ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

SHA State Highway Administration
Maryland Department of Transportation

How to Establish the ICE Analysis Geographical Boundary

ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

SHA State Highway Administration
Maryland Department of Transportation

How to Establish the ICE Analysis Geographical Boundary

Several sub-boundaries should be considered in establishing ICE Analysis boundary. These include:

- **Resource Boundaries**
- **Census Tracts**
- **Extent of Preliminary / Conceptual Alternatives**
- **Area of Traffic Influence**
- **State and Local Planning Areas**
- **Sewer/Water Service**
- **Other**

How to Establish the ICE Analysis Geographical Boundary

KEY POINTS TO REMEMBER

The ICE Analysis Geographical Boundary is a synthesis of many sub-boundaries into a single ICE Analysis boundary.

ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

SHA State Highway Administration
Maryland Department of Transportation

Sub-Boundaries to Consider When Establishing the ICE Analysis Boundary:

Resource boundaries - Parks, forest, historic districts, watershed and sub-watershed boundaries, sensitive species protection areas, Chesapeake Bay Critical Area, etc.

Census tract boundaries

- **The census tracts which are affected by the proposed alternatives**
- **While boundaries of census tracts may change, they show areas where substantial growth (and resource impacts) have occurred in the past and are likely to occur in the future**

Extent of Preliminary / Conceptual alternatives - Area that encompasses all of the preliminary/conceptual alternatives

Factors to Consider When Establishing the ICE Analysis Boundary - continued

Area of traffic influence - Geographic extent to which a project will affect traffic levels on nearby roadways.

- **In MPO areas, Traffic Analysis Zones (TAZ) may be used, as well as travel demand models which can provide the percentage increase/decrease in traffic for the alternatives.**
- **The travel forecaster may also use professional judgement in determining the limits of traffic influence, especially for non-MPO areas.**

State and Local planning area boundaries - Special land use planning areas, such as Montgomery County Planning Areas, that may impact future land development.

Sewer and water service locations - Existing and proposed.

Other - Coastal Zone Management (CZM) Area, etc.

ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

Factors to Consider When Establishing the ICE Analysis Boundary - continued

Sub-Boundary Checklist

Sub - Boundaries	Considered		Rationale
	Yes	No	
Resource boundaries			Used to determine natural environmental, cultural and socio-economic resource sub-boundaries.
Census tract boundaries			Recommended under SHA guidelines as a way of developing sub-boundaries for socio-economic resources.
Extent of preliminary/ conceptual alternatives			ICE Analysis boundary should be within the extent of the Alternatives Retained for Detailed Study.
Area of traffic influence			Determine if area of traffic influence extends beyond the limits considered to have cumulative effects.
State and local planning area boundaries			Planning boundaries that fall within the area of cumulative effects.
Sewer/water service locations			Differentiate between public water/sewer and private septic, and well systems.
Other			Additional boundaries that are unique to a project but should be considered in establishing the ICE Analysis geographical boundary.

ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

Valuable Data Sources

Key Data Source	*Description*	*SHA Availability*
Alternatives Mapping	Area that encompasses preliminary/conceptual alternatives	
Travel Forecasts - MPO and/or project specific data	Used to assess area of traffic influence	
US census data - census tract boundaries and population/employment data	Used to identify areas of past and likely future growth	
USGS Topographic Maps	Used to identify watersheds/sub-watersheds, State/National forests and parks	
Department of Housing and Community Development	Used to identify historic districts or sites	
Maryland Department of Natural Resources Technology Toolbox	Used to identify wetlands, protected lands, sensitive species protection areas, floodplains, submerged acqatic vegetation, watersheds and Chesapeake Bay Critical Area	
County Master Plans	Used to identify areas of past and projected growth	
Sewer/Water Service Plans	Used to identify areas of existing and planned service	
County GIS Mapping	Used to identify various resources, such as watersheds, forests and parks, etc.	

