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NUCLEAR ENERGY

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ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Calvert Cliffs Nuclear Power Plant, Unit 3
Follow-up Response to Environmental Report RAI 1011, Alternative Sites

The Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 Alternative Sites analyses have recently been revised following feedback received from the NRC Staff in the Friday, May 8, 2009, public meeting. The revised analyses affected the current text contained in CCNPP Unit 3, Combined License Application (COLA) Revision 5, and responses to RAI Nos. 1011-1 through -6, 196 through 201, 210, 212, 213, 215, 217 through 220, 222, and SE-7.

Enclosure 1 contains the revised response to RAI No. 1011. Enclosure 2 provides revised Section 9.3 of the CCNPP Unit 3 Environmental Report (ER). Enclosure 3 provides the revised Calvert Cliffs Nuclear Power Plant Unit 3 Alternate Site Evaluation, dated July 2009, which documents the site selection process utilized to confirm/validate the Calvert Cliffs "Proposed Site."

A Licensing Basis Document Change Request has been initiated to incorporate the changes into a future revision of the CCNPP Unit 3 Combined License Application. This response does not include any new regulatory commitments.

If there are any questions regarding this transmittal, please contact me at (410) 470-4205, or Mr. Dimitri Lutchenkov at (410) 470-5524.

D096
NRO

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 17, 2009

Greg Gibson

Enclosures:

1) Follow-up Response to NRC Request for Additional Information 1011, Alternative Sites, Calvert Cliffs Nuclear Power Plant Unit 3
2) ER Section 9.3 Associated with Revised Alternative Site Analysis, Calvert Cliffs Nuclear Power Plant Unit 3
3) Calvert Cliffs Nuclear Power Plant Unit 3, Alternate Site Evaluation, July 17, 2009

cc: John Rycyna, NRC Project Manager, U.S. EPR COL Application
Laura Quinn, NRC Environmental Project Manager, U.S. EPR COL Application
Getachew Tesfaye, NRC Project Manager, U.S. EPR DC Application (w/o enclosure)
Loren Plisco, Deputy Regional Administrator, NRC Region II (w/o enclosure)
Silas Kennedy, U.S. NRC Resident Inspector, CCNPP, Units 1 and 2
U.S. NRC Region I Office

GTG/KAB/kat

Enclosure 1

Follow-up Response to
NRC Request for Additional Information 1011,
Alternative Sites
Calvert Cliffs Nuclear Power Plant Unit 3

RAI Number : 1011-1

Question ESRP 9.3-1

UniStar's region of interest is stated in the ER to be New York and Maryland. The ER discusses four candidate sites, two in Maryland and two in New York. Need for power is analyzed in the ER for Maryland but not for New York. Explain why the two New York sites were included in the ER as alternative sites given that no need for power in New York is identified or discussed in the ER.

Response

The Region of Interest (ROI) discussion provided in ER Section 9.3.1.1 has been substantially revised. New York is no longer included in the ROI. The revised response replaces the current text contained in CCNPP Unit 3, COLA Revision 5, as well as ER changes stated in the past response to RAI No. 1011-1 (Question ESRP 9.3-1).

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are provided in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

RAI Number : 1011-2

Question ESRP 9.3-2

Assuming that a need for power exists in both New York and Maryland, why did UniStar select a Maryland site for the proposed site?

Response

The ROI discussion provided in ER Section 9.3.1.1 has been substantially revised. The ROI is defined as the state of Maryland. The revised response replaces the current text contained in CCNPP Unit 3, COLA Revision 5, as well as ER changes stated in the past response to RAI No. 1011-2 (Question ESRP 9.3-2).

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are provided in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

RAI Number : 1011-3

Question ESRP 9.3 – 3

The August 18, 2008 RAI responses 198 and 199 identify criteria used to screen for candidate areas, potential sites, and candidate sites. However, it does not provide the actual evaluation used including the ratings for the sites being screened. Provide the actual ratings by criteria for the site selection process used to screen for candidate areas and potential sites and used to select the candidate sites. Describe in detail the full process including the scores of the 13 potential sites evaluated in the screening to candidate sites.

Response

The Site Selection Process discussion is provided in ER Section 9.3.1. The details requested in this original RAI are provided in the new ER Section 9.3. The revised response replaces the current text contained in CCNPP Unit 3, COLA Revision 5, as well as ER changes stated in the past response to RAI No. 1011-3 (Question ESRP 9.3-3).

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are provided in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

RAI Number : 1011-4

Question ESRP 9.3 – 4

The proposed site may be determined from a list of candidate sites (screening process) or, as a special case, which includes selection of one at an existing nuclear power plant site. Was the Calvert Cliffs site selected based on the screening process or the ESRP 9.3 exception process for existing nuclear plant sites? Provide the analysis details that resulted in its selection.

Response

Discussion of the Proposed Site is provided in ER Section 9.3.2.1. The details requested in this original RAI are provided in the new ER Section 9.3. The revised response replaces the current text contained in CCNPP Unit 3, COLA Revision 5, as well as ER changes stated in the past response to RAI No. 1011-4 (Question ESRP 9.3-4).

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are provided in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

RAI Number : 1011-5

Question ESRP 9.3 – 5

What was the screening process described in the responses to June 12, 2008 RAIs 198 and 199, used to select NMP and Ginna as candidate sites?

Response

The ROI discussion provided in ER Section 9.3.1.1 has been substantially revised. New York is no longer in the ROI. The revised response replaces the current text contained in CCNPP Unit 3, COLA Revision 5, as well as ER changes stated in the past response to RAI No. 1011-5 (Question ESRP 9.3-5).

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are provided in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

RAI Number : 1011-6

Question ESRP 9.3 – 6

Describe any difference in the alternative site selection processes that led UniStar to add the former Thiokol site as an alternative site.

Response

The former Thiokol Site is discussed in ER Section 9.3.2.4. The alternative site evaluation selection process is provided in ER Section 9.3.2. The revised response replaces the current text contained in CCNPP Unit 3, COLA Revision 5, as well as ER changes stated in the past response to RAI No. 1011-6 (Question ESRP 9.3-6).

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are provided in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

RAI Number : 1011-9

Question ESRP 9.3 – 9

Explain how the potential presence of unexploded ordnance was included in the site rating for the Thiokol site.

Response

Revised ER Table 9.3-2, "Site Ranking Criteria" includes ordnance in ranking criterion 10a.

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are provided in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

RAI Number : 1011-10

Question ESRP 9.3 – 10

Describe the actions previously taken to locate and remove the unexploded ordnance from the Thiokol site.

Response

Unexploded ordinance (UXO), in relation to the Thiokol site, is discussed in ER Section 9.3.2.4.1.

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are provided in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

RAI Number : 1011-11

Question ESRP 9.3 – 11

Provide an evaluation of the potential impacts of the construction and operation of a nuclear unit at the Thiokol site on the Federally endangered dwarf wedge mussel (*Alasmidonta heterodon*), which occurs in McIntosh Run just downstream from the site. Provide information about any other Federally listed or State-listed endangered or threatened species that could be affected by the construction and operation of a nuclear unit at the Thiokol site.

Response

The dwarf wedge mussel in relation to the Thiokol site is discussed in ER Section 9.3.2.4.5.

COLA Impact

The changes to the COLA associated with the new Alternative Sites analysis are presented in Enclosure 2. ER Section 9.3 will be updated as indicated in Enclosure 2 in a future COLA revision.

Enclosure 2

ER Section 9.3 Associated with Revised Alternative Site Analysis
Calvert Cliffs Nuclear Power Plant Unit 3

9.3 ALTERNATIVE SITES

This section presents an evaluation of alternative sites to the proposed location of Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3. The objective of the evaluation is to demonstrate that there are no sites that are "obviously superior" to the proposed CCNPP Unit 3 site. The underlying assessment (UniStar, 2009) evaluated other candidate sites based on the guidance provided in NUREG-1555, Environmental Standard Review Plan (NRC, 1999), Regulatory Guide 4.2, Preparation of Environmental Reports for Nuclear Power Stations (NRC, 1976), Regulatory Guide 4.7, General Site Suitability for Nuclear Power Stations (NRC, 1998), and the Electric Power Research Institute (EPRI) Siting Guide: Site Selection and Evaluation Criteria for an Early Siting Permit Application Final Report (EPRI, 2002). The results of that assessment are provided in this section.

The NRC recognizes in NUREG-1555, Section 9.3(III)(8) that the proposed site for a new reactor may not always be based on a systematic review. Siting new units at existing nuclear sites has provided another option to the way alternatives are reviewed and selected. Existing sites offer decades of environmental and operational information about the impact of a nuclear plant on the environment. NUREG-1555 Section 9.3 (III)(8) states:

> Recognize that there will be special cases in which the proposed site was not selected on the basis of a systematic site-selection process. Examples include plants proposed to be constructed on the site of an existing nuclear power plant previously found acceptable on the basis of a NEPA review and/or demonstrated to be environmentally satisfactory on the basis of operating experience, and sites assigned or allocated to an applicant by a State government from a list of State-approved power-plant sites. For such cases, the reviewer should analyze the applicant's site-selection process only as it applies to candidate sites other than the proposed site, and the site-comparison process may be restricted to a site-by-site comparison of these candidates with the proposed site. As a corollary, all nuclear power plant sites within the identified region of interest having an operating nuclear power plant or a construction permit issued by the NRC should be compared with the applicant's proposed site.

The information provided in this section is consistent with this special case. This section provides a description of the evaluation of a set of alternative locations for the proposed site that includes direct comparisons of their environmental suitability to the environmental suitability of the proposed site. The objective is to conform that no site is "Environmentally Preferable" and thus not "Obviously Superior" to the proposed location of CCNPP Unit 3.

9.3.1 SITE SELECTION PROCESS

The site selection process focuses on identifying and evaluating locations that represent a range of reasonable alternative sites for the proposed project.

A list of candidate sites is developed and a preferred site is chosen from those sites. The preferred site is compared to the remaining candidate sites to demonstrate that none are environmentally preferable. The primary objective of the site-selection process is to determine if any alternative site is "obviously superior" to the preferred site for eventual construction and operation of the proposed reactor units. The basic constraints and limitations applicable to the site-selection process are the currently implemented rules,

regulations, and laws within the federal, state, and local agency levels. These provide a comprehensive basis and an objective rationale under which this selection process is performed. As stated in NUREG-1555, Section 9.3:

> "Region of interest" (ROI) is the geographic area considered in searching for candidate sites. "Candidate sites" are those sites (at least four) that are within the region of interest and that are considered in the comparative evaluation of sites to be among the best that can reasonably be found for the siting of a nuclear power plant. "Proposed site" is the candidate site submitted to the NRC by the applicant, or by a person requesting an early site review pursuant to Appendix A to 10 CFR 50, as the proposed location for a nuclear power plant. "Alternative sites" are those candidate sites that are specifically compared to the proposed site to determine if there is an obviously superior site. An "environmentally preferred" alternative site is a site for which the environmental impacts are sufficiently less than for the proposed site so that environmental preference for the alternative site can be established.

The evaluation process follows NUREG-1555 and elements of the EPRI siting guide (EPRI, 2002). The alternative site evaluation process is shown in Figure 9.3-1 and is summarized as follows:

- Establish the Region of Interest (ROI)
  - Establish the basis for the ROI and define the ROI
  - Develop the basis for establishing a pool of sites to evaluate
  - Establish an initial base pool of sites to evaluate
- Determine "Candidate Areas" within the ROI
  - Establish exclusionary criteria (e.g., population centers)
  - Apply the exclusionary criteria to the "Candidate Areas"
- Identify list of "Candidate Sites"
  - Establish exclusionary criteria (e.g., < 420 ac (170 ha))
  - Apply exclusionary criteria to identify list of "Candidate Sites"
- Rank "Candidate Sites" based on non-commercial criteria (i.e., environmental bases)
  - Establish ranking and weighting criteria and bases
  - Apply ranking and weighting criteria and bases
- Select the top 3 to 5 ranked "Candidate Sites" as "Alternative Sites" to be compared to the "Proposed Site"
- Compare the "Alternative Sites" to the "Proposed Site"
  - Evaluate if any "Alternative Sites" are "Environmentally Preferred" to the "Proposed Site"
  - If one or more of the "Alternative Sites" is significantly higher, then apply Commercial Ranking to evaluate whether an "Alternative Site" is "Obviously Superior" to a the "Proposed Site".

