methods have not been developed. It is anticipated that construction of the new bridge spans would occur in multiple phases. Phasing of the Preferred Alternative may involve building one span at a time: the first new bridge span may be built, then one existing bridge span could be demolished, and the new bridge span would be in use while the second new bridge span is built. Once both new bridge spans are complete, the second span of the existing bridge could be demolished. The exact order and timing of construction have yet to be determined; however, a preliminary construction sequence is found in **Table 3-1**.

Table 3-1: Preliminary Construction Sequence

Construction Activity	Construction Years
Construction of Bridge 1 (eastbound) – Occurring during years 1 through 5	
Start Construction, Bridge 1	1
Construct landings (work completed on land)	1-4
Constructing approaches and main span	1-5
Trestles and water access construction	1
Dredging for eastbound bridge	1-2
Transport and disposal of dredge	1-2
Substructure/pier protection construction	1-3
Superstructure construction	2-5
Complete construction, Bridge 1	5
Demolition of existing eastbound bridge – Occurring during years 6 through 7	
Start demolition, existing eastbound bridge	6
Blasting (total of 18 blast events)	6-7
Superstructure Truss Units	
Cantilever Deck Truss Spans (12 spans, 4 events)	
Through Truss Spans (4 simple spans, 1 event)	
250’ Simple Deck Truss Spans (4 simple spans, 1 event)	
300’ Simple Deck Truss Spans (6 simple spans, 2 events)	
Suspension Spans (3 suspension spans, 1 event)	
Substructure Piers in Deep Water	
4 Column Piers (4 piers, 4 events)	
2 Column Piers (7 piers, 3 events)	
Solid Shaft Piers Under Suspension Span (4 piers, 2 events)	
Dismantling	6-7
Complete demolition, existing eastbound bridge	7
Construction of Bridge 2 (westbound) – Occurring during years 7 through 13	
Start construction, Bridge 2	7
Construct landings (work completed on land)	7-13
Constructing approaches and main span	7-13
Trestles and water access construction	7
Dredging for westbound bridge	7-8
Transport and disposal of dredge	7-8

Substructure/pier protection construction	7-12
Superstructure construction	8-13
Complete construction, Bridge 2	13
Demolition of existing westbound bridge – Occurring during years 14 through 15	
Start demolition, existing westbound bridge	14
Blasting (16 total events)	14-15
Superstructure Truss Units	
Cantilever Deck Truss Spans (12 spans, 4 events)	
Through Truss Spans (3 spans, 1 event)	
Suspension Spans (3 suspension spans, 1 event)	
Substructure Piers in Deep Water	
4 Column Piers (8 piers, 8 events)	
2 Column Piers (6 piers, 3 events)	
Dismantling	14-15
Complete demolition, existing westbound bridge	15

3.1 Land-based Activities

The Tier 2 Study is in preliminary engineering for the Preferred Alternative. The Preferred Alternative extends along U.S. 50/301 for approximately 8.3 miles from west of Oceanic Drive to east of Cox Creek. The limits of disturbance (LOD) include all proposed construction, erosion and sediment control (ESC), stormwater management (SWM), and right-of-way offsets. Impacts to bat habitat within the LOD relate to the acreage of forest clearing, the number of bridges, overpasses, and culverts impacted, construction techniques, construction access and duration, and the success of implemented ESC and SWM Best Management Practices (BMPs).

Forests and other linear wooded features containing live trees and snags, especially those with exfoliating bark, crevices, cavities, or leaf clusters provide suitable habitat for NLEB and TCB. Forest clearing impacts have been determined to be 57.7 acres, or 59.1 acres if an SUP is constructed. Streams and wetlands may provide NLEB and TCB with forage, water, and cover from predators. The Preferred Alternative will impact 670 linear feet of nontidal waterways, or 700 linear feet if an SUP is constructed. For wetlands, the Preferred Alternative will impact 5.6 acres, or 6.3 acres if an SUP is constructed.

Expansion joints and other crevices on bridges can provide habitat for roosting bats by mimicking cave-like conditions. Bridges impacted by the Preferred Alternative include the Bay Bridge and Cox Creek bridge. The Bay Bridge will be demolished and replaced. The eastbound span of the Cox Creek bridge will be widened. Work is not proposed directly to the Oceanic Drive overpass; however, coordination with USFWS indicated concerns of this overpass as suitable bat habitat. Impacting the road surface underneath the overpass may impact bats; therefore, it is included in this assessment.

Cracks and crevices within 36-inches or wider culverts may also mimic cave-like environments and provide suitable habitat for NLEB and TCB. The Preferred Alternative will impact thirteen (13) 36-inch or wider culverts. Buildings can act as potential roosting locations for bats and vary in

quality depending on the building materials and the amount of noise and light surrounding them. Following refinements to the Preferred Alternative, no impacts to existing buildings are anticipated.

These land-based activities have the potential to impact existing bat habitat including forests, streams and wetlands, bridges, and culverts. A more extensive examination of these impacts is discussed in **Section 6 Effects Determination**.

Figure 3-1: Vicinity Map



4 ACTION AREA

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR §402.02). The action area of a project includes the project area and any area where stressors may affect any listed species, terrestrial and marine. This BA focuses on impacts to NLEB and TCB; however, the action area includes any area where there may be impacts to all listed or proposed species in accordance with 50 CFR 402.02. The action area spans 1267.8 acres across land and water, currently determined by the land-based construction area and the potential in-water construction, sedimentation, and turbidity impacts associated with the Preferred Alternative. A map of the action area is presented in **Appendix B**.

Within the action area, direct impacts to NLEB and TCB will likely be contained within the identified LOD for the Preferred Alternative. The action area for the Preferred Alternative includes all areas affected by temporary and permanent disturbances associated with the proposed project, including construction of the new bridge spans (pile driving), approach roadway widening (tree/vegetation removal), demolition of the existing bridge spans (cutting and/or blasting, temporary access, and all land-based construction activities.

4.1 Existing Conditions within the Action Area

The action area lies within the Severn River (02131002), Magothy River (02131001), Lower Chesapeake Bay (02139998), Kent Island Bay (02130511), Eastern Bay (02130501), Kent Narrows (02130504), Wye River (02130503), and Lower Chester River (02130505) 8-digit federal HUC watersheds. Land use within the vicinity of the action area on either side of the Chesapeake Bay consists of low-density residential, medium-density residential, commercial, transportation, institutional, and water.

The action area is in the Atlantic Coastal Plain physiographic province, specifically within the Western Shore Lowlands Region and Delmarva Peninsula Region. The Western Shore Lowlands Region borders the Western Shore Uplands Regions of the Atlantic Coastal Plain physiographic province and is characterized as a region with flat-lying sedimentary beds. Elevation in the Western Shore Lowlands Region ranges from 0 to 65 feet. The Delmarva Peninsula Region is also characterized by flat sedimentary beds, some of which are bioturbated. This region features low salt marshes and islands with a maximum elevation of 80 feet.

The action area contains forests, tree clusters, wetlands, and streams, which provide NLEB and TCB with habitat, forage, water, and protection from predation. Throughout the action area, 144 wetland systems have been identified, including 36 palustrine emergent wetlands, 58 palustrine forested wetlands, six (6) palustrine scrub/shrub wetlands, nine (9) palustrine unconsolidated bottom wetlands, 31 estuarine emergent wetlands, and four (4) estuarine scrub/shrub or forested wetlands. Fifty-eight (58) waterways have been identified within the action area, including 16 nontidal perennial waterways, 23 nontidal intermittent waterways, and 19 tidal waterways. Prevalent forest communities in the action area include pine-oak heath forests, bottomland hardwood forest, and tidal hardwood swamp. Common tree species within these forests include oaks, gums, hickories, pines, and maples.

Noise may negatively impact bats in the action area by altering behavior, reducing foraging efficiency, and increasing susceptibility to disease. A noise monitoring study completed in 2023 and discussed in the *Bay Crossing Study Noise Technical Report,* included 136 measurements used to validate the computer model that would be used to predict future noise conditions of the proposed action. Short-term noise monitoring was conducted in the form of 15-minute spot measurements. These 15-minute measurements were then multiplied by four to develop hourly volumes. This noise monitoring study measured sound level weighted to the sensitivity of human hearing using the A-weighted sound level (dBA) via the equivalent sound level (L_{eq}), which is the constant sound level over a given period and situation. Short-term noise monitoring revealed that the highest noise levels, measured in dBA, originated from two monitoring sites along U.S. 50/301 on the Western Shore at a L_{eq} value of 75 between 1200 and 1500 hours. The lowest noise level, measured in dBA, was recorded, on the same day, at a different monitoring site, also on the Western Shore along U.S. 50/301, at a L_{eq} value of 47 between 1300 and 1500 hours. The study also predicts that lands within 100 feet of proposed construction activity may experience noise levels between 78 to 83 dBA.

4.2 USFWS Listed Species in the Action Area

There is one federally endangered bat species and one federally proposed endangered bat species that have the potential to occur in the action area and may be affected by the proposed action. ESA-listed and proposed bat species include:

- Northern long-eared bat (*Myotis septentrionalis*) – endangered
- Tricolored bat (*Perimyotis subflavus*) – proposed endangered

Northern Long-Eared Bat (NLEB)

The NLEB is a medium-sized insectivorous bat that typically hibernates within caves or abandoned mines and may use man-made structures when typical habitats are limited (USFWS/ECOS, 2015). On October 2, 2013, USFWS issued a proposed rule to list the NLEB as endangered, with a final listing of the species as threatened on April 2, 2015 (80 FR 17974). On November 30, 2022, the NLEB was uplisted to endangered; this reclassification went into effect March 31, 2023 (88 FR 4908; 87 FR 73488). The NLEB is found across much of the eastern and northcentral United States (range includes 37 states) and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. Populations tend to be patchy across its range and are typically composed of small numbers. More than 1,100 winter hibernacula have been identified in the United States, most of which contain only a few (1 to 3) individuals. USFWS recognizes four United States populations of NLEB. NLEBs inhabiting Maryland are considered part of the Eastern population, which has historically been the most abundant population and consists of individuals inhabiting Maine south to Virginia and west to West Virginia (USFWS/ECOS, 2015).

The primary factor, as cited in the ESA listing, for the decline of NLEB populations is white-nose syndrome (WNS), a lethal fungal disease spread while the species inhabits caves and mines during winter hibernation. The NLEB has experienced a sharp decline in the northeastern part of its range, as evidenced by a combination of hibernacula surveys and summer capture trends. Although the disease has not yet spread throughout the species' entire range (WNS is currently found throughout approximately 80% of the NLEB range) it continues to spread. Other factors contributing to the decline in populations include collisions with wind turbines, human disturbance

of hibernacula, nonstationary climate, and loss of summer habitat due to forest conversion and forest management (USFWS/ECOS, 2015).

NLEBs primarily overwinter in hibernacula of various sizes including caves and abandoned mines. Hibernacula have relatively constant, cool temperatures with very high humidity and no air currents. Less commonly, NLEBs have been observed overwintering in abandoned railroad tunnels, storm sewers, aqueducts, attics, and other non-cave or mine hibernacula with temperature, humidity, and air flow conditions resembling suitable caves and mines (USFWS/ECOS, 2015).

Spring staging is the time between winter hibernation and spring migration to summer habitat when bats begin to gradually emerge from hibernation. Individuals will exit the hibernacula to feed but re-enter the same or alternative hibernacula to resume periods of physical inactivity. The staging period, in Maryland, is believed to be short for the NLEB and may last from April through mid-May with variations in timing and duration based on latitude and weather (USFWS, 2011).

NLEBs typically roost during summer underneath bark or in cavities or crevices of both live trees and snags individually or in colonies. Males and nonreproductive females may also roost in cooler locations, including caves and mines. Individuals have also been observed roosting in colonies in buildings, barns, on utility poles, and in other man-made structures. The species has been documented to roost in many species of trees, including black oak (*Quercus velutina*), northern red oak (*Quercus rubra*), silver maple (*Acer saccharinum*), black locust (*Robinia pseudoacacia*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), sourwood (*Oxydendrum arboreum*), and shortleaf pine *(Pinus echinata*) (Foster and Kurta, 1999).

Fall swarming is the time between the summer and winter seasons and includes behaviors such as copulation, introduction of juveniles to hibernacula, and stop-overs at sites between summer and winter regions. Both males and females are present together at swarming sites, and other bat species are often present as well. For NLEBs, the swarming period, in Maryland, may occur between mid-August and mid-November. NLEBs may use caves and mines during swarming. Little is known about roost tree selection during this period, but some studies suggest that a wider variation in tree selection may occur during swarming than during the summer (USFWS/ECOS, 2015).

Tricolored Bat (TCB)

The TCB is a small insectivorous bat that typically hibernates within caves or abandoned mines (USFWS, 2021). On September 14, 2022, USFWS issued a proposed rule to list the TCB as endangered (87 FR 56381). The bat is found across much of the eastern and central United States (range includes 39 states), Washington D.C., and in four Canadian provinces, from southern Ontario to Nova Scotia (USFWS, 2021). The species is experiencing a westward expansion due to the increase in riparian trees as well as man-made structures for roosting. Most TCB roosts are composed of one individual and range upwards from roosting pairs to small groups. USFWS recognizes three United States Representation Units (RPU), each different due to genetic and behavioral diversity. TCBs inhabiting northern and western Maryland are considered part of the Eastern RPU, while the rest of Maryland is within the Southern RPU. The Eastern RPU extends from southeastern Virginia and continues up the Atlantic coast to Nova Scotia, containing the lowest abundance of TCB (11%) and known winter hibernacula (11%). The

Southern RPU, containing the action area, begins as far north as central Maryland and continues south through Honduras (USFWS, 2021).

The primary factor, as cited in the ESA-listing proposed rule, for the decline of TCB populations is WNS. The TCB has experienced a sharp decline across the majority of its range as evidenced by a combination of hibernacula surveys and predictive modeling. Recent estimations from data of 27 states and two North American provinces show declines of up to 100% over 59% of TCB range. TCB of the Southern RPU that hibernate in roadside culverts have experienced a far more severe effect of WNS compared to TCB hibernating in caves across all RPU. Although the disease has not yet spread throughout the species' entire range (WNS is currently found in 36 of 39 States where the TCB occurs), it continues to spread. Other factors contributing to the decline in populations include collisions with wind turbines, loss of deciduous forest and emergent wetland habitat, and a nonstationary climate (USFWS, 2021).

TCBs overwinter primarily in hibernacula of various sizes including caves, abandoned mines, and culverts in the Southern RPU. TCB require hibernacula to have relatively constant and higher temperature requirements than other cave-roosting species, with very high humidity and no air currents. TCBs may also overwinter in tree cavities, abandoned wells, and other human-made structures with the narrow temperature, humidity, and air flow conditions resembling suitable caves and mines (USFWS, 2021).

Spring staging is the time between winter hibernation and spring migration to summer habitat when bats begin to gradually emerge from hibernation. Individuals will exit the hibernacula to feed but re-enter the same or alternative hibernacula to resume periods of physical inactivity. During this time, bats are preparing for spring migration to summer habitat. The staging period in Maryland is believed to be short for the TCB and may last from April through mid-May, with variations in timing and duration based on latitude and weather (USFWS 2024).

TCBs typically roost during summer within leaf clusters of living or newly dead deciduous trees and may also roost in pine needles and eastern redcedar (*Juniperus virginiana*). TCB will roost in the mid to upper canopy of a variety of tree species, showing some degree of preference for larger oaks (*Quercus spp*.). In some sections of the species' range, TCB will roost within Spanish moss (*Tillandisa usneoides*) and bony bear lichen (*Usnea trichodea)*. Bridges, barns, and concrete surfaces may also provide artificial summer roosting habitat for TCB. Female TCB are known to return to the same roost each year and form maternity colonies with other females. Male TCB are known to roost as individuals (USFWS, 2021).

Fall swarming is the time between the summer and winter seasons and includes behaviors such as copulation, introduction of juveniles to hibernacula, and stop-overs at sites between summer and winter regions. For TCBs in Maryland, the swarming period may occur between mid-August and mid-November. TCB are known to begin hibernation earlier following the fall swarming period compared to other cave-hibernating species (USFWS, 2021 and Tate, 2020). Previous studies have shown that TCB, during this time, will roost in leaf clusters of living trees and that proximity to hibernaculum is important (Tate 2020).

5 BAT HABITAT SURVEYS

A bat habitat suitability field assessment was conducted within the action area in fall 2025. The results of this initial assessment are included in **Appendix C**; however, it should be noted that the LOD has been refined since the field assessment. The following discussion of bat habitat reflects these refinements to the LOD. Forest is the largest land use category in the Anne Arundel County portion of the action area and is more scattered in the Queen Anne's County portion due to higher levels of development and more tidal emergent wetlands and waterways.

The *Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines* (USFWS, 2024) were followed during the bat habitat assessment. A total of 32 individual suitable bat habitat areas were identified. Within the LOD, 72.4 acres (20%) are classified as suitable habitat for NLEB and TCB; and 284.8 acres (80%) are classified as unsuitable bat habitat.

In general, wooded areas within the action area follow a linear path and are typified by a moderate to heavy vine load, including oriental bittersweet and English ivy, as well as being dominated by trees not typically favored by NLEB or TCB, such as Callery pear and sweetgum. Canopy is the least dense forest layer, never exceeding 50% density, which may expose bats roosting in these stands to predation. Midstory and understory layers vary throughout the action area and are occupied, to some extent, by denser shrubs and trees such as Callery pear and autumn olive. Many of the wooded areas are adjacent to the highway, creating tracts of forest edge, which may be beneficial to TCB. Unsuitable areas of bat habitat include roadways, trees with a diameter at breast height (DBH) of three inches or less, and areas with only shrubby vegetation. The complete suitable habitat assessment is presented in **Appendix C**.

On September 19, October 7 and 16, 2025, systematic visual assessments were conducted on two (2) bridges, one (1) overpass, 13 culverts, and three (3) buildings throughout the action area for evidence of roosting bats. Since completion of these visual surveys, the LOD of the Preferred Alternative has been refined and the three (3) buildings surveyed will no longer be impacted. Per USFWS coordination, the assessment of the Bay Bridge was conducted using MDTA biennial inspection reports. The Oceanic Drive overpass as well as three buildings were assessed using only publicly available imagery. The visual assessments of the Cox Creek bridge and all culverts were completed, in the field, following Appendix K of the *Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines* and included the use of a borescope with a 20-foot reach, an infrared camera, binoculars, and spotlights (USFWS, 2024, Appendix K).

The visual assessment of all 19 structures yielded no evidence of roosting bats. Despite suitable cracks, crevices, and concrete surfaces along the exterior as well as interior structures, no evidence of roosting bats was detected within the Bay Bridge. The Cox Creek bridge and Oceanic Drive overpass did not yield evidence of roosting bats, despite also containing concrete elements. Bats within the LOD may be avoiding roosting in bridges due to increased noise and light of heavy vehicular traffic, especially considering that suitable forested habitat exists within 1,000 feet of these bridges (Zurcher et al., 2010). Similarly, the three buildings assessed yielded no evidence of roosting bats, which may be due to increased lighting and noise from commercial buildings and the highway as well as proximity to, likely, higher quality habitat in forested areas. Finally, none of the culverts assessed contained evidence of roosting bats; however, most of the culverts were blocked to bats via debris or other obstructions, heavily limiting the ability of bats to utilize them. The complete bridge and culvert survey report is in **Appendix D**.

6 EFFECTS ANALYSIS

Habitat Modification

Potential direct effects to NLEB and TCB include habitat loss, degradation, disturbance, and fragmentation. NLEB and TCB habitat in the action area may be distributed amongst 72.4 acres of suitable forest habitat of varied quality as well as 16 potential roosting locations in bridges, overpasses, and culverts.

The Tier 2 Study Preferred Alternative will require the removal of 57.7 acres of forest. Forest impacts in the Anne Arundel County portion of the action area will largely occur surrounding Mezick Pond and adjacent to a Habitat Protection Area north of Mezick Pond. In Queen Anne's County, forest impacts would primarily occur in a previously disturbed area between the eastern shoreline of the Chesapeake Bay and MD 8. Potential impacts to forest within the action area, would occur primarily within forest edge and fragmented forests, due to disturbance typical of a linear transportation corridor. A more detailed view of these forested areas is shown in **Appendix C**. Forest fragments and edge is the preferred forest habitat of TCB, allowing for efficient foraging to facilitate their fast metabolism (USFWS, 2024). Other preferred habitat elements for this species includes deciduous trees, especially oaks, providing live or dead leaf clusters for roosting. NLEB are more likely to be found in forests containing trees with exfoliating or shaggy bark, cracks, crevices, or cavities. This species shows preference for intact forests of various size and is less commonly seen along fragmented forest or forest edge (USFWS, 2024). The assessment of bat habitat within the LOD indicates that the majority of forested resources are within 100 feet of the highway and generally composed of invasive vegetation, providing low-quality bat habitat for NLEB and TCB.