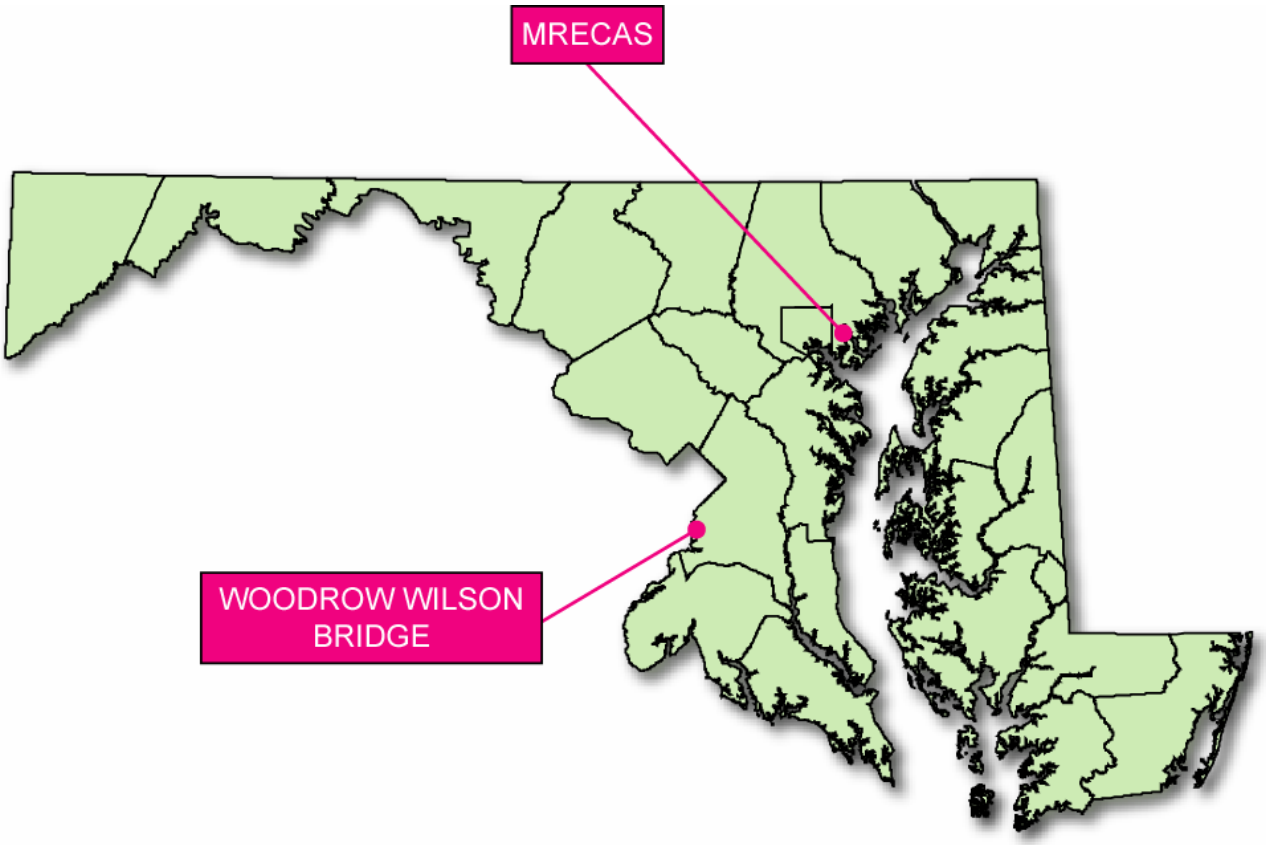
ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

Supporting Documentation

The following may be used to document and support ICE Analysis geographical boundary decisions:

- **Document graphically and in your ICE Analysis narrative how the overall ICE Analysis boundary is a synthesis of all sub-boundaries considered.**
- **Clearly record comments and recommendations received from resource agencies to use in developing the ICE Analysis boundary.**
- **Provide mapping showing all sub-boundaries along with the overall synthesized ICE Analysis boundary.**



Case Studies

- **Woodrow Wilson Bridge**
- **MRECAS (MD 43 Extended)**

Woodrow Wilson Bridge Supplemental Environmental Impact Statement

ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

SHA State Highway Administration
Maryland Department of Transportation

Woodrow Wilson Bridge Supplemental Environmental Impact Statement

- **ICE Analysis was developed in conformance with Maryland State Highway Administration's Indirect and Cumulative Effects Analysis Guidelines for Environmental Impact Statements and Environmental Assessments (revised 7/21/99).**
- **Provides good example of developing and documenting an ICE Analysis Geographical Boundary.**
- **The ICE Analysis Geographical Boundary was a synthesis of overlays including:**
  - **areas of traffic influence**
  - **subwatersheds**
  - **Upper Tidal Potomac River Boundary**
  - **census tracts**
  - **Other**

ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

SHA State Highway Administration
Maryland Department of Transportation

Woodrow Wilson Bridge Supplemental Environmental Impact Statement

AREA OF TRAFFIC INFLUENCE

- **Select link analysis conducted to determine 2020 traffic volumes with and without the current design alternative.**
- **The difference in traffic volumes/patterns identified the extent of traffic influenced by the project.**
- **MWCOG Round 6.1 Cooperative Forecast land use assumptions are consistent with the future land use assumptions used in the Indirect and Cumulative Effects Analysis.**

Woodrow Wilson Bridge Supplemental Environmental Impact Statement

SUBWATERSHEDS

- The current design alternative's area of traffic influence lies within six subwatersheds of the Potomac River Basin including:
  - Cameron Run, Fairfax County, Virginia
  - Four Mile Run, Fairfax County, Virginia
  - Belle Haven subwatersheds, Fairfax County, Virginia
  - Oxon Run, Prince George's County, Maryland
  - Broad Creek, Prince George's County, Maryland
  - Hanson Creek, Prince George's County, Maryland

ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

SHA State Highway Administration
Maryland Department of Transportation

Woodrow Wilson Bridge Supplemental Environmental Impact Statement

UPPER TIDAL POTOMAC RIVER BOUNDARY

- **Considered since same land use areas within the areas of traffic influence drain directly into the Potomac River Basin. Not all of the areas within the ICE Analysis Geographical Boundary drain into the subwatersheds.**

- **The Upper Potomac Tidal River Boundary (USGS) is the area that may potentially receive drainage from the areas of traffic influence.**

- **The subwatershed boundaries along with Upper Tidal Potomac River boundary predominantly defined the ICE Analysis Geographical Boundary limits along the Potomac River.**

Woodrow Wilson Bridge Supplemental Environmental Impact Statement

CENSUS DATA

- **A total of 192 census tracts are situated within the ICE Analysis Geographical Boundary.**
- **The area of traffic influence is situated within an area that includes 35 of these census tracts.**
- **Census tracts represent areas that can be studied for historic and projected changes in:**
  - **population**
  - **housing**
  - **employment**
  - **land use**

Woodrow Wilson Bridge Supplemental Environmental Impact Statement

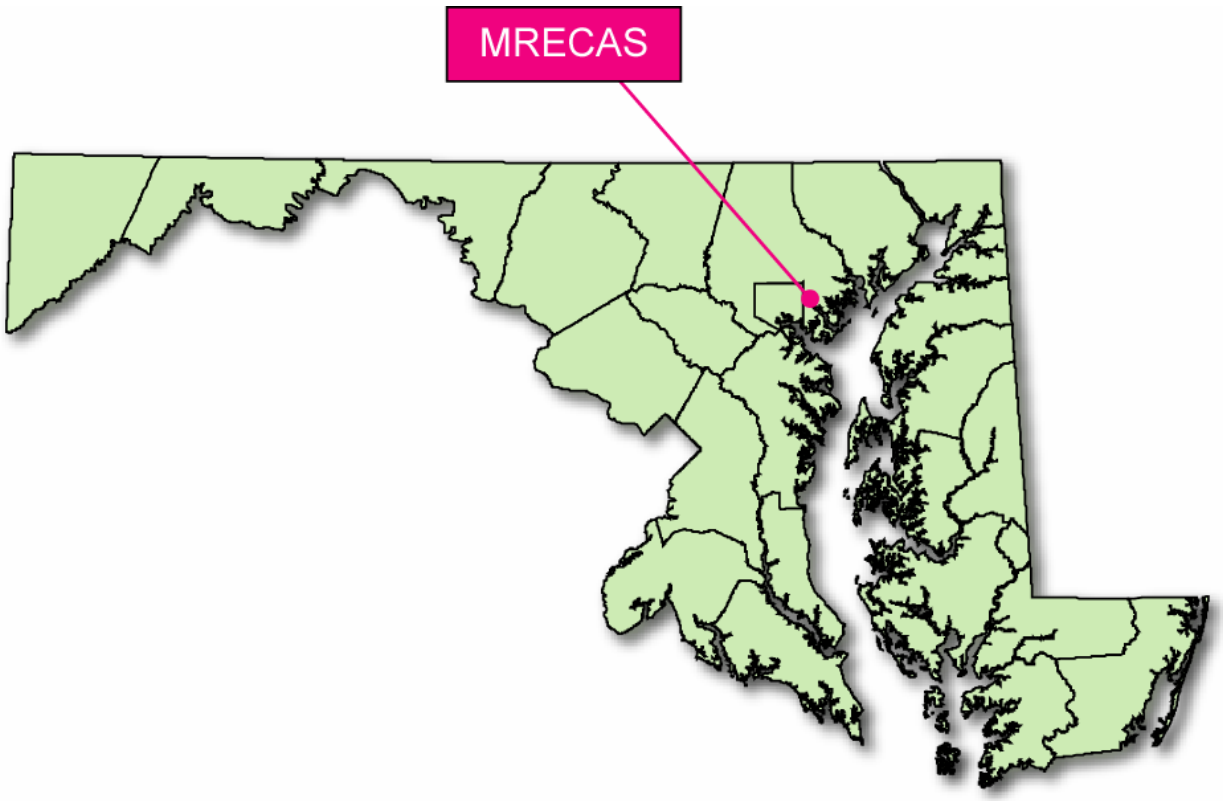
OTHER CONSIDERATIONS

- **Alexandria Historic District (National Register of Historic Places listed).**
- **Maryland communities adjacent to the Woodrow Wilson Bridge (including Forest Heights and Oxon Hill).**

Woodrow Wilson Bridge Supplemental Environmental Impact Statement

Woodrow Wilson Bridge ICE Analysis Geographical Boundary

Middle River Employment Center Access Study (MRECAS)



ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

Middle River Employment Center Access Study (MRECAS)

