Indirect and Cumulative Effects (ICE) Analysis Technical Report

I-270/US 15 Multi-Modal Corridor Study
Montgomery and Frederick Counties, Maryland

May 2009

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I. INTRODUCTION

This Indirect and Cumulative Effects (ICE) analysis report is presented as a supplemental document to the January 2009 I-270/US 15 Multimodal Corridor Study Alternatives Analysis (AA)/Environmental Assessment (EA). The report reiterates the analysis of ICE of the build alternatives presented in the 2002 Draft Environmental Impact Statement (DEIS) and details the analysis of ICE of the two Express Toll Lanes (ETLs) alternatives that are presented in the 2009 AA/EA. Each of the alternatives studied includes highway improvements and transit improvements. The report presents the results of the ICE scoping and the assessment performed for the alternatives. Where possible, this report builds upon and updates the results of the secondary and cumulative effects analysis (SCEA) performed for and documented in the 2002 DEIS. Updates to any resource characteristics that may have changed since publication of the DEIS are discussed, as well as the potential indirect and cumulative effects of the new ETL alternatives and the transit alternatives on these resources. Information on highway and transit alternatives presented in the 2002 DEIS is included in this document and have been re-assessed where appropriate.

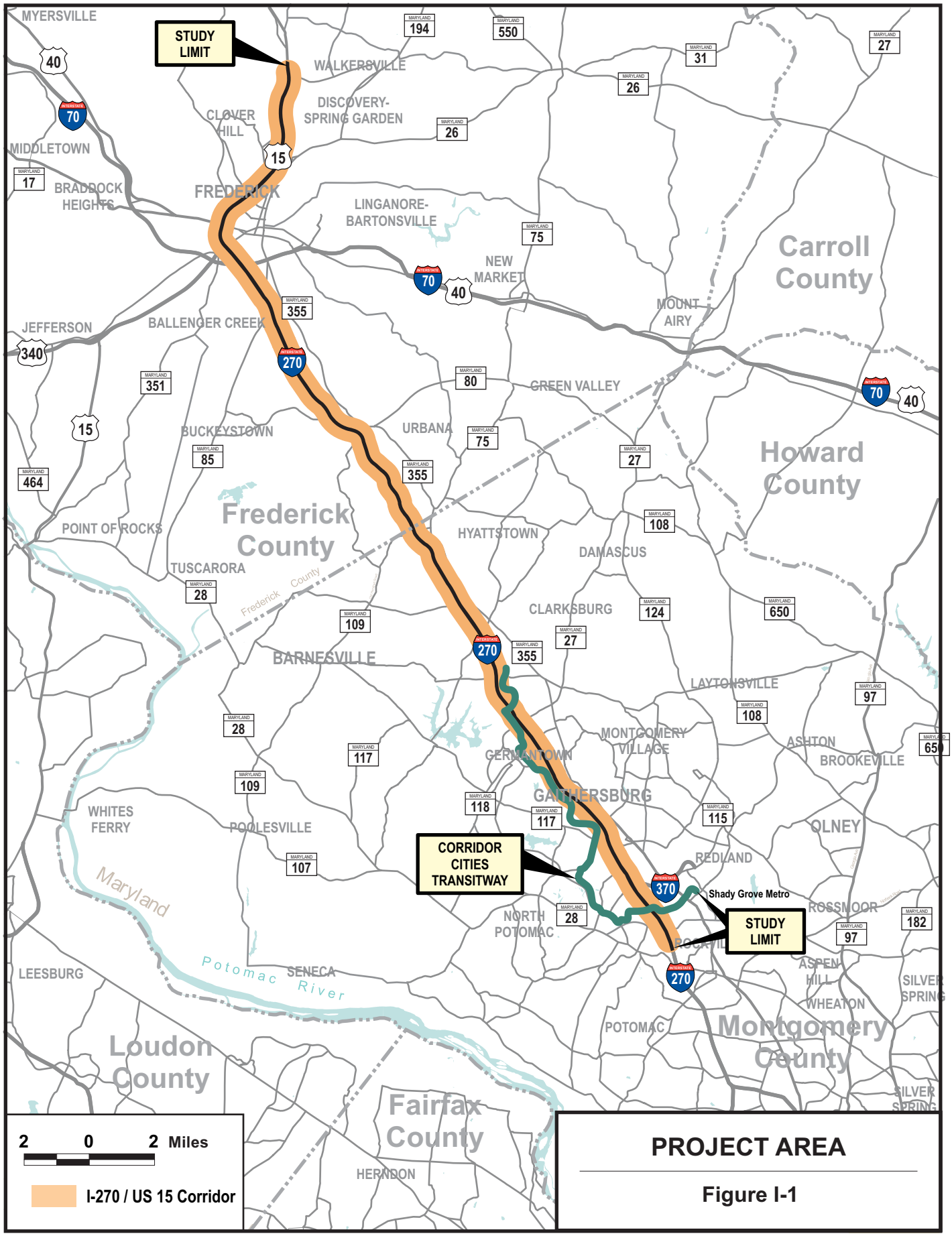
The document has been prepared in accordance with ICE analysis guidance from the United States Environmental Protection Agency (EPA), Federal Highway Administration (FHWA), Federal Transit Administration (FTA), Maryland State Highway Administration (SHA) and Maryland Transit Administration (MTA). Specific guidance sources are described in Chapter II of this report.

This report summarizes the alternatives under consideration, identifies the resources that may be directly or indirectly affected by the project, reviews the context of the analysis (geographic and temporal boundaries), reviews the applicable standards and regulations, evaluates indirect and cumulative effects on the resources directly or indirectly affected by the project, and discusses the conclusions of the analysis.

A. DESCRIPTION OF PROJECT

The project area (area of direct effects) generally extends along the I-270/US 15 Corridor from the Shady Grove Metro Station south of I-370 in Montgomery County, Maryland, to the US 15/Biggs Ford Road intersection north of the City of Frederick in Frederick County, Maryland, as shown in ***Figure I-1***.

The project includes a Transportation System Management/Transportation Demand Management (TSM/TDM) component, a highway component (the addition of general-purpose and/or High Occupancy Vehicle (HOV) lanes/ETLs, auxiliary lanes, interchanges, and interchange improvements), a transit component (either Light Rail Transit (LRT) or Bus Rapid Transit (BRT) on the CCT or Premium Bus Service on managed lanes; a transit operations and maintenance facility; and a hiker-biker trail adjacent to the CCT.


STUDY LIMIT
CORRIDOR CITIES TRANSITWAY
STUDY LIMIT
Shady Grove Metro
MYERSVILLE
WALKERSVILLE
DISCOVERY-SPRING GARDEN
CLOVER HILL
MIDDLETOWN
BRADDOCK HEIGHTS
FREDERICK
LINGANORE-BARTONSVILLE
NEW MARKET
MOUNT AIRY
Carroll County
JEFFERSON
BALLENGER CREEK
BUCKEYSTOWN
URBANA
GREEN VALLEY
Howard County
POINT OF ROCKS
Frederick County
HYATTSTOWN
DAMASCUS
TUSCARORA
CLARKSBURG
BARNESVILLE
LAYTONSVILLE
MONTGOMERY VILLAGE
ASHTON
BROOKEVILLE
GERMANTOWN
GAITHERSBURG
WHITES FERRY
POOLESVILLE
OLNEY
REDLAND
NORTH POTOMAC
ROSSMOOR
ASPEN HILL
SILVER SPRING
WHEATON
POTOMAC
Montgomery County
LEESBURG
SENECA
Maryland
Potomac River
Loudon County
Fairfax County
HERNDON
2 0 2 Miles
I-270 / US 15 Corridor
PROJECT AREA
Figure I-1

B. PURPOSE AND NEED

1. Project Purpose

The purpose of the I-270/US 15 Multi-Modal Corridor Study is to investigate options to address congestion and improve safety conditions along the I-270/US 15 Corridor. The I-270/US 15 Corridor provides an essential connection between the Washington, DC metropolitan area and both central and western Maryland and is an important corridor for carrying local and long distance trips, both within and beyond the Corridor.

2. Project Need

The need for the project results from the mobility challenges from the growing traffic congestion in the I-270 and US 15 corridors. Population and employment growth in Montgomery and Frederick Counties is expected to cause peak period traffic congestion along the I-270/US 15 Corridor to worsen. The lack of alternative, high-speed routes within the corridor also contributes to congestion on I-270 and US 15. Transit provides an alternative, but express and local bus service travels in mixed traffic in the study area and is subject to the same congestion as other vehicles. Rail services such as MARC and Metrorail provide fast, reliable travel options for some residents of the study area. However, access to Metrorail is hampered by the same traffic congestion as other traffic and parking at some of the existing MARC and Metrorail stations is filled to capacity before the morning peak travel hours are over. Refer to the 2002 DEIS, Chapter I.D., for a more complete description of the capacity and safety problems of alternate routes including MD 355.

3. Project Goals

In order to more effectively evaluate the proposed transportation strategies and alternatives, the project team developed five goals for this project. These goals were developed in consultation with the I-270/US 15 Multi-Modal Corridor Study Focus Group, approximately 20 individuals representing business and community interests in the project area to review and offer input for the many transportation improvement options and evaluation measures. The five project goals are:

Support Orderly Economic Growth
Support the orderly economic development of the I-270/US 15 Corridor consistent with the local government land use plans and Maryland's Economic Growth, Resource Protection and Planning Act.

Enhance Mobility
Provide enhanced traveler mobility throughout the I-270/US 15 Corridor by: optimizing travel choices by destination, mode and route; minimizing delay; and improving the safety and overall efficiency of the transportation system.

Improve Goods Movement
Facilitate the movement of goods within and through the I-270/US 15 Corridor and improve the delivery of services in support of the regional and local economies.

Preserve and Protect the Environment
Deliver transportation services in a manner that preserves, protects and enhances the quality of life and social, cultural and natural environment in the I-270/US 15 Corridor.

Optimize Public Investment
Provide a transportation system in the I-270/US 15 Corridor that makes optimal use of existing transportation infrastructure while making cost effective investments in facilities and services that support other project goals.

C. PROJECT BACKGROUND

The I-270 Corridor has been the subject of transit service studies since 1970, conducted by local and state agencies to address transportation needs in the corridor. The I-270/US 15 Multi-Modal Corridor Study DEIS was approved by the FHWA, FTA, SHA, and MTA in May 2002 and published for review and comment.

Following publication of the DEIS in May 2002, Public Hearings were held to receive comments on the document on June 25, 2002 in Montgomery County and on June 27, 2002 in Frederick County. The public comment period ended on August 16, 2002.

In the fall of 2003, the Maryland Department of Transportation (MDOT) directed the SHA to consider the ETL concept as an alternative for the I-270/US 15 Corridor, and Public Workshops were held on June 29 and 30, 2004, to introduce the ETL concept for the project. Written comments were received from 22 citizens. An almost equal number of comments focused on transit and highway concerns, and comments were fairly equally divided in favor of or against the ETL concept.

1. Master Plan Context

In general, the master plan context for improvements in the I-270/US 15 Corridor is based on the Frederick and Montgomery County master planning documents, including:

- Montgomery County's *On Wedges and Corridors* master plan and the area plans within which the I-270 Corridor lies the Gaithersburg Vicinity, Germantown, Clarksburg and Hyattstown area plans, and

- Frederick City and County comprehensive plans and the area plans for the Frederick and Urbana Regions.

Three of these master plans are currently being updated the *Gaithersburg Vicinity-Shady Grove Master Plan Amendment* (November 1996), the *Gaithersburg Vicinity Master Plan Amendment* (July 1990) and the *Germantown Master Plan* (1990). Master plans that have been updated since the 2002 DEIS include

- The *Frederick Region Plan* (update adopted July 2002) supports the selection of any of the alternatives in the DEIS (including highway widening, and interchange improvements) and identifies additional recommendations for intersections on US 15 and the preservation of a transitway into downtown Frederick.

- The *Urbana Region Plan* (update adopted June 2004) recommends that I-270 be widened to six or eight lanes, construction of a new interchange on I-270 at MD 75, improvements to the MD 80 interchange and consideration of an additional interchange at Park Mills Road. The *Urbana Region Plan* also supports the preservation of a transitway in Frederick County.

- The *City of Frederick Comprehensive Plan* (update adopted September 2004) recommends the implementation of the improvements in the I-270/US 15 Multi-Modal Corridor Study DEIS, supports direct transit service to Montgomery County and Washington, DC employment centers as well as reverse commute service, and identifies an extension of Maryland Rail Commuter (MARC) service through the City.

There are no updates available for the *Clarksburg Master Plan and Hyattstown Special Study Area* or the Frederick County Comprehensive Plan.

The MTA MARC Master Plan/Strategic Plan is used as an internal document by MTA as a guide to capital project planning.

In winter 2005, MDOT developed *Maryland's Statewide Express Toll Lanes Network Initiative*, which provides an overview of the state's vision for regional connectivity through the implementation of managed lanes (including ETL, HOV, and High Occupancy Toll (HOT)) on major transportation routes. The implementation of ETLs on I-270 between the Capital Beltway (I-495) and I-70 is included in MDOT's regional plan.

2. Programmed Improvements

Programmed improvements associated with and within the I-270/US 15 Corridor are identified in the Metropolitan Washington Council of Government (MWCOG) 2007 Constrained Long Range Transportation Plan (CLRP) and in the Maryland Consolidated Transportation Program 2008-2013 (CTP) and listed in ***Table I-1***.

Table I-1: Transportation Improvements Programmed for I-270/US 15 Corridor included in 2030 Forecasts

Location	Description	Projected Completion Date
Highway Upgrade, Reconstruction, Extension and Widening Projects		
US 15 at Monocacy Boulevard	Construct a new interchange at US 15 and Monocacy Boulevard	2010
I-70 from Mt. Phillip Road to MD 144 (Baltimore National Pike)	Extend MD 475 (East St) from South Street to proposed Monocacy Boulevard, including storm water management ponds and new urban diamond interchange with I-70 and ramps to Walser Drive	Under construction
	Replace I-70 bridge over Reich's Ford Road & reconstruct ramps, widen from MD 144 to west of Monocacy Boulevard; reconstruct Monocacy Boulevard interchange	2015
	Widen to 6 lanes, New Design Road to Mt. Phillip	2015

Table I-1: Transportation Improvements Programmed for I-270/US 15 Corridor included in 2030 Forecasts

Location	Description	Projected Completion Date
	Road	
I-270 Interchange at Watkins Mill Road	Widen and extend Watkins Mill Road from 4-6 lanes; construct interchange; add 2-lane collector-distributor roads NB & SB on I-270	2020
I-270 at MD 121	Reconstruct interchange of I-270 and MD 121	2010
MD 27 from MD 355 to Snowden Farm Parkway (A-305)	Widen to 6 lanes from MD 355 to Midcounty Highway.; widen to 4 lanes from Midcounty Highway. to Snowden Farm Parkway	2010
Midcounty Highway (M-83) from Montgomery Village Avenue to MD 27	Construct 4 to 6 lane roadway	2020
MD 85 from English Muffin Way to north of Grove Road	Upgrade MD 85 to multi-land divided highway	2020
MD 117 from Great Seneca Park (*sic.*) [Seneca Creek State Park] to I-270	Improve roadway and reconstruct intersections to provide capacity and improve operations. Includes sidewalks where appropriate & multi-use path on south side.	Engineering to be completed by 2010
MD 118 from MD 355 to M-83 (Midcounty Highway)/ Watkins Mill Road	Extend MD 118 as a 6-lane divided highway (includes bicycle/pedestrian accommodation)	2020
MD 355/MD 80 Urbana Bypass, east of I-270 north & south of Urbana	Construct to 4 lanes relocated east of I-270, from north of MD 80 to south of MD 80, including intersection (2 separate projects)	2010
Father Hurley Boulevard from Wisteria Road to MD 118 Relocated	Construct final link of Father Hurley as a 4- or 6-lane roadway (includes bridge over CSX railroad; includes bicycle/pedestrian accommodation)	2010
Middlebrook Road Extended from MD 355 to M-83	Study to construct 6 lanes	2010
I-270: replace bridge over Doctor Perry Road	Existing bridge is deteriorated.	2010
Dorsey Mill Road from Century Boulevard to Observation Drive	Connect Dorsey Mill Road between Century Boulevard and Observation Drive via an overpass of I-270	Not available
Observation Drive extended north to Stringtown Road	Planning study to extend Observation Drive as a 4-lane divided roadway from south of Little Seneca Creek to Clarksburg Town Center	Not available
Intercounty Connector (ICC)	Construct toll freeway between I-270 and I-95/US1; engineering, right-of-way acquisition and construction under way	2012
Transit Extensions and Parking Expansion Projects		
Olney Transit Center	Construction of transit center in Olney	2015
Montgomery County Randolph Road bus enhancements	Bus Rapid Transit (BRT) from MD 355 to US 29	2010
Clarksburg Transit Center	Construct Transit Center	2015
Paul S. Sarbanes Transit Center Silver Spring	Transit center at Silver Spring to include Metrorail/MARC station, local and intercity bus, and	2010

Table I-1: Transportation Improvements Programmed for I-270/US 15 Corridor included in 2030 Forecasts

Location	Description	Projected Completion Date
	a taxi queue area. Incorporates connections for a possible future Bi-County Transitway (Purple Line) and/or hiker/biker trail. Phase I construction is complete.	
Purple Line	Study of 16-mile transitway between New Carrollton and Bethesda Metrorail stations, connecting the Metrorail Red, Green and Orange lines to key destinations in Prince George's and Montgomery Counties.	Planning to be completed in 2010

3. Project Changes

Since the 2002 DEIS, the following improvements have been completed in the Corridor

- I-270/MD 117 Interchange – An interchange improvement was completed that added a 368-space park and ride lot.
- US 15/MD 26 Interchange – An interchange improvement project was completed in 2006, adding a new northbound on-ramp to US 15 at this location.
- MD 124 from MD 28 to Longdraft Road – The roadway was reconstructed as a six-lane highway.
- MD 28 from Riffle Ford Road to Shady Grove Road – MD 28 was widened to a four-lane divided highway, with six lanes between Muddy Branch Road and Shady Grove Road.
- Shady Grove Metrorail Station Parking Garage – A second garage opened in May 2003, adding 2,140 additional spaces for a total parking capacity of 5,865 spaces.
- Montgomery County Transit Centers – A 5---space park and ride lot and town center was opened at US 29 and MD 198 in Burtonsville, and a 300-space park and ride lot was opened at Lakeforest Mall in Gaithersburg.
- Ride-On Express Bus from Germantown to Shady Grove – Bus Route 100 operates directly on I-270 and I-370 and was greatly expanded in 2006 to provide more frequent service in peak periods.
- US 15 Auxiliary Lane - An auxiliary lane was constructed in 2004 on US 15 southbound connecting the Rosemont Avenue southbound on-ramp with the US 40 southbound off-ramp deceleration lane.
- I-270 Auxiliary Lane – An auxiliary lane was constructed in 2007 on I-270 southbound connecting the I-70 eastbound on-ramp acceleration lane with the MD 85 southbound off-ramp deceleration lane.
- MD 355 at I-70 – New ramps were constructed from eastbound I-70 to MD 355, MD 85 was relocated at MD 355, and MD 355 was widened from south of I-70 for 2,000 feet.
- MD 27 was widened to six lanes from Observation Drive to MD 355.

Changes in the project's description since the 2002 DEIS include Express Toll Lanes, interchanges, and transit elements as described in the following sections.

a. Express Toll Lanes

Express Toll Lanes (ETLs) are generally new capacity tolled highway lanes which can be combined with existing highway lanes, providing motorists a choice to pay a fee for a relatively congestion-free trip when travel time is critical. Tolls, collected electronically, would vary based on demand, and would provide an additional source of funding for roadway construction and maintenance. ETLs, like HOV lanes, can be used by public buses to improve travel times for transit users. Two alternatives are added that include the implementation of one or two ETLs and direct access ramps as part of the highway component. The addition of ETLs resulted in a change in the southern limit for mainline construction to approximately 2,000 feet south of the I-270/Shady Grove Road interchange to allow for transition between the ETLs and existing HOV lanes.

b. Residential Displacement Minimization

Proposed improvements shown in the DEIS and at the June 2002 Public Hearings identified 35 residential displacements in the Fox Chapel community. A minimization option was designed subsequent to the 2002 DEIS that would potentially avoid displacements in this community. Avoidance and minimization of residential displacements is continually being reviewed and shall continue as design proceeds.

c. Interchanges

The southbound ramps at the proposed interchange at I-270/Newcut Road have been reconfigured to the southwest quadrant based on environmental coordination with the US Army Corps of Engineers. The proposed interchange reconfiguration represents an alternative to be considered versus the configuration proposed in the DEIS.

The I-270/MD 121 interchange improvements have been broken out as a separate project, led by a private developer. The planning study investigated additional transportation movements that were not included in the DEIS, due to newly-approved development west of the existing interchange. The selected interchange improvements are under design for construction in 2009.

The I-270/MD 85 intersection has been reconfigured from the DEIS to address changes in traffic forecasts.

The US 15 interchange with Monocacy Boulevard/Christopher's Crossing has been broken out as a separate project planning study led by SHA, and project planning is nearly complete.

The I-270/I-370 direct access ramps have been reconfigured to reduce the number of residential displacements north of the interchange.

The I-270/MD 117 interchange has been modified from the DEIS configuration to accommodate potential ETL direct access to/from the south. The proposed southbound I-270 exit ramp has been eliminated due to a change in traffic projections.

The I-270/Watkins Mill Road HOV direct access ramps described in the DEIS have been relocated to a proposed Metropolitan Grove Road Extended interchange (between MD 124 and

the proposed Watkins Mill Road interchange). The Metropolitan Grove Road Extended interchange would provide access to/from the ETLs only and would provide access to the proposed Metropolitan Grove CCT station and the existing Metropolitan Grove MARC station.

The MD 118 bridge over I-270 is proposed to be relocated to accommodate the ETL direct access ramps.

d. Collector-Distributor (CD) Roadways

The existing northbound CD roadway system, signed as the "Local" lanes, would be removed from I-370 to north of MD 124 to accommodate the proposed ETL roadway alternatives. The CD roadway between Montrose Road and I-370 will remain in place.

e. Transit Element Changes

Since the publication of the 2002 DEIS, the MTA has dropped the proposed School Drive Station from further consideration. Montgomery County approved development in this area which, when built, prevented the use of the School Drive site for a station. Some of the proposed locations for the CCT O&M facilities have been eliminated through the screening process, and new sites have been added. As described in Chapter II of the Alternatives Analysis/Environmental Assessment (AA/EA), of the eight sites retained in the DEIS for additional study, only one site is still being considered and four new sites have been identified. At this time, two sites in the Shady Grove area, two sites in the Metropolitan Grove area and one site in the COMSAT area are being studied. Some of these sites would be suitable for LRT or BRT only.

D. ALTERNATIVES CONSIDERED

The I-270/US 15 Multi-Modal Corridor Study is considering the addition of both highway and transit improvements. The study looks at several ways to add capacity to the highway, including the addition of general purpose (GP) lanes or managed lanes – either HOV lanes or ETLs. Other proposed highway improvements include the addition of collector/distributor (CD) lanes, acceleration/deceleration lanes, auxiliary lanes, new and improved interchanges, and park and ride lots.

The transit alternatives being considered are LRT or BRT on the CCT, Premium Bus service operating on the highway's managed lanes, and a shared use path for bicyclists and pedestrians.

The various transportation modes and system improvements under consideration are defined as are the alternatives evaluated in the 2002 Draft Environmental Impact Statement (DEIS). This Section 4(f) Evaluation analyzes the AA/EA Alternatives 6A/B and 7A/B. Descriptions of both the DEIS and AA/EA alternatives are provided to assist the reader in understanding the entire proposed project.

1. Highway Improvement Descriptions

The I-270/US 15 highway alternatives propose various types of improvements. A brief description of the various lane types includes:

- ***General Purpose*** (GP) lanes are regular traffic lanes designed to accommodate all motor vehicle traffic on interstate and state highways, generally posted at speeds of 55 miles per hour or higher.
- ***High-Occupancy Vehicle*** (HOV) lanes are dedicated lanes which can only be used by vehicles with two or more occupants or by motorcycles. They may be separated from the GP lanes by striping or by a barrier. HOV lanes are managed lanes which are designed to encourage carpooling. I-270 currently has one HOV lane, designated as HOV-2, in both the northbound and southbound directions. HOV-2 requires at least two persons per vehicle.
- ***Express Toll Lanes*** (ETLs) are another type of managed lanes designed to alleviate congestion in GP lanes and provide relatively free-flowing traffic. ETLs are limited-access, tolled interstate highway lanes that are usually barrier-separated from GP lanes. Motorists who wish to travel in the less congested ETLs pay a toll that is collected at highway speeds by an *E-ZPass*™ transponder.
- ***Collector/Distributor*** (CD) lanes are one-way roads next to the interstate that operate similar to frontage roads. CD lanes provide relatively free-flowing lanes for shorter trips and are used to collect entering and exiting traffic at interchanges. This helps to eliminate weaving traffic in the main lanes of the interstate. CD lanes are barrier-separated from GP lanes and access between the CD and GP lanes is limited. I-270 currently uses a CD lane system designated as the "Local" lanes.
- ***Direct Access*** ramps provide direct, barrier-separated access to/from managed lanes at a limited number of locations along the highway. The direct access ramps provide continuity of travel and eliminate the necessity of merging managed lane and GP lane traffic at exits and entrances.
- ***Acceleration/deceleration*** lanes extend the length of entry and exit ramps to provide adequate distance for entering vehicles to reach highway speeds before merging with through traffic or allow exiting vehicles to slow to appropriate ramp speeds.
- ***Auxiliary*** lanes are acceleration and deceleration lanes connected between consecutive interchange ramps, so that vehicles traveling from one interchange to the next do not have to merge with the through highway lanes. They may eliminate some weaving between interchanges and provide a longer distance for vehicles entering the roadway to reach highway speeds.

2. Transit Descriptions

The following terms describe important elements of the transit alternatives:

- ***Corridor Cities Transitway*** (CCT) is a reserved transit corridor that is identified in Montgomery County and Frederick County master plans. The CCT alignment extends from the Shady Grove Metrorail Station in Gaithersburg, Montgomery County, to downtown Frederick in Frederick County. For the I-270/US 15 Multi-Modal Corridor Study, transit is only being considered between Shady Grove and the COMSAT area in Clarksburg, Montgomery County.
- ***Light Rail Transit*** (LRT) is an electric railway system that can operate single cars or short trains. The LRT system proposed for this project would operate completely on a dedicated right-of-way, or guideway, separated from traffic on local streets.

- ***Bus Rapid Transit*** (BRT) is a mode of transit that has characteristics common to both conventional bus systems and LRT. BRT for this project would use rubber-tired transit vehicles, most likely articulated buses, along a reserved transit guideway. Vehicles would be similar to LRT vehicles in performance and appearance. However they would be able to leave the transit guideway to access local destinations using the local road network.
- ***Premium Bus*** service would provide bus service using dedicated (managed) highway lanes and direct access ramps to travel from station to station. Premium bus provides limited stop service and non-stop service between origins and destinations.
- ***Corridor Cities Transitway Bike Path***, as denoted in Montgomery County planning documents, is a shared-use, hiker/biker trail that is an integral part of both the I-270/US 15 Multi-Modal Corridor Study and Montgomery County's bikeway network.

3. Alternatives

The alternatives being considered for the I-270/US 15 Multi-Modal Corridor Study include those presented in the 2002 DEIS (Alternatives 1, 2, 3A/B, 4A/B and 5A/B/C), two new build alternatives (Alternatives 6A/B and 7A/B), and the alternatives required to complete the FTA Alternatives Analysis (Alternatives 6.1 and 6.2). Brief descriptions of the alternatives are presented below.

a. Alternatives Evaluated in the 2002 DEIS

Nine alternatives, listed in ***Table I-2,*** were retained and evaluated in the DEIS, including:

- Alternative 1: the No-Build Alternative;
- Alternative 2: TSM/TDM Alternative; and
- Build Alternatives 3A/B, 4A/B and 5A/B/C, each of which consisted of a highway component and a transit component.

Table I-2: Alternatives Retained in the 2002 DEIS

Alternative	Description
1	No-Build Alternative
2	TSM/TDM Alternative
3A	Master Plan[1] HOV/LRT Alternative
3B	Master Plan[1] HOV/BRT Alternative
4A	Master Plan[1] General-Purpose/LRT Alternative
4B	Master Plan[1] General-Purpose/BRT Alternative
5A	Enhanced[2] Master Plan HOV/General-Purpose/LRT Alternative
5B	Enhanced[2] Master Plan HOV/General-Purpose/BRT Alternative
5C	Enhanced[2] Master Plan HOV/General-Purpose/Premium Bus Alternative

1 Master Plan refers to proposed alignments along I-270 & US 15 included in the current Frederick and Montgomery County approved master plans.

2 Enhanced Master Plan refers to proposed improvements that are greater than called for in the Montgomery County Clarksburg Area Master Plan.

Alternative 1: No-Build Alternative

The No-Build Alternative (Alternative 1) serves as a basis for comparing all other alternatives. The No-Build Alternative does not provide any major changes to the existing transportation network. The No-Build Alternative includes minor repairs, maintenance, and safety improvements, as well as programmed improvements identified in the State's fiscally-constrained long range transportation plan, with the exception of the proposed improvements in this study. The existing I-270 roadway is a fully access-controlled highway that provides a combination of CD, GP and HOV lanes in the northbound direction and between two and four GP lanes in the southbound direction. US 15 is a fully access-controlled highway through the City of Frederick and has limited access north of Frederick. US 15 has two GP lanes in each direction.

Alternative 2: TSM/TDM Alternative

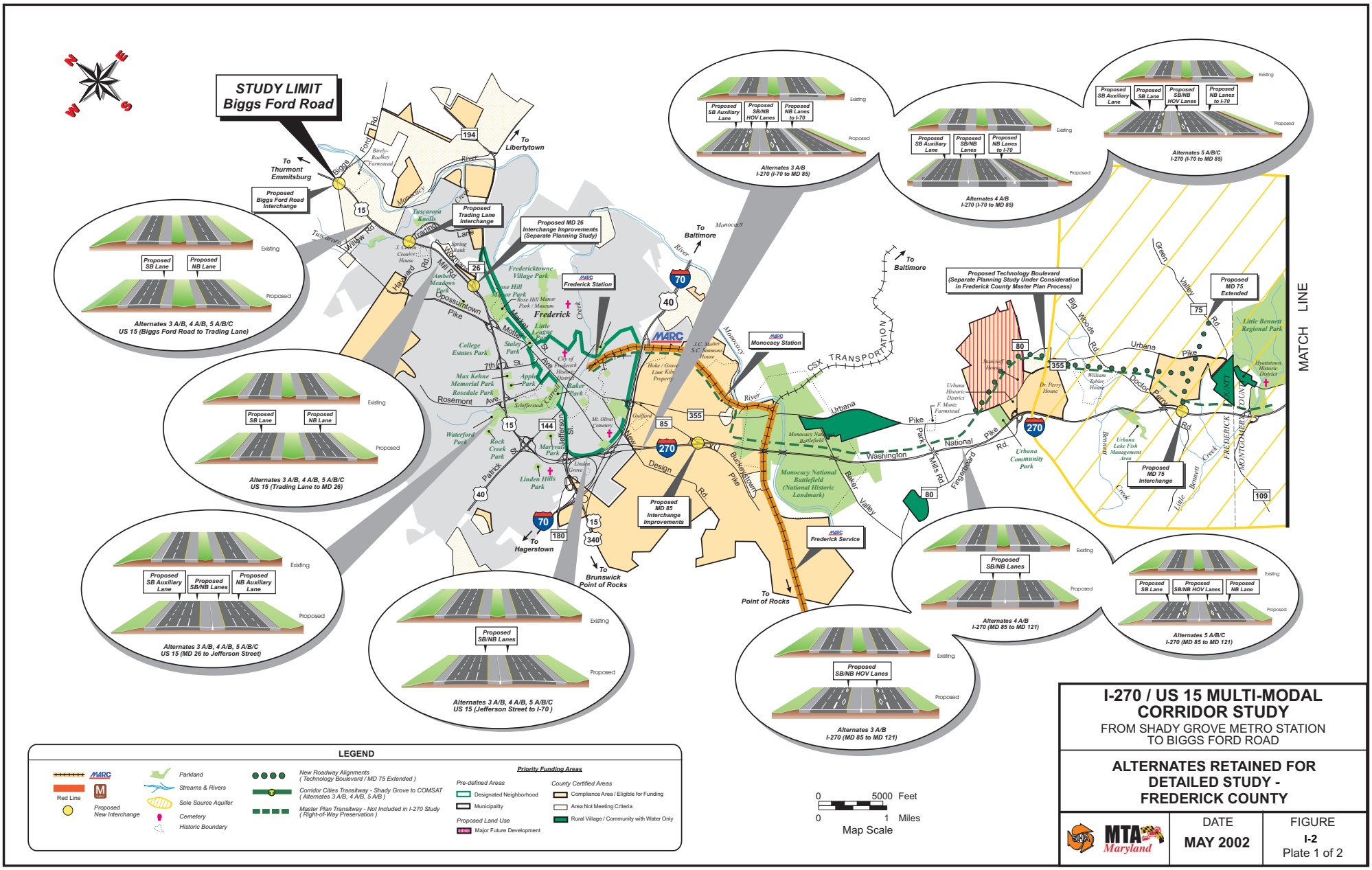
The TSM/TDM Alternative (Alternative 2) includes a number of relatively low-cost measures that are meant to improve the overall operation of the existing transportation system without major capacity improvements. TSM measures include increased local bus service, enhanced feeder bus service to existing fixed guideway transit, the addition of intelligent transportation systems to improve traffic flow and incident management on I-270, and interactive transit information made available at major employment centers. TDM measures include adding park and ride lots, rideshare programs, vanpool, pedestrian and bicycle programs, and telecommuting and flexible work hours programs. The TSM/TDM alternative also includes programmed improvements. The elements of the TSM/TDM alternative are also included as a component of each of the build alternatives.

Alternatives 3A and 3B

Alternatives 3A and 3B, as retained in the 2002 DEIS, would add GP lanes, HOV lanes, auxiliary lanes, and direct access ramps along I-270 and GP lanes and auxiliary lanes along US 15. Alternative 3A would provide LRT on the CCT from the Shady Grove Metrorail station to the COMSAT area in Montgomery County, while Alternative 3B would provide BRT service on the CCT between the same destinations. Alternatives 3A/B are shown on ***Figures I-2*** and ***I-3*** and can be reviewed in detail in the 2002 DEIS in Volume 2, Chapter XI.

The highway improvements would include the following:

- Between I-370 and Father Hurley Boulevard, I-270 would have three GP lanes and one HOV lane in each direction, barrier-separated from CD and auxiliary lanes as necessitated by projected traffic volumes. GP lanes would be separated from HOV lanes by striping.
- Between Father Hurley Boulevard and MD 121, I-270 would have four GP lanes and one HOV lane in each direction, with GP lanes separated from HOV lanes by striping.
- From MD 121 to MD 85, I-270 would have two GP lanes and one HOV lane in each direction, with GP lanes separated from HOV lanes by striping.



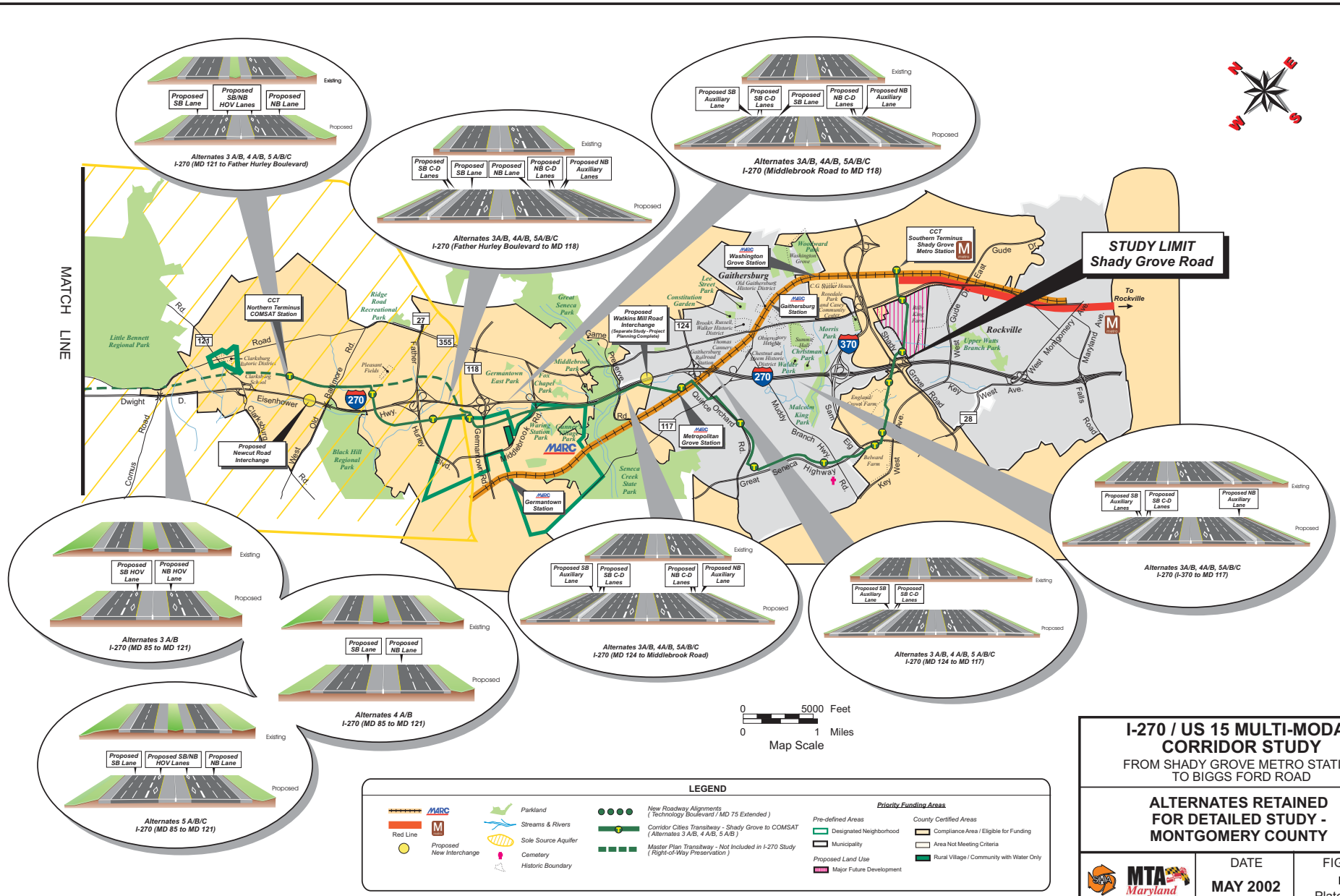
I-270 / US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD

ALTERNATES RETAINED FOR DETAILED STUDY - FREDERICK COUNTY

MTA Maryland

DATE	FIGURE
MAY 2002	I-2 Plate 1 of 2



I-270 / US 15 MULTI-MODAL CORRIDOR STUDY

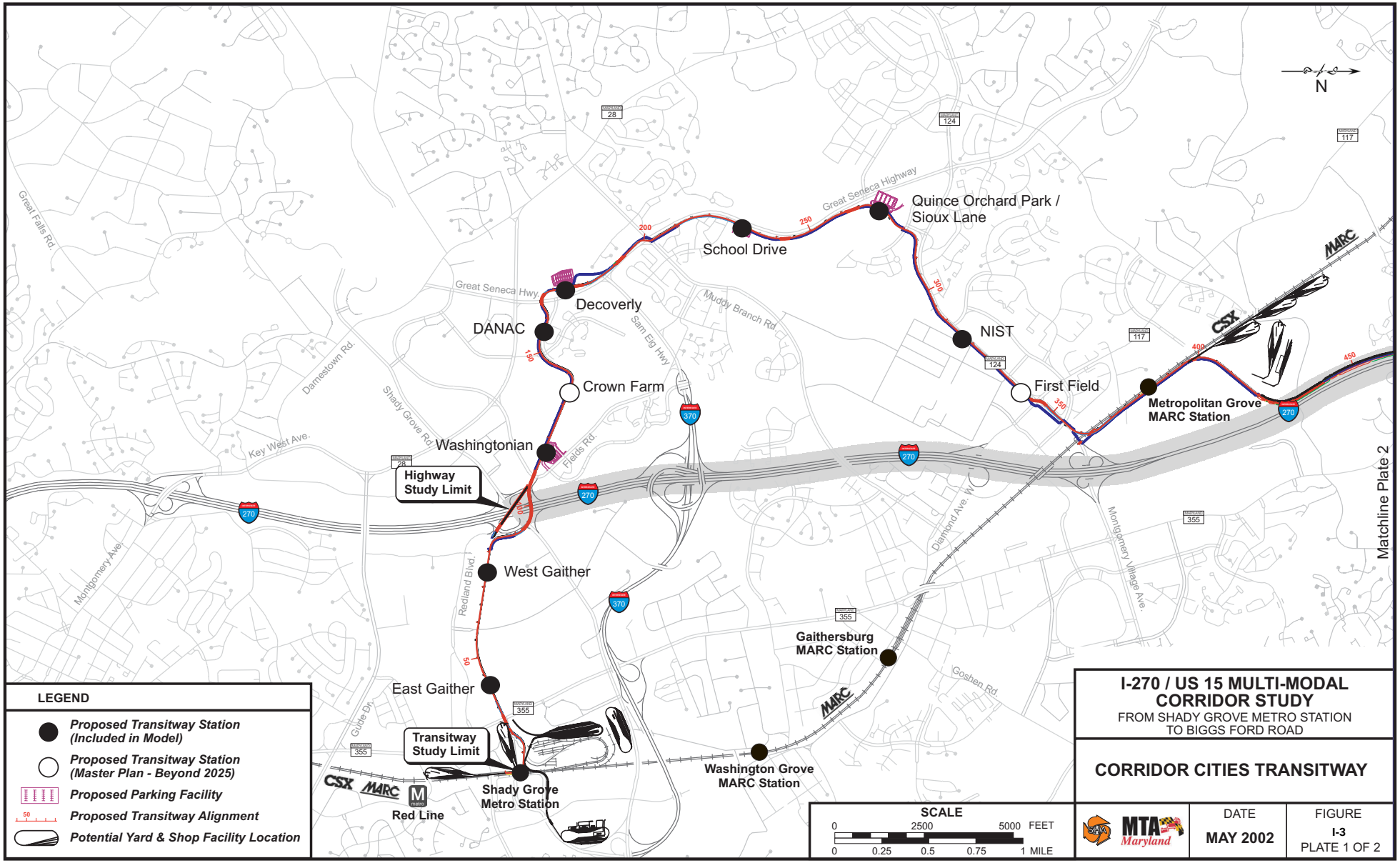
FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD

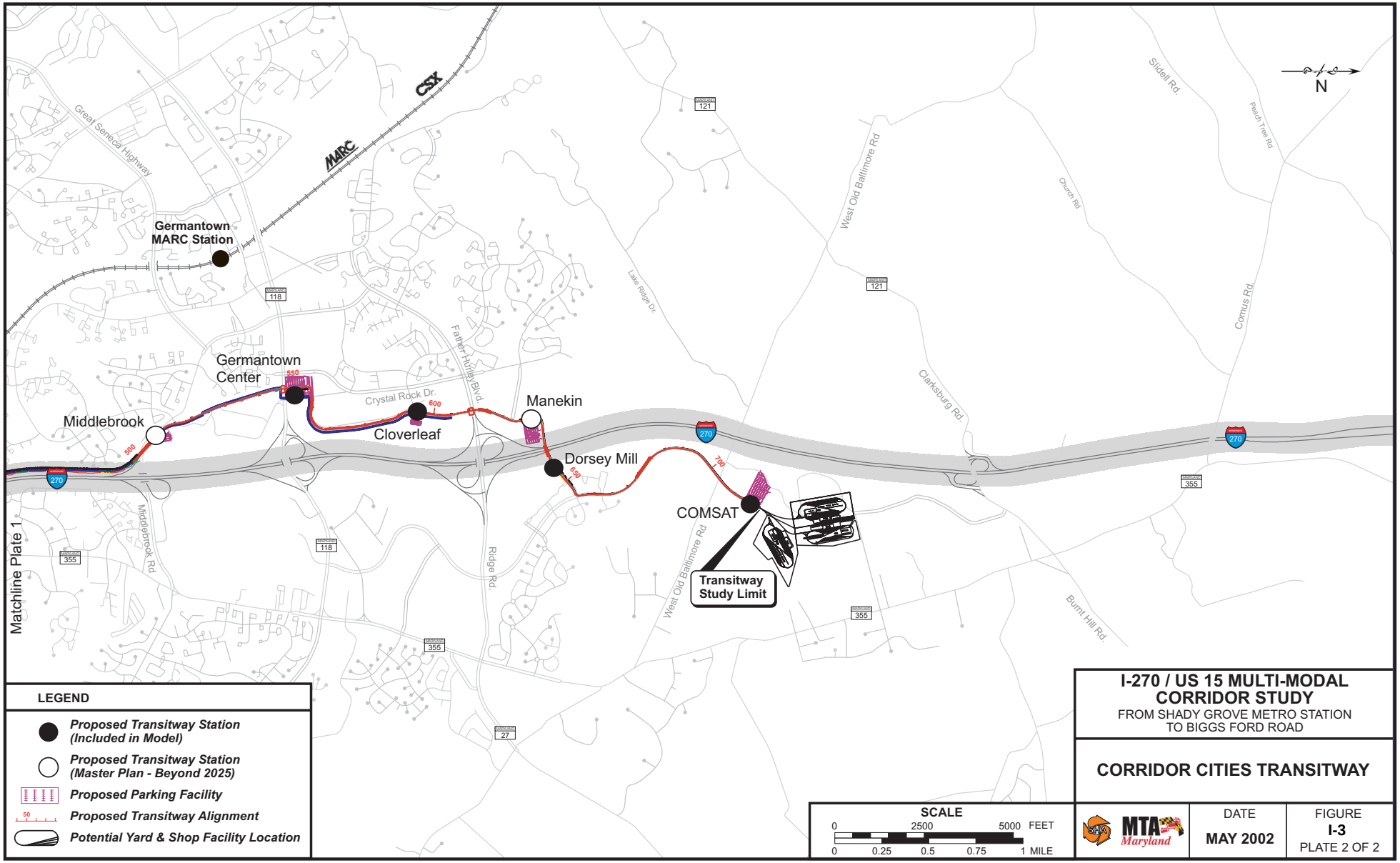
ALTERNATES RETAINED FOR DETAILED STUDY - MONTGOMERY COUNTY

MTA Maryland

DATE
MAY 2002

FIGURE
I-2
Plate 2 of 2


N
Quince Orchard Park / Sioux Lane
School Drive
Great Seneca Highway
Decoverly
DANAC
Crown Farm
Washingtonian
Highway Study Limit
West Gaither
East Gaither
Transitway Study Limit
Shady Grove Metro Station
Red Line
Washington Grove MARC Station
Gaithersburg MARC Station
NIST
First Field
Metropolitan Grove MARC Station
Great Seneca Hwy.
Muddy Branch Rd.
Sam Eig Hwy.
Damestown Rd.
Shady Grove Rd.
Key West Ave.
Fields Rd.
Redland Blvd.
Diamond Ave. W.
Montgomery Village Ave.
Goshen Rd.
Gude Dr.
Great Falls Rd.
Matchline Plate 2
LEGEND
Proposed Transitway Station (Included in Model)
Proposed Transitway Station (Master Plan - Beyond 2025)
Proposed Parking Facility
Proposed Transitway Alignment
Potential Yard & Shop Facility Location
SCALE
0 2500 5000 FEET
0 0.25 0.5 0.75 1 MILE
I-270 / US 15 MULTI-MODAL CORRIDOR STUDY
FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD
CORRIDOR CITIES TRANSITWAY
MTA Maryland
DATE
MAY 2002
FIGURE
I-3
PLATE 1 OF 2



LEGEND

- *Proposed Transitway Station (Included in Model)*
- *Proposed Transitway Station (Master Plan - Beyond 2025)*
- *Proposed Parking Facility*
- *Proposed Transitway Alignment*
- *Potential Yard & Shop Facility Location*

SCALE

0 2500 5000 FEET

0 0.25 0.5 0.75 1 MILE

I-270 / US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD

CORRIDOR CITIES TRANSITWAY

MTA Maryland

DATE **MAY 2002**

FIGURE **I-3** PLATE 2 OF 2

- From MD 85 to I-70, I-270 would have two GP lanes and one HOV lane in each direction, with GP lanes separated from HOV lanes by striping. An auxiliary lane would be provided in the southbound direction, while a barrier-separated, three-lane ramp to I-70 would be provided in the northbound direction.
- Between I-70 and Biggs Ford Road, US 15 would have three GP lanes in each direction. An auxiliary lane would extend in both directions between Jefferson Street and MD 26.