Proposed forest impacts would comply with the Forest Conservation Act (FCA) and Chesapeake Bay Critical Area Act (CBCAA) where required. Maryland Reforestation Law requires 1:1 replacement of impacted forest acreage. Where possible, the MDTA will replace trees on-site; however, it is expected that all required reforestation and/or afforestation would not be possible on site, potentially requiring some off-site replacement. The MDTA will prioritize off-site planting areas that expand existing forest habitats where practicable. Mitigation would be required for forest impacts within the Critical Area at a ratio ranging from 1:1 to 3:1 depending on the percent of forest acreage cleared, designated land use classification, and whether impacts fall within the identified Critical Area Buffer. During final design, the MDTA would look to replace affected trees and forest. The MDTA will work with the MDNR Critical Area Commission to identify additional land within the Critical Area outside the LOD, and within the Critical Area Buffer, as appropriate, to fully address mitigation requirements. These laws limit clearing and require specific mitigation through reforestation and tree planting, potentially benefitting NLEB and TCB. Tree clearing will be prohibited during the active season (April 1 to September 30) to avoid and minimize potential direct effects to NLEB and TCB in the action area. There are no known NLEB roosts or hibernacula in the action area and it is unknown whether TCB are roosting or hibernating in the action area.

The Preferred Alternative will permanently impact 5.6 acres of tidal and nontidal wetlands as well as 670 linear feet of nontidal waterways. Wetlands and streams may provide NLEB and TCB with forage, water, and cover from predators. A compensatory mitigation plan for unavoidable wetland impacts will be coordinated with state and Federal regulatory agencies during final design. Mitigation for wetland impacts would focus on qualitative measures, such as the replacement of wetland function, as well as quantitative measures, such as specified acreage of wetland loss and/or construction activities.

The Preferred Alternative would result in impacts to two bridges in the action area. Impacts to bridges include the replacement and demolition of the existing Bay Bridge spans and the widening of the eastbound span of the Cox Creek bridge, in Stevensville, shown in **Figure 6-1**. The removal of the existing Bay Bridge spans would remove potential NLEB and TCB habitat; however, the October 2025 visual assessment did not reveal evidence of bat use. Further coordination with USFWS would be required if roosting bats are detected in a bridge span and may result in time of year restriction(s) for construction activity on the bridges. However, the Preferred Alternative proposes a wider Bay Bridge structure that would provide a net increase in potential bat roosting habitat. The widening of the Cox Creek eastbound span would also provide a slight increase in potential bat roosting habitat. This roadway widening project will result in an increase in impervious surface, meaning the project must comply with the Maryland Department of the Environment's (MDE) Stormwater Design Manual.

Modification or replacement is anticipated for most culverts in the action area due to concerns of projected hydrologic conditions and headwater elevations that overtop the roadway. Culvert modifications will also be required to accommodate roadway widening. In the action area, an assessment of 36-inch or wider diameter culverts determined that the 36-inch reinforced concrete pipe conveying Meredith Creek beneath U.S. 50/301 does not currently meet the criteria of the MDOT Highway Drainage Manual (MDOT, 2023). The methods to increase capacity at Meredith Creek may include a full replacement with a larger pipe or the addition of three (3) 36-inch RCPs. The assessment identified two (2) additional RCPs that are undersized, shown in **Figure 6-1**, one on the Eastern Shore conveying Thompson Creek and one on the Western Shore, just east of the Meredith Creek RCP. To address these concerns, while maintaining MDOT SHA Drainage Manual standards (MDOT, 2023), culvert capacity increases may be completed by replacing the culvert, either in sections or entirely, or by adding pipes adjacent to the existing pipe. Another option that may be employed to address the excessive headwater elevation would be to improve the headwalls of some culverts. The method used to increase capacity and improve these identified culverts will be determined in final design. The proposed action would impact 1,330 linear feet of culverted waterways in the action area. Additional culverts that need increased capacity may be identified during final design; however, if the culverts are smaller than 36 inches in diameter, they are currently unsuitable for use by NLEB and TCB (USFWS, 2024). Culverts that are blocked by debris would also be highly unlikely to support NLEB and TCB (USFWS, 2024). There are no known roosts of NLEB or TCB occurring in culverts within the action area. Bat usage was not observed during the October 2025 visual assessments of the three (3) culverts that require modification, and 10 other 36-inch or greater culverts whose modification requirements are unknown at this time.

Figure 6-1: Impacts to Bridges and Culverts



Bats utilize day and night roosts, each serving unique purposes. Day roosts protect bats while resting or tending to young, while night roosts are needed for bats to digest food while feeding (Keeley and Tuttle, 1999). Due to the requirements of day roosts, human-made structures along busy highways are less likely to be suitable habitat. Structures composed of concrete with crevices 0.5 to 1.25 inches wide and 12 inches or greater in depth are of high priority for bats. Quiet roosts are also of some priority, as bats within them will be with young or resting (Keeley and Tuttle, 1999). The Chesapeake Bay Bridge is a mostly steel structure, containing some concrete portions, that experiences high traffic volumes of cars and trucks, as well as vessel traffic underneath the spans. The Cox Creek bridge is a much smaller bridge, with proportionally greater concrete surface when compared to the Bay Bridge. The Cox Creek bridge is positioned closer to the water, meaning that vessel traffic is not a concern for bats; however, heavy vehicular traffic would still impact bats potentially roosting in this bridge. Bats are more likely to seek bridges at night as they retain heat, reducing the energetic cost of thermoregulation (Keeley and Tuttle, 1999). Bats show preference for bridges as night roosts that are fully exposed to sun and with space between beams of the deck (Keeley and Tuttle, 1999). Evidence of bats was not detected during the October 2025 visual assessments; however, these bridge structures may provide bats with suitable habitat in the form of poor-quality night roosts. Most culverts in the LOD were blocked to some extent and are unlikely to support NLEB and TCB during the day or night (USFWS, 2024).

The LOD is not located within a karst area and does not contain documented habitat for NLEB and TCB. The suitable habitat available within the LOD is typical of a transportation corridor, being heavily fragmented, exposed to heavy vehicular traffic, and moderately developed in some areas. Furthermore, the MDTA and FHWA will ensure no tree clearing will occur from April 1 to September 30 of any year, which will avoid direct injury or mortality to NLEB and TCB from tree clearing. Large areas of high-quality forest adjacent to the LOD will remain for use by NLEB and TCB. For these reasons, impacts to forest resources may affect but are not likely to adversely affect NLEB and TCB. The impacts of the Preferred Alternative to bridges and culverts in the action area may affect but are not likely to adversely affect NLEB and TCB. The proposed wider/larger structures will increase the potential suitable habitat for NLEB and TCB, which could benefit these species.

Noise

Noise impacts may originate from pile driving, bridge demolition, tree/vegetation clearing, and the operation of equipment associated with construction activities. As pile driving and bridge demolition, either cutting or blasting, would impact the subaqueous environment, it would not impact suitable bat habitat. Construction activities that may produce noise within or adjacent to suitable bat habitat include, but are not limited to, tree/vegetation clearing, structure takes, construction access, and equipment mobilization. Ambient noise monitoring in the action area revealed noise levels ranging from 47 dBA to 75 dBA. The noise study was completed to validate a computer model that would be used to predict the noise increase in the action area during the construction of the Preferred Alternative. The model predicts that lands within 100 feet of construction may experience noise levels up to 83 dBA. The model also predicts that there would not be substantial increases in noise levels in Noise Sensitive Areas (NSA), which include single and multiple family structures, following the completion of the Preferred Alternative. While dBA is not typically used in studies pertaining to noise impacts on bats, there is evidence to show that bats may experience decreased foraging efficiency under the effects of noise at 56 dBA to 88 dBA as well as changes

to call frequency and amplitude of echolocation at 88 dBA (Bunkley and Barber, 2015). Additionally, bats foraging near highways, especially those with high traffic volumes, may experience decreased foraging efficiency up to 60 meters from road surface (Siemers and Schaub, 2011). Over time, bats may adjust to low noise levels or louder noise levels at greater distances. However, high noise levels at close proximity, accompanied by vibration, may force bats away from roosting areas and induce evasive responses (USFWS, 2015). In proximity to highways, bats are more likely to engage in evasive actions and are less likely to cross roadways, posing a barrier to foraging habitat when traffic volumes are higher (Zurcher et al., 2010). Evasive actions and alterations to call frequency and echolocation incur energetic costs to bats, which are intensified by decreased forage efficiency and restricted access to forage areas associated with high noise levels. Along with increased energy costs, chronic exposure to excess noise may induce stress responses and increase the incidence of disease (Song et al., 2018; Davy et al., 2017). WNS is a disease of concern as it has resulted in heavy declines of North American bat populations (Bektas et al., 2021; Powell et al., 2021). As pile driving and bridge demolition would occur within the water, the impacts to NLEB, TCB, and suitable habitat are negligible. Bats that may be roosting within the action area are likely adjusted to heightened noise levels and would likely shift roosting locations or temporarily abandon the roost during construction activities. As a result, noise impacts from the Preferred Alternative may affect but are not likely to adversely affect NLEB and TCB.

Lighting

Artificial light, especially at night, may negatively affect bats by entombing them in their roost, forcing them to abandon roosts, or disrupting behaviors such as foraging or avoiding predators (Zeale et al., 2016). Temporary lighting may encourage insect-gleaning species, such as the NLEB and TCB, to forage; however, the effects are relative to individuals (Voigt et al., 2021). Some studies have shown that members of the *Myotis* genus forage less within areas lit by streetlamps and forage more in darker areas (Rydell, 1992). However, artificial light may disturb the forage base for bats, as congregating insects will be preyed upon by multiple predators (Van Grunsven et al., 2020). Finally, bats may be at greater risk of predation as they take less optimal paths to avoid artificial light (Voigt and Kingston, 2016).

The Preferred Alternative may include temporary artificial light to support extended day and overnight construction activities. Nighttime construction is most likely to occur on the Bay Bridge spans; however, it is unknown if nighttime work will be required at this time. If temporary artificial light is used, it will comply with applicable Occupational Safety and Health Administration (OSHA) standards. This utilization of temporary lighting would be an increase from existing conditions in the action area. As the temporary lighting would be focused on the Bay Bridge spans and any required access roads or access trestles, it is unlikely that it would impact suitable bat forest habitat. This would minimize exposure of suitable bat habitat, and any bats that may be within it, to artificial light.

Currently, any changes to the existing permanent lighting regime of the action area are unknown. Assessments of the lighting in the action area indicate that minor increases in permanent lighting may be needed to meet the exact requirements for interchange lighting outlined in the *MDTA and SHA Lighting Guidelines* (MDTA, 2019). On the Bay Bridge, at minimum, safety lighting for air traffic on bridge towers, U.S. Coast Guard required navigational channel lighting, as well as functional roadway lighting would be anticipated. The design of the bridge's lighting system will

be based on DarkSky International's Five Principles for Responsible Outdoor Lighting: Useful, Targeted, Low Level, Controlled, and Warm-Colored. By integrating these principles, the project can minimize light pollution, protect wildlife habitats, reduce energy costs, and comply with *MDTA and SHA Lighting Guidelines* (MDTA, 2019). Specific details of this safety lighting, as well as any continuous or aesthetic lighting on the bridge deck, would be determined in final design. Currently, the Bay Bridge is unlit, except for overhead gantry systems and necessary lighting for roadway safety, vessel navigation, and aviation. Any additional permanent lighting would be an increase from existing conditions. Any changes to the continuous or aesthetic lighting regime would include measures to ensure safety and navigational compliance, and minimize impacts on species and the environment, particularly within the ecologically sensitive Chesapeake Bay region. These considerations may include the use of energy-efficient lighting systems installed along the main span, approaches, and support piers to provide uniform illumination for vehicular traffic, maintenance operations, and emergency access. Navigational lighting, as required by the U.S. Coast Guard, would be implemented on the bridge's substructure to ensure safe passage for maritime vessels, utilizing shielded, downward-directed fixtures to reduce glare and light trespass into the Chesapeake Bay's sensitive aquatic and avian habitats. Aesthetic lighting may be considered for the bridge towers, with the option of employing programmable low-intensity lighting to adhere to DarkSky principles to minimize impacts on migratory birds and the scenic viewsheds of the Chesapeake Bay.

If utilized, temporary nighttime lighting would be directed on the Bay Bridge and accompanied by elevated noise originating from construction. It is likely that NLEB and TCB would avoid this area or not remain for extended periods of time. Currently, temporary nighttime light is only anticipated on the Bay Bridge spans; therefore, it is unlikely that bats occupying forest habitat within the action area would be impacted by temporary nighttime lighting. For these reasons, if nighttime work were to be conducted, it may affect but is not likely to adversely affect NLEB and TCB.

Currently, increases in the permanent lighting along U.S. 50/301 or other roadways are expected to be minor. If permanent lighting increases are determined during final design, they would comply with the *MDTA and SHA Lighting Guidelines* (MDTA, 2019). Considerations for potential environmental impacts include the installation of full-cutoff fixtures with warm-toned wavelengths (below 3000 Kelvin) or house side shields to reduce skyglow and light trespass into NLEB and TCB suitable habitat. Additionally, adaptive controls can dim lights during low-traffic periods to minimize energy consumption and ecological disturbance. Changes to permanent lighting along U.S. 50/301 or other roadways would likely have less impact on the NLEB and TCB on the Eastern Shore, as that area is highly lit by commercial buildings and parking lots compared to the forest habitat of the Western Shore. Although any increase in permanent light on the Bay Bridge would be an increase compared to the existing condition, it is unlikely that there will be much impact from this light source to bats due to distance to forest habitat and potential disturbance from vehicular and vessel traffic at the Bay Bridge spans. Currently, temporary and permanent lighting in the action area is not expected to increase substantially beyond current conditions; therefore, it is anticipated that impacts of the proposed project from lighting may affect but are not likely to adversely affect NLEB and TCB. Determinations on lighting will be made during final design; therefore, anticipated impacts to bats may change.

Indirect Effects

Throughout the action area, land-based construction activities such as clearing and grading have the potential to deposit sediment in NLEB and TCB habitat, such as streams and wetlands. Sediment deposition may be detrimental to NLEB and TCB as streams and wetlands may provide bats with forage, water, and cover. An ESC plan, in accordance with MDE guidelines, will be prepared during final design, ensuring that appropriate BMPs are implemented at each area of construction. The LOD of the Preferred Alternative has been developed to accommodate all aspects of the ESC plan. The project will increase the amount of impervious surface in the action area. This may result in indirect effects to bats via groundwater impacts to wetlands and streams, as well as pollutant runoff into these resources. As a result, this project must comply with the MDE Stormwater Design Manual. The MDTA's approach to design and development will aim to incorporate ESD to meet (and exceed where feasible) surface and protection requirements along the roadway and the Bay Bridge. The MDTA would adhere to the developed ESD and required BMPs, ESC, and SWM practices to treat runoff from new impervious surfaces and manage stormwater quality and quantity. Similar to the ESC plan, the LOD will accommodate all elements of the SWM plan, but details will not be determined until final design. For these reasons, it is anticipated that, at this time, indirect impacts of the Preferred Alternative may affect but are not likely to adversely affect NLEB and TCB in the action area.

7 CONCLUSION AND EFFECTS DETERMINATION

This Biological Assessment evaluated the potential effects of the proposed Chesapeake Bay Crossing project on the NLEB and the TCB. The proposed action is the Preferred Alternative. Based on currently available Tier 2 Study information, FHWA, in coordination with the MDTA, has made a determination that the Preferred Alternative may affect but is not likely to adversely affect the NLEB and TCB. Effects to NLEB and TCB are expected to be discountable because: 1) bat surveys did not detect NLEB or TCB on or within any of existing bridge or culverts within the LOD, 2) tree clearing will be prohibited during the bat active season (April 1 to September 30), 3) vegetation removal is limited to 57.8 acres primarily within forest edge and fragmented forests found within 100 feet of the roadway, and 4) Visual assessments of all bridges, culverts, and buildings identified for take will occur every two years and before and structure takes to maintain probable absence of NLEB and TCB. Further evaluation of potential impacts will be conducted during final design, and the effects determination will be re-assessed as more detailed construction means and methods are made available. FHWA, in coordination with the MDTA, will continue to coordinate with USFWS through final design to ensure implementation of appropriate avoidance, minimization, and mitigative protection measures so that there are no adverse effects to listed or proposed bat species.

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APPENDIX A

AGENCY COORESPONDENCE

PROJECT SUMMARY

Project Code: 2024-0014247
Project Name: Bay Crossing Study Tier 2
Project Type: Road/Hwy - New Construction
Project Description: The Chesapeake Bay Crossing Study: Tier 2 NEPA (Tier 2 Study) is a National Environmental Policy Act (NEPA) study that will analyze alternatives to provide congestion relief and improve travel reliability, mobility and safety across the Chesapeake Bay. The Tier 2 Study is focusing on the Selected Corridor Alternative (Corridor 7) that was identified at the conclusion of the Tier 1 Study. Alternatives will include a No Build Alternative and a range of build alternatives involving various alignments, crossing types and modal and operational alternatives (e.g. transit, pedestrian, bicycle, etc.). Corridor 7 is two miles wide and runs 22 miles from the Severn River Bridge in Anne Arundel County to the U.S. 50/U.S. 301 split in Queen Anne's County.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.9956717,-76.3745195263001,14z



Counties: Anne Arundel and Queen Anne's counties, Maryland

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

COASTAL BARRIERS

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on Federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

SYSTEM UNIT (SU)

Most new Federal expenditures and financial assistance, including Federal flood insurance, are prohibited within System Units. ***Federally-funded projects within System Units require consultation with the Service.*** *Consultation is not required for projects using private, state, or local funds.*

UNIT	NAME	TYPE	SYSTEM UNIT ESTABLISHMENT DATE	FLOOD INSURANCE PROHIBITION DATE
MD-32	Stevensville	SU	11/16/1990	11/16/1990
MD-32	Stevensville	SU	11/25/2024	11/25/2025

WETLANDS

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

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1Fx
- PFO1Cx
- PSS1S
- PSS4C
- PFO4/SS1S
- PSS1B
- PFO4/1R
- PFO4/EM1R
- PSS1/EM1F
- PSS1/FO4B
- PSS1Ah
- PSS1A
- PSS1Bh
- PFO1D
- PFO4/1B
- PSS3/4R
- PFO1E

- PSS1Ex
- PFO1/SS1S
- PFO1Ch
- PSS1R
- PSS1Cx
- PFO1A
- PSS1/EM1Cx
- PFO1/2F
- PFO1/EM1A
- PFO1F
- PSS1Ch
- PFO1Fb
- PFO4S
- PFO1/SS1A
- PSS1C
- PFO4/1S
- PFO1/4B
- PSS1/EM1C
- PFO1Ex
- PFO1Db
- PFO1/2C
- PFO4/1C
- PFO1C
- PFO1B
- PFO1/4C
- PFO1Fh
- PFO1T
- PFO4D
- PFO1/4A
- PFO1R
- PSS4A
- PFO1/2E
- PFO4B
- PFO1/4S
- PSS1/EM1D
- PFO1Ad

- PFO/SS1A
- PFO1/EM1R
- PSS1E
- PSS1/EM1A
- PSS1D
- PFO1S
- PFO4R
- PFO4C
- PFO1/SS1R
- PFO1/SS1C

FRESHWATER POND

- PUSA
- PUSCx
- PUBF
- PUBH
- PUBHx
- PABHx
- PAB1Hx
- PUBFx
- PUBHh
- PUBVh
- PUBKx

RIVERINE

- R4SBCx
- R5UBH
- R4SBC

FRESHWATER EMERGENT WETLAND

- PEM1Dx
- PEM1Ch
- PEM1Ah
- PEM1B
- PEM5A
- PEM1F
- PEM1Dh
- PEM1D
- PEM1/SS1C

- PEM1A
- PEM1Ex
- PEM1Rh
- PEM1/SS1Fx
- PEM1/SS1Ch
- PEM1/SS1Cx
- PEM1R
- PEM1/SS1D
- PEM1Fx
- PEM1/SS1R
- PEM5C
- PEM1Fb
- PEM1C
- PEM1Fh
- PEM5Eh
- PEM1E
- PEM1Cx

ESTUARINE AND MARINE WETLAND

- E2USP
- E2EM1/SS1P
- E2EM1Pd
- E2SS1P
- E2SS1/EM1P
- E2EM1/SS4P
- E2US/SS1P
- E2US2P
- E2SS3/4P
- E2SS1Pd
- E2USN
- E2SS1/EM5P
- E2USM
- E2SS4P
- E2EM2N
- E2EM1N
- E2EM5P
- E2FO4P