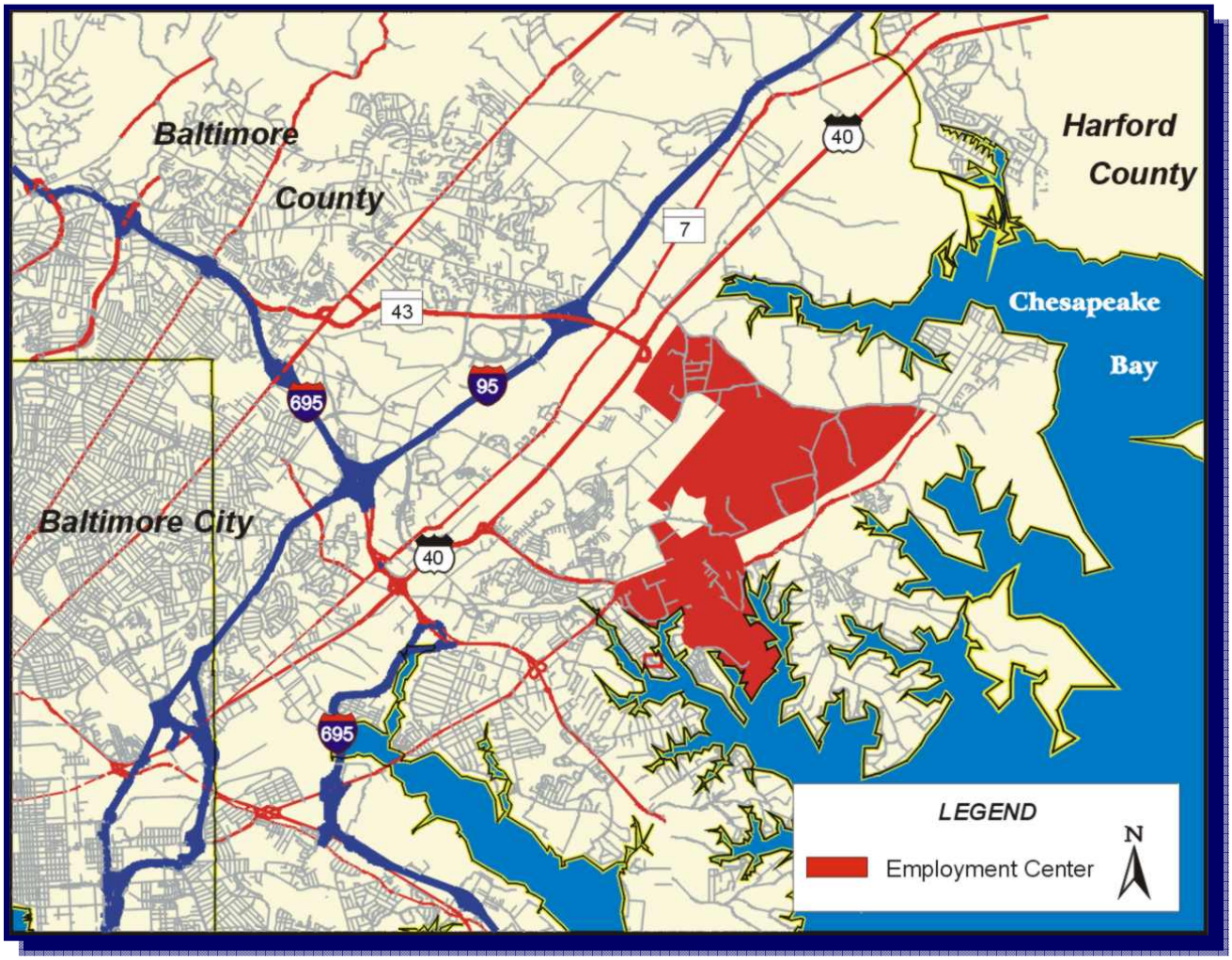
MRECAS Sub-Boundary Resource Considerations

Sub - Boundaries	Considered		Rationale
	Yes	No	
Resource boundaries	✓		3 Watershed boundaries were used to create a natural environmental sub-boundary.
Census tract boundaries	✓		The outer limit of 24 contiguous census tracts were used to create a socio-economic sub-boundary.
Extent of preliminary/ conceptual alternatives	✓		Direct impacts study area encompasses the extent of Alternatives Retained for Detailed Study
Area of traffic influence		✓	The ICE Analysis did not identify the area of traffic influence as a separate sub-boundary in the documentation.
State and local planning area boundaries	✓		Middle River Employment Center falls within the indirect effects sub-boundary.
Sewer/water service locations		✓	The ICE Analysis did not identify sewer/water service as a separate sub-boundary in the documentation.

NOTE: Anytime a particular sub-boundary type is not included in the development of the ICE Analysis geographic boundary, be sure to document why it was omitted.

Middle River Employment Center Access Study (MRECAS)

Employment Center Boundary



Middle River Employment Center Access Study (MRECAS)

Indirect Effects Sub-Boundaries –
For this study, the geographical boundary for the Indirect Effects analysis was identical to the boundaries of the Middle River Employment Center (MREC). The rationale for creating this boundary was the assumption that the planned development within the employment center would constitute the short-term, Indirect Effects of the proposed project.