Ramps providing direct access to the HOV lanes would be provided at the proposed Newcut Road and Watkins Mill Road interchanges to facilitate movements by buses and autos to transit stations at COMSAT and Metropolitan Grove.

New interchanges are proposed at I-270/Newcut Road, I-270/MD 75 Extended, US 15/ Trading Lane (now Monocacy Boulevard/Christopher's Crossing), and at US 15/Biggs Ford Road. Existing interchanges will be modified to accommodate all traffic movements and the improved highway section. Three park and ride lots are included in Alternatives 3A/B, located at US 15/MD 26, US 15/Monocacy Boulevard, and US 15/Biggs Ford Road.

The transit component of Alternatives 3A and 3B would provide either LRT or BRT on the CCT. Thirteen new station locations were initially identified for construction to service employment and mixed-use centers, with a proposed combined parking capacity of 4,500 to 5,150 spaces. Four additional future station locations were identified. Station locations include: Shady Grove Metrorail (existing station with over 5,800 parking spaces), East Gaither, West Gaither, Washingtonian, Crown Farm (future station), DANAC, Decoverly, School Drive *(dropped from consideration in 2007 due to property development)*, Quince Orchard Park/Sioux Lane, NIST, First Field (future station), Metropolitan Grove, Middlebrook (future station), Germantown Center, Cloverleaf, Manekin (future station), Dorsey Mill, and COMSAT.

An O&M facility for servicing light rail or bus rapid transit vehicles would be located in one of three identified areas: Shady Grove, Metropolitan Grove, or COMSAT. A shared use hiker/biker trail would also be constructed adjacent to the CCT.

Alternatives 4A and 4B

Alternatives 4A and 4B would add GP lanes, HOV lanes, auxiliary lanes, and direct access ramps along I-270 and GP lanes and auxiliary lanes along US 15. Alternative 4A would provide LRT on the CCT from Shady Grove to COMSAT, while Alternative 4B would provide BRT service on the CCT. Alternatives 4A/B are shown on ***Figures I-2*** and ***I-3*** and can be reviewed in detail in the 2002 DEIS in Volume 2, Chapter XI.

The highway component of Alternatives 4A/B would be the same for I-270 and US 15 as it is in Alternatives 3A/B, except for the section between MD 121 and MD 85. From MD 121 to MD 85, Alternatives 4A/B would have three GP lanes in each direction instead of two.

The transit component for Alternatives 4A/B is identical to the transit component for Alternatives 3A/B.

Alternatives 5A, 5B and 5C

Alternatives 5A, 5B, and 5C would add GP lanes, HOV lanes, auxiliary lanes, and direct access ramps along I-270 and GP lanes and auxiliary lanes along US 15. The highway component would be the same as Alternatives 3A/B, except for the section between MD 121 and I-70.

- Between MD 121 and MD 85, Alternative 5 would have three GP lanes and one HOV lane in each direction, with GP lanes separated from HOV lanes by striping. The HOV lanes would terminate at the proposed direct access ramps to/from MD 85.
- Between MD 85 and I-70, I-270 would have four GP lanes in each direction. An auxiliary lane would be provided in the southbound direction, while a barrier-separated, three-lane ramp to I-70 would be provided in the northbound direction.

Direct access ramps to HOV lanes would be provided at the proposed Watkins Mill Road (a separate SHA planning effort) and Newcut Road interchanges, as well as at the I-370, MD 118 and MD 85 interchanges.

Alternative 5A would provide LRT on the CCT from Shady Grove to COMSAT, while Alternative 5B would provide BRT service on the CCT. Alternative 5C would replace the CCT with Premium Bus service operating on the highway HOV lanes. Alternatives 5A/B/C are shown on ***Figures I-2*** and ***I-3*** and can be reviewed in detail in the 2002 DEIS In Volume 2, Chapter XI.

b. New Alternatives Being Evaluated in the EA

This Section 4(f) Evaluation has been prepared to analyze the AA/EA Alternatives 6A/B and 7A/B. An AA is used by FTA to evaluate the costs and benefits of a range of transportation alternatives to make an informed selection of a preferred transit mode and alignment. The EA is used to evaluate the environmental impacts of the proposed highway and transit improvements of the alternatives and to make an informed selection of a Locally Preferred Alternative. The alternatives being evaluated by the AA and EA are shown in ***Table II-2.*** Seven alternatives are listed, and six of these meet the FTA guidelines for an AA. Two alternatives, Alternative 6.1: No-Build Transit and Alternative 6.2: Transit TSM, are included solely for the assessment of transit performance and are not evaluated for resource impacts. Four alternatives, Alternatives 6A, 6B, 7A and 7B, are being evaluated for resource impacts in this document. Alternatives 6A/B and 7A/B include ETLs instead of HOV lanes as the managed lane component, plus the LRT or BRT transit mode on the CCT as the transit component. Alternative 1: No-Build is carried forward from the 2002 DEIS and is updated to reflect the latest demographic forecasts from the Metropolitan Washington Council of Governments (MWCOG) and the latest planned transportation improvements in the MWCOG Constrained Long Range Plan (CLRP).

Table I-3: Alternatives Considered in the EA or AA

Alternative	Description	AA or EA
1: No-Build	No-Build Alternative carried from 2002 DEIS; includes latest Metropolitan Planning Organization (MPO) demographic forecasts	EA
6: No-Build Transit	Master Plan[1] ETL Alternative 6; no transit improvements beyond CLRP (with CCT removed)	AA
6-TSM: Transit TSM	Master Plan[1] ETL Alternative 6; with Transit TSM (enhanced bus service)	AA
6A	Master Plan[1] ETL/LRT Alternative	AA and EA
6B	Master Plan[1] ETL/BRT Alternative	AA and EA
7A	Enhanced[2] Master Plan ETL/LRT Alternative	AA and EA
7B	Enhanced[2] Master Plan ETL/BRT Alternative	AA and EA

1 Master Plan refers to alignments along I-270 & US 15included in current Frederick and Montgomery County approved master plans.

2 Enhanced Master Plan refers to proposed improvements that are greater than called for in the Montgomery County Clarksburg Area Master Plan.

Alternatives 6A and 6B

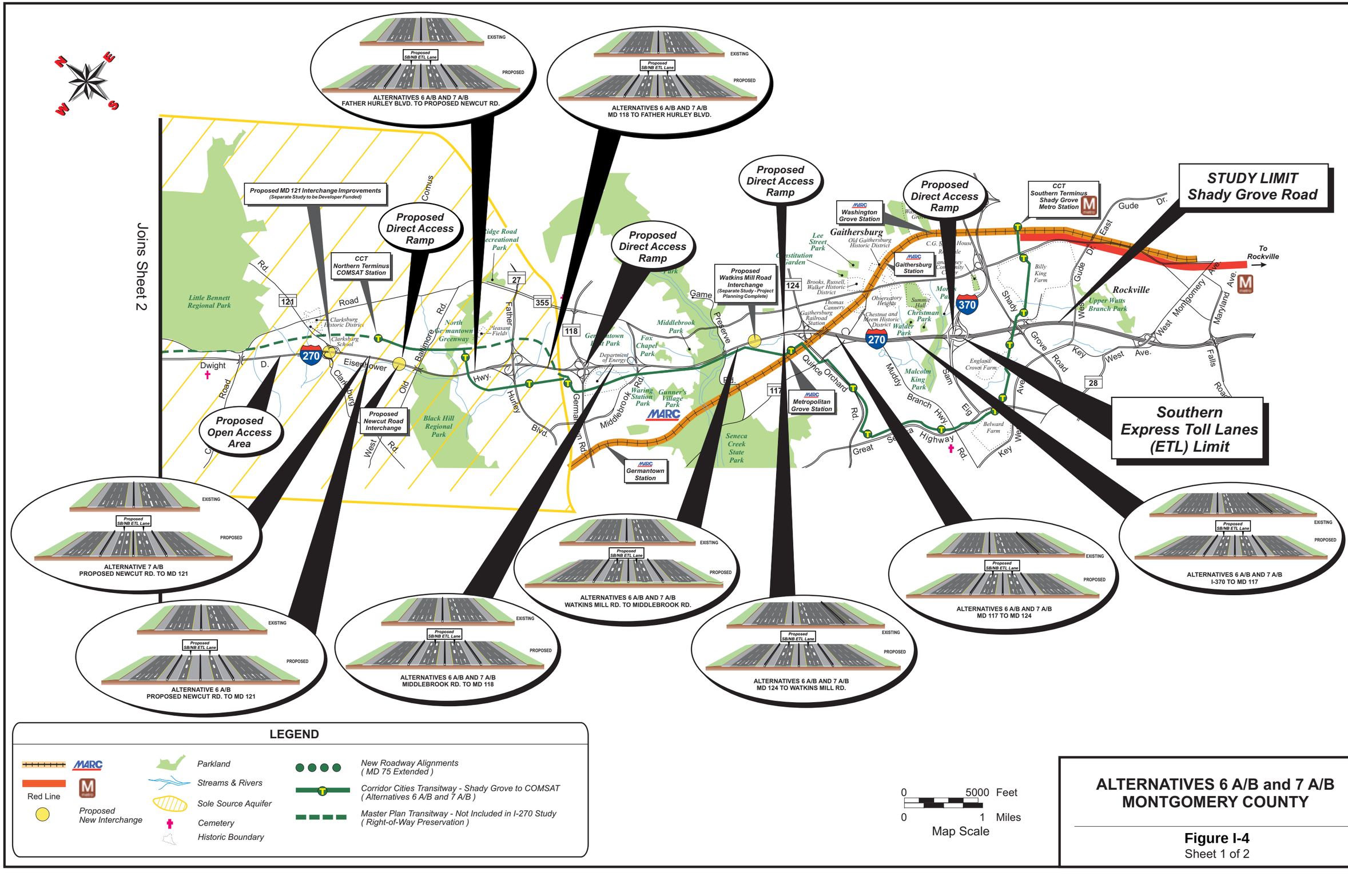
The highway component of Alternatives 6A and 6B would add GP lanes, ETLs, auxiliary lanes, and direct access ramps along I-270 and GP lanes and auxiliary lanes along US 15. ETLs would terminate north of MD 80 at the direct access ramps south of the Monocacy National Battlefield in Frederick County. Alternative 6A would provide LRT on the CCT from Shady Grove to COMSAT, while Alternative 6B would provide BRT service on the CCT. Alternatives 6A/B are shown on ***Figures I-4 (Sheets 1 and 2), I-5*** and ***I-6***.

Between I-370 and north of MD 80, Alternatives 6A and 6B would provide up to two ETLs in each direction in the median lanes, barrier-separated from highway GP lanes and served by direct access ramps at designated interchanges and open access areas. The highway component would provide:

- Four GP lanes and two ETLs each direction between Shady Grove Road and MD 124,
- Three GP lanes and two ETLs in each direction between MD 124 and proposed Newcut Road,
- Three GP lanes and one ETL in each direction between proposed Newcut Road and MD 121,
- Two GP lanes and one ETL in each direction between MD 121 and north of MD 80, where the ETLs will terminate in the vicinity of Park Mills Road , and
- Three GP lanes in each direction from north of MD 80 to Biggs Ford Road.

Auxiliary lanes would provide additional travel lanes between interchanges as needed to provide capacity. The typical sections are also shown on ***Figure I-4 (Sheets 1 and 2)***.

Direct access ramps for ETLs only would be provided south of I-370 and north of MD 80 at the ETL termini; at the interchanges of I-270 with I-370, MD 118, and proposed Newcut Road; from proposed Metropolitan Grove Road Extended; and via open access ramps between MD 121 and MD 109 and between MD 75 and MD 80.



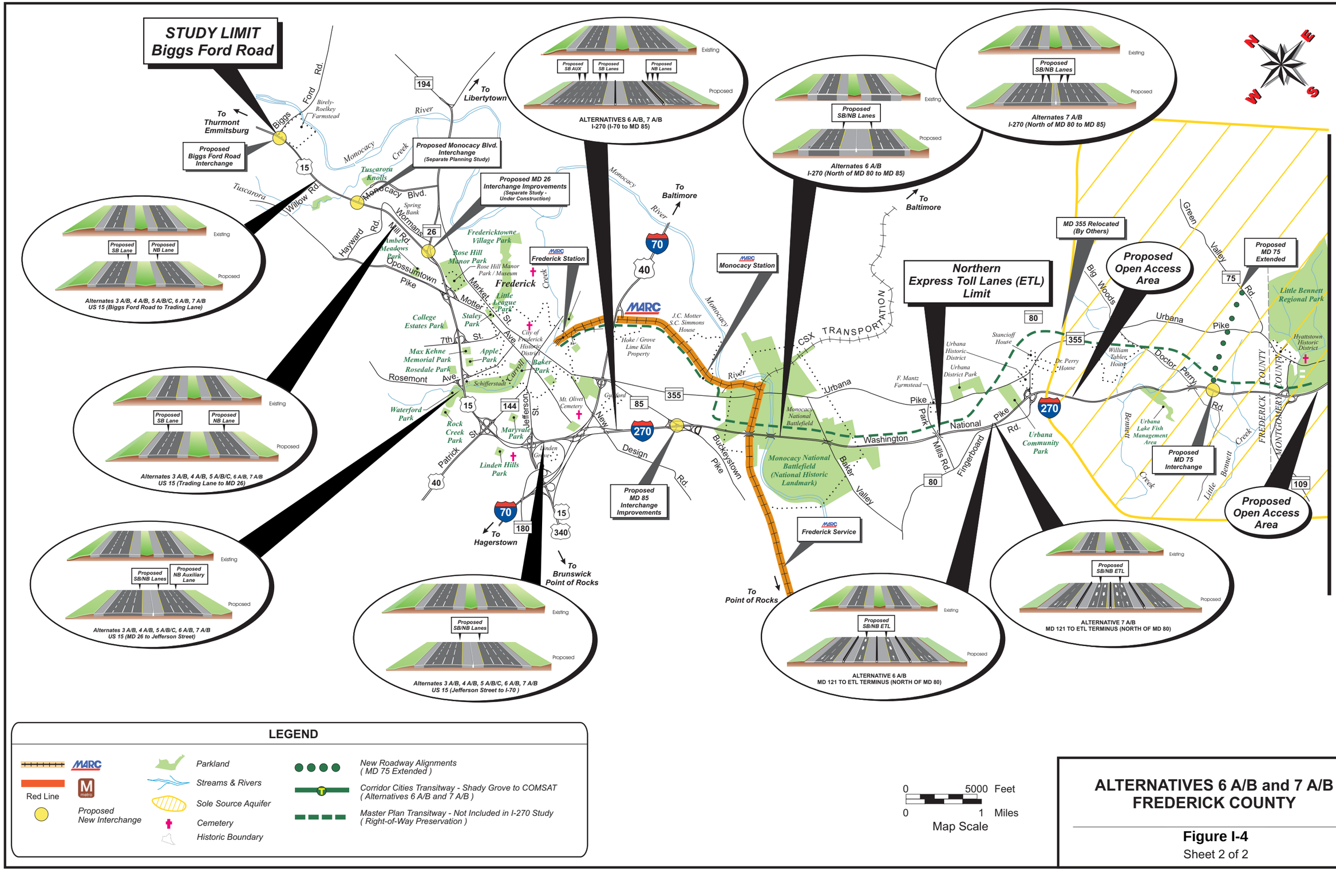
LEGEND

- Red Line
- MARC
- Proposed New Interchange
- Parkland
- Streams & Rivers
- Sole Source Aquifer
- Cemetery
- Historic Boundary
- New Roadway Alignments (MD 75 Extended)
- Corridor Cities Transitway - Shady Grove to COMSAT (Alternatives 6 A/B and 7 A/B)
- Master Plan Transitway - Not Included in I-270 Study (Right-of-Way Preservation)

0 5000 Feet
0 1 Miles
Map Scale

ALTERNATIVES 6 A/B and 7 A/B
MONTGOMERY COUNTY

Figure I-4
Sheet 1 of 2



ALTERNATIVES 6 A/B and 7 A/B
FREDERICK COUNTY

Figure I-4

Sheet 2 of 2

Bus Routes

90 — FREDSG

Following bus routes terminate at:

COMSAT: 75

Quince Orchard: 74, 76

Metro Grove: 71, 78

Decoverly: 67

CCT Alignment

CCT Stations

Parklands

Water

Urban Areas

N

Alternative 6A: LRT Service Impacted/New Bus Service

0 0.5 1 2

Miles

Figure I-5

Bus Routes

FREDSG

Following bus routes follow TSM Route to Shady Grove at:

Metro Grove:

- 90x
- KPTN-MG-SG
- FRED-MG-SG

TSM Alignment/COM-SG Bus from Frederick

CCT Stations

Parklands

Water

Urban Areas

N

Alternative 6B: BRT Impacted/New Bus Service

0 0.5 1 2

Miles

Figure I-6

New interchanges are proposed at I-270/Newcut Road, I-270/MD 75 Extended, and at US 15/Biggs Ford Road. Existing interchanges will be modified to accommodate all traffic movements and the improved highway section. Two interchanges, at I-270/Watkins Mill Road and at US 15/Monocacy Boulevard/Christopher's Crossing, are being developed by SHA as separate planning projects that should accommodate future changes in the I-270/US 15 roadway. One park and ride lot at US 15 and Biggs Ford Road is included in Alternatives 6A and 6B.

The transit component of Alternatives 6A and 6B would provide either light rail or bus rapid transit on the CCT. Twelve new station locations were identified for initial construction to service employment and mixed-use centers, with a proposed combined parking capacity of 4,700 spaces. Four additional future station locations were identified. Station locations include: Shady Grove Metrorail (existing station with over 5,800 parking spaces), East Gaither, West Gaither, Washingtonian, Crown Farm (future station), DANAC, Decoverly, Quince Orchard, NIST, First Field (future station), Metropolitan Grove, Middlebrook (future station), Germantown Center, Cloverleaf , Manekin (future station), Dorsey Mill, and COMSAT.

In addition to transit service on the CCT, transit measures include the following:

- New feeder bus routes to serve the CCT stations
- New premium bus routes from Frederick County serving major activity centers
- Park and ride facilities at key CCT stations
- Interactive transit information at major employment centers in the Corridor and at CCT stations

In addition to BRT or LRT service, Alternatives 6A and 6B will include Premium Bus service between Frederick County and corridor park and ride lots, major activity centers, and transit stations operating on the managed lanes of I-270. These include the FREDSG, FREDMGSG and KPTNMGSG routes that also appear in Alternative 6.2: Transit TSM.

An Operations and Maintenance (O&M) facility for servicing light rail or bus vehicles would be located in one of three identified areas: Shady Grove, Metropolitan Grove, or COMSAT. A shared use hiker/biker trail would also be constructed adjacent to the CCT.

Alternatives 7A and 7B

Alternatives 7A and 7B would add GP lanes, ETLs, auxiliary lanes, and direct access ramps along I-270 and GP lanes and auxiliary lanes along US 15. ETLs would terminate north of MD 80 at the direct access ramps south of the Monocacy National Battlefield in Frederick County. Alternative 7A would provide LRT on the CCT from Shady Grove to COMSAT, while Alternative 7B would provide BRT service on the CCT. Alternatives 7A/B are shown on ***Figures I-4 (Sheets 1 and 2), I-5*** and ***I-6***.

The highway typical section for Alternatives 7A/B is identical to the section for Alternatives 6A/B except between MD 121 and north of MD 80. In this section, Alternatives 7A/B would have two ETLs per direction, with a four-foot inside offset to the median barrier.

The transit component of Alternatives 7A and 7B is identical to the transit component of Alternatives 6A and 6B.

Alternative 6.1: No-Build Transit

The highway component of the No-Build Transit Alternative is identical to the highway improvements in Alternative 6A/B. The highway build is included as part of the No-Build Transit Alternative to facilitate the analysis of the transit alternatives. By using an identical highway network baseline in the travel demand modeling of the No-Build Transit, Transit TSM, and transit build alternatives, the analysis is able to isolate the benefits attributable solely to the transit components, without having to compensate for changes in the underlying traffic patterns.

The transit component of Alternative 6.1: No-Build Transit consists of the existing transit services in the corridor plus any improvements programmed in the fiscally constrained long-range transportation plan for the Metropolitan Washington Region. ***Table II-4*** summarizes the routes, termini, and frequency of transit services in Montgomery and Frederick Counties for the No-Build Transit Alternative.

Alternative 6.2: Transit TSM

The Transit TSM Alternative ***(Figure I-7)*** serves as the baseline for analyzing transportation performance among the transit alternatives, as required by the FTA. The Transit TSM Alternative represents the best transit service that can be achieved for the purposes of meeting the project Purpose and Need without investing in major capital improvements, such as the construction of an LRT or BRT fixed guideway. The Transit TSM Alternative is designed to provide comparable quality and levels of transit service at lower cost that Alternatives 6A/B, without major investment in a transit fixed guideway and using the same assumptions for the highway network as Alternatives 6A/B. Alternative 6.2 includes the operation of high quality transit service to a comparable level as the CCT, but without the construction of the exclusive transitway.

The highway component of Alternative 6.2 is identical to the highway improvements in Alternative 6A/B. The highway build is included in Alternative 6.2 to isolate the transit improvements and determine the benefits attributable solely to the transit components.

The transit TSM measures in this alternative include the following:

- New Premium Bus service operating on local roads and serving stops comparable to CCT transit stations
- New stations and park and ride facilities in the same locations as proposed for Alternatives 6A and 6B
- Premium bus service from Frederick County to major activity centers using managed lanes with direct access ramps to park and ride lots, major activity centers and transit stations.
- Enhanced feeder bus service to Metrorail and MARC stations
- Interactive transit information at major employment centers in the Corridor.

Table I-5: 2030 No-Build Transit Service

Route	Current Terminals		2006 Headways		Notes	Proposed 2030 No-Build Headways	
	Start	End	Peak	Off-Peak		Peak	Off-Peak
43	Travillah Transit Center	Shady Grove	15	20		15	20
54	Lake Forest	Rockville	20	30		15	30
55	Germantown Transit Center	Rockville	15	30		10	20
56	Lake Forest	Rockville	20	30		15	30
61	Germantown Transit Center	Shady Grove	30	30		15	30
63	Shady Grove	Rockville	30	30		20	30
66	Travillah Transit Center	Shady Grove	30	-	off-peak dir only	20	30
67	Travillah Transit Center	Shady Grove	30	-	peak direction only	20	30
70	Milestone	Bethesda Medical Center	15	-	not all stops	15	
71	Kingview Park and Ride	Shady Grove	30	-	peak direction only	20	
74	Germantown Transit Center	Shady Grove	30	30		20	30
75	Urbana	Germantown Transit Center	30	30	not all stops in off-peak	20	30
76	Poolesville	Shady Grove	30	-	not all stops in off-peak	20	30
78	Kingview P&R	Shady Grove	30	-	peak direction only	20	-
79	Milestone	Shady Grove	30	-	peak direction only	20	-
82	Clarksburg	Germantown Transit Center/DOE	30	-	peak direction only	20	-
83	Milestone	Germantown Transit Center	15	30	MARC station in peak	15	30
90	Milestone	Shady Grove	30	30	different routes throughout day	20	30
97	Germantown Transit Center	Germantown MARC	15	30	loop	15	30
98	Germantown Transit Center	Seabreeze Court	15	30	loop	15	30
100	Germantown Transit Center	Shady Grove	5	15	express via I-270	5	15
124	MD 124 Park and Ride (MD 117 Park and Ride)	Shady Grove	30	-	express via I-270	20	-
MTA 991	Hagerstown	Shady Grove/Rock Spring Park	15	-		15	-
FT10	Frederick Towne Mall	Francis Scott Key Mall	30	40		30	40
FT20	Francis Scott Key Mall	Frederick Transit Center	30	60		30	60
FT30	Frederick Towne Mall	Frederick Transit Center	30	60	loop	30	60
FT40	Frederick Towne Mall	Frederick Transit Center	30	60		30	60
FT50	Frederick Towne Mall	Frederick Transit Center	30	60	loop	30	60
FT60	Frederick Community College	Frederick Transit Center	30	60	loop	30	60
FT70	College Park Plaza	Frederick Transit Center	60	60	loop	60	60
FT80	Frederick Community College	Frederick Towne Mall	30	60		30	60
FT-EC Shuttle	Spring Ridge Apartments	Department of Aging			4 round trips/day		
FT-BJ Shuttle	Frederick Transit Center	Brunswick MARC Station	180	-	4 round trips/day	180	-
FT-ET Shuttle	Emmitsburg	Frederick Transit Center	120	-	2 round trips/day	120	-
FT-85 Shuttle	Bowmans Industrial Park	Frederick Transit Center			2 round trips/day		
FT-POR Shuttle	Frederick Shopping Center	Point of Rocks MARC Station	40		peak direction only	40	
FT-Fd/ MARC Shuttle	Frederick Towne Mall	Frederick Transit Center	60	-	peak direction only	60	-
FT-Walk/ MARC Shuttle	Walkersville	Frederick Transit Center	60	-	peak direction only	60	-
FT-Walk Shuttle	Walkersville	Frederick Transit Center	60	120		60	120

The primary improvement in Alternative 6.2 is the construction of new station facilities that are connected via a new limited stop bus route between the Shady Grove Metrorail station and COMSAT. This bus route would operate on existing streets at a peak headway of six minutes (busiest travel times) and a non-peak headway of 10 minutes. Headway is the interval of time between buses. In addition to the new limited stop bus route providing service to the proposed stations, new service is also proposed from Frederick County to the Shady Grove Metrorail station and to the CCT area in Gaithersburg. ***Table II-4*** describes the new bus routes, where they start and end, and their frequency of service for the Transit TSM Alternative.

Table II-4: 2030 Alternative 6.2 Additions to No-Build Transit Service

Route	Terminals		Proposed 2030 TSM Headways	
	Start	End	Peak	Off-Peak
FREDSG	Frederick Transit Center	Shady Grove	15	-
FREDMGSG	Frederick Transit Center	Shady Grove	20	30
KPTNMGSG	Kemptown	Shady Grove	30	-
COM-MGSG	COMSAT	Shady Grove	6	10

Bus Routes

- FREDSG

The following bus routes follow TSM Route between Shady Grove and Metropolitan Grove

- 90
- KPTN-MG-SG
- FRED-MG-SG

- TSM Alignment
- CCT Stations
- MARC Stations
- Metro Stations
- Park and Ride
- Parklands
- Water Bodies
- Urban Areas

N

Seneca Creek State Park
Cabin Branch Park
BALTIMORE RD
HWY 121
I-270
RIFFLEFORD RD
COMSAT
Dorsey Mill
Cloverleaf
FRED-MG-SG
Germantown
HWY 117
MARYLAND 355
Little Seneca Greenway Park
MARYLAND 28
KPTN-MG-SG
RIDGE RD
90
HWY 27
CEDAR GROVE
MARYLAND 27
GERMANTOWN
TSM Alignment
FREDSG
Quince Orchard
NIST
Metropolitan Grove
Great Seneca Park
Decoverly
DANAC
Washingtonian
GAITHERSBURG
I-370
W. Gaither
E. Gaither
HWY 355
Shady Grove
ROCKVILLE
Lois Y. Green Park
BLUNT RD
WILDCAT RD
MARYLAND 124
WATKINS RD
HWY 124
MARYLAND 115
AIRP

SCALE
0 0.5 1 2 MILES

ALTERNATIVE 6.2: TRANSIT TSM
TRANSIT TSM BUS SERVICE

Figure I-7

II. INDIRECT AND CUMULATIVE EFFECTS ANALYSIS

In compliance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.25(c)), a secondary and cumulative effects analysis (SCEA) was completed in 2002 for the I-270/US 15 Multi-Modal Corridor Study Draft Environmental Impact Statement (DEIS). The analysis focused on effects that may result from the I-270/US 15 project in conjunction with other past, present, and reasonably foreseeable future actions.

This Indirect and Cumulative Effects (ICE) analysis revises the information collected and analyzed for the 2002 SCEA. The purpose is to identify the potential indirect and cumulative effects on environmental resources that result from changes to the project (including the addition of Alternatives 6 A/B and 7 A/B); changes to development patterns within the analysis area; and changes to SHA and FHWA guidance. Where information has not changed, information from 2002 remains valid and is brought forward in this text. This ICE analysis therefore replaces the 2002 SCEA.

The revised evaluation is based upon guidance from the following publications:

- Council on Environmental Quality's (CEQ) regulations (40 CFR Sections 1500 – 1508) implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC Sections 4321 *et seq*.).
- Council on Environmental Quality 1997 guidelines, Considering Cumulative Effects under the National Environmental Policy Act.
- Maryland State Highway Administration's Internal Indirect and Cumulative Effects (ICE) Analysis Guidelines, Revised 2007.
- Federal Highway Administration Position Paper: Secondary and Cumulative Impact Assessment in the Highway Project Development Process, April 1992.

The CEQ regulations and guidelines entitled "Considering Cumulative Effects Under the National Environmental Policy Act" defines indirect (secondary) and cumulative effects as follows:

> *Indirect (Secondary) Effects*: "effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." (40 CFR 1508.8(b))
>
> *Cumulative Impacts*: "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal, or non-Federal) or person undertakes such other actions." (40 CFR 1508.7)

A. ICE SCOPING

According to SHA guidance, scoping involves identifying the geographic and temporal boundaries within which to frame the analysis, identifying environmental resources within the ICE boundary that will be evaluated, and the availability of data upon which to base the analysis. Scoping for the 2002 SCEA consisted of identifying the geographic boundary and time frame; the impacts of other projects in the region to be considered with the I-270/US 15 project; the resources potentially affected by the project; and the analysis methodology. This revised ICE analysis reexamines the scoping elements of the 2002 SCEA to determine if they remain appropriate.

1. ICE Boundary

The geographic boundary for indirect and cumulative effects analysis (referred to as the ICE boundary) was originally determined in the 2002 SCEA. The boundary was formed using a series of map overlays, including areas of traffic influence, Transportation Analysis Zones (TAZ's), census tract boundaries, county planning area boundaries, watersheds and subwatersheds, parks, water and sewer service limits, and Priority Funding Areas. These overlay maps were set atop a base map of the region that encompassed all of the alternatives.

Each of the subjects studied and mapped to determine the geographic boundary for the ICE analysis were selected based on the resources that would be encompassed by each, as explained in the following. Subwatershed boundaries were used to define the ICE analysis boundary as much as possible, based on the extent of areas of traffic influence. Where the use of a subwatershed boundary was not practical, the ICE analysis boundary was defined using a roadway or census tract boundary or by scribing the most practical connection. ***Figure II-8*** (Watersheds and Subwatersheds) shows where the ICE boundary was defined by subwatershed boundaries.

Areas of Traffic Influence -- The area of traffic influence (ATI) is the geographic extent to which a project would affect traffic levels on roadways, and therefore where there could be indirect or cumulative effects on communities. The areas of traffic influence of the I-270/US 15 project were identified using two separate methods: select link analysis and regional screenline analysis. Land use assumptions were the same for both analysis methods. The methods used indicated a similar area of influence and indicate the geographic extent to which the I-270/US 15 project would affect traffic volumes and travel patterns.

Select Link Analysis - A select link analysis was completed by MWCOG to identify 2020 traffic volumes using projections for the No-Build Alternative and Alternative 5A. Alternative 5A was chosen for the analysis as it was anticipated to have the greatest difference in impact from the No-Build on future traffic operations. This analysis was conducted on the MWCOG Cooperative Forecast Round 6.1 land use assumptions for the region. The differences in traffic volumes (equal to or greater than 10,000 vehicles/± 10% difference in average weekday daily traffic (AWDT)) and travel patterns identified show the anticipated geographic extent of the traffic influenced by the project. The area of traffic influence associated with the project is defined as those areas exhibiting a projected

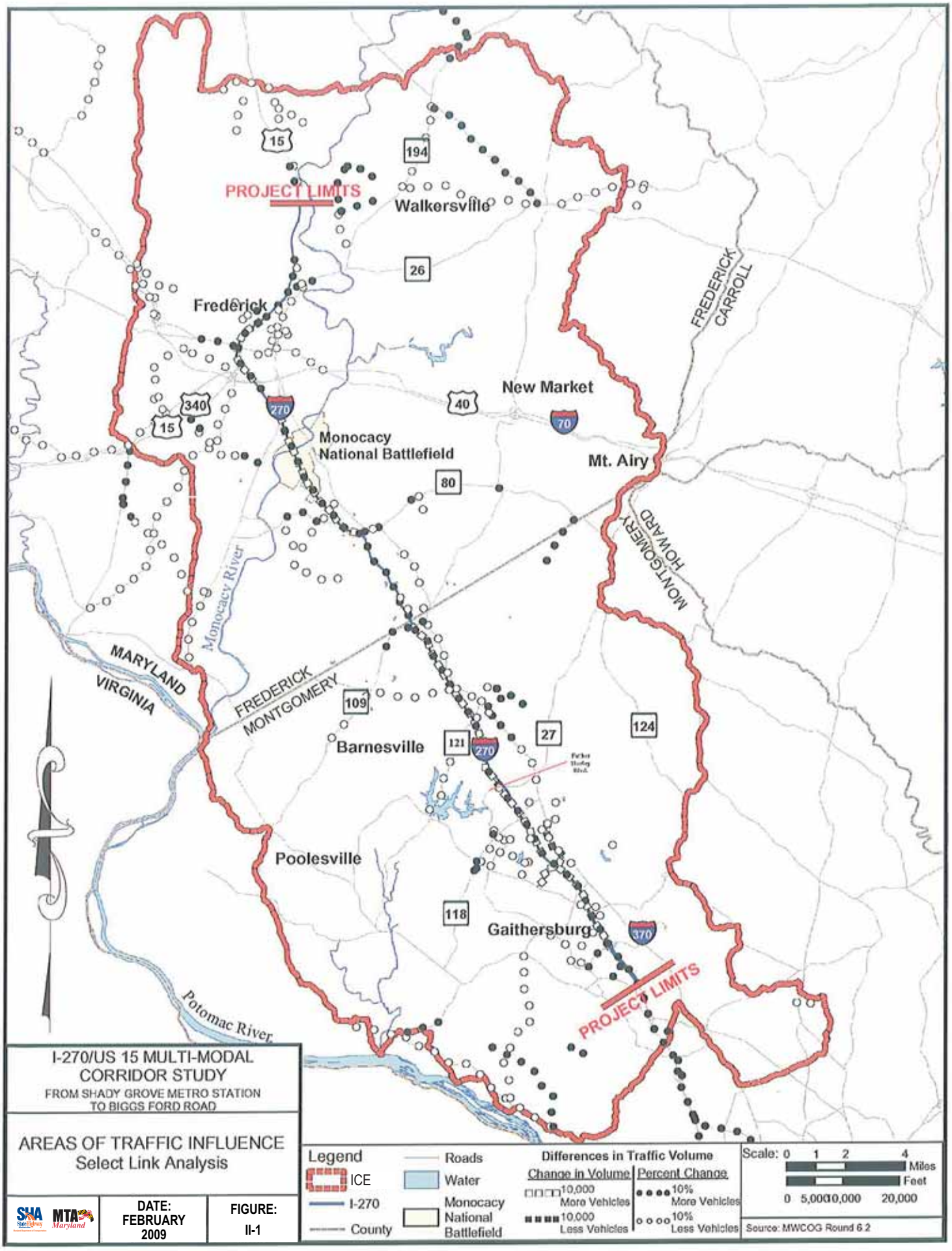
difference equal to or greater than 10,000 vehicles AWDT and is concentrated adjacent to the project limits and along the Corridor. See ***Figure II-1***.

Regional Screenline Analysis -- Using a system of regional screenlines, a confirmation of the area of traffic influence was obtained by SHA. Three screenlines were established and evaluated for changes in traffic volumes: (1) north of the City of Frederick on US 15, (2) north of MD 118 on I-270, and (3) north of I-370 on I-270. A one percent difference in traffic volumes was observed north of the City of Frederick (screenline 1) and north of I-370 (screenline 3); a five percent difference was observed at the screenline 2 north of MD 118. Based on these observations, an area of traffic influence was established as the affected Transportation Analysis Zones (TAZs) (MWCOG Round 6.2 – 2161 zone system) adjacent to the I-270/US 15 Corridor. ***See Figure II-2.***

Transportation Analysis Zones (TAZs) -- Transportation analysis zones are subdivisions of geographical areas that are delineated for land use and travel analysis purposes. TAZs are used by the MWCOG in their planning and analysis efforts. MWCOG uses the data for each TAZ to develop population and employment data and for future land use and development planning. Information on population and employment within Frederick and Montgomery counties was obtained from MWCOG by TAZ for use by the Land Use Expert Panel in their deliberations. TAZs provide an indication of where indirect and cumulative effects to communities could occur as a result of planned development and changes to travel patterns.

Census Tract Boundaries -- Census tract boundaries were reviewed during the ICE boundary determination efforts, however they did not influence the ICE analysis boundary. Information regarding historic and projected changes in population, housing, employment and land use can be obtained based on US Census Bureau data and provides a basis for the analysis of indirect and cumulative effects to communities. See ***Figure II-3***.

Watersheds/Subwatersheds – Watershed boundaries are used to identify the limits of indirect and cumulative effects on wetlands, forests and streams. The I-270/US 15 Multi-Modal Corridor lies within the Potomac River Basin. The Basin is a watershed of approximately 12,000 square miles reaching into Virginia, Maryland, the District of Columbia, Pennsylvania, and West Virginia. Within the Potomac River Basin, the areas of traffic influence lie within the Middle Potomac Watershed and the Washington Metropolitan Watershed. Subwatersheds directly or potentially impacted by the project include: the Upper Monocacy River, the Lower Monocacy River, Seneca Creek, Rock Creek, and the Middle Potomac River. The Seneca Creek watershed is included in its entirety within the SCEA boundary. The Upper Monocacy, Lower Monocacy, Rock Creek and Middle Potomac watersheds were further subdivided. Selected subsubwatersheds from these areas were included (Upper Monocacy numbers 0240, 0243, 0241, and 0242; all sub-subwatersheds in the Lower Monocacy except numbers 0235 and 0358; Rock Creek numbers 0837 and 0839; and Middle Potomac numbers 0848, 0846, and 0853). See ***Figure II-4***. Watershed boundaries were used to define a significant portion of the ICE analysis boundary.