- E2EM1P
- E2SS1/3P

OTHER

- Pf

ESTUARINE AND MARINE DEEPWATER

- E1UBLx
- E1UBLh
- E1ABLh
- E1UBL

IPAC USER CONTACT INFORMATION

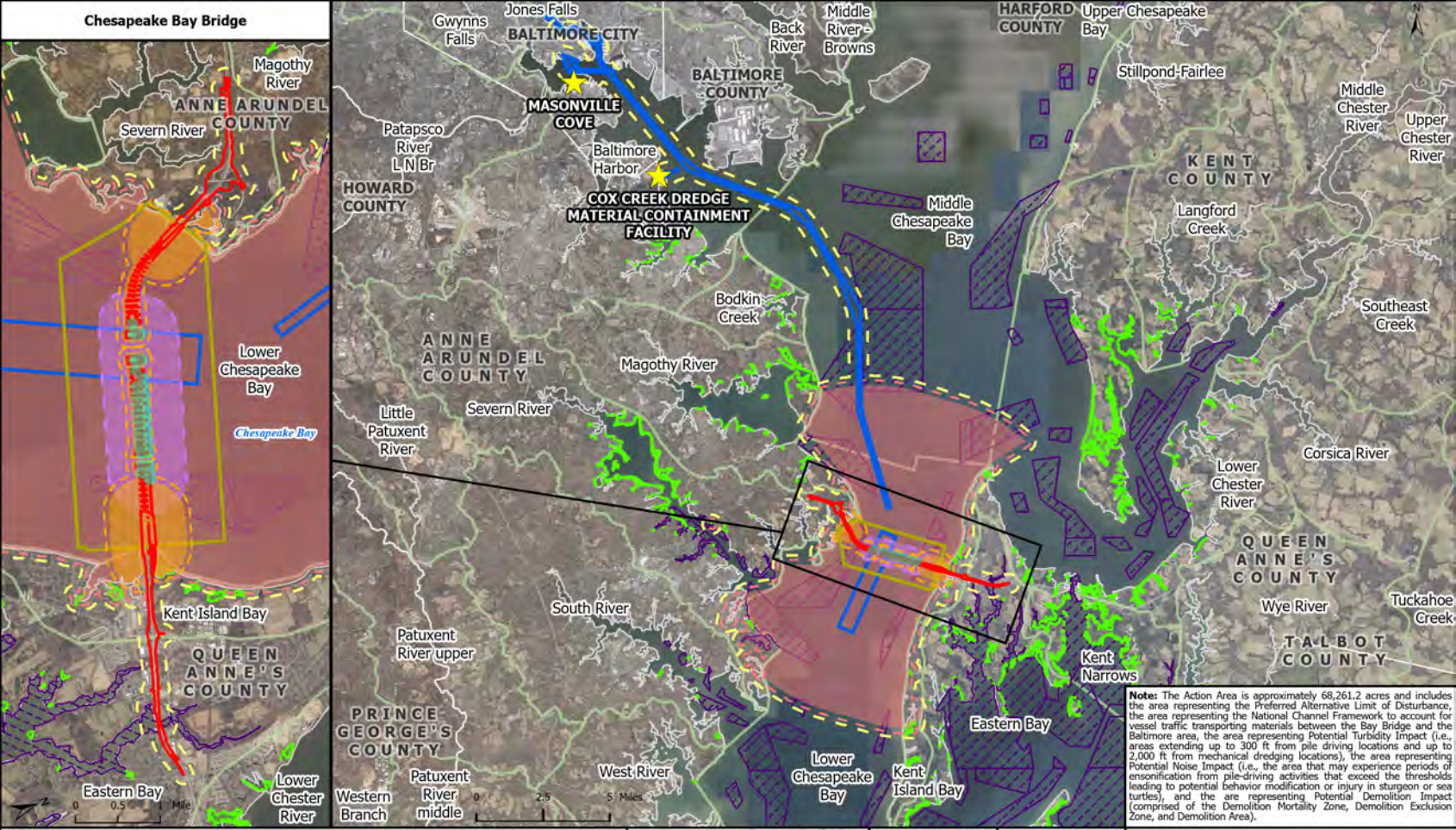
Agency: Private Entity
Name: Gavin Studds
Address: 25 Old Solomons Island Road
City: Annapolis
State: MD
Zip: 20401
Email gavins@cri.biz
Phone: 4104746559

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration
Name: Heather Lowe
Email: hlowe@mdta.state.md.us
Phone: 4105375665

APPENDIX B

ACTION AREA MAP


Chesapeake Bay Bridge
Magothy River
ANNE ARUNDEL COUNTY
Severn River
Lower Chesapeake Bay
Chesapeake Bay
Kent Island Bay
QUEEN ANNE'S COUNTY
Eastern Bay
Lower Chester River
0 0.5 1 Mile
Gwynns Falls
Jones Falls
BALTIMORE CITY
Back River
Middle River - Browns
HARFORD COUNTY
Upper Chesapeake Bay
Stillpond-Fairlee
BALTIMORE COUNTY
MASONVILLE COVE
Middle Chester River
Upper Chester River
Patapsco River L N Br
Baltimore Harbor
KENT COUNTY
HOWARD COUNTY
COX CREEK DREDGE MATERIAL CONTAINMENT FACILITY
Middle Chesapeake Bay
Langford Creek
Bodkin Creek
Southeast Creek
ANNE ARUNDEL COUNTY
Magothy River
Severn River
Little Patuxent River
Corsica River
Lower Chester River
QUEEN ANNE'S COUNTY
South River
Wye River
Tuckahoe Creek
Patuxent River upper
TALBOT COUNTY
Kent Narrows
PRINCE GEORGE'S COUNTY
Eastern Bay
Lower Chesapeake Bay
West River
Kent Island Bay
Western Branch
Patuxent River middle
0 2.5 5 Miles
N
Note: The Action Area is approximately 68,261.2 acres and includes the area representing the Preferred Alternative Limit of Disturbance, the area representing the National Channel Framework to account for vessel traffic transporting materials between the Bay Bridge and the Baltimore area, the area representing Potential Turbidity Impact (i.e., areas extending up to 300 ft from pile driving locations and up to 2,000 ft from mechanical dredging locations), the area representing Potential Noise Impact (i.e., the area that may experience periods of ensonification from pile-driving activities that exceed the thresholds leading to potential behavior modification or injury in sturgeon or sea turtles), and the are representing Potential Demolition Impact (comprised of the Demolition Mortality Zone, Demolition Exclusion Zone, and Demolition Area).
Potential Dredge Disposal Site
Preferred Alternative Limit of Disturbance
SAV (2019-2023)
Natural Oyster Bottom (NOB)
County Boundary
Action Area
Action Area - National Channel Framework
Action Area - Potential Turbidity Impact
Action Area - Potential Noise Impact
MDE 8-Digit Watershed
Action Area - Demolition Mortality Zone
Action Area - Demolition Exclusion Zone
Action Area - Demolition Area
Location Overview
New
Washington
Maryland
0 25 50 100 mi
Credits: MD iMAP, DNR, MD iMAP, SHA, MD iMAP, DoIT, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, USGS
MDTA
Maryland Transportation Authority
Chesapeake BAY CROSSING STUDY
TIER 2 NEPA
Action Area Map

APPENDIX C

BAT HABITAT ASSESSMENT

DRAFT BAT HABITAT ASSESSMENT

BAY CROSSING TIER 2 STUDY

ANNE ARUNDEL & QUEEN ANNE'S COUNTY(S), MARYLAND





OCTOBER 2025

Prepared For:

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

MDTA Maryland Transportation Authority

Prepared By:

COASTAL RESOURCES INC.

25 Old Solomons Island Road, Annapolis, Maryland 21401

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APPENDIX B: FEDERAL AGENCY COORDINATION
APPENDIX C: BAT HABITAT CHARACTERIZATION DATASHEETS
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APPENDIX E: BAT HABITAT SUITABILITY DATA

1.0 Introduction

Coastal Resources, Inc. (CRI), sub-consultant to Rummel, Klepper, & Kahl, LLP (RKK), under contract with Maryland Transportation Authority (MDTA), has completed a bat habitat assessment for the Northern long-eared bat (*Myotis lucifugus*, NLEB) and the tricolored bat (*Perimyotis subflavus*, TCB) in support of the Chesapeake Bay Crossing Study Tier 2 NEPA Project, in Anne Arundel and Queen Anne's Counties, Maryland.

2.0 Study Area

The study area is comprised of approximately eight miles of MDTA right of way spanning across the Chesapeake Bay from west of Oceanic Drive in Annapolis to east of Cox Creek in Chester (**Figure 1 – Vicinity Map**). Land use classifications within and adjacent to the study areas include transportation, commercial, low density residential, and other land. The Bay Crossing Study Tier 2 NEPA project occurs within the Severn River (02131002), Lower Chesapeake Bay (02139998), Kent Island Bay (02130511), and Chester River (02130501) MDE 8-digit watersheds and lies within the Coastal Plain physiographic province.

3.0 Methodology

Prior to conducting the bat habitat assessment, CRI began the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) review process. The IPaC review was conducted on June 28, 2025, and indicated the federally endangered NLEB and proposed endangered TCB may occur within the project area. IPaC documentation is included in **Appendix B**.

Prior to the bat habitat assessment, CRI researched existing literature on the habitat types associated with each of the bat species of concern (**Table 1**)**.** During the field assessment, potential bat habitat identified using the definitions of suitable NLEB and TCB habitat as defined in the 2024 USFWS *Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines* (USFWS 2024). Areas of potential bat habitat were created using the ArcGIS Field Maps application on an iOS device. These areas were field verified and adjusted using the cruise method. Inaccessible areas are assumed to be comprised of suitable bat habitat.

Figure 1: Vicinity Map

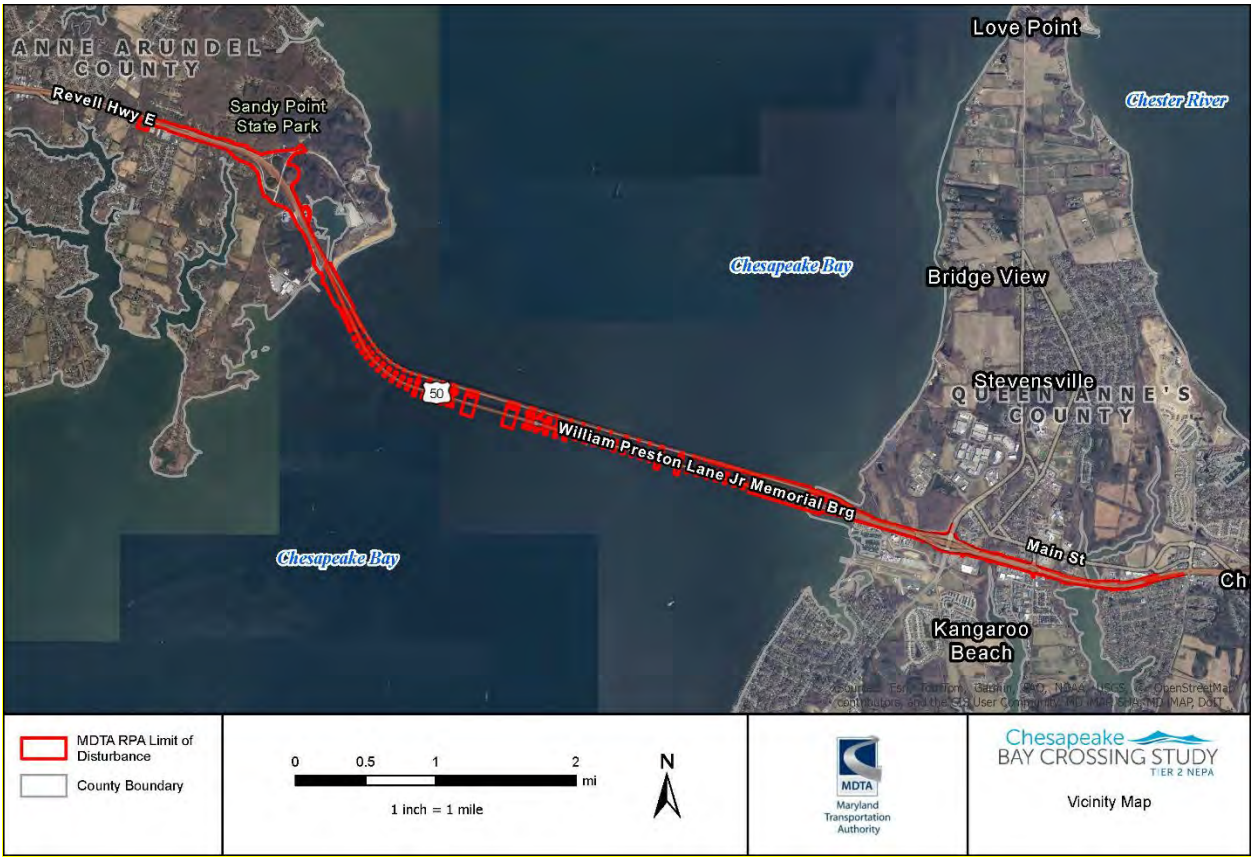


Table 1. Summary of RTE Habitat Assessment Results for Northern Long-eared Bat and Tricolored Bat

Common Name	Species	RTE Status[1]	Habitat Preference[2]	Suitable Habitat Present (Yes/No)
Northern Long-eared Bat	*Myotis septentrionalis*	FE, SE	Mixed-type wooded areas with potential roost trees and variable amounts of canopy closure and small gaps. May roost in human-made structures. [2]	Yes
Tri-colored Bat	*Perimyotis subflavus*	FPE, HSR	Wooded areas and adjacent non-forested habitat that includes emergent wetlands, shrublands, grasslands, and forested edges of fields and pastures. Will roost in human-made structures. [2]	Yes

[1]FT = Federally Endangered; FPE = Federally Proposed Endangered; SE = State Endangered; HSR = Highly State Rare
[2]Habitat associations obtained from 2024 USFWS Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines

4.0 Results and Discussion

The results of the bat habitat assessment are summarized below. Maps depicting the locations of bat habitat are included in **Appendix A**. Bat habitat characterization datasheets are included in **Appendix C**.

Representative site photographs of forest stands and tree clusters are included in **Appendix D** and bat habitat suitability data are included in **Appendix E**.

Both species of bats are insectivores. Because insects are so closely associated with water resources, streams and wetlands within suitable portions of the study area may provide important food sources and water for these species. These bats will typically forage over or along the edges of ponds, wetlands, and streams. During the waters of the U.S. (including wetlands) delineation, 38 wetland systems were identified within the LOD, including seven palustrine emergent wetlands, eight estuarine emergent wetlands, 21 palustrine forested wetlands, one palustrine scrub-shrub wetlands, one estuarine scrub-shrub wetland. Fifteen watercourses were identified within the study area, including 10 perennial streams and five intermittent streams.

Within the LOD, approximately 72.41 acres (20.58%) are classified as suitable bat habitat for the NLEB and TCB; and 279.41 acres (79.42%) are classified as unsuitable bat habitat. Much of the wooded areas in the project corridor provide suitable habitat, 10.23 acres (13.91%) of which is classified as good habitat for NLEB, 42.57 acres (59.43%) which is classified as moderate habitat for NLEB, and 19.6 acres (26.66%) which is classified as moderate-to-good habitat for NLEB. Within the LOD, 13.3 acres (18.41%) of suitable bat habitat is classified as good quality for TCB, 38.19 acres (53.43%) is classified as moderate quality for TCB, and 20.7 acres (28.16%) is classified as moderate-to-good habitat for TCB. In general, wooded areas along the project corridor follow a linear structure and are typified by a moderate to heavy vine load, including oriental bittersweet and English ivy, as well as being dominated by trees not typically favored by NLEB or TCB, such as Callery pear and sweetgum. Canopy was also the least dense forest layer, never exceeding 50% density, which may expose bats roosting in these stands to predation. Midstory and understory layers varied throughout the study area and were occupied, to some extent, by denser shrubs and trees such as Callery pear and autumn olive. Many of the wooded areas abutted the highway, creating tracts of forest edge, which may be beneficial to TCB. Unsuitable areas of bat habitat included roadways, trees with a DBH of three inches or less, and areas with only shrubby vegetation. The forest stands and tree clusters are depicted on the Bat Habitat Assessment Maps, included as **Appendix A**.

5.0 Conclusions

A habitat assessment was conducted for the Chesapeake Bay Crossing Tier 2 NEPA project to determine the potential for federally listed bat species to occur within the study area. Based on the results of the assessment, suitable roosting, traveling, and foraging bat habitat is present within the study area. Time of year restrictions and minimization measures will continue to be coordinated with USFWS as the project design progresses.

6.0 Literature Cited

U.S. Army Corps of Engineers (USACE). 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0, ed. J. F. Berkowitz, J. S. Wakeley, R. W. Lichvar, C. V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Fish and Wildlife Service (USWFS). 2024. Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines. U.S. Fish and Wildlife Service, Region 3, Bloomington, MN. 95 pp.

APPENDIX A: BAT HABITAT MAP



MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview

Chesapeake Bay

0 1.25 2.5 5 mi

0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 1 of 14

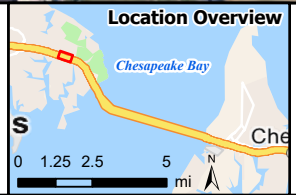


MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 2 of 14

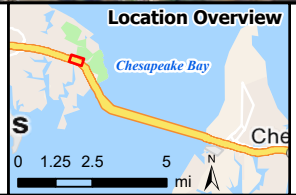


MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 3 of 14



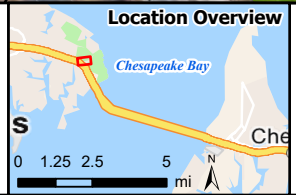
MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Specimen Tree

Location Overview



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

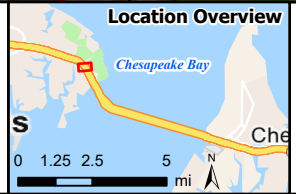
Sheet 4 of 14



MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 5 of 14

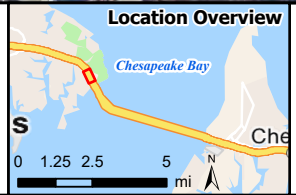


MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 6 of 14



MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview

Chesapeake Bay

0 1.25 2.5 5 mi

0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

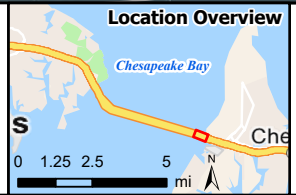
Sheet 7 of 14



MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat



0 0.01 0.03 0.05 mi

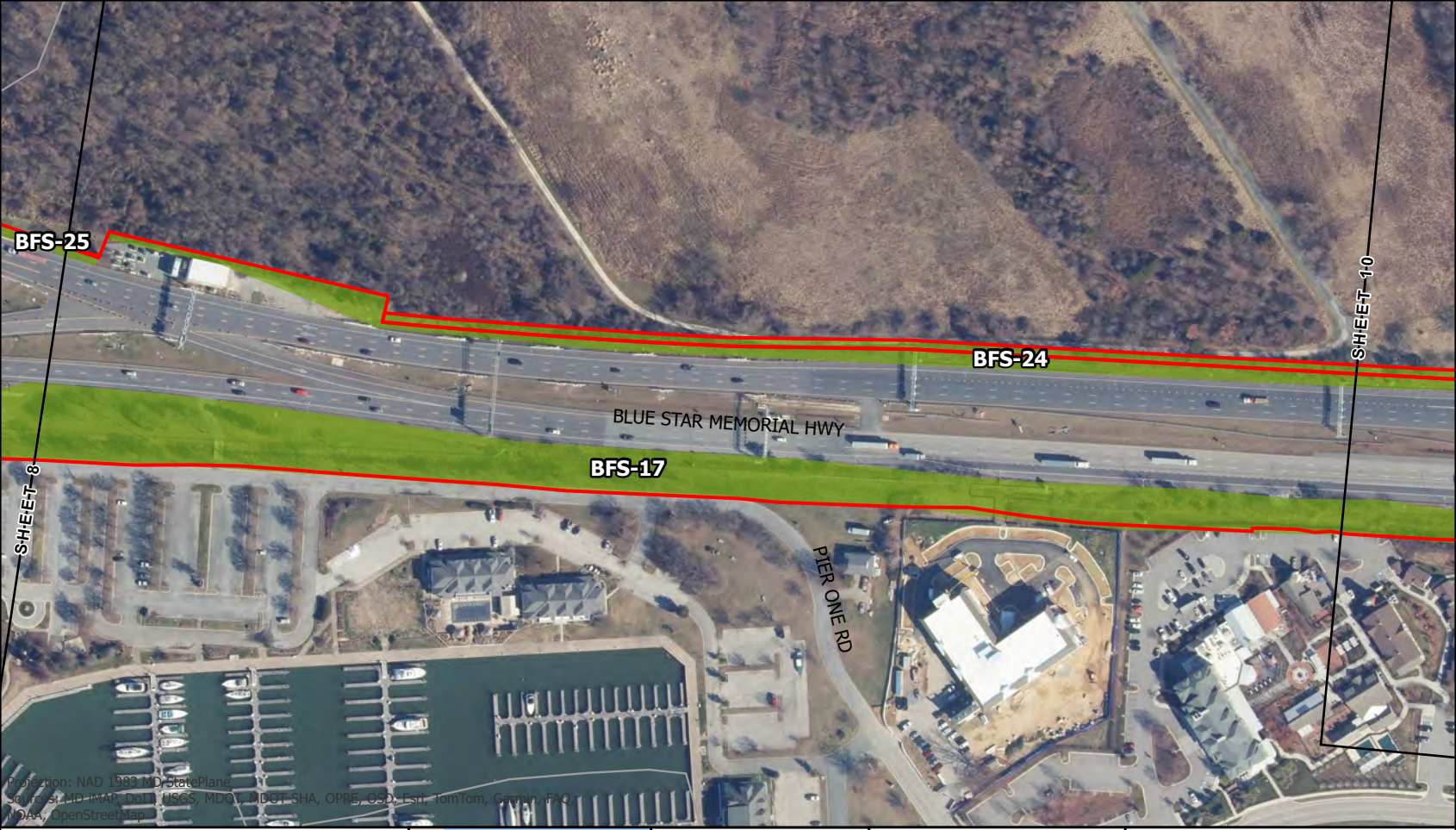
1 inch = 0.05 mile

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

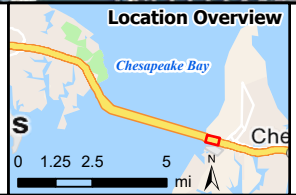
Sheet 8 of 14



MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 9 of 14

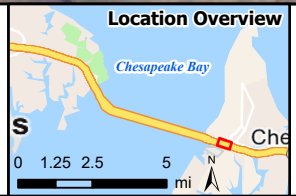


MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 10 of 14

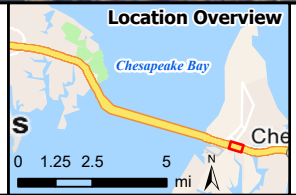


MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 11 of 14

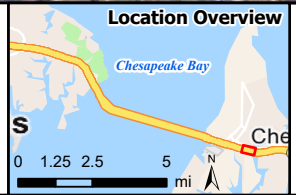


MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 12 of 14



MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat

Location Overview

Chesapeake Bay

0 1.25 2.5 5 mi

0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

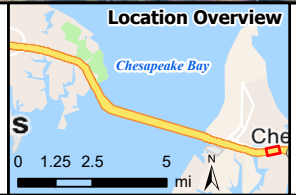
Sheet 13 of 14



MDTA RPA Limit of Disturbance

Map Sheet

Bat Forest Habitat



0 0.01 0.03 0.05 mi

1 inch = 0.05 mile

N

MDTA Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

Bat Habitat Assessment Maps

Sheet 14 of 14

APPENDIX B: FEDERAL AGENCY COORDINATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
Phone: (410) 573-4599 Fax: (410) 266-9127

