VI. AVOIDANCE ANALYSIS

This section provides an analysis of five alternates that would completely avoid all Section 4(f) properties. The analysis was conducted in accordance with the definition of *feasible and prudent avoidance alternatives* found in 23 CFR 774.17. ***Table 8*** on the following page provides a summary of the impacts of Modified Alternate 7 compared to other alternatives discussed in this evaluation.

All five alternates in this analysis assume that the existing bridge would remain standing. Existing transportation use would continue or the bridge would be taken out of service. It is assumed that any future maintenance and/or rehabilitation of the existing Nice Bridge would be made in accordance with the AASHTO *Guidelines for Historic Bridge Rehabilitation and Replacement,* which would likely maintain the historic integrity of the bridge and avoid Section 4(f) use. This assumption differs from the Draft Section 4(f) Evaluation so that these alternates can be properly assessed as avoidance alternatives. However, it is still recognized that, over time, these alternates may require rehabilitation of the Nice Bridge which could impact the historic integrity of the bridge and may result in a Section 4(f) use.

Per 23 CFR 774.3(b), an analysis of feasible and prudent avoidance alternatives is not required for properties that would incur a *de minimis* impact. However, because the alternates could affect multiple Section 4(f) properties that are in close proximity to one another, the avoidance analysis has been completed for all resources, including those for which a *de minimis* impact finding is made (i.e. Barnesfield Park).

A. Alternate 1: No-Build / Rehabilitation of Existing Bridge

Alternate 1 would involve deck replacement and structural improvements of the existing Nice Bridge. The bridge would continue to be used for transportation purposes as it is today. Alternate 1 would have no impact to Section 4(f) properties and would have no direct impact to any natural or socioeconomic resources. Although Alternate 1 has less impact and would cost considerably less than Modified Alternate 7, it would not meet any of the project purpose and need items described in ***Section III***. Therefore, Alternate 1 is not prudent because it would be unreasonable to proceed with the alternate in light of the project's stated purpose and need. Alternate 1 is being eliminated because it causes other severe problems of a magnitude that substantially outweighs the importance of protecting Section 4(f) properties in the project area.

B. Alternate 8: Off Existing Alignment

Section 4(f) use of all resources identified in the study area could be avoided by shifting the location of US 301 (including the new proposed bridge) to the north or south of the existing Nice Bridge while leaving the existing bridge in place and in service for local traffic, but not owned by MDTA.

1. Alternate 8 (North of Existing Alignment)

Alternate 8 (North) would relocate US 301 to a new alignment crossing the Potomac River approximately 2.5 miles north of the existing bridge. New four-lane bridge approach roadways would need to be constructed in Maryland and Virginia to move US 301 to a feasible alignment that follows existing roadways. The alignment would begin in Maryland near the intersection of US 301 and Pope's Creek Road. The new US 301 would follow Pope's Creek Road west to the Potomac River, where a new bridge would be built in a southwest direction. On the Virginia shore, US 301 would meet Mathias Point Road and eventually connect with Route 624 (Owens Drive). The new US 301 roadway would then reconnect with US 301 near the existing intersection of Route 216/US 301 south of Owens. Alternate 8 (North) would be approximately 9.9 miles long, with a crossing of the Potomac River that would be approximately 2.2 miles long. A new toll facility and administration complex would be required in Maryland. The alternate would cost approximately $1.9 billion.

Table 8a: Comparison of Alternate Impacts (Alternates 1 – 7)