Under current SHA Guidelines, there should not be separate Indirect and Cumulative Effects boundaries. In the MRECAS analysis, the Middle River Employment Center study area boundary should have been synthesized into one larger ICE Analysis geographical boundary.

! CAUTION

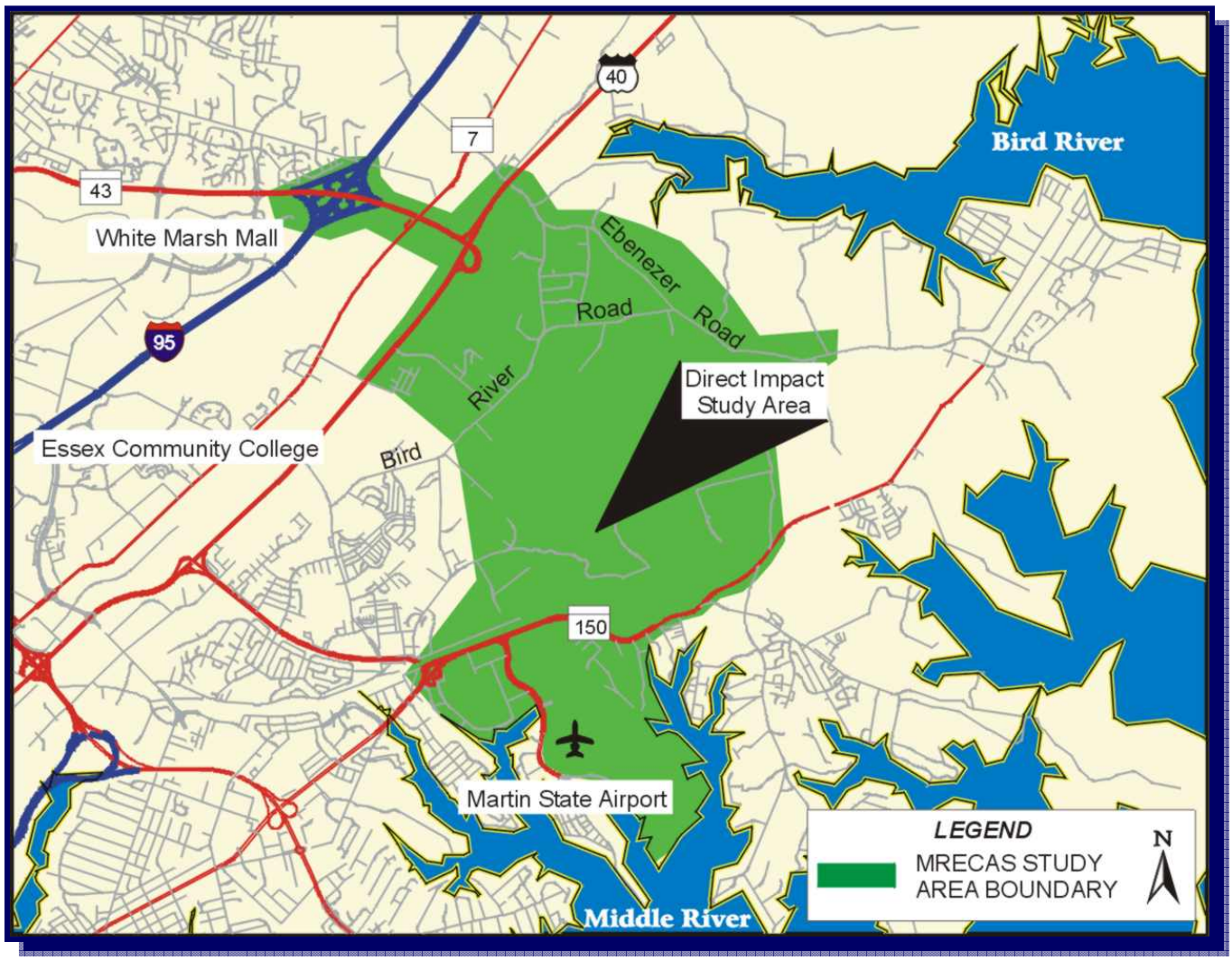
Middle River Employment Center Access Study (MRECAS)

SHA guidelines recommend that an ICE Analysis boundary synthesize multiple resource sub-boundaries into a single ICE Analysis boundary. In this case, indirect development was assumed to be contained within a single growth boundary defined by the proposed employment center.

SHA guidelines recommend that ICE Analysis geographical boundaries be partially defined by resources. Land use is not a resource as defined by the guidelines. Land use is used to assess potential effects upon environmental resources.