In Reply Refer To: 07/28/2025 18:48:35 UTC
Project Code: 2024-0014247
Project Name: Bay Crossing Study Tier 2

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

- USFWS National Wildlife Refuges and Fish Hatcheries
- Coastal Barriers
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
(410) 573-4599

PROJECT SUMMARY

Project Code: 2024-0014247
Project Name: Bay Crossing Study Tier 2
Project Type: Road/Hwy - New Construction
Project Description: The Chesapeake Bay Crossing Study: Tier 2 NEPA (Tier 2 Study) is a National Environmental Policy Act (NEPA) study that will analyze alternatives to provide congestion relief and improve travel reliability, mobility and safety across the Chesapeake Bay. The Tier 2 Study is focusing on the Selected Corridor Alternative (Corridor 7) that was identified at the conclusion of the Tier 1 Study. Alternatives will include a No Build Alternative and a range of build alternatives involving various alignments, crossing types and modal and operational alternatives (e.g. transit, pedestrian, bicycle, etc.). Corridor 7 is two miles wide and runs 22 miles from the Severn River Bridge in Anne Arundel County to the U.S. 50/U.S. 301 split in Queen Anne's County.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.9956717,-76.3745195263001,14z



Counties: Anne Arundel and Queen Anne's counties, Maryland

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

COASTAL BARRIERS

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on Federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

SYSTEM UNIT (SU)

Most new Federal expenditures and financial assistance, including Federal flood insurance, are prohibited within System Units. ***Federally-funded projects within System Units require consultation with the Service.*** *Consultation is not required for projects using private, state, or local funds.*

UNIT	NAME	TYPE	SYSTEM UNIT ESTABLISHMENT DATE	FLOOD INSURANCE PROHIBITION DATE
MD-32	Stevensville	SU	11/16/1990	11/16/1990
MD-32	Stevensville	SU	11/25/2024	11/25/2025

WETLANDS

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

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1Fx
- PFO1Cx
- PSS1S
- PSS4C
- PFO4/SS1S
- PSS1B
- PFO4/1R
- PFO4/EM1R
- PSS1/EM1F
- PSS1/FO4B
- PSS1Ah
- PSS1A
- PSS1Bh
- PFO1D
- PFO4/1B
- PSS3/4R
- PFO1E

- PSS1Ex
- PFO1/SS1S
- PFO1Ch
- PSS1R
- PSS1Cx
- PFO1A
- PSS1/EM1Cx
- PFO1/2F
- PFO1/EM1A
- PFO1F
- PSS1Ch
- PFO1Fb
- PFO4S
- PFO1/SS1A
- PSS1C
- PFO4/1S
- PFO1/4B
- PSS1/EM1C
- PFO1Ex
- PFO1Db
- PFO1/2C
- PFO4/1C
- PFO1C
- PFO1B
- PFO1/4C
- PFO1Fh
- PFO1T
- PFO4D
- PFO1/4A
- PFO1R
- PSS4A
- PFO1/2E
- PFO4B
- PFO1/4S
- PSS1/EM1D
- PFO1Ad

- PFO/SS1A
- PFO1/EM1R
- PSS1E
- PSS1/EM1A
- PSS1D
- PFO1S
- PFO4R
- PFO4C
- PFO1/SS1R
- PFO1/SS1C

FRESHWATER POND

- PUSA
- PUSCx
- PUBF
- PUBH
- PUBHx
- PABHx
- PAB1Hx
- PUBFx
- PUBHh
- PUBVh
- PUBKx

RIVERINE

- R4SBCx
- R5UBH
- R4SBC

FRESHWATER EMERGENT WETLAND

- PEM1Dx
- PEM1Ch
- PEM1Ah
- PEM1B
- PEM5A
- PEM1F
- PEM1Dh
- PEM1D
- PEM1/SS1C

- PEM1A
- PEM1Ex
- PEM1Rh
- PEM1/SS1Fx
- PEM1/SS1Ch
- PEM1/SS1Cx
- PEM1R
- PEM1/SS1D
- PEM1Fx
- PEM1/SS1R
- PEM5C
- PEM1Fb
- PEM1C
- PEM1Fh
- PEM5Eh
- PEM1E
- PEM1Cx

ESTUARINE AND MARINE WETLAND

- E2USP
- E2EM1/SS1P
- E2EM1Pd
- E2SS1P
- E2SS1/EM1P
- E2EM1/SS4P
- E2US/SS1P
- E2US2P
- E2SS3/4P
- E2SS1Pd
- E2USN
- E2SS1/EM5P
- E2USM
- E2SS4P
- E2EM2N
- E2EM1N
- E2EM5P
- E2FO4P

- E2EM1P
- E2SS1/3P

OTHER

- Pf

ESTUARINE AND MARINE DEEPWATER

- E1UBLx
- E1UBLh
- E1ABLh
- E1UBL

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Gavin Studds
Address: 25 Old Solomons Island Road
City: Annapolis
State: MD
Zip: 20401
Email gavins@cri.biz
Phone: 4104746559

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration
Name: Heather Lowe
Email: hlowe@mdta.state.md.us
Phone: 4105375665

APPENDIX C: BAT HABITAT CHARACTERIZATION DATASHEETS

Sample Site No.(s): BFS-1

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	40	50	35
Dominant Species of Mature Trees	PRAV, MOAL, Elm sp., JUNI		
% Trees w Exfoliating Bark	0	5	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	60	35	5
No. of Suitable Snags	0		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ → Mod/Good

Tricolored Bats? ✓ → Mod

Additional Comments

Western extend of stand is likely out of LOD behind of forceline, aside from dripline
Heavy vine load of QUPA2, HEHE, LOMA, + porcelainberry
Moving east, forest bumps out to a deeper stand (mostly 9-15" JUNI), decreased vines, increased forest structure

Sample Site No.(s): BFS-2

Water Resources at Sample Site						
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**	1 40ft
Pools/Ponds (# and size)			**Open and accessible to bats?**		✓	
Wetlands (approx. ac.)	**Permanent**		**Seasonal**			

Describe existing condition of water resources: Meredith Creek

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	30	45	15
Dominant Species of Mature Trees	LIST, ACSA2, JUVI, ROPS		
% Trees w Exfoliating Bark	2	0	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	15	70	15
No. of Suitable Snags	2		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ → Mod

Tricolored Bats? ✓ Mod/Good

Additional Comments

Heavy vine load, esp @ Gilbert Rd
Evidence of pruning @ powerline
Mostly smaller trees along Skidmore Dr, opens to sapling/shrub section (<3" DBH) abutting a WL/RIC
↳ Dense cluster of SANI, MOAL
Stand, moving east, returns to heavy vines + pruned JUVI, LIST
Western extent = better NLEB hab, East = better TCB hab

Sample Site No.(s): BFS-3

Water Resources at Sample Site						
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**	
(# and length)					1	2202ft
Pools/Ponds		**Open and accessible to bats?**				
(# and size)		✓				
Wetlands	**Permanent**	**Seasonal**				
(approx. ac.)						

Describe existing condition of water resources: Meredith Creek

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	30	40	15
Dominant Species of Mature Trees	LIST, JUNI, NYSY, ACSA2		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	25	65	10
No. of Suitable Snags	5		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ → Good

Tricolored Bats? ✓ → Mod

Additional Comments

Moving E, few canopy openings, tree size + vine load increases
Fairly open understory
Transitions to wetland, includes Meredith Creek, phragmites stand dominates understory
Small flowing WC abutting US30
Eastern extent → increases understory clutter + midstory clutter, + young/smaller trees
↳ Then again transitions to more open understory

Sample Site No.(s): BFS-4

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds		**Open and accessible to bats?**					
(# and size)							
Wetlands	**Permanent**	**Seasonal**					
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	0	10	30
Dominant Species of Mature Trees	DIVI, LIST, JUVI		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	90	10	0
No. of Suitable Snags	0		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Dense understory of autumn olive, JUVI, HEHE

Sample Site No.(s): BFS-5

Water Resources at Sample Site						
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)						
Pools/Ponds		**Open and accessible to bats?**				
(# and size)						
Wetlands	**Permanent**	**Seasonal**				
(approx. ac.)						

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	50	35	20
Dominant Species of Mature Trees	LIST, PITA, ACRU, ACSA2		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	50	40	10
No. of Suitable Snags	3		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Good

Tricolored Bats? ✓ Mod

Additional Comments

Dense canopy → understory. evidence of pruning @ powerline
20ft of old growth field before forest edge
Forest opens over Carrs Rd, connected by midstory
West of Carrs Rd, understory is very open, low vines
Forest opening for powerline

Sample Site No.(s): BFS-6

Water Resources at Sample Site						
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)						
Pools/Ponds		**Open and accessible to bats?**				
(# and size)						
Wetlands	**Permanent**	**Seasonal**				
(approx. ac.)						

Forest Resources at Sample Site				
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**	1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%
	10	85	15	
Dominant Species of Mature Trees	LIST, Unknown ornamental			
% Trees w Exfoliating Bark	0	0	0	
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**	
Live Trees (%)	50	45	5	
No. of Suitable Snags	0			

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Small strip of yard trees - connecting BFS-5 + BFS-7

Heavy vine load + dense midstory clutter of white pine + ornamental sp

Sample Site No.(s): BFS-7

Water Resources at Sample Site							
Stream Type (# and length)	Ephemeral		Intermittent		Perennial	30ft	Describe existing condition of water resources: Meredith Creek
Pools/Ponds (# and size)			Open and accessible to bats?				
Wetlands (approx. ac.)	Permanent		Seasonal				

Forest Resources at Sample Site			
Closure/Density	Canopy (>50')	Midstory (20-50')	Understory (<20')
	40	30	35
Dominant Species of Mature Trees	LIST, QUAL		
% Trees w Exfoliating Bark	0	0	0
Size Composition of Live Trees (%)	Small (3-8")	Med (9-15")	Large(>15")
	80	70	10
No. of Suitable Snags	0		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ → Mod/Good

Tricolored Bats? ✓ → Good

Additional Comments

Linear forested feature abutting WL/WL
Heavy vine load in the mid/understory
From Skidmore Dr: 20ft of field growth (sapling JUNI + RUPS) before forest edge
↳ Cleared for powerline

Sample Site No.(s): BFS-8

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	25	30	20
Dominant Species of Mature Trees	QUAC 80, PYCA 80, PITA, LIST 2		
% Trees w Exfoliating Bark	20	0	2
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	50	40	10
No. of Suitable Snags	6		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ mod

Tricolored Bats? ✓ mod

Additional Comments

Ditch between US50 + forest, currently dry

Moving E, understory = more cluttered, low vine load, small saplings (JUVI), tall shrubs (autumnolive, hawthorne sp)

Sample Site No.(s): BFS-9

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	15	45	25
Dominant Species of Mature Trees	ACRU, QUPA2, QUPH, ILOP		
% Trees w Exfoliating Bark	0	5	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	30	40	30
No. of Suitable Snags	4		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Moderately open understory, low-mod vine load
Mixed oak + maple, typically large
Currently dry ditch surrounds forest island as it approaches road surface, phrag + other clutter in the understory - more present @ forest edge, smilax density increases @ edge
Moving E - forest breaks over access path, then returns to forest w/ heavy vines

Sample Site No.(s): BFS-10

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)					1	50ft	Meredith Creek
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	35	60	60
Dominant Species of Mature Trees	PYCA80, LIST, ROPS		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	65	30	5
No. of Suitable Snags	0		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Dense vine load + understory clutter of PYCA80
↳ HEHE + grape sp
Opens to stand of phragmites, likely depressed wetland (Heading west)
Heading east, more dense/cluttered understory 3-10" PYCA80
Heavier vine load @ forest edge within LOD. Beyond LOD, vine load decreases
↳ (PAQU)
Forest opens @ NHP Building over a maintained lawn

Sample Site No.(s): B FS-11

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	20	15	30
Dominant Species of Mature Trees	PYCA80, QURU, NOAL, QUPH, QUAL80		
% Trees w Exfoliating Bark	0	0	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	65	30	5
No. of Suitable Snags			

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Uphill small forested island between US50 + College Pkwy
Understory moderately cluttered w/ vines (PAQU2, TORA2) + PYCA80
Mixed oak assemblege, moderately sized

Sample Site No.(s): BFS-12

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	10	30	60
Dominant Species of Mature Trees	ACRU, LITU, QUAC80		
% Trees w Exfoliating Bark	0	0	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	10	50	10
No. of Suitable Snags			

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Linear forest edge feature

Moderately dense understory w <20' JUVI + vines (grape sp, QUPA2)

↳ Moving west, vine load increases to heavy, very dense

Sample Site No.(s): BFS-13

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
					1	40ft	Meredith Creek
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	0	5	35
Dominant Species of Mature Trees	PLOC, LIST2, JUVI		
% Trees w Exfoliating Bark	5	5	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	80	20	0
No. of Suitable Snags	2		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod/Good

Tricolored Bats? ✓ Good

Additional Comments

Better TCB habitat → Linear feature of small residential trees that opens over a wetland w/ standing water. Understory cluttered w/ vines

At the western most extent, understory thrayh canopy density increases

Sample Site No.(s): BFS-14

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	35	50	45
Dominant Species of Mature Trees	LIST2, QURU, PRSE2		
% Trees w Exfoliating Bark	0	2	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	40	55	5
No. of Suitable Snags	10		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Forest edge → heavy vine load (HEHE, PAQU2) in understory + midstory
Few standing snags, overtaken by vines

Sample Site No.(s): BFS -15

Water Resources at Sample Site						
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**	**Describe existing condition of water resources:**
(# and length)						
Pools/Ponds		**Open and accessible to bats?**				
(# and size)						
Wetlands	**Permanent**	**Seasonal**				
(approx. ac.)						

Forest Resources at Sample Site				
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**	1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%
	0	30	50	
Dominant Species of Mature Trees	LITU, PYCA80, ACRS			
% Trees w Exfoliating Bark	0	0	0	
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**	
Live Trees (%)	40	60	0	
No. of Suitable Snags	0			

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Forest island between US50 + Bike path, 450ft West = 30" + QURU

Understory moderately cluttered by PYCA80 + vines

Forest edge has standing water, mowing east = many plantings of shrubs + saplings

↳ Likely favors TCB ↳ canopy + midstory not present

Sample Site No.(s): BFS-17

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	0	45	20
Dominant Species of Mature Trees	Japanese Zelkova, PITA, Callery, Crape Myrtle, Southern Red Oak		
% Trees w Exfoliating Bark	0	40	
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	10	65	20
No. of Suitable Snags	0		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Good/Mod

Additional Comments

Linear feature of street trees, continuous phragmites stand, some areas of standing water. Better TCB habitat - more openings, no canopy.

Moving east, stand incorporates singular new sp, adding to the midstory = more oak mix, smaller diameters like crape-myrtle + hawthorn sp., Further east, = more standing water

Vine load very low, few heavy spots moving east

Sample Site No.(s): BFS-18

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds		**Open and accessible to bats?**					
(# and size)							
Wetlands	**Permanent**	**Seasonal**					
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	5	20	30
Dominant Species of Mature Trees	QUPH, Sawtooth Oak, QURU		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	5	55	40
No. of Suitable Snags	6		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? _____

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod/Good

Additional Comments

Mixed oak corridor, divided by roadsurface
Better TCB habitat due to linear feature, open on most sides + species comp
Vine load low, except for few trees at eastern most

Sample Site No.(s): BFS-19

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)					1	30ft	Cox Creek
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	0	10	40
Dominant Species of Mature Trees	Honey Locust, Elm 2		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	65	35	0
No. of Suitable Snags	0		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Most likely

Tricolored Bats? ✓ Good

Additional Comments

Linear street tree feature parallel to US 50 + going over Cox Creek
Better for TCB due to openness + proximity to water
Western bank of Cox Creek has heavy vine load
Vines also present on east bank

Sample Site No.(s): BFS-20

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	0	3	40
Dominant Species of Mature Trees	JUVI, Caller Pe	oa	
% Trees w Exfoliating Bark			0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	55	40	5
No. of Suitable Snags	1		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? Mod

Tricolored Bats? Mod/Good

Additional Comments

Moderate vine load (grape & Dense understory due to JUVI branching, pear, + pin oak
Western most end abuts Cox Creek
Vines consistent throughout, includes Amur honeysuckle + VA creeper
Better for TCB due to oak assemblage + openness. Easternmost extent = heavily dense understory due to JUVI

Sample Site No.(s): BFS-21

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	0	10	10
Dominant Species of Mature Trees	PLOC		
% Trees w Exfoliating Bark	0	100	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	0	100	0
No. of Suitable Snags	6		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

2 PLOC within 100ft of FS-20

Sample Site No.(s): BFS-22

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	5	10	60
Dominant Species of Mature Trees	V. DUPH, ACO, Callery Pear		
% Trees w Exfoliating Bark	0	0	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	70	25	5
No. of Suitable Snags	11		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ mod

Tricolored Bats? ✓ Mod|Good

Additional Comments

Linear forest feature abutting US50, mixed assemblage, esp oaks (QUPH, QUMU)
Some portions w/ standing water
Understory dense w/ shrubs like staghorn sumac + sapling callery pear
Vine load heavy (VA Creeper, poison ivy, grape sp. multiflora rose)
Better for TCB due to assemblage, water, + openness

Sample Site No.(s): PFS-23

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)					1	30ft	Thompson Creek
Pools/Ponds		**Open and accessible to bats?**					
(# and size)							
Wetlands	**Permanent**	**Seasonal**					
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	10	20	15
Dominant Species of Mature Trees	JUNI, ACRU, JUNI, LIST, Pin oak		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	35	60	5
No. of Suitable Snags	2		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod/ Good