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD

AREAS OF TRAFFIC INFLUENCE
Select Link Analysis

SHA State Highway Administration | MTA Maryland

DATE: FEBRUARY 2009

FIGURE: II-1

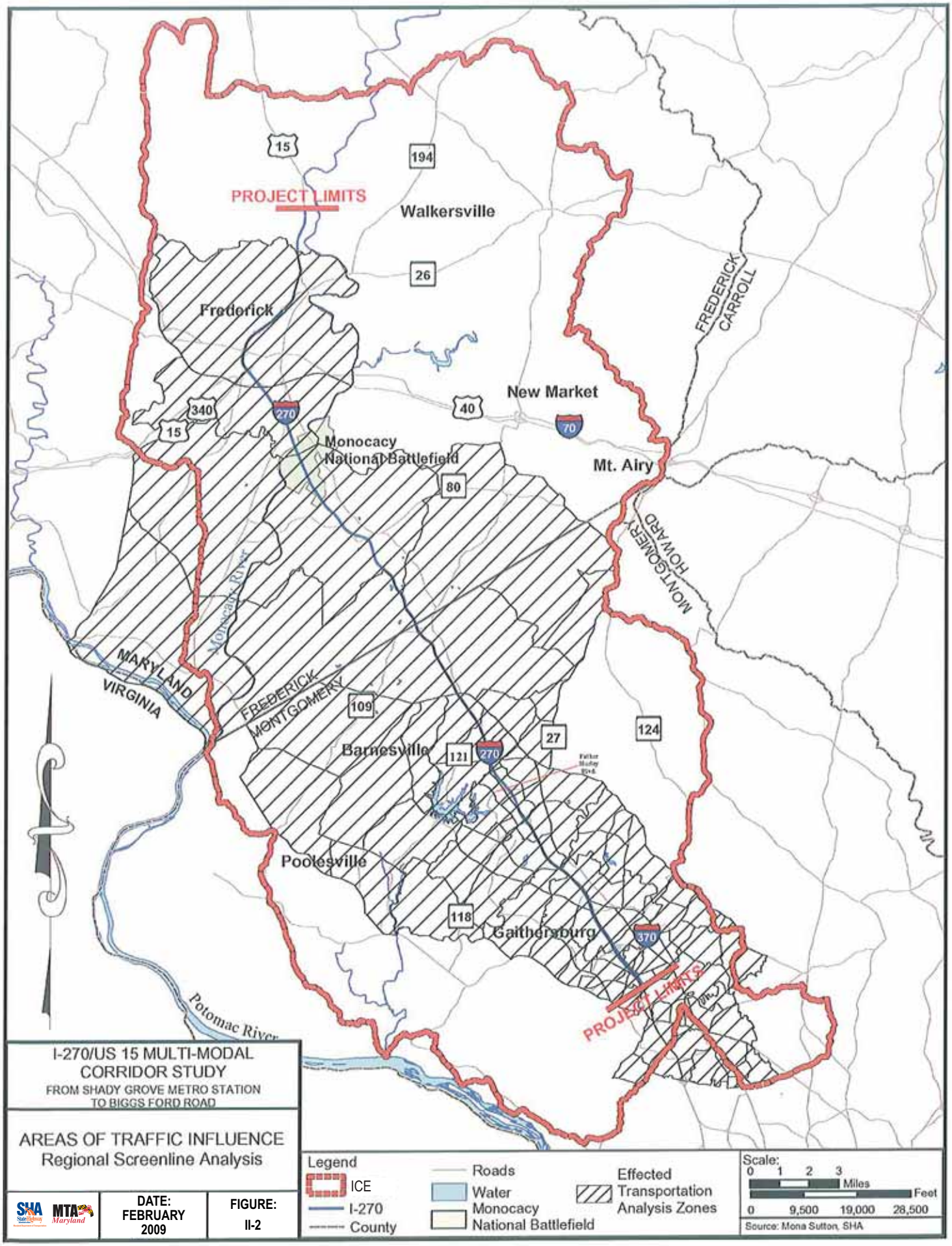
Legend
- ICE
- I-270
- County
- Roads
- Water
- Monocacy National Battlefield

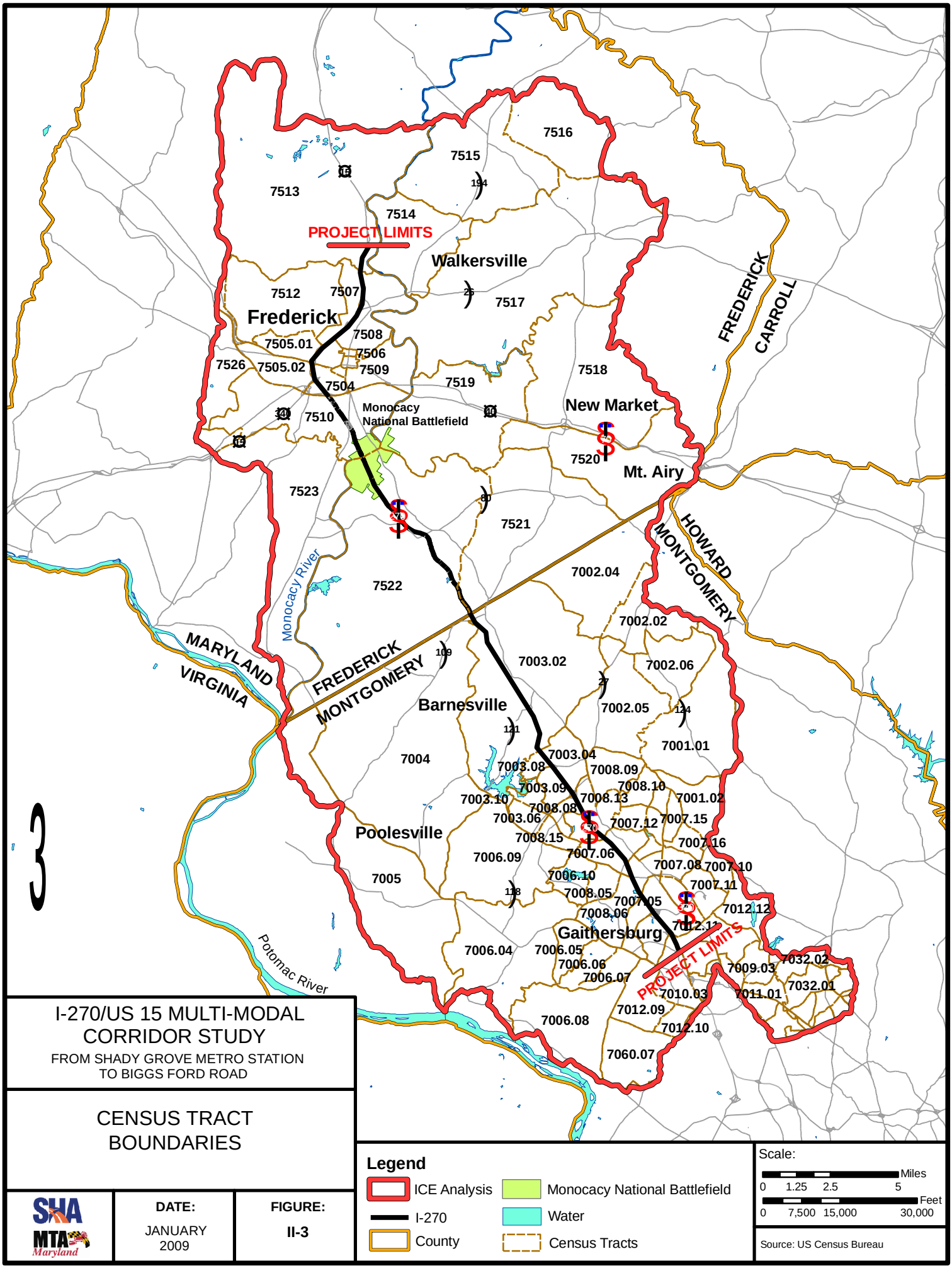
Differences in Traffic Volume

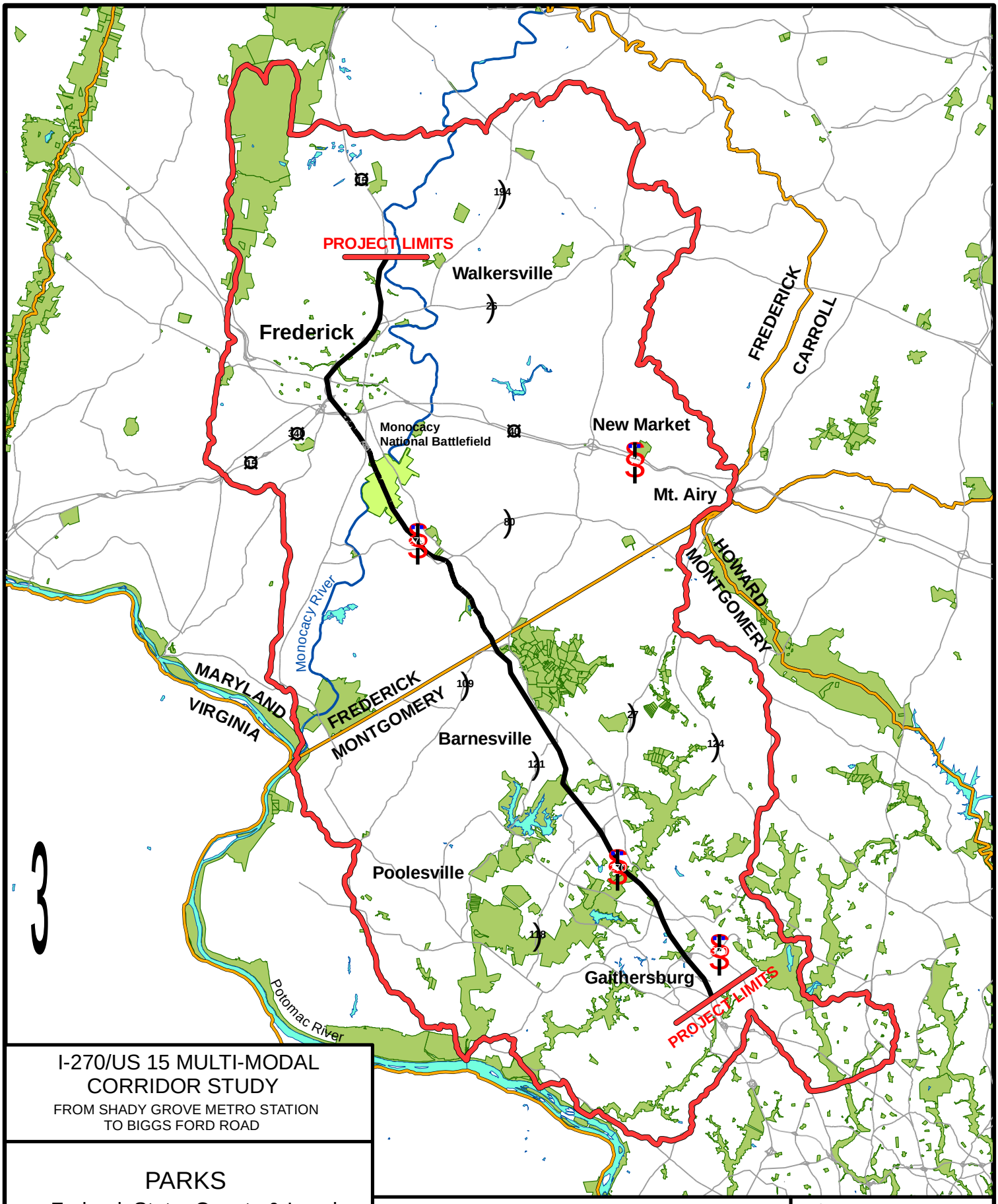
Change in Volume	Percent Change
10,000 More Vehicles	10% More Vehicles
10,000 Less Vehicles	10% Less Vehicles

Scale: 0 1 2 4 Miles
0 5,000 10,000 20,000 Feet

Source: MWCOG Round 6.2


PROJECT LIMITS
Walkersville
Frederick
New Market
Monocacy National Battlefield
Mt. Airy
Barnesville
Poolesville
Gaithersburg
PROJECT LIMITS
FREDERICK
CARROLL
MONTGOMERY
HOWARD
FREDERICK
MONTGOMERY
MARYLAND
VIRGINIA
Monocacy River
Potomac River
15
194
26
340
15
270
40
70
80
109
121
270
27
124
118
370
I-270/US 15 MULTI-MODAL CORRIDOR STUDY
FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD
AREAS OF TRAFFIC INFLUENCE
Regional Screenline Analysis
DATE: FEBRUARY 2009
FIGURE: II-2
Legend
ICE
I-270
County
Roads
Water
Monocacy National Battlefield
Effected Transportation Analysis Zones
Scale:
0 1 2 3 Miles
0 9,500 19,000 28,500 Feet
Source: Mona Sutton, SHA


PROJECT LIMITS
Walkersville
Frederick
Monocacy National Battlefield
New Market
Mt. Airy
Barnesville
Poolesville
Gaithersburg
PROJECT LIMITS
Monocacy River
Potomac River
MARYLAND
VIRGINIA
FREDERICK
MONTGOMERY
FREDERICK
CARROLL
HOWARD
MONTGOMERY
7513
7516
7515
7514
7512
7507
7517
7508
7505.01
7506
7526
7505.02
7509
7504
7519
7518
7510
7523
7521
7522
7002.04
7002.02
7002.06
7003.02
7002.05
7001.01
7004
7003.04
7003.08
7008.09
7008.10
7003.09
7003.10
7008.13
7001.02
7008.08
7003.06
7007.12
7007.15
7008.15
7007.16
7006.09
7007.06
7007.08
7007.10
7005
7006.10
7007.11
7008.05
7007.05
7012.12
7008.06
7012.11
7006.04
7006.05
7006.06
7009.03
7032.02
7006.07
7032.01
7010.03
7011.01
7012.09
7006.08
7012.10
7060.07
3
I-270/US 15 MULTI-MODAL CORRIDOR STUDY
FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD
CENSUS TRACT BOUNDARIES
DATE:
JANUARY 2009
FIGURE:
II-3
Legend
ICE Analysis
I-270
County
Monocacy National Battlefield
Water
Census Tracts
Scale:
Miles
0 1.25 2.5 5
Feet
0 7,500 15,000 30,000
Source: US Census Bureau



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

PARKS

Federal, State, County & Local

Legend

- ICE Analysis
- I-270
- County
- Monocacy National Battlefield
- Water
- PARKS: Federal, State, County & Local

Scale:

0 1.25 2.5 5 Miles

0 7,500 15,000 30,000 Feet

Source: Maryland Department of Natural Resources

SHA
MTA Maryland

DATE:
JANUARY
2009

FIGURE:
II-4

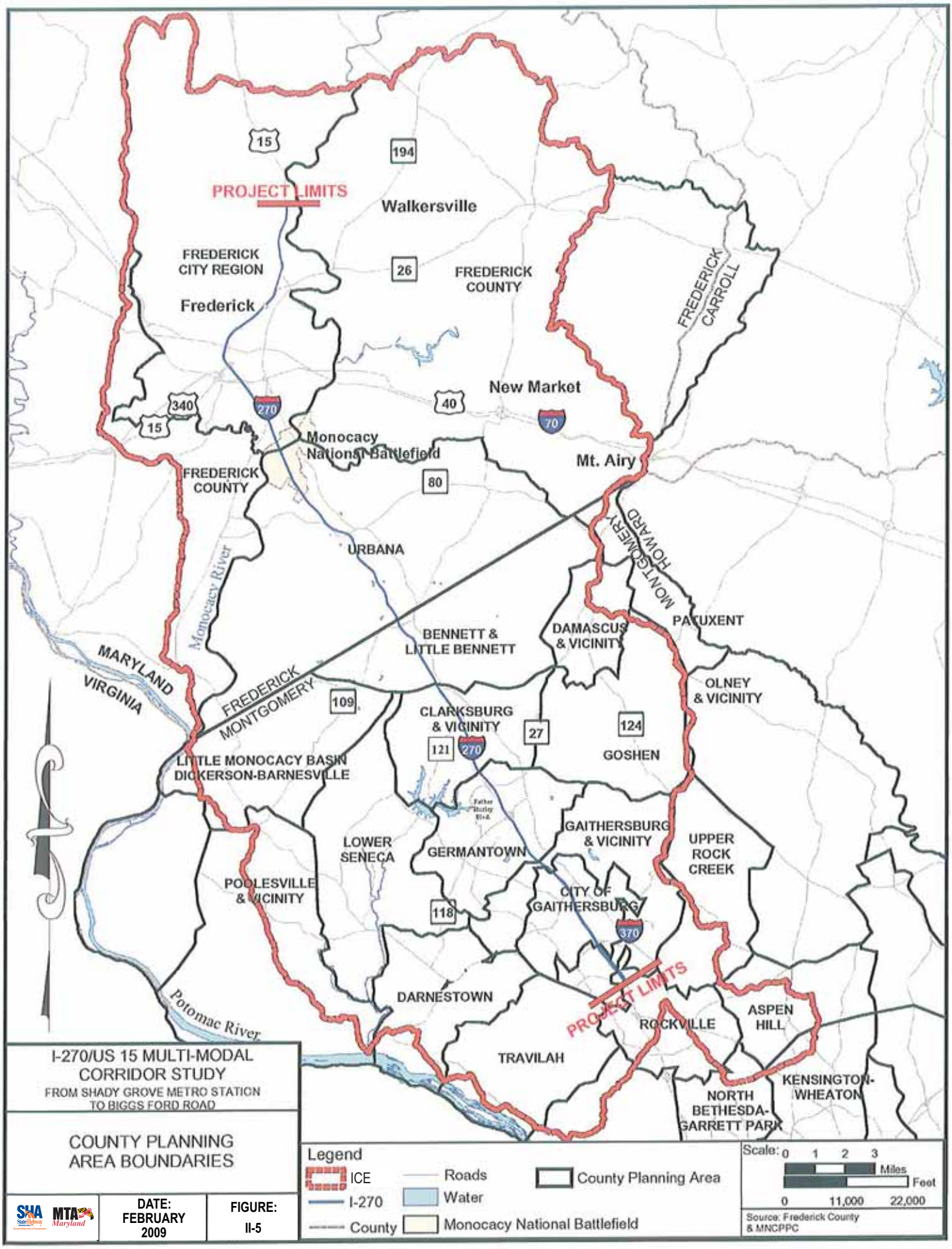
Parks -- Parks in the region of the project were identified and their boundaries were considered while determining the ICE analysis boundary. Although park boundaries were considered during development of the overall ICE boundary, no parks specifically influenced the ICE analysis boundary area. In the northwestern corner of the ICE analysis area, the areas of City of Frederick Municipal Farms and Gambrill State Park, although included within the boundary, are not anticipated to be affected by indirect or cumulative effects. Portions of the Dickerson Conservation Area and the Chesapeake and Ohio (C&O) Canal National Historic Park, likewise included in the ICE boundary, are not anticipated to be affected. See ***Figure II-5***.

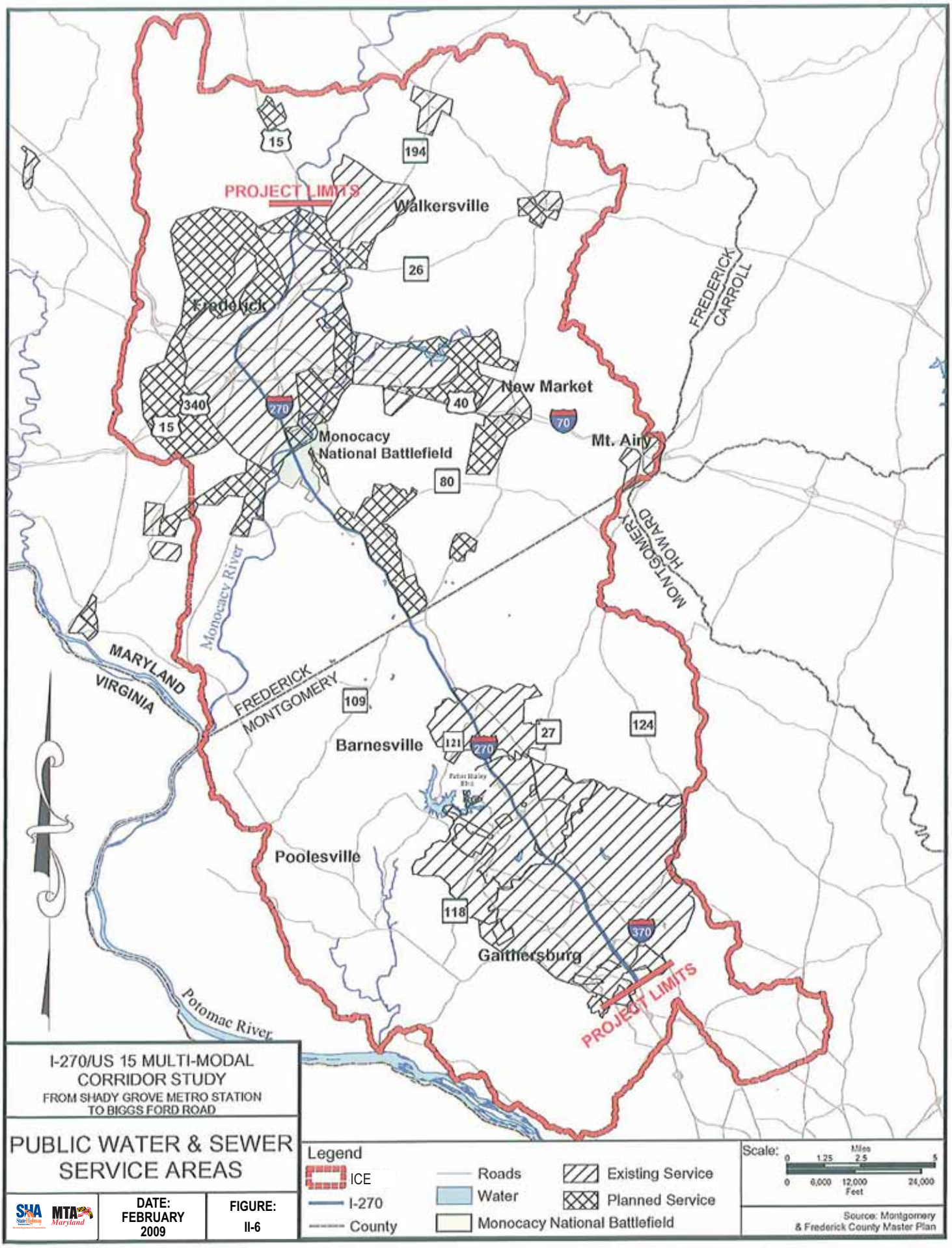
County Planning Area Boundaries -- The I-270/US 15 Multi-Modal Corridor project lies within the Urbana Region and the Frederick Region planning areas in Frederick County. In Montgomery County, the project lies in the I-270 Corridor Planning Area, and includes the community planning areas of Gaithersburg and Vicinity/Shady Grove, Germantown, and Clarksburg and Vicinity (including the Hyattstown Special Study Area). Information found in the master plans for these planning areas can be useful in determining past land uses and visions/goals for future land use. Planning area boundaries are used in the overall ICE boundary to represent potential indirect and cumulative effects to communities. See ***Figure II-6***.

Water and Sewer Service Locations -- Existing water and sewer service covered a total of 107.53 square miles within the ICE analysis boundary in 2002, and then-planned future coverage would add an additional 43.73 square miles. The locations of existing and proposed sewer services can identify areas of planned land development and therefore provide an indication of where indirect and cumulative effects to communities could occur. See ***Figure II-7***.

In Montgomery County, water and sewer service exists in the greater Gaithersburg, Germantown and Clarksburg areas. No new planned extensions of the existing service have been identified. In Frederick County, existing service is found in greater Frederick City and environs, east of Frederick City in the Lake Linganore area, and in New Market and Mount Airy. North of the city, service is existing in Walkersville, Woodsboro and Libertytown. Water and sewer service area expansions are planned for each of these areas except Woodsboro and Mount Airy. New water and sewer service is planned along the I-270 Corridor on the east side only from Urbana/Centerville south to the Montgomery County line, in the Pleasant Grove area, along the MD 85 and Ballinger Creek areas southwest of Frederick City, and in Lewistown in the north.

Priority Funding Areas -- Several areas within Montgomery and Frederick counties have been identified as Priority Funding Areas (PFAs). These areas are sites within the counties where development is planned and focused on using existing infrastructure in an effort to reduce urban sprawl and thus preserve areas of primary agricultural farmlands or open space. Like water and sewer coverage areas, PFAs provide an indication of where indirect and cumulative effects to communities could occur as a result of urban development. See ***Figure II-8***.


PROJECT LIMITS
Walkersville
FREDERICK CITY REGION
Frederick
FREDERICK COUNTY
FREDERICK
CARROLL
New Market
Monocacy National Battlefield
Mt. Airy
FREDERICK COUNTY
URBANA
Monocacy River
MONTGOMERY
HOWARD
PATUXENT
BENNETT & LITTLE BENNETT
DAMASCUS & VICINITY
MARYLAND
VIRGINIA
FREDERICK
MONTGOMERY
OLNEY & VICINITY
CLARKSBURG & VICINITY
GOSHEN
LITTLE MONOCACY BASIN DICKERSON-BARNESVILLE
GAITHERSBURG & VICINITY
UPPER ROCK CREEK
LOWER SENECA
GERMANTOWN
POOLESVILLE & VICINITY
CITY OF GAITHERSBURG
DARNESTOWN
PROJECT LIMITS
ROCKVILLE
ASPEN HILL
TRAVILAH
KENSINGTON-WHEATON
NORTH BETHESDA-GARRETT PARK
Potomac River
I-270/US 15 MULTI-MODAL CORRIDOR STUDY
FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD
COUNTY PLANNING AREA BOUNDARIES
DATE: FEBRUARY 2009
FIGURE: II-5
Legend
ICE
I-270
County
Roads
Water
Monocacy National Battlefield
County Planning Area
Scale: 0 1 2 3 Miles
0 11,000 22,000 Feet
Source: Frederick County & MNCPPC



I-270/US 15 MULTI-MODAL CORRIDOR STUDY
FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD

PUBLIC WATER & SEWER SERVICE AREAS

SHA State Highway Administration | MTA Maryland

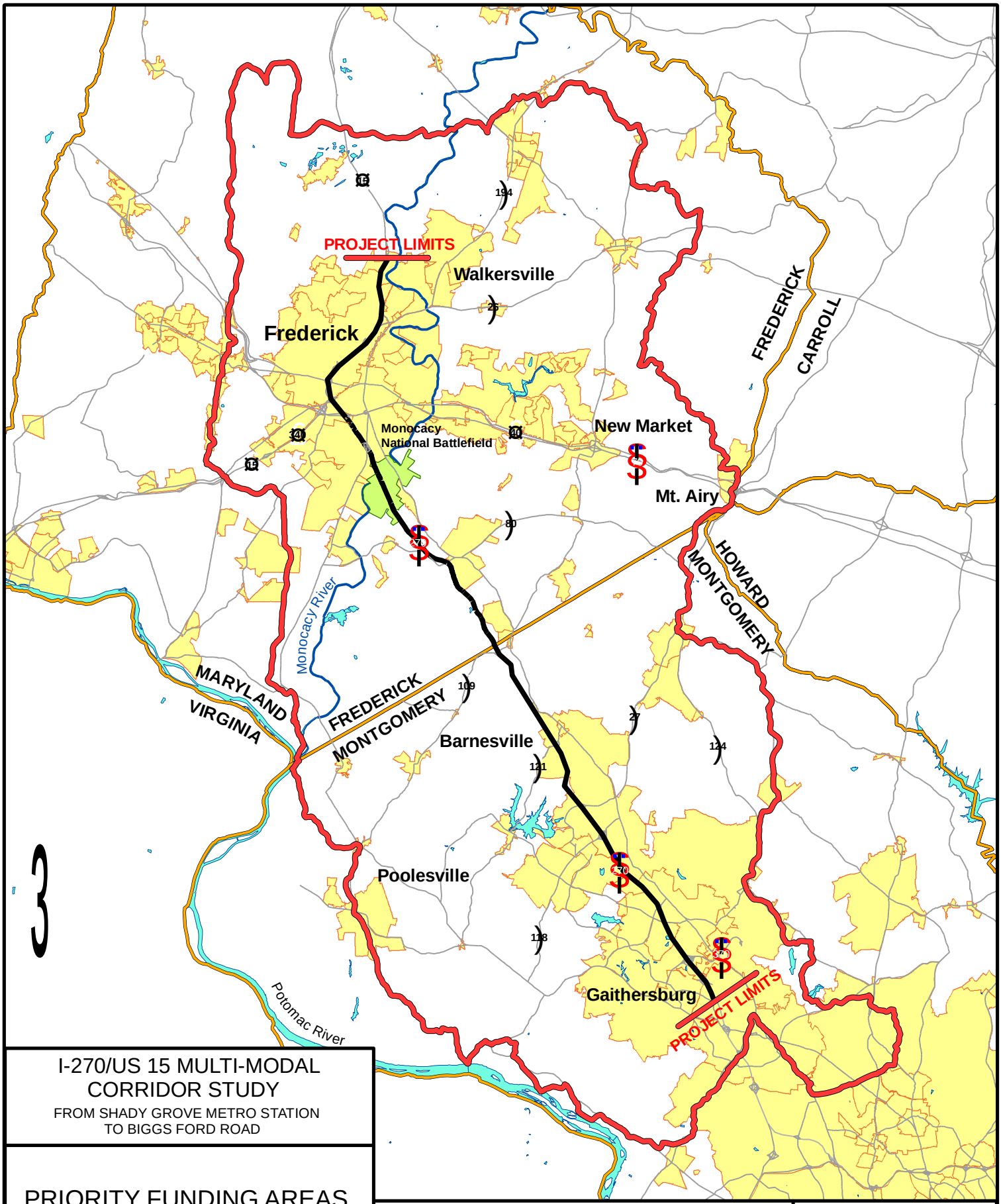
DATE: FEBRUARY 2009

FIGURE: II-6

Legend
- ICE
- I-270
- County
- Roads
- Water
- Monocacy National Battlefield
- Existing Service
- Planned Service

Scale: Miles 0 1.25 2.5 5 | 0 6,000 12,000 24,000 Feet

Source: Montgomery & Frederick County Master Plan



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

PRIORITY FUNDING AREAS

Legend

- ICE Analysis
- I-270
- County
- Monocacy National Battlefield
- Water
- Priority Funding Areas

Scale:

Miles: 0 1.25 2.5 5

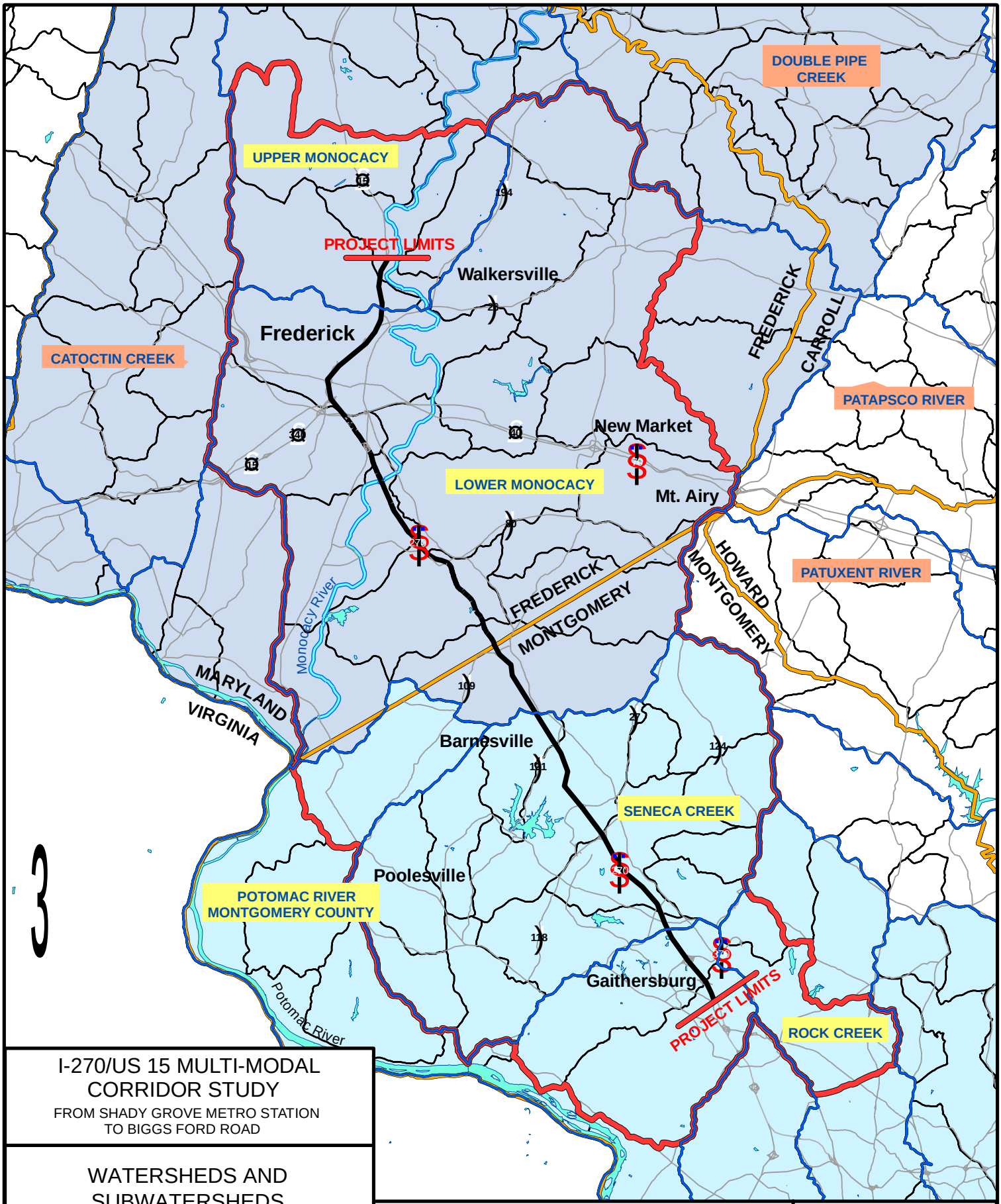
Feet: 0 7,500 15,000 30,000

Source: Maryland Department of Planning

SHA MTA Maryland

DATE: JANUARY 2009

FIGURE: II-7



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

WATERSHEDS AND SUBWATERSHEDS

Legend

- ICE Analysis
- I-270
- County
- Middle Potomac
- Upper Potomac
- Subwatersheds
- Watersheds
- Water

Scale:

0 1.25 2.5 5 Miles

0 7,500 15,000 30,000 Feet

Source: Maryland Department of Natural Resources

SHA MTA Maryland

DATE:	FIGURE:
JANUARY 2009	II-8

PFAs included in the ICE boundary in Frederick County include portions of Frederick City and its immediate suburbs. In addition, Walkersville, Woodsboro, Libertytown, Lake Linganore, New Market and Mount Airy are PFAs on the I-70 Corridor to the east of Frederick City; Green Valley, Pleasant Grove, and Urbana PFAs are south of Frederick City; Adamstown, Buckeystown, and Church Hill PFAs are southwest of Frederick City; and the Middletown area PFA lies west of Frederick City along the I-70 Corridor.

In Montgomery County, PFAs within the ICE boundary include portions of the towns/cities of Rockville, Gaithersburg, and Germantown. The Hyattstown PFA is adjacent to and east of the project area. Barnesville, Dickerson, Beallsville and Poolesville PFAs are west of the Corridor, and Damascus/Kings Valley and Laytonsville PFAs lie to the east.

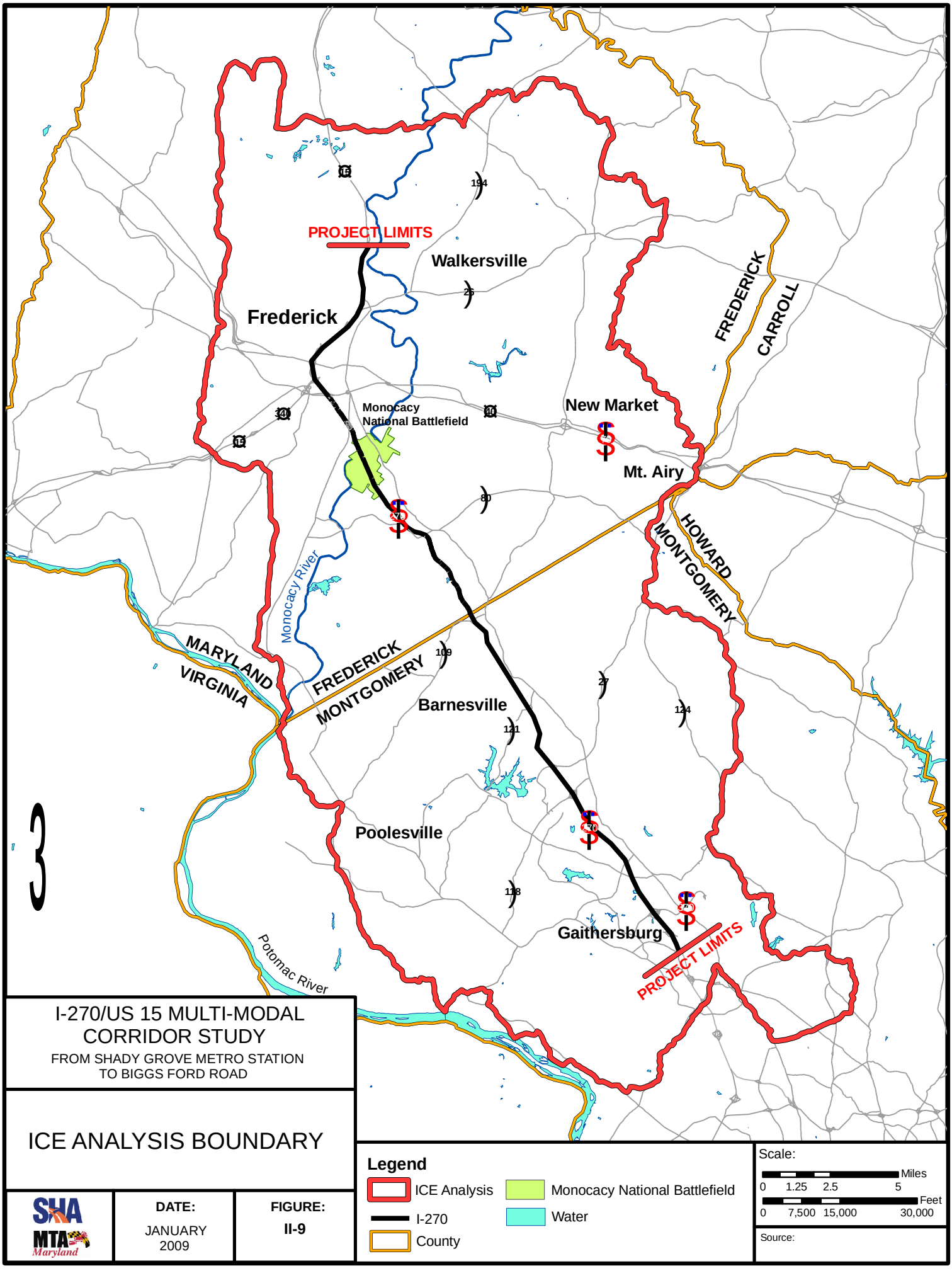
The ICE boundary divides the Poolesville, Buckeystown, Adamstown, Middletown, Woodsboro, Mount Airy, Laytonsville, Gaithersburg and Shady Grove PFAs, including only portions of those areas. PFA boundaries were not used to determine the ICE boundary, but do identify areas targeted for development. The divided PFAs were considered during the analysis.

Overall ICE Boundary -- ***Figures II-1 through II-8*** show the geographic sub-boundaries (ATI Select Link Analysis, ATI Regional Screenline Analysis, TAZs, 2000 U.S. Census Tracts, Watersheds and Subwatersheds, Parks, County Planning Areas, Public Water and Sewer Service Areas, and Priority Funding Areas (PFAs)) which were used to develop the overall ICE boundary.

The overlays were synthesized into an overall ICE boundary. This area of approximately 531 square miles is shown in ***Figure II-9***. The ICE boundary was used for data collection and for mapping of the socioeconomic, natural and cultural resources studied. Based on the analysis performed for this update, the ICE boundary is identical to the SCEA boundary developed for the 2002 DEIS.

Following the ICE boundary, beginning in Frederick County at the northwestern corner, moving clockwise, the boundary roughly follows Gambrill Park Drive east and south to approximately parallel to and north of Fish Hatchery Road. The northern boundary does not follow any roadway, but extends in an easterly direction north of Fish Hatchery Road, Lewistown Road, Bridge Road, Gravel Hill Road, Dublin Road, and Renner Road to a point where it intersects Van Buren Road at Green Valley Road. The boundary continues south along Green Valley Road, then easterly on Coppermine Road to the Town of Deerfield.

The eastern ICE boundary moves in a southerly direction toward MD 26, continues southward west of Mapleville Road, and turns southeasterly onto Annapolis Road until it reaches near the center of Mount Airy. The boundary continues south through the town of Mount Airy and into Montgomery County to Damascus, approximating the alignment of Ridge Road. In Damascus, the boundary follows MD 108 (Damascus Road, Laytonsville Road) to the town of Laytonsville, where it follows Woodfield Road (MD 124) in a southerly direction almost to Gaithersburg (Washington Grove vicinity). At the intersection of Woodfield and Muncaster Mill Road, the boundary changes direction to follow a southeasterly direction along Muncaster Mill Road and


PROJECT LIMITS
Walkersville
Frederick
FREDERICK
CARROLL
Monocacy
National Battlefield
New Market
Mt. Airy
HOWARD
MONTGOMERY
Monocacy River
MARYLAND
VIRGINIA
FREDERICK
MONTGOMERY
Barnesville
Poolesville
Gaithersburg
PROJECT LIMITS
Potomac River
I-270/US 15 MULTI-MODAL
CORRIDOR STUDY
FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD
ICE ANALYSIS BOUNDARY
Legend
ICE Analysis
I-270
County
Monocacy National Battlefield
Water
Scale:
Miles
0 1.25 2.5 5
Feet
0 7,500 15,000 30,000
Source:
SHA
MTA Maryland
DATE:
JANUARY
2009
FIGURE:
II-9

the eastern boundary of Rock Creek Park. South of Lake Bernard Frank, the boundary encircles Aspen Hill in a clockwise direction to MD 355. The boundary follows MD 355 and the Metrorail alignment up to the northern city limits of Rockville.

The southern ICE boundary follows Falls Road in a southwestern direction of Democracy Boulevard, where it follows a northwestern direction along the shoreline of the Potomac River to the eastern boundary of Seneca Creek State Park. The western boundary follows a roughly northern direction from the Potomac River to bisect the town of Poolesville, emerging from Poolesville along the Beallsville Road. At Beallsville, the boundary follows West Hunter Road before traversing through the Dickerson Conservation Area at the southern edge of the C&O Canal National Park to the Montgomery/Frederick County line. The boundary follows an approximately northern course from the county line, jogging west of MD 85 and roughly following New Design Road to Buckeystown Road. The boundary crosses the MARC (CSX/AMTRAK) line west of New Design Road, turns westerly after crossing Ballenger Creek Pike, and crosses just north of the US 15/US 40 intersection. The boundary roughly follows Jefferson Boulevard, Ridge Road, and Gambrill Park Road to the northwestern corner.

Since the 2002 ICE, the following minor changes have occurred to the resource sub-boundaries:

- There are no substantial changes to Census Tracts, watershed boundaries, parks boundaries, planning area boundaries, or the extent of coverage by water and sewer infrastructure.
- PFA boundaries expanded slightly throughout the study corridor, but do not change to extend beyond the ICE boundary.
- The updated traffic analysis indicates that current 2030 traffic projections are similar to the 2025 projections developed for the DEIS. Therefore, the areas of traffic influence were deemed to be similar to those predicted for the 2002 analysis.

Given the limited changes to resource boundaries, this revised ICE uses the same overall boundary that was used in 2002 to evaluate indirect and cumulative effects of the project.

2. Time Frame

A review of historic population trends and employment data was undertaken to define the temporal boundary of the SCEA. The history of the interstate highway system generally and the I-70/I-270 highways in particular was examined to understand the role of the highway on the area. Population and employment data for Frederick and Montgomery counties and the cities of Frederick, Gaithersburg, and Germantown were compiled and reviewed.

Population data for Frederick County, Montgomery County and the State of Maryland were collected from the US Census Bureau files and reviewed for the decades of 1940 through 2020 (see Table III-94 in the DEIS). The data for Frederick County shows increases in population of less than 20 percent per decade through 1970. The decade from 1970 to 1980 saw an increase in population of 35 percent. This was followed by increases of 31 percent and 30 percent for the following two decades, more than doubling the county's population in 30 years. Estimates of future population growth for Frederick County project a declining but still substantial rate of increase.

In Montgomery County, the greatest increases in population were prior to 1970 (96 percent in the 1940-1950 decade, 107 percent in the 10 years from 1950 to 1960, and over 50 percent from 1960 to 1970). The county's population has continued to increase since 1970, but growth has not equaled the previous decades' rates. Estimates of future population growth for Montgomery County project a steadily declining moderate rate of increase.

Employment data, available from 1970 to 1990, were collected and reviewed (see Table III-95 in the DEIS). The data show substantial increases in employment in Frederick County and Montgomery County above that for the State of Maryland as a whole. While the data do not point to a specific decade or event that influenced growth in the project area, a historic temporal boundary of 1970 is suggested to ensure that any influence of the establishment of I-270 (1973) would be captured and addressed.

The basis for the past time frame included an evaluation of historic population and employment growth and future projections as well as the establishment of I-270 in 1973. Updated regional and county population and employment history and projections are presented in ***Table II-1*** and ***Table II-2***.

Table II-1. Regional Population Data, 1940 through 2030

Jurisdiction	1940	1950	1960	1970	1980	1990	2000	2010	2020	2030
State of Maryland										
Total Population	1,821,244	2,343,001	3,100,689	3,923,897	4,216,933	4,780,753	5,296,486	5,779,400	6,339,300	6,684,250
Percent Change		*28.6*	*32.3*	*26.5*	*7.5*	*13.4*	*10.8*	*9.1*	*9.7*	*5.4*
Frederick County										
Total Population	57,312	62,287	71,930	84,927	114,792	150,208	195,277	233,600	287,900	331,700
Percent Change		*8.7*	*15.5*	*18.1*	*35.2*	*30.8*	*30.0*	*19.6*	*23.2*	*15.2*
Montgomery County										
Total Population	83,912	164,401	340,928	522,809	579,053	757,027	873,341	966,000	1,075,000	1,141,000
Percent Change		*95.9*	*107.4*	*53.3*	*10.8*	*30.7*	*15.4*	*10.6*	*11.3*	*6.1*

Source: Maryland Department of Planning, Planning Data Services, December 2008

Table II-2. Regional Employment Data from 1970 to 2000

Jurisdiction	1970	1980	1990	2000
State of Maryland				
Total Employment	1,702,301	2,074,539	2,760,811	2,769,525
Percent Change		*21.9*	*33.1*	*0.3*
Frederick County				
Total Employment	33,438	44,176	72,622	107,151
Percent Change		*32.1*	*64.4*	*47.6*
Montgomery County				
Total Employment	235,415	349,952	517,188	477,123
Percent Change		*48.7*	*47.8*	*-7.7*

Sources: 1970-1990: 2002 DEIS. 2000: US Census Bureau 2000 Census

As noted in the 2002 SCEA analysis, "While the data does not point to a specific decade or event that influenced growth in the project area, a historic temporal boundary of 1970 is suggested to ensure that any influence of the establishment of I-270 (1973) would be captured and addressed." This reasoning remains valid for this ICE analysis. The future temporal boundary for analysis was identified in the 2002 SCEA as the year 2025, the design year at the time for the I-270/US 15 project. A future time frame of 2030, the current design year for the project, is established for this updated ICE analysis.