	Modified Alternate 7 (Proposed Action)	Alternate 1 (No-Build)	Alternate 2	Alternate 3	Alternate 4	Alternate 5	Alternate 6
Section 4(f) Avoidance Alternative?	No	Yes	No	No	No	No	No
Use of historic Nice Bridge?	Yes: Remove	No[1]	No[1]	Yes: Replacement	No[1]	Yes: Replacement	No[1]
Use of Potomac River Bridge Administration Building?	Yes: 0.5 acres, remove	No	Yes: 0.1 acre	Yes: 0.1 acre	Yes: 0.5 acre, remove	Yes: 0.5 acre, remove	Yes: 0.1 acre
Use of Barnesfield Park?	Yes: 2.2 acres	No	No	No	Yes: 0.4 acres	Yes: 0.4 acres	No
Use of Dahlgren Wayside Park?	Yes: 2.2 acres	No	No	No	Yes: 1.4 acres	Yes: 1.4 acres	No
Use of Potomac Gateway Welcome Center?	Yes: 2.1 acres	No	No	No	Yes: 2.1 acres	Yes: 2.1 acres	No
Section 4(f) *de minimis* finding?	Yes: Barnesfield Park	No	Yes: Nice Bridge	No	Yes: Barnesfield Park and Nice Bridge	Yes: Barnesfield Park	No
NSF Dahlgren Impacts?	No	No	Yes: 3.3 acres	Yes: 3.1 acres	No	No	Yes: 3.7 acres
Business ROW?	Yes: 7.6 acres	No	No	No	Yes: 7.0 acres	Yes: 7.0 acres	No
Wetland impacts?	Yes: 0.1 acres	No	Yes: 0.7 acres	Yes: 0.7 acres	Yes: 0.1 acres	Yes: 0.2 acres	Yes: 0.7 acres
Stream impacts?	Yes: 3,660 lf	No	Yes: 2,500 lf	Yes: 2,500 lf	Yes: 3,600 lf	Yes: 3,700 lf	Yes: 2,400 lf
Open water dredge impacts?	Yes: 65 acres	No	Yes: 62 acres	Yes: 88 acres	Yes: 63 acres	Yes: 89 acres	Yes: 68 acres
Floodplain impacts?	Yes: 8.4 acres	No	Yes: 6.3 acres	Yes: 8.6 acres	Yes: 8.4 acres	Yes: 8.7 acres	Yes: 6.5 acres
Forest impacts?	Yes: 2.7 acres[2]	No	Yes: 0.5 acres	Yes: 0.5 acres	Yes: 1.0 acres	Yes: 1.0 acres	Yes: 0.7 acres
Unique problems?	No	No	No	No	No	No	No
Meets purpose and need?	Yes	No	Partially	Yes	Partially	Yes	Yes
Approximate cost (in 2008 dollars)	$805-885M[3]	$110-120 M[3]	$515-565 M[2]	$915-1010 M[2]	$570-625 M[2]	$945-1040 M[2]	$805-885 M[2]
If avoidance, feasible and prudent? [4]	N/A	No	N/A	N/A	N/A	N/A	N/A

[1] Assumes AASHTO *Guidelines for Historic Bridge Rehabilitation and Replacement* are followed for future rehabilitation of existing bridge. MDTA would not own/maintain existing bridge and/or original administration building.
[2] Measured based on MD Critical Area definition for forest; other alternates measured using MD Forest Conservation Act definition.
[3] Cost with one bicycle/pedestrian path (Alternates Modified 7, 2 and 4) or two bicycle/pedestrian paths (Alternates 3, 5, 6, 7).
[4] Only applied to avoidance alternates.

Table 8b: Comparison of Alternate Impacts (Alternates 8 – 15)