Tricolored Bats? ✓ Mod/ Good

Additional Comments

Linear forested feature along USSD that crosses Thompson Creek
Between USSD + FS-23 is a drainage ditch, w/ standing water
Moderate vine load
Likely better for TCB due to water, open linear feature, + mixed oaks (QUAL, QUNI, Pin oak, Shumard oak)

Sample Site No.(s): BFS-24

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	5	30	60
Dominant Species of Mature Trees	LIST: PITA ACRU, Mixed oak, Eastern cottonwood		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	30	60	10
No. of Suitable Snags			

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod/high

Additional Comments

Easternmost portion includes sloped forest

Includes phrag stand, likely wetland, lake-like has water w/in

Moving west, stand becomes more

Likely better TCB hab due to oak

↳ Very open canopy, dense understory

Sample Site No.(s): BFS-25

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	5	20	25
Dominant Species of Mature Trees	PYCA80		
% Trees w Exfoliating Bark	0	0	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	60	35	5
No. of Suitable Snags	0		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Small strips of woody veg abutting the Bay Bridge
↳ Includes staghorn sumac

Sample Site No.(s): BFS-26

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	15	30	15
Dominant Species of Mature Trees	Witch Oak Gallery Pear, PITA		
% Trees w Exfoliating Bark		0	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	45	45	10
No. of Suitable Snags	~~HH~~ III		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod/Good

Tricolored Bats? ✓ Mod

Additional Comments

Forest edge dominated by larger trees, mostly Southern red oak + PITA + Gallery pear, tall autumn olive
↳ Interior dominated by smaller trees, also including LIST + JUVI + mixed oaks
Vine load low-moderate, not restrictive on the whole
Currently wet drainage ditch sits between USGS + forest interior
Moving east to the portion within the ramp, forest interior dominated by larger trees, mostly PITA, resulting in a more dense stand, phragmites stand where edge meets USGS

Sample Site No.(s): BFS-27

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	10	15	30
Dominant Species of Mature Trees	Japanese zelkova, LITU, QUPH		
% Trees w Exfoliating Bark	5		
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	60	30	10
No. of Suitable Snags	III		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Vine load moderate (HEHE, ROMU, greenbriar, CEOR)
Understory dense w/ fallen woody debris overtaken by vines
Standing water + wetland veg seen at forest edge along E College Pkwy

Sample Site No.(s): BFS-28

Water Resources at Sample Site							
Stream Type (# and length)	Ephemeral		Intermittent		Perennial		Describe existing condition of water resources:
Pools/Ponds (# and size)			Open and accessible to bats?				
Wetlands (approx. ac.)	Permanent		Seasonal				

Forest Resources at Sample Site			
Closure/Density	Canopy (>50')	Midstory (20-50')	Understory (<20')
	40	50	15
Dominant Species of Mature Trees	PITA, Sawtooth Oak, P. oak, QUPH		
% Trees w Exfoliating Bark	5	5	0
Size Composition of Live Trees (%)	Small (3-8")	Med (9-15")	Large(>15")
	20	30	50
No. of Suitable Snags	1		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? 0

Northern Long-eared Bats? " (Good)

Tricolored Bats? " Good

Additional Comments
Forest includes extensive wetland w/ standing water with [illegible] a variety of large oaks + PITA Understory fairly open, sapling/valley oak with mid-story

Sample Site No.(s): BFS-29

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	20	5	50
Dominant Species of Mature Trees	A S 25		
% Trees w Exfoliating Bark	10	10	0
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	15	60	25
No. of Suitable Snags	IIII		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod

Additional Comments

Vine load mod - heavy, mostly TORA

Southern extent is almost exclusively Sassafras cat

↳ North extent - more PITA

Depression @ the eastern extent of Phase present

Sample Site No.(s): BFS-30

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)					1	170ft	
Pools/Ponds			**Open and accessible to bats?**				
(# and size)			✓				
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	20	40	30
Dominant Species of Mature Trees	ACRU, LITU		
% Trees w Exfoliating Bark	15	5	0
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	2	60	15
No. of Suitable Snags	IIII		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? ✓

Northern Long-eared Bats? ✓ Mod

Tricolored Bats? ✓ Mod/Good

Additional Comments

Forested wetland, little standing water @ time of survey at the western ending
From the ramp, there is a steep slope down into the forest
Looking NE vine load is low (TOPA, HEHE, RAMO)
Abuts Meezick Pond wetland; edge likely better habitat for TCB

Sample Site No.(s): BFS-31

Water Resources at Sample Site							
Stream Type (# and length)	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
Pools/Ponds (# and size)			**Open and accessible to bats?**				
Wetlands (approx. ac.)	**Permanent**		**Seasonal**				

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	15	30	10
Dominant Species of Mature Trees	LIST: Honeylocust, Callery Pear, PIVI, PRSE2		
% Trees w Exfoliating Bark	5	10	5
Size Composition of Live Trees (%)	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
	20	60	20
No. of Suitable Snags	~~IIII~~ 1		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? V

Northern Long-eared Bats? V Marginal

Tricolored Bats? V Good

Additional Comments

Riparian edge habitat @ Mezick Ponds, dense phragmites beyond fenceline (~50ft before opens to pond)
Understory most maintained, so open Moving east, large open field
Heavy vine cover on fence, ~~6ft~~ of dense vine
Some large, mixed oaks at pond perimeter
Far better TCB habitat due to oak assemblage [illegible] water/wetlands

Sample Site No.(s): BFS-32

Water Resources at Sample Site							
Stream Type	**Ephemeral**		**Intermittent**		**Perennial**		**Describe existing condition of water resources:**
(# and length)							
Pools/Ponds			**Open and accessible to bats?**				
(# and size)							
Wetlands	**Permanent**		**Seasonal**				
(approx. ac.)							

Forest Resources at Sample Site			
Closure/Density	**Canopy (>50')**	**Midstory (20-50')**	**Understory (<20')**
	10	35	40
Dominant Species of Mature Trees	QUPH, PITA		
% Trees w Exfoliating Bark	0	5	5
Size Composition of	**Small (3-8")**	**Med (9-15")**	**Large(>15")**
Live Trees (%)	20	70	10
No. of Suitable Snags	11		

1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%

Is the habitat suitable f Indiana Bats? V

Northern Long-eared Bats? V Mod

Tricolored Bats? ✓ Mod

Additional Comments

Vine load heavy throughout midstory

APPENDIX D: SITE PHOTOGRAPHS

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 1. Representative photo of suitable bat habitat in a sweet cherry and white mulberry fencerow forest (BFS-1)



Photo 2. Representative photo, farther east, of suitable bat habitat in a sweet cherry, black walnut, and white mulberry fencerow forest (BFS-1).



Photo 3. Representative photo of suitable bat habitat in a row of sweetgum, silver maple, eastern redcedar, black locust (BFS-2).



Photo 4. Representative photo of suitable bat habitat in a row of sweetgum, silver maple, eastern redcedar, black locust (BFS-2).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 5. Representative photo of suitable bat habitat in a sweetgum, black walnut, black gum, silver maple forest (BFS-3).



Photo 6. Representative photo of suitable bat habitat in a sweetgum, black walnut, black gum, silver maple forest (BFS-3).



Photo 7. Representative photo of suitable bat habitat in a sweetgum, black walnut, black gum, silver maple forest (BFS-3).



Photo 8. Representative photo of suitable bat habitat in a common persimmon, sweetgum, and eastern redcedar cluster (BFS-4).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 9. Representative photo of suitable bat habitat in a common persimmon, sweetgum, and eastern redcedar cluster (BFS-4).

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Photo 10. Representative photo of suitable bat habitat in a sweetgum, loblolly pine, red maple, and silver maple forest (BFS-5).



Photo 11. Representative photo of suitable bat habitat in a sweetgum, loblolly pine, red maple, and silver maple forest (BFS-5).



Photo 12. Representative photo of suitable bat habitat in a sweetgum, loblolly pine, red maple, and silver maple forest (BFS-5).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 13. Representative photo of suitable bat habitat in a cluster of sweetgum and unknown ornamental trees (BFS-6).



Photo 14. Representative photo of suitable bat habitat in a sweetgum and white oak forest (BFS-7).



Photo 15. Representative photo of suitable bat habitat in a sweetgum and white oak forest (BFS-7).



Photo 16. Representative photo of suitable bat habitat in a sawtooth oak, Callery pear, loblolly pine, and sweetgum forest (BFS-8).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 17. Representative photo of suitable bat habitat in a red maple, pin oak, willow oak, and American holly (BFS-9).



Photo 18. Representative photo of suitable bat habitat in a red maple, pin oak, willow oak, and American holly (BFS-9).



Photo 19. Representative photo of suitable bat habitat in a Callery pear, sweetgum, and black locust forest (BFS-10).



Photo 20. Representative photo of suitable bat habitat in a Callery pear, sweetgum, and black locust forest (BFS-10).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 21. Representative photo of suitable bat habitat in a Callery pear, sweetgum, and black locust forest (BFS-10).



Photo 22. Representative photo of suitable bat habitat in a Callery pear, white mulberry, and mixed oak forest (BFS-11).



Photo 23. Representative photo of suitable bat habitat in a Callery pear, white mulberry, and mixed oak forest (BFS-11).



Photo 24. Representative photo of suitable bat habitat in a red maple, sweetgum, sawtooth oak, and tuliptree forest (BFS-12).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 25. Representative photo of suitable bat habitat in an American sycamore, sweetgum, and eastern redcedar forest (BFS-13).



Photo 26. Representative photo of suitable bat habitat in an American sycamore, sweetgum, and eastern redcedar forest (BFS-13).



Photo 27. Representative photo of suitable bat habitat in a sweetgum, northern red oak, and black cherry forest (BFS-14).



Photo 28. Representative photo of suitable bat habitat in a sweetgum, northern red oak, and black cherry forest (BFS-14).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 29. Representative photo of suitable bat habitat in a tuliptree, Callery pear, and black locust forest (BFS-15).



Photo 30. Representative photo of suitable bat habitat in a mixed deciduous forest (BFS-16).



Photo 31. Representative photo of suitable bat habitat in a planted mixed deciduous forest (BFS-17).



Photo 32. Representative photo of suitable bat habitat in a mixed oak cluster (BFS-18).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 33. Representative photo of suitable bat habitat in a honey locust and sweetgum forest (BFS-19).



Photo 34. Representative photo of suitable bat habitat in a eastern redcedar, Callery pear, and pin oak forest (BFS-20).



Photo 35. Representative photo of suitable bat habitat in a small cluster of American sycamore (BFS-21).



Photo 36. Representative photo of suitable bat habitat in a eastern redcedar, willow oak, Callery pear, and bitternut hickory forest (BFS-22).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 37. Representative photo of suitable bat habitat in a mixed deciduous forest (BFS-23).



Photo 38. Representative photo of suitable bat habitat in a sweetgum, loblolly pine, red maple, and mixed oak forest (BFS-24).



Photo 39. Representative photo of suitable bat habitat in a Callery pear, loblolly pine, and sawtooth oak forest (BFS-26).



Photo 40. Representative photo of suitable bat habitat in a Callery pear, loblolly pine, and sawtooth oak forest (BFS-26).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 41. Representative photo of suitable bat habitat in a sweetgum, willow oak, and Japanese zelkova forest (BFS-27).



Photo 42. Representative photo of suitable bat habitat in a sweetgum, willow oak, and Japanese zelkova forest (BFS-27).



Photo 43. Representative photo of suitable bat habitat in a mixed oak and loblolly pine forest (BFS-28).



Photo 44. Representative photo of suitable bat habitat in a mixed oak and loblolly pine forest (BFS-28).

Appendix D: Chesapeake Bay Crossing Study Bat Habitat Assessment Photograph Log



Photo 45. Representative photo of suitable bat habitat in a loblolly pine, sweetgum, and sawtooth oak forest (BFS-29).



Photo 46. Representative photo of suitable bat habitat in a red maple and sweetgum forest (BFS-30).



Photo 47. Representative photo of suitable bat habitat in a mixed deciduous forest (BFS-31).



Photo 48. Representative photo of suitable bat habitat in a willow oak and loblolly pine cluster (BFS-32).

APPENDIX E: BAT HABITAT SUITABILITY DATA

Bat Habitat Data

			Quality				Canopy Density (%)			Size Composition (%)			Acres
Stand Code	**NLEB**	**TCB**	**NLEB**	**TCB**	**Forest Type**	**Dominatnt Tree Species**	**Understory**	**Midstory**	**Canopy**	**Small**	**Medium**	**Large**	
BFS-1	Yes	Yes	Mod/Good	Moderate	Deciduous	Sweet Cherry, White Mulberry, Black Walnut, Elm sp.	35	50	40	60	35	5	2.55
BFS-2	Yes	Yes	Moderate	Mod/Good	Mixed	Sweetgum, Silver Maple, Eastern Redcedar, Black Locust	15	45	50	15	70	15	0.86
BFS-3	Yes	Yes	Good	Moderate	Deciduous	Sweetgum, Black Walnut, Black Gum, Silver Maple	15	40	30	25	65	10	4.29
BFS-4	Yes	Yes	Moderate	Moderate	Mixed	Common Persimmon, Sweetgum, Eastern Redcedar	30	10	0	90	10	0	0.28
BFS-5	Yes	Yes	Good	Moderate	Mixed	Sweetgum, Loblolly Pine, Red Maple, Silver Maple	20	55	50	50	40	10	1.36
BFS-6	Yes	Yes	Moderate	Moderate	Deciduous	Sweetgum, Unknown Ornamental	15	85	10	50	45	5	0.06
BFS-7	Yes	Yes	Mod/Good	Good	Deciduous	Sweetgum, White Oak	35	50	40	20	70	10	0.34
BFS-8	Yes	Yes	Moderate	Moderate	Mixed	Sawtooth Oak, Callery Pear, Loblolly Pine, Sweetgum	20	30	25	50	40	10	1.92
BFS-9	Yes	Yes	Moderate	Moderate	Deciduous	Red Maple, Pin Oak, Willow Oak, American Holly	25	45	15	30	40	30	4.96
BFS-10	Yes	Yes	Moderate	Moderate	Deciduous	Callery Pear, Sweetgum, Black Locust	60	60	35	65	30	5	2.24
BFS-11	Yes	Yes	Moderate	Moderate	Deciduous	Callery Pear, Northern Red Oak, White Mulberry, Willow Oak, Sawtooth Oak	30	15	20	65	30	5	0.48
BFS-12	Yes	Yes	Moderate	Moderate	Deciduous	Red Maple, Tuliptree, Sawtooth Oak	60	30	10	10	80	10	0.95
BFS-13	Yes	Yes	Mod/Good	Good	Mixed	American Sycamore, Sweetgum, Eastern Redcedar	35	5	0	80	20	0	0.47
BFS-14	Yes	Yes	Moderate	Moderate	Deciduous	Sweetgtum, Northern Red Oak, Black Cherry	45	50	35	40	55	5	1.54
BFS-15	Yes	Yes	Moderate	Moderate	Deciduous	Tuliptree, Callery Pear, Black Locust	50	30	0	40	60	0	0.36
BFS-16	Yes	Yes	Moderate	Moderate	Deciduous	Red Maple, Tuliptree, Sweetgum, Black Cherry, American Holly	65	30	20	30	60	10	1.12
BFS-17	Yes	Yes	Moderate	Mod/Good	Mixed	Japanese Zelkova, Loblolly Pine, Callery Pear, Black Willow, Sawtooth Oak, Crape-Myrtle	20	45	0	10	65	20	4.74
BFS-18	Yes	Yes	Moderate	Mod/Good	Deciduous	Willow Oak, Sawtooth Oak, Northern Red Oak	30	20	5	5	55	40	6.59
BFS-19	Yes	Yes	Mod/Good	Good	Deciduous	Honey Locust, Sweetgum	40	10	0	65	35	0	3.2
BFS-20	Yes	Yes	Good	Mod/Good	Deciduous	Eastern Redcedar. Callery Pear, Pin Oak	40	30	0	55	40	5	2.49
BFS-21	Yes	Yes	Moderate	Moderate	Deciduous	American Sycamore	10	10	0	0	100	0	0.09
BFS-22	Yes	Yes	Moderate	Moderate	Mixed	Eastern Redcedar, Willow Oak, Bitternut Hickory, Callery Pear	60	10	5	70	25	5	0.66
BFS-23	Yes	Yes	Mod/Good	Mod/Good	Mixed	Black Walnut, Red Maple, Eastern Redcedar, Sweetgum, Pin Oak	15	20	10	35	60	5	2.54
BFS-24	Yes	Yes	Moderate	Mod/Good	Mixed	Sweetgum, Loblolly Pine, Red Maple, Crape-Myrtle, Mixed Oaks	60	30	5	30	60	10	3.11
BFS-25	Yes	Yes	Moderate	Moderate	Deciduous	Callery Pear	25	20	5	60	35	5	3.86
BFS-26	Yes	Yes	Mod/Good	Moderate	Mixed	Sawtooth Oak, Callery Pear, Loblolly Pine	15	40	15	45	45	10	5.49
BFS-27	Yes	Yes	Moderate	Moderate	Deciduous	Japanese Zelkova, Sweetgum, Willow Oak	30	15	10	60	30	10	2.7
BFS-28	Yes	Yes	Good	Good	Mixed	Loblolly Pine, Sawtooth Oak, Pin Oak, Willow Oak	15	50	40	20	30	50	4.58
BFS-29	Yes	Yes	Moderate	Moderate	Mixed	Loblolly Pine, Sweetgum, Sawtooth Oak	50	55	20	15	60	25	2.2
BFS-30	Yes	Yes	Moderate	Mod/Good	Deciduous	Red Maple, Sweetgum	20	40	30	25	60	15	4.19
BFS-31	Yes	Yes	Mod/Good	Good	Mixed	Sweetgum, Honey Locust, Callery Pear, Virginia Pine, Black Cherry	10	30	15	20	60	20	2.46
BFS-32	Yes	Yes	Moderate	Moderate	Mixed	Willow Oak, Loblolly Pine	40	35	10	20	70	10	0.87

APPENDIX D

BAT BRIDGE AND CULVERT ASSESSMENT

MEMORANDUM

DATE: OCTOBER 16, 2025

TO: RAY LI, USFWS

FROM: GAVIN STUDDS, COASTAL RESOURCES, INC.

SUBJECT: CHESAPEAKE BAY CROSSING STUDY TIER 2 NEPA PROJECT BRIDGE AND CULVERT BAT SURVEY

1.0 Introduction

Coastal Resources, Inc. (CRI), sub-consultant to Rummel, Klepper, & Kahl, LLP (RKK), under contract with Maryland Transportation Authority (MDTA), conducted a bridge and culvert bat survey for the Chesapeake Bay Crossing Study Tier 2 NEPA Project, in Anne Arundel and Queen Anne's Counties, Maryland (**Figure 1 – Vicinity Map)**. The study area is comprised of approximately eight miles of MDTA right of way spanning across the Chesapeake Bay from west of Oceanic Drive in Annapolis to east of Cox Creek in Chester. As part of coordination with U.S. Fish and Wildlife Service (USFWS), CRI conducted bridge and culvert surveys for evidence of roosting bats during the fall of 2025. Three bridges, thirteen (13) culverts, and three buildings were surveyed on September 19, October 7, and October 16, 2025, for evidence of roosting bats. Due to safety concerns, culverts less than three feet in diameter or that were otherwise inaccessible were not entered. Due to access constraints for private property, the three buildings were assessed using publicly available photographs. Coordinated with USFWS, the overpass of Oceanic Drive was also surveyed using publicly available imagery. Finally, due to its large size and primarily steel design, the Bay Bridge was assessed for viable roosting habitat using MDTA inspection reports. No bats were observed in any of the surveyed bridges, culverts, or buildings during the bridge and culvert survey.

Figure 1: Vicinity Map


ANNE ARUNDEL COUNTY
Revell Hwy E
Sandy Point State Park
Love Point
Chester River
Chesapeake Bay
Bridge View
50
William Preston Lane Jr Memorial Brg
Stevensville
QUEEN ANNE'S COUNTY
Main St
Ch
Chesapeake Bay
Kangaroo Beach
Source: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, MD iMAP, SHA, MD MAP, DoIT
MDTA RPA Limit of Disturbance
County Boundary
0 0.5 1 2 mi
1 inch = 1 mile
N
MDTA
Maryland Transportation Authority
Chesapeake BAY CROSSING STUDY TIER 2 NEPA
Vicinity Map

2.0 Methodology

Nineteen (19) structures were surveyed in the fall of 2025 for presence of day- roosting bats or evidence (e.g., guano or urine staining) of night roosting bats. Characteristics such as approximate length, height, and material were recorded for each of the structures assessed in the field on a datasheet provided by USFWS and are included in **Appendix B**.