Additional information on population and employment trends within the ICE boundary is provided in Section II-B.

3. Resources Evaluated in the ICE Analysis

Resources impacted directly or indirectly by the project form the basis for resources that are examined in the ICE analysis. If a resource was determined to be impacted directly or indirectly, it is included in this ICE analysis. Resources appropriate for inclusion in the ICE analysis because of potential direct or indirect effects are communities, parks and recreation areas, historic properties, farms and farmland soils, forests and other terrestrial habitats, floodplains, surface waters and aquatic biota, and Waters of the US (streams and wetlands). The resources directly affected by the project are summarized in ***Table II-3***.

The project also has the potential to directly impact rare, threatened, and endangered (RTE) habitat and species including state-listed fish species and terrestrial species. These direct impacts are not quantifiable, and are detailed in the 2007 Natural Resources Technical Report (NETR). The project may also impact archeological sites (see Chapter IV.C. Cultural Resources of the AA/EA), however, these impacts are not yet known. The ICE analysis considers the indirect and cumulative effects to both RTEs and archeological sites.

Table II-3: Direct Impacts of the Alternatives

Resource	Alternatives 3 A/B[1]	Alternatives 4 A/B[1]	Alternatives 5 A/B[1]	Alternative 5C[1]	Alternatives 6A/B[2]	Alternatives 7A/B[2]
Natural Environment						
Farms, number/acres	30/133	30/133 acres	30/143 acres	27/106 acres	38 parcels/191 acres	38 parcels/191 acres
Prime Farmland Soils, acres	284.6	284.6 acres	290.2 acres	207.7 acres	742.6 acres	742.6 acres
Soils of Statewide Importance, acres	367[3]	367 acres[3]	391.9 acres[3]	339.6 acres[3]	488.7 acres	488.7 acres
Floodplains, acres	23	23 acres	24 acres	21 acres	28.4 acres	28.4 acres
Forest, acres Transit O&M facilities, range, acres	183	183 acres	199 acres	180 acres	295.8 acres[4] 0.8 to 18.7 acres	295.8 acres[4] 0.8 to 18.7 acres
Rare, Threatened & Endangered Species					Potential[5]	Potential[5]
Streams, linear feet Ephemeral Channels, linear feet Wetlands, acres Transit O&M Facilities, range: Streams, linear feet	14,185 linear feet[6] Not determined 10.7 acres 0-2,176[8]	14,185 linear feet[6] Not determined 10.7 acres 0-2,176[8]	16,331 linear feet[6] Not determined 11.6 acres 0-2,176[8]	13,407 linear feet[6] Not determined 10.7 acres	24,204 linear feet[4,6] 12,458 linear feet 15.6 acres 0-660 linear feet[9]	24,204 linear feet[4,6] 12,458 linear feet 15.6 acres wetlands 0-660 linear feet[9]
Cultural Resources						
Historic Properties, Number/acres	7[10]	7[10]	7[10]	5[10]	7 properties/43.28 acres	7 properties/43.28 acres
Socioeconomic Resources						
Public Parks, number/acres	11parks/37 acres	11parks/37 acres	12 parks/44 acres	13 parks/48 acres	13 parks/42.72 acres	13 parks/42.72 acres
Residential Displacements, number	64-127	64-127	64-128	127-385	256-260	256-260
Business Displacements, number	4-11	4-11	4-12	2-11	13-43	13-43

1. *Impacts of Alternatives 3A/B, 4A/B, 5A/B and 5C are from the 2002 DEIS.*
2. *Alternatives 6A/B and 7A/B have an identical highway footprint.*
3. *Total includes all soils in Frederick County (including prime farmland and soils of statewide importance) plus soils of statewide importance in Montgomery County (as calculated in the 2002 DEIS).*
4. *Does not include potential impacts of O&M facilities.*
5. *Potential direct and indirect impacts to two fish species: pearl dace and comely shiner.*
6. *Does not include ephemeral streams*
7. *Since 2002, the USACE has broadened the definition of waters of the US to include ephemeral channels. Ephemeral channels were not quantified in the 2002 DEIS.*
8. *Of the 12 sites reported in the DEIS, COMSAT Sites 1 and 3 had impacts to wetlands (1.4 and 0.7 acres, respectively). COMSAT Sites 1, 2 and 3 impacted streams (2,176, 612, and 348 linear feet, respectively). COMSAT Sites 1 and 3 were eliminated from consideration (DEIS page II-22).*
9. *Stream impacts only: Metropolitan Grove Police Impound Lot – 486 lf; PEPCO Transmission Lines site – 660 lf; all other potential O&M sites – 0 lf*
10. *The Atomic Energy Commission Building was not evaluated for eligibility in the 2002 DEIS and is not included in these numbers. It is presumed that the DEIS Alternatives 3A/B, 4A/B and 5A/B would have similar impacts to Alternatives 6A/B and 7A/B. Alternative 5C would only have highway impacts.*

Although there are no direct or indirect impacts to groundwater, effects to groundwater are included in this ICE analysis because of the location of the Piedmont sole-source aquifer (SSA) that is crossed by the project. Because of the designation as a SSA, additional stringent requirements are in place for erosion and sediment controls, stormwater management (SWM) facilities, and the use of best management practices (BMPs). Although the ICE analysis concludes that the project will have little potential to affect the Piedmont SSA indirectly or to add to the cumulative effects on the aquifer, an analysis of indirect and cumulative effects to groundwater are included in this analysis.

4. Data Availability and Analysis Methodology

A combination of analysis methodologies was employed to fully assess and qualify indirect and cumulative effects. Analysis of historic impacts included research and review of published literature, coordination with Maryland Historical Trust, and field studies. Geographic Information Systems (GIS) mapping was obtained or created for the ICE analysis boundary area and was used to understand and document conditions. Potential changes in land use were studied with the aid of local and regional plans. MWCOG has recently undertaken an extensive study of future land use in the region for its air conformity analyses. This study was a team effort involving MWCOG and local jurisdictions. The MWCOG land use projections were the basis of the current analysis. Land use experts, professionals familiar with the region and experienced in historical land use and changes in the corridor, were empanelled to provide their opinions about future growth in the region. The land use experts were further charged to provide an understanding of potential development outside of that which was planned or programmed.

Trend analysis, matrices, and overlays comparing past conditions to existing conditions were used to assess probable future conditions within the ICE geographical boundary and time frame. Table IV-29 shows methods used to perform the analysis for each resource incorporated in the MD 28/MD 198. Detailed discussion of each resource analysis can be found later in this section.

The indirect and cumulative effects analyses were based on data that was readily available and not necessarily based on a comprehensive data set. Therefore, some conclusions drawn from this analysis are qualitative. ***Table II-4*** provides a matrix of available data, data sources, and methods used for each of the resources analyzed.

Trends Analysis

Trends analysis was used to identify effects over time and to project future cumulative effects. Historic data was collected and compiled to understand past effects and the rate at which these effects occurred. This information was used to project future effects.

Interviews

Information from Federal, state, regional and local agency staff not readily available in published documents was collected for use during the Expert Land Use Panel's deliberations. This was especially helpful in critically reviewing potential and forecasted development. In addition, the entire Land Use Expert Panel effort is considered a critical component of the information upon which the analysis was built.

Table II-4: Resources, Data Sources, and Analysis Methods

Resource	Available Data	Data Sources	Methods
Communities; EJ Communities	Parcel Mapping; field review	US Census; M-NCPPC; Frederick County; MDP	Aerial photo analysis; neighborhood trends analysis; field studies
Parks & Recreation Areas	Land Use maps; parks inventories; field data	M-NCPPC; Frederick County	Land use trends analysis
Historic Properties	Cultural Resources Inventories; project surveys	MHT; NRHP; Frederick and Montgomery Counties	Land use trends analysis adjacent to historic properties
Farmlands and Farmland Soils	Aerial photography; field surveys; soil survey data	USDA NRCS; Frederick and Montgomery Counties	Trends analysis
Forest	Current and historic land use/land cover maps	MDP; DNR; NRCS	Trends analysis; land use analysis
Floodplain	Aerial photography; FEMA maps	FEMA	Overlay analysis; floodplains trends analysis
Surface Water, Streams, Ephemeral Streams	Stream quality records; stream mapping; aerial photos; field inventory	DNR; USGS; EPA; MDE; M-NCPPC; Frederick County; MBSS	Stream quality comparison; reported results of in-stream sampling
Wetlands	field inventory; land use data; wetlands mapping	NWI; M-NCPPC; Frederick County	Trends analysis; land use overlay analysis

Overlays

Overlays were used to combine land use projections with land use controls such as zoning, critical areas, and natural environmental constraints to create a reasonable, foreseeable, future scenario to analyze.

B. POPULATION AND EMPLOYMENT TRENDS

1. Population

Population trends for Montgomery and Frederick Counties are shown in ***Table II-5*** and ***Figure II-10***.

Montgomery County land area occupies 495.52 square miles in central Maryland and lies north of Washington, DC. The county seat and largest municipality is Rockville. Most of the county's residents live in unincorporated locales, with the greatest population densities in the southern part of the county and surrounding the I-270 corridor. In 2000, the population was 873,341. The population growth rate for the county increased at a higher rate in the two decades between 1980 and 2000, and, although growth is still seen, the average annual growth rate has been at a lower and steadier rate. This steadier rate of growth is projected to continue through 2030.

Frederick County land area occupies 662.88 square miles in north central Maryland, north of Montgomery County. The county is the largest in land area in the state. The population in 2000 was 195,277 persons. The average annual growth rate in Frederick County has remained relatively steady since 1970, and the trend is projected to continue. Although Frederick County's

growth has been slower paced than other counties in the Baltimore/Washington area prior to 1990, between 1970 and 2000, the total population grew by over 30 percent per decade. The County is projected to grow at a faster rate than any of the other counties in the future. Except for the City of Frederick, most of the county remains relatively rural.

Table II-5: Population Trends in Montgomery and Frederick Counties

	1970	1980	1990	2000	2005	2010	2015	2020	2025	2030
Frederick County										
Population	84,927	114,792	150,208	195,277	218,700	233,600	260,350	287,900	310,400	331,700
Avg. Annual Growth Rate		3.06%	2.73%	2.66%	2.29%	1.33%	2.19%	2.03%	1.52%	1.34%
Montgomery County										
Population	522,809	579,053	757,027	873,341	929,100	966,000	1,025,000	1,075,000	1,113,000	1,141,000
Avg. Annual Growth Rate		1.03%	2.72%	1.44%	1.25%	0.78%	1.19%	0.96%	0.70%	0.50%

Source: Maryland Department of Planning, Planning Data Services, December 2008

Figure II-10: Population Growth Trends in Montgomery and Frederick Counties
Part 1 of 2

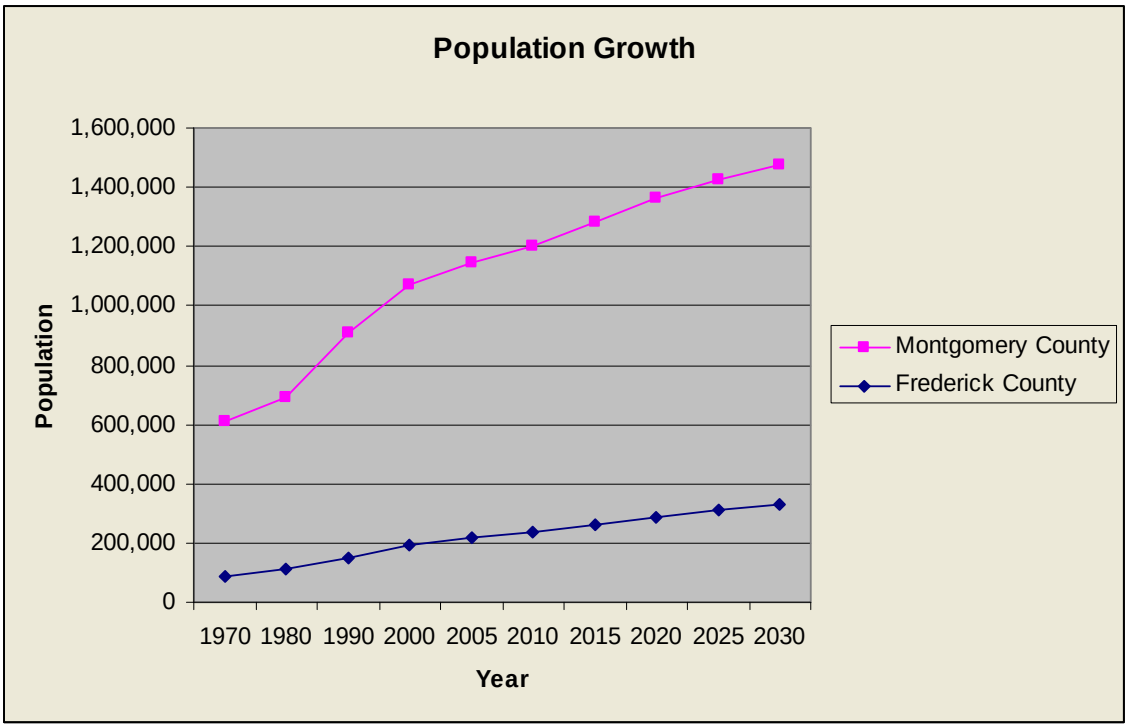
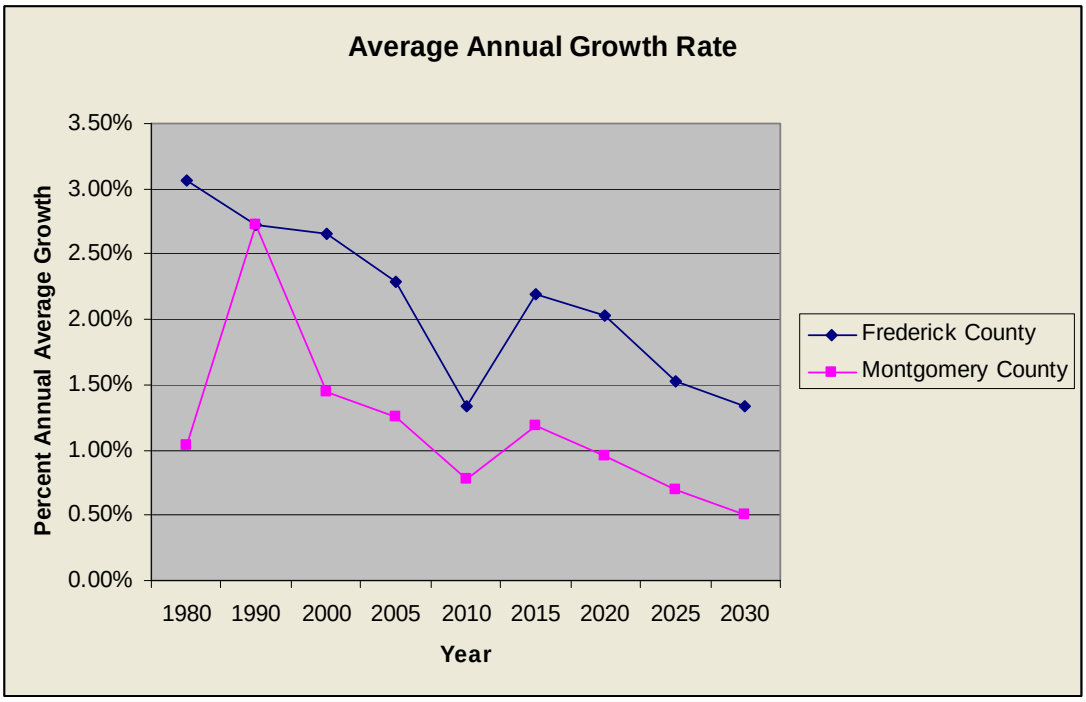


Figure II-10: Population Growth Trends in Montgomery and Frederick Counties
Part 2 of 2



2. Employment

Employment data from 1970 to 2000 is shown previously on ***Table II-2***.

Montgomery County has the eighth highest household median income in the United States and second highest in Maryland, according to the US Census Bureau 2006 American Community Survey. The median household income in 2006 was $87,624, and the per capita income was $$43,073. About 3.3% of families and 4.6% of the population were below the poverty line.

There were an estimated 729,958 employed persons in the county in 2006; 485,382 were estimated as commuting to work. The most residents were employed in the professional, scientific, and management, and administrative and waste management industries (110,442) and the second most persons were employed in the educational services, and health care, and social assistance industries. Much of the northern portion of the county is in agricultural and rural land uses, and about 818 persons were employed in the agriculture, forestry, fishing and hunting, and mining industries.

Employment trends in Montgomery County show projected continued growth in the number of jobs available in the county through 2030, as shown in ***Table II-6*** and ***Figure II-11.*** Although the percentage of new jobs is anticipated to slow from the almost 20 percent increase between 1990 and 2000, the actual number of jobs available in the county is projected to continue to rise.

Table II-6: Montgomery and Frederick County Employment Projections

Year	1990	2000	2005	2010	2015	2020	2025	2030
Montgomery County								
Total Employment	400,800	479,800	500,000	545,000	580,000	615,000	645,000	670,000
Percent Change		19.7	4.2	9.0	6.4	6.0	4.9	3.9
Frederick County								
Total Employment	54,000	99,700	122,200	142,400	151,500	158,300	163,500	167,300
Percent Change		84.6	22.6	16.5	6.4	4.5	3.3	2.3

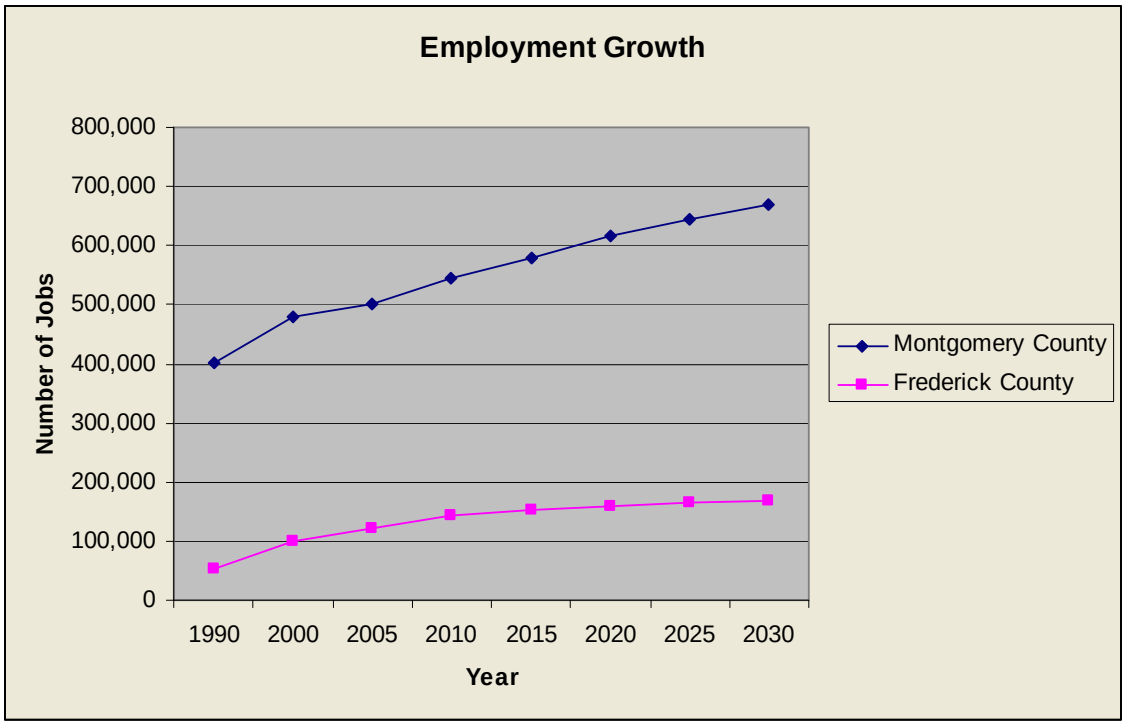
Source: Metropolitan Washington Council of Governments, Growth Trends to 2030: Cooperative Forecasting in the Washington Region. 1990 and 2000 from Fall 2004, Round 6.4A. 2005 to 2030 from Fall 2007, Round 7.1 Cooperative Forecasts

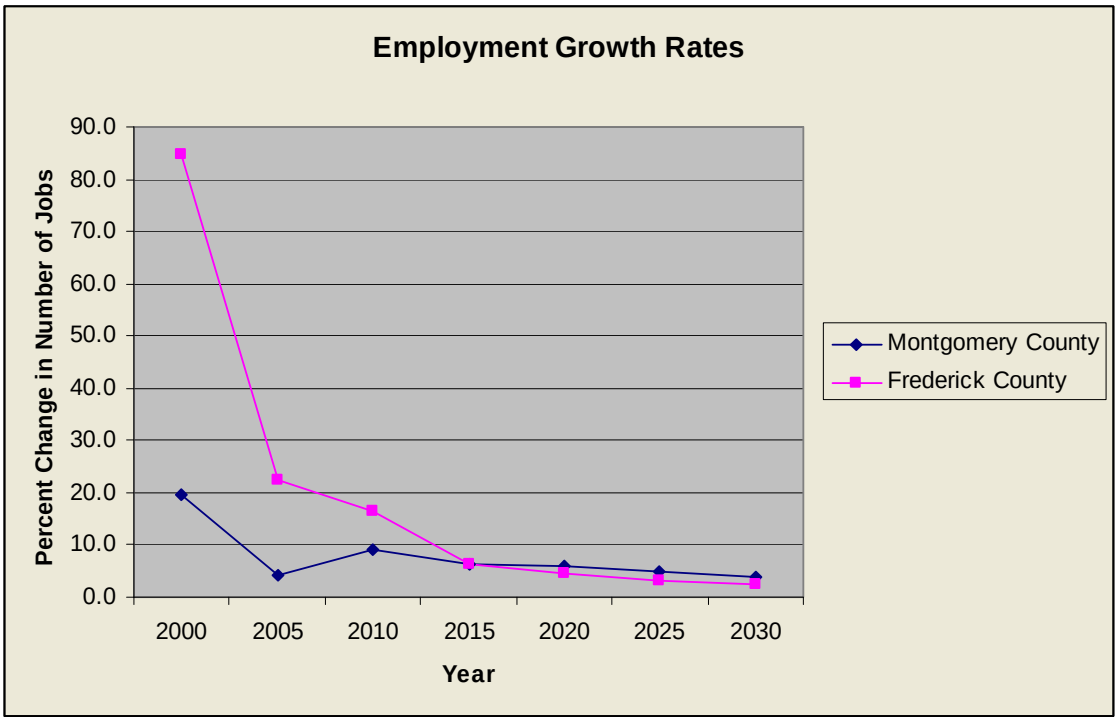
Frederick County's largest employer is Fort Detrick; other large employers besides the government are the Frederick Memorial Healthcare System, Bechtel, SAIC and Wells Fargo. The largest city in the county is the City of Frederick. Much of the county remains rural with agricultural and forest land uses dominating. The county has a large agricultural component to its economy, with large areas of farmland. Frederick County is Maryland's largest milk producer. The median household income in the county in 2006 was $60,276, and the per capita income was $25,404. About 2.9% of families and 4.50% of the population were below the poverty line.

Employment in Frederick County is expected to continue to grow, but at a slower pace in future years. Following the almost 85 percent increase seen between 1990 and 2000, the number of jobs is projected to continue to increase at a decreasing rate through 2030.

In 2006, according to the US Census, an estimated 173,662 persons living in Frederick County were employed; 117,850 were estimated as commuting to work. The most residents were employed in the educational services, and health care, and social assistance industries (22,137), and the second most persons were employed in the professional, scientific, and management, and administrative and waste management industries (17,880). About 1,278 persons were employed in the agriculture, forestry, fishing and hunting, and mining industries.

Figure II-11: Employment Growth Trends in Montgomery and Frederick Counties





C. LAND USE AND DEVELOPMENT PROJECTS

Projected land use changes are usually identified through the county and region comprehensive plans revision process, which identifies areas of potential planned growth (both residential and non-residential). Changes in county and municipal zoning are identified in the comprehensive (master) plans. Both Frederick and Montgomery Counties have county-wide comprehensive plans (*The Frederick County Comprehensive Plan Volume I*, October 1998 and *On Wedges and Corridors*, 1964 and updates) that guide the overall development in the county.

Beyond the county-wide plans, the ICE boundary encompasses regional comprehensive plans. The I-270/US 15 Multi-Modal Corridor project lies within the Urbana Region and the Frederick Region planning areas in Frederick County. In Montgomery County, the project lies in the I-270 Corridor Planning Area, and includes the community planning areas of Gaithersburg and Vicinity/Shady Grove, Germantown, and Clarksburg and Vicinity (including the Hyattstown Special Study Area). Information found in the master plans for these planning areas can be useful in determining past land uses and visions/goals for future land use.

1. Past, Present, and Future Land Use Trends

The following sections describe the land use conditions and trends for portions of the ICE area within Frederick and Montgomery Counties. Past (1973), present (2002) and projected future (2030) land use is shown on ***Figure II-12, Figure II-13*** and ***Figure II-14***, respectively.

a. Frederick County

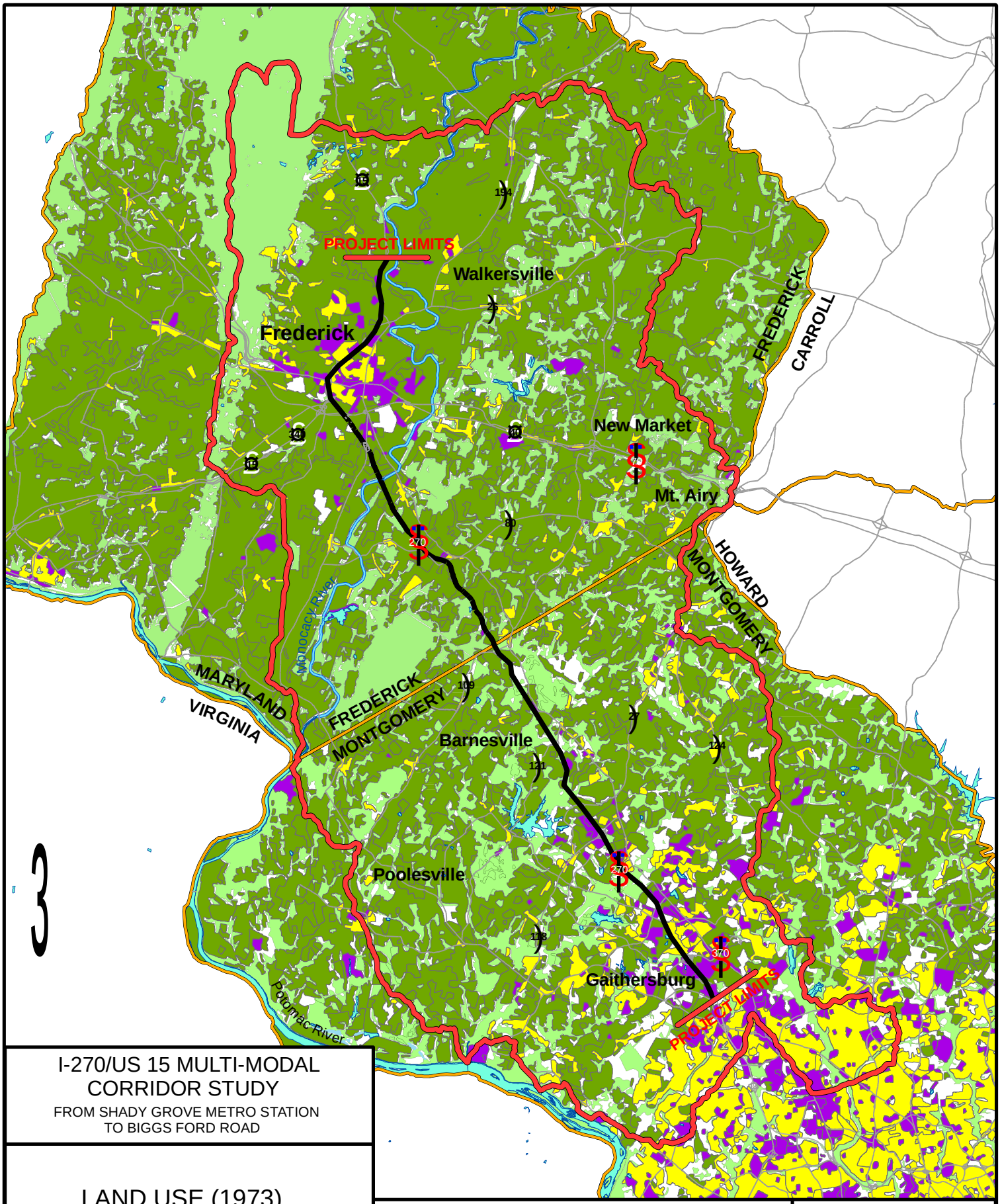
Land use changes in Frederick County within the ICE boundary between 1973 and 2002 are quite evident from the differences shown on ***Figures II-12*** and ***II-13***, and future planned land use (2030), as shown on ***Figure II-14***, indicates a continuing expansion of residential and non-residential development most prominently in and surrounding Frederick City and to a lesser extent in the southeastern part of the county and to the northeast towards Walkersville.

Past

Past land use in Frederick County within the ICE boundary was almost completely forest, agriculture and open space, as seen in ***Figure II-12***. A relatively small area of residential and non-residential development existed in Frederick City and other scattered towns and villages, including Walkersville, Poolesville, and New Market among others.

Present

Existing (2002) land use within the ICE boundary still shows a large portion of the area in forest, agriculture, and open space uses. Residential and commercial/industrial/institutional uses have increased, especially within and surrounding Frederick City. Residential development has increased in the southeastern portion of the ICE boundary as well around New Market and Mount Airy and in the Urbana Planning Region.



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

LAND USE (1973)

Legend

- ICE Analysis
- I-270
- County
- Other
- Water
- Residential
- Commercial/Industrial/Institutional
- Forest
- Agriculture

Scale:

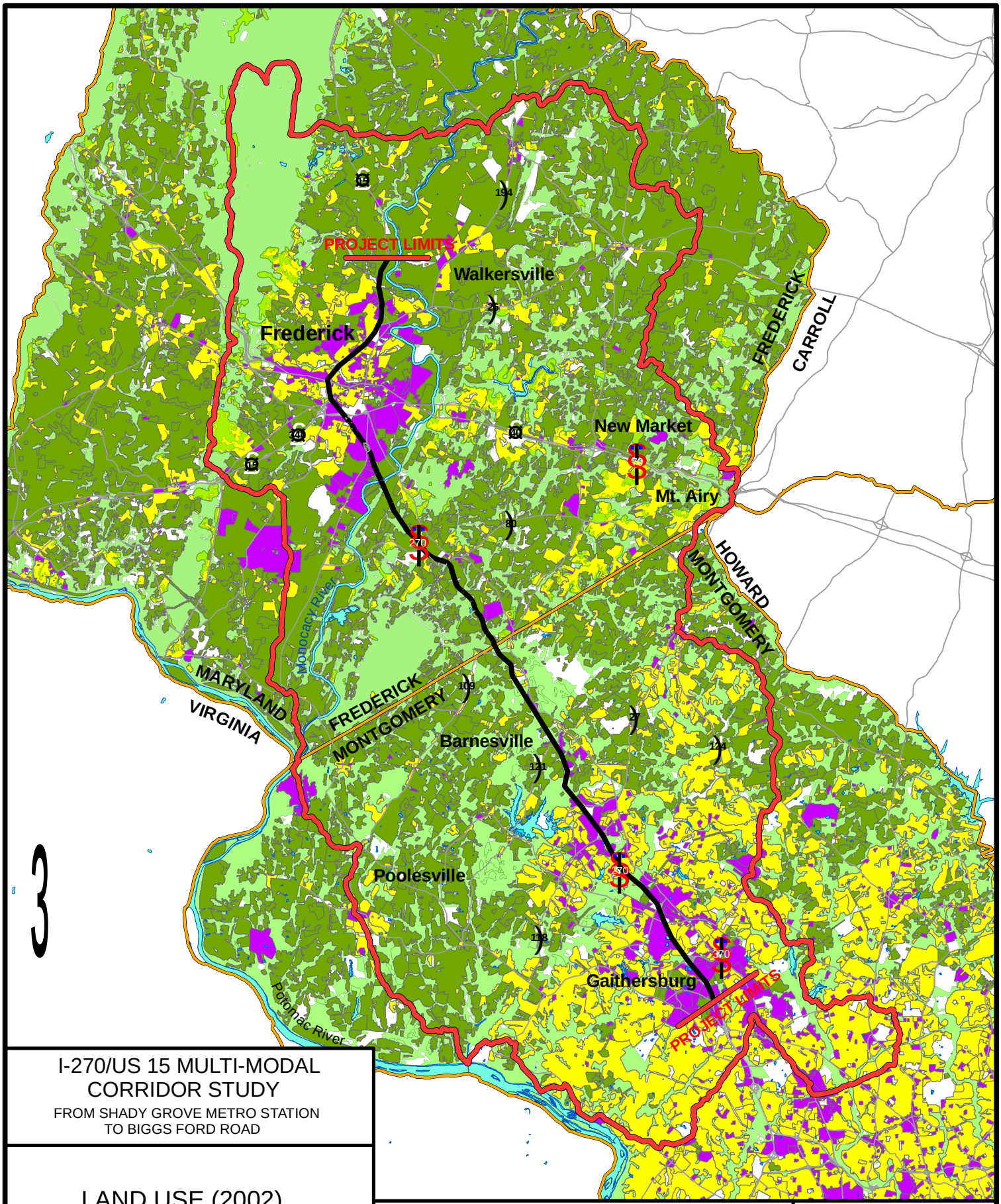
0 1.25 2.5 5 Miles

0 7,500 15,000 30,000 Feet

Source: Maryland Department of Planning

SHA MTA Maryland

DATE:	FIGURE:
JANUARY 2009	II-12



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

LAND USE (2002)

Legend

- ICE Analysis
- I-270
- County
- Other
- Water
- Residential
- Commercial/Industrial/Institutional
- Forest
- Agriculture

Scale:

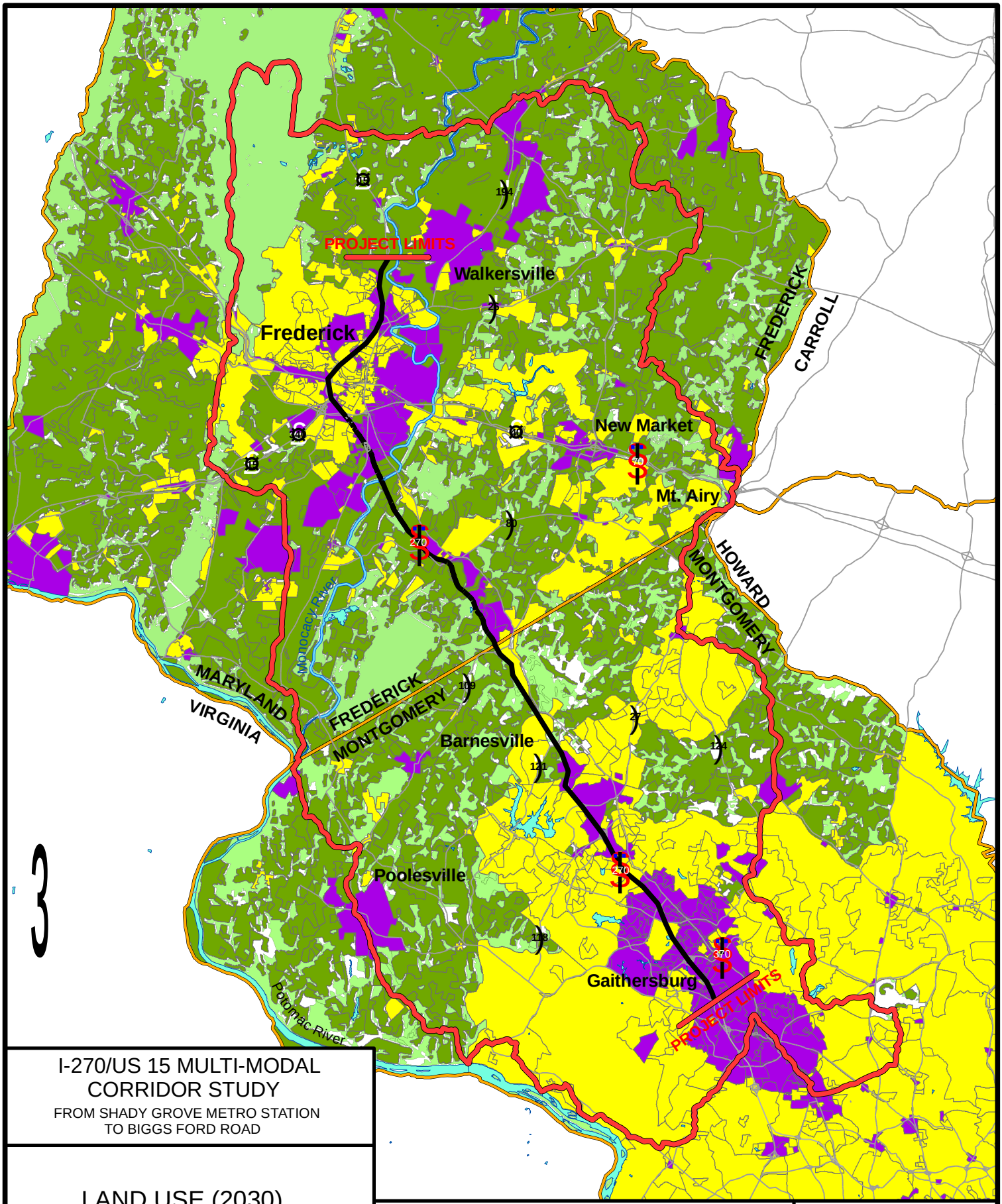
Miles: 0 1 2 4

Feet: 0 7,500 15,000 30,000

Source: Maryland Department of Planning

SHA MTA Maryland

DATE:	FIGURE:
JANUARY 2009	II-13



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

LAND USE (2030)

Legend

- ICE Analysis
- I-270
- County
- Other
- Water
- Residential
- Commercial/Industrial/Institutional
- Forest
- Agriculture

Scale:

0 1.25 2.5 5 Miles

0 7,500 15,000 30,000 Feet

Source: Maryland Department of Planning

SHA
MTA Maryland

DATE:
JANUARY
2009

FIGURE:
II-14

Future

Future land use, based on the county's master plans (The Frederick County Comprehensive Plan, The Urbana Region Comprehensive Zoning Map, and the City of Frederick Comprehensive Plan) is shown on the 2030 Land Use ***Figure II-14***. The developed portions within the ICE boundary are projected to increase substantially, with a subsequent loss of forest, agriculture and open space. Planned residential and commercial/industrial/institutional growth areas include continuing growth in the Urbana Region, both in the southeast adjacent to the Montgomery County border and along I-270. Substantial non-residential development is proposed in the Walkersville area northeast of Frederick City, and considerable residential development is proposed to occur between Frederick City and New Market. A substantial increase in residential development in and surrounding Frederick City is projected, generally expanding on both sides of US 15 and to the north and west, with a concentration of non-residential growth concentrated to the southeast.

b. Montgomery County

Past and future land use changes between 1973 and 2030 in the Montgomery County portion of the ICE boundary are illustrated by comparing ***Figures II-12, II-13*** and ***II-14***. The figures clearly illustrate the expansion of development throughout the southern and eastern portions of the ICE boundary, with preservation of agriculture and open space evident in the northern and northwestern ICE areas.

Past

Montgomery County officially adopted the *On Wedges and Corridors* General Plan in 1964, with its goals to reinforce the existing patterns of corridor development separated by wedges of less intensive use. In general, the plan has, up to 2002, achieved success by containing the county's greatest growth along the transportation corridors. From 1970 to 1980, 35 percent of all housing units and 50 percent of total population growth occurred in the I-270 Corridor. Since its inception, the *On Wedges and Corridors* General Plan has undergone refinement and revision (in 1969 and most recently in 1993). The original concepts remain successful in directing changes in land use and development of residential and employment areas centered along the transportation corridors. Less dense residential and agricultural wedges remain, providing low density and rural housing and protecting natural habitats and agricultural areas.

The 1973 land use shown on ***Figure II-12*** shows development clustered around the major transportation corridor, I-270, with agriculture and forest uses on the majority of the land within the ICE boundary.

Present

Land use in Montgomery County changed substantially between 1973 and the present (2002), as residential and industrial uses have expanded north from Washington DC and along the I-270 corridor, as shown on ***Figure II-13***. The greatest expansions of growth within the ICE boundary have been to the southern end, in and around the "Corridor Cities" of Rockville, Gaithersburg and Germantown. Most commercial/industrial/institutional uses are clustered adjacent to I-270,

with residential uses spreading out to either side of the I-270 corridor. Residential development is more intense to the west of I-270 and south of Seneca Creek and to the east of I-270 south of MD 124.

Future

Projected future land use (2030, shown on ***Figure II-14***) in the southern part of the ICE boundary is planned for almost solidly developed uses (residential and commercial/ industrial/institutional), although two "wedges" of agricultural/forest land use still remain to the east and west of I-270 in northern Montgomery County near the Frederick County line. Little open space is projected to remain in the intensely developed areas, with most non-residential uses clustered close to the I-270 corridor through Rockville, Gaithersburg and Germantown. Another proposed intensely developed area is Damascus, in the northeast corner of the ICE boundary. The Hyattstown area, on the north side of I-270 south of the Frederick County line, is another smaller, yet intensely residential area.

c. Land Use Summary

Land uses clearly are trending towards more developed uses, with concurrent decreases in forest and agricultural uses. There is also a clear effort to conserve forest, open space and agricultural lands in both counties by concentrating development is certain areas of the county.

Table II-7: Land Use/Land Cover in the ICE Boundary – 1973, 2002, and 2030 (Acres)

Land Use	1973	2002		2030 (Projected)	
	acres	acres	% change	acres	% change
Residential	26,610	75,529	184 %	109,183	44.6 %
Commercial/Industrial/ Institutional	8,796	27,525	213 %	36,928	34.2 %
Total Developed Uses	**35,406**	**103,054**	**191%**	**146,111**	**41.8 %**
Agriculture	195,644	128,983	-34.1 %		
Forest	102,452	104,133	-1.6 %		
Wetland	0	92	--		
Barren	699	60	--		
Least Protective				28,402	
Most Protective				156,280	
Mixed Use				2,989	
Municipality				12,742	
Water	610	1,925	--		
Other				9,009	
Total Resource Uses	**299,405**	**235,193**	**21.5 %**	**209,422**	**11.1 %**
Total Area	**339,752**	**339,753**	**--**	**339,802**	**--**

Note: Because of the different land use designations, calculations cannot be completed for each resource individually.
Source: Maryland Department of Planning Land Use Maps

Conservation efforts include Montgomery County's preservation program for the rural wedges originally established in the *On Wedges and Corridors* General Plan (1964) and Frederick County's comprehensive resource protection under the Sensitive Areas Program. Resources identified in the Sensitive Areas Program include: streams and stream buffers, 100-year floodplains, habitats for rare, threatened or endangered species, steep slopes, the Monocacy

Scenic River, areas of prime agricultural soils outside planned Community Growth Boundaries, wetlands, groundwater resources and wellhead protection areas, limestone conglomerate/carbonate rock areas and historic and archeological resources. Under the *On Wedges and Corridors* plan, Montgomery County's rural pattern is designed to mold the urban areas and well as provide and protect large open spaces for recreational opportunities, provide for areas where farming, hunting and fishing and other natural resource activities can be carried on, and conserve those natural resources and protect the public water supply.

2. Transportation Improvements and Development Projects

A review of the current transportation planning documents (MWCOG 2007 Constrained Long-Range Plan; MDOT Capital Improvement Program 2008-2013, and the Montgomery County Ten-Year Transportation Plan September 2007) provides a list of future transportation projects within the ICE boundary (shown in ***Table II-7***). None of these projects will be induced by or are dependent upon the I-270 project.