9.3.1.1 Region of Interest

The first step in the alternative site selection process is to define and identify the ROI. As defined in ESRP 9.3 (NRC, 2007), the ROI is the largest area considered and is the geographic area within which sites suitable for the size and type of nuclear power generating facility proposed by the applicant are evaluated. As stated in Section 1.1, Proposed Action:

> "The purpose is to build and operate a baseload nuclear merchant power plant that will generate needed power for Maryland."

A detailed discussion of the need for power in Maryland is provided in Chapter 8. The Maryland Public Service Commission (PSC) (MDPSC, 2007; Scholer, 2007) has identified that "Maryland suffers from a State-wide shortfall in net generating capacity", that nuclear provides the highest cumulative economic value added ("EVA") compared to the costs of all other energy scenarios, and an expectation that the needed electric power, to meet in-state demand, should not be imported into the state (i.e., generation from within the state boundary of MD) to ensure reliable and cost-effective power to the Maryland consumer. In addition, the PSCs Final Order in Case No. 9127 granting a Certificate of Public Convenience and Necessity (CPCN), for construction of Calvert Cliffs Nuclear Power Plant Unit 3 states that:

> "The plant will constitute a new large source of power that would be of benefit to the citizens and State of Maryland, with record showing that such plant location at the site of an existing nuclear plant campus will reduce impacts, and with conditions accepted herein will meet all applicable environmental standards and requirements."

NUREG-1555, Section 9.3, Alternative Sites states:

> "The basis for an ROI is the State in which the proposed site is located or the relevant service area for the proposed plant."

Based on the aforementioned, the ROI is defined as the state of Maryland. The ROI is provided in Figure 9.3-2.

9.3.1.2 Candidate Areas and Candidate Sites

Various brownfield sites, remediation sites, and other power facilities were considered within the ROI. In excess of 1000 sites within the ROI were initially selected for consideration. To be retained for further consideration, the location must meet the following criteria as outlined in NUREG-1555 (NRC,1999), Section 9.3 (II)(4c).

- Consumptive use of water should not cause significant adverse effects on other users.
- There should not be any further endangerment of Federal, State, regional, local, and affected Native American tribal listed threatened, endangered, or candidate species.
- There should not be any potential significant impacts to spawning grounds or nursery areas of populations of important aquatic species on Federal, State, regional, local, and affected Native American tribal lists.

- Discharges of effluents into waterways should be in accordance with Federal, State, regional, local, and affected Native American tribal regulations and would not adversely impact efforts to meet water-quality objectives.
- There would be no preemption of or adverse impacts on land specially designated for environmental, recreational, or other special purposes.
- There would not be any potential significant impact on terrestrial and aquatic ecosystems, including wetlands, which are unique to the resource area.
- Population density and numbers conform to 10 CFR 100.
- There are no other significant issues that affect costs by more than 5% or that preclude the use of the site.

The information presented in 10 CFR 100 does not specify a permissible population density or total population within a zone because the situation may vary from case to case. NRC Regulatory Guide 4.7 (NRC, 1998) contains the same information as presented in 10 CFR 100, but adds the following specific criteria:

> *Preferably a reactor would be located so that, at the time of initial site approval and within about 5 years thereafter, the population density, including weighted transient population, averaged over any radial distance out to 20 miles (cumulative population at a distance divided by the circular area at that distance), does not exceed 500 persons per square mile. A reactor should not be located at a site whose population density is well in excess of the above value.*

As functional requirements, the site also needs to be located near a suitable cooling water source and within proximity to adequate transmission lines. The following exclusionary criteria were used to narrow the list of sites to be retained for further consideration:

- Population – Not located in an area with greater than or equal to 300 persons per square mile (300 persons per 2.6 km^2) (Figure 9.3-3). Note that this criterion is more restrictive than that specified in Regulatory Guide 4.7 and thus conservative.
- Transmission – Not located more than 30 miles (48.3 km) from a 345-kV or 500-kV transmission line. The 345-kV or 500-kV transmission lines are needed for the EPR standard grid connection design (Figure 9.3-4).
- Dedicated Land – Not located on Dedicated Land (e.g., within national or state parks, historic sites, tribal lands, etc.) (Figure 9.3-5)
- Water – Not located more than 15 miles (24.1 km) from an adequate cooling water source (Figure 9.3-6).

Figure 9.3-7 shows all of the exclusion areas combined.

The "Candidate Areas" within the ROI are shown in Figure 9.3-8. The locations of various sites within the "Candidate Areas" are shown in Figure 9.3-9.

The next step in the site selection process involves screening the remaining sites using refined criteria to identify potential geographic locations for the placement of the proposed nuclear power station. A de-select criteria, as allowed by NUREG-1555 and the EPRI siting guide (EPRI, 2002), was applied to the list of sites within the candidate areas to narrow the

list. At least 420 acres (170 ha) are needed to construct the U.S. EPR. Therefore, all sites with less than 420 acres (170 ha) were screened out in this step. This narrowed the list to the following potential sites:

- Bainbridge Naval Training Center
- BWI Airport
- Beiler Property
- Conowingo
- East ALCO Aluminum Company
- Former Thiokol Site
- Morgantown
- Sparrows Point

Of these eight locations, the BWI Airport site was determined not to be licensable due to its proximity to a commercial airport. The Sparrows Point site was determined not to be licensable due to being within a 10 mile proximity to a population center greater than 300 ppsm [or 300 persons per 2.6 km^2]). The Morgantown site was determined not to be a viable option based on the fact that utilizing Morgantown as the site does not meet the "need for power". That is, removing an existing/operating 1486MW facility such as Morgantown to replace it with 1600Mw for a net of 114Mw does not increase electric supply significantly and, as such, does not meet the need for power. As a result, the following five sites were identified as licensable and viable for continuing as "Candidate sites" for the next step of the process:

- Bainbridge Naval Training Center
- Beiler Property
- Conowingo
- East ALCO Aluminum Company
- Former Thiokol Site

The locations of the "Candidate Sites" are shown in Figure 9.3-10.

The next step is a two-part sequential process. The first step is to identify "Alternative Sites" by ranking the "Candidate Sites" based on a set of non-commercial criteria. This screening was accomplished using a table similar to Table 9.3-1 in NUREG-1555. The ranking criteria used in this process are described in Table 9.3-2 and the rational for the criteria is given in Table 9.3-3. The criteria used to evaluate the "Candidate Sites" were drawn from a larger, more comprehensive set of criteria identified in Section 9.3 of NUREG-1555 and the EPRI siting guide (EPRI, 2002). A weighting value is also applied at this step to each of the categories. The summarized totals from the underlying assessment (UniStar, 2009) are provided in Table 9.3-4. The three sites with the highest scores are those selected for comparison as the "Alternative Sites."

After ranking, the following three sites were identified as "Alternative Sites":

- Bainbridge Naval Training Center
- East ALCO Aluminum Company
- Former Thiokol Site

These "Alternative Sites" are compared to the "Proposed Site" in the final step of the alternative site evaluation. The locations of the "Alternative Sites" and the "Proposed Site" are shown in Figure 9.3-11.

9.3.2 PROPOSED AND ALTERNATIVE SITE EVALUATION

Once the "Alternative Sites" are identified, the next step in the site evaluation process is to compare the "Alternative Sites" to the "Proposed Site" in a two-part sequential test to determine whether an "Alternative Site" is 1) "Environmentally Preferable" and 2) if so, if it is "Obviously Superior" to the "Proposed Site." The "Alternative Sites" that are compared with the "Proposed Site" are:

- Bainbridge Naval Training Center
- East ALCO Aluminum Company
- Former Thiokol Site

Additionally, the "Proposed Site" is compared to a "Generic Greenfield" site.

The "Alternative Sites" are compared to the "Proposed Site" based on information about the existing nuclear plants and the surrounding area, as well as existing environmental studies and Final Environmental Impact Statements issued by the Atomic Energy Commission and/or the U.S. Nuclear Regulatory Commission. This comparison is performed to determine whether or not any alternative sites are "Environmentally Preferable" to the "Proposed Site".

If any of the "Alternative Sites" is determined to be "Environmentally Preferable" to the "Proposed Site" then the evaluation continues to the second step of the process. The second step of the process utilizes commercially-based evaluation criteria to rank the "Proposed Site" and the "Alternative Site(s)" that have been determined to be "Environmentally Preferable" to determine if any "Alternative Site" is "Obviously Superior".

Throughout this section, environmental impacts of the alternatives are assessed using the NRC three-level standard of significance – SMALL, MODERATE, or LARGE. This standard of significance was developed using Council on Environmental Quality guidelines set forth in the footnotes to Table B-1 of 10 CFR 51, Subpart A, Appendix B (CFR, 2007):

- SMALL: Environmental effects are not detectable or are so minor they will neither destabilize nor noticeably alter any important attribute of the resource.
- MODERATE: Environmental effects are sufficient to alter noticeably but not to destabilize important attributes of the resource.
- LARGE: Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

In order to analyze the effects of building a new nuclear plant at each of these locations, it was assumed the construction and operation practices described in Chapters 4 and 5 would generally be carried to each site. In this manner, it was possible to apply a consistent description of the impacts to each site. For example, in order to assess impacts to transportation infrastructure, a traffic impact study, prepared for construction and outage activities at CCNPP, was reviewed. The study findings were applied to each site to determine potential impacts from construction.

9.3.2.1 CCNPP (Proposed Site)

The CCNPP site is the preferred site for locating the new nuclear reactor. The CCNPP site is located in Maryland on the Chesapeake Bay southeast and adjacent to CCNPP Units 1 and 2. A detailed description of the CCNPP site and surroundings, environmental impacts of construction, and environmental impacts of operation are given in Chapter 2, Chapter 4, and Chapter 5. This information is summarized below.

9.3.2.1.1 Land Use

Land use in the area surrounding the CCNPP site is predominantly rural. Hunting is common in the region surrounding the plant because large areas are rural and forested. Less than 5% of the county land uses are classified as commercial or industrial. Calvert County has open space and land preservation plans in place that direct commercial development toward town centers in order to preserve the rural character. Land use impacts associated with the construction and operation of CCNPP Unit 3 are discussed in greater detail in Section 4.1 and Section 5.1, respectively. Overall land use impacts are anticipated to be SMALL for both construction and operation activities because of distance to population centers and population density.

9.3.2.1.2 Air Quality

Calvert County is in attainment with all National Ambient Air Quality Standards except for ozone. Because of its proximity to Washington, DC, the county is classified as a serious non-attainment zone for ozone. Moreover, because the CCNPP site is located in a serious non-attainment zone for ozone and has the potential to emit greater than 50 tons per year for both volatile organic compounds and nitrogen oxides, the facility is classified as a major source of these substances. Air quality impacts associated with the construction and operation of CCNPP Unit 3 are discussed in greater detail in Section 4.4.1 and Section 5.8.1, respectively. Air quality impacts are anticipated to be MODERATE for both construction and operation activities due to the potential plant emissions.

9.3.2.1.3 Water

The CCNPP site is located on the western shore of the Chesapeake Bay, which is an estuary approximately 200 mi (320 km) long and up to 35 mi (56 km) wide. Makeup water for the plant would be drawn from Chesapeake Bay as discussed in Chapters 4 and 5. The impacts to water resources are expected to be SMALL and would be less than or similar to impacts due to the existing reactors at the site. Groundwater at the site occurs at depths near 30 ft (9 m) and flows toward the Chesapeake Bay. The artesian aquifer from which water would be drawn during construction is approximately 550 ft (167 m) below ground surface and

approximately 100 ft (30 m) thick. This aquifer underlies much of Maryland. Current groundwater use at the site for existing operational and domestic use does not noticeably alter offsite groundwater characteristics.

Operational fresh water needs will be provided by desalination of Chesapeake Bay water, so there will be no impacts on groundwater during operation. Additional groundwater withdrawals will be required for constructing the new reactor, so would be temporary and are not expected to destabilize offsite groundwater resources. Water impacts are discussed in greater detail in Section 4.2 and Section 5.2.

Due to the large size of both the surface water and groundwater resources and the current rural nature of the area and resultant low usage of these resources, impacts to water resources at the site from construction and operation of the new reactor unit are anticipated to be SMALL.

9.3.2.1.4 Terrestrial Ecology and Sensitive Species

The CCNPP site is largely forested and situated among other large forested tracts. Together these tracts form one contiguous and predominantly undeveloped forested area. The State of Maryland prepared a Wildlife Management Plan for the CCNPP site in 1987, and Baltimore Gas and Electric updated the plan in 1993 to include several habitat enhancement projects. The Wildlife Habitat Council has certified and registered the CCNPP site as a valuable corporate wildlife habitat.