Field maps on an aerial base image were prepared that highlighted each of the 19 selected bridges, culverts, and buildings to be surveyed (**Appendix A**). Equipment used in the visual assessments and for safety included an infrared camera, a borescope, high powered spotlights, binoculars, hardhats, high visibility vests, and iPads connected to a Global Positioning System (GPS) to record survey data and take photographs. Surveyors also carried guano collection kits and decontamination equipment, if bats were observed or evidence of roosting was detected.

Systematic visual surveys of bridges, culverts, and structures were conducted during daylight hours on September 19, October 7, and October 16, 2025. Each bridge, culvert and structure survey was carried out by two surveyors, at least one of which was certified to conduct bridge and culvert assessments for bats in Maryland. Surfaces beneath the bridges were assessed across their entire span from the junction of each abutment with the bridge deck. Inspections included visual surveys of all abutments, decks, piers, and other structures associated with each bridge. Suitable roosting habitat for bats on bridge structures includes cracks or crevices formed from spalling concrete, junctions of the bridge abutment with the bridge deck, expansion joints, and other cave-like areas associated with bridges. Surveys for the presence of day roosting bats typically began at each abutment with surveyors shining bright spotlights into dark spaces across the entire width of each bridge. The assessment focused its greatest attention on spaces generally less than two inches in width. Following the investigation using a spotlight, a borescope, attached to a 20- foot pole, was then used to more closely assess these areas, especially spaces smaller than two inches in width and four or more inches in depth. After using the borescope, an infrared camera was used to assess each of these areas of interest for heat signatures associated with roosting bats. In addition to looking for the visual presence of day roosting bats, evidence of bats was also assessed by listening for high pitched squeaking sounds of day roosting bats and searching for guano or urine staining or odor that may indicate use by day or night roosting bats. This same protocol was followed to sample all culverts as well, with the exception that culverts smaller than three feet in diameter or that had covered entrances, such as grates or debris, were not to be entered and had to be assessed from the outside. Based on coordination with USFWS, it was decided that the Bay Bridge will be visually assessed by inspection reports for evidence of bat use. Assessments were conducted using inspection reports due to constraints operating drones in the area. Three buildings and the Oceanic Drive overpass were assessed for evidence of bats using publicly available imagery.

As noted above, USFWS Bridge/Culvert Assessment Forms (USFWS, 2024, Appendix K) were completed for each bridge, culvert, and structure surveyed in the field. Data collected included associated date and time of assessment, location, facility carried, structure height and length, structure type and material, crossings traversed, surrounding habitat, names of inspectors, and any documented evidence of the presence of bats. The forms also provide a checklist of types of potential bat roosting habitat present for each structure, including:

- All vertical crevices sealed at the top that are 0.5-1.25” wide and ≥4” deep
- Concrete surfaces
- Spaces between concrete end walls and the bridge deck
- Crack between concrete railings on top of the bridge deck
- Vertical surfaces on concrete I-beams
- Spaces between walls, ceiling joists
- Weep holes, scupper drains, and inlets/pipes
- All guiderails
- All expansion joints

Completed data forms are included in **Appendix B**. Photographs were also taken of each assessed bridge and culvert; representative of the potential habitat checklist provided in the datasheets. These are included in a photographic log in **Appendix C**. Other representative photographs were taken using the borescope camera and infrared camera as appropriate.

3.0 Results

During the visual assessments of the bridges, culverts, and buildings, none were found to have evidence of bat use, including visual confirmation of bats, guano, or staining. Of the 13 culverts to be surveyed, 11 of them were not entered, due to steel grates or being mostly filled with water or sediment, so were surveyed from the outside. Of these, Culvert 50 was not surveyed as it was fully submerged.

The Bay Bridge was surveyed using MDTA inspection reports, which included detailed photographs of cracks and crevices. Viewing these reports yielded no evidence of bats, including visible staining or guano. Of the three buildings surveyed using publicly available imagery, none showed obvious evidence of bats from the exterior.

4.0 Discussion and Conclusions

During the visual assessments of bridges, culverts, and buildings from September 19, October 7, and October 16, 2025, no evidence of bat roosting was found and there were no observations of roosting bats.

Of the three bridges surveyed, Cox Creek bridge, the Oceanic Drive overpass, and the Bay Bridge, neither were found to contain evidence of roosting bats. The Bay Bridge, being mostly composed of steel, lacked plentiful quality roosting habitat. Of the available concrete surface, most cracks and crevices were less than four inches deep, and those that exceed four inches in depth were not sufficiently sealed to provide a cave-like environment. The concrete railings present along the Bridge are also reinforced with steel, reducing the viability of these features as bat summer roosting habitat. Similarly, the Oceanic Drive overpass is also primarily steel design with some concrete elements. However, assessment of these elements shows that they are mostly pristine,

with no evidence of guano or staining. The Cox Creek bridge, despite a greater percentage of concrete surface, contained metal I-beams and also lacked deep, sealed concrete crevices. The lack of these concrete crevices reduces protection from the elements and predators and does not allow for a stable thermal regime. These bridges may also be lower quality bat habitat due to the high volume of vehicular traffic and distance from forested resources. The Cox Creek bridge and portions of the Bay Bridge are within 1000 feet of suitable forested bat habitat, indicating that the lack of bats detected in the bridges may be due to higher quality habitat nearby.

Within the LOD, 13 culverts with a minimum width of three feet were targeted for survey. Culverts greater than three feet are the minimum size for tricolored bat occupancy, four feet for Indiana bat, and four and a half feet for northern long-eared bat (USFWS, 2024, Appendix K). Despite meeting the minimum size preference for bat use and primarily composed of concrete, more than half of the culverts were blocked to bats via grating or debris, heavily reducing available roosting habitat from these structures. Furthermore, five of the targeted culverts were also drains within or adjacent to the shoulder of the highway, meaning that bats seeking to roost within them would be exposed to greatly increased noise, light, and collision risk associated with highway traffic.

Each of the buildings surveyed using publicly available images are commercial buildings, which draw pedestrian and vehicular traffic. This increased noise may be a deterrent for bats looking to roost within human structures. These buildings are also well lit, providing a risk of potential roost entombment to bats within, which acts as another potential deterrent. All buildings proposed for take are also in close proximity to the highway and forested habitat patches. Again, proximity to the highway would increase the exposure of bats to high levels of noise, light from vehicles, as well as risk of collision. This, in conjunction with proximity to forested resources, may mean that bats in the area have better habitat alternatives than the four structures proposed for take.

As no bats were observed, nor was any evidence of bats detected at any of the bridges, culverts, and structures surveyed, another summer visual assessment will not need to be completed for two years.

5.0 Literature Cited

United States Fish and Wildlife Service (USFWS) 2022. Species Status Report (SSA) Report for the Northern Long-eared Bat (Myotis septentrionalis). https://www.fws.gov/sites/default/files/documents/Species%20Status%20Assessment%20Report%20for%20the%20Northern%20long-eared%20bat-%20Version%201.1%20%282%29.pdf

United States Fish and Wildlife Service (USFWS) 2021. Species Status Report (SSA) Report for the Tricolored Bat (Perimyotis subflavus). https://ecos.fws.gov/ServCat/DownloadFile/221212

United States Fish and Wildlife Service (USFWS) 2024. Range-wide Indiana Bat & Northern Long-eared Bat Survey Guideline. https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines

APPENDIX A: SURVEY MAP

Source: Large-scale map: Maryland iMAP, DoIT. Imagery flown in 2022 (Eastern Shore) and 2020 (Western Shore). Received December 2024. Small-scale map: Esri, HERE, Garmin, FAO, NOAA, USGS, OpenStreetMap contributors, and the GIS user community. Received December 2024.



MDTA
Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY
TIER 2 NEPA

Chesapeake Bay Crossing Study

Bridge and Culvert Survey Maps

Anne Arundel and Queen Anne's Counties, MD

October 2025

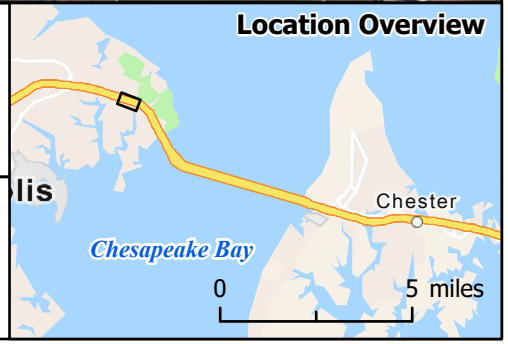
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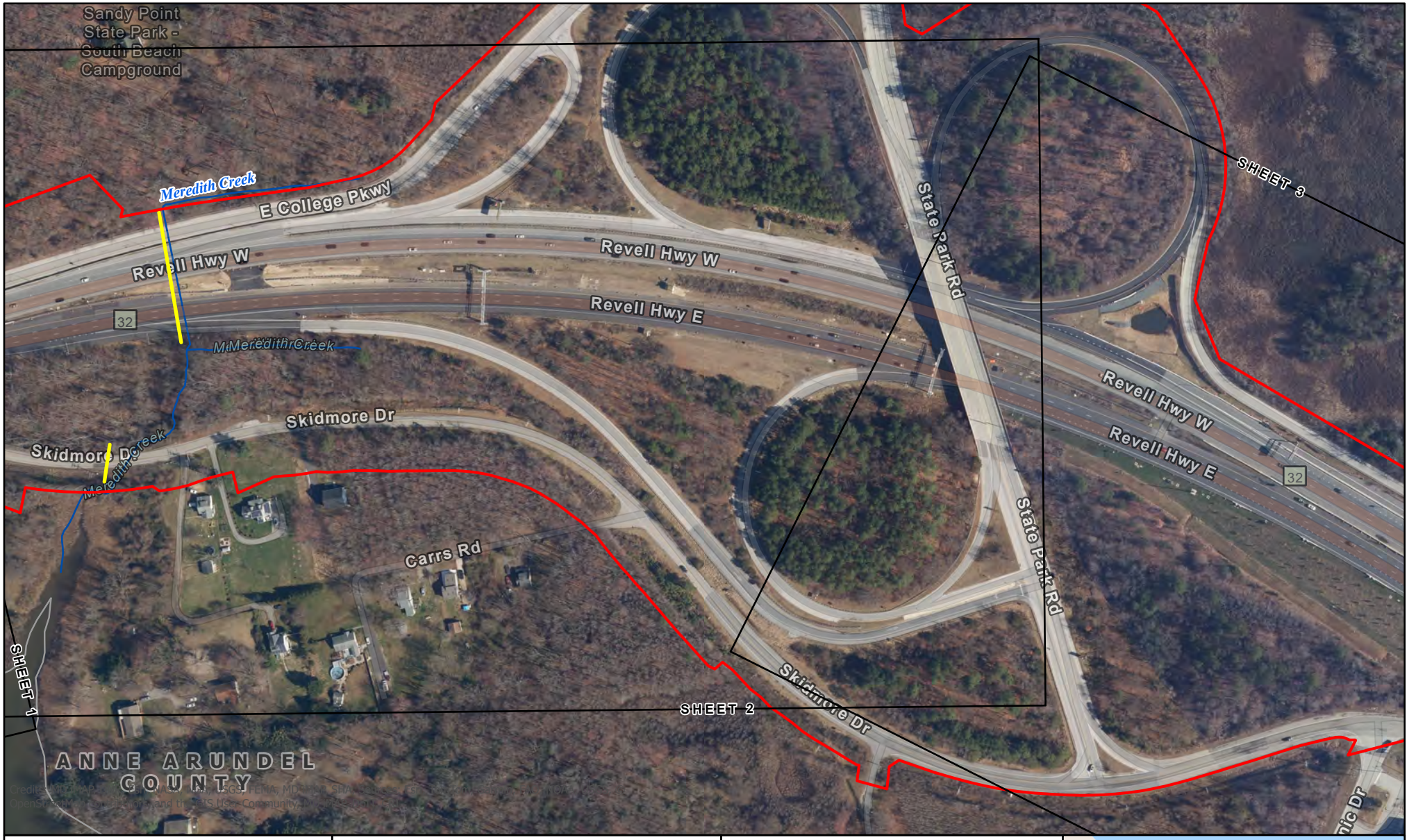
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- MDTA RPA Limit of Disturbance
- Impacted 36-Inch Culvurt
- Mapped Stream
- County Boundary
- Map Sheet

N E S W

0 0.03 0.05
mile

Location Overview





MDTA
Maryland Transportation Authority

Chesapeake BAY CROSSING STUDY
TIER 2 NEPA

Chesapeake Bay Crossing Study

Bridge and Culvert Survey Maps

Anne Arundel and Queen Anne's Counties, MD

October 2025

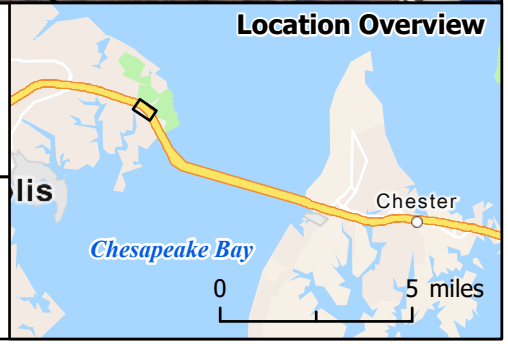
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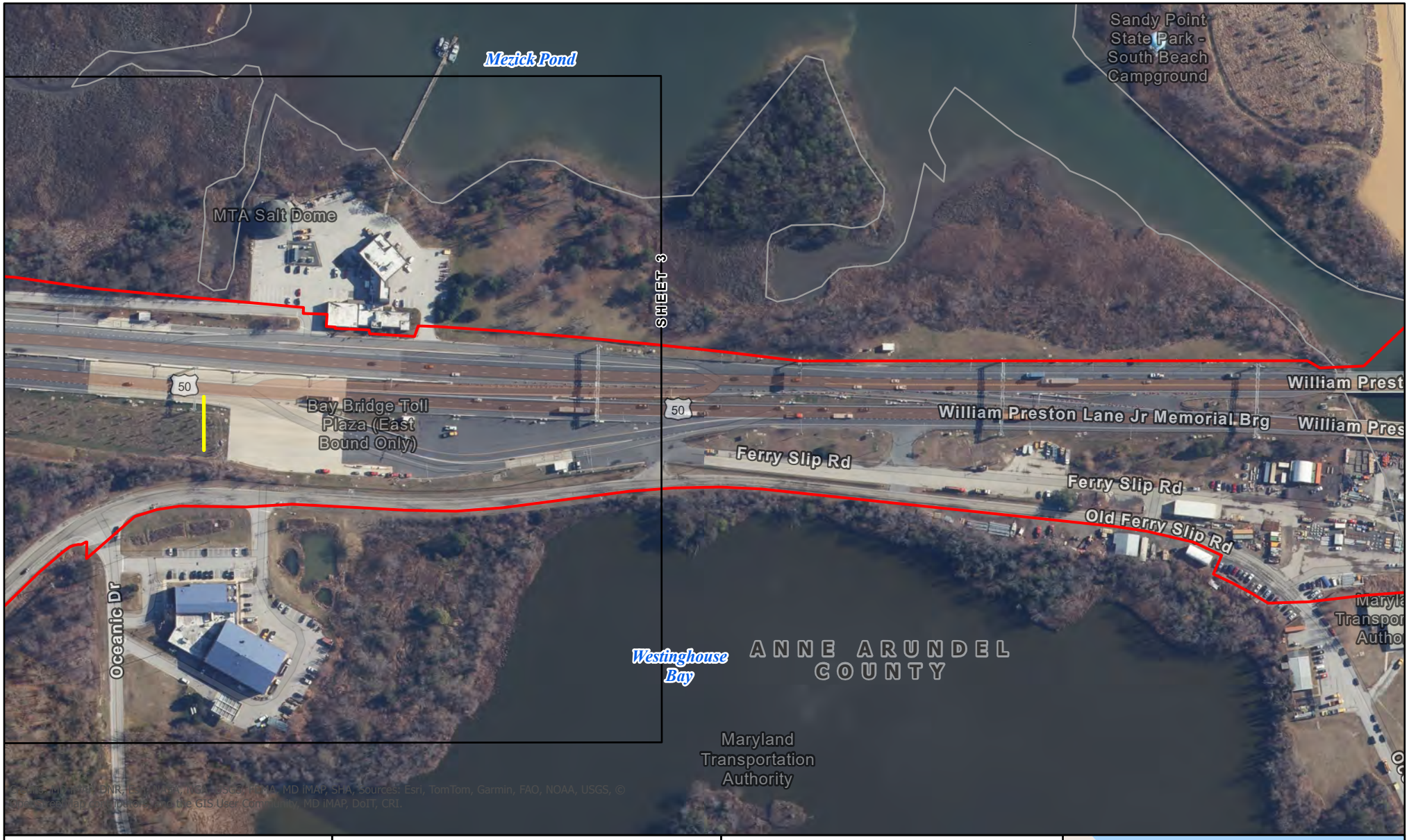
- MDTA RPA Limit of Disturbance
- Impacted 36-Inch Culvurt
- Mapped Stream
- County Boundary
- Map Sheet

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Location Overview





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Chesapeake BAY CROSSING STUDY
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Chesapeake Bay Crossing Study

Bridge and Culvert Survey Maps

Anne Arundel and Queen Anne's Counties, MD

October 2025

Sheet 3 of 6

- MDTA RPA Limit of Disturbance
- Impacted 36-Inch Culvurt
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Chesapeake BAY CROSSING STUDY
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Bridge and Culvert Survey Maps

Anne Arundel and Queen Anne's Counties, MD

October 2025

Sheet 4 of 6

MDTA RPA Limit of Disturbance

Impacted 36-Inch Culvurt

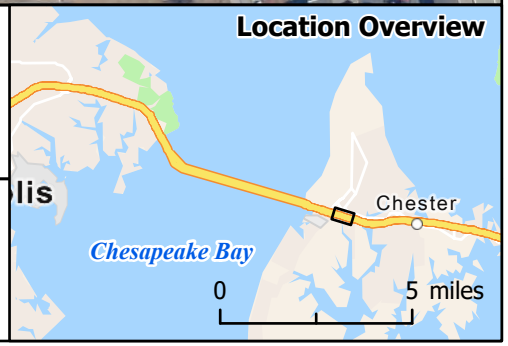
County Boundary

Map Sheet

N E S W

0 0.03 0.05
mile

Location Overview





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Chesapeake BAY CROSSING STUDY
TIER 2 NEPA

Chesapeake Bay Crossing Study

Bridge and Culvert Survey Maps

Anne Arundel and Queen Anne's Counties, MD

October 2025

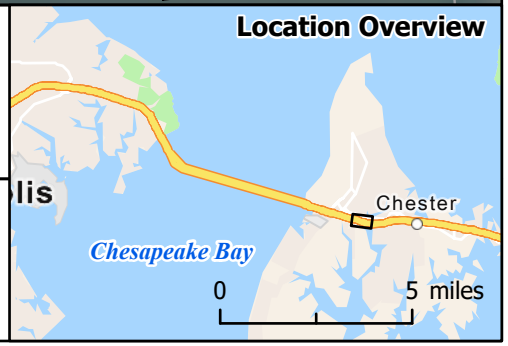
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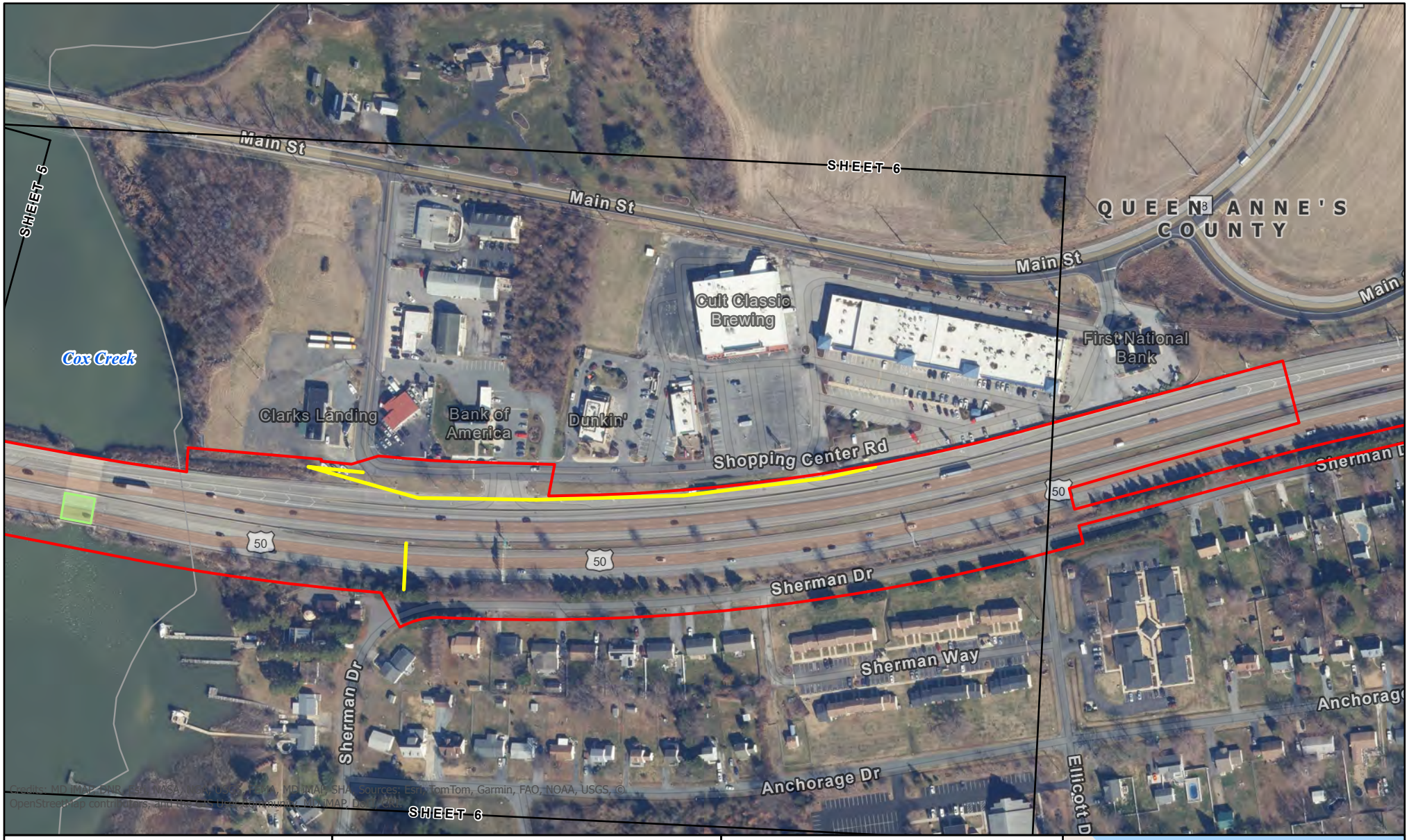
- Impacted Bridge
- MDTA RPA Limit of Disturbance
- Impacted 36-Inch Culvurt
- County Boundary
- Map Sheet

N E S W

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Location Overview





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Chesapeake BAY CROSSING STUDY
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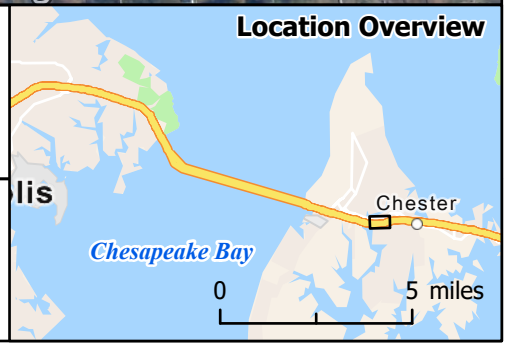
Sheet 6 of 6

- Impacted Bridge
- MDTA RPA Limit of Disturbance
- Impacted 36-Inch Culvurt
- County Boundary
- Map Sheet

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Location Overview



APPENDIX B: COMPLETED DATASHEETS

Sherman Dr.