Table II-8: Transportation Improvements Programmed within the ICE Boundary

Location	Description	Projected Completion Date
Highway Upgrade, Reconstruction, Extension and Widening Projects		
US 15 at Monocacy Boulevard	Construct a new interchange at US 15 and Monocacy Boulevard. Impacts include: ROW = 36.3 acres; 100-yr floodplain - 1 acre; forest, 0.8 acre; streams - 173 lf	2010
I-70 from Mt. Phillip Road to MD 144 (Baltimore National Pike) (Phased for construction; Phases 1, 1A, 2A, 2B, 2C and 3 are complete or under construction. Only Phases 2D and 4 remain.	Extend MD 475 (East St) from South Street to proposed Monocacy Boulevard, including storm water management ponds and new urban diamond interchange with I-70 and ramps to Walser Drive. (Phases 2B, 2C)	Under construction
	Replace I-70 bridge over Reich's Ford Road & reconstruct ramps, widen from MD 144 to west of Monocacy Boulevard; reconstruct Monocacy Boulevard interchange (Phase 2D). PI under way.	2015
	Widen to 6 lanes, New Design Road to Mt. Phillip Road. EA completed for entire project; FONSI approved 1987. 2009 Reevaluation in progress for Phase 2D indicates no change in total impacts (wetlands, 0.86 acre (Phase 1); 2 business acquisitions (Phase 2A); 1 residential displacement (Phase 2B/2C/3))	2015
I-270 Interchange at Watkins Mill Road	Widen and extend Watkins Mill Road from 4-6 lanes; construct interchange; add 2-lane collector-distributor roads NB & SB on I-270. Impacts include: ROW = 68 acres; 2 parks, 6 acres; 9-10 stream crossings; 30 acres forest; <1.0 acre wetlands; 6 acres 100-yr floodplain; noise impacts at 2 NSAs	2020
I-270 at MD 121	Reconstruct interchange of I-270 and MD 121. Impacts include: wetlands, <0.4 acre; forest, 3 acres.	2010
MD 27 from MD 355 to Snowden Farm Parkway (A-305)	Widen to 6 lanes from MD 355 to Midcounty Highway.; widen to 4 lanes from Midcounty Highway. to Snowden Farm Parkway	2010

Table II-8: Transportation Improvements Programmed within the ICE Boundary

Location	Description	Projected Completion Date
Midcounty Highway. (M-83) from Montgomery Village Avenue to MD 27	Construct 4 to 6 lane roadway. ARDS range of impacts includes: wetlands 0.9-13 acres; streams 627-6,685 lf; 100-yr floodplain 4.3-23 acres; forest 1.2-79 acres; farmland 2.5-41 acres.	2020
MD 85 from English Muffin Way to north of Grove Road	Upgrade MD 85 to a 4/6-lane divided highway – 4 lanes from south of English Muffin Way to SHA/Westview complex; 6 lanes through I-270; 4 lanes from north of Spectrum Drive to Grove Road. Partial reconstruction of I-270/MD 85 interchange is included. Auxiliary lanes where needed.	2020
MD 117 from Great Seneca Park (*sic.*) [Seneca Creek State Park] to I-270	Improve roadway and reconstruct intersections to provide capacity and improve operations. Includes sidewalks where appropriate & multi-use path on south side. A Categorical Exclusion (CE) is approved.	Engineering to be completed by 2010
MD 118 from MD 355 to M-83 [Midcounty Highway]/ Watkins Mill Road	Extend MD 118 as a 6-lane divided highway (includes bicycle/pedestrian accommodation)	2020
MD 355/MD 80 Urbana Bypass, east of I-270 north & south of Urbana	Construct to 4 lanes relocated east of I-270, from north of MD 80 to south of MD 80, including intersection (2 separate projects)	2010
Father Hurley Boulevard from Wisteria Road to MD 118 Relocated	Construct final link of Father Hurley as a 4- or 6-lane roadway (includes bridge over CSX railroad; includes bicycle/pedestrian accommodation)	2010
Middlebrook Road Extended from MD 355 to M-83	Study to construct 6 lanes	2010
I-270: replace bridge over Doctor Perry Road	Existing bridge is deteriorated.	2010
Dorsey Mill Road from Century Boulevard to Observation Drive	Connect Dorsey Mill Road between Century Boulevard and Observation Drive via an overpass of I-270	Not available
Observation Drive extended north to Stringtown Road	Planning study to extend Observation Drive as a 4-lane divided roadway from south of Little Seneca Creek to Clarksburg Town Center	Not available
Intercounty Connector (ICC)	Construct toll freeway on new alignment between I-270 and I-95/US1; engineering, right-of-way acquisition and construction under way. Impacts include ROW-1,389 acres; wetlands-47.8 acres; streams-38,088 lf; floodplain-33 acres;forest-746 acres;parkland-88 acres;residential displacements-50; business/community facilities displacements-10. Environmental stewardship package included to mitigate most natural resources impacts.	2012
East-West Intersection Improvement Program	A series of minor intersection improvement projects to relieve traffic congestion and improve east-west travel between I-270 and US 1. Some are developer funded. A CE is approved; some are under construction.	Not available
Quince Orchard Road from Dufeif Road to MD 28	Facilities Planning – spot safety improvements include median modifications, sight distance improvements, missing sidewalk links and others.	Not available

Table II-8: Transportation Improvements Programmed within the ICE Boundary

Location	Description	Projected Completion Date
	Includes 8-foot wide bikeway on entire west side between Darnestown Road and Dufeif Road.	
Shady Grove Road from Briardale Road to MD 115 (Muncaster Mill Road)	Widen segments along Shady Grove Road to complete the 6-lane section.	Not available
MD 115, Muncaster Mill Road from MD 28 to MD 124	Provide safety improvements concentrating on horizontal and vertical deficiencies as well as spot intersection improvements. CE is approved.	Not available
MD 124 (Woodfield Road) from Midcounty Highway to Warfield Road	Reconstruct MD 124; include sidewalks where appropriate and wide curb lanes to accommodate bicycles. CE approved.	Not available
MD 28 (Darnestown Road) from Riffle Ford Road to Great Seneca Highway (MD 119)	Upgrade to a 4/6 lane divided highway (6-lane section from Muddy Branch Road to MD 119, with sidewalks where appropriate and a separate bicycle/pedestrian facility on the north side of MD 28 fro MD 119 to Ownes Glen Way. Elsewhere, wide curb lanes will accommodate bicycles. FEIS approved.	Not available
Stringtown Road Extension from I-270/MD 121 interchange to existing Stringtown Road at MD 355	Extend as a 4-lane (2 in each direction) divided arterial. Includes sidewalk on south side and bicycle path on north side; street trees and street lights; auxiliary lands and traffic signals at intersections with MD 355 and Gateway Center Drive.	Not available
Transit Extensions and Parking Expansion Projects		
Olney Transit Center	Construction of transit center in Olney	2015
Montgomery County Randolph Road bus enhancements	Bus Rapid Transit (BRT) from MD 355 to US 29	2010
Clarksburg Transit Center	Construct Transit Center	2015
Park and Ride Lots	I-270 and MD 121 – new 500-space lot US 340/Mount Zion Road – new 25-space lot	Not available
Purple Line	Study of 16-mile transitway between New Carrollton and Bethesda Metrorail stations, connecting the Metrorail Red, Green and Orange lines to key destinations in Prince George's and Montgomery Counties. Preliminary impacts include: 3-12 residential displacements; 8.8-16 acres parks & open space; 1-14 acres Waters of the US including wetlands.	Planning to be completed in 2010

Sources: MWCOG 2007 CLRP, Montgomery County's Ten-Year Transportation Plan September 2007, and MDOT 2008-2013 CTP.

A review of Frederick County and Montgomery County databases provides a listing of proposed residential and non-residential development (as shown in ***Tables II-9, II-10 and II-11***) within the ICE boundary. As identified in the AA/EA section on Land Use (Chapter IV.A), projects that are considered major developments (50 or more residential units and 100,000 square feet (SF) of non-residential space) are included in the tables. None of these projects will be induced by or are dependent upon the I-270/US 15 project.

Table II-9: Approved Montgomery County Commercial Development in the ICE Boundary

Annual Growth Policy Area	Size	Estimated Job Capacity	Remaining to be Completed
Clarksburg	3,784,000 SF	7,498 office; 4,753 retail	3,247,139 SF
Derwood	427,775 SF	1,389 office; 31 retail; 144 industrial	406,793 SF
Gaithersburg City	4,814,448 SF	12,659 office; 3,033 retail; 226 industrial; 259 other	3,827,007 SF
Germantown East	3,059,378 SF	10,465 office; 208 retail	1,946,169 SF
Germantown West	1,587,740 SF	5,986 office; 285 retail; 15 other	1,467,053 SF
Montgomery Village/ Montgomery Airpark	1,299,545 SF	1,770 office; 511 retail; 1,529 industrial	1,256,025 SF
*Potomac	1,350,000 SF	1,664 office; 1,514 retail; 197 other	1,350,000 SF
Research & Development Village	4,086,667 SF	76 office; 3,777 industrial; 2,477 other	2,063,909 SF
*Rockville City	6,378,653 SF	17,213 office; 731 retail; 401 industrial; 395 other	5,738,895 SF
Twinbrook	447,914 SF	1,280 other	447,914 SF
*Rural	673,568 SF	216 office; 962 retail; 219 other	620,924 SF

Sources:
Montgomery County: Pipeline of Approved Commercial Development (as of July 15, 2008) – M-NCPPC; and Annual Growth Policy Areas map December 29, 2005 – M-NCPPC.
** Only portions of the following Montgomery County Annual Growth Policy Areas are within the ICE boundary: Potomac, Rockville and Rural.*

Table II-10: Approved Montgomery County Residential Development in the ICE Boundary

Name	Location	Size (if known)	Approved Development	Other Development included in the Project
Clarksburg Town Center	Frederick Road and Clarksburg Road	267 acres	186 single family detached 623 single family attached 491 multifamily apt/condo	100,000 SF office 150,000 SF retail
Greenway Village at Clarksburg	Skylark Road and Newcut Road	374 acres	600 single family detached 386 single family attached 344 multifamily apt/condo	89,000 SF retail center 2,000 SF public use space
Martens Property	Frederick Road north of West Old Baltimore Road	102.9 acres	109 single family detached 216 single family attached	
Linthicum East Property	West Old Baltimore Road and I-270	208.5 acres	157 single family detached 102 single family attached	
Tregoning/Dameron Properties	Piedmont Road SE of Janbeall Court	92.61 acres	92 single family detached	
Highlands at Clarksburg	Stringtown Road and MD 355	56.5 acres	30 multifamily apt/condo 202 single family detached 128 single family attached 8 duplex semi-detached	18,590 SF office 12,870 SF commercial retail 31,460 SF retail center
Woodcrest	MD 355, n of Clarksburg Road	43.3 acres	59 single family detached 27 single family attached	
Clarksburg Village	Stringtown Road and Piedmont Road	776.57 acres	1,204 single family detached 950 single family attached 500 multifamily apt/condo	5,000 SF child day care 20,000 SF commercial retail
Linthicum West Property	MD 121 and West Old Baltimore Road	165.25 acres	253 single family detached	
Gateway Commons	MD 355 and Stringtown Road	45.25 acres	27 single family detached 93 single family attached 166 multifamily apt/condo	
Eastside	Shawnee Lane, east of Gateway Center Drive	23.82 acres	59 single family attached 226 multifamily apt/condo	
Cabin Branch Phase 2	MD 121 and I-270	535.3 acres	1,032 single family detached 854 single family attached 500 assisted living	2,400,000 SF office
Cabin Branch – Winchester	MD 121 and I-270	141.26 acres	427 multifamily apt/condo	
Casey Property at Mill Creek	Amity Drive west of Bounding Bend Court	65.59 acres	92 single family detached 92 single family attached	

Table II-10: Approved Montgomery County Residential Development in the ICE Boundary

Name	Location	Size (if known)	Approved Development	Other Development included in the Project
Shady Grove Phase I	Crabbs Branch Way and Shady Grove Road	42.5 acres	1 transit-oriented facility 144 townhouses 196 multifamily apt/condo	
Piedmont Crossing	Amity Drive west of Bounding Bend Court	66.09 acres	41 single family detached 20 single family attached	
Piedmont Crossing (Casey Property)	Amity Drive west of Bounding Bend Court	66.09 acres	52 single family detached 12 single family attached	
Asbury Manor Homes	City of Gaithersburg		60 multifamily	
Crown Farm	Southeast of I-370, west of I-270	182.82 acres	1,975 to 2,550 residential units	260,000 to 370,000 SF commercial 30-acre site for public high school
Crowne Point	City of Gaithersburg		13 single family detached 33 townhouses	
Deer Park	City of Gaithersburg		302 single family	
Greater Historic District – Realty Park	City of Gaithersburg		54 single family	
Greater Historic District – Russell & Brooks Addition	City of Gaithersburg		56 single family	
The Collonnade (Archstone)	City of Gaithersburg		307 multifamily	
Hidden Creek – Land Bay III	City of Gaithersburg		16 single family 441 townhouses	
Humane Society of the US	City of Gaithersburg		300 multifamily	
Observatory/Brown's – Brown's Addition	City of Gaithersburg		181 single family	
Observatory/Brown's – Observatory Heights	City of Gaithersburg		66 single family	
Olde Towne – Archstone	City of Gaithersburg		389 multifamily	
The Spectrum – Casey East	Between I-270 and MD 355, northwest of new Watkins Mill Road interchange	40.1 acres	382 residential units	116,400 SF commercial 70,100 SF office 39,200 SF public uses 6th Dist County Police Station 10,000 SF senior center
Summit Center	City of Gaithersburg		300 multifamily	
The Vistas at Quince Orchard Park	City of Gaithersburg		13 single family 70 townhouses	
Watkins Mill Town Center –	North of CSX and Metropolitan		94 single family detached	259,939 SF commercial mixed use

Table II-10: Approved Montgomery County Residential Development in the ICE Boundary

Name	Location	Size (if known)	Approved Development	Other Development included in the Project
Casey West	Grove Road, south of I-270		180 single family attached 162 condominiums	936,650 SF office
West Deer Park - Fairfield	City of Gaithersburg		58 townhouses 28 multifamily	
West Deer Park – Summit Woods Apartments	City of Gaithersburg		198 multifamily	
Residences @ Olde Towne	City of Gaithersburg		191 multifamily	
Eton Square	Frederick Road and Oxbridge Road	10.88 acres	126 single family attached	
Churchill Senior Living	Father Hurley Boulevard south of Waters Landing	6.5 acres	300 multifamily apt/condo	
Hoyles Mill Village (King Hargett Property)	Schaeffer Road and Hoyles Mill Road	241.9 acres	399 single family detached 60 single family attached	
Leaman Farm	Clopper Road and Schaeffer Road	29.3 acres	42 single family detached 27 single family attached	
Fairfield at Germantown	Waters Road south of Wisteria Drive	62.4 acres	610 multifamily apt/condo	40,000 SF office 210,000 SF retail center
Avalon at Decoverly, Phase II	Decoverly Drive north of Diamondback Drive	44.09 acres	168 multifamily apt/condo	
Bowie Mill Estates	Muncaster Mill Road at Needwood Road	468.53 acres	158 single family detached 28 single family attached	
Twinbrook Commons (East)	WMATA Station Redevelopment – Twinbrook Parkway		798 multifamily apt/condo	92,400 retail
Twinbrook Commons (West)	WMATA Station redevelopment – Chapman Avenue		687 multifamily apt/condo	325,000 SF office 127,600 SF retail
Srour Property (Archstone)	100 First Street, Rockville		192 multifamily apt/condo	
Twinbrook Commons (Suburban Propane)	WMATA Station redevelopment – Halpine Road		110 multifamily apt/condo	Plus parking
Upper Rock District Blocks B, C, D, E, F, G, H (JBG Market Square)	1 Choke Cherry Road 2 Choke Cherry Road 3 Choke Cherry Road City of Rockville		B – 100 multifamily apts C – 158 multifamily apt/condo E – 235 multifamily apt/condo F – 96 multifamily apt/condo G – mixed-use multifamily apts H – mixed-use multifamily apts	B – 9,000 SF retail C E F G – retail and office uses H – retail and office uses

Sources: Montgomery County: Pipeline of Approved Residential Development (as of December 16, 2008) – M-NPCCP; Rockville website www.rockvillemd.gov and www.rockgis.ci.rockville.md.us/website/sitedev/viewer.htm; City of Gaithersburg website www.gaithersburgmd.gov

Table II-11: Approved Development in Frederick County in the ICE Boundary

Name	Location	Size	Proposed Development	Other	Status/Comments
Urbana Town Center	I-270, MD 355, MD 80	357 acres	2.5 million SF 3,500 dwelling units	Includes construction of relocated MD 355 from Urbana Community Park to MD 80.	Permit is complete; MD 355 relocation is 70% complete
Russell Property	West of MD 85	520,300 SF	Light industrial development		Access permit approved.
Green Valley Active Adult Community	West of MD 75; north of MD 80; west of Ed McClain Road		1,100 active adult residential units		Final plans awaiting approval
Jefferson Technology Park	MD 80; US 340/US 15 interchange	175 acres	558 apartments 228 townhomes 70,000 SF retail 250-room hotel 1,071,500 SF research/develop.	Approved for 825 condominiums on 59 acres 10/18/06.	
Monrovia Town Center	MD 75 and MD 80	400 acres	30,000 SF commercial 1,608 residential units	Age-restricted community 55+.	Plan approved by county planning commission in January 2008.
Youkins Property	Elmer Derr Road and English Muffin Way		237 residential units 98,500 SF retail 549,510 SF light industrial 61,000 SF general office		
Prime Outlets	I-270 and MD 80	550,000 SF	Outlet Mall - retail		

Source: Frederick County: SHA Major Developments Matrix; 12/8/08

3. The Land Use Expert Panel

Indirect and cumulative effects often occur as a result of changes in land use. In order to identify potential future land use in the region SHA, in 2001, established a panel of land use experts to address this issue. The Land Use Expert Panel (the Panel) was composed of knowledgeable local and national professionals who used their expertise and a comprehensive set of background materials (provided by the project team) to evaluate the changes that could result from alternative highway and transit improvements proposed along the I-270/US 15 Corridor in Upper Montgomery and Frederick counties. In the first phase, the Panel was asked to determine the broad influence of rail or highway on the potential locations of employment and households. In the second phase, the Panel was asked, based upon the population and employment conditions presented by the project team and each member's area of expertise, to allocate future (year 2025) employment and population growth to 19 Forecast Zones for four specific transportation alternatives that were developed as part of the Corridor Study. Finally, the project team used those results to determine whether the alternatives presented in the DEIS would influence land use changes, and thus have an indirect effect on resources within the ICE boundary. The Panel's final report is included as ***Appendix A***.

In the first phase of the deliberations, the Panel was asked what broad differences in the locations of households and employment might occur under three generalized transportation scenarios:

- In the No-Build scenario, the corridor would stay mostly as it is (in 2001) with minor funded and programmed improvements consistent with the regional CLRP.
- In Scenario 2, the highway scenario, the entire highway corridor would receive additional capacity to result in 12 lanes from I-370 to MD 121, eight lanes from MD 121 to I-70, and six lanes from I-70 to Biggs Ford Road. No transit improvements were included.
- In Scenario 3, the rail scenario, there would be no new highway capacity, and a rail transit line would be constructed from Shady Grove Metrorail station to downtown Frederick.

The Panel responded to three general questions that focused on three issues: (1) What is the impact of transportation on growth; (2) What is the impact of the different transportation scenarios on Frederick and Montgomery Counties; and (3) How will the different modes affect the distribution of growth?

Many panelists stated that the effects of the I-270 transportation improvements are not the major determinant of regional growth. Growth will continue under all scenarios. Although transportation is one of many factors influencing future growth, capacity and accessibility within the study area influence the rate and location of growth, particularly employment. Local plans and policies will also influence the rate, location and timing of growth.

Some panelists felt that increased congestion on I-270 would make Frederick more attractive to growth, and others felt increased congestion would make Frederick less attractive.

The Panel felt that the influence of rail on development would depend on its operating characteristics. Specifically, travel speed, alignment, station locations and fare structure would influence land use outcomes. Rail impacts would take longer to be evident and would influence

location decisions; light rail impacts would be more evident at or near stations. The influence of highway would lead to more dispersed residential growth than the rail scenario.

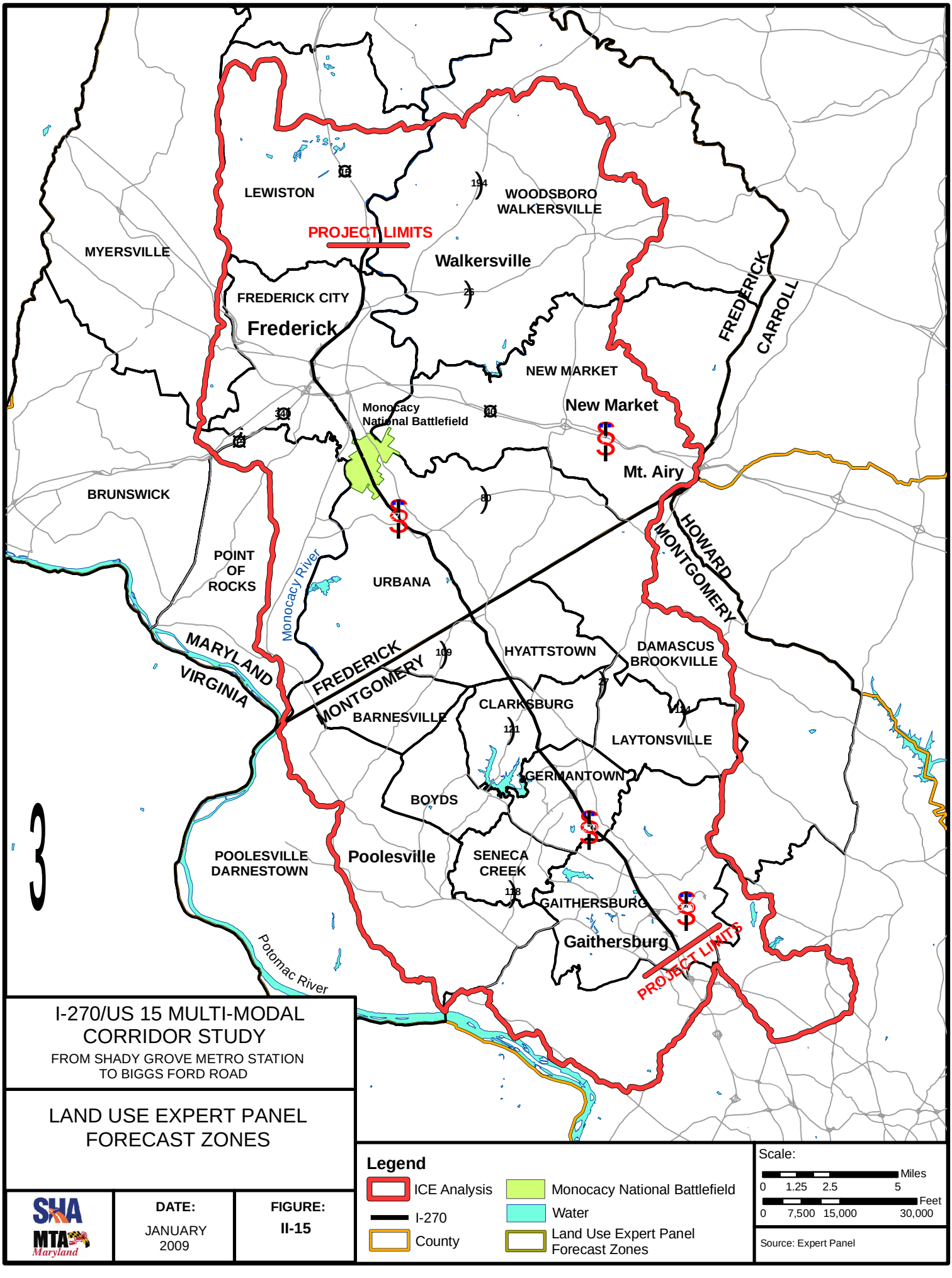
In the second phase, the Panel developed their individual forecasts of population and employment for each Forecast Zone based on four transportation alternatives that did not mimic exactly, but are related to and are virtually identical to in many locations, the alternatives proposed in the 2002 DEIS (Alternatives 1, 2, 3A/B, 4A/B, and 5A/B/C):

- The Base Case Master Plan (BCMP) was based on transportation improvements included in the (then) current Montgomery and Frederick County master plans and included additional road construction and transit not included in the No-Build.
- The No-Build Alternative 1 is similar to the No-Build Alternative in the DEIS and in the AA/EA – no new construction beyond minor improvements already programmed.
- Alternative 2 consisted of highway improvements in both counties and the construction of LRT in Montgomery County from the Shady Grove Metrorail station to MD 121.
- Alternative 3 would provide the same highway improvements as Alternative 2. Additional bus service on the HOV lanes is included as the transit element.

The project team took the population and employment forecasts for each Forecast Zone from each panelist and developed an average allocation of the Panel's responses. The project team then determined whether they would anticipate growth differences based on the forecast numbers provided. Following that, the Panel used their own forecasts to identify potential changes in future land use that could be different from the master plans. The differences in population and employment locations resulting from this comparison would indicate where the build alternatives may change land use and could result in indirect and cumulative impacts to resources.

The Panel study area for determining the potential future land use was not identical to that area encompassed within the SCEA/ICE boundary. The Panel's study area was delineated with the objective to consider likely locations and intensities of future development within the 19 Forecast Zones selected by the panel development team. These forecast zones were built upon the MWCOG's Transportation Analysis Zones (TAZs) and provided the opportunity to allocate growth without being restricted to a specific boundary area. The Panel's study area included all of Frederick County and a significant portion of upper Montgomery County, while the ICE boundary encompasses a smaller portion of Frederick County and differs in the extent of coverage in upper Montgomery County. An overlay comparison of the two study areas is included as ***Figure II-15***.

The four alternatives are compared to the DEIS and AA/EA alternatives in ***Table II-12***. The Base Case Master Plan (BCMP) Alternative is based on the transportation improvements described in the Montgomery and Frederick County Master Plans that were current in 2001. It includes additional road construction and transit that is not included in the No-Build. The Panel did not consider BRT or TSM/TDM alternatives in their deliberations.



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

LAND USE EXPERT PANEL FORECAST ZONES

Legend

- ICE Analysis
- I-270
- County
- Monocacy National Battlefield
- Water
- Land Use Expert Panel Forecast Zones

Scale:

Miles: 0 1.25 2.5 5

Feet: 0 7,500 15,000 30,000

Source: Expert Panel

SHA
MTA Maryland

DATE:	FIGURE:
JANUARY 2009	II-15

Table II-12: Land Use Expert Panel Alternative Comparison

Land Use Panel Alternative	Similar 2002 DEIS Alternative	Similar 2009 AA/EA Alternative
Base Case Master Plan (BCMP)	Not represented	Not represented
Alternative 1 (No-Build)	Alternative 1 (No-Build)	Alternative 1 (No-Build)
Alternative 2 (LRT and Highway)	Alternatives 3A, 4A and 5A	Alternatives 6A and 7A
Alternative 3 (Bus, HOV and Highway	Alternative 5C	Not represented

The project team did not consider refining the results of the Panel's deliberations to further conform to the proposed alternatives, based upon the relatively small differences in population and employment forecasts by the Panel for the No-Build and build alternatives for the study area as a whole. A description of the specific differences in the BCMP, Alternative 1 (No-Build) and Alternatives 2 and 3 as compared to Alternatives 1 (No-Build) and Alternatives 3A/B, 4A/B and 5A/B/C is included in the DEIS (pages III-349 – III-350).

For the alternatives presented in the AA/EA, Alternative 2 is identified as best representing Alternatives 6A and 7A. The Panel's results are summarized in the following sections.

Furthermore, based on the development information from Montgomery and Frederick Counties presented in Section C.2, the project team has determined that the results of the Panel remain valid for this ICE analysis. The results are therefore incorporated into this ICE analysis and have been used to develop the analysis of indirect and cumulative effects on individual environmental resources.

a. Results - Land Use Expert Panel Forecasts of Population and Employment

Generally, the Panel determined that the No-Build Alternative allocations of population and employment would be virtually the same as the BCMP, and that the build alternatives would have higher allocations of population and employment that the No-Build Alternative. The Panel deliberations showed that there was mostly a negligible difference between the two build alternatives, and that the build alternatives would attract approximately a four percent more growth in population and about a three percent greater increase in the number of jobs than the No-Build. Overall differences are shown in ***Table II-13***.

Table II-13: Overall Differences in Panel Allocations of Population and Employment

Total Area Studied	BCMP	Alternative 1 No-Build	Alternative 2 LRT & Highway	Alternative 3 Bus, HOV & Hwy
Population	657,600	650,313	674,633	674,660
Employment	398,600	401,012	413,025	413,289

Population Forecasts

In most of the zones, allocations of population by the Panel are similar to the pattern seen in the study area as a whole. Zones where differences in allocations can be considered measurable (defined by the panel analysts as differences over 2,000 people in terms of absolute numbers) were noted in the following paragraphs.

The Seneca Creek zone is the only one in which the BCMP forecast is notably greater than the Panel allocation for the two build alternatives. In this zone, the BCMP estimate is about 1,500 to 1,700 more people than the Panel's estimates for the two build alternatives (differences of about eight percent). This zone is located in upper Montgomery County, to the southwest of the Corridor, and has no major access to the Corridor.

The Panel's greatest absolute projected increases in population for build alternatives above the BCMP forecasts are in the Frederick City zone and the Damascus-Brookeville zone. The Frederick City zone has Panel allocations that assign an increase in population of about 4,000 (LRT & Highway), 5,400 (No-Build), and almost 7,000 (Bus, HOV & Highway) over the BCMP forecast. These are increases of about four percent to six percent. For the Damascus-Brookeville zone, the Panel allocations represent increases of about 1,100 (No-Build) and about 2,000 for the two build alternatives.

Panel allocations for the greatest absolute increases in population over the No-Build Alternative for the two build alternatives are in the Clarksburg zone, which has a 4,500 to 5,000 increase, and the Germantown zone, with about a 4,400 increase for the LRT & Highway alternative. These zones are contiguous and straddle the I-270 Corridor in Montgomery County. Three additional zones, Lewistown zone, Urbana zone, and Seneca Creek zone have the next greatest increases for the build alternatives over the No-Build, with about 2,000 to 3,000 more people. The Lewistown zone is located just north of the Frederick City zone, and several panelists indicated that this represented growth associated with the Frederick City zone. The Urbana zone also straddles I-270 in Frederick County, just north of the Montgomery County line.

The Gaithersburg zone had a measurably greater allocation for the LRT and Highway Alternative 2 over the No-Build (about 3,600 more people), while the Myersville zone had a measurably greater allocation for the bus, HOV and Highway Alternative 3 over the No Build (about 2,700 more people).

In terms of differences between the two build alternatives, the Germantown and Gaithersburg zones each had panel allocations that assigned about 2,400 to 3,500 more people for the LRT and Highway Alternative 2 over the Bus, HOV and Highway Alternative 3. These differences are approximately two to three percent. The Frederick City zone and Woodsboro-Walkersville zone had panel allocations of 2,700 more people for the Bus, HOV and Highway Alternative 3 over the LRT and Highway Alternative 2, differences of about two to five percent.

Employment Forecasts

As with population, the forecast zones in which there are meaningful differences between alternatives for employment include the Frederick City, Urbana, Clarksburg, Gaithersburg and Germantown zones. Although there were several zones for which the BCMP forecast was greater than the Panel allocation, the differences were small enough to be considered negligible.

The greatest absolute increases over the BCMP are in the Frederick City zone, as was the case for population as well. The panel allocations represent increases in employment of about 8,300 (Bus, HOV & Highway), 8,600 (LRT & Highway), and 11,000 (No-Build) jobs over the BCMP forecast. These are increases of eight to eleven percent. This zone also had the greatest

difference in the number of jobs allocated for the No-Build Alternative relative to the two build alternatives, or about 3,000 more jobs for the No-Build than allocated for the two build alternatives (about a three percent difference).

The greatest employment increases from the No-Build to the two build alternatives are in the Gaithersburg and Germantown zones, both of which straddle I-270 in Montgomery County. In the Germantown zone, the build alternatives have allocations of about 5,600 to 5,700 more jobs than the No-Build Alternative (a 15% difference). In the Gaithersburg zone just south of the Germantown zone, the build alternatives have 5,000 to 6,700 more jobs allocated than in the No-Build Alternative (a three to four percent difference). The Urbana and Clarksburg zones have the next greatest increases in employment allocations for the build alternatives over the No-Build, about 2,000 to 3,000 jobs. This represents increases of 15 to 20 percent in the Urbana zone and almost 50 percent in the Clarksburg zone.

Although there were several zones for which the LRT and Highway (Alternative 2) had a greater Panel allocation for employment than the Bus, HOV and Highway (Alternative 3), the differences were small enough to be considered negligible.

b. Potential Land Use Changes as a Result of Panel Allocations

Future land use changes that may be different from those identified in the county master plans could be anticipated as a result of the population and employment forecasts developed by the Panel. Changes in existing land use can be anticipated based upon:

- existing and future land use plans and demographics for each county,
- household occupancy determinations based on current and approved development densities, and
- estimates of employment per acre of developable land.

Overall, the Panel did not find substantial differences in development between the alternatives studied. For the most part, anticipated development would match or is not substantially different from that planned for by the counties, and the counties' future land use plans were considered appropriate on which to base the indirect and cumulative effects analysis. On a zone by zone basis, however, development was found to be measurably different in some zones between build and No-Build or between BCMP and build. Three zones were identified - Frederick City, Damascus-Brookeville and Clarksburg - that could potentially experience land use changes not accounted for in the Frederick and Montgomery Counties' master plans.

Five additional areas were identified by the Panel where there might be somewhat different future population or employment projections. In these cases, included on ***Table II-14***, the differences were such that the county master plan future land use plans were used for the indirect and cumulative effects analysis.

Table II-14: Forecast Zones where Build Alternatives Future Land Use Could Be Different from Master Plans

Forecast Zone	Result
Frederick City	Increases in both population and employment beyond that identified in master plans could mean land use changes greater than planned.
Damascus-Brookeville	Projected higher increases in population than anticipated in the BCMP Alternative suggest that land use changes could be greater than the master plan called for.
Clarksburg	Lower population growth could mean less residential development, but there may be land use changes beyond those anticipated in the master plans because of higher employment growth. This zone is a designated growth area. Development commitments and future residential densities in the master plans current in 2000 indicated pressures that may prove to be detrimental to resources.
Lewistown	The Panel determined that the zone could have about 1,500 less people with No-Build than the master plan anticipated, but growth with both build alternatives is measurably greater than with the No-Build. The county land use plans were considered adequate for the analysis.
Urbana	The Panel anticipated somewhat greater than anticipated residential growth than in the master plan; therefore there is a potential for increased indirect and cumulative effects. The county land use plans were considered adequate for the analysis.
Germantown	Differences found by the Panel were considered such that the master plans future land use was considered adequate for the analysis.
Seneca Creek	The Panel anticipated measurably less growth in this zone under all alternatives considered; therefore potential indirect and cumulative effects would not be greater than anticipated from planned land use development. The county land use plans were considered adequate for the analysis.
Gaithersburg	Although the Panel anticipated less growth under No-Build and more growth under the build alternatives than planned for by the county, the county land use plans were considered adequate for the analysis.

c. Conclusions, PFAs, and Applicability of the Panel's Results

The Panel predicted that the two build alternatives would have the greatest impact relative to the No-Build alternative in the zones that straddle I-270 and US 15. The Germantown, Clarksburg and Urbana zones each straddle I-270 and have the greatest absolute projected increases in population and employment in the two build alternatives. The Gaithersburg and Lewistown zones also straddle the corridor and have high projected increases in population in the two build alternatives. The Frederick City zone was assigned the greatest absolute increases in population and employment for the build alternatives relative to the BCMP.

Most of the area within Germantown, Gaithersburg and Frederick City zones is within certified PFAs or is shown on future land use plans (refer to ***Figure II-14***) as developed. In Clarksburg, most of the area east of I-270 is included in PFAs as is a small portion west of the highway. Most of Clarksburg is also identified as developed under future land use plans. The Urbana zone has five PFAs to the east of I-270, primarily in and around MD 355 and MD 80, but nearly all of the area to the west of I-270 has no PFAs. Most of the area to the west of I-270 in the Urbana zone is in agricultural and forest uses and is projected to remain so in future county plans. The area to the east of I-270 and centered around MD 355 is where the future land use plans identify growth and development. Lewistown was an unusual case for the Panel, having one PFA that is

not adjacent to Frederick City, but several Panelists commented that the growth allocations to the Lewistown zone should be associated with the growth anticipated for Frederick.

PFAs are identified as areas targeted for growth and development under the Smart Growth Area Act of 1997. Therefore, the conclusions and allocations of greater numbers of population and employment in zones that are associated with PFAs should not be surprising. The locations and boundaries of PFAs have not changed considerably since the Panel's deliberations in 2001. The majority of the programmed development, listed on ***Tables II-8***, ***II-9*** and ***II-10***, within the ICE boundary, is located within PFAs. Therefore, based on programmed development within the ICE boundary, the county land use plans for future growth and development, and the Panel's forecasts of greater growth in forecast zones that have areas targeted for growth in PFAs, the project team found that the conclusions of the Land Use Expert Panel could be used in this ICE analysis to determine where changes in land use might produce indirect and/or cumulative effects on resources.

D. INDIRECT AND CUMULATIVE EFFECTS ANALYSIS

1. Communities

The project would have a direct impact on communities adjacent to the I-270 and US 15 corridors where there would be right-of-way acquisitions and relocations of residences and businesses. The numbers of direct impacts to residences and businesses are shown on ***Table II-3***. Other direct impacts to communities include noise and visual impacts and minor impacts to community cohesion as the roadway is constructed closer to existing businesses and homes. There are no impacts to access with the highway improvements, as the improvements are at the edges of existing roadways. The transitway would be constructed entirely on reserved alignment, eliminating community impacts. Generally, improved access, decreased congestion, faster travel times, and additional opportunities for alternative modes of travel would result from the project. Impacts from the transitway stations are anticipated to provide improved access to existing neighborhoods and employment centers and opportunities for planned transit oriented development in areas close to proposed station locations. The hiker-biker component of the transitway will provide connectivity for pedestrians and bicyclists

The 2002 DEIS documented 35 neighborhoods and/or subdivisions in Montgomery County and 19 in Frederick County (Chapter III.B) that are adjacent to the highway and/or transitway improvements. Several new subdivisions have been constructed since that documentation, including newly emerging communities of Cabin Branch, Upper Rock District, Casey East, Casey West and Crown Farm in Montgomery County. Five new residential subdivisions are approved and/or nearly completed: Summerfield Crossing, Woodcrest, Clarksburg Ridge, Gateway Commons and Observation Heights Woods. The majority of residential community impacts would occur in the southern portion of the project area, in Rockville, Gaithersburg and Germantown, and in the northern portion in the City of Frederick, where residential areas are most concentrated.

a. Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, directs Federal agencies to "promote nondiscrimination in Federal programs substantially affecting human health and the environment, and provide minority and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment." The Order directs agencies to utilize existing law to ensure that when they act:

- They do not discriminate on the basis of race, color, or national origin.
- They identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income communities.
- They provide opportunities for community input in the NEPA process, including input on potential effects and mitigation measures.

The Environmental Justice (EJ) analysis undertaken in the 2002 DEIS and in the AA/EA identifies disproportionately high and adverse human health and environmental effects to minority and low-income communities that would result from a build alternative. Executive Order 12898 requires federal agencies to identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." To comply with the order, the project team considered potential effects on low-income and minority populations as identified within the I-270/US 15 Corridor and determined whether the effects were disproportionately high in relation to other areas in the Corridor.

Within US Census block groups that met the threshold for minority or low-income populations, potential EJ areas were identified and examined for direct impacts from the project. Most of the community impacts (residential relocations) are concentrated adjacent to the existing highway corridor in four areas considered to be EJ areas: Brighton West, London Derry, and Caulfield in Montgomery County and Foxcroft II in Frederick County. Therefore impacts to EJ areas, because of the concentrated nature of the impacts, could be considered disproportionately high and adverse.

b. Community Cohesion

Community cohesion refers to inherent elements of neighborhoods that formulate a community sustained by stability, interdependence and social interaction among persons or groups in a community. The highway improvements are proposed along the edges of the affected communities and, therefore, are not anticipated to affect community cohesion outside of the immediate area of direct impacts, where the displacement of residents could result in adverse changes in social interaction or sense of community, stability, and psychological unity by removing residents from other residents located with a close community.

Indirect effects to communities within the ICE boundary are not anticipated as a result of a build alternative. The No-Build Alternative may indirectly impact communities throughout the ICE boundary by not addressing congestion and safety on the roadways. The No-Build Alternative could cause additional congestion within neighborhoods as travelers look for alternate routes to

and from destinations. The completion of a build alternative for the project is anticipated to benefit communities by providing increased accessibility, decreased congestion, and shorter travel times for the residents of those communities within the ICE boundary.

The Land Use Expert Panel did not identify substantial land use changes that would occur as a result of the project. Therefore, there are no indirect effects to new, emerging communities or to proposed new communities. The implementation of a build alternative may cause increased pressures on resources due to greater predicted development in some areas (Damascus-Brookeville and Clarksburg zones) or due to the presence of land use constraints, such as rural legacy, parks, and agricultural preservation, in others (Hyattstown and Poolesville-Darnestown zones). The locations of transit stations may provide development opportunities for transit oriented development densities. These effects are anticipated to be minor.

Cumulative effects to communities could include increased pressures for redevelopment or rezoning in areas where transit stations provide greater access to transit use; the strength of master plans and zoning ordinances would temper these pressures.

2. Cultural Resources

A total of 61 historic properties that are listed in the National Register of Historic Places (NRHP) are located within the ICE analysis boundary. These historic properties are listed in ***Table II-15*** and their locations are shown on ***Figure II-16***. In addition to historic sites listed in the NRHP, 1,312 sites (including historic roads, districts, and properties) within the ICE boundary are recognized by Maryland as being historic and should therefore be preserved. There are also 413 archaeological sites within the ICE boundary.

Table II-15: Properties within the ICE Analysis Boundary Listed in the National Register of Historic Places

NRHP Reference #	County	Name	Date Listed
71000373	Frederick	Hessian Barracks	1/25/1971
71000374	Frederick	Rose Hill Manor	12/14/1971
72000580	Frederick	Loats Female Orphan Asylum of Frederick City	10/10/1972
73000919	Frederick	Amelung House and Glassworks	10/3/1973
88000713	Frederick	Frederick Historic District	10/18/1973
66000908	Frederick	Monocacy National Battlefield	11/12/1973
74000951	Frederick	Nallin Farmhouse	5/23/1974
74000952	Frederick	Schifferstadt	7/22/1974
73000917	Frederick	Abraham Jones House	7/24/1974
75002107	Frederick	Old National Pike Milestones	3/27/1975
75000896	Frederick	Stancioff House	4/23/1975
75000894	Frederick	Biggs Ford Site	6/10/1975
75000151	Frederick	Monocacy Site	7/30/1975
75000895	Frederick	Guilford	10/14/1975
75000897	Frederick	New Market Historic District	12/6/1975
77000695	Frederick	Nallin Farm Springhouse and Bank Barn	9/17/1977

Table II-15: Properties within the ICE Analysis Boundary Listed in the National Register of Historic Places

NRHP Reference #	County	Name	Date Listed
77000696	Frederick	One-Million-Liter Test Sphere	11/23/1977
7800317X	Frederick	Covered Bridges in Frederick County, Maryland	6/23/1978
78001455	Frederick	Arcadia	8/3/1978
78001463	Frederick	Crum Road Bridge	12/28/1978
79001133	Frederick	Fat Oxen	5/21/1979
79001130	Frederick	Thomas Maynard House	7/18/1979
79001129	Frederick	Edgewood	8/29/1979
79003276	Frederick	Woodsborough & Frederick Turnpike Company Toll House	9/24/1979
80001810	Frederick	Prospect Hall	9/8/1980
80001811	Frederick	Henry Nelson House	12/4/1980
82002811	Frederick	Buckeystown Historic District	4/6/1982
82002812	Frederick	Buckingham House and Industrial School	5/20/1982
82001592	Frederick	John C. Motter House	12/2/1982
84001772	Frederick	Spring Bank Farm	9/7/1984
85002172	Frederick	George Widrick House	9/12/1985
85002672	Frederick	Frederick Armory	9/25/1985
85002902	Frederick	Gambrill House	11/18/1985
86003543	Frederick	Drummine Farm	1/8/1987
87001570	Frederick	Linden Grove	9/10/1987
94000799	Frederick	Harris Farm	7/29/1994
N/A	Both	Chesapeake & Ohio Canal National Park	10/15/1966
73000224	Montgomery	Seneca Quarry	4/24/1973
74000960	Montgomery	Chiswell's Inheritance	9/10/1974
75000909	Montgomery	The Clarksburg School	2/20/1975
75000913	Montgomery	Poolesville Historic District	5/29/1975
75000915	Montgomery	West Montgomery Avenue Historic District	5/29/1975
75000912	Montgomery	Old Chiswell Place	9/9/1975
75000911	Montgomery	Layton House	9/25/1975
78001473	Montgomery	Gaithersburg B & O Railroad Station and Freight Shed	10/5/1978
78001475	Montgomery	Seneca Historic District	11/15/1978
79001140	Montgomery	Darnall Place	8/13/1979
80001829	Montgomery	Washington Grove Historic District	4/9/1980
80001823	Montgomery	Hanover Farm House	8/6/1980
80001828	Montgomery	Bingham-Brewer House	11/24/1980
82002818	Montgomery	Valhalla	3/15/1982
83002956	Montgomery	Montrose Schoolhouse	1/24/1983
83002958	Montgomery	Susanna Farm	1/27/1983
84001845	Montgomery	J.A. Belt Building	8/9/1984
85001578	Montgomery	Gaithersburg Latitude Observatory	7/12/1985
86000371	Montgomery	Drury-Austin House	3/13/1986
88002143	Montgomery	Dowden's Luck	11/10/1988
90001025	Montgomery	Thomas & Company Cannery	7/5/1990

Table II-15: Properties within the ICE Analysis Boundary Listed in the National Register of Historic Places

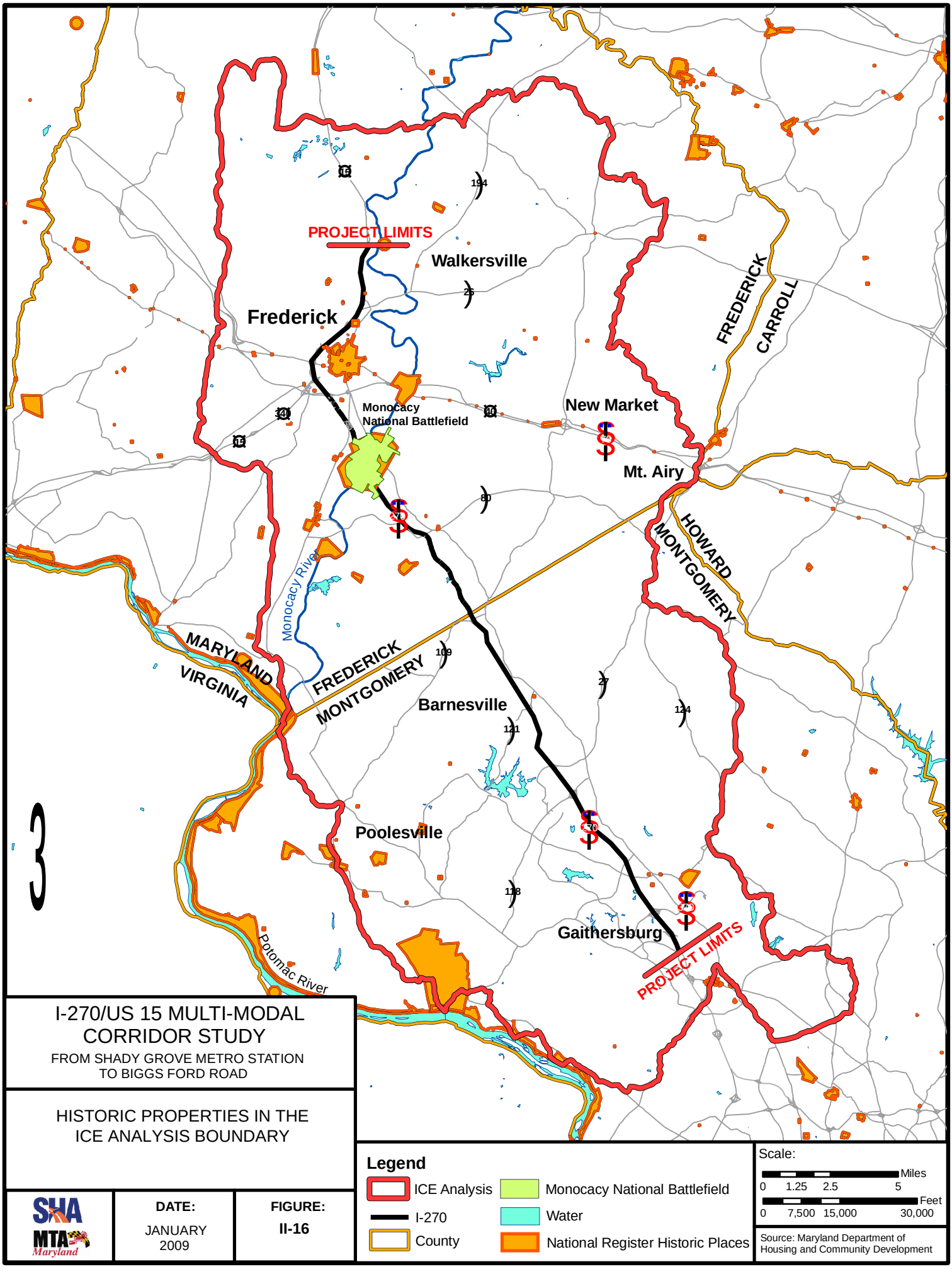
NRHP Reference #	County	Name	Date Listed
92001383	Montgomery	Friends Advice	10/28/1992
96000902	Montgomery	Edward Beale House	8/16/1996

***S**ource: Maryland Department of Housing and Community Development, from the 2002 DEIS.*

The National Historic Preservation Act (NHPA) of 1966 governs, on a federal level, the identification, analysis, and treatment of cultural (historic) resources. The lead federal agencies, FHWA and FTA, are required to take into account, during the planning process, the effect of their proposed project on historic properties which are listed on, or eligible for, the National Register of Historic Places (NRHP). In addition, Section 4(f) of the U.S. Department of Transportation Act of 1966, 49 USC 303(c), requires that the proposed use of land from any publicly-owned public park, recreation area, wildlife and/or waterfowl refuge, or any significant historic site, as a part of a federally funded or approved transportation project, is permissible only if there is no feasible and prudent alternative to the use.

On the state level, the Maryland State Historic Preservation Office (SHPO) maintains a state-based historic property registration program. The SHPO routinely prepares a state historic preservation plan that provides information about trends affecting historic properties. This document provides data on proposed efforts to more fully identify, document, register, and enhance historic properties. The plan often includes information about historic property rate of loss and includes a description of efforts to partner with federal, state, and local agencies and private non-profit organizations regarding preservation projects of importance.

Locally, both Montgomery and Frederick Counties have a number of historic preservation initiatives that provide for ongoing study, identification, and protection of both historic standing structures and archaeological sites. The Montgomery County Historic Preservation Ordinance was passed in 1979. The enforcement authority of the Historic Preservation Ordinance is the Historic Preservation Commission. Duties of the Commission include evaluating sites to be considered for preservation, reviewing work permits concerning historic sites, informing the public and holding workshops on historic preservation techniques. In order to encourage preservation in Montgomery County, several benefits are provided to minimize the restoration costs of historic sites, including federal, county and state income tax credits, and low-interest state loans.


PROJECT LIMITS
Walkersville
Frederick
Monocacy
National Battlefield
New Market
Mt. Airy
FREDERICK
CARROLL
HOWARD
MONTGOMERY
Monocacy River
MARYLAND
VIRGINIA
FREDERICK
MONTGOMERY
Barnesville
Poolesville
Gaithersburg
PROJECT LIMITS
Potomac River
3
I-270/US 15 MULTI-MODAL
CORRIDOR STUDY
FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD
HISTORIC PROPERTIES IN THE
ICE ANALYSIS BOUNDARY
SHA
MTA Maryland
DATE:
JANUARY
2009
FIGURE:
II-16
Legend
ICE Analysis
I-270
County
Monocacy National Battlefield
Water
National Register Historic Places
Scale:
Miles
0 1.25 2.5 5
Feet
0 7,500 15,000 30,000
Source: Maryland Department of
Housing and Community Development

Frederick County adopted a County Historical Preservation Plan in 1997, a Historic Preservation Ordinance and a Historic Preservation Commission to enforce it. The Commission reviews property owners' requests for nomination to the NRHP for eligibility and makes a determination whether it is historic. Once listed in the NRHP, the commission must review proposed changes to the exterior of their structures and their setting. The Commission also works towards educating the public about the importance of historic preservation. For those who wish to improve and restore a historic site, the same incentives exist for those in Frederick County as they do in Montgomery County, including the local property tax credit, and an additional limited-time reimbursement of assessed rehabilitation costs.

The ever-increasing population in Montgomery and Frederick Counties has placed greater demands on development of open areas and redevelopment of existing structures. As a result, important structures began to vanish, and the need to preserve historic sites and landmarks was recognized. However, while Montgomery County realized the need to save historic sites in the late 1970s, it was not until the 1990s that Frederick County began to face the same challenges.

The direct impacts of Alternatives 1-5 are detailed in the 2002 DEIS, and Alternatives 6A/B and 7A/B are detailed in the AA/EA (See ***Table II-3*** of this report). The project would also impact historic sites visually and audibly by altering the existing viewsheds and by increasing noise levels at historic sites.

All of the project build alternatives will have an adverse effect on the Monocacy National Battlefield, a National Historic Landmark. Direct impacts include the taking of land for right-of-way and the construction of a highway pier in the Monocacy River within the Battlefield. Additional impacts include noise and visual impacts. Direct impacts of the project on archeological sites has not been determined and will be addressed through Section 106 (of the NHPA) coordination efforts and the completion of a Memorandum of Agreement that will describe the identification, evaluation and treatment of any archeological sites that may be affected by the project's build alternatives. An Archeological Resources Protection Act Permit will be sought from the National Park Service.

a. Indirect Effects

Section 106 considers audible and visual impacts to be "indirect" effects; however, for the purposes of the I-270 AA/EA, these effects are considered to be direct and are accounted for in the Section 106 consultation process. This process is ongoing and will continue through the completion of a build alternative, if one is selected. Such efforts may include the determination of noise and visual impacts and potential minimization or mitigation of such impacts, addressing the settings of resources, and addressing the impacts themselves.

There are no developments dependent upon the I-270 project that would affect cultural resources elsewhere within the ICE boundary. Furthermore, there are no reasonably foreseeable cultural resource impacts related to the project that are further removed in time or space than the project's direct effects. Therefore, there are no indirect effects to cultural resources.

b. Cumulative Effects

Due to the unavailability of records showing trends in the elimination or protection of historic sites in the past to present time frame, a trends analysis was not conducted for these resources. However, for present and future time frames, it is assumed that development pressures associated with population and employment growth, in conjunction with all of the build alternatives, may affect existing historic resources or properties. Cumulative effects to cultural resources are therefore possible due to the increased traffic and use from development within the ICE boundary. As the population within the ICE boundary increases and commercial and residential development pressures rise, there may be additional physical, audible, and visual cumulative impacts to potentially significant cultural resources. Designated build-out areas lying within the ICE boundary may be developed, causing changes in land use, and resulting in potential cumulative effects to cultural resources.

The Monocacy National Battlefield may experience cumulative effects, including continued encroachment of development surrounding the park's boundaries. The Panel concluded that increased development would occur within most of the ICE boundary regardless of the implementation of a highway or transitway alternative.

Both Montgomery and Frederick Counties have responded to the loss of cultural resources resulting from development through their Historic Preservation Commissions. These commissions work to ensure that planned future development protects these resources to the extent possible. However, the Land Use Expert Panel did identify some forecast zones where residential and business development may be different from what the master plans describe (see ***Table II-14***). Cultural resources located in these forecast zones may be under more pressure for redevelopment than anticipated under the master plans.

Cumulative effects from this project plus other actions to cultural resources would be minimal based upon regulations controlling impacts to many of these resources. If adverse cumulative effects were to occur to these sites, laws and regulations are provided to facilitate the protection of these resources. For example, Section 106 of the National Historic Preservation Act and Section 4(f) of the 1966 Department of Transportation Act are in place to protect significant historic sites, minimize permitted impacts, and/or mitigate for any unavoidable impacts associated with projects that require a federal action. The I-270 project will not affect the cumulative development trends already affecting cultural resources in the ICE area.

3. Parks and Recreation Areas

Between 11 and 13 individual parks and recreation areas will be directly impacted by the project's build alternatives (***Table II-3***). Each alternative would require the use of land from parks/recreation areas as right-of-way for planned improvements. Direct effects are identified and discussed in detail in the Section 4(f) Evaluation summarized in the AA/EA and detailed in the Section 4(f) Evaluation Technical Report, February 2009.

More than 200 parks are located within the ICE boundary (refer to ***Figure II-4***). The parks are administered by a number of entities including the National Park Service, M-NCPPC and Frederick and Montgomery County's local or municipal jurisdictions. Each county is committed

to the preservation and expansion of their parks as stated in their respective master plans. Montgomery County elaborates on their commitment to parklands in their *2005 Land Preservation, Parks, and Recreation Plan* (December 2005) and Frederick County's equivalent is their *Land Preservation, Parks, and Recreation Plan*, approved May 2, 2006. Specific information on the historic growth of parklands within the ICE boundary was not readily available.

Section 4(f) of the US Department of Transportation Act of 1966, 49 USC. 303(c), requires that the proposed use of land from a publicly-owned public park, recreation area, wildlife and/or waterfowl refuge, or any significant historic site, as part of a federally funded or approved transportation project, is permissible only if there is no feasible and prudent alternative to the use. Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Section 6009 (P.L. 109-53) and 23 CFR 774.3(b) clarifies that if the Administration determines that the use of the Section 4(f) property, including any measures to minimize harm (such as avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a *de minimis* impact on the property. Final action requiring the taking of such land would, therefore, document and demonstrate that the proposed action includes all possible planning to minimize harm to the property resulting from such use. Therefore, the direct parkland impacts resulting from the I-270/US 15 Corridor improvements will be mitigated. However, the Section 4(f) requirements apply only to federal transportation improvement projects; parks that may be impacted by other land use changes would not be protected in the same manner. Parks affected by non-federal transportation actions would be protected by state and local ordinances that preserve existing open space.

a. Indirect Effects

There are no developments dependent upon the I-270 project that would affect park and recreation areas within the ICE boundary, other than those directly affected by the build alternatives. Furthermore, there are no reasonably foreseeable park and recreational facility impacts related to the project that are further removed in time or space than the project's direct effects. Therefore, there would be no indirect effects to parks or recreation areas caused by the I-270 project.

b. Cumulative Effects

The Panel found that most of the additional development would occur regardless of the alternative, including the No-Build. However, the Land Use Expert Panel also identified the potential for residential and business development in some of the forecast zones that straddle the corridor in excess of what the master plans describe. In particular, the Lewistown, Frederick City, Urbana, Damascus-Brookeville, Clarksburg, Germantown, Seneca Creek, and Gaithersburg zones may each develop differently than as planned for in the county master plans.

Parks located in these zones may incur cumulative effects on park resources in conjunction with this project. Given the counties' commitments to preservation of parklands, development accounted for in the county master plans would be expected to occur in a manner that preserves these resources.

Under all of the build alternatives, cumulative effects to parks and/or recreational areas caused by other development within the ICE boundary are possible. However, impacts to parklands are anticipated to be minimal because parklands are protected from development impacts through the counties and the state. Residential, commercial, and industrial development, in conjunction with the build alternatives, will result in increased use of park facilities, as well as increased noise and visual encroachment. Given current land use plans and regulations, proposed developments are not expected to require the use of parkland, therefore no acreage impacts are expected.

As noted above, impacts to public parks and recreation areas as a part of a federally funded or approved transportation project would require a Section 4(f) Evaluation to document that there are no feasible or prudent alternatives to the use of land from the park, and that the project includes all possible planning to minimize harm to the park.

4. Farms and Farmland Soils

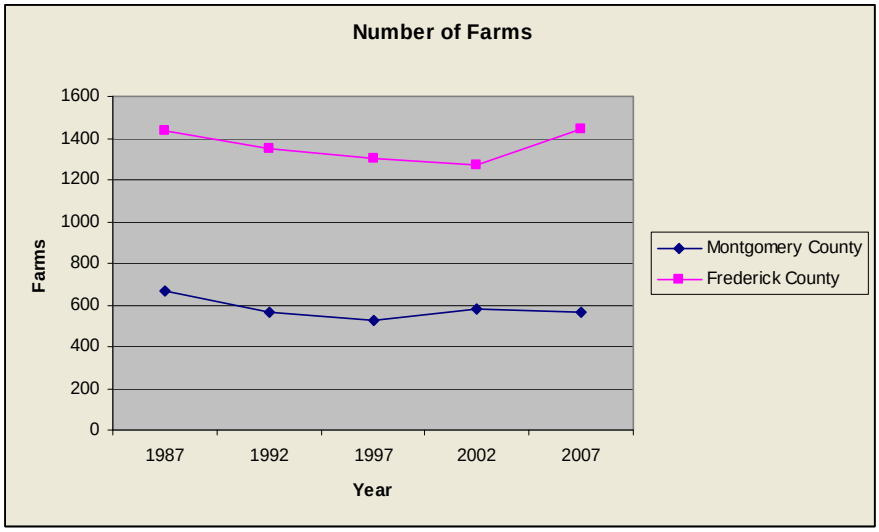
The amount of land used for farming in Maryland has been declining. The Agricultural Census, performed every five years by the US Department of Agriculture, reports on the status of farming throughout the United States. Data obtained from the 1992, 1997, 2002, and 2007 Agricultural Censuses provided the numbers of farms and the acres of land in farming for Maryland, Montgomery and Frederick Counties for those years. Although the number of farms and acres of land in farms has clearly decreased in past years, the trend appears to have reversed in recent (2002 and 2007) census years. This data is shown on ***Table II-16***, and the date for the counties is shown in ***Figure II-17.***

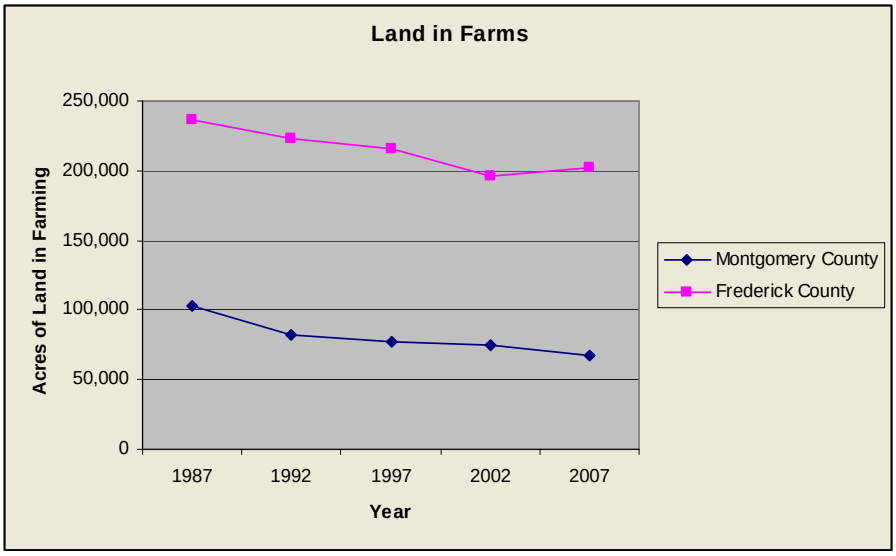
Table II-16: Farms and Farmland Trends

Year	1987	1992	1997	2002	2007
Maryland					
Number of Farms	14,776	13,037	12,084	12,198	12,834
Acres in Farmland	2,396,629	2,223,476	2,154,875	2,077,630	2,051,756
Montgomery County					
Number of Farms	669	561	526	577	561
Acres in Farmland	103,377	82,470	77,266	75,077	67,613
Frederick County					
Number of Farms	1,439	1,346	1,304	1,273	1,442
Acres in Farmland	236,350	222,768	215,927	195,827	202,067

Source: USDA Census of Agriculture at www.agcensus.usda.gov

Figure II-17: Trends in Farms and Farmed Acres in Montgomery and Frederick Counties





In Frederick County, the number of farms steadily declined in recent years, from 1,439 in 1987 to 1,273 in 2002. The amount of land in farming has continued to decline since 1987, from 236,350 acres to about 200,000 acres, a loss almost 15 percent of all farmed lands in the county. However, between the 2002 census and 2007 census, the number of farms has increased by 13 percent, and the amount of land in farms has increased by three percent.

In Montgomery County, the number of farms decreased from 669 in 1987 to 561 in 2007, and the number of acres in active farming also decreased from 103,377 acres in 1987 to 67,613 acres in 2007. This decline represents a loss of about one third of farmed land in Montgomery County. The Atlas of Agricultural Land Preservation in Maryland indicates that much of Maryland's prime and productive agricultural land is being fragmented by development.

The general trend of agricultural change in both Montgomery and Frederick counties indicates that this historical industry and way of life is declining. ***Figure II-14*** indicates the future for agricultural use in the ICE boundary, indicating a continued decline in the number of farms and acres of farmland. As the nation's population grows, more housing resources are needed. Very often, farms are the first targets of development, because of their comparatively low cost of acquisition. Furthermore, farmland is more attractive than other types of land, because it poses fewer constraints when converting the area into residential development.

The Farmland Protection Policy Act (FPPA), as amended in 1984 and 1994, defines the situations when the FPPA applies. Under this legislation, federal programs are administered in unison with state and local government, and private programs and policies to protect farmland. In Frederick and Montgomery Counties, the FPPA applies to prime farmland soils and soils of statewide importance. The criteria for these designations are related to soil characteristics such as texture, depth to water table, slope, and available moisture. These soils have the best combination of soil quality, growing season, and water supply for growing food and are capable of economically sustaining high crop yields. Urban areas and areas planned for development overlying prime farmland soils and soils of statewide importance are excluded from consideration under the FPPA. While many areas, particularly in Montgomery County, qualify for exclusion because of ongoing and planned development, there are still areas in the northern portion of the county that remain in active farmland and have prime farmland soils or soils of statewide importance. Actively farmed areas also occur in Frederick County north and south of the City of Frederick.

Maryland has designated approximately 23 percent of its soils as prime farmland, excluding federal land, urban land and water areas. Cultivated and uncultivated crop production consists of 47 percent prime farmland soils in Maryland land enrolled in the Conservation Reserve Program (CRP). CRP is a voluntary program for agricultural landowners to establish long-term, resource conserving covers on eligible farmland. CRP has the highest percentage of its land in prime farmland soils. Approximately 57 percent of total CRP land in Maryland is made up of prime farmland soils (Natural Resources Conservation Service (NRCS website, January 26, 2009, *www.nrcs.usda.gov/programs/CRP*).

With respect to prime farmland and statewide important soils, the long, linear nature of the proposed highway and transitway components of all build alternatives and extensive coverage of the study area by these soils result in direct impacts to these resources (refer to ***Table II-3***). The direct impacts associated with the build alternatives are not anticipated to interrupt viable farm operations or jeopardize the financial stability of these businesses.

a. Indirect Effects

There are no developments dependent upon the I-270 project that would affect farmland or farmland soils within the ICE boundary, other than those directly affected by the build alternatives.

Prime farmland soil may incur indirect effects from the project where land grading is necessary to construct additional lanes for the highway component, park and ride lots, transitway, transitway stations, and transitway O&M facilities, but where actual acquisition of the property

is not necessary. However, because much of the planned highway and transitway improvements are adjacent to areas of farmland that have already been disturbed, the indirect effects to adjacent undisturbed soils would be minor. There are no reasonably foreseeable farmland impacts related to the project that are further removed in time or space than the project's direct effects.

b. Cumulative Effects

The proposed future development in Clarksburg, Urbana, and Frederick and the designation of these towns as Priority Funding Areas will have impacts to prime farmland and statewide important soils through the conversion of these areas to commercial, industrial or medium/high density uses. Many areas that are presently in agricultural use are planned for development; see master plan documents and ***Tables II-9 and II-10***. This is consistent with the findings of the Panel.

The cumulative effects to prime farmland and statewide important soils are expected to be greatest in northern Montgomery County and middle and southern Frederick County where a majority of the land use in these areas is cropland, pasture, or orchard, and where the Panel expects the greatest amount of urban development to occur. Residential growth could have more substantial cumulative impacts to these soils as existing agricultural land uses are converted to medium and high density residential uses.

The cumulative effects to the southern portion of the ICE study area will be minimal as most of the area is developed and only a few scattered parcels of prime farmland and statewide important soils remain. Most of farmland soils have been converted to medium and high density residential or industrial land uses in these areas already. Therefore, the residential and commercial growth proposed by the Panel, in conjunction with construction of any of the build alternatives, would have minor cumulative impacts to any remaining parcels of prime farmland and statewide important soils.

In accordance with the FPPA, a Farmland Conversion Impact Rating form has been completed for this project and submitted to the Natural Resources Conservation Service (NRCS) for both Montgomery and Frederick Counties. The FPPA review by the United States Department of Agriculture-NRCS provides an evaluation of farmland within the project area to determine whether or not farmland soils are suitable for protection. Furthermore, Frederick and Montgomery Counties both have strong agricultural resource preservation goals in their master plans, which will help to minimize cumulative effects to farmland.

5. Forests/Terrestrial Habitat/Species

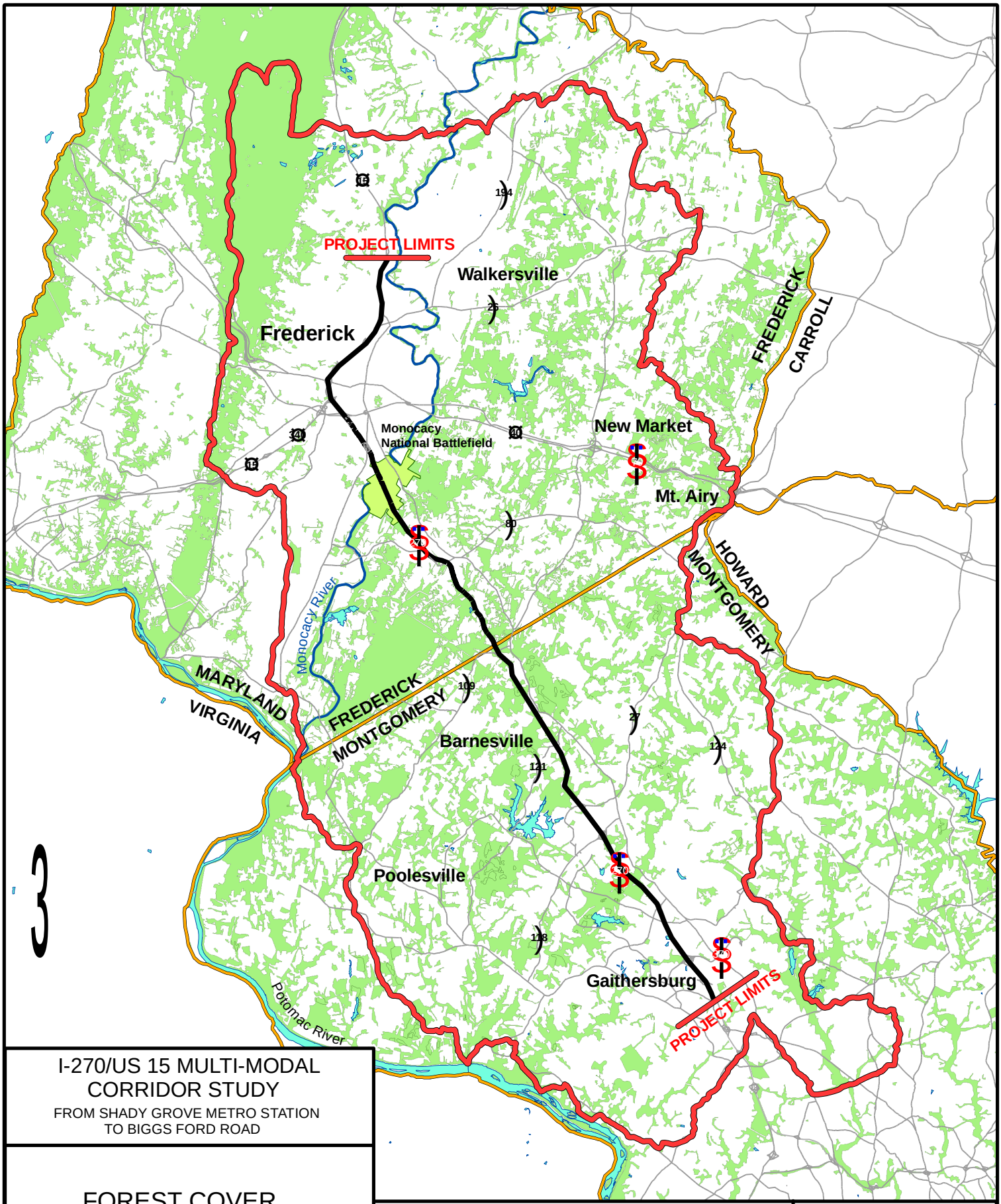
Forests are the primary terrestrial habitat within the ICE boundary, providing more ecological functions than any other type of habitat. According to DNR, forests are the single best land use for water quality protection and clean air and providing wildlife habitat (MDNR(b) 2003). Forests contribute to clean air by removing carbon dioxide and pollutants and releasing oxygen. They are also efficient filters, cleaning sediments and other pollutants from water, as well as stabilizing stream banks to reduce erosion. Streamside forests are also important for aquatic organisms that use decaying organic matter and downed woody debris for shelter, and that

benefit from temperature regulation and other water quality benefits provided by forests (MDNR(b) 2003).

In 1976, Frederick County contained 425,000 acres of total land, and 130,700 acres of wooded area (30.7 percent) (Powell and Kingsley 1980). Montgomery County contained approximately 317,000 acres of land, 87,400 acres of which was wooded (27.6 percent) (Powell and Kingsley 1980). By 1986, the amount of wooded land in Frederick County had been reduced to 116,800 acres (27.5 percent) (Frieswyk and DiGiovanni 1988). Similar 1986 data were not available specifically for Montgomery County; however, a forest resource inventory for Montgomery and Prince George's counties combined indicated the presence of 153,000 wooded acres (Frieswyk and DiGiovanni 1988). Preliminary, unconfirmed data from the US Forest Service showed that in 1999, wooded areas in Frederick and Montgomery/Prince George's counties increased to 127,300 acres and 235,200 acres, respectively (Frieswyk 2000 - unpublished/unofficial). This increase is likely attributable to the idling of cropland and its subsequent reversion to forest. However, there were also significant decreases in the rate of forest land cleared, as development favored previously cleared areas such as agricultural lands over undisturbed forest areas.

Based on 2000 land use maps of Frederick and Montgomery counties for the lower Monocacy River watershed, the watershed was 29 percent forested in Frederick County and 44 percent forested in Montgomery County (MDNR(a) 2003). The percent of forest converted to development between 1997 and 2000 is approximately 2.2 percent for Frederick County and 3.5 percent for Montgomery County (MDNR 2002). Forest corridors within Frederick County lost more than 10 percent of their area to development. In Montgomery County, many new small developments, close in proximity to one another or near previously developed areas, have obstructed forested corridors within the county (MDNR 2002).

The southern portion of the ICE study area, particularly in Montgomery County, is largely developed, with remaining forests situated along major streams. These streams include Rock Creek, Watts Branch, Muddy Branch, Great Seneca Creek, Little Seneca Creek, and Little Bennett Creek. Most of these forests are under local, state, or federal protection from extensive degradation. The forested areas remain concentrated along stream valleys north of the developed portions of Montgomery County, with land use transitioning from medium/high density residential and commercial to cropland and pasture. Most of Frederick County and the northern portions of Montgomery County have cropland as the dominant land use. However, larger streams such as portions of Little Bennett Creek, Bennett Creek, Monocacy River, and portions of Tuscarora Creek are surrounded by forest. The Monocacy River watershed is extensively forested, as this area has several agricultural easements located within its boundaries that forever restrict development on wooded parcels. Portions of the Monocacy River within the Monocacy National Battlefield are further protected by federal regulations due to their historical significance and their designation as a national park. Forest cover within the ICE analysis boundary is shown on ***Figure II-18***.



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

FOREST COVER

Legend

- ICE Analysis
- I-270
- County
- Monocacy National Battlefield
- Water
- Forest Cover

Scale:

0 1.25 2.5 5 Miles

0 7,500 15,000 30,000 Feet

Source: Maryland Department of Natural Resources

SHA MTA Maryland

DATE:	FIGURE:
JANUARY 2009	II-18

The types of direct impacts to plant communities and wildlife associated with the I-270 project's build alternatives would be similar (***Table II-3***), as the alternatives all share a similar impact adjacent to the existing roadways and for the CCT alignment. Alternatives 6A/B and 7A/B share the identical physical footprint. In general, direct impacts to forests and other plant communities include losses from clearing within right-of-ways and changes in plant community, structure, and composition. Effects to terrestrial resources will involve the conversion of habitat to impervious road, rail, or other associated facilities. The transitway O&M facilities are mostly proposed on undeveloped land adjacent to the transitway alignment, as are portions of the proposed transitway alignment itself between Metropolitan Grove Station and the proposed COMSAT station.

a. Indirect Effects

The pressures of development within forested parcels can lead to the indirect effects in the form of fragmentation of large contiguous forests into smaller, isolated patches, increasing the potential for their future conversion to non-forest use. Fragmentation can also affect the ecosystem of the forest by reducing wildlife and plant diversity and water quality (DNR 2003).

The vast contiguous stretches of forestland that were once present have been fragmented into smaller blocks by residential development, affecting many wildlife species. Fragmented forests create islands surrounded by development, which restricts species to these islands, reducing the number of individuals that can be supported by the available resources and potentially increasing the risk of inbreeding. These patches or islands create edge habitats that are more susceptible to predators and parasites from adjacent open areas, including invaders that could never survive in an interior forest (DNR 2003). Wildlife corridors and passageways are also interrupted by forest fragmentation, limiting wildlife access to other food sources and shelter.

Many species, such as forest interior dwelling bird species (FIDS), require large, contiguous forest tracts for survival. FIDS depend upon large, contiguous forest stands in order to successfully breed and produce sustainable populations. Within Maryland's Chesapeake Bay Critical Area (CBCA) (lands within 1,000 feet of tidal waters), FIDS are regulated through the protection of forest interior habitat (COMAR 1992). While the Critical Area law does not extend outside this zone and the suitable FIDS habitat within the ICE study area occurs outside of the Critical Area, the decline of FIDS and FIDS habitat has created awareness of the conservation needs for this group of birds throughout the state. FIDS typically require forests of at least 100 acres or riparian forest at least 300 feet wide to maintain viable breeding populations (Robbins et al. 1989).

When forest interior is converted to edge habitat, several negative effects can occur over time. These impacts include increased penetration of light and wind into the forest, and the establishment of invasive plants and other competing and predatory species. Changes in moisture and vegetation composition can occur due to an increase of light and wind penetrating into the forest. Interior forests typically are more moist and have more leaf litter, which is very important in the maintenance of food sources (insects, spiders, etc.) on which birds feed. When forests become fragmented, this important food source for interior birds can decrease.

Because all of the highway build alternatives are located along the existing alignments of I-270 and US 15, indirect effects caused by the fragmentation of existing forests within the ICE study area are not likely to occur as part of the highway component of the project. Encroachment impacts will slightly reduce the size of the forested tracts associated with the stream valley parks; however, it should not affect their suitability as FIDS habitat.

The transitway component has the potential to impact the edge of the forest tract associated with Great Seneca Creek, as it traverses this stream valley park adjacent to I-270. Indirect effects to forests and FIDS are anticipated to occur within the Great Seneca Creek and Little Seneca Creek watersheds as a result of the transitway alignment through relatively undisturbed forested stream valleys. This area is ideal FIDS habitat and likely supports many species of mammals, reptiles, and amphibians as well. The transitway will lie adjacent to the highway alignment on its passage through the forests, providing new openings for nest predators (e.g., raccoons) or parasites (e.g., brown-headed cowbirds) of FIDS.

Potential O&M facility sites are located in portions of the Great Seneca Creek and Little Seneca Creek watersheds that are currently undisturbed forest tracts. The location of transit stations (and potentially an O&M facility) and their potential to attract future development within undisturbed forested areas could cause direct forest impacts and fragmentation of these areas.

The conversion of forest land to industrial use could alter the functions that the forest is currently providing for these large stream systems. These functions include floodflow alteration, shoreline stabilization, in-stream shading, and wildlife habitat. The current and future regulatory framework associated with impacts to stream valley parks and community parks would limit encroachment within these areas, and any conversion of forest to non-forest uses would be subject to federal, state, and local regulations and ordinances.

Indirect impacts to terrestrial vegetation, including forest resources, could occur from changes to the physical environment encroached upon by a widened facility or by the newly constructed transitway. These changes in the physical environment resulting from the expansion or creation of an edge effect can include increased light exposure, soil compaction, increased surface temperatures, decreased soil water content, increased surface water runoff and sedimentation, and increased dust levels (Trombulak and Frissell 2000). All of these changes to the physical environment can lead to changes in plant communities, particularly areas of forest interior that become exposed to increased levels of light, wind, and soil compaction. These environmental stresses can result in the loss of trees from death due to disease or from blow down.

Indirect impacts to forests and other vegetative communities could also result from changes in the chemical environment. The operation and maintenance of nearby roads or transitways could result in the release of various chemical pollutants such as heavy metals, salts, organic compounds, ozone, and nutrients (Trombulak and Frissell 2000). These chemical pollutants can have potential impacts on terrestrial vegetation, including forested habitats, some distance away from roadways. For example, negative effects on roadside vegetation have been shown from the spread of deicing salts (Blomqvist 2001) and leaf damage from road deicing salts has been shown to occur up to 120 meters from a roadway (National Research Council 1991). Likewise, negative effects on plants along roadways have been shown for organic compounds (Cape 2002).

Incidental forest impacts could also occur from the human-induced introduction of invasive, non-native plant species facilitated by newly constructed roadways (Parendes and Jones 2000). Invasive species typically thrive within areas of disturbance and can tolerate a wide range of ecological conditions. Where large stands of forest may be fragmented, creating increased areas of edge habitat, greater light exposure, soil disturbance, and drier conditions may favor invasive species establishment to the detriment of native species. Fragmentation of larger blocks of forest can lead to diminished ecological functions and values by eliminating species adapted to forest interior habitat. A more detailed discussion of impacts to forest interior dwelling birds is provided below. Incidental impacts could occur along all build alternatives through the bisecting of larger forest blocks into smaller parcels that would have reduced capacity to support forest interior adapted species.

b. Cumulative Effects

Cumulative effects to forests are expected to be greatest for the watersheds of Great Seneca Creek and Little Seneca Creek under all of the build alternatives in conjunction with other transportation projects and urban development. The potential population and economic growth projected to occur within these areas from proposed future development within PFAs could result in encroachment into forested stream valleys. Fragmentation caused by cumulative development within the forested tracts of the Great Seneca Creek watershed could create breaks within this extensive wildlife corridor as well as alter the FIDS habitat.

The forested stream valley associated with Little Bennett Creek within the ICE study area may experience a loss of forest habitat due to planned development within Clarksburg. The projected population and economic growth for this area, could cause encroachment into forested areas. Encroachment may be minimal if existing commercial and industrial parcels are redeveloped. Pressures to develop within the forested areas of the Monocacy River watershed may also occur, as Frederick is identified as an area of major economic and population growth. The designation of these watersheds as stream valley parks, and the protection these areas warrant through federal, state, and local ordinances, has prevented development of the associated forest habitat. However, as future population and economic growth occurs within these watersheds the pressure to develop in protected areas may increase.

Any impacts to forests as a result of the cumulative effects would be minimized through application of regulations stated in the Maryland Forest Conservation Act (ACM, Natural Resources Article, Sections 5-1601 through 5-1613). The Forest Conservation Act (FCA) regulates forest impacts for most other projects including public and private development projects. The FCA requires preparation of a forest conservation plan for impacts to forests that total more than 40,000 square feet. Unlike the Maryland Reforestation Law, the FCA does not require a strict 1:1 mitigation ratio for affected forests. Rather the FCA protects “high priority” forests and sets reforestation and afforestation threshold percentages for any land undergoing development.

All road construction or construction projects utilizing state highway funding will require an acre for acre replacement of forest removed as part of the Maryland Reforestation Law 5-103. Forest mitigation in the form of reforestation is required and prioritized as follows:

1. Reforestation should occur on the construction site or in the project right-of-way being used for the construction.
2. Reforestation should occur on any public land within the county and watershed where the construction occurred.
3. Reforestation should occur in the county or watershed in the state in which the construction activity is located.
4. If all opportunities for reforestation have been exhausted to the satisfaction of the Department of Natural Resources, payment for forested area cleared can be made into the Reforestation Law fund.

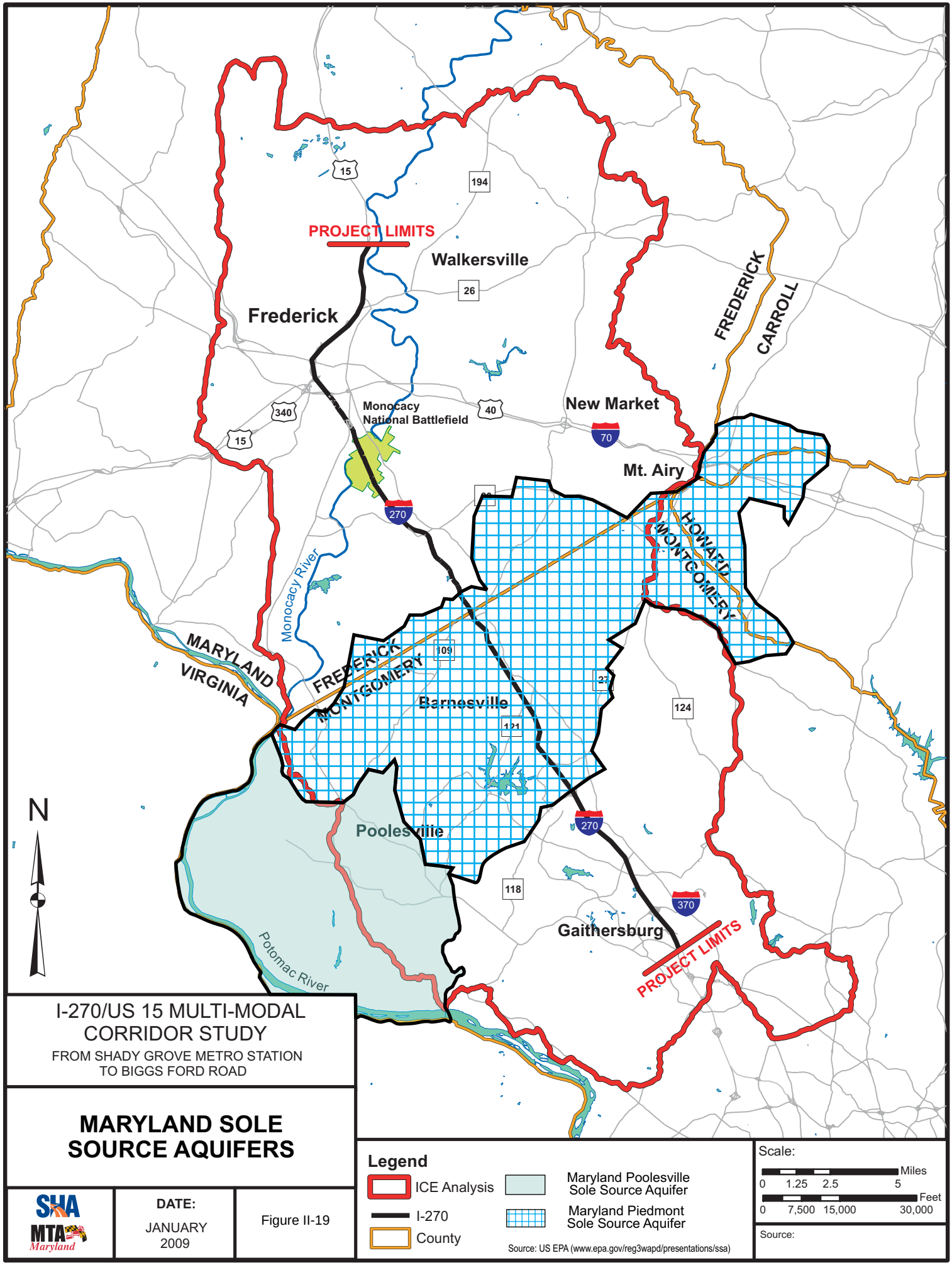
6. Groundwater/Sole Source Aquifers

The U. S. Environmental Protection Agency (EPA) Sole Source Aquifer (SSA) program allows individuals and organizations to petition the EPA to designate aquifers as the "sole or principal" source of drinking water for an area. The program was established under Section 1424(e) of the Safe Drinking Water Act (SDWA) of 1974 to provide EPA review of federal financially assisted projects planned for an area and to determine their potential for contaminating the aquifer and creating a significant hazard to public health.

The Poolesville and Piedmont Sole Source Aquifers (SSA) span a large portion of the ICE study area, as shown in ***Figure II-19***. Approximately 62 percent of the domestic drinking water used in this area is supplied by both sole source aquifers. Several drainages are located within the designated SSA area and include Little Seneca Creek, Great Seneca Creek, Dry Seneca Creek, Ten Mile Creek, Little Monocacy River, Little Bennett Creek, and Bennett Creek. The Poolesville SSA generally has good water quality, but due to a very thin soil layer and rapid water movement within the aquifer, there is little opportunity for contaminant attenuation. This aquifer is especially vulnerable to point and non-point source contamination. In addition, the EPA found that the three primary options available to local residents, in the event of contamination that makes the aquifer unusable, are not economically feasible. The primary forms of contamination that threaten the Piedmont SSA are through abandoned wells, septic tanks, leaking fuel tanks, and leaking from open dumps and improperly operated landfill sites. In 1980 there was evidence of localized contamination of the Piedmont SSA through individual disposal systems and leaking fuel tanks.

a. Indirect Impacts

The indirect effects of Alternatives 1 through 5 are discussed in detail in the 2002 SCEA. Alternatives 6A/B and 7A/B share the same footprint, so the impacts are the same. According to the Panel, development would occur within the ICE boundary whether or not a build alternative is selected. The Panel also identified the potential for increased dispersed residential growth in the less developed areas of Frederick County that could occur because of highway upgrades and identified clustered growth around proposed CCT stations. Much of the Piedmont SSA, within the ICE boundary, is located within Montgomery County. The portion of the Piedmont SSA within Frederick County is located just south of the Urbana area.



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD

MARYLAND SOLE SOURCE AQUIFERS

Legend

- ICE Analysis
- I-270
- County
- Maryland Poolesville Sole Source Aquifer
- Maryland Piedmont Sole Source Aquifer

Source: US EPA (www.epa.gov/reg3wapd/presentations/ssa)

Scale:

Miles: 0 1.25 2.5 5

Feet: 0 7,500 15,000 30,000

Source:

SHA MTA Maryland

DATE: JANUARY 2009

Figure II-19

The Panel found that the greatest increases in growth, that may impact SSA, occur in Urbana, Clarksburg, and Germantown. The conversion of open-space and forested areas to impervious areas or manicured landscapes would be expected to increase surface runoff and peak storm flows, as well as to introduce sediment and other pollutants into waterways and groundwater systems. These effects would be somewhat mitigated by required compliance with water quality protection regulations administered by MDE. These regulations require reductions in runoff and pollutant loadings through the use of approved stormwater management and erosion and sediment control plans. Growth in the Urbana area would have the potential to negatively affect the water quality of the upper Piedmont SSA.

The Clarksburg area was identified by the Panel as an area where substantial growth is expected to occur. The Clarksburg area is located in the center of the Piedmont SSA so any increases in development and associated contamination have the potential to negatively affect the groundwater quality. Any increased development within the Clarksburg Special Protection Area (SPA), discussed further in Section 8. Surface Waters and Aquatic Biota, would have to comply with stringent Best Management Practices (BMPs) designed to protect surface and groundwater quality. In addition, several of the transitway stations are proposed in areas along Little Seneca Creek. Transitway stations, their associated parking lots, and potential station area development have the potential to increase contamination of ground and surface waters. These effects should be minimized by compliance with MDE stormwater regulations and SPA BMPs.

In areas such as Germantown where development is already widespread, infill development is also likely to add to past and current surface and groundwater quality impacts, as it would further reduce the remaining natural habitats in the project area available to filter and infiltrate runoff. Areas where redevelopment is expected would most likely have limited net impacts on ground water quality, as most of the conversion of impervious areas would have occurred during the original development of the land. In addition, new projects would be required to comply with current regulations to reduce water quality impacts wherever possible.

During operation of the alternatives, the highway and transitway would have similar potential to increase groundwater quality degradation from stormwater runoff, because greater impervious surfaces and their associated contaminants from either mode could affect water quality. These indirect effects are anticipated to be minimal, as BMPs, SWM facilities and erosion and sediment control plans during construction are expected to eliminate the impact. Additionally, the increase in overall imperviousness in any of the affected watersheds is very small.

b. Cumulative Impacts

Potential impacts to the sole source aquifer will be reviewed by the EPA under the SDWA, Section 1424(e), which allows the EPA administrator to designate the aquifers that serve as principal drinking water sources and to prevent a contamination of the aquifer that could lead to a significant hazard to public health. The cumulative effects of Alternatives 1 through 5 are discussed in detail in the 2002 SCEA.

Only a small portion of the Poolesville SSA is located within the ICE boundary, but is not found within the project's limits of disturbance. There are no direct impacts to the Poolesville SSA

from Alternatives 6A/B or 7A/B, and the project will not add to cumulative impacts to the Poolesville SSA.

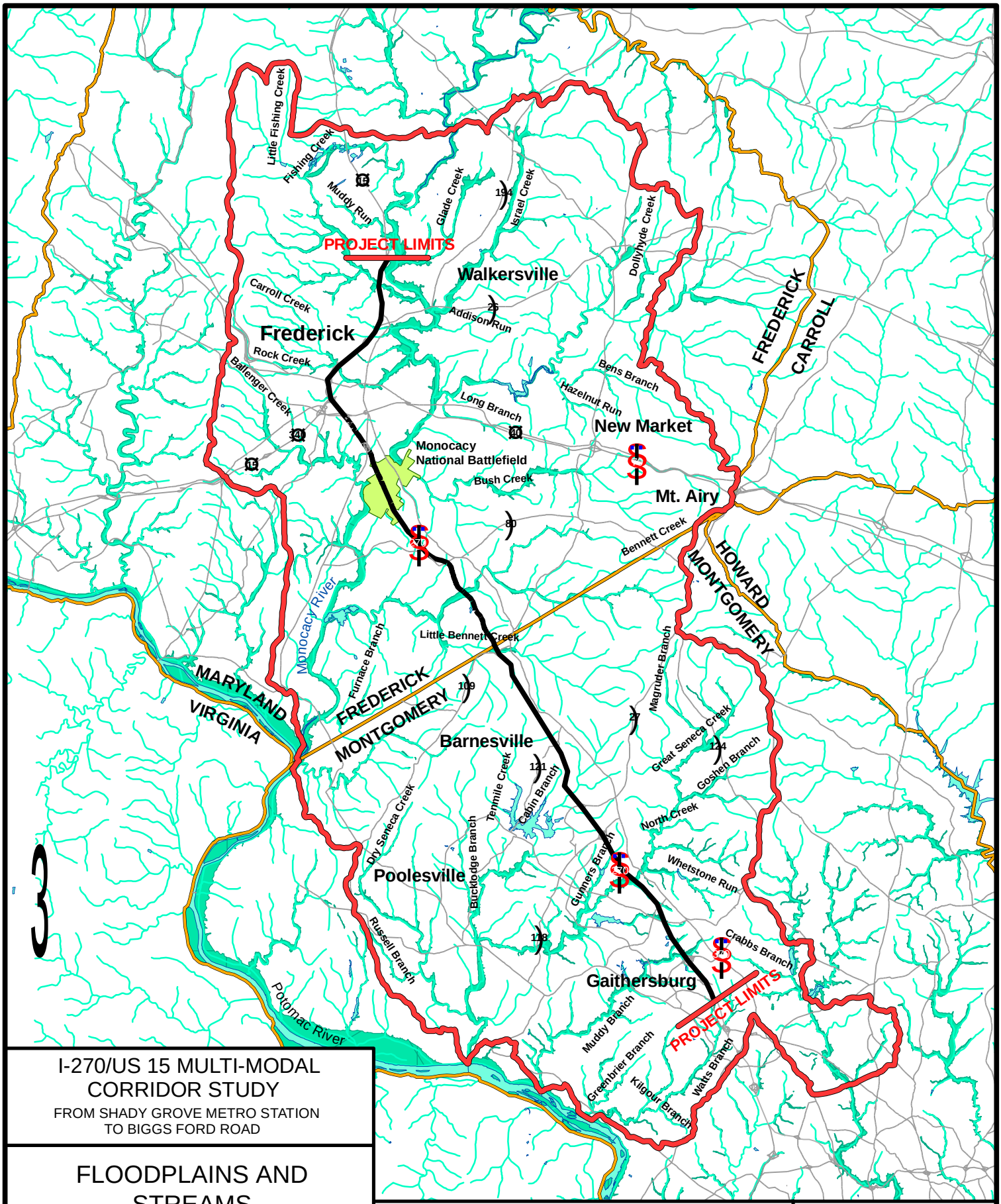
Both build alternatives will traverse the Piedmont SSA within the Little Seneca Creek, Little Bennett Creek, and Bennett Creek drainages. Direct impacts to the SSA are not anticipated as deep excavation or tunneling for either the highway or transitway components are not anticipated. The watersheds that have the potential to experience the most impacts from additional growth and development are Little Seneca Creek and Ten Mile Creek in the Clarksburg area, Little Bennett and Bennett Creek in the Urbana area, and Great Seneca Creek in the Gaithersburg area. These watersheds are all associated with the Piedmont SSA.

According to the Panel, the Clarksburg area is predicted to have the greatest amount of growth and development. The Clarksburg area is classified as a Priority Funding Area (PFA). PFAs are designated by the state and counties pursuant to the Smart Growth Priority Funding Act of 1997. PFAs receive targeted state spending for development and redevelopment projects. A large development located adjacent to Clarksburg Road, the Clarksburg Town Center, was recently created. This development covers 267 acres and is located within the Clarksburg SPA. BMPs and stormwater controls required by the SPA regulations should help to minimize future impacts to the Piedmont SSA. In addition, the Cabin Branch development project is planned for this area. A 530-acre mixed use development, located west of I-270 between MD 121 and West Old Baltimore Road, is planned for implementation during the 2005 – 2020 time frame. Increased residential and commercial development within the Clarksburg area may increase the potential for groundwater contamination. Stringent sediment and erosion controls, BMPs, and stormwater management will be necessary to protect the groundwater quality within the Clarksburg area.

The Urbana area in southern Frederick County is also predicted to have a large amount of growth and development. Urbana is also classified as a PFA. The Piedmont SSA would be indirectly impacted by the selection of a build alternative, as discussed above. The Urbana Town Center, located adjacent to I-270 and MD 355, is a 357-acre parcel that was recently developed. Currently, the Urbana area is primarily agricultural and forested land uses. The Panel identified the Urbana area as one where growth might be greater than planned under the master plan scenario. Continued growth and development that changes these land uses to residential and commercial may increase the potential for groundwater contamination.

7. Floodplains

Due to the large size of the ICE study area, only those streams located within the MDNR 8-digit watersheds that have 100-year floodplains associated with their boundaries are discussed in this analysis. These floodplain systems are shown in ***Figure II-20*** and include Fishing Creek, Hunting Creek, Glade Creek, Monocacy River, Israel Creek, Tuscarora Creek, Carroll Creek, Ballenger Creek, Bush Creek, Bennett Creek, Little Bennett Creek, Linganore Creek, Muddy Run, Gunners Branch, Seneca Creek, Dry Seneca Creek, Great Seneca Creek, Little Seneca Creek, Little Monocacy River, Muddy Branch, and Watts Branch.


PROJECT LIMITS
Walkersville
Frederick
New Market
Monocacy National Battlefield
Mt. Airy
Barnesville
Poolesville
Gaithersburg
PROJECT LIMITS
Little Fishing Creek
Fishing Creek
Muddy Run
Glade Creek
Israel Creek
Dollyhyde Creek
Carroll Creek
Addison Run
Rock Creek
Ballenger Creek
Bens Branch
Hazelnut Run
Long Branch
Bush Creek
Bennett Creek
Monocacy River
Furnace Branch
Little Bennett Creek
Magruder Branch
Great Seneca Creek
Gosheh Branch
North Creek
Whetstone Run
Crabbs Branch
Muddy Branch
Greenbrier Branch
Kilgour Branch
Watts Branch
Gunners Branch
Cabin Branch
Tennile Creek
Buckhodge Branch
Dry Seneca Creek
Russell Branch
Potomac River
FREDERICK
CARROLL
HOWARD
MONTGOMERY
MARYLAND
VIRGINIA
FREDERICK
MONTGOMERY
I-270/US 15 MULTI-MODAL CORRIDOR STUDY
FROM SHADY GROVE METRO STATION TO BIGGS FORD ROAD
FLOODPLAINS AND STREAMS
Legend
ICE Analysis
I-270
County
Monocacy National Battlefield
Water
MD 100 Year Floodplain
Streams
Scale:
Miles
0 1.25 2.5 5
Feet
0 7,500 15,000 30,000
Source: Maryland Department of Natural Resources
SHA
MTA Maryland
DATE:
JANUARY 2009
Figure II-20

Floodplains have been historically impacted throughout portions of the ICE study area where substantial development has occurred. Impacts to floodplains, as a result of past development, include the reduction of the floodplain area with filling of floodplains and construction of flood control structures, alteration of the flood elevation as a result of construction within the floodplain, and the impacts of uncontrolled stormwater runoff and increasing impervious area. In Montgomery County, the designation of stream valley parks facilitated the preservation of 100-year floodplains and discouraged encroachment within these areas, reducing the need for flood control projects.

Direct impacts to 100-year floodplains from the project alternatives are shown in ***Table II-3***. Project alternatives are not configured in such a manner that major longitudinal floodplain encroachments will occur. The majority of floodplain encroachments will be from perpendicular crossings by the build alternatives and the transitway alignment.

Floodplains provide important functions that are vital to the natural environment and human safety. Some of the most important of these functions are flood storage, pollutant attenuation, benefits to wildlife, recreational opportunities, open space, and groundwater recharge. A majority of the floodplains in the study area are forested stream valleys that have been retained as public parks or recreation areas within which minimal disturbance is allowed due to their significant aesthetic and historical value. These floodplain systems also retain all of their potential functions discussed above making them even higher value systems within the surrounding landscape. However, disturbances occur in areas where the existing I-270/US 15 roadway bisects the floodplain with bridge and culvert spans that have support components placed within the 100-year floodplain. The undisturbed nature of the study area floodplain resources within the proposed transitway alignment is also providing these same functions to their full extent without any encroachment from existing infrastructure or roadways. The significance of floodplain encroachment was evaluated with respect to the criteria in Executive Order 11988 (Floodplain Management). Floodplain encroachment was also analyzed according to the Federal Aid Highway Program Manual, which recommends that longitudinal encroachment (encroachment that parallels the stream channel) be avoided whenever possible.

Potential direct impacts to floodplains are greater along the transitway as the alignment extends through relatively undisturbed landscapes. Vegetation removal and grading for the track bed and the transit stations near Muddy Branch, Great Seneca Creek, Gunners Branch, and Little Seneca Creek could alter flow regime of the stream, diminishing flood storage and wildlife potential. The potential O&M facilities sites could also convert portions of the 100-year floodplain of Little Seneca Creek and Great Seneca Creek into impervious cover. Hydrologic and hydraulic studies will be conducted at later phases to determine if these disturbances will increase the potential for downstream flooding of residential and commercial areas.

a. Indirect Effects

The 100-year floodplains most affected by indirect effects associated with the project include Muddy Branch, Great Seneca Creek, Gunners Branch, and Little Seneca Creek. These systems are being traversed by both the highway and transitway components which could indirectly impact the 100-year floodplains associated with these streams.

Indirect effects to floodplain systems would be similar to indirect effects on surface waters, which are described in the next section. In general, indirect effects are related to the direct impacts caused by the presence of a highway or transitway, but occur upstream or downstream of the direct impacts. Indirect impacts to floodplains from any of the build alternatives could result from highway or transitway runoff, sedimentation, and alterations to floodplain dynamics. For instance, indirect impacts of a culvert could be aggradation upstream and scour and degradation downstream of a culvert.

The primary indirect impacts to floodplains in the study area would likely occur as a result of increased imperviousness caused from a widened roadway or a new transitway facility. Indirect impacts from bridge crossings can also occur due to clearing of forested riparian areas and the placement of fill, retaining walls, and piers in floodplains that may inhibit lateral channel migration. Details on these kinds of indirect impacts are further described in the surface waters section.

b. Cumulative Effects

Construction of other transportation, residential, and commercial development, coupled with the direct effects of any of the build alternatives, could potentially cause cumulative effects to 100-year floodplains. The 100-year floodplains associated with Muddy Branch and Gunners Branch have experienced encroachment and manipulation from past development. Future encroachment into these areas is unlikely as they are already surrounded by medium to high density residential and institutional land uses.

Cumulative effects to floodplains are most likely to occur where future transportation and urban development is planned, particularly in the watersheds of Great Seneca Creek and Little Seneca Creek. The effects of any of the project build alternative in these watersheds, in conjunction with the planned future development projects in Germantown and Clarksburg, are more concentrated near these floodplains than any other floodplains within the ICE study area. The designation of the Great Seneca Creek and Little Seneca Creek stream valleys as parklands greatly limits the potential for floodplain impacts from development in these areas under local ordinances. There will, however, be some loss in floodplain function as areas within Great Seneca Creek and Little Seneca Creek that were previously available for storage or dissipation of flood waters are affected by development. The mitigation of flood storage impacts is required by the MDE if the proposed development increases flooding or creates a dangerous situation during flooding, especially on another person's property.

Cumulative effects would be greatly minimized through federal, state, and local regulations which limit encroachment into floodplains. Local municipalities and counties have adopted ordinances to manage development within the 100-year floodplain to prevent increased flooding and reduce future flood damage as part of the National Flood Insurance Program (NFIP). The NFIP requires permits for all development within the 100-year floodplain. Development includes grading, filling, dredging, extraction, storage, subdivision of land, and the construction or improvement of structures.

Montgomery County requires a permit for any land-disturbing activity totaling 5,000 square feet or more within the floodplain district (including associated 25-foot Building Restriction Line)

and for temporary or permanent construction involving the placement of a structure, regardless of the size of the disturbed area. The Federal Emergency Management Agency (FEMA) contracted with MDE to review local floodplain ordinances to insure that they meet FEMA requirements for eligibility for flood insurance. Floodplain impacts within designated M-NCPPC stream valley parks will also be subject to M-NCPPC environmental guidelines and review processes.

Frederick County also regulates development within the floodplain based on their county ordinance. The ordinance prohibits new development including parking lots impervious to water, fill, or excavation operations in conjunction with development in FEMA designated 100-year floodplains.

In addition to local ordinances, any development impacts to 100-year floodplains would require federal and state permits and any floodplain encroachment would also require authorization by the MDE under a Waterway Construction Permit.

8. Surface Waters and Aquatic Biota

Surface waters within the ICE boundary are located within two Maryland 6-digit watersheds, the Upper Potomac (021403) and the Middle Potomac (021402). These larger watersheds are further divided into 8-digit watersheds that lie within the ICE boundary, including the Upper Monocacy (02140303), Lower Monocacy (02140302), Seneca Creek (02140208), Potomac River Montgomery County (02140202), and Rock Creek (02140206).

Within the Upper Monocacy 8-digit watershed, the primary named stream systems include Fishing Creek, Hunting Creek, and Glade Creek. Within the Lower Monocacy, the primary named stream systems include Israel Creek, Tuscarora Creek, Carroll Creek, Ballenger Creek, Bush Creek, Bennett Creek, Little Bennett Creek, Wildcat Branch to Little Bennett, Linganore Creek, and Muddy Run.

Within the Seneca Creek watershed, the primary named stream systems include Gunners Branch, Wildcat Branch, Seneca Creek, Dry Seneca Creek, Great Seneca Creek, Wildcat Branch to Great Seneca, Little Seneca Creek, and Ten Mile Creek. Within the Potomac River Montgomery County watershed, the primary named stream systems within the ICE boundary include the Little Monocacy, Muddy Branch, and Watts Branch. The Rock Creek watershed includes only Rock Creek.

In addition, there are six lakes within the ICE boundary. Four lakes are within Montgomery County: Little Seneca Lake, Gunners Lake, Lake Churchill, and Clopper Lake. Two lakes are within Frederick County: Lilypons fish hatchery and Lake Linganore.

a. Descriptions of the Watersheds within the ICE Boundary

The following discussion of watersheds within the ICE boundary describes the existing water quality conditions and trends that may be affected by indirect or cumulative impacts. Direct effects from the project on these watersheds are discussed in detail in the project's Natural Environmental Technical Report (2007), and summarized in ***Table II-3***.

Upper Monocacy

The Monocacy is the largest Maryland tributary to the Potomac River, and forms near the Maryland and Pennsylvania border west of Harney, Maryland, at the confluence of Marsh and Rock creeks. From its origin, the river flows south to Double Pipe Creek, marking the border between Frederick and Carroll Counties. Continuing south solely within Frederick County, it flows east of Frederick City and empties into the Potomac River near Dickerson, Maryland, some 58 miles from its source.

The Monocacy watershed, a sub-basin of the Middle Potomac River basin, encompasses 774 square miles or 476,200 acres, 75 percent of which is located in Maryland. The remainder of the watershed lies in Pennsylvania. Roughly three-quarters of the land in the watershed has been cleared for agriculture and currently supports about 3,500 farms, averaging 150 acres each. The remaining land supports forests, the City of Frederick, and ever-growing residential neighborhoods. Sediment continues to be a management problem for the basin. High levels of sediments suspended in surface waters periodically force the closure of drinking water supplies up river and the need for additional chemical treatment in drinking water from lower stretches and the Potomac River. Agriculture practiced on highly erodible soils has the potential to degrade both surface and groundwater resources by contributing nutrients (such as nitrogen and phosphorus), agrichemicals, and sediment. Recognizing this, the Maryland Department of Agriculture has targeted the Monocacy watershed as a top water quality management priority.

Across the Monocacy watershed, crop land soil erosion ranges from two to 35 tons per acre per year, and more on intensively cultivated land. Of the 3,500 farms in the watershed, most are commercial livestock operations such as dairy, poultry, hogs, and horses. Together, these livestock operations produce nearly 1,119,400 tons of manure annually containing the equivalent of 4,400 tons of nitrogen and 900 tons of phosphorus. This animal waste, along with processed water from milking parlors that produces additional nutrients, organic material, and pathogens, eventually fouls the odor, taste, and appearance of surface waters. Fecal coliform, an indicator of disease-causing organisms, has been a persistent problem for a section of the river below the Frederick Sewage Treatment Plant. Failing septic systems also contribute to nutrient enrichment problems. National studies have shown that the use of inorganic nitrogen fertilizers increased four-fold from 1960 to 1980. Nitrogen is of particular concern because it readily dissolves in water and in high concentrations can cause illness in infants. After passage of the Scenic and Wild Rivers Act, officials identified the Monocacy River as a significant state resource and prime candidate for scenic designation. Approval came on April 30, 1974, and a management plan with recommendations to conserve, preserve, and manage the Monocacy and its tributaries is now in place.

The Maryland Biological Stream Survey (MBSS) rated the Upper Monocacy River as a Tier 1 watershed for Stream and Riverine Biodiversity. The Upper Monocacy is a stronghold watershed for both Maryland state listed endangered or threatened species as well as for species of Greatest Conservation Need (GCN). The Upper Monocacy River was placed on Maryland's 303(d) list of water quality limited segments (WQLS) as impaired by fecal coliform in 2002, nutrients in 1996, sediments in 1996, and impacts to biological communities in 2002. The Upper Monocacy River has two Total Maximum Daily Load (TMDL) plans that have been submitted,

one for bacterial impairment and the other for sediment impairment. Furthermore, a TMDL is currently under development for nutrients.

Fishing Creek, a Use III-P natural trout waters tributary to the Monocacy River, is located entirely within Frederick County. The MBSS Fish Index of Biotic Integrity (FIBI) rated the sites sampled within Fishing Creek from Fair to Good. The Benthic Index of Biotic Integrity (BIBI) rated the same sites from Very Poor to Fair. The Physical Habitat Index (PHI) rated the stream system as Partially Degraded.

Hunting Creek, a Use III-P natural trout waters tributary to the Monocacy River, is located entirely within Frederick County. The fish community was generally rated Good by the MBSS FIBI, with some tributaries rated as Fair or Poor. Brook, rainbow, and brown trout were all found in the Hunting Creek watershed. The MBSS BIBI rated the benthic macroinvertebrate community between Very Poor and Fair. Physical habitat in the Hunting Creek watershed was rated as Minimally Degraded.

Glade Creek, a Use IV-P recreational trout waters tributary to the Monocacy River, is located entirely within Frederick County. The fish and benthic macroinvertebrate community were both rated Very Poor by the MBSS. Aquatic habitat was Generally Marginal at this site.

Lower Monocacy

The Lower Monocacy watershed is rated as a Tier 6 watershed for biodiversity. Tier 6 watersheds are not considered stronghold watersheds for GCN species, listed species, or biological conservation units. The Lower Monocacy River was placed on Maryland's 303(d) list of WQLS as impaired by fecal coliform in 2002, nutrients in 1996, sediments in 1996, and impacts to biological communities in 2002, 2004, and 2006. Lake Linganore, an impoundment within the Lower Monocacy River basin, was listed for nutrients and sediments in 1996. The Lower Monocacy River has two TMDL plans that have been submitted, one for bacterial impairment and the other for sediment impairment. Furthermore, a TMDL is currently under development for nutrients.

Israel Creek, a Use IV-P recreational trout waters tributary to the Monocacy River, is located entirely within Frederick County. The fish community was rated Good by the MBSS FIBI. The benthic macroinvertebrate community was rated between Poor and Fair. Aquatic habitat within the watershed was generally rated as Suboptimal by MBSS.

Tuscarora Creek, a Use III-P natural trout waters tributary to the Monocacy River, is located entirely within Frederick County. Biological conditions are varied throughout this watershed primarily due to agricultural land use stressors. The fish community was rated from Poor to Good using the MBSS FIBI. The benthic macroinvertebrate community was rated from Very Poor to Fair using the MBSS BIBI. Aquatic habitat was Severely Degraded within the watershed, primarily due to agricultural impacts.

Carroll Creek, a Use III-P natural trout waters tributary to the Monocacy River, is located entirely within Frederick County. Carroll Creek is regularly stocked by MDNR with rainbow trout. One Maryland threatened species, pearl dace (*Margariscus margarita*) is found within the

Carroll Creek watershed. The MBSS FIBI rated the fish community within Carroll Creek between Fair and Good. The benthic macroinvertebrate community was rated Very Poor by the MBSS BIBI. Overall, aquatic habitat within the watershed is Partially Degraded.

Ballenger Creek, a Use III-P natural trout waters tributary to the Monocacy River, is located entirely within Frederick County. One Maryland threatened species, pearl dace, is found within the Ballenger Creek watershed. Brown trout were also found within Ballenger Creek. Overall, the MBSS FIBI rated the fish community within Ballenger Creek between Poor and Good. The benthic macroinvertebrate community was rated from Very Poor to Fair. Aquatic habitat varied throughout the watershed ranging from Degraded to Minimally Degraded.

Bush Creek, a Use I-P water contact recreation tributary to the Monocacy River, is located entirely within Frederick County. The MBSS FIBI rated sites located along the mainstem of Bush Creek in the Fair and Good range with sites located along tributaries scoring in the Very Poor range. The benthic macroinvertebrate community ranged from Poor to Fair throughout the watershed. Aquatic habitat was generally Marginal to Suboptimal.

Bennett Creek, a Use I-P water contact recreation tributary to the Monocacy River is located entirely within Frederick County. The fish community within Bennett Creek is rated Fair and Poor by the MBSS FIBI. The Maryland state threatened comely shiner (*Notropis ameonus*) is located within the Bennett Creek watershed. The benthic macroinvertebrate community within Bennett Creek is rated Poor to Fair by the MBSS BIBI. Aquatic habitat is rated Partially Degraded by the MBSS PHI.

Little Bennett Creek is a stream valley greenway originating in Oak Ridge, traveling southwest through Clarksburg, and into the Black Hill Regional Park. Little Bennett Creek is classified as Use I-P water contact recreation below MD 355, and Use III-P natural trout waters above MD 355. The fish community of Little Bennett Creek is rated Fair and Good by the MBSS FIBI. The benthic macroinvertebrate community is rated Poor and Fair by the MBSS FIBI. The aquatic habitat of the watershed ranges from Marginal to Suboptimal. MCDEP found that all of the Little Bennett Creek watershed, including Wildcat Branch, support a Good biological community and is an important cold-water fishery in the county. The Little Bennett Creek watershed contains a large number of the reference sites used to determine the water quality of other streams in the county.

Linganore Creek, a Use III-P natural trout waters tributary to the Monocacy River, is located entirely within Frederick County. The fish community of Linganore Creek is rated Fair and Good by the MBSS FIBI. The benthic macroinvertebrate community is rated Very Poor to Fair by the MBSS BIBI. The aquatic habitat is rated Partially Degraded or Minimally Degraded by the MBSS PHI.

Muddy Run, a Use I-P water contact recreation tributary to the Monocacy River, is located entirely within Frederick County. The fish community of Muddy Run is rated Fair and Poor by the MBSS FIBI. The benthic macroinvertebrate community is rated Very Poor to Fair. The aquatic habitat is characterized as Severely Degraded.

Lake Linganore is located along Linganore Creek in Frederick County. Lake Linganore was added to Maryland's 303(d) list of WQLS in 1996. In 2003, the EPA approved a final TMDL plan for the lake to address problems with sediments and nutrients, especially phosphorous.

Seneca Creek

The Seneca Creek watershed covers 128 square miles, or 27 percent of Montgomery County, however, the drainage area in the Potomac Subregion (a community planning area within Montgomery County) is only about nine square miles or 5,776 acres. Seneca Creek is the largest watershed wholly within the county. Due in part to the size of its watershed, Seneca Creek takes on the character of a small river as it approaches its confluence with the Potomac.

The Seneca Creek watershed is the most rural of the watersheds in the Potomac subregion. The rolling landscape is dominated by farm fields and woodlots and punctuated by large-lot developments. The stream valley, which is largely within Seneca Creek State Park, contains extensive areas of mature upland and floodplain forests. Imperviousness in the portion of the watershed in the Potomac Subregion ranges from four to 11 percent. Within the Potomac Subregion, the Seneca watershed contains approximately 2,500 acres of forest (EA 1997a). The Countywide Stream Protection Strategy (CSPS) characterized the portion of Seneca Creek in the Potomac Subregion as fair to good for stream habitat conditions (MCDEP1997). Areas lower in the watershed are in better condition than the headwater sections draining urbanized areas of Shady Grove and the City of Gaithersburg.

In 1976, a concept plan containing a summary of water quality information for Seneca Creek for a period ending in 1972 presented an overview of water quality conditions in the Seneca Creek watershed (M-NCPPC, 1976). The report concluded that Seneca Creek generally did not have water quality problems related to dissolved oxygen, pH, turbidity, temperature, nutrients (nitrates and phosphates), and biochemical oxygen demand. However, the report indicated that none of the streams in the Seneca Creek watershed met the fecal coliform standard at all times.

From 1977 to 1985, Seneca Creek experienced a statistically significant trend of degrading water quality on the basis of total suspended solids (TSS) and fecal coliform (MDE 1988). This trend appears to have stabilized, as the levels of TSS and fecal coliform decreased significantly between 1985 and 1987 (MDE 1988). Data for subsequent years indicate slightly elevated levels of TSS and fecal coliform (MDE 1991, 1994), but do not provide sufficient information to determine if the trend is increasing or decreasing.

Surveys completed over the years 1989-1993 indicate good, unimpaired habitat with a moderately impaired aquatic community (MDE 1991, 1994). The improved water quality is evidenced by the reported health of the benthic macroinvertebrate community. The Seneca Creek watershed is now rated as a Tier 6 watershed for biodiversity. Tier 6 watersheds are not considered stronghold watersheds for GCN species, listed species, or biological conservation units.

Dry Seneca Creek is located just south of Route 107 near Poolesville, and connects with Great Seneca Creek to the southeast. Dry Seneca Creek is classified as a Use I-P, water contact recreation stream system. Dry Seneca Creek flows into Seneca Creek just before the confluence

with the Potomac River. The fish community within Dry Seneca Creek is rated Fair and Good by the MBSS FIBI. The benthic macroinvertebrate community is rated Poor to Good by the MBSS BIBI. The aquatic habitat is generally Degraded with some areas of higher quality habitat. MCDEP found Good quality biological conditions in many parts of Dry Seneca Creek, but notably found Poor conditions below the Poolesville wastewater treatment plant.

Great Seneca Creek is an existing stream valley greenway, which begins in Damascus and connects with the Potomac River. Additional linkages occur with Dry Seneca and Little Seneca Creeks. The MCDEP found that the Great Seneca Creek watershed is in good to excellent biological condition (MCDEP 1999). MCDEP found that the highest quality biological communities were located father down in the watershed, away from the urbanized Gaithersburg area. The MCDEP also indicated that portions of Great Seneca Creek have elevated levels of nutrients. The biological community was highly variable throughout the Great Seneca Creek watershed. The MBSS FIBI rated the fish community Very Poor to Good. The MBSS BIBI rated the benthic macroinvertebrate community Very Poor to Fair. Aquatic habitat was primarily rated as Degraded.

Wildcat Branch to Great Seneca Creek is a Use III, natural trout waters stream system. The MBSS FIBI rated the fish community of Wildcat Branch as Good and brown trout were found in the stream during the sampling. The MBSS BIBI rated the stream as Fair and the PHI rated the aquatic habitat as Partially Degraded.

Little Seneca Creek is a partially established greenway that originates south of Clarksburg and links with Great Seneca Creek to the southwest. Little Seneca Creek is a Use III-P stream from its confluence with Bucklodge Branch upstream until it reaches the Baltimore and Ohio Railroad Bridge. Above this area, Little Seneca Creek is classified as Use IV-P. The fish community within the Little Seneca Creek was rated Very Poor to Good by the MBSS FIBI. Most sites scored in the Good range. The benthic macroinvertebrate community was rated between Poor and Good by the MBSS BIBI, with most sites scoring in the Fair range. Aquatic habitat was rated Partially Degraded by the MBSS PHI.

The Little Seneca Creek watershed upstream of Little Seneca Lake is designated by Montgomery County as the Clarksburg Special Protection Area (SPA). SPAs are places where existing water resources or other environmental features directly relating to water resources are of high quality or unusually sensitive. These places are also where proposed land uses would threaten the quality of preservation of those resources or features in the absence of special water quality protection measures, which are closely coordinated with appropriate land use controls. Development within SPAs requires coordination with Montgomery County and the implementation and monitoring of best management practices (BMPs).

Ten Mile Creek is a stream valley greenway connecting the Little Bennett Greenway and the Little Seneca Greenway via Black Hill Regional Park. Ten Mile Creek is classified as a Use IV-P, recreational trout waters, and flows into Little Seneca Lake. The fish community of Ten Mile Creek was rated as Good by the MBSS FIBI. The benthic macroinvertebrate community was rated as Fair by the MBSS BIBI. The aquatic habitat was rated as Severely Degraded.

Gunners Branch is a tributary to Great Seneca Creek. The fish and benthic macroinvertebrate communities of Gunners Branch were rated as Poor by the MBSS IBIs. Aquatic habitat was rated as Severely Degraded by the MBSS PHI. MCDEP found that Gunners Branch had an overall stream condition of Fair.

Little Seneca Lake is 505 acres in size and classified as mesotrophic. Cold water from the bottom of Little Seneca Lake enables the downstream areas of Little Seneca Creek to be suitable as Use III natural trout waters. In 1998, Little Seneca Lake was put on Maryland's 303(d) as impaired by nutrients. In 2006, EPA concurred on a water quality analysis conducted by MDE that found that Little Seneca Lake was no longer impaired by nutrients.

Clopper Lake is 90 acres in size and classified as mesotrophic. Clopper Lake was placed on Maryland's 303(d) list in 1998 for impairments associated with phosphorous and sediments. In 2002, EPA approved a TMDL for Clopper Lake which included phosphorous and sediments.

Potomac River Montgomery County

The MBSS rated the Potomac River Montgomery County as a Tier 1 watershed for Stream and Riverine Biodiversity. This watershed is a stronghold watershed for both Maryland state listed endangered or threatened species as well as for species of GCN.

The Little Monocacy River is a Use I-P direct tributary to the Potomac River. Minimal development has occurred within the Little Monocacy watershed during the past forty years. Small towns such as Barnsville and Dickerson and their associated residential communities characterize this rural and forested watershed. The fish community of the Little Monocacy watershed was rated Good along the mainstem and Fair within the tributary systems. The benthic macroinvertebrate community was rated Poor to Good by the MBSS BIBI. Aquatic habitat throughout the watershed was rated as Marginal or Suboptimal. MCDEP considers the Little Monocacy watershed to be one of the most scenic rural watersheds in the County. Overall, MCDEP found that the aquatic habitat and biological conditions were in the Good range.

Muddy Branch is an existing stream valley greenway beginning south of Gaithersburg and connecting to the Potomac River. No detailed assessment information was available. The Muddy Branch watershed, like much of the urbanized portion of Montgomery County, has been negatively affected by past development that has occurred along major roadways and rail lines. Muddy Branch is a Use I-P direct tributary to the Potomac River. The fish community of Muddy Branch was generally rated Good by the MBSS FIBI, while the benthic macroinvertebrate community was generally rated Poor. Aquatic habitat was in the Suboptimal range. MCDEP found the headwaters of Muddy Branch to be in Poor condition while the lower portions of the watershed were in Fair condition.

Watts Branch is a Use I-P direct tributary to the Potomac River. The Watts Branch watershed, like much of the urbanized portion of Montgomery County, has been negatively affected by past development that has occurred along major roadways and rail lines. The MBSS FIBI rated the fish community of Watts Branch as Poor and Good. The benthic macroinvertebrate community was rated Very Poor and Poor. Generally, aquatic habitat was Severely Degraded. MCDEP

found that Watts Branch supports a Fair biological community. The Piney Branch Special Protection Area is located within the Watts Branch watershed.

Rock Creek

The Rock Creek watershed has experienced significant development during the late 20th century. Areas that were historically agricultural land uses have been transformed to high and medium density residential, industrial, commercial, and institutional land uses. Surface water quality and the aquatic communities have experienced significant negative impacts from this development. Much of the Upper Rock Creek stream valleys supported naturally reproducing trout streams. Today however, trout are limited to a small Special Protection Area on North Branch Rock Creek. Forested stream valleys protected by Montgomery County park facilities currently provide what little stream buffers are left within the system.

Rock Creek is a stream valley greenway that originates south of MD 108, passes through Rockville, and enters the District of Columbia below Chevy Chase. The Rock Creek Greenway extends through Washington, DC, to the Lincoln Memorial. Data from the one CORE station in the lower mainstem creek at East-West Boulevard shows elevated bacteria levels that are likely due to upstream nonpoint runoff from urban areas and natural sources.

The Rock Creek watershed is rated as a Tier 6 watershed for biodiversity. Rock Creek was added to Maryland's 303(d) list of impaired waters in 1996 for nutrients and sediments and in 2002 for fecal bacteria and impaired biological communities. In 2007, the EPA approved a TMDL for fecal bacteria in the Rock Creek watershed.

b. Indirect Effects

Because there would be no development dependent on the I-270 project, indirect effects associated with road and transit use of any of the build alternatives are mainly based on the potential for contamination of surface waters by run-off and from new impervious surfaces. Run-off may cause impacts to surface waters and watersheds that are further later in time or further in distance than direct effects. These runoff constituents can be grouped as heavy metals, salt, organic molecules, and nutrients (Trombulak, 1999). ***Table II-17*** contains a list of common highway runoff constituents and their sources.

Table II-17: Common Highway Runoff Constituents and their Primary Sources

Constituent	**Primary Sources**
Particulates	Pavement wear, vehicles, atmosphere, maintenance
Nitrogen, Phosphorous	Atmosphere, roadside fertilizer application
Lead	Gasoline (auto exhaust), tire wear (lead oxide filler material), lubricating oil and grease, bearing wear
Zinc	Tire wear (filler material), motor oil (stabilizing additive), grease
Iron	Auto body rust, steel highway structures (guardrails, etc.), moving engine parts

Table II-17: Common Highway Runoff Constituents and their Primary Sources

Constituent	Primary Sources
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicides and insecticides applied by maintenance operations
Cadmium	Tire wear (filler material), insecticide application
Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving
Manganese	Moving engine parts
Bromide	Exhaust
Cyanide	Anticake compound (ferric ferrocyanide, Prussian Blue or sodium ferrocyanide, Yellow Prussiate of Soda) used to keep deicing salt granular
Sodium, Calcium	Deicing salts, grease
Chloride	Deicing salts
Sulfate	Roadway blends, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate
Polychlorinated Biphenyls (PCB's)	Spraying of highway right-of-ways, background atmospheric deposition, PCB catalyst in synthetic tires
Pesticides, Pathogenic Bacteria (indicators)	Soil, litter, bird droppings and trucks hauling livestock and stockyard waste
Rubber	Tire wear
Asbestos	Clutch and brake lining wear

Source: Kobriger, 1984

Heavy metal concentration in nearby surface waters can be increased from increased impervious surfaces and vehicle use. The most common heavy metal contaminants are lead, aluminum, iron, cadmium, copper, manganese, titanium, nickel, zinc, and boron. Most of these contaminants are related to gasoline additives and regular highway maintenance. Other sources of metals include mobilization by excavation, vehicle wear, combustion of petroleum products, historical fuel additives, and catalytic-converter emissions. Generally heavy metals from highways found in streams are not at concentrations high enough to cause acute toxicity (CWP, 2003). The greatest concern associated with metals, even at low concentrations, is the long-term accumulation that can result in toxic bottom sediments and animal tissues, with the greatest toxicity occurring at the top of the food web.

Major water quality stressors are the deicing salts that are used during the winter for highway safety maintenance. Sodium chloride is the most common deicer but it can also be blended with calcium chloride or magnesium chloride. Urea and ethylene glycol are also sometimes used to

deice. MSHA most commonly uses rock salt (sodium chloride), a salt brine, and magnesium chloride. Chlorides from these salts can cause acute and chronic toxicity in fish, macroinvertebrates, and plants. The effect of chlorides in streams is dependent on the amount that is applied and the dilution of the receiving waters (CWP, 2003).

Another group of pollutants, organic molecules including dioxins and polychlorinated biphenyls (PCBs), have been found to be in higher concentrations along roadways. Sources of these compounds include run-off derived from exhaust, fuel, lubricants and asphalt (Buckler, 1999). Other pollutants in this group include PAHs, benzene, toluene, ethylbenzene, and xylene (BTEX), and methyl tertiary butyl ether (MTBE) (Buckler, 1999). Vehicle emissions have been shown to be an important source of the BTEX compounds. These organic pollutants are known to accumulate in concentrations that will cause mortality and affect growth and reproduction in aquatic organisms (Lopes et. al., 1998).

Nutrients are also found in highway runoff. Most research involving nutrients is directed towards lakes, which experience eutrophication in the presence of excess nutrients. High levels of nitrogen and phosphorous can cause algae blooms that lead to lower DO from the decomposition of the algae. These nutrients are deposited into the aquatic system by atmospheric deposition, fossil fuel combustion of automobiles, and stream bank erosion (CWP, 2003).

An increase in impervious cover also has the potential to increase bacteria sources including; failing septic systems, sewage overflows, wildlife and other inappropriate discharge of human and animal waste. Bacteria most commonly found in urban stormwater runoff are from the coliform family. These bacteria are typically generated within the digestive tract of warm-blooded animals. Their presence in aquatic systems indicates the presence of fecal waste, which is a common vector of harmful viruses and pathogens. The coliform bacteria are used as an indicator for these potential human health risks and are not actual causes of disease. Watershed studies have found that concentration of bacteria tend to be higher in urban areas than in rural areas (CWP 2003). Therefore increases in impervious cover may increase bacterial concentrations in aquatic systems within the project area, though urban development is much more likely to cause notable increases in bacteria levels than a large highway facility.

Sediments are also a primary concern with an increase in impervious areas. Even relatively moderate sediment loading to an otherwise healthy stream can reduce the variety and abundance of aquatic life (Waters, 1995).

Several studies have shown that the average weekday traffic (AWDT) can be used to predict highway runoff quality. Driscoll et al. (1990) found that roadways with AWDT greater than 30,000 vehicles produced two to five times the pollutant levels present in runoff from rural highways (less than 30,000 AWDT). The mean pollutant levels from an urban highway (greater than 30,000 AWDT) and a rural highway (less than 30,000 AWDT) from 31 states during storm events are shown in ***Table II-18***. Barrett et al. (1993) found that while some studies show that AWDT greatly influences runoff pollutant levels, other studies show less correlation between AWDT and pollutant loads and suggest that AWDT may simply be an indicator of the surrounding land use. In these low correlation cases, the pollutant sources from surrounding land

uses (i.e., atmospheric deposition from urban pollution sources) may be more important than AWDT in determining pollutant loads (Barrett et. al., 1993; Young et. al., 1996). Mushack (1990) found that freeways generally had lower pollutant loads than local streets due to the acceleration/deceleration activities on local streets associated with traffic lights and stop signs, increased tire and roadway abrasion, brake wear, and vehicle emissions and leakages.

Table II-18: Mean Pollutant Concentrations in Highway Runoff from Urban and Rural Highways

Pollutant	Mean Pollutant Concentration (mg/L) for Urban Highways (includes I-270 and US 15) (ADT > 30,000)	Mean Pollutant Concentration (mg/L) for Rural Highways (ADT < 30,000)
Total Suspended Solids	142	41
Volatile Suspended Solids	39	12
Total Organic Carbon	25	8
Chemical Oxygen Demand	114	49
Nitrite + Nitrate	0.76	0.57
Total Kjeldahl Nitrogen	1.83	0.87
Phosphorous	0.40	0.16
Total Copper	0.054	0.022
Total Lead	0.40	0.080
Total Zinc	0.329	0.080

Source: Driscoll et. al., 1990

Dupuis (1985) reported that highways with traffic densities ranging from 12,000 to 120,000 AWDT had little effect on the biota of receiving waters. Various studies cited by Barrett et al, (1993) show conflicting results regarding the chronic and acute effects of highway runoff on aquatic organisms. While some studies showed that highway runoff had little or no effect on aquatic life, other studies did identify the bioaccumulation of metals with AWDTs as low as 10,000 (Barrett et al, 1993). Dilution of runoff water can play an important role in the toxic effect of highway pollutants and smaller receiving bodies may be at greater risk (Barrett et. al., 1993; Muschack, 1990).

c. Cumulative Effects

Cumulative impacts from all of the build alternatives would be similar. The Panel found that increased development would occur within most of the ICE boundary regardless of the implementation of a highway or transitway alternative. Within the more urbanized watersheds located within Montgomery County, the redevelopment of these areas, coupled with the direct impacts of the project, will not substantially increase the impervious surfaces to a level that would cause significant additional runoff from impervious surfaces to surface waters or aquatic biota or habitat, because these areas are already impervious. These more urbanized watersheds include Rock Creek, Watts Branch, Muddy Branch, and parts of Great Seneca Creek. Additionally, Montgomery County has forest conservation laws that provide for certain forest retention areas and specific quantities within different land uses. These laws would protect forested stream valleys that are essential to maintaining water quality and aquatic communities.

The watersheds that have the potential to experience additional runoff from impervious surfaces from additional growth and development are Little Seneca Creek and Ten Mile Creek in the Clarksburg area; Little Bennett Creek and Bennett Creek in the Urbana area; Carroll Creek, Ballenger Creek, Fishing Creek, and the Monocacy River in the Frederick area; and Great Seneca Creek in the Gaithersburg area.

The Clarksburg area was predicted by the Panel to have the greatest amount of growth and development of all the areas studied. The Clarksburg area is classified as a Priority Funding Area (PFA). PFAs receive targeted state spending for development and redevelopment projects. A large development located adjacent to Clarksburg Road, the Clarksburg Town Center, was recently created. This development covers 267 acres and is located within the Clarksburg Special Protection Area. BMPs and stormwater controls are regulated by the SPA and would help to minimize future impacts due to impervious surface runoff to the Little Seneca Creek watershed. In addition, increased residential and commercial development within the Clarksburg area would increase the overall amount of impervious surfaces within the three affected watersheds. All of these watersheds support a diverse biological community and naturally reproducing brown trout populations. Stringent sediment and erosion controls, BMPs, and stormwater management will be necessary to protect the water quality and aquatic communities within the Clarksburg area.

The Urbana area is also predicted by the Panel to have a large amount of growth and development. Urbana is also classified as a PFA. The Little Bennett and Bennett Creek watersheds would be indirectly impacted by the selection of a build alternative, as discussed above. The Urbana Town Center, located adjacent to I-270 and MD 355, is a 357-acre parcel that was recently developed. Currently, the Urbana area is primarily agricultural and forested land uses. Planned growth, in conjunction with the project build alternatives, may have a cumulative impact on surface water quality and aquatic communities due to increased surface water runoff. On the other hand, agricultural impairments including a lack of stream buffers and sediment and nutrient inputs may be ameliorated with developments that include forest buffers, stormwater management, and BMPs. Additionally, the Bennett Creek watershed supports a population of comely shiner, a Maryland threatened species. Increased development and impervious surfaces in the watershed may also result in increased stormwater runoff that may negatively impact the comely shiner.

Much of the area surrounding Frederick is classified as a PFA. The Panel internally disagreed as to whether increased traffic and congestion would lead to more or less growth within the Frederick region. If growth and development continue in the same sprawling pattern as in the past few decades, several watersheds may be impacted by cumulative effects. Currently, the land use outside of the Frederick area is primarily agricultural and forested land uses. Planned growth, in conjunction with any of the project build alternatives, may have an impact on surface water quality and aquatic communities by increasing stormwater runoff qualtity. Many of the streams surrounding the City of Frederick, including Tuscarora Creek and Muddy Run, suffer from significant agricultural impairments. These impairments including a lack of stream buffers and sediment and nutrient inputs from storm runoff may be ameliorated with developments that include forest buffers, stormwater management, and BMPs. Many Use III-P natural trout waters systems surround the Frederick area. Increased impervious surfaces that result from continued

growth within these watersheds may result in increased stormwater runoff that may negatively impact the aquatic community, especially resident and stocked trout. Additionally, the Ballenger Creek and Carroll Creek watersheds support a population of pearl dace, a Maryland threatened species. Increased development and impervious surfaces in these watersheds may also result in increased stormwater runoff that may negatively impact the pearl dace.

Implementation of a transitway component of the project build alternatives, together with the cumulative impacts from planned urban development near the I-270 / MD 124 interchange, would remove some areas of forested buffer from the Great Seneca Creek stream valley. These forest encroachments will be minimized and mitigated for under Montgomery County's Forest Conservation Law. Overall, the incremental impacts to the Great Seneca Creek watershed are expected to be lower compared to other watersheds, because of the comparably greater amount existing development in the watershed.. Of the affected watersheds within the ICE boundary, Great Seneca Creek watershed is the most developed.

Any impacts to Waters of the U.S. as a result of the project and near future proposed development will be subject to a Section 401 Water Quality Certificate and a Section 404 permit from the USACE for the discharge of dredged or fill material into streams. In addition, required stream mitigation will help offset overall impact trends within the ICE study area. Mitigation for impacts to stream systems is discussed further in Chapter IV.F, Waters of the US including Wetlands. As mentioned above, potential effects to aquatic habitat and water quality will be minimized by strict adherence to sediment and erosion control plans and SWM plans, which will be developed in accordance with state regulations to provide long-term mitigation of potential effects from stormwater. In addition, in-stream construction will not be performed during state mandated stream closure periods, which are from March 1 to June 15 for Use I-P streams, from October 1 to April 30 for Use III-P streams, and March 1 through May 31 for Use IV-P streams.

d. Wild and Scenic Rivers

The Scenic and Wild Rivers Act, as amended in 1984, protects the rivers of Maryland or portions of them and their related adjacent land areas that possess outstanding scenic, geologic, ecologic, historic, recreational, agricultural, fish, wildlife, cultural, and other similar values. The policy of the state is to preserve and protect the natural values of these rivers, enhance their water quality, and fulfill vital conservation purposes by wise use of resources within their surrounding environment. Development of a Scenic and Wild Rivers Program fulfills these purposes. The Monocacy River and its tributaries is the only river within the ICE boundary that is included in the Wild and Scenic Rivers Program.

In 1984, the Maryland Water Resources Administration conducted a rivers study that identified 250 miles of rivers and river segments which possess significant natural, recreational, and cultural resources values. Seneca Creek is the only stream within the ICE boundary that is designated as highly significant.

The Monocacy River is directly impacted by I-270 in one location, where I-270 crosses over the Monocacy River in the Monocacy National Battlefield. In addition, the river's tributaries cross the I-270 corridor in numerous locations.

Indirect Effects

Under the project's build alternatives, the proposed improvements to I-270 will indirectly impact the Monocacy River and its tributaries because of downstream and upstream effects of new culverts, culvert extensions, and new impervious surfaces associated with roadway improvements. Indirect effect from the project would therefore be similar to indirect effects to other surface waters, described in previous sections.

Cumulative Effects

Overall, the areas surrounding the Monocacy River will face a great amount of development in the near future. In conjunction with the project's build alternatives, future development may have a cumulative impact on the presence and usage of the Monocacy River both aesthetically and physically. Frederick County realizes the importance, as described in their Park and Recreation Plan, where it states: "As land along the Monocacy River, particularly in areas adjacent to existing bridge crossings, becomes available for development, Frederick County should obtain suitable property to provide public access points to the river." It also lists as one of its policies in the same document that "The County shall establish a 500-foot development setback/buffer area along the Monocacy Scenic River…."

Future development in the Monocacy watershed may negatively impact the Monocacy River, as parkland buffers protect only a few areas. Some of the portions that are not protected by parkland serve as the border to three of the Land Use Expert Panel forecast zones (3, 5, 8), which the Panel estimated will grow faster than Frederick County's master plans projections. However, all areas surrounding the Monocacy River and its tributaries are anticipated to experience a substantial increase in both population and employment over the next 25 years. The result of development in this area may therefore negatively impact the river aesthetically, physically, and biologically.

Damascus-Brookeville (Zone 10) is expected to grow considerably by approximately 6,000 people (20 percent) and 1,500 jobs (20 percent). This area of Seneca Creek lies in an area that is mostly undeveloped, and may be under threat by future development, if the area is in fact not protected as parkland.

9. Waters of the U.S. including Wetlands

Wetlands are important natural resources, providing numerous values and functions to society including, fish and wildlife habitat, flood protection, erosion control and water quality preservation (MDE 2007). Between the years of 1981 and 1982, the total amount of wetlands in Montgomery County was 9,699 acres, which made up 3.1 percent of the state wetland total for that time period. Frederick County had 7,325 acres of wetlands within the county, which made up 1.7 percent of the state total (Tiner and Burke 1995). ***Table II-19*** reflects the types of wetlands and corresponding acreage for Montgomery and Frederick counties between 1981 and 1982.

Table II-19: Acreage of Wetland Types per County between 1981 and 1982

County	Estuarine Wetlands	Palustrine Wetlands	Riverine Wetlands	Lacustrine Wetlands	Total Acreage	Total Percentage of the State
Montgomery	0	9,566	31	102	9,699	3.1
Frederick	0	7,243	33	49	7,325	1.7

Source: Tiner and Burke 1995.

In 1978, according to *Status and Recent Trends of Wetlands in Five Mid-Atlantic States* (citation), in 1978, Maryland possessed an estimated 438,000 acres of wetlands, which occupied about six percent of the state's land area. Eight percent (21,000 acres) of these wetlands were located in the Piedmont region. In the *Wetland Status and Trends In Selected Areas of Maryland's Piedmont Region (1980-1981 to 1988-1989)* (citation), a portion of the ICE boundary was studied (including Walkersville, Libertytown, Buckeystown, Urbana, and Rockville within the ICE boundary). This study determined that in 1988 to 1990 the area studied had approximately 4,298 acres of wetlands, excluding linear fringe wetlands along narrow streams. The total amount is approximately 1.9 percent of the area's land surface. Between 1980-1981 and 1988-1989, the area lost 98 acres of vegetated wetlands.

Based on the *MDNR 2003 Lower Monocacy River Watershed Study*, the Bennett Creek subwatershed within the Lower Monocacy watershed had the highest amount of wetland acres (2,404 acres), which made upor eight percent of the entire watershed. The other MDNR 8- digit subwatersheds within the lower Lower Monocacy River watershed and their corresponding wetland acres and percentages are shown in ***Table II-20***.

Over half of the wetlands originally in Frederick County have been lost, with an estimated 15,277 acres lost in the Upper Monocacy River watershed alone (MDNR 2003). Wetland loss resulted from disturbances that include: filling or draining for agricultural development, vegetation removal, altering hydrology, high pollutant loads from surrounding areas, livestock grazing within wetlands, and fragmentation from roads being built through wetlands (MDNR(a) 2003).

All direct impacts to wetlands from the project alternatives are presented in ***Table II-3***. Wetland and waterway impacts associated with the build alternatives are similar.

a. Indirect Effects

Indirect effects associated with the project's build alternatives would be the result of impacts that are caused by the project that are later in time or further in distance than direct effects. It is not anticipated that there would be any induced development that would cause indirect effects. Therefore, indirect effects to Waters of the US including wetlands would be similar to the indirect effects described in the surface waters section of this report.

Table II-20: Wetlands within Frederick County Subwatersheds of the Lower Monocacy River Watershed

Subwatershed	Wetland Acres	Subwatershed Acres	Percent of Subwatershed
Ballenger Creek	388	14,547	3
Bennett Creek	2,404	30,569	8
Bush Creek	1,409	21,153	7
Carroll Creek	184	14,443	1
Israel Creek	405	24,354	2
Linganore Creek	1,628	53,177	3
Monocacy River	405	9,445	4

Source: MDNR(a) 2003

b. Cumulative Effects

The cumulative effects associated the project build alternatives would be similar. Cumulative effects to wetlands in the ICE study area will occur in the form of encroachment from new residential development and the placement of transitway stations in areas previously undisturbed by the highway. Effects could include the loss of wetland functions, conversion of vegetation within the wetlands, and the filling or destruction of wetland systems. Planned residential growth in conjunction with the I-270 project could affect portions of the wetland systems already being crossed by the highway, but in areas located farther upstream and downstream of the highway crossing. These systems include Watts Branch, Rock Creek, Muddy Branch, Great Seneca Creek, Little Seneca Creek, Little Bennett Creek, Bennett Creek, Monocacy River, and Tuscarora Creek. Most of the wetlands associated with these streams are typically undisturbed and provide numerous functions due to their location within protected stream valley parks. Because these wetlands are hydrologically connected to adjacent stream systems, they also provide functions associated with streams such as floodflow alteration, fish/shellfish habitat, and sediment/shoreline stabilization. Additional functions include uniqueness/heritage values due to their affiliation with national and state parks that have significant aesthetic and historical value.

Encroachment, as a result of dispersed residential growth, into the wetland systems associated with Watts Branch, Muddy Branch, and Rock Creek located in the southern end of the ICE study area will be minimal, as medium to high density residential and industrial land uses currently surround these streams. The cumulative effects to wetlands are potentially the greatest for wetlands located within Great Seneca Creek and Little Seneca Creek stream valley parks. However, the stream valley parks themselves are protected through county regulations, which should preclude them from being developed. The designation of Little Seneca Creek as a Special Protection Area, which is discussed in more detail in the Surface Waters section, provides additional regulations that should deter encroachment into these areas.

Cumulative effects to wetlands situated along streams with adjacent land uses of cropland, pasture, and orchards could occur from dispersed residential growth that would convert these

areas into medium and high density residential areas. These stream systems include Little Bennett Creek, Bennett Creek, Monocacy River, and Tuscarora Creek. The wetlands located within these systems are providing sediment and nutrient retention, especially in areas that are actively being farmed. Those areas designated as prime farmland are offered protections through the Maryland Agricultural Land Preservation Foundation where agricultural preservation easements can be purchased to restrict development on these lands.

Future commercial and residential development projects slated for the Germantown and Clarksburg areas, coupled with their designation as Priority Funding Areas (PFAs), further support the potential for cumulative effects to wetlands within these watersheds in the form of removal of vegetation, loss of wetland function, or conversion of wetland vegetation.

The build alternatives will directly impact wetlands located within the Monocacy River, Carroll Creek, and Tuscarora Creek watersheds. The direct impacts of the project, coupled with planned and zoned residential growth could result in cumulative effects to wetlands within these watersheds. Wetlands situated within the Little Bennett Creek and Bennett Creek watersheds will not be directly impacted by the build alternatives. However, the future development projects located within Urbana and Frederick and their designation as PFAs could result in the conversion of wetland areas within these watersheds to commercial or residential uses, as these PFAs are expected to experience future population and economic growth.

Any cumulative impacts to Waters of the US, including wetlands, will be minimized through federal, state, and county laws and regulations. Section 404 of the Clean Water Act (CWA) establishes a program to regulate the discharge of dredged or fill material into Waters of the United States, including wetlands. Section 404 requires a permit before dredged or fill material may be discharged into Waters of the United States, unless the activity is exempt from Section 404. Although the USACE is responsible for implementing the Section 404 regulatory program, the final authority rests with the United States Environmental Protection Agency (USEPA). In Maryland, any proposed discharge of fill material into Waters of the United States, including wetlands, requires authorization from the USACE. USACE authorizations include conditions imposed at the federal level or by the State through the Section 401 Water Quality Certification (WQC). Conditions of the State's WQC automatically become conditions of the USACE authorization. The Maryland Nontidal Wetlands Protection Act also requires a nontidal wetlands permit or letter of authorization from MDE Nontidal Wetlands & Waterways Division (NWWD) for activities in a nontidal wetland or within a 25-foot buffer or 100-foot expanded buffer around a nontidal wetland.

Wetland losses within the ICE study area would be offset through compensatory mitigation requirements included in all USACE or MDE permit authorizations. Mitigation for any authorized impacts to wetlands as a result of any future development will be required in accordance with the USACE Regulatory Program pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 or through the MDE NWWD. Both state and federal programs require compensatory mitigation to replace aquatic resource functions unavoidably lost or adversely affected by authorized activities.

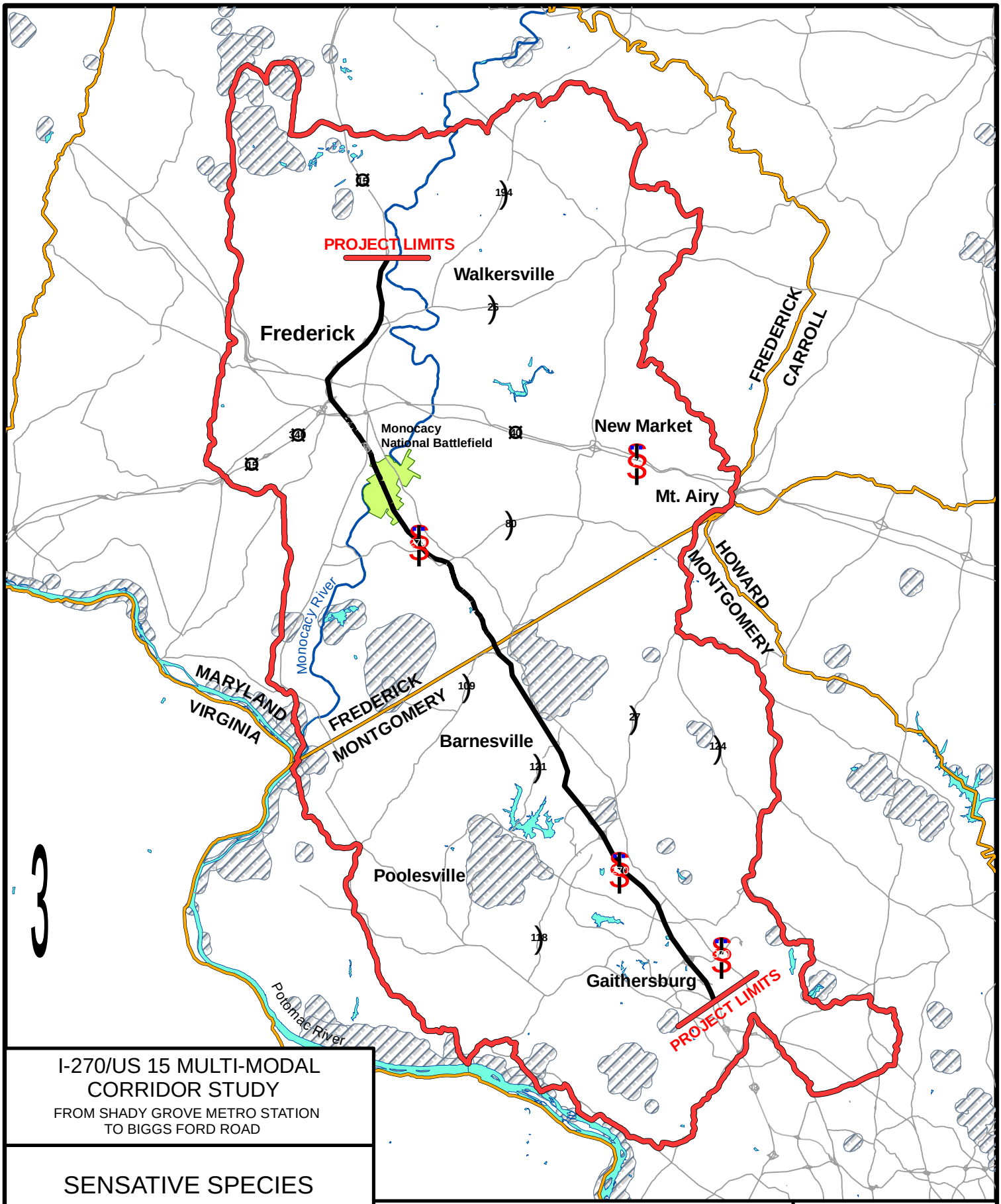
10. Rare, Threatened, and Endangered (RTE) Species

The combination of loss and degradation of habitat, subsistence hunting, and vermin control resulted in diminished wildlife population throughout Maryland in the 1900s. Some species, such as elk, bison, wolves, and cougars, disappeared, while others became extinct, such as the passenger pigeon and Carolina parakeet. Forest habitats have been changed and those species dependent upon them are now rare, endangered or no longer living in Maryland. The loss and degradation of habitats across the state from development and growth in population remains the primary threat to species of greatest conservation need (GCN). Other statewide threats to wildlife include pollution, pesticides and/or herbicides, incompatible forestry practices, and excessive human use and/or disturbances, including from off-road vehicles (ORVs) (DNR 2005).

During the ICE past time frame, the federal Endangered Species Act of 1973 was passed, authorizing state and federal governments to establish a list of threatened and endangered species and to develop conservation programs for these species. In Maryland, this Act was further strengthened in 1975 by the passage of the Nongame and Endangered Species Conservation Act (Annotated Code of Maryland, Natural Resources Article, Section 10-2A-01). The MDNR Wildlife and Heritage Service Natural Heritage Program (NHP) lists the status of species within the borders of Maryland. The federal law is administered by the USFWS and the National Marine Fisheries Service (NMFS), which oversees the status of the species throughout its entire range that may cover several states. The enactment of the Endangered Species Act assisted in decreasing the rate of species loss across the nation and within Maryland.

The vast contiguous stretches of forestland that were once present have been fragmented into smaller blocks by residential homes and development, affecting many wildlife species. A more detailed discussion of forest characteristics within the ICE time frame is available in the previous Forest/Terrestrial Habitat/Species section. Past, present, and future aquatic habitat within the ICE boundaries are discussed further in the previous section on Surface Waters and Aquatic Biota. The MDNR has designated certain areas as Sensitive Species Project Review Areas (SSPRA), shown on ***Figure II-21***. The SSPRAs primarily include areas of habitat for federal and state listed endangered and threatened species or species of state concern. The SSPRA are divided into three groups. Group 1 contains areas that are habitat for or actually contain federally-listed species. Group 2 contains areas that are habitat for or actually contain state-listed species. Group 3 contains species or natural communities of concern with no official status.

The ICE boundary does not contain any Group 1 SSPRA. Group 2 SSPRA are located in the northern portion of the ICE boundary, within the Fishing Creek watershed, and throughout the middle and southern portions of the ICE boundary. Group 2 SSPRA are located within the Little Bennett Creek and Bennett Creek watersheds, as well as along Little Seneca Creek and Watts Branch. Five Group 3 SSPRA are located close to the southern ICE boundary.



I-270/US 15 MULTI-MODAL CORRIDOR STUDY

FROM SHADY GROVE METRO STATION
TO BIGGS FORD ROAD

SENSATIVE SPECIES PROJECT REVIEW AREAS

Legend

- SCEA
- I-270
- County
- Monocacy National Battlefield
- Water
- Sensative Species Areas

Scale:

0 1.25 2.5 5 Miles

0 7,500 15,000 30,000 Feet

Source: Maryland Department of Natural Resources

SHA MTA Maryland

DATE:
JANUARY
2009

Figure II-21

In addition to the SSPRA, specific listed species located in close vicinity to the project area are described in the I-270/US 15 Natural Environmental Technical Reports (NETR) (SHA 2002, 2007). State listed threatened species for which records occur on or immediately adjacent to the alternatives include sedge wren (*Cistothorus platensis*), Canadian burnet (*Sanguisorba canadensis*), swamp-oats (*Sphenopholis pensylvanica*), and Buxbaum's sedge (*Carex buxbaumii*). State listed species that are known to occur in the vicinity (within one mile) of the alternatives include southern pygmy shrew (*Sorex hoyi winnemana*), butternut (*Juglans cinerea*), fringe-tip closed gentian (*Gentiana andrewsii*), purple fringeless orchid (*Platanthera peramoena*), brook floater mussel (*Alasmidonta varicose*), loggerhead shrike (*Lanius ludovicianus*), Indian paintbrush (*Castilleja coccinea*), coastal juneberry (*Amelanchier obovalis*), potato dandelion (*Krigia dandelion*), low bindweed (*Calystegia spithamaea*), least weasel (*Mustela nivalis*), one-sided pyrola (*Orthilia secunda*), crested iris (*Iris cristata*), and American bittern (*Botaurus lentiginosus*). Many of these species were last recorded in these areas over 20 years ago, and substantial development has occurred that has likely resulted in local species extinctions. This is certainly true for the three listed bird species. The sedge wren was last recorded within the project area in 1991 and the loggerhead shrike and American bittern were last documented adjacent to the project area in 1989 and the 1970s, respectively. Results of the 2002 to 2006 Maryland and District of Columbia Breeding Bird Atlas project indicate that none of these species were documented in these SSPRA during the five-year study (*Breeding Bird Atlas Explorer (online resource). 2009. U.S. Geological Survey Patuxent Wildlife Research Center & National Biological Information Infrastructure. <January 26, 2009>. http://www.pwrc.usgs.gov/bba. Data compiled from: Maryland and the District of Columbia Breeding Bird Atlas 2002-2006. Maryland Ornithological Society. Interim results used with permission.*).

The MBSS has found that several additional rare, threatened, or endangered species are located within the ICE boundary. The checkered sculpin (*Cottus n.* sp.) is a state rare species located within several tributaries to the Lower Monocacy River. The state threatened comely shiner (*Notropis amoenus*) was found by MBSS throughout the Monocacy River and within Little Seneca Creek. Sampling conducted for the 2007 NETR found the comely shiner within the Bennett Creek watershed. The state threatened pearl dace (*Margariscus margarita*) was found by MBSS throughout the Monocacy River. Sampling conducted for the 2007 NETR found the pearl dace within the Carroll Creek watershed.

As discussed in the previous paragraph, several state rare fish species found near the project area may be directly affected by the project build alternatives. Additional discussion of potential impacts is also included in the project's Natural Environmental Technical Report (2007). Although the project would not directly affect any SSPRAs, potential indirect and cumulative effects to these areas provide a framework for assessing indirect and cumulative effects to RTE species.

a. Indirect Effects

All of the projects build alternatives would have similar indirect effects. Project impacts near the Urbana area could have the potential to indirectly affect SSPRA and listed species located within the Bennett Creek, Little Bennett Creek, and Monocacy River watersheds. The state threatened

comely shiner that inhabits Bennett Creek may also be indirectly affected by increased impervious surfaces and related stormflows associated with the project. These effects would be somewhat mitigated by required compliance with water quality protection, stormwater management, and erosion and sediment control regulations administered by MDE.

Several transitway stations are proposed in areas along Little Seneca Creek. Transitway stations and their associated parking lots have the potential to increase the percentage of impervious surfaces within a watershed and to decrease the amount of breeding and foraging habitat available for sensitive species. Increased impervious surfaces may also indirectly affect listed or sensitive species living in aquatic environments. Increased development that involves clearing of forested or grassland environments may also negatively affect listed and sensitive species by destroying or limiting breeding and foraging habitats.

During operation of the alternatives, the highway and transitway would have similar potential to increase water quality degradation from stormwater runoff, because greater impervious surfaces from either mode could affect water quality. In addition, as discussed in previous sections, fragmentation of forest habitat and expanding edge habitat caused by the project could have an indirect effect on sensitive species.

b. Cumulative Effects

Cumulative effects to RTE species could occur from direct project impacts in conjunction with planned urban development. The Panel found that increased development would occur within most of the ICE boundary regardless of the implementation of a highway or transitway alternative. Within the more urbanized areas located within Montgomery County, redevelopment will most likely not substantially increase the impervious surfaces or the destruction of desirable habitat to a level that would cause significant alteration to surface waters or habitat. These more urbanized watersheds include Rock Creek, Watts Branch, Muddy Branch, and parts of Great Seneca Creek. Additionally, the state of Maryland and Montgomery County have forest conservation laws that provide for certain forest retention areas and specific quantities within different land uses. These laws would protect forested stream valleys that are essential to maintaining water quality and animal habitat.

The watersheds that have the potential to experience the most cumulative impacts of additional growth and development are Little Seneca Creek in the Clarksburg area, Little Bennett and Bennett Creek in the Urbana area, Carroll Creek, Ballenger Creek, Fishing Creek, and the Monocacy River in the Frederick area. RTE species in these watersheds are therefore the most likely to incur cumulative impacts.

As described previously, stream relocations, new culverts, culvert extensions, and new impervious surfaces associated with the project and planned development would impact surface water resources. Clearing for residential and commercial developments would destroy or diminish open spaces and forested and grassland habitats. The Clarksburg area is predicted to have the greatest amount of growth and development. Cumulative impacts would be greatest in the Clarksburg, Urbana, Frederick, and Germantown areas, which have less urban development than exists today but where future growth is planned.

In areas such as Germantown and Frederick where development is already widespread, infill development is also likely to reduce the remaining natural areas in the project area available to provide habitat to sensitive or listed species. Areas where redevelopment is expected would most likely have limited net impacts on habitat, as most of the conversion of natural areas would have occurred during the original development of the land. In addition, new projects would be required to comply with current regulations to reduce forest and water quality impacts wherever possible.

The Great Seneca Creek watershed would experience the majority of potential negative impacts associated with growth in the Germantown area. Great Seneca Creek is generally protected by forested stream valleys located with in Montgomery County Park facilities. These areas will likely be protected by the County; therefore impacts to the Great Seneca Creek watershed will likely be minimal. Increased development within the Frederick area may have negative impacts to the Monocacy River, Carroll Creek, Ballenger Creek, Fishing Creek, and Tuscarora Creek watersheds. The state threatened pearl dace is found in Carroll and Ballenger Creeks. Increased impervious surfaces associated with additional dispersed residential development may negatively impact these sensitive aquatic resources.

The Clarksburg area was identified by the Panel as an area where substantial growth is expected to occur. Development within the Clarksburg area has the potential to negatively affect the SSPRA and listed species located within the Little Seneca Creek watershed. The Little Seneca Creek watershed, located around Clarksburg, is protected by Montgomery County as a Special Protection Area (SPA). SPAs are discussed previously in the Surface Waters and Aquatic Biota section. Any increased residential development will be required to comply with BMP standards.

11. Wetlands of Special State Concern

Wetlands with rare, threatened, or endangered species (RTE) or unique habitats have been designated by MDE as Nontidal Wetlands of Special State Concern (NTWSSC). Through legislative approval, these areas have been entered into the *Code of Maryland Regulations* (COMAR) 26.23.06.01-.02, which affords them certain protections, including a 100-foot buffer from any development. MDE is responsible for regulating these areas, while MDNR WHS is responsible for identifying NTWSSC and their associated boundaries.

The Germantown Bog is a NTWSSC that lies over 1,000 feet east of the I-270/US 15 Corridor within an unnamed tributary to Little Seneca Creek. The listed species within the Germantown Bog include Canadian burnet (*Sanguisorba canadensis*), swampoats (*Sphenopholis pensylvanica*), and Buxbaum's sedge (*Carex buxbaumii*). A new RTE survey for the state listed threatened species known to occur within the Germantown Bog was conducted on June 29, 2007, during the corresponding flowering periods for these species (May to October). None of the listed species were observed within the I-270 project study area or a nearby emergent wetland.

The only NTWSSC in the project area, the Germantown Bog, is located upstream of the project build alternatives. None of the build alternatives will have direct or indirect impacts to WTSSCs. Therefore, WTSSCs are not subject to an indirect and cumulative effects analysis.

E. ICE ANALYSIS CONCLUSIONS

A SCEA was completed for the 2002 DEIS for Alternatives 3A/B, 4A/B and 5A/B/C. That analysis included the use of a panel of land use experts to identify whether a build alternative for the corridor would cause changes in land use that would be substantially different from the changes anticipated in the master plans associated with the I-270 and US 15 project corridor.

This ICE analysis has been completed to review the 2002 SCEA as well as to analyze the indirect and cumulative effects of Alternatives 6A/B and 7A/B, and to identify if the conclusions reached during the 2002 analysis have changed because of new urban development in the project area environment, new build alternatives proposed for the project, or changes in ICE analysis guidance.

Both the 2002 analysis and the current (2007-2008) analysis indicate that there are no substantial changes since the 2002 DEIS in the land use or projected land use, based on area master plans. In the intervening years, projects have continued to be approved and constructed within the designated development areas. The conclusions reached by the analysis, including the projections of the Land Use Expert Panel, were that "select locations in the region would experience future development beyond that planned for Montgomery and Frederick counties" and that "this additional development would occur regardless of the alternate, including the No-Build." The current analysis did not find any indications that this conclusion has changed, and the conclusions of the former analysis remain valid.

The current ICE analysis also relied on the land use projections of the Panel, which found that in select locations the region would experience future development beyond that planned for by Montgomery and Frederick Counties. The Panel determined that this additional development would occur regardless of the alternative, including the No-Build. Therefore, resources in these locations may be under unanticipated stress.

1. Indirect Effects

Indirect effects were considered for communities, cultural resources, parklands, farms and farmlands, forests and terrestrial habitats and species, floodplains, surface waters and aquatic biota, Waters of the US including wetlands, groundwater and RTE species.

Based on the Panel's conclusions and recent updates to master plans, there would be no indirect effects to resources that would be caused by development induced by the I-270/US 15 project. However, in some instances, the project may result in impacts that are later in time or further in distance than the project's direct effects

Indirect effects to communities should be minor and in most cases beneficial. Communities within the ICE boundary will benefit from the reduced congestion, improved access and shorter travel times that will occur with the completion of a build alternative.

There would be no indirect effects to cultural resources as a result of the project. Cultural resources will continue to feel pressure from planned development within the ICE boundary; however, these development projects are not dependent on the I-270/US 15 project. Section 106

of the NHPA requires a review of "indirect" effects such as noise and visual impacts; for the purpose of this evaluation, these effects are considered "direct." There are no reasonably foreseeable cultural resource impacts related to the project that are further removed in time or space than the project's direct effects.

Indirect impacts to parks are not anticipated as a result of a build alternative. The counties have programs in place to preserve and protect parklands. Furthermore, there are no reasonably foreseeable park and recreational facility impacts related to the project that are later in time or further in distance than the project's direct effects.

None of the alternatives, including the No-Build Alternative, are anticipated to have substantial indirect effects to farmlands or farmland soils Because the project is largely adjacent to an existing roadway, direct impacts to farmlands will be relatively minor and along the edges of fields.

All of the build alternatives considered for the project could have indirect effects on forest resources within the ICE boundary. Indirect impacts to terrestrial vegetation could occur from changes to the physical environment (such as changes to edge habitat) and chemical environment (changes resulting from runoff). Development of the build alternatives could also lead to fragmentation of large contiguous forests into smaller, isolated patches, increasing the potential for their future conversion to non-forest use. Indirect impacts to forests could also result in indirect effects to terrestrial RTE species or FIDS as additional forest lands are cleared or fragmented.

Indirect effects to groundwater are not anticipated. Special provisions to prevent possible contamination would be followed where the project crosses the Piedmont Sole Source aquifer.

Indirect impacts to 100-year floodplains are not expected as there are state, federal and local regulations discouraging development in 100-year floodplains, and any floodplain encroachment would require authorization by MDE under a Waterways Construction Permit.

The project alternatives could cause indirect impacts to surface waters and aquatic biota due to runoff from the construction site and from new impervious surfaces created by a build alternative. The use of BMPs and erosion and sediment controls during construction activities, as overseen by MDE, would prevent the introduction of contaminants into surface waters. The inclusion of stormwater management facilities in the design of the roadway and transitway improvements would prevent contamination from stormwater runoff. As a result of these controls, indirect impacts to surface waters and aquatic biota are not anticipated. The Monocacy River, a wild and scenic river within the ICE boundary, will be directly impacted by the project. Due to controls identified above, as well as time-of-year restrictions on construction within the river, no indirect impacts from the project to the Monocacy River are anticipated.

Substantial indirect impacts to aquatic habitats are not anticipated to occur as a result of any of the alternatives considered. The project is not anticipated to create long-term impacts to aquatic habitat resources, since none of the alternatives considered involve the creation of a new roadway corridor. Because there are no anticipated indirect effects to aquatic habitats, the potential for indirect impacts to aquatic RTE species is unlikely. Adherence to time-of-year

restrictions on in-stream construction will further reduce the likelihood for indirect impacts to RTE species. Opportunities for maintaining current aquatic habitats in a healthy status are based in the management of public lands, wetlands, and waters within the ICE boundary.

Indirect impacts to wetlands and Waters of the US are not anticipated to occur as a result of any of the build alternatives considered. Direct (project-related) impacts to wetlands and Waters of the US will be offset by the proposed mitigation package. Most in-stream construction activities associated with the project, such as culvert and bridge extensions, will occur in areas previously disturbed by development in the project area. The use of BMPs and adherence to established riparian buffer zones during the project's implementation will minimize overall impacts, and the completion of a project mitigation package will provide for the replacement of wetlands that are directly impacted and stream mitigation for impacts to streams, such as enhancement of riparian buffer areas and stream bank restoration.

2. Cumulative Effects

The project will have an overall incremental increase of effects to some resources within the project area, which, when added to the effects of other projects, would result in cumulative effects. Direct impacts on the environment from each of the alternatives considered are added to other past, present and future actions to result in cumulative impacts. The No-Build Alternative would not result in direct impacts to natural environmental resources within the project area and thus would not contribute to cumulative impacts. The build alternatives would result in direct impacts to communities, cultural resources, parklands, farmlands and farmland soils, forests and terrestrial habitat/species, floodplains, surface water and aquatic biota, Waters of the US including wetlands, and RTE species. These resources have historically been impacted by development within the ICE boundary and would be further impacted by the project. Impacts to these resources from the project along with other past, present and future actions within the ICE boundary would result in cumulative effects.

a. Social Environment

The No-Build Alternative would result in indirect and cumulative effects to communities, as the continued congestion within the project area could influence traffic patterns and add to congestion on alternate routes throughout the ICE boundary, as drivers would seek ways to escape the congested I-270 and US 15 main highway route. The increased congestion could also add to the difficulty experienced in accessing communities, businesses and commercial areas.

The build alternatives would add to cumulative effects on communities, as residents and businesses are displaced as a result of Alternatives 6A/B or 7A/B. Other transportation projects may also cause displacements, but most of these are unknown at this time (refer to ***Table II-8***). Displaced residents and businesses would likely find new locations within the ICE boundary because of the continued development of new communities and employment opportunities, minimizing the effect. Noise and visual impacts to communities will be mitigated by the construction of noise barriers, which will lower noise impacts and eliminate contributions to these effects. Visual impacts from the expanded highway and presence of the transitway may be lessened in some locations by noise barriers, which would also eliminate the view of the highway, but would create their own visual impact. This, when added to the effects of other

transportation projects within the ICE boundary, would add to the cumulative effects of the highway and transitway.

Cumulative impacts to parklands within the ICE boundary are anticipated to be minimal as developments on parklands are rarely permitted. Impacts to public parks and recreation areas as a part of any future federally funded or approved transportation project would require a Section 4(f) Evaluation to document that there are no feasible or prudent alternatives to avoid the use of park lands, and that the project would maximize efforts to minimize harm to the park and its resources and activities. Some of the parklands impacted by the project or by other federally-funded transportation projects, if purchased using Project Open Space or land and water conservation funds, would require replacement lands of equal or greater value to mitigate impacts, lessening the project's contribution to cumulative loss of parkland. Other projects, such as residential development projects or commercial office parks, are required to set aside a portion of land as open space, and, although these areas are not owned by the public, they are generally available for use by the residents or employees. These areas would continue to add to open space within the ICE boundary.

b. Cultural Resources

Development pressures associated with population and employment growth may affect existing historic resources or properties that may be determined historically significant in the future. The impacts of Alternatives 6A/B and 7A/B (43.28 acres acquired from 7 historic properties; noise and visual impacts) will add to the cumulative effects to historic resources caused by development and other unrelated transportation projects. Both Montgomery and Frederick Counties have responded to prior losses of cultural resources resulting from development through the establishment of historic preservation commissions, who work to protect these resources to the greatest extent from planned future development projects. In some locations described by the Land Use Expert Panel as prone to development different from the master plans, special attention should be given to cultural resources for which the settings are contributing factors in the historic significance.

c. Natural Resources

The effect of widening I-270 and US 15 and the completion of the CCT would directly impact farmlands, adding to the continuing loss of this resource. Agricultural uses are generally in decline throughout Montgomery and Frederick Counties and within the ICE boundary as a result of increased development. The development trend is projected to continue as proposed land use changes occur. Approved development and the pressure for further development to support the growing population will also impact farms, with ever greater demands being placed on agricultural land to be developed for non-farm uses. For zones where the Panel anticipated development above what the county master plans call for, a greater threat could be placed upon farmland from other projects.

The I-270/US 15 project will add up to almost 300 acres of impacts to the cumulative impacts to forest resources and forest habitats. The project's direct impact to forests and forest habitat will occur along the edges of the existing roadway and along the trasitway. However, because of the regulations and laws governing losses to forestlands that occur as a result of transportation

projects, the project will be required to replace the number of acres of forest removed at an acre for acre ratio. Therefore, the project will not substantially add to the cumulative impacts to forests from other projects. The project is not anticipated in impact terrestrial RTE species; therefore, there are no anticipated cumulative effects to terrestrial RTE species as a result of this project.

Alternative 6A/B or 7A/B would make an incremental contribution of 28.4 acres of impact to cumulative 100-year floodplain effects within the ICE boundary. This effect will be minimized to some extent within the area through mitigation sites that would enhance local floodplain function. Within the ICE boundary, 90 percent of floodplain area is open space. Future land use plans identify an increase in both residential and business development within the ICE boundary that would increase the area of impermeable land within the floodplains. This increased development would increase the risk and severity of flooding. Federal and state floodplain regulations and local permitting requirements make it unlikely that historic rates of floodplain encroachment would continue.

The project may add a small increment of impact to cumulative effects to surface waters and aquatic habitat as a result of new impervious surfaces created by a build alternative. As other development within the ICE boundary continues to expand, the conversion of open space and forested areas to impervious areas or manicured landscapes would be expected to increase surface runoff and peak storm flows as well as introduce sediment and other pollutants into waterways. Infill development is also likely to add to past and current water quality impacts by further reducing the remaining natural areas within the ICE boundary. These effects would be mitigated somewhat by required compliance with water quality protection regulations administered by MDE. These regulations require reductions in runoff and pollutant loadings through the use of approved stormwater management and erosion and sediment control plans. All new projects would be required to comply with current regulations to reduce water quality impacts wherever possible.

Most of the relevant constraints and opportunities facing aquatic habitats are well established and function separately from the project. These constraints are based upon federal and state regulations and local ordinances. As a result, no cumulative impacts to aquatic species, including RTE species, or aquatic habitats are anticipated as a result of the project.

All areas surrounding the wild and scenic Monocacy River and its tributaries are anticipated to experience a substantial increase in both population and employment over the next 25 years. The result of development in this area may negatively impact the river aesthetically, physically, and biologically. The project's improvements (requiring an additonal pier in the Monocacy River) would contribute to these effects.

Cumulative effects to Waters of the US could occur as a result of project impacts in conjunction with impacts from other unrelated projects. These effects are expected to be minimal as a result of this project, based on two factors:

- Many of the streams which will be directly affected by the project were previously impacted during the initial construction of I-270. The addition of culvert length for the

widening of I-270 and US 15 is not anticipated to significantly affect the streams as they are already in culverts.

- The proposed mitigation package for wetlands and streams impacts will effectively eliminate any potential contribution made by the project to long-term impacts to Waters of the US. The proposed mitigation would replace all wetland acres impacted based upon wetland types and the required mitigation ratios. Attention will be given to continuing and/or restoring specific wetland functions as well. Streams mitigations could include stream restoration, stream bank revegetation or stream bank enhancement

Therefore, the project is not anticipated to cause substantial cumulative impacts on Waters of the US (streams and wetlands) within the ICE boundary, since its contribution to long-term regional trends will be minimal.

The management of continued proposed development and the construction activities associated with it will play an important part in stabilizing the quantity and quality of wetlands within the ICE boundary. These processes will operate independently of the project, and will not be accelerated or promoted as a result of the project.

APPENDIX A

I-270/US 15 Expert Panel
Land Use Impact Analysis
Summary of Panel Activities and Panel Findings