The federally listed threatened puritan tiger beetle (*Cicindela puritana*) and the northeastern beach tiger beetle (*Cicindela dorsaliscan*) can be found at the base of the cliffs on the CCNPP site along the beach south of the barge dock. The bald eagle, which is federally protected under the Bald and Golden Eagle Act, has active nests on the CCNPP site. One state-listed terrestrial species, showy goldenrod (*Solidago speciosa*) was determined from ecological surveys to be present within the limits of disturbance for the CCNPP Unit 3 location. Terrestrial ecology impacts from the construction and operation of CCNPP Unit 3 are discussed in greater detail in Section 4.3.1, Section 5.3.3.2, and Section 5.6.1.

No significant impacts to the terrestrial ecosystems would be expected once construction of the new reactor is complete. Therefore, the impacts of construction may be MODERATE due to presence of federal and state threatened and endangered habitats/species disruptions; however, the impacts of operation would be SMALL.

9.3.2.1.5 Aquatic Ecology and Sensitive Species

The area of the Chesapeake Bay where the CCNPP site is located is in the mesohaline zone, which is characterized by moderate salinity. Recreationally and commercially important shellfish and finfish found in large numbers in the vicinity of the plant during pre-operational surveys included the eastern oyster (*Crassostrea virginica*), blue crab (Callinectes sapidus), striped bass (*Morone saxatilis*), and weakfish (*Cynoscion regalis*).

Two fish and two sea turtle species in the project area are afforded special protection under the Endangered Species Act: the Shortnose and Atlantic Sturgeon, and the Loggerhead and Kemp's Ridley Turtle.

The Shortnose Sturgeon (*Acipenser brevirostrum*), is known to inhabit the Chesapeake Bay. However, this species has not been observed in the extensive impingement studies conducted at the CCNPP site area over the past 30 years.

A larger, longer-lived relative of the Shortnose Sturgeon, the Atlantic Sturgeon (*Acipenser oxyrhynchus*) once supported a robust fishery in the Chesapeake Bay. It is currently on the candidate species list maintained by NOAA Fisheries, because it is undergoing a status review under the Endangered Species Act.

Loggerheads (*Caretta caretta*) occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. The Loggerhead is the most abundant species of sea turtle found in U.S. coastal waters, including the Chesapeake Bay. At the global level, the primary threat to Loggerhead turtle populations is incidental capture in fishing gear, especially in longlines and gillnets, but also in trawls, traps and pots, and dredges. NOAA Fisheries is currently implementing a program to evaluate the incidence of bycatch of sea turtles in various types of gear, including pound nets in the Chesapeake Bay.

The Kemp's Ridley Turtle (*Lepidochelys kempii*) is one of the smallest of the sea turtles, with adults reaching about 2 ft (0.6 m) in length and weighing up to 100 lbs. The Kemp's Ridley Turtle has been on the endangered species list since 1970. The principal threats to this species occur on the nesting beaches, where both deliberate and accidental disturbances interfere with nesting success and in accidental take by fisheries vessels.

Construction impacts would be primarily due to runoff and siltation and will be controlled by best management practices and compliance with permit requirements. Aquatic ecology impacts at the CCNPP Unit 3 site from construction and operation activities are discussed in Section 4.3.2, Section 5.3.1.2, Section 5.3.2.2, and Section 5.6.2.

Because no sensitive species are known to occur in the vicinity and the new reactor is expected to have a similar impact to the existing reactor, construction and operation of the new reactor at this site is expected have a SMALL impact on the aquatic ecology in the Chesapeake Bay.

9.3.2.1.6 Socioeconomics

The estimated population of Calvert County in 2005 was nearly 88,000 people. Other socioeconomic facts related to Calvert County are as follows:

- Calvert County experienced an 18% population increase from the 2000 census population of nearly 75,000 people.
- The median household income is slightly higher than $70,000 per year.
- Approximately 5% of the county's population lives below the poverty level.
- The nearest large city is Washington, D.C.

By the year 2010, the estimated population within 10 mi (16 km) of the CCNPP site is estimated to be approximately 63,000 people. By 2040, the population estimate for the same area is increased to approximately 124,000 people. Estimates for population growth within a 50 mi (80 km) radius of the plant are 4,757,810 for the year 2010, with a drop to 4,719,000 for the year 2040. Calvert County also has a large transient seasonal population. These people

are attracted to the county's recreational opportunities such as the area parks and marinas. The seasonal population is estimated to increase the county population by nearly 25%.

Socioeconomic impacts associated with the construction and operation of CCNPP Unit 3 are discussed in greater detail in Section 4.4 and Section 5.8, respectively.

Although construction and operation of a new reactor would create both temporary and permanent jobs, the percent of the population employed by the new plant, and therefore the effect of the new reactor on the area's population, is expected to be SMALL.

9.3.2.1.7 Transportation

Calvert County has one main four-lane road (Maryland State Highway 2/4) bisecting the County north to south with smaller roads running like veins from the main road to the water on each side. Very few of the smaller roads off Maryland State Highway 2/4 connect with each other; therefore, this highway services the bulk of the traffic for the length of the County. This highway runs adjacent to the CCNPP site and provides the only access to the site.

A traffic study prepared for construction at CCNPP predicts that construction traffic will peak above 1,450 vehicles per hour (Vph). Heavy vehicle shipments and construction traffic will make up most of the traffic, assuming a peak construction workforce of about 3,950 workers (calculated at 1.3 occupants per vehicle). It is anticipated that Calvert Beach Road and Nursery Road will be most heavily affected, but the impacts would occur during morning and evening commutes to the plant. Impacts on that road would be temporary, and likely end after construction was finished. Other roadways will likely be able to sustain the increase in traffic.

There are several ways to mitigate the potential transportation impacts during construction such as developing a construction traffic management plan prior to construction to address potential impacts on local roadways. If necessary, coordinating with local planning authorities for the upgrading of local roads, intersections, and signals to handle increased traffic loads could be considered.

The impacts of transportation from construction and operation of CCNPP Unit 3 and associated mitigation measures are discussed in greater detail in Section 4.4.1 and Section 5.8.2, respectively.

Schedules during workforce shift changes and for the delivery of larger pieces of equipment or structures could be coordinated to limit impacts on local roads. In addition the use of shared (e.g., carpooling) and multi-person transport (e.g., buses) during construction and/or operation of the facility could be encouraged. By implementing appropriate measures, it is expected that there would be SMALL to MODERATE impacts on transportation during construction activities and SMALL impact during operation of the facility.

9.3.2.1.8 Historic, Cultural, and Archeological Resources

There are eight historic sites within a 5 mi (8.0 km) radius of CCNPP site listed on the National Register of Historic Places. As described in Sections II.D and XII.E of the Final Environmental Statement for CCNPP Units 1 and 2, two historic dwellings located on the original Calvert Cliffs site were evaluated by the Maryland Historical Trust and found to be too derelict to be nominated for inclusion on the National Register. However, photographs and

some architectural elements of the structures were salvaged and are displayed in the Visitors Center (a remodeled old tobacco barn) onsite.

During 1992 and 1993, archeological surveys were conducted along a proposed South Circuit transmission line and right-of-way. As a result, two archeological sites were examined extensively during an evaluatory testing phase. One prehistoric site was found to retain sufficient subsurface integrity to be considered eligible for inclusion on the National Register of Historic Places. The impact areas of the site were evaluated extensively, and towers were located in areas that would not affect any intact subsurface deposits.

From the air, the principal visual features of the CCNPP site region are the Chesapeake Bay, the Patuxent River, and countryside that is generally wooded. The distance across the Chesapeake Bay in the vicinity of CCNPP site is approximately 6 mi (10 km) and, from the shore, the far shore is a dark line on the horizon; the view up-Bay or down-Bay is water to the horizon. From the Chesapeake Bay, the shoreline is wooded with widely spaced small housing developments and marinas. The CCNPP site has a 1,500 ft (457 m) wide developed area approximately in the middle of 6 mi (9.7 km) of undeveloped, wooded shoreline featuring 100 ft (30 m) cliffs. These scenic resources have remained unchanged since the construction of CCNPP Units 1 and 2.

Scenic resources inland have changed since the construction of CCNPP Units 1 and 2 due to area population growth. This growth has resulted in housing, commercial, and road development supplanting agricultural and wooded areas. However, Maryland State Highway 2/4, which transects the area, is a scenic highway, affording views of gently rolling, wooded countryside with interspersed development and occasional agricultural areas.

Potential impacts to historic, cultural, and archeological resources from the construction and operation of CCNPP Unit 3 are discussed in greater detail in Section 4.1.3 and Section 5.1.3, respectively.

It is anticipated that historic and cultural impacts would be SMALL given the secluded location of the CCNPP site and that appropriate mitigation will occur with the State Historic Preservation Officer prior to and during construction of the facility.

9.3.2.1.9 Environmental Justice

The population of this area is similar in composition to the State of Maryland and to the U.S. as a whole. Although the CCNPP site is located in a largely rural area, the likelihood of minority communities being disproportionately and adversely affected by this plant is low. Furthermore, this site has been operating as a nuclear power generating facility for a number of years.

Environmental justice impacts from the construction and operation of CCNPP Unit 3 are discussed in greater detail in Section 4.4.3 and Section 5.8.3, respectively. It is anticipated that the environmental justice impacts would be SMALL because of low likelihood of minority communities being disproportionately and adversely affected.

9.3.2.1.10 Transmission Corridors

The existing CCNPP transmission facilities consist of three separate three-phase, 500 kV transmission lines. Two circuits deliver power to the Waugh Chapel substation and a third line connects to the Chalk Point generating station.

Transmission corridors and towers would be situated (if possible) in existing right-of-way to avoid critical or sensitive habitats/species as much as possible. Specific monitoring requirements for new transmission lines and corridors, and associated switchyards will be designed to meet conditions of applicable Federal, State, and Local permits, to minimize adverse environmental impacts, and to ensure that organisms are protected against transmission line alterations.

Transmission system environmental impacts due to the construction and operation of CCNPP Unit 3 are discussed in greater detail in Section 4.1.2 and Section 5.6, respectively. Due to the rural nature of the areas that would be transected by these transmission lines, any impacts are expected to be SMALL in nature.

9.3.2.2 Bainbridge Naval Training Center (Alternative Site 1)

The Bainbridge Site is located at a deactivated naval training center in Port Deposit, Cecil County, MD (Figure 9.3-12 and Figure 9.3-13). The Bainbridge Naval Training Center was deactivated in 1976. Part of the site was used by the Department of Labor as a Job Corps Training Center until 1990 (EPA, 2009a). In 2000, after remediation activities were completed, the Bainbridge site was transferred to the Bainbridge Development Corporation (BDC). The BDC was established to develop the Bainbridge Naval Training Center site and accelerate transfer of the site to the private sector (BDC, 2009).

9.3.2.2.1 Land Use

The Bainbridge site has an overall area of approximately 1,185 acres (480 hectares) (EPA, 2000). The structures that were used at the Bainbridge site have largely been demolished. The structures that remain are decrepit and are generally concentrated within several areas.

The Bainbridge site is located in Port Deposit, Cecil County, MD. The site is located adjacent to the Port Deposit town center. The southwestern edge (approximately 0.5 miles (0.8 km)) of the site is parallel to and less than a 0.1 mi (0.2 km) from the Susquehanna River. The site rises away from the river to the top of a hill, where the site becomes relatively flat. The only site use at this time is truck driver training. Otherwise, the site resembles an abandoned industrial area (BDC, 2009 and Site inspection, July 3, 2009).

The site contains a sanitary landfill along the western edge (EPA, 2009a; MDE, 2009). The landfill is closed and has a grass cap. The areas of the site where military installations existed are overgrown with vegetation. The fence surrounding the site property is also overgrown with vegetation to the point of obscuring the existence of the fence in many places. The portions of the site that never supported buildings or naval activities are either forested or scrub (BDC, 2009 and Site inspection, July 3, 2009).

According to the Port Deposit website and Zoning Maps the Bainbridge Site is zoned as BSU – Bainbridge Special Use (Town of Port Deposit, 2009). The site has been planned for a

mixed-use development consisting of commercial/office space in addition to residential land uses.

The area around the site supports agricultural activity (farms), river-related recreational activities/businesses (e.g., boating and fishing), and housing.

The site topography using GIS contours indicate a relief across the site of eighty feet, hence the cut and fill requirements for construction would be moderate. The site can easily accommodate the 420 acres (170 hectares) needed for the construction of an EPR Nuclear Power Plant.