	Alternate 8 (New Location)	Alternate 9 (Roadway Shift)	Alternate 10 (Tunnel)	Alternate 11 (Stacked Deck)	Alternate 12 (3-Lane Bridge)	Alternate 13 (TSM/ TDM)	Alternate 14 (Transit)	Alternate 15 (Replace Bridge)
Section 4(f) Avoidance Alternative?	Yes	No	Yes	No	No	Yes	Yes	No
Use of historic Nice Bridge?	No[1]	Yes: Modification	No[1]	Yes: Modification	Yes: Modification	No[1]	No[1]	Yes: Remove
Use of Potomac River Bridge Administration Building?	No	Yes: *MD North* – Remove, *MD South* - 0.1 acre	No	No	No	No	No	No
Use of Barnesfield Park?	No	*MD North*: No *MD South*: 0.4 acres	No	No	No	No	No	No
Use of Dahlgren Wayside Park?	No	*MD North*: No *MD South*: 1.4 acres	No	No	No	No	No	No
Use of Potomac Gateway Welcome Center?	No	*MD North*: No *MD South*: 2.1 acres	No	No	No	No	No	No
Section 4(f) *de minimis* finding?	N/A	*MD North*: No *MD South*: Barnesfield Park	N/A	No	No	N/A	N/A	No
NSF Dahlgren Impacts?	No	Yes: *MD North*- 3.1 acres	Yes: prohibits hazmat crossing	Yes: 3.1 acres	Yes: 1.0-2.0 acres	No	No	Yes: extended bridge closure
Business ROW?	Yes: 100-200 properties displaced	Yes: *MD North* - 4.4 acres, *MD South* - 11.9 acres	No	Yes: 4.0 acres	Yes: 2.0-3.0 acres	No	No	Yes: 2.0-3.0 acres
Wetland impacts?	Yes: 4 acres (based on NWI)	Yes: 0.2-0.7 acre	No	Yes: 0.7 acres	No	No	No	No
Stream impacts?	Yes: 2-5 major crossings	Yes: 2,500-3,700 lf	No	Yes: 2,500 lf	Yes: 1,000-1,500 lf	No	No	Yes: 1,000-1,500 lf
Open water dredge impacts?	Yes: 100-200 acres	Yes: 60-80 acres	No	Yes: 60-80 acres	Yes: 60-80 acres	No	No	Yes: 60-80 acres
Floodplain impacts?	Yes: (Detailed mapping not available)	Yes: 6.5-8.6 acres	No	Yes: 6.3 acres	Yes: 1.0-3.0 acres	No	No	Yes: 1.0-3.0 acres
Forest impacts?	Yes: 58-72 acres	Yes: 2.6-3.0 acres	No	Yes: 2.6 acres	Yes: 2.0-2.5 acres	No	No	Yes: 2.0-2.5 acres
Unique problems?	Yes: not consistent with plans	Yes: complex design / construction	Yes: haz mats/ MEC/ river bed	Yes: strengthen substructure of existing bridge	No	No	No	Yes: >100 mi roadway detour
Meets purpose and need?	Yes	Partially	Yes	Partially	No	No	No	Yes
Approximate cost (in 2008 dollars)	$1.9-3.2M	$500M	$1.9B	$890M	$220M; Long-term op. costs	$0	$0	$620M
If avoidance, feasible and prudent? [2]	No	N/A	No	N/A	N/A	No	No	N/A

[1] Assumes AASHTO *Guidelines for Historic Bridge Rehabilitation and Replacement* are followed for future rehabilitation of existing bridge. MDTA would not own/maintain existing bridge and/or original administration building.

[2] Only applied to avoidance alternates.

Alternate 8 (North) would avoid all identified Section 4(f) properties. However, assuming that the new roadway would require 75 feet of additional disturbance on each side of existing roadways, it is estimated that the alternate could displace more than 100 residences and businesses; and impact two major streams (Clifton Creek and Gambo Creek), approximately four acres of wetlands (based on National Wetlands Inventory (NWI) mapping), approximately 17 acres of agricultural land and 58 acres of forest. Alternate 8 (North) may also affect historic sites that lie along its potential alignment that have not been identified.

Alternate 8 (North) could cause indirect impacts to businesses along existing US 301 if the roadway is relocated. Businesses along the existing US 301, particularly in Maryland, would have less traffic passing by, resulting in a loss of patronage.

Alternate 8 (North) would also have land use implications in both Maryland and Virginia. Traffic would be diverted from the existing, heavily-traveled roadway to portions of Charles and King George Counties where the land is sparsely developed and rural in character. The increase in traffic through these areas could increase development pressure along the new alignment that is not consistent with the comprehensive planning goals of Charles or King George County. In Charles County, portions of the area to the north are classified as Agricultural Conservation District, and, according to the *2006 Charles County Comprehensive Plan*, the County "seeks to preserve [in this area] the agricultural industry and the land base necessary to support it." In King George County, the majority of the area to the north of US 301 is undeveloped forest classified as a Rural Development Area. According to the 2006 *King George County Comprehensive Plan*, Rural Development Areas "include most of the agricultural and environmentally sensitive areas, as well as areas that are not appropriate for public utility service in the long term." Communities such as Pope's Creek in Maryland and Owens in Virginia would be affected.