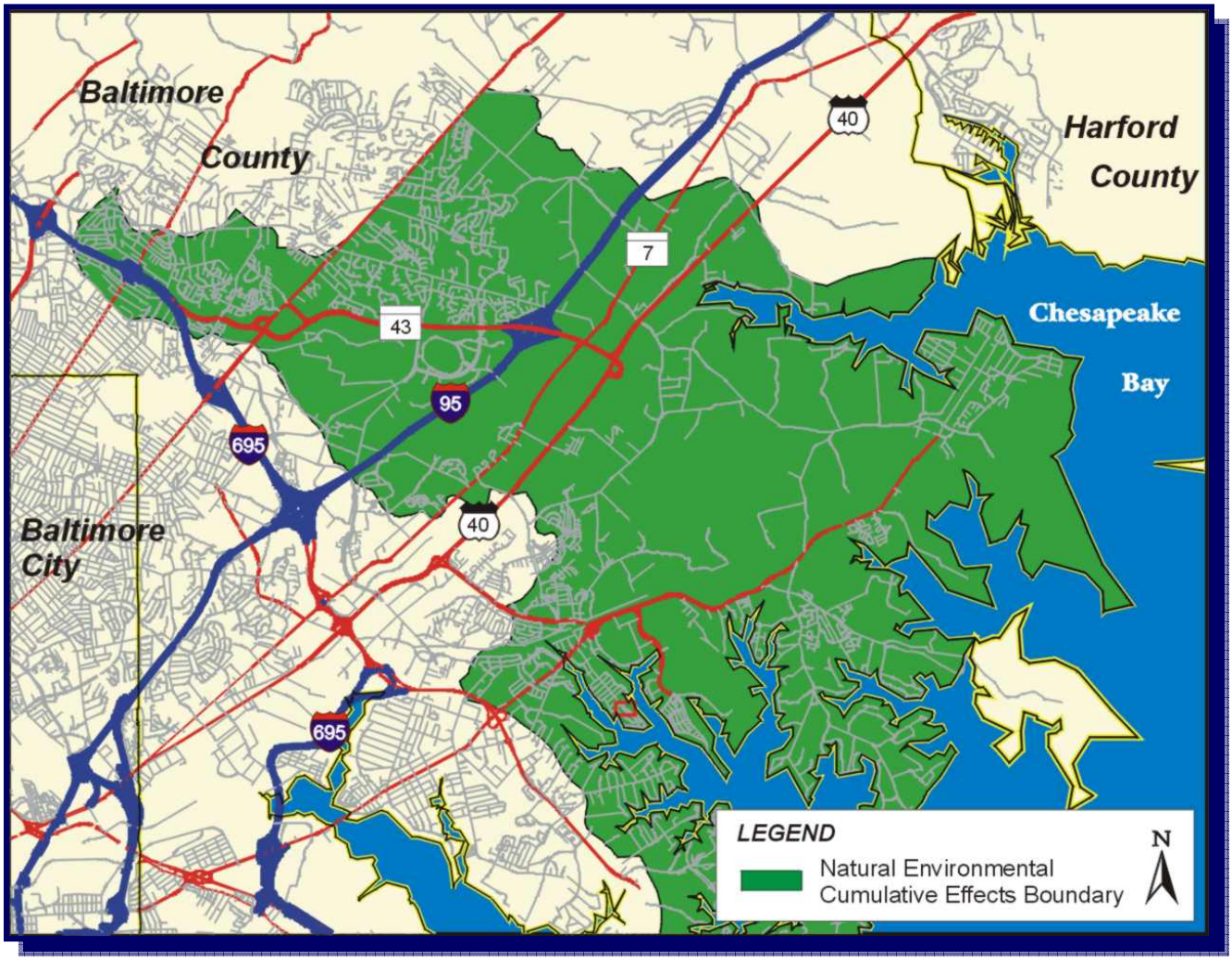
Middle River Employment Center Access Study (MRECAS)