Figure 9.3-12 shows the map location of Port Deposit, MD. Figure 9.3-13 is an aerial photograph of the site showing the existing property boundary. Figure 9.3-13 also has a 420-acre footprint comparable to the proposed Calvert Cliffs Unit 3 footprint superimposed to demonstrate the adequacy of the location to accommodate the proposed nuclear power plant. The location of the footprint is within the overall propert boundary but is not intended to show an actual proposed location for the Plant.

The site contains two areas (the Old Base Landfill and Fire Training Area) where previous contamination has not been completely removed. The selected remedies for these locations are institutional controls (deed restrictions on the landfill cap and ground water use restrictions).

The Bainbridge site is not designated as a National Priority List (NPL) Site or a Voluntary Cleanup Program Site. However, some demolition of structures and some environmental remediation may be required.

Based upon GIS estimates, the nearest (Federal, State, or Tribal) dedicated lands are approximately 6.9 mi (11.1 km) from the site.

The Bainbridge site is within 0.1 mi (0.2 km) from the Susquehanna River, its potential source of water. It would be necessary to acquire a small amount riverfront land sufficient for an intake, major pumping station and ancillary structures as well as additional land for the construction of a pipeline large enough to provide approximately 50 million gallons per day (Mgd) (189 million liters per day (Mld)) of river water to the plant site. A pipeline would necessarily cross both railroad tracks and several local roads however, no major roads are located between the river and the plant site.

Overall land use impacts are expected to be MODERATE due to planned commercial and residential use, existing environmental remediation needs, topography, and proximity of dedicated lands.

9.3.2.2.2 Air Quality

The Bainbridge site lies in a non-attainment area for 8 hour ozone (EPA, 2009b). Typically, the emissions from nuclear power plants are low enough to avoid triggering nonattainment area new source review because of the low emissions associated with plant operation. However, emissions from auxiliary equipment including Emergency Diesel Electric Generators and Diesel-driven Fire Water Pumps will require some level of permitting action. The air quality impacts of construction both from offsite transportation and onsite activities

would also require regulatory consideration. Once the plant was completed, ongoing emission contributions associated with transportation of operating staff and periodic outage workers are expected to be small.

The proposed facility will contain a cooling tower that will emit water vapor and particulate matter to the atmosphere. Because of the exceptionally low level of emissions, operation activities are not expected to cause or contribute to a violation of any state or federal ambient air quality standards.

The Bainbridge site is at least 80 mi (129 km) from the closest Class 1 PSD area (EPA, 2009c; NPS, 2009a).

Overall air quality impacts to the surrounding area attributable to the construction and operation of the proposed facility would be SMALL due to adherence to regulatory requirements during construction and the typically low emissions for an operating nuclear power plant.

9.3.2.2.3 Water

The Bainbridge site lies less than 0.1 mi (0.2 km) from the Susquehanna River, the only sufficiently large source of water. The segment of the Susquehanna River proposed to be the source of cooling water is designated as tidal fresh water estuary (COMAR, 2009a). This portion of the Northern Chesapeake Bay (segment designator CB1TF2) surface water segment is part of the Lower Susquehanna River Area Sub-Basin.

The segment of the Lower Susquehanna River Sub-Basin considered as a potential cooling water source does not have a special water quality classification (COMAR, 2009b). The Surface Water Use Designation for the Northern Chesapeake Bay (CB1TF2) segment is Use II-P: Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting and Public Water Supplies (COMAR, 2009b).

Impacts to hydrology and consumptive water use will be primarily associated with water withdrawal from the main source of water. Consumptive water use is associated with evaporative cooling attributable to the use of closed cycle cooling systems that require the use of cooling towers for heat rejection from both the main steam condensers and plant auxiliary heat exchangers. The consumptive water usage of the proposed facility at the Bainbridge Naval Training Center site is estimated to be 50 Mgd (189 Mld).

The main source of water for the proposed site will be the Susquehanna River. The low flow value for the period of record (42 years) for the river at the nearest USGS gage (01578310 at downstream side of Conowingo Dam, 1.0 mi (1.6 km) southwest of Conowingo, Maryland, and 9.9 mi (15.9 km) upstream from mouth) is approximately 93 Mgd (352 Mld) (USGS, 2009). The water usage of a nuclear power plant could be as high as approximately 54% of the lowest recorded value at the downstream side of the Conowingo Dam.

The existing hydrology may also be altered by the construction of temporary roads, parking areas, areas for stockpiling and assembly of construction materials, the development of measures for storm water control, erosion and sediment control and the construction of a river side intake structure and pipeline.

Groundwater impacts at this site would be minimal as it is unlikely that groundwater would be needed for plant operations, however, it would probably be necessary to temporarily utilize groundwater during construction. The quantities of construction water needed have not been determined for this site.

Water discharges from the plant would include cooling tower blowdown, treated process wastewater, treated sanitary wastewater and small amounts of radioactive water. Cooling tower blowdown also represents a thermal effluent to the receiving waters. Notwithstanding the use of potential engineered mitigation, these discharges would have some impact on the receiving waters The manner of return of these effluents to the river has not been established at this time.

Overall water related impacts to the surrounding area attributable to the construction and operation of the proposed facility would be MODERATE due to the fraction of available water that may be pulled from the Susquehanna under low flow conditions.

9.3.2.2.4 Terrestrial Ecology and Sensitive Species

The Bainbridge Naval Training Center site is located in Cecil County, Maryland. The site consists principally of wooded areas, grasslands (mostly on the sanitary landfill), scrub, and previous training center areas (concrete base mats, pavement) being reclaimed by vegetation. The area surrounding the plant site is principally agricultural and residential, with some undeveloped areas. Wooded areas on the site are mostly mixed deciduous forested area. One percent of the site is within a FEMA-identified 100 or 500 year floodplain (USFWS, 2009).

According to the National Wetlands Inventory, the project site has no wetlands (USFWS, 2008a). On-site construction wetlands-related impacts are therefore expected to be insignificant.

A listing of current and historical rare, threatened, and endangered species of Cecil County is provided in Table 9.3-5. According to the Maryland Department of Natural Resources, Cecil County has five federally listed special status species, four animal and one plant. Special status state species include 12 animal and 108 plant species (MDNR, 2009c; MDNR, 2009d). The State's database contains a record for one federally-listed species and one state listed species as occurring adjacent to the project site.

Impacts of construction on the terrestrial ecosystem include noise, clearing and grading and the aforementioned potential hydrological changes. Construction of the facility could result in the direct mortality of some species and the available habitat would be reduced but would not adversely affect local or regional populations of wildlife species. Species that are mobile are likely to relocate to adjacent lands.

There are four existing 500Kv transmission lines available for possible interconnection: one is 5 mi north of the site and the other three are between 10 mi (16 km) and 20 mi (32 km) away from the site. There are five existing 230Kv transmission lines within 5 mi (8 km) of the proposed Bainbridge Naval Training site, and there are six 230Kv transmission lines between 10 mi (16 km) and 20 mi (32 km) away from the site. Because new right-of-way (ROW) would need to be constructed to accommodate the new transmission lines, it is anticipated that

there would be terrestrial ecology impacts from the development of new transmission corridors. The terrestrial ecology impacts from construction of the facility and the ancillary water pipeline and transmission line corridors are anticipated to be MODERATE but would be minimized by searching for sensitive species and complying with permit and mitigation requirements before beginning work.

9.3.2.2.5 Aquatic Ecology and Sensitive Species

The site is located approximately a tenth of a mile from the Susquehanna River, contains several small ponds and no streams or other wetlands onsite. This site would use the freshwater portion of the Susquehanna River for cooling water. The segment of the Susquehanna River proposed to be the source of cooling water is designated as tidal fresh water estuary.

Construction related aquatic ecological impacts would include temporary loss of habitat and short term degradation of water quality as a result of in-river and shoreline construction of water intake and discharge structures. Some amount of dredging in the river will be necessary and best practices for minimizing turbidity and for the containment of sediments would be implemented to minimize the impacts on benthic and other organisms. Removed dredge spoil from a small area will remove some benthic organisms but this represents a small impact. During dredging operations fin fish would tend to avoid the immediate area perhaps feeding on entrained organisms downstream of the construction location.

The use of water withdrawn from the Susquehanna River through a waterfront intake structure will entail impingement and entrainment impacts to aquatic organisms. The use of Cooling Towers at the site along with intake structures designed to mitigate such impacts would allow the plant to comply with CWA, 316b regulations.

Construction of a nuclear power plant with closed cycle cooling will introduce thermal discharges to the receiving waters in the form of cooling tower blowdown assuming that it is discharged directly to the river. Blowdown would represent only a small fraction of the water withdrawn from the river and its impact would be mitigated by the use of engineered diffusers or other means.

Adverse aquatic ecology impacts associated with construction and operation are anticipated to be LARGE due to the number of rare and endangered species and their habitats and the potential vulnerabilities to thermal discharges in this segment of the Susquehanna River.

9.3.2.2.6 Socioeconomics

The Bainbridge site is located in Port Deposit in Cecil County, Maryland. According to the 2000 census the town had a population of 536 and the county had a population of 85,951. Table 9.3-9 contains population details. The population density in 2007 of Port Deposit was 419 people per square mile. The median household income was $42,723. The median residence value was $149,667Approximately three hospitals, six police stations, and 17 fire stations or departments (including volunteer stations) are located within Cecil County. Cecil County has an office of emergency services that coordinates disaster, mitigation, preparedness response, and recovery (CCDES, 2009). .The influx of up to 4000 workers during the plants construction will impact these resources.

Road data was reviewed to determine the level of available access to the site during construction activities. State Highway 276 is adjacent to the north of the site and U.S. Highway 222 is adjacent to the south of the site. Other roads within 1.0 mi (1.6 km) of the site include State Highway 275, State Highway 269. Interstate 95 is also located within 5.0 mi (8.0 km) southeast of the site. Existing roads are present and in close proximity to the site. It appears that the existing transportation infrastructure may be able to support construction traffic.

It is estimated that a workforce of approximately 4,000 would be employed during construction of the facility (the same for each alternative site). According to occupational projections for 2004 through 2014, there appears to be a general upward trend for construction and extraction employment within the area (MDDOL, 2008a). An increase in employment indicates additional competition in acquiring workforce for the construction of the project. In addition, according to 2014 projections, the construction workforce required for the project would represent approximately 34% of the total construction workforce for the area. Availability of a suitable workforce within the county from which to draw the construction workforce appears limited.

American Survey data from the US Census Bureau was consulted to determine the availability of sufficient housing to accommodate the workforce influx for construction and operation that would be expected (USCB, 2009). According to a three year estimate from 2005 through 2007, a total of 3,703 housing units are vacant or not occupied which is less than the projected construction workforce. Housing, therefore, appears to be limited within the county.

The distance of population centers greater than 25,000 in size was also assessed to determine the probable availability of shopping and other services for the construction and operation workforce. The nearest population center is Bel Air South which is just over 10 (16 km) miles away.

The cooling tower plume from the proposed facility would likely be visible at a considerable distance. The facility would be somewhat hidden by wooded areas and therefore would have some viewshed protection.

Overall impacts to the area's population from construction and operation of a new reactor would be MODERATE because of the limited housing available for added workforce.

9.3.2.2.7 Transportation

There is existing barge access at the BNTC site on the Susquehanna River.

Transportation infrastructure in Cecil County includes Interstate Route 95 which enters northeastern Maryland from Delaware and continues through Washington, DC, and into Virginia. State routes are also available in the area.

There is railroad access (Consolidated Rail Corporation) along the Susquehanna River on the western border of the site.

Good workforce road access is located to within approximately 3.0 mi (4.8 km) of the site via I-95. The local roads around the site are two-lane. During the period of construction the use

of these roads by both workforce and construction vehicles will have large impacts on congestion. Ultimately the use of these roads by the operations workforces will have minimal impact.

Overall impacts to the area's transportation infrastructure from construction and operation of a new reactor would be SMALL due to availability of railroad access, barge access, and roadways.

9.3.2.2.8 Historic, Cultural, and Archeological Resources

The Bainbridge site is located in Port Deposit, Cecil County, Maryland. The county is located in the northeast corner of Maryland. The Susquehanna River runs along the western boundary of the county. Port Deposit, located on the Susquehanna River in the western portion of the county, is considered an incorporated town of Maryland. Port Deposit is the furthest navigable point upstream for ships from the Chesapeake Bay and has traditionally served as an important trading point. Although the town was given the name Port Deposit is 1813, it existed under several other names prior to that time.