Bridge/Culvert Bat Assessment Form

Culv D

Date & Time of Assessment: 9/19/25 9:24	DOT Project Number or IPaC Code: 2024-0014247	Route/Facility Carried: US50	County: Queen Anne's
Federal Structure ID: N/A	Structure Coordinates (latitude and longitude): 38.9743863 -76.3009492	Structure Height (approximate): 36"	Structure Length: 77"

Structure Type (check one)

Bridge Construction Style

	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box		Steel I-beam
	Truss (Side View)		Covered
	Parallel Box Beam		Other:

Culvert Type

	Box
✓	Pipe/round
	Other:

Other Structure

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
Metal	None	Concrete
Concrete	Concrete	Timber
Timber	Steel	Stone/Masonry
Open grid	Timber	Other
Other	Other	

Creosote Evidence

	Yes	No
	Unknown	

Culvert Material

	Metal
✓	Concrete
	Plastic
	Stone/masonry
	Other

NOTES:

Crossings Traversed (check all that apply)

✓	Bare ground		Open vegetation
	Rip-rap		Closed vegetation
	Flowing water		Railroad
	Standing water		Road/trail - Type:
	Seasonal water		Other:

Surrounding Habitat (check all that apply)

	Agricultural		Grassland
	Commercial		Ranching
✓	Residential-urban		Riparian/wetland
	Residential-rural		Mixed use
✓	Woodland/forested		Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☑ All crevices and cracks **Bridges/culverts**: rough surfaces or imperfections in concrete **Other structures**: soffits, rafters, attic areas	☐ Not present Pipe filled w/ sediment not explored. Assessed w/ IR and spotlight	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☑ Concrete surfaces (open roosting on concrete)	☐ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between concrete end walls and the bridge deck	☒ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	☒ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Vertical surfaces on concrete I-beams	☒ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between walls, ceiling joists	☒ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☑ Weep holes, scupper drains, and inlets/pipes	☐ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All guiderails	☒ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All expansion joints	☒ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name: Gavin Stubbs

Signature: Gavin Stubbs

Bridge/Culvert Bat Assessment Form

Culv 1

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
9/16/25 10:00	2024-0014247	US50	Queen Anne's
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A	38.9748389 -76.2993161	48	235

Structure Type (check one)

Bridge Construction Style

- [ ] Cast-in-place
- [ ] Flat Slab/Box
- [ ] Truss
- [ ] Parallel Box Beam
- [ ] Pre-stressed Girder
- [ ] Steel I-beam
- [ ] Covered
- [ ] Other:

Culvert Type

- [ ] Box
- [x] Pipe/round
- [ ] Other:

Other Structure

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
[ ] Metal	[ ] None	[ ] Concrete
[ ] Concrete	[ ] Concrete	[ ] Timber
[ ] Timber	[ ] Steel	[ ] Stone/Masonry
[ ] Open grid	[ ] Timber	[ ] Other
[ ] Other	[ ] Other	

Creosote Evidence

- [ ] Yes
- [ ] No
- [ ] Unknown

Culvert Material

- [ ] Metal
- [x] Concrete
- [ ] Plastic
- [ ] Stone/masonry
- [ ] Other

NOTES: Pipe sit below grade inaccessible

Crossings Traversed (check all that apply)

- [ ] Bare ground
- [ ] Rip-rap
- [ ] Flowing water
- [ ] Standing water
- [ ] Seasonal water
- [ ] Open vegetation
- [ ] Closed vegetation
- [ ] Railroad
- [ ] Road/trail - Type:
- [ ] Other:

Surrounding Habitat (check all that apply)

- [ ] Agricultural
- [ ] Commercial
- [ ] Residential-urban
- [ ] Residential-rural
- [ ] Woodland/forested
- [ ] Grassland
- [ ] Ranching
- [ ] Riparian/wetland
- [ ] Mixed use
- [ ] Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
[ ] All crevices and cracks **Bridges/culverts**: rough surfaces or imperfections in concrete **Other structures**: soffits, rafters, attic areas	[ ] Not present Evidence of [illegible]	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species
[ ] Concrete surfaces (open roosting on concrete)	[ ] Not present	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species
[ ] Spaces between concrete end walls and the bridge deck	[ ] Not present	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species
[ ] Crack between concrete railings on top of the bridge deck (Gap / Railing)	[ ] Not present	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species
[ ] Vertical surfaces on concrete I-beams	[ ] Not present	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species
[ ] Spaces between walls, ceiling joists	[ ] Not present	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species
[ ] Weep holes, scupper drains, and inlets/pipes	[ ] Not present	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species
[ ] All guiderails	[ ] Not present	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species
[ ] All expansion joints	[ ] Not present	Visual - live # dead #; Guano; Staining; [ ] Audible; [ ] Odor; [ ] Photos; [ ] Species

Name: Gavin Shields

Signature: [signature]

Bridge/Culvert Bat Assessment Form

Culv 2

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
9/16/25 0955	2024-0014247	US50	Queen Anne's
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A		48	294

Structure Type (check one)

Bridge Construction Style

☐	Cast-in-place	☐	Pre-stressed Girder
☐	Flat Slab/Box	☐	Steel I-beam
☐	Truss (Side View)	☐	Covered
☐	Parallel Box Beam	☐	Other:

Culvert Type	*Other Structure*
☐ Box	
☐ Pipe/Round	
☐ Other:	

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
☐ Metal	☐ None	☐ Concrete
☐ Concrete	☐ Concrete	☐ Timber
☐ Timber	☐ Steel	☐ Stone/Masonry
☐ Open grid	☐ Timber	☐ Other:
☐ Other:	☐ Other:	

Culvert Material

☐ Metal
☐ Concrete
☐ Plastic
☐ Stone/Masonry
☐ Other:

Creosote Evidence

☐ Yes ☐ No
☐ Unknown

NOTES: Pipe SFT below grade Inaccessible

Crossings Traversed (check all that apply)

☐ Bare ground	☐ Open vegetation
☐ Rip-rap	☐ Closed vegetation
☐ Flowing water	☐ Railroad
☐ Standing water	☐ Road/trail - Type:
☐ Seasonal water	☐ Other:

Surrounding Habitat (check all that apply)

☐ Agricultural	☐ Grassland
☐ Commercial	☐ Ranching
☐ Residential-urban	☐ Riparian/wetland
☐ Residential-rural	☐ Mixed use
☐ Woodland/forested	☐ Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☑ All crevices and cracks: **Bridges/culverts**: rough surfaces or imperfections in concrete **Other structures**: soffits, rafters, attic areas	☐ Not present: Assessed w/ borescope + IR	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining
☑ Concrete surfaces (open roosting on concrete)	☐ Not present:	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining
☐ Spaces between concrete end walls and the bridge deck	☑ Not present:	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	☑ Not present:	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining
☐ Vertical surfaces on concrete I-beams	☒ Not present:	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining
☐ Spaces between walls, ceiling joists	☒ Not present:	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining
☐ Weep holes, scupper drains, and inlets/pipes	☒ Not present:	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining
☐ All guiderails	☒ Not present:	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining
☐ All expansion joints	☒ Not present:	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Photos ☐ Guano ☐ Staining

Name: Gavin Studels **Signature:** Gavin Studels

Bridge/Culvert Bat Assessment Form

Culv 3

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
9/19/25 10:10	2024-0014247	US50	Queen Anne's
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A	38.9748317 -76.3001396	42	215

Structure Type (check one)

Bridge Construction Style

	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box		Steel I-beam
	Truss		Covered
	Parallel Box Beam		Other:

Culvert Type

	box
✓	pipe/round
	Other:

Other Structure

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
Metal	None	Concrete
Concrete	Concrete	Timber
Timber	Steel	Stone/Masonry
Open grid	Timber	Other
Other	Other	

Creosote Evidence

	Yes	No
	Unknown	

Culvert Material

	Metal
✓	Concrete
	Plastic
	Stone/Masonry
	Other

NOTES: Pipe 5ft below grade. Inaccessible

Crossings Traversed (check all that apply)

	Bare ground		Open vegetation
	Rip-rap		Closed vegetation
	Flowing water		Railroad
	Standing water		Road/trail - Type:
	Seasonal water		Other:

Surrounding Habitat (check all that apply)

	Agricultural		Grassland
	Commercial		Ranching
	Residential-urban		Riparian/wetland
	Residential-rural		Mixed use
	Woodland/forested		Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

	Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☐	All crevices and cracks **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☐ Not present Access with borescope	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐	Concrete surfaces (open roosting on concrete)	☐ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐	Spaces between concrete end walls and the bridge deck	✓ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐	Crack between concrete railings on top of the bridge deck (Gap / Railing)	✓ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐	Vertical surfaces on concrete I-beams	✓ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐	Spaces between walls, ceiling joists	✓ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐	Weep holes, scupper drains, and inlets/pipes	☐ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐	All guiderails	✓ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐	All expansion joints	✓ Not present	Visual - live # dead #; Guano; Staining; ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name: Gavin Studds

Signature: Gavin Studds

Culv 4

Bridge/Culvert Bat Assessment Form

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
10-15	2024-0014247	US50	Queen Anne's
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A	38.9744730 -76.3066922	42	130

Structure Type (check one)

Bridge Construction Style

	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box		Steel I-beam
	Truss (Side View)		Covered
	Parallel Box Beam		Other:

Culvert Type	*Other Structure*
✓ Box	
Pipe/round	
Other:	

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
Metal	None	Concrete
Concrete	Concrete	Timber
Timber	Steel	Stone/Masonry
Open grid	Timber	Other:
Other:	Other:	

Culvert Material

Metal	
✓ Concrete	
Plastic	
Stone/masonry	
Other:	

Creosote Evidence

Yes	No
Unknown	

Notes: Filled over ½ with water, did not enter

Crossings Traversed (check all that apply)

Bare ground	Open vegetation
Rip-rap	Closed vegetation
Flowing water	Railroad
Standing water	Road/trail - Type:
Seasonal water	Other:

Surrounding Habitat (check all that apply)

Agricultural	Grassland
Commercial	Ranching
Residential-urban	Riparian/wetland
Residential-rural	Mixed use
Woodland/forested	Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
✓ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	Not present: Assessed w/ IR camera + boroscope	Visual - live # dead # Guano Staining; Audible Odor Photos; Species
✓ Concrete surfaces (open roosting on concrete)	Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos; Species
☐ Spaces between concrete end walls and the bridge deck	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos; Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos; Species
☐ Vertical surfaces on concrete I-beams	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos; Species
☐ Spaces between walls, ceiling joists	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos; Species
☐ Weep holes, scupper drains, and inlets/pipes	Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos; Species
☐ All guiderails	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos; Species
☐ All expansion joints	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos; Species

Name:	Signature:
Gavin Stubbs	Gavin Stubbs

Bridge/Culvert Bat Assessment Form

Culv 5

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
9:30 2/14/25	2024-0014217	US50	Queen Anne's
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A	38.97499062 -76.2973296	9?	330

Structure Type (check one)

Bridge Construction Style

	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box		Steel I-beam
	Truss		Covered
	Parallel Box Beam		Other:

Culvert Type

	Box
✓	Pipe/round
	Other:

Other Structure

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
Metal	None	Concrete
Concrete	Concrete	Timber
Timber	Steel	Stone/Masonry
Open grid	Timber	Other:
Other	Other:	

Culvert Material

	Metal
✓	Concrete
	Plastic
	Stone/masonry
	Other

Creosote Evidence

Yes	No
Unknown	

Notes: Pipe 5ft below grade

Crossings Traversed (check all that apply)

	Bare ground		Open vegetation
	Rip-rap		Closed vegetation
	Flowing water		Railroad
	Standing water	✓	Road/trail - Type:
	Seasonal water		Other:

Surrounding Habitat (check all that apply)

	Agricultural		Grassland
	Commercial		Ranching
	Residential-urban		Riparian/wetland
	Residential-rural		Mixed use
	Woodland/forested		Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☑ All crevices and cracks: **Bridges/culverts**: rough surfaces or imperfections in concrete **Other structures**: soffits, rafters, attic areas	☐ Not present: Pipe inaccessible; assessed w/ borescope	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☑ Concrete surfaces (open roosting on concrete)	☐ Not present:	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between concrete end walls and the bridge deck	✓ Not present:	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	✓ Not present:	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Vertical surfaces on concrete I-beams	✓ Not present:	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between walls, ceiling joists	✓ Not present:	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Weep holes, scupper drains, and inlets/pipes	☐ Not present:	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All guiderails	✓ Not present:	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All expansion joints	✓ Not present:	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name: Lauren Shields

Signature: Lauren Shields

Culv 6

Bridge/Culvert Bat Assessment Form

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
9/11/25 9:15	2024-0014247	US 50	Queen Anne's
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A	39.9750671 -76.2969612	93"	95"

Structure Type (check one)

Bridge Construction Style

☐	Cast-in-place	☐	Pre-stressed Girder
☐	Flat Slab/Box	☐	Steel I-beam
☐	Truss	☐	Covered
☐	Parallel Box Beam	☐	Other:

Culvert Type

☐	Box
☑	Pipe/round
☐	Other:

Other Structure

☐	

Structure Material (check all that apply)

Deck Material		*Beam Material*		*End/Back Wall Material*	
☐	Metal	☐	None	☐	Concrete
☐	Concrete	☐	Concrete	☐	Timber
☐	Timber	☐	Steel	☐	Stone/Masonry
☐	Open grid	☐	Timber	☐	Other:
☐	Other	☐	Other		

Culvert Material

☐	Metal
☐	Concrete
☐	Plastic
☐	Stone/masonry
☑	Other: CMP

Creosote Evidence

☐	Yes
☐	No
☐	Unknown

NOTES: Pipe, 2ft below grade inaccessible

Crossings Traversed (check all that apply)

☐	Bare ground	☐	Open vegetation
☐	Rip-rap	☐	Closed vegetation
☐	Flowing water	☐	Railroad
☐	Standing water	☐	Road/trail - Type:
☐	Seasonal water	☐	Other:

Surrounding Habitat (check all that apply)

☐	Agricultural	☐	Grassland
☐	Commercial	☐	Ranching
☐	Residential-urban	☐	Riparian/wetland
☐	Residential-rural	☐	Mixed use
☐	Woodland/forested	☐	Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☑ All crevices and cracks **Bridges/culverts**: rough surfaces or imperfections in concrete **Other structures**: soffits, rafters, attic areas	☐ Not present Pipe accessible but not within boat scope	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☑ Concrete surfaces (open roosting on concrete)	☐ Not present	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between concrete end walls and the bridge deck	☑ Not present	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	☑ Not present	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Vertical surfaces on concrete I-beams	☑ Not present	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between walls, ceiling joists	☑ Not present	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Weep holes, scupper drains, and inlets/pipes	☑ Not present	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All guiderails	☑ Not present	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All expansion joints	☑ Not present	Visual - live # dead # Guano Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name: Gavin Studds

Signature: Gavin Studds

Bridge/Culvert Bat Assessment Form

Culvert 45

Date Time of Assessment	10/7/25	ject Number / IPaC Code	2024-0014207	ute/Facility Carried	Cox Creek	ty	Queen Anne's
tructure ID		Structure Coordinates (latitude and longitude)	38.9753473 -76.3074356	Structure Height (approximate)		Structure Length	80ft

tructu y (ch k ne

ndge ction tyle

- Cast-in-pl ce
- at Slab/Bo
- russ (Side View)
- Parallel Box Beam
- Pre-stre Gir
- Stee beam
- Covere
- Othe

Structure Material ch a at p

Deck Material	*Beam M*	*d/Ba W Ma*
Metal	None	Co te
Concrete	Concrete	imber
imber	Stee	Stone/Mason
Open grid	Timber	Other
Other	Other	

Creosote Evidence: es / No / Unknown

Culvert Material: Metal; ✓ Concrete; Plastic; Stone/Masonry; Other

Notes

Culvert Type: box; ✓ Pipe/round; Other

Other Structure:

Crossings Traversed (check all that apply)

Bare ground	Open vegetation
Rip-rap	Closed vegetation
Flowing water	Railroad
✓ landing wate	Road/trail Type
Seasonal water	Other:

Surrounding Habitat (check all that apply)

Agricultural	Grassland
Commercial	anch
Residential	Riparian/wetland
Residential-rural	Mixed use
Woodland/forested	Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☑ All crevices and cracks **Bridges/culverts**: rough surfaces or imperfections in concrete **Other structures**: soffits, rafters, attic areas	☐ Not present	Visual - live # dead # / Guano / Staining; Audible / Odor / Photos; Species
☑ Concrete surfaces (open roosting on concrete)	☐ Not present	Visual - live # dead # / Guano / Staining; Audible / Odor / Photos; Species
☐ Spaces between concrete end walls and the bridge deck	☒ Not present	Visual - live # dead # / Guano / Staining; Audible / Odor / Photos; Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	☒ Not present	Visual live # dead # / Guano / Staining; Audible / Odor / Photos; Species
☐ Vertical surfaces on concrete I-beams	☒ Not present	Visual live # dead # / Guano / Staining; Audible / Odor / Photos; Species
☑ Spaces between walls, ceiling joists	☐ Not present	Visual live # dead # / Guano / Staining; Audible / Odor / Photos; Species
☑ Weep holes, scupper drains and inlets/pipes	☐ Not present	Visual live # dead # / Guano / Staining; Audible / Odor / Photos; Species
☐ All guiderails	☒ Not present	Visual live # dead # / Guano / Staining; Audible / Odor / Photos; Species
☐ All expansion joints	☒ Not present	Visual - live # dead # / Guano / Staining; Audible / Odor / Photos; Species

Name: Gavin Studds **Signature:** Gavin Studds

Bridge/Structure Bat Assessment Form C

Date & Time of Assessment: 9/19/25 12:00	DOT Project Number: 2024004 47	Route/Facility Carried:	County: Anne Arundel
Federal Structure ID: 4	Structure Coordinates (latitude and longitude): 39.0206873 -76.4185329	Structure Height (approximate): 36	Structure Length: 264