Direct Impacts Study Area Boundary



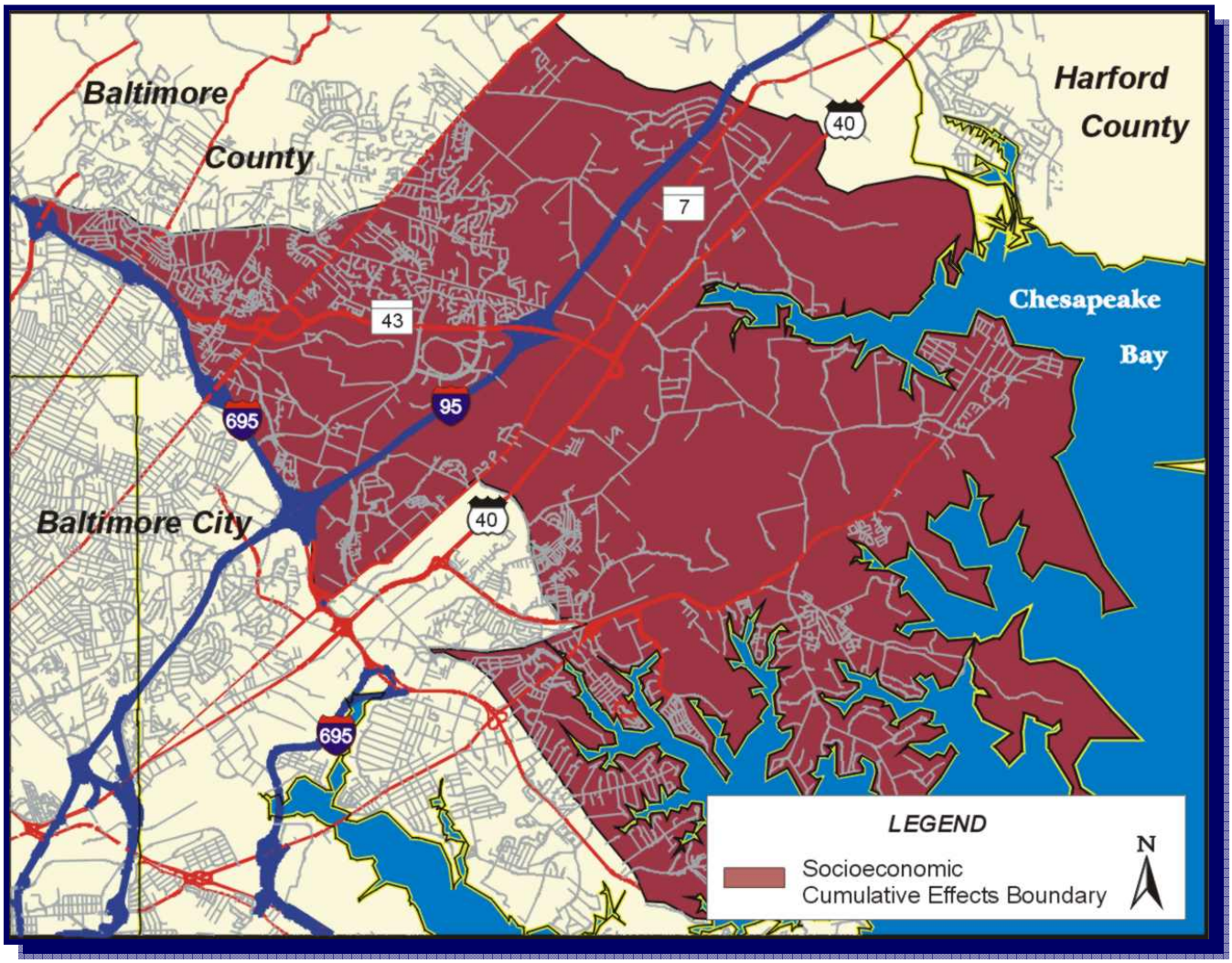
Middle River Employment Center Access Study (MRECAS)

Natural Environmental Cumulative Effects Boundary



Middle River Employment Center Access Study (MRECAS)

Socio-Economic Cumulative Effects Boundary



ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

SHA State Highway Administration
Maryland Department of Transportation

Middle River Employment Center Access Study (MRECAS)

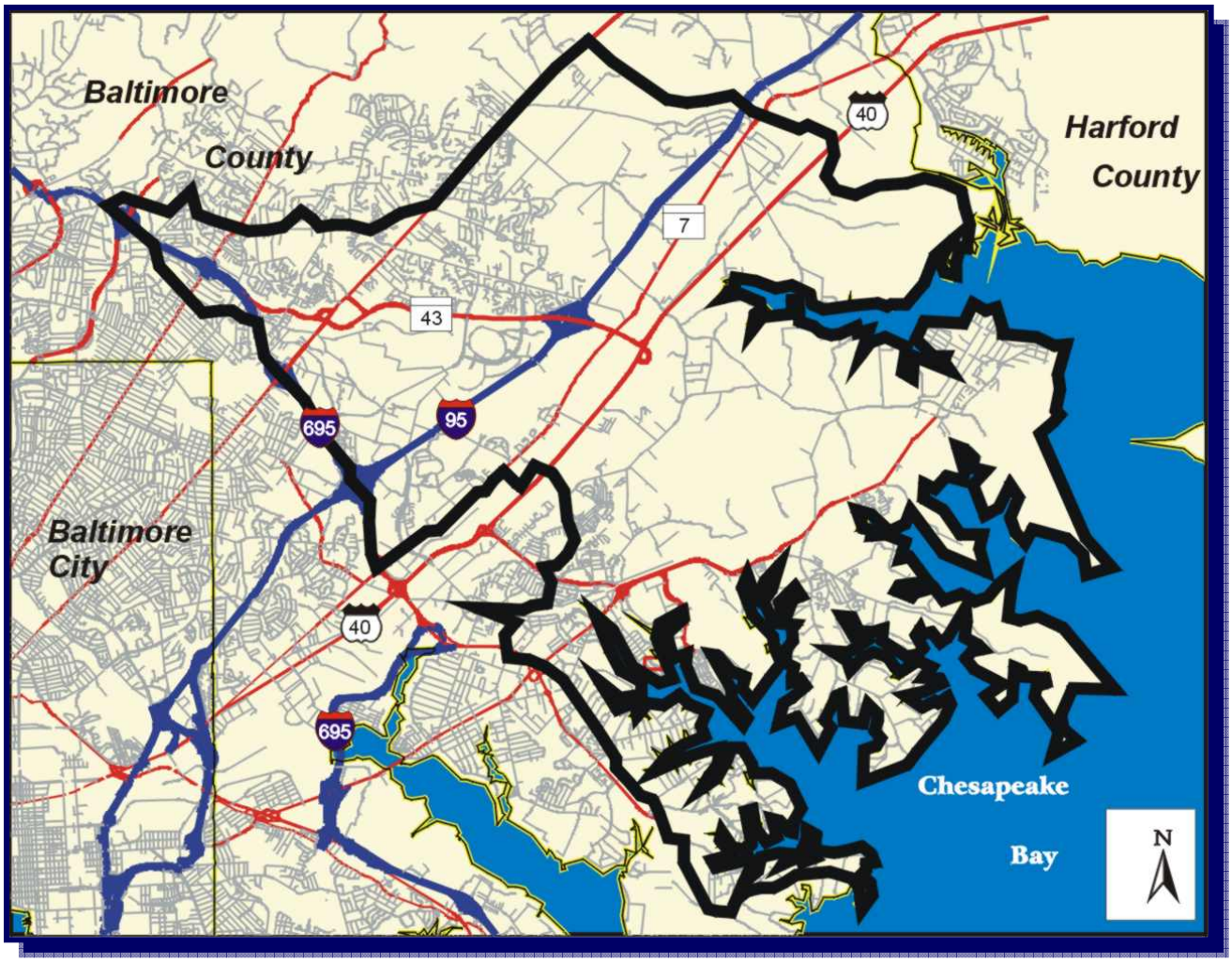
Cumulative Effects Boundaries - The geographical boundaries for the natural environmental cumulative effects analysis encompassed the contiguous areas of three watersheds: Middle River, Bird River, and Gunpowder River.