2. Alternate 8 (South of Existing Alignment)

Alternate 8 (South) would relocate US 301 to a new alignment that crosses the Potomac River at a skewed angle, meeting the shore approximately 5.5 miles south of the existing bridge in Virginia, and approximately 1.5 miles south of the existing crossing in Maryland. New four-lane bridge approach roadways would need to be constructed to move US 301 to a feasible alignment which roughly follows existing roads. The alignment would be located as close to the existing location of the Morgantown Generating Station, as well as NSF Dahlgren and the proving grounds south of Dahlgren, as possible while still completely avoiding these properties. Under this alternate, realigned US 301 would begin near the existing MD 257/US 301 intersection near Newburg, follow Route 257 southeast to near Wayside, then turn west towards the Potomac River. A new bridge crossing would be constructed on a south-southwest alignment to the Virginia shore near Potomac Beach. US 301 would then roughly follow Route 619 (Stony Point Road) west to Route 205 (Ridge Road) before connecting with existing US 301 near Edge Hill. Alternate 8 (South) would be approximately 17.8 miles long, with a crossing of the Potomac River that would be approximately 4.4 miles long. A new toll facility and administration complex would be required in Maryland. The alternate would cost approximately $3.2 billion.

Alternate 8 (South) would avoid all identified Section 4(f) properties. However, assuming that the new roadway would require 75 feet of additional disturbance on each side of existing roadways, it is estimated that the alternate would displace more than 200 residences and businesses; impact five major streams (Pasquahanza Creek, Piccowaxen Creek, Waverly Creek, Gambo Creek, and Williams Creek); and impact approximately nine acres of agricultural land and 72 acres of forest. Alternate 8 (South) may also affect historic sites that lie along its potential alignment that have not been identified.

Alternate 8 (South) would have land use implications that would be similar to Alternate 8 (North), based on current comprehensive plans in both Charles County and King George County. Communities such as Newburg and Morgantown in Maryland, and Potomac Beach and Edgehill in Virginia would be affected.

Although both the northern and southern alignments considered for Alternates 8 would avoid the identified Section 4(f) properties and would meet the purpose and need for the Nice Bridge Improvement Project, they would involve substantial realignment of the US 301 roadway. In addition, both alignments would cause severe social and natural environmental impacts to residences and businesses, streams, wetlands, floodplains, farmlands, forests, the Potomac River and currently unidentified cultural resources in generally undisturbed locations.

Both the northern and southern alignments considered for Alternate 8 are not prudent because each would 1) cause severe social, economic, or environmental impacts; 2) cause severe disruption to established communities; 3) cause severe impacts to environmental resources protected under other federal statutes (streams, wetlands, and floodplains); and 4) result in additional construction, maintenance, or operational costs of an extraordinary magnitude. Alternate 8 is being eliminated because it causes other severe problems of a magnitude that substantially outweighs the importance of protecting Section 4(f) properties.

C. Alternate 10: Tunnel

Alternate 10 involves constructing a four-lane tunnel under the Potomac River near the location of the existing bridge. The existing bridge would remain standing and either taken out of service or continue in use for local traffic. If the bridge is taken out of service, MDTA would not be responsible for bridge maintenance.

Alternate 10 would avoid all Section 4(f) properties by passing under or south of the Nice Bridge Administration Building in Maryland and the park properties in Virginia. The alternate could also be designed to have no impact to residences or businesses, streams, wetlands, floodplains, agricultural land, or forest if potential impacts are limited to tunnel portal locations only within the existing public right-of-way. Alternate 10 could disturb hazardous materials or potential Munitions and Explosives of Concern (MEC) that may exist in the Potomac River bottom and shore lines. The alternate would also have a particularly severe effect on the efficiency of operations at NSF Dahlgren, as well as broader local and regional commercial transportation and economic implications, because flammable and hazardous materials are prohibited in tunnels.