Structure Type (check one)

Bridge Construction Style

- ○ Cast-in-place
- ○ Flat Slab/Box
- ○ Truss (Side View)
- ○ Parallel Box Beam
- ○ Pre-stressed Girder
- ○ Steel I-beam
- ○ Covered
- ○ Other:

Culvert Type

- ○ Box
- ⊗ Pipe/Round
- ○ Other:

Other Structure

- ○

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
☐ Metal	☐ None	☐ Concrete
☐ Concrete	☐ Concrete	☐ Timber
☐ Timber	☐ Steel	☐ Stone/Masonry
☐ Open grid	☐ Timber	☐ Other:
☐ Other:	☐ Other:	

Creosote Evidence

○ Yes ○ No ○ Unknown

Culvert Material

- ☐ Metal
- ✓ Concrete
- ☐ Plastic
- ☐ Stone/Masonry
- ☐ Other:

Notes: entrance cracked + falling / full of water

Crossings Traversed (check all that apply)

☐ Bare ground	☐ Open vegetation
☐ Rip-rap	☐ Closed vegetation
☐ Flowing water	☐ Railroad
✓ Standing water	☐ Road/trail - Type:
☐ Seasonal water	☐ Other:

Surrounding Habitat (check all that apply)

☐ Agricultural	☐ Grassland
☐ Commercial	☐ Ranching
☐ Residential-urban	✓ Riparian/wetland
☐ Residential-rural	☐ Mixed use
✓ Woodland/forested	☐ Other: Highway

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
✓ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
✓ Concrete surfaces (open roosting on concrete)	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between concrete end walls and the bridge deck	✓ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	✓ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Vertical surfaces on concrete I-beams	✓ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between walls, ceiling joists	✓ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
✓ Weep holes, scupper drains, and inlets/pipes	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All guiderails	✓ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All expansion joints	✓ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name: Gavin Studds

Signature: Gavin Studds

Bridge/Structure Bat Assessment Form

Date & Time of Assessment	DOT Project Number	Route/Facility Carried	County
9/2	1424	US50	Mesa
Federal Structure ID	Structure Coordinates (latitude and longitude)	Structure Height (approximate)	Structure Length
	76	6	2

Structure Type (check one)

Bridge Construction Style

- ○ Cast-in-place
- ○ Flat Slab/Box
- ○ Truss (Side View)
- ○ Parallel Box Beam
- ○ Pre-stressed Girder
- ○ Steel I-beam
- ○ Covered
- ○ Other:

Culvert Type

- ○ Box
- ◉ Pipe/Round
- ○ Other:

Other Structure

- ○

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
☐ Metal	☐ None	☐ Concrete
☐ Concrete	☐ Concrete	☐ Timber
☐ Timber	☐ Steel	☐ Stone/Masonry
☐ Open grid	☐ Timber	☐ Other:
☐ Other:	☐ Other:	

Creosote Evidence

- ○ Yes ◉ No
- ○ Unknown

Culvert Material

- ☐ Metal
- ☑ Concrete
- ☐ Plastic
- ☐ Stone/Masonry
- ☐ Other:

Notes:

Crossings Traversed (check all that apply)

☐ Bare ground	☐ Open vegetation
☐ Rip-rap	☐ Closed vegetation
☐ Flowing water	☐ Railroad
☑ Standing water	☐ Road/trail - Type:
☐ Seasonal water	☐ Other:

Surrounding Habitat (check all that apply)

☐ Agricultural	☐ Grassland
☐ Commercial	☐ Ranching
☐ Residential-urban	☑ Riparian/wetland
☐ Residential-rural	☐ Mixed use
☑ Woodland/forested	☐ Other: Hay

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☐ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☑ Concrete surfaces (open roosting on concrete)	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between concrete end walls and the bridge deck	☑ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Crack between concrete railings on top of the bridge deck (Gap, Railing)	☑ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Vertical surfaces on concrete I-beams	☑ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between walls, ceiling joists	☑ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Weep holes, scupper drains, and inlets/pipes	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All guiderails	☑ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All expansion joints	☑ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name: Gavin Stuedle

Signature: Gavin Stuedle

Bridge/Culvert Bat Assessment Form

Culv 87

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
9/9/25 1:00	2024-0014247	US50	Anne Arundel
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A	39.0138176 -76.4079599	36"	105"

Structure Type (check one)

Bridge Construction Style

	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box		Steel I-beam
	Truss		Covered
	Parallel Box Beam		Other:

Culvert Type

	Box
✓	Pipe/round
	Other:

Other Structure

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
Metal	None	Concrete
Concrete	Concrete	Timber
Timber	Steel	Stone/Masonry
Open grid	Timber	Other:
Other	Other	

Creosote Evidence: Yes / No / Unknown

Culvert Material

	Metal
✓	Concrete
	Plastic
	Stone/Masonry
	Other

Notes: Pipe not located, seemingly buried

Crossings Traversed (check all that apply)

✓	Bare ground	✓	Open vegetation
	Rip-rap		Closed vegetation
	Flowing water		Railroad
	Standing water	✓	Road/trail - Type: Paved
	Seasonal water		Other:

Surrounding Habitat (check all that apply)

	Agricultural		Grassland
	Commercial		Ranching
	Residential-urban		Riparian/wetland
	Residential-rural		Mixed use
	Woodland/forested		Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☐ All crevices and cracks **Bridges/culverts**: rough surfaces or imperfections in concrete **Other structures**: soffits, rafters, attic areas	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species
☐ Concrete surfaces (open roosting on concrete)	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species
☐ Spaces between concrete end walls and the bridge deck	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species
☐ Vertical surfaces on concrete I-beams	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species
☐ Spaces between walls, ceiling joists	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species
☐ Weep holes, scupper drains, and inlets/pipes	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species
☐ All guiderails	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species
☐ All expansion joints	✓ Not present:	Visual - live # dead # / Guano / Staining / Audible / Odor / Photos / Species

Name: Gavin Studds **Signature:** Gavin Studds

Bridge/Culvert Bat Assessment Form

Culv 89

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
9/19/25 12:20	8034-0014847	Skidmore Dr	Anne Arundel
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A	39.019273 -76.415055	36"	745"

Structure Type (check one)

Bridge Construction Style

	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box		Steel I-beam
	Truss (Side View)		Covered
	Parallel Box Beam		Other:

Culvert Type

	pipe
✓	pipe/round
	Other:

Other Structure

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
Metal	None	Concrete
Concrete	Concrete	Timber
Timber	Steel	Stone/Masonry
Open grid	Timber	Other
Other	Other	

Creosote Evidence

	Yes	X	No
	Unknown		

Culvert Material

	Metal
✓	Concrete
	Plastic
	Stone/Masonry
	Other:

NOTES: Culvert 1/3 filled with water. Piped cracked & separated

Crossings Traversed (check all that apply)

	Bare ground	✓	Open vegetation
	Rip-rap		Closed vegetation
	Flowing water		Railroad
✓	Standing water		Road/trail - Type:
	Seasonal water		Other:

Surrounding Habitat (check all that apply)

	Agricultural		Grassland
	Commercial		Ranching
	Residential-urban	✓	Riparian/wetland
	Residential-rural		Mixed use
✓	Woodland/forested		Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☑ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos Species
☑ Concrete surfaces (open roosting on concrete)	Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos Species
☐ Spaces between concrete end walls and the bridge deck	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	X Not present:	Visual - live # dead # Guano Staining; Audible Odor ✓ Photos Species
☐ Vertical surfaces on concrete I-beams	X Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos Species
☐ Spaces between walls, ceiling joists	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos Species
☑ Weep holes, scupper drains, and inlets/pipes	Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos Species
☐ All guiderails	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos Species
☐ All expansion joints	✓ Not present:	Visual - live # dead # Guano Staining; Audible Odor Photos Species

Name: Gavin Studdz

Signature: Gavin Studdz

Bridge/Culvert Bat Assessment Form

Cox Creek Bridge

Date & Time of Assessment	DOT Project Number or IPaC Code	Route/Facility Carried	County
9/19/25 10:45	2024-0044247	US 50	Queen Anne's
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
N/A	38.974719 -76.302504	10ft	65ft

Structure Type (check one)

Bridge Construction Style

✓	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box		Steel I-beam
	Truss (Side View)		Covered
	Parallel Box Beam		Other:

Culvert Type

	Box		
	Pipe/round		
	Other:		

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
Metal	None	✓ Concrete
✓ Concrete	Concrete	Timber
Timber	✓ Steel	Stone/Masonry
Open grid	Timber	Other:
Other:	Other:	

Culvert Material

- Metal
- Concrete
- Plastic
- Stone/Masonry
- Other:

Creosote Evidence

Yes | X No | Unknown

Notes:

Other Structure

Crossings Traversed (check all that apply)

	Bare ground	✓	Open vegetation
	Rip-rap		Closed vegetation
✓	Flowing water		Railroad
	Standing water		Road/trail - Type:
	Seasonal water		Other:

Surrounding Habitat (check all that apply)

	Agricultural		Grassland
	Commercial		Ranching
	Residential-urban		Riparian/wetland
	Residential-rural		Mixed use
	Woodland/forested	✓	Other: Road/Water

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☑ All crevices and cracks: **Bridges/culverts**: rough surfaces or imperfections in concrete **Other structures**: soffits, rafters, attic areas	Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species
☑ Concrete surfaces (open roosting on concrete)	Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species
☐ Spaces between concrete end walls and the bridge deck	Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	X Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species
☐ Vertical surfaces on concrete I-beams	X Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species
☐ Spaces between walls, ceiling joists	X Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species
☑ Weep holes, scupper drains, and inlets/pipes	Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species
☑ All guiderails	Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species
☑ All expansion joints	Not present:	Visual - live # dead # · Guano · Staining · Audible · Odor · Photos · Species

Name: Gavin Stubbs **Signature:** Gavin Stubbs

Bridge/Culvert Bat Assessment Form

Date & Time of Assessment: 10/6/25 13:35	DOT Project Number or IPaC Code: 2024-0014207	Route/Facility Carried: Oceanic Dr	County: AnneArundel
Federal Structure ID:	Structure Coordinates (latitude and longitude):	Structure Height (approximate): 35ft	Structure Length: 350ft

Structure Type (check one)

Bridge Construction Style

	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box	✓	Steel I-beam
	Truss		Covered
	Parallel Box Beam		Other:

Culvert Type

	Box		
	Pipe/Round		
	Other:		

Other Structure

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
✓ Metal	None	✓ Concrete
Concrete	Concrete	Timber
Timber	✓ Steel	Stone/Masonry
Open grid	Timber	Other
Other:	Other:	

Creosote Evidence: Yes | X No | Unknown

Culvert Material: Metal; Concrete; Plastic; Stone/Masonry; Other:

Notes:

Crossings Traversed (check all that apply)

	Bare ground		Open vegetation
	Rip-rap		Closed vegetation
	Flowing water		Railroad
	Standing water	✓	Road/trail - Type: US 50
	Seasonal water		Other:

Surrounding Habitat (check all that apply)

	Agricultural		Grassland
	Commercial		Ranching
	Residential-urban		Riparian/Wetland
	Residential-rural		Mixed use
	Woodland/forested	✓	Other: Transportation

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
☑ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☐ Not present	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining
☑ Concrete surfaces (open roosting on concrete)	☐ Not present	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining
☑ Spaces between concrete end walls and the bridge deck	☐ Not present: Viewed as best as possible in street view	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining
☑ Crack between concrete railings on top of the bridge deck (Gap / Railing)	☐ Not present: 11	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining
☐ Vertical surfaces on concrete I-beams	✓ Not present	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining
☐ Spaces between walls, ceiling joists	X Not present	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining
☐ Weep holes, scupper drains, and inlets/pipes	X Not present	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining
☑ All guiderails	☐ Not present	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining
☑ All expansion joints	☐ Not present: 4	Visual - live # dead # ☐ Audible ☐ Species ☐ Odor ☐ Guano ☐ Photos ☐ Staining

Name: Gavin Studds

Signature: Gavin Studds

APPENDIX C: PHOTOGRAPH LOG

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log



Photo 1. Looking at the outside of Culvert 0.



Photo 2. Looking inside of Culvert 0.



Photo 3. Looking at the steel grate covering Culvert 1.

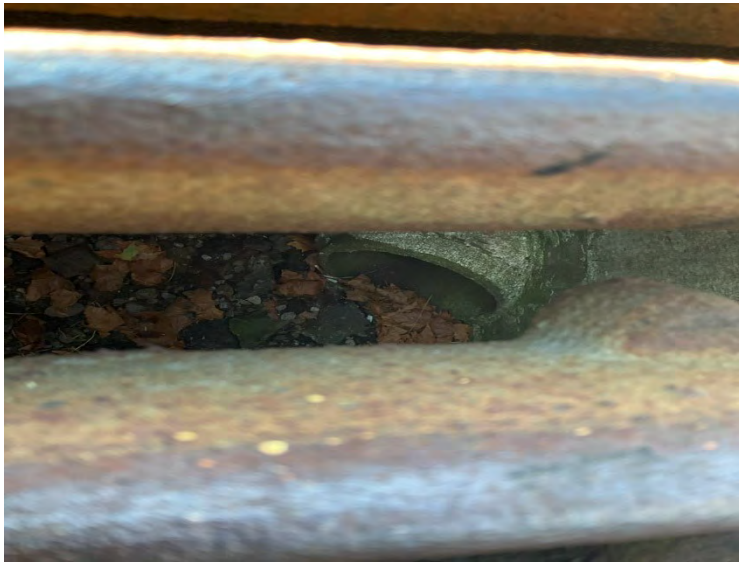


Photo 4. Looking through the steel grate to Culvert 1.

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log



Photo 5. Looking down at the steel grate covering Culvert 2.

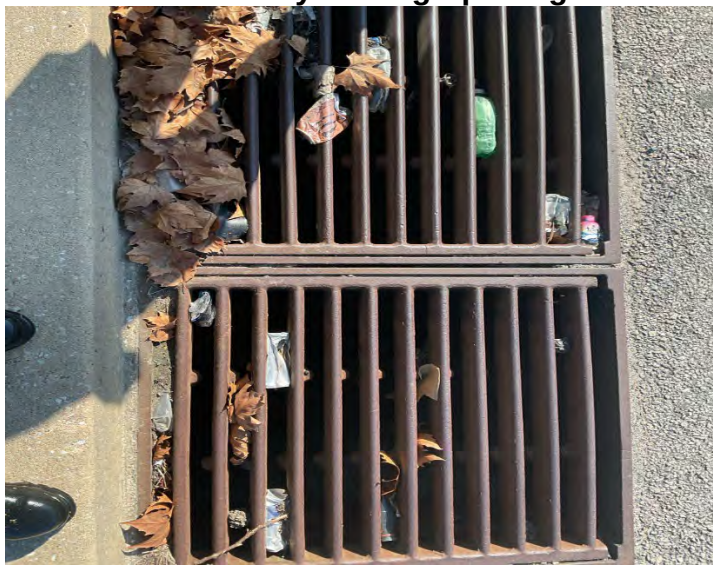


Photo 6. Looking down at the steel grate covering Culvert 3.



Photo 7. Looking through the steel grate to Culvert 3.



Photo 8. Looking at the headwall of Culvert 4.

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log



Photo 9. Looking inside of Culvert 4.

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Photo 10. Looking at the steel grate covering Culvert 5.

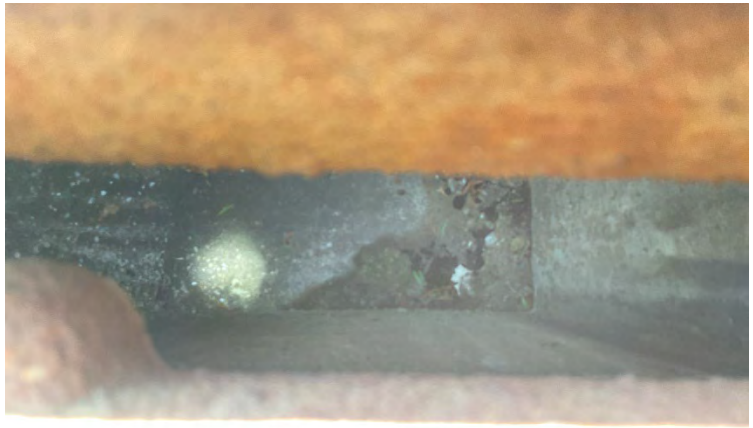


Photo 11. Looking through the steel grate at the concrete surface surrounding Culvert 5.



Photo 12. Looking at the steel grate covering Culvert 6.

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log



Photo 13. Looking through the steel grate to Culvert 6 below.



Photo 14. Looking at the headwall of Culvert 45.



Photo 15. Looking north at the headwall of Culvert 62.



Photo 16. Looking inside of Culvert 62.

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log



Photo 17. Looking at a representative crack inside of Culvert 62.



Photo 18. Looking south at the headwall of Culvert 62.



Photo 19. Looking at the exterior of Culvert 82.



Photo 20. Looking at the interior of Culvert 82.

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log



Photo 21. Looking through steel grate at Culvert 87.



Photo 22. Looking at cracked exterior of Culvert 89.



Photo 23. Looking at the interior of Culvert 89.



Photo 24. Looking at steel I-beams, decking, and piers of the Oceanic Drive overpass.

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log



Photo 25. Looking at the south abutment of the Oceanic Drive overpass.



Photo 26. Looking west at the concrete parapet and fencing of the Oceanic Drive overpass.



Photo 27. Looking northeast at the eastbound span of the Cox Creek bridge.



Photo 28. Looking east at the deck, I beams and drains approaching the Cox Creek Bridge abutment.

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log

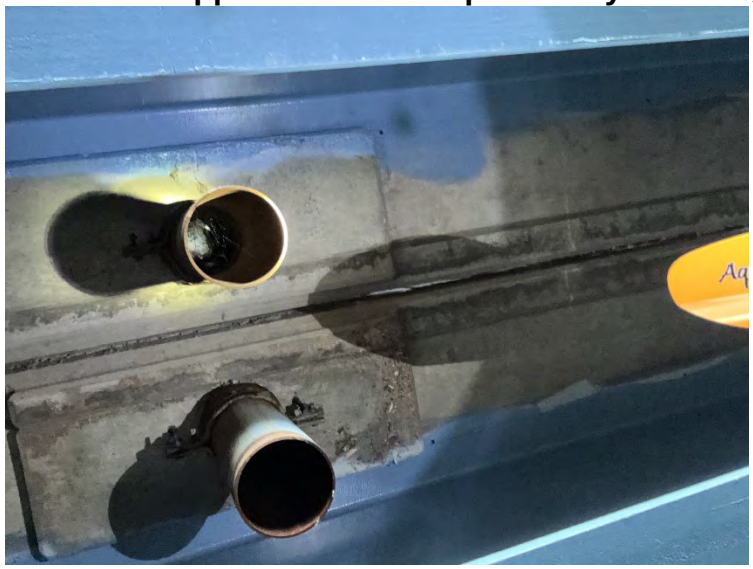


Photo 29. Looking into a drain under the eastbound span of the Cox Creek Bridge.



Photo 30. Looking northwest at the exterior of 1046 E College Parkway, a building proposed for take.



Photo 31. Looking southwest at the exterior of 1001 Skidmore Dr, a building proposed for take.



Photo 32. Looking south at the side and front of 1598 Whitehall Rd, a building proposed for partial take.

Appendix C: Chesapeake Bay Crossing Study Bridge and Culvert Bat Survey Photograph Log

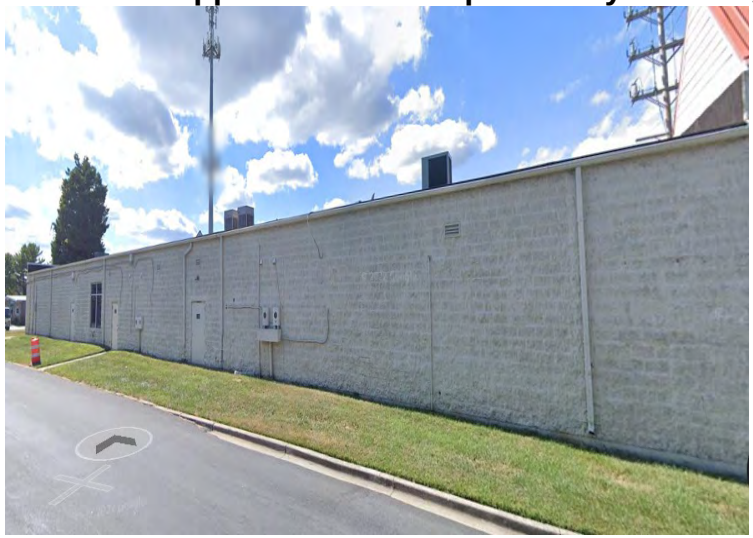


Photo 33. Looking west at the rear of 1598 Whitehall Rd, a building proposed for partial take.