The geographical boundaries for the socio-economic cumulative effects analysis encompassed 24 Baltimore County census tracts that, together, comprised the same general area as the three watersheds.

One single boundary that includes a synthesis of all sub-boundaries would be the appropriate methodology for establishing an ICE Analysis geographical boundary for MRECAS. In the case of MRECAS, a cumulative effects boundary for socio-economic analysis closely reflects the cumulative effects boundary for natural environmental analysis along with other sub-boundaries, but they were not synthesized to one overall boundary.

Middle River Employment Center Access Study (MRECAS)

Possible Single ICE Analysis Boundary Incorporating the sub-boundaries of Census Tracts, Watershed Boundaries, Employment Center, Extent of Alternatives Retained for Detailed Study and Indirect Effects.



Group Exercise

- **Establishing a Geographical Boundary**

- **Determine which sub-boundary is most representative of each resource.**

Pick up your polling devices!

- **What other non-resource sub-boundaries may have been considered in the analysis?**

Pick up your polling devices!

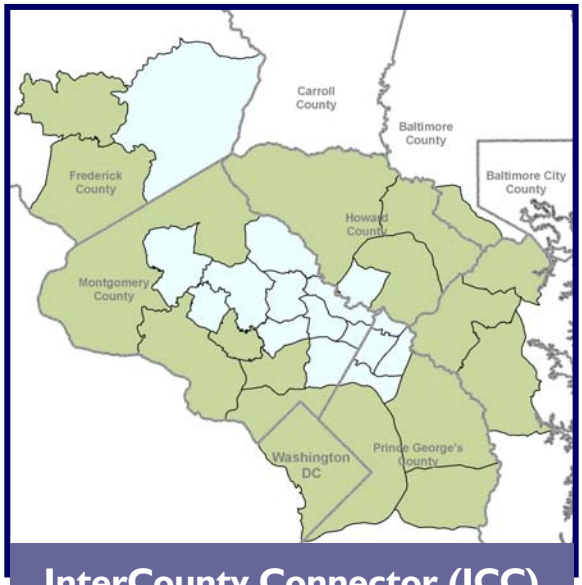
ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

Expert Land Use Panel Boundary

What is an Expert Land Use Panel (ELUP)?

- An advisory group established to estimate differences in the amount and location of future households and jobs (secondary development) for the Alternatives.
- The ELUP process is included as part of SHA's ICEA Guidelines (SHA, 2007) for select projects.
- Due to the complexity of the project, an ELUP was selected to identify future land use scenarios since there were differing viewpoints among local jurisdictions, agencies and special interest groups.



InterCounty Connector (ICC)

How was the ELUP Boundary Established?

- An ELUP boundary was established based on population and employment estimates for 34 Forecast Zones.
- Forecast Zones that experienced greater than a 5 % change in allocation between No-Action and either build alternative represent areas that could experience potential secondary effects.

ICE Analysis Training Program

Module 2:
How to Establish the ICE Analysis Geographical Boundary

SHA State Highway Administration
Maryland Department of Transportation