There are a total of 12 NRHP listed properties within 5 mi (8 km) of the site; two properties are within 1.0 mi (1.6 km) of the site (NPS, 2009b). The two properties located within 1.0 mi (1.6 km) of the site are: the Paw Paw Building, and the Edward W. Haviland House. This result is based on data available from the Maryland Historic Trust and the National Register of Historic Places (NRHP) (MHT, 2008). There are four NRHP listed historic districts within 5 mi (8 km) of the site, two of which are less than 1.0 mi (1.6 km) from the site (MHT, 2008; NPS, 2009b).

Additionally the Bainbridge Naval Training Center which encompassed the larger property was established in 1942 and saw over 500,000 sailors receive recruit or specialty training on its grounds before closure in 1976. A complete cultural resources investigation of both the archaeological and architectural resources onsite would be needed before construction activities begin. This work would be done in consultation with the Maryland State Historic Preservation Officer and should any significant cultural resources be identified, appropriate mitigation measures would be negotiated prior to construction and operation.

Impacts to cultural resources from construction and operation are likely to be LARGE because of the presence of numerous NRHP-listed properties.

9.3.2.2.9 Environmental Justice

The demographic characteristics surrounding the project site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income populations. Demographic information used for this study was obtained from the 2000 U.S. Census. Demographics of the adjoining census tracts (CT)/block groups (BG) on and adjacent to the project site were examined and compared with the demographics of Cecil County and the State of Maryland. Table 9.3-9 (USCB, 2000a) presents this demographic information. The Port Deposit racial makeup was 78% white non-Hispanic, 17.8% black, 1.8% two or more races, 1.6% Hispanic, 1.3% American Indian, and 0.6% other race.

The Bainbridge Naval Training Center site is located in CT 31201 BG 3. CT 31201 BG 3 has a lower percentage of minority residents compared to one of the two adjacent CTs, and the State of Maryland, and a slightly higher percentage of minority residents compared to the other adjacent CT and Cecil County. CT 31201 BG 2, an adjacent CT/BG to the project site, has the highest minority population (17.4 percent) of the CT/BGs at or adjacent to the site.

The percent of poverty for CT 31201 BG 3 is slightly higher but comparable to the Cecil County and the State of Maryland and lower than the two adjacent CTs. CT 31201 BG 2, an adjacent CT/BG to the project site, has the highest low-income population (11.6 percent) of the CT/BGs at or adjacent to the site.

Based on the data presented in Table 9.3-9, no disproportionately high percentage of minority or low-income residents would be directly impacted by construction and operation of the proposed project.

It is anticipated that environmental justice impacts would be SMALL to MODERATE due to the slightly higher percentage of low-income and minority populations near the site.

9.3.2.2.10 Transmission Corridors

There are four existing 500Kv transmission lines available for possible interconnection: one is 5 mi (8 km) north of the site and the other three are between 10 mi (16 km) and 20 mi (32 km) away from the site. There are five existing 230Kv transmission lines within 5 mi (8 km) of the proposed Bainbridge Naval Training site, and there are six 230Kv transmission lines between 10 mi (16 km) and 20 mi (32 km) away from the site. Because new ROW would need to be constructed to accommodate the new transmission lines, it is anticipated that there would be ecological impacts from the development of new transmission corridors.

Construction and operation transmission impacts are anticipated to be SMALL to MODERATE because of the ecological impacts associated with constructing new transmission corridors.

9.3.2.3 East ALCO Aluminum Company (Alternative Site 2)

The East ALCO Site is located at a defunct aluminum production plant located in Frederick County Maryland. The plant structures still exist, occupying a relatively small portion of the overall site. No aluminum production has occurred at this facility since 1995, when production was curtailed due to the high cost of electric energy at this location.

9.3.2.3.1 Land Use

The East ALCO site has an overall area of approximately 2,200 acres. The existing structures which were used for aluminum production occupy only a small portion of the site (approximately 400 acres). It is located in a relatively flat, primarily agricultural area about 10 miles southwest of the City of Frederick. However, there is some light industry located nearby. According to the Frederick County zoning map, the site itself is zoned as GI – General Industry (FCDOP, 2009). There is an Airport located at the eastern boundary of the City of Frederick.

Aside from the industrialized area, the site consists principally of open grasslands and agricultural fields with small wooded patches. The site topography using GIS contours indicate a relief across the site of ten feet, hence the cut and fill requirements for construction would be minimal.

The site can easily accommodate the 420 acres needed for the construction of an EPR Nuclear Power Plant. Figure 9.3-14 shows the map location of the site. Figure 9.3-15 is an aerial photograph of the site showing the existing plant structures. Both Figures have a 420 acre footprint comparable to the proposed Calvert Cliffs Unit 3 footprint superimposed to demonstrate the adequacy of the location to accommodate the proposed Nuclear Power Plant. The footprint is within the overall property boundary but is not intended to show the actual location of the power plant on the site

Although Hazardous Waste can be found at most aluminum production facilities, the East ALCO plant site while included in the State of Maryland Master List is not designated as either a National Priority List (NPL) or Voluntary Cleanup Program Site (MDE, 2009). Never-the-less extensive demolition and some environmental remediation would be required to prepare the site for EPR construction.

Based upon available geographic information system (GIS) data, the nearest (Federal, State, or Tribal) dedicated lands are 2.8 miles from the site. This is somewhat less than the five mile radius designated by NRC regulation as optimal for plant siting.

Because the site is approximately 5.8 miles from its potential source of water (the Potomac River), it would be necessary to acquire riverfront land sufficient for an intake, major pumping station and ancillary structures as well as additional land for the construction of a pipeline of capacity to provide approximately 50 million gallons per day (mgd) of river water to the plant site. A pipeline would necessarily cross both railroad and numerous local roads however, no major roads are located between the river and the plant site.

Overall land use impacts are expected to be SMALL due to the large area available for site construction and the limited changes needed prior to construction initiation.

9.3.2.3.2 Air Quality

The East Alco site lies in a non-attainment area for 8 hour ozone and Particulate Matter 2.5 (EPA, 2009b). Typically, the emissions from nuclear power plants are low enough to avoid triggering Nonattainment Area New Source Review under the CAA regulations administered by USEPA. However, emissions from auxiliary equipment including Emergency Diesel Electric Generators and Diesel driven Fire Water Pumps will likely require an Air Quality Permit from the MDE. The air quality impacts of construction both from offsite transportation and on site activities would also require regulatory consideration. Once the plant was completed ongoing emission contributions associated with transportation of operating staff and periodic outage workers are expected to be small.

Among the sites evaluated, the East Alco site is the closest to a Class 1 PSD area (EPA, 2009c; NPS, 2009a). It is 45 miles from the site to the Shenandoah National Park, the closest area.

Overall air quality impacts to the surrounding area attributable to the construction and operation of the proposed facility would be SMALL due to adherence to regulatory requirements during construction and the typically low emissions for an operating nuclear power plant.

9.3.2.3.3 Water

The East ALCO site lies approximately 5.8 miles from the Potomac River, which represents the nearest waterway capable of providing the necessary cooling water volume. The area of the Middle Potomac River closest to the site has a special water quality use classification, indicating it is suitable for drinking water. The City of Frederick withdraws water for potable use from this reach of the river. The Surface Water Use Designation for the Middle Potomac River Area Sub-Basin is Use I-P (Water Contact Recreation, Protection of Nontidal Warmwater Aquatic Life and Public Water Supply) (COMAR, 2009a; COMAR, 2009b).

Impacts to Hydrology are principally associated with consumptive water use for evaporative cooling attributable to the use of closed cycle cooling systems which require the use of cooling towers for heat rejection from both the main steam condensers and plant auxiliary heat exchangers. The consumptive use of an EPR Nuclear power Plant at this site would be approximately 50 million gallons per day (mgd). The nearest USGS gaging station located at Point of Rocks, MD (01638500) has recorded a low flow of 343 mgd during 114 years of monitoring (USGS, 2009). Hence, a Nuclear Power Plant at the East ALCO site could consume as much as 15% of the extreme low river flow.

Because the East ALCO site is comparatively remote from its closest suitable water supply, other hydrological impacts could be associated with the creation of a significant impoundment on the site to assure plant reliability and for safety as an Ultimate Heat Sink. A detailed engineering analysis is required to determine the extent of such an impoundment. The existing hydrology would also be altered by the construction of temporary roads, parking areas, areas for stockpiling and assembly of construction materials, the development of measures for storm water control, erosion and sediment control and the construction of a major river waterfront intake structure, pumphouse, and pipeline corridor.

Groundwater impacts at this site would be minimal. It is unlikely that Groundwater would be needed for plant operations, however, it may be necessary to temporarily utilize groundwater during construction. The quantities of construction water needed have not been determined for this site.

Water discharges from the plant would include cooling tower blowdown, treated process wastewater, treated sanitary wastewater an small amounts of radioactive water. The introduction of cooling tower blowndown to the receiving waters represents a thermal discharge. The manner of return of these effluents to the river has not been established at this time however, all effluents will comply with the requirements of the Clean Water Act.

The hydrology impacts are expected to be MODERATE due to the potential to withdraw a significant portion of the Potomac River during low flow river conditions.

9.3.2.3.4 Terrestrial Ecology and Sensitive Species

The 2200 acre site is relatively flat consisting principally of active agricultural fields, with a complement of regularly mown grasslands. The site has small patches and windrows of forest, many of which appear to be supplemented with screening plantings installed by ALCOA. The area surrounding the plant site is approximately 90% agricultural and about 10% undeveloped. Agricultural activity typical for the area is principally the production of corn, soybeans and winter wheat. Wooded upland areas are mostly oak, maple and tulip poplar. The site is outside of any FEMA identified 100 or 500 year floodplain (USFWS, 2009).

A listing of current and historical rare, threatened, and endangered species of Frederick County is provided in Table 9.3-6. According to the Maryland Department of Natural Resources, Frederick County has no Federally listed special status species (MDNR, 2009a; MDNR, 2009b). There are 18 animal species and 57 plant species with state status, including both terrestrial and aquatic species. Notwithstanding the fact that the developed component of the site consists principally of mowed grassland and developed industrial area and no Rare, Threatened or Endangered Habitat is known to exist at the East ALCO site, the potential exists for threatened or endangered animal and plant species to be present at this location. One known observance of a state-listed terrestrial species is documented to occur approximately 1 mile south of the site boundary. (MDNR, 2009c; MDNR, 2009d)

Impacts of construction on the terrestrial ecosystem include noise, clearing and grading and the aforementioned hydrological changes. Construction of the facility could result in the direct mortality of some species and available undisturbed habitat may be reduced, but the direct impact at this site is expected to be minimal. The necessary construction of an approximately 5.8 mile water pipeline would also result in impacts to terrestrial species. No proposed right-of-way has been determined but the land areas closer to the Potomac River are heavily vegetated and demonstrate significant topographic relief, necessitating significant earthworks for pipeline construction.

Because the aluminum production facility relied on extensive use of electric power, there is a large transmission corridor leading to the plant. It is not currently known if this corridor is appropriate to construct the necessary transmission lines associated with the proposed large Nuclear Power Plant. Consequently it cannot be stated with assurance that there will not be additional terrestrial disturbance associated with transmission line ROW expansion or creation.

The impacts on terrestrial ecology and sensitive species are expected to be MODERATE due to the presence of numerous threatened and endangered species in Frederick County.

9.3.2.3.5 Aquatic Ecology and Sensitive Species

No known threatened or endangered aquatic animal species or habitats are known to exist on the East ALCO site. One known state-listed species was identified approximately 1 mile south of the site in a location that encompasses mapped aquatic stream habitat (MDNR, 2009c; MDNR, 2009d).

The Maryland Department of Natural Resources states that Frederick County has historic records of five threatened or endangered aquatic animal species and 13 threatened or endangered aquatic plant species in the county (MDNR, 2009a; MDNR, 2009b).

According to the National Wetlands Inventory, the site has relatively few streams or other wetlands (USFWS, 2008a). On-site construction related impacts to these resources would therefore be expected to be minimal. Construction of a cross-country water pipeline would, however, be expected to cross several small streams and wetland complexes and would have commensurate temporary impacts to these areas during construction.

Construction related aquatic ecological impacts would include temporary loss of habitat and short term degradation of water quality as a result of in-river and shoreline construction of water intake and discharge structures. An undetermined amount of dredging in the Potomac River would be necessary for cooling water intake structure installation, and best practices for minimizing turbidity and for the containment of sediments would be implemented to minimize the impacts on benthic and other organisms. Removed dredged material from a limited footprint will directly impact benthic organisms, but this represents a small impact based upon aerial and temporal extent of the disturbance. During dredging operations fin fish would tend to avoid the immediate area, perhaps feeding on dislodged organisms downstream of the construction location.

Withdrawal of cooling water from the Potomac River will result in impacts resulting from the entrainment and impingement of aquatic organisms. The use of cooling towers which minimizes the volume of water used for cooling and the use of state-of the-art features in the design of the intake structure would allow the plant to meet all requirement of section 316B of the Clean Water Act.

Construction of a nuclear power plant with closed cycle cooling will introduce a thermal discharge to the receiving water in the form of cooling tower blowdown assuming that it is discharged directly to the river. Blowdown would represent only a small fraction of the water withdrawn from the river and its impact would be mitigated by the use of engineered diffusers.

The impacts on aquatic ecology and sensitive species are expected to be MODERATE due to the proximity of a state-listed species and impacts on warmwater aquatic life in the Potomac River.

9.3.2.3.6 Socioeconomics

The East ALCO site is located in Frederick County, Maryland which according to the 1990 census had a population of 195,277. The county has had significant population growth since the last census. The East ALCO site is located in Census Tract 7523 with a 1990 population of 3,089. Table 9.3-10 contains details of the Frederick County population. The East ALCO site is located in District 1 Buckeystown, MD which has a 2007 population density of 177 persons per square mile. The Districts 2007 Population was 7,145 persons. The median household income was $85,745. Median residence value was $371,917.

Frederick County has a well developed system of Emergency Services. There are five hospitals, five police stations and 25 fire stations or departments (including volunteer stations). The County has a division of emergency management that coordinates disaster

mitigation, preparedness and recovery. The influx of workers during the period of construction would have only minor impacts on these resources.

It is estimated that an estimated workforce of approximately 4,000 would be employed during construction of the facility (the same for each alternative site) According to the Maryland Department of Labor, Occupational Projection for the period 2004 through 2014, there will be a general upward trend for construction and extraction employment within the area (MDDOL, 2008b). An increase in employment suggests additional competition in acquiring the workforce for the project. In addition the 2014 projection indicates that the project required workforce would amount to approximately of the total construction workforce for the area. The availability of the construction workforce from within Frederick County is probably insufficient.

American Survey data from the US Census Bureau was consulted to determine the availability of sufficient housing to accommodate the workforce influx for construction and operation that would be expected. According to data for 2005 through 2007, a total of 4,386 housing units were vacant representing much less than twice the projected workforce (USCB, 2009). On this basis available housing in the immediate area appears to be insufficient.

The City of Frederick is the single population center larger than 25,000 persons that could support provide retail and other services for the workforce. Frederick City is approximately four miles from the East ALCO site.

Fredrick County has 19 elementary, 13 middle, and 10 high schools (FCPS, 2009). Frederick County also hosts 6 vocational institutions, colleges or universities. The impact of increased school enrolment resulting from this project would not have a major impact upon the Frederick County or surrounding Maryland, Virginia, or West Virginia counties from which the construction work force would commute.

Recreation includes the minor league Frederick Keys baseball team along with 63 parks and other recreational areas within a 10 mile radius of the East ALCO site.

The impacts on socioeconomic factors is expected to be SMALL to MODERATE due to the potential deficiency in necessary workforce housing.

9.3.2.3.7 Transportation

Transportation infrastructure in Frederick county includes Interstate Route 70 which extends from Baltimore to Pennsylvania. Interstate Route 270 extends from Frederick to Virginia by connection to Interstate Route 495. Other major roads in the area connect to Pennsylvania, Virginia and West Virginia. Consequently, roadway infrastructure supporting EPR development on the East ALCO site is good.

There is no practical water (Barge) transportation that is accessible to the site. There is no Barge access within five miles of the site (MPA, 2009).

There is good Railroad access to the site. The Baltimore and Ohio (B&O) main line, part of the CSX Transportation System is located approximately 0.7 miles from the site. A spur from the B&O is located about 0.5 miles from the site.

Good workforce road access is located to within approximately 1 mile of the site however many of the roads in the area are heavily congested by commuters to Frederick and, Washington DC, and its suburbs.

Transportation impacts are expected to be MODERATE because of the lack of barge access to the vicinity of the site.

9.3.2.3.8 Historic, Cultural, and Archeological Resources

There are no known Historic, Cultural, or Archeological resources at the East ALCO property.

Frederick County includes many Historic, Cultural, and Archeological resources. According to data available from the Maryland Historical Trust (MHT) and the National Registry of Historic Places, approximately 17 NRHP listed properties are within 5 miles of the site (MHT, 2008; NPS, 2009b). There is one Historic District: the Buckeystown Historic District within five miles (more than 1 mile) of the site. A complete cultural resources investigation of both the archaeological and architectural resources would be needed before construction activities begin. This work would be done in consultation with the Maryland State Historic Preservation Officer and should any significant cultural resources be identified, appropriate mitigation measures would be negotiated prior to construction and operation.

The construction of a pipeline to the Potomac River would entail impacts to the historic C&O Canal and Towpath.

The impacts on historic, cultural and archeological resources are expected to be MODERATE due to the presence of an NRHP-listed property within a mile from the site and numerous other historic properties within five miles of the site.

9.3.2.3.9 Environmental Justice

The demographic characteristics surrounding the project were evaluated to determine the potential for Environmental Justice issues based upon disproportionately high and adverse impacts to minority or low income population. The Demographic information was taken from the US Census (USCB, 2000b; UCSB, 2000c). Demographics of adjoining census tracts (CT)/block groups (BG) are included as are the demographics of both Frederick county and the State of Maryland.

The East ALCO site is located in CT 7523 BG2 which has a lower percentage of minority residents compared to two of the five adjacent CT/BG's and the State of Maryland and a higher percentage than Frederick County. The CT 7510 BG4 tract which is adjacent to CT 7523 BG2 has the highest minority population (40.4%) suggesting a potential for Environmental Justice impact.

The CT 7523 BG2 poverty level population is slightly higher than three of five adjacent CT/BG's as well as Frederick County. Its poverty level population is however lower than two of the five adjacent CT's and the State of Maryland. CT 7523 BG4 which is adjacent to the site CT has the highest low-income level population (7.6%) among the adjacent CT/BG's.

Based upon the data presented in Table 9.3-10, overall, no disproportionately high percentage of minority or low income residents would be adversely directly impacted by construction and operation of the proposed project.

There are expected to be MODERATE impacts on environmental justice factors, primarily the high percentage of local minority population.

9.3.2.3.10 Transmission Corridors

There are seven existing 500Kv transmission lines within 5 miles of the East ALCO site. There is a 345 Kv transmission line about 12.7 miles northwest of the site. There are also nine 230 Kv transmission lines available for interconnection: one line about 0.5 miles, another line 1.8 miles, two lines 2.2 miles and another five lines more than four miles from the site. In order to connect to any of these lines some new right of way would be necessary. Some level of ecological impact would result from the construction of new connecting transmission lines.

The environmental impacts from transmission corridors are expected to be SMALL to MODERATE due to ecological impacts of constructing new connecting transmission lines.

9.3.2.4 Former Thiokol Site (Alternative Site 3)

The former Thiokol site is a 619-ac (250-ha) property located near Mechanicsville in St. Mary's County, Maryland. Figure 9.3-16 shows the location of the former Thiokol site and Figure 9.3-17 shows the site vicinity.

9.3.2.4.1 Land Use

The former Thiokol site is located in St. Mary's County, Maryland, less than 3 mi (4.8 km) south of the Patuxent River. The site is bordered by Maryland State Route 235 to the north and Friendship School Road to the west. Woodlands are located to the east and south. Washington D.C. is the closest major city and is located approximately 40 mi (64.3 km) north of the site.

The former Thiokol site is currently undeveloped and covered in vegetation including trees and shrubs. According to the St. Mary's County Department of Land Use & Growth Management, the Thiokol Site is zoned as a Rural Preservation District. The surrounding area is a mix of suburban and agricultural development with a portion of the land being undeveloped. There are no population centers, parks, airports, or other major destinations located in the vicinity. Land to the east of the site is generally comprised of low-density residential development that includes residential subdivisions. Most of the land to the north of the site is also in residential development and has a lower density than lands to the east. Lands west of the site contain a mix of low-density residential development and agriculture. The areas south of the site are generally undeveloped but also contain some low-density residential development.

The site was formerly used for the manufacturing of munitions up until the late 1950s.In the early 1980s, buildings were removed from the site, timber was harvested, and the site was reforested. The property contains covenants that restrict residential development in two areas that amount to a total of approximately 75 ac (30.3ha). Notwithstanding the implications of the provisions of the Covenant, several surveys and remediation activities to identify and remove

unexploded ordnance (UXO) and hazardous materials were conducted at the Thiokol site between 1992 and 2000. Upon completion of the final clearance activities in 2000, Certification Letters documenting the site free of UXO in accordance with US Department of Defense Guidelines were submitted by the remediation specialist contractor. The site is currently being monitored by the Maryland Department of the Environment (MDE), Land Restoration Program (MDE, 2009), to determine the appropriate measures necessary to finish remediation of the site.

Overall land use impacts are expected to be SMALL to MODERATE due to the proximity of residential developments and lack of industrial and manufacturing facilities.

9.3.2.4.2 Air Quality

The former Thiokol site is located in St. Mary's County, Maryland. St. Mary's County is currently designated as being in attainment of all air pollutants regulated by the U.S. Environmental Protection Agency (EPA) (EPA, 2008). Any air emissions that would occur as a result of the operation of the proposed new facility will be low enough that they would not cause or contribute to a significant change in local or regional air quality levels at any location.

Construction activities at the site have the potential to temporarily impact the ambient air quality in the immediate vicinity of construction due to emissions from onsite construction equipment. These emissions are expected to be consistent with emissions from other construction projects of this magnitude. It is anticipated that there should be no significant impacts on air quality at offsite locations during the construction period due to the relatively long distance from the center of the site (where most construction and equipment laydown will occur) to the site boundaries. Overall air quality impacts to the surrounding area attributable to the construction of the proposed facility would be SMALL due to adherence to regulatory requirements.

With the exception of some relatively small diesel-fueled emergency power generating equipment and fire pumps, operation of the proposed facility will not have any significant sources of emissions attributable to the combustion of fossil or other fuels. The proposed facility will contain a cooling tower that will emit water vapor and particulate matter to the atmosphere. Because of the exceptionally low level of emissions, operation activities are not expected to cause or contribute to a violation of any state or federal ambient air quality standards. There would be a small increase in regional and local air emissions as a result of increased vehicular traffic associated with workforce employed for plant operations. It is anticipated that overall air quality impacts associated with operation of the proposed facility will be SMALL due to typically low emissions for an operating nuclear power plant.

9.3.2.4.3 Water

The main source of water for the former Thiokol site would be the Patuxent River. The proposed nuclear facility would require a cooling water system and it would include a circulating water system (CWS) and a service water system. The CWS circulates cool water through the main condensers to condense steam after it passes through the turbine. The service water system circulates cooling water through heat exchangers that serve various plant components. The CWS for the proposed unit would be a closed-cycle system that uses

a cooling tower. The proposed new unit would have a separate intake and discharge structures located offshore in the river, and a screenwell and pumphouse structure located onshore. The proposed plant would require approximately 50 million gpd for cooling and other purposes.

Hydrologic impacts associated with construction activities include alteration of the existing watershed surface; disturbance of the ground surface for stockpiles, material storage, and construction of temporary access roads; construction of water intake and discharge structures; construction of cofferdams and storm sewers; construction of piers, jetties, basins, or other structures that might alter shoreline processes; dredging operations; temporary dewatering activities; construction activities contributing to sediment runoff; changes in surface water drainage characteristics; decreases in surface water infiltration (increases of impervious surfaces); and increased erosion and sedimentation. Water will be used for construction activities. A specific quantity of water usage is not known at this time. However, proper mitigation and management methods implemented during construction will limit the potential water quantity and quality effects to surface water and groundwater.

Construction-related water use impacts will be minimized through the implementation of best management practices (BMPs) including erosion, grading, and sediment control measures; stormwater control measures; spill prevention plan; and observance of federal, state, regional, and local regulations pertaining to nonpoint source discharges. Overall construction-related water impacts will be SMALL primarily due to the abundance of available water.

Plant operation will result in a number of aqueous effluents. The largest effluent discharge would be cooling tower blowdown. Treated plant process wastewater, treated sanitary wastewater and small amounts of radioactive liquids could be discharged to the Patuxent River. All effluents would be treated prior to discharge to acceptable levels defined under the Clean Water Act. Cooling tower blowdown would be discharged at temperatures above ambient river temperatures however engineered diffusers will be employed to mitigate any thermal effects.

Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts to water availability and water quality. It is anticipated that there would be site-specific water treatment systems or the use of a municipal system, if available. Therefore, it is anticipated that overall water use impacts from operation activities would be SMALL primarily due to the abundance of available water.

9.3.2.4.4 Terrestrial Ecology and Sensitive Species

This site is relatively flat area surrounded by deciduous forests. A listing of current and historical rare, threatened, and endangered species of St. Mary's County is provided in Table 9.3-7. There are 10 animal and 21 plant species listed as having state threatened or endangered status in St. Mary's County, Maryland (MDDNR, 2008). Of those state listed special status species, only one terrestrial animal species has federal status, the threatened northeastern beach tiger beetle and it is unlikely to occur on the site, but could occur in the vicinity of the cooling water intake and discharge structures along the Patuxent River depending on their location. Because the area is heavily forested and has been relatively

undisturbed since the 1980's, there is a high potential for threatened or endangered terrestrial species to exist onsite.

Impacts on the terrestrial ecosystem associated with construction of the proposed facility include noise, clearing and grading, and potential collisions of birds with new structures. Construction of the proposed facility would result in direct mortality for certain wildlife and would reduce the available habitat area but would not adversely affect local or regional populations of wildlife species. Species that are mobile are likely to preferentially use less-disturbed habitats on adjacent lands. The terrestrial ecology impacts from construction of the facility and the ancillary water pipeline and transmission line corridors are anticipated to be MODERATE to LARGE but would be minimized by searching for sensitive species and complying with permit and mitigation requirements before beginning work. Because no land will be disturbed once construction is complete, the impacts of operation would be SMALL.

9.3.2.4.5 Aquatic Ecology and Sensitive Species

The Rich Neck Creek and Tom Swamp Run, including interim tributaries, are located on the Thiokol site. According to the USFWS National Wetlands Inventory (NWI), the site contains approximately 49.2 ac (19.9 ha) of non-tidal wetlands and approximately 14,411 linear feet (lf) (4,392 m) of stream channel (USFWS, 2008b).

Construction-related impacts to the aquatic ecology would include temporary loss of habitat and short-term degradation of water quality in isolated areas due to inwater and shoreline construction of the cooling water intake structure (CWIS) and other appurtenant structures (such as blowdown and discharge pipelines). The total area of the pipe corridor and associated structures would be approximately 25.1 acres (10.2 ha), including approximately 0.4 ac (0.2 ha) of wetlands. The right-of-way for the 500 kV transmission line would include approximately 15.8 ac (6.4 ha) of wetlands and 4,200.8 (1,280.4 m) of stream channel. The proposed project would permanently impact wetlands and stream features.

National Wetland Inventory maps show palustrine forested wetlands associated with streams to the east and west of the Former Thiokol site (USFWS, 2008b). Some wetlands would probably be impacted given the large footprint needed to construct the proposed facility. Federal Emergency Management Agency (FEMA) floodplain maps show no flood zones within the study area (FEMA, 2008).

The Federally Endangered Dwarf Wedge Mussel is known to occur in a small stream downstream of the Thiokol site. Mitigating measures associated with erosion and sediment control are expected to be sufficient to avoid impacting this species. While much of the supporting CWIS structure will be located onshore, a portion will extend a short distance into the waterway and will likely involve the dredging of sediment to allow for the construction of the concrete structure on the bottom of the river. The dredging of sediment during construction of the CWIS and pipeline will result in the temporary suspension and redeposition of the sediment, as well as the removal of those benthic organisms living in or on the removed sediment. It is anticipated that the suspended sediment will quickly redeposit in the immediate area. For a short period of time, the suspended sediment will create increased turbidity in the immediate area of the construction. Fish and motile crustaceans present in the area during construction activities will avoid the area during active construction

or will actively feed on suspended organisms during dredging operations, and are unlikely to be adversely affected by the construction activities.

No construction effluents are anticipated from in-water construction activities. BMPs and compliance with permit requirements will be used to minimize runoff volumes and impacts. The use of a cofferdam to facilitate construction of the inwater portions of the CWIS will minimize releases of sediment. Prior to commencement of dredging, sediment in those areas proposed to be dredged will be sampled and analyzed to obtain detailed chemical characterizations according to the requirements of dredging permits; special sediment-handling requirements suggested by the sediment sampling results and required by the dredging permit will be followed.

CWIS and pipeline construction-related impacts on aquatic species are anticipated to be minor because the area of impacts is limited to the immediate vicinity of the construction activities. Because the potential impacts will be localized and given the short-term nature of the construction activities and the relatively short-term recovery periods for disturbed benthic species within and near the dredged area, no long-term effects on important species and their habitats are anticipated to occur. Therefore, the adverse aquatic ecology impacts associated with construction of the CWIS and other appurtenant structures (such as blowdown and discharge pipelines) are anticipated to be SMALL to MODERATE. The aquatic ecology impacts from construction of the water pipeline and transmission line corridors are anticipated to be MODERATE to LARGE but would be minimized by searching for sensitive species and complying with permit and mitigation requirements before beginning work. Operation of the proposed new reactor is expected to have a SMALL impact on the aquatic ecology in the area.

9.3.2.4.6 Socioeconomics

The former Thiokol site is located within census tract (CT) 995600 block group (BG) 3, St. Mary's County, Maryland. In 2007 St. Mary's County had a population of approximately 100,378, a 14.1 percent increase from 2000. In 2000 and 2005 the population within CT 995600 BG 3 was 812 and 817, respectively. The population density for CT 995600 BG 3 in 2000 and 2005 was 125 ppsm and 134 ppsm, respectively. The population density of St. Mary's County in 2000 and 2005 was 139 ppsm and 152 ppsm, respectively. The 2005 and 2007 population data presented is projected and therefore an estimated value.

Census tract data from 2000 were reviewed to determine the average population density within a 20-mi (32.2-km) radius of the former Thiokol site. Based on these data, there are 149 ppsm within this area (USCB, 2000d). The 149 ppsm includes seasonal transient populations. When using population data from the year 2000 as a baseline, St. Mary's County is estimated to experience a population increase of 25.0 percent by 2010, 38.6 percent by 2015, and 51.7percent by 2020 (MDSDC, 2007).

Employment projections within the area indicate a general upward trend in the availability of various construction jobs. The Maryland Occupational Projections for 2004 to 2014 for construction trades workers estimates an increase of 52,000 openings from 135,000 in 2004 to 163,000 in 2014 (MDLLR, 2009). The unemployment rate in St. Mary's County was 3.4 percent and 3.2 percent for the southern Maryland area. St. Mary's County employs 38,000 people, of which 2,000 are in construction. The southern Maryland area employs 167,000

people, of which 8,600 are in construction jobs (MDLLR, 2008a). An increase of available jobs indicates additional competition in acquiring a workforce for the construction of the project.

The employer tax credits available include: federal, state, work opportunity, employment opportunity, welfare to work, enterprise zone, Maryland disability employment, and individuals with barriers to employment (MDLLR, 2008b). According to 2006 American Survey data, approximately 3,796 housing units are currently vacant, representing 9.5 percent of the total housing units within the county (USCB, 2006).

The cooling tower plume from the proposed facility would likely be visible at a considerable distance. The proposed facility, however, is predominately wooded and therefore would have some viewshed protection. Overall impacts to the area's population from construction and operation of a new reactor would be SMALL due to proximity of workforce, positive employer environment, and aesthetics.

9.3.2.4.7 Transportation

Maryland State Route 235 / Three Notch Road (MD 235) runs along the northern border of the site. Access to the site must be from MD 235 because all other roads near the site are local residential roads. MD 235 is an important north/south road connecting many of the smaller communities in the county. It is the main transportation route in this area of the county. MD 245 / Hollywood Road is the closest east-west transportation route south of the site and MD 5 / Loveville Road is the closest east-west transportation route north of the site. Many of the local roads surrounding the site do not have good connections with other roads.

The closest airport is the St. Mary's County Airport located approximately 5 mi (8.0 km) south of the site off of MD 235. The site is less than 3 mi (4.8 km) from the Patuxent River but it has no immediate barge access (MPA, 2009). The site is approximately 17 mi (27.3 km) from the nearest active rail line.

It is anticipated that there will be traffic impacts on local roads during construction and operation activities. The development of a traffic management plan prior to construction would aid in identifying and mitigating potential traffic impacts. The following mitigation measures will be considered in the traffic management plan:

Workforce shift changes and delivery options: Scheduling shift changes and the delivery of large items during off-peak hours could reduce potential impacts on local roads.

Carpooling: The use of carpooling and providing transit services (buses) during construction and operation of the facility could be considered.

Coordination with local planning authorities: If necessary, the upgrading of local roads, intersections, and signals to handle increased traffic loads could be considered. Implementing the appropriate mitigation measures would result in SMALL to MODERATE impacts on transportation systems during construction activities and SMALL impacts during operation of the proposed facility.

9.3.2.4.8 Historic, Cultural, and Archeological Resources

The former Thiokol Site is located in Mechanicsville, St. Mary's County, Maryland. The county, the first established in Maryland, is located on a peninsula between the Patuxent and Potomac Rivers in southern Maryland. Mechanicsville, located in the northern portion of the county, is considered an unincorporated area of Maryland. St Mary's City, more than 20 mi SSW of the site, was settled by colonists from England in 1634. St. Mary's City was the provincial capital of Maryland until 1695; the seat is now Leonardtown.

There are no NRHP-listed properties in Mechanicsville (NPS, 2008b); there are 31 NRHP-listed properties in St. Mary's County (NPS, 2008a). The Maryland Historical Trust (MHT) has files on 50 properties (which include individual buildings, sites, structures and districts) in Mechanicsville that have been recorded as part of their Historic Sites Survey program (MHT, 2008). Recordation of a site is not however, an indication that it is NRHP-eligible.

This county contains some of the earliest settlements in the country, an indication that historic archaeological sites may be present on the site. However, removal of a number of buildings in the 1950s followed by razing of all remaining buildings by Thiokol in the early 1980's, and subsequent soil removal in 1994 and 1998, as well as soil testing in 1999 and 2000, reduce the potential for finding significant archaeological and above ground architectural resources on the site.

A complete cultural resources investigation of both the archaeological and architectural resources would be needed before construction activities begin. This work would be done in consultation with the Maryland SHPO and should any significant cultural resources be identified, appropriate mitigation measures would be negotiated prior to construction and operation. Impacts to cultural resources are likely to SMALL, depending on the results of the cultural resource investigations.

9.3.2.4.9 Environmental Justice

The demographic characteristics surrounding the former Thiokol site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income population. Demographic information used for this study was obtained from the 2000 U.S. Census. Demographics (USCB, 2000d; USCB, 2000e) of the adjoining CTs/BGs on and around the site within the county were examined and compared with the demographics of St. Mary's County and the State of Maryland. Table 9.3-11 presents this demographic information.

The former Thiokol site is located in CT 995600 BG 3. Adjacent CTs include 995600 (BG 2 and 4), 995500 (BG 1 and 3), and 995700 (BG 4). CT 995600 BG 3 has a 6.3 percent minority population, which is lower than or comparable to all adjacent CTs within the county (995600 BG 2 [7.5 percent] and BG 4 [36.4 percent], 995500 BG 1 [15.3 percent] and BG 3 [19.8 percent], and 995700 BG 4 [4.5 percent]). The Hispanic population for the proposed action CT/BG is 0.7 percent and is comparable to the adjacent CTs and BGs, which range from 0.1 percent to 1.5 percent.

CT 995600 BG 3 (6.3 percent) has a lower percentage of minority residents compared to St. Mary's County (18.4 percent) and the State of Maryland (36.0 percent). The Hispanic

population of CT 995600 BG 1 (0.7 percent) is lower than St. Mary's County (2.0 percent) and the State of Maryland (4.3 percent).

In 2000 the median household income for St. Mary's County was $54,706, compared to an average of $52,868 for the State of Maryland (USCB, 2000e).

CT 995600 BG 3 has 21.7 percent of its population below the poverty level, which is higher than the adjacent CT 995600 BG 2 (2.7 percent) and BG 4 (2.3 percent), CT 995500 BG 1 (6.0 percent) and BG 3 (20.0 percent), and CT 995700 BG 1 (6.0 percent). The percent of population classified as below the poverty level in CT 995600 BG 3 (21.7 percent) is higher than that in St Mary's County (7.2 percent) and the State of Maryland (8.5 percent).

Based on the data presented in Table 9.3-11, no disproportionately high percentage of minority residents would be directly impacted by construction and operation of the proposed project. The proposed project site does have a higher poverty population in comparison to the surroundings CTs/BGs, St. Mary's County, and the State of Maryland. The poverty level at the proposed site, however, is not disproportionately higher when compared to the State of Maryland. The economic benefits of the facility to the county would likely also benefit minority and low-income populations to some degree, either directly by offering new jobs or indirectly through secondary job creation and increased services from the increased tax revenue.

The proposed facility would be a positive economic stimulus to St. Mary's County and the local economy. Any adverse human health and environmental consequences from the proposed facility would not be borne disproportionately by minority or low-income groups. Therefore, it is anticipated that environmental justice impacts would be SMALL.

9.3.2.4.10 Transmission Corridors

The former Thiokol site was not used for power generation and has no existing power transmission lines or corridors. New transmission corridors would be necessary to connect with existing or proposed transmission lines. Specific monitoring requirements for new transmission lines and corridors and associated switchyards would be designed to satisfy conditions of applicable federal, state, and local permits, to minimize adverse environmental impacts, and to ensure that organisms are protected against transmission line alterations.

Most transmission corridors would pass through land that is primarily agricultural and forest land. New transmission corridors would result in some ecological impacts from potential surface water and wetlands crossings. The areas are mostly rural and remote with low population densities. The effect of these corridors on land usage is minimal; farmlands that have corridors passing through them generally continue to be used as farmland. Because new right-of ways would need to be constructed to accommodate the new transmission lines, it is anticipated that construction impacts from the development of new transmission corridors would be MODERATE to LARGE due to the commitment of land and construction impacts on ecological resources.

Operational activities within the transmission corridors might include visual inspection and appropriate maintenance of transmission line ROWs. Maintenance activities might include reclearing vegetation, tree trimming/removal, and encroachment licensing/removal. For maintenance purposes, wooded sections of the ROW would be recleared to the full width

through mechanical clearing, hand cutting, or herbicide application. Overall operation transmission impacts are anticipated to be SMALL.

9.3.2.5 Generic Greenfield Site

A greenfield site is one that is undeveloped, not having been used previously for any industrial purpose (NRC, 1996). As such, it is possible that some portion of the greenfield site has been disturbed, for example, for agricultural use. It would, therefore, have no likely history of industrial legacy contamination, no prior NRC review, and limited or no data collected regarding characterization.

No specific location for the hypothetical greenfield site was selected; however, a qualitative analysis can be done regardless. Guided by relevant impact areas suggested in the NRC's Table 9.3-2, NUREG-1555 (NRC, 1999) for alternative site reviews, the following qualitative analysis is provided. Expected impacts associated with siting the new facility at the CCNPP site are summarized in ER Table 10.1-1 (for unavoidable adverse impacts). This table is the primary source for impact information used in the following discussion. For impacts not expected to result in unavoidable adverse impacts, sections 4 and 5 of this report were consulted.

9.3.2.5.1 Land Use

Relative to the proposed site, land use for a new nuclear facility would likely require more land commitment at a greenfield site due to exclusion area requirements. A new nuclear facility takes substantial advantage of the currently existing 270 acre (838 hectare) site with adequate (residence free) area for an exclusion area boundary, which is wholly within the CCNPP site property boundary.

A new nuclear facility would use a portion of the current site switchyard to connect to the transmission system for offsite independent circuit requirements in addition to having a new switchyard for the new unit. For the greenfield site, additional land would be required to meet this need. It is also likely that additional land would be required, overall, for transmission line corridors to support the greenfield site. It is conceivable that the greenfield site may be located near a well-developed transmission system.

In addition, depending on the extent to which the greenfield site has been disturbed (from prior non-industrial use), it is possible that its larger land use demands could impact a greater amount of undisturbed land as well.

The need to obtain land, including easements, from third parties, as well as the considerable size of property that would need to be obtained, would also make greenfield sites less favorable. A greenfield site is most likely currently zoned as agricultural, forest or natural resource management. This consideration also holds true for existing nuclear facilities for which additional land must be obtained.

The impact on land use for a greenfield site for construction and operation of a nuclear power plant would be MODERATE to LARGE because of the due to the likely need to acquire, rezone, and disturb the land. Based on this expected greater land use demand, the greenfield site alternative would neither be environmentally preferred nor obviously superior.

9.3.2.5.2 Air Quality

Air quality impacts of construction and operation of a new nuclear unit would likely be similar at the CCNPP site and the alternative sites. The construction impacts would include dust from disturbed land, roads, and construction activities and emissions from construction equipment. These impacts would be similar to the impacts associated with any large construction project. A discussion of measures that UniStar Nuclear Operating Services, LLC and Calvert Cliffs 3 Nuclear Project, LLC would take to mitigate air quality impacts at the proposed CCNPP site is provided in Chapters 4 and 5. The same or similar measures would be taken if a new nuclear unit were to be constructed at any of the alternative sites. For purposes of the evaluation of the greenfield site, it is reasonable to assume that the air quality impacts of emissions from vehicles used for construction worker transportation likely would be similar at all sites and temporary.

Impacts of operation of a new nuclear plant on air quality are related primarily to the operation of standby generators and cooling towers. The operation of standby generators is independent of the site. Similarly, the quantity of cooling tower drift is generally a function of cooling tower design, not the site. The assumption is made that UniStar Nuclear Operating Services, LLC and Calvert Cliffs 3 Nuclear Project, LLC would comply with all regulations related to emissions from generators. Cooling towers would use current technology to minimize drift. Based on identified limiting meteorological parameters at the CCNPP site, aspects of drift are assumed to be generally equivalent for the generic greenfield site.

The physical impacts of construction would be similar at all of the alternative sites. People who work or live around the alternative sites could be exposed to noise, fugitive dust, and gaseous emissions from construction activities. Construction workers and personnel working on-site could be the most impacted. Air pollution emissions are expected to be controlled by applicable best management practices and federal, state, and local regulations.

During station operation, standby diesel generators used for auxiliary power would have air pollution emissions. It is expected that these generators would see limited use and, if used, would be used for only short time periods. Applicable federal, state, and local air pollution requirements would apply to all fuel-burning engines. At the site boundary, the annual average exposure from gaseous emission sources is anticipated not to exceed applicable regulations during normal operations. The impacts of station operations on air quality are expected to be minimal. As with construction impacts, potential offsite receptors are generally located well away from the site boundaries.

In summary, air quality impacts would be expected to be SMALL and comparable to other candidate sites during construction due to the adherence to regulatory requirements and SMALL during operation due to typically low emissions for an operating nuclear power plant. Therefore, the greenfield alternative may be generally equivalent but not obviously superior.

9.3.2.5.3 Water

Overall, lasting impacts to the CCNPP site from a new nuclear facility to local streams would be minimal. Some sedimentation is expected during construction but would not be expected to change the current characteristics of the streams. Impacts to groundwater from a new nuclear facility are minor and localized; and no impact to offsite users is expected. The

largest portion of raw water makeup for a new facility is to be drawn from the Chesapeake Bay. Raw water makeup withdrawal is a very small percentage of Susquehanna River inflow to the Chesapeake Bay. In general, similar levels of impact could be expected from construction and operation of a new facility at a greenfield site located near the Maryland shore, but the relative impacts would also depend on surface water availability and layout of streams and topography at that site. In fact, if the greenfield site did not use the Chesapeake Bay, and instead used groundwater or small rivers or ponds for cooling, then relative water use impacts could be significantly greater than that assumed for a typical nuclear plant site.

In summary, assuming the greenfield site uses the Chesapeake Bay, a large water source, for raw water, the impact on water use and water quality would be SMALL for construction and operation. If a river or groundwater aquifer is used, the impact is expected to be MODERATE for construction and MODERATE to LARGE for operation due to the significant fraction of the water that would need to be withdrawn. Given the overall minimal impact of the proposed project to surface water and ground water, the greenfield site alternative would neither be environmentally preferred nor obviously superior.

9.3.2.5.4 Terrestrial Ecology and Sensitive Species

Approximately 460 acres (186 hectares) of land would be impacted by construction of the new facility. About 320 acres (129 hectares) of land would be occupied by permanent structures for a new nuclear facility. The remaining land (i.e., about 140 acres (57 hectares)) would be revegetated and allowed to revert to a natural state.

Given the likely increased land use required at a greenfield site related to undisturbed areas and switchyard/transmission needs, a corresponding larger impact to terrestrial resources is expected. It can be assumed that greater land use would likely translate into greater permanent displacement of wildlife and impact to habitats. It is assumed that there are no endangered, threatened or sensitive species present at the greenfield site.

The impact on terrestrial ecology and sensitive species for a greenfield site is expected to be MODERATE to LARGE for construction due to the increased land use related to undisturbed areas and SMALL for operation due to return of part of the land disturbed by construction to a natural state. Therefore, a greenfield site would not be environmentally preferred or obviously superior to other sites.

9.3.2.5.5 Aquatic Ecology and Sensitive Species

Overall, due to construction and operation, siting of a new facility at the CCNPP Site was demonstrated to have no more than a SMALL to MODERATE impact to aquatic biological resources, including consideration of intake impacts, thermal discharge plumes, stream alteration, sedimentation, etc.

Ten operational impacts of cooling water systems on aquatic ecology (including issues concerning gas supersaturation, water quality, nuisance organisms, and others) determined to be applicable to current operating nuclear power plants were evaluated in NUREG-1437. These impacts were found to be minimal for all currently operating plants and, based on the nature of these ecological effects, it is expected that they would also be minimal for the next generation of nuclear plants. However, other potential impacts of water intake and discharge

systems on aquatic ecosystems at nuclear power plants such as impingement and entrainment of fish and shellfish are site-specific and depend on factors related to specific features of the design and construction of these systems.

Construction activities would likely result in only temporary disturbance to most aquatic resources. However, alterations to any water bodies or wetlands within the construction footprint would likely result in permanent impacts. Depending on the location of the greenfield site, impacts may be equivalent or greater.

The expected impact on aquatic ecology and sensitive species for a greenfield site may range from SMALL to LARGE for construction (intake impacts, stream alteration) and SMALL for operation as any impacts would already have been made during construction. Therefore, the greenfield alternative may be generally equivalent but not obviously superior.

9.3.2.5.6 Socioeconomics

Regarding impacts to housing, public services, transportation networks, etc., relative assessments of the CCNPP site vs. a hypothetical greenfield site are dependent on the specific greenfield site location. However, such socioeconomic impacts from a new nuclear facility on the CCNPP site and surrounding area were assumed, in general, to be distributed throughout a relatively large area with minor localized impacts to the communities in which the construction or operating workers (and their families) reside. Impacts to principally used transportation routes (i.e., State Highways and Interstates) during commuting periods are expected to be SMALL and within the capacity of the transportation networks. Impacts to local town and county roads used during construction to gain site access are expected to be SMALL to MODERATE, depending on the extent of local infrastructure. Given the likelihood of selecting a similarly located greenfield site in a relatively remote, non-urban setting, impacts would be expected to be roughly equivalent assuming the existing nuclear plant site is not located next to a highway.

The most prominent additional visual features, from an aesthetic perspective, are the natural or mechanical draft cooling towers (and associated plumes). Given that the CCNPP site already includes two nuclear power plants with tall structures, the additional tower is not considered to have substantial, additional aesthetic impact. This would not be the case for a greenfield site in which the addition of cooling towers and other structures (such as containment building, transmission lines and towers) would have relatively greater aesthetic impact. Therefore, aesthetic impacts to the greenfield site would be MODERATE to LARGE.

In addition, the existing CCNPP facility is already integrated into the socioeconomic, land use, and aesthetic environment of the area. It is reasonable to assume that an additional unit would be consistent with this baseline and result in a SMALL impact. With a greenfield site, depending on its location, the impacts would be new and may have MODERATE to LARGE impacts on the area.

Based on the above considerations, it is not likely that the greenfield site alternative would be evaluated as environmentally preferred or obviously superior in any of these socioeconomic related impact areas.

9.3.2.5.7 Transportation

Regarding impacts to transportation networks, etc., relative assessments of the CCNPP site vs. a hypothetical greenfield site are dependent on the specific greenfield site location. However, such socioeconomic impacts from a new nuclear facility on the CCNPP site and surrounding area were