Although Alternate 10 would meet the purpose and need for the project, the Potomac River bottom has questionable bearing capabilities for a tunnel; therefore, it is unknown whether a tunnel is feasible to design and build, or whether a tunnel could be built as a matter of sound engineering judgment. Alternate 10 would have a construction cost of approximately $1.9 billion. Alternate 10 is not prudent because it would 1) result in additional construction, maintenance, or operational costs of an extraordinary magnitude and 2) result in other unique problems or unusual factors associated with potential hazardous materials and MEC in the Potomac River, operations at NSF Dahlgren, and regional commerce. Therefore, Alternate 10 is being eliminated because it causes other severe problems of a magnitude that substantially outweighs the importance of protecting Section 4(f) properties.

D. Alternate 13: Transportation Systems Management/Travel Demand Management

Alternate 13 involves stand-alone Transportation Systems Management (TSM)/Travel Demand Management (TDM) improvements (e.g., van-carpooling, flexible work schedules, telecommuting, traveler information services) in conjunction with improvements to maintain service on the existing Nice Bridge (similar to Alternate 1). No additional capacity or widening would occur to US 301. Alternate 13 would avoid all Section 4(f) properties. Alternate 13 would also have no impact to residences or businesses, streams, wetlands, floodplains, agricultural land, or forest. Because a new bridge would not be constructed, the alternate would have a substantially lower cost than Modified Alternate 7.

Although Alternate 13 would have minimal environmental impact and cost less than Modified Alternate 7, it does not meet the project purpose and need because it does not provide a crossing that is

geometrically compatible with approach roadways; does not meet capacity needs for 2030 or the ability to maintain two-way traffic flow; and would not improve safety on the existing bridge. Alternate 13 is not prudent because it would 1) be unreasonable to proceed with the alternate in light of the project's stated purpose and need; and 2) result in unacceptable safety and operational problems. Therefore, Alternate 13 is being eliminated because it causes other severe problems of a magnitude that substantially outweighs the importance of protecting Section 4(f) properties within the project area.

E. Alternate 14: Transit

Alternate 14 would involve stand-alone transit improvements, such as bus operation, in conjunction with improvements to maintain service on the existing Nice Bridge (similar to Alternate 1). No additional capacity or widening would occur to US 301. Alternate 14 would also have no impact to residences or businesses, streams, wetlands, floodplains, agricultural land, or forest. Because a new bridge would not be constructed, the alternate would have a substantially lower cost than Modified Alternate 7.

Alternate 14 would avoid all Section 4(f) properties and have minimal environmental impact. However, it does not meet the project purpose and need because it does not provide a geometrically compatible crossing with approach roadways; does not meet capacity needs for 2030 or the ability to maintain two-way traffic flow; and would not improve safety on the existing roadway approaches or the bridge. Alternate 14 is not prudent because 1) it would be unreasonable to proceed with the alternate in light of the project's stated purpose and need; and 2) it results in unacceptable safety, capacity, and operational problems. Therefore, Alternate 14 is being eliminated because it causes other severe problems of a magnitude that substantially outweighs the importance of protecting Section 4(f) properties within the project area.

Conclusion of Avoidance Analysis

Based on the evaluation presented in this section, there is no feasible and prudent avoidance alternative to the use of Section 4(f) properties.

VII. LEAST OVERALL HARM ANALYSIS

Pursuant to 23 CFR 774.3(c)(1), if the avoidance analysis determines that there is no feasible and prudent avoidance alternative, then only the alternative that causes the least overall harm may be approved. Therefore, this section provides a review of the multiple remaining alternates that use one or more Section 4(f) properties, including remaining alternates that would eliminate or reduce the use of individual Section 4(f) properties.

Build Alternates 2 through 6 were retained for detailed study for the Environmental Assessment/Draft Section 4(f) Evaluation, and as such, each includes an option to construct a bike/ped path. The 10-foot wide path would require no additional permanent impact to the park resources in Virginia. For consistency with Modified Alternate 7, each of these retained alternates is assumed to include a single two-way bike/ped path, as opposed to the two one-way paths which were presented in the Draft Section 4(f) Evaluation.

23 CFR 774.3(c)(1) provides seven factors for identifying the alternative with the least overall harm. ***Table 9*** presents a comparison of the alternates by each least overall harm evaluation factor, and identifies the alternate resulting in the least overall harm. Potential *de minimis* impact findings for individual Section 4(f) properties are factored into the least overall harm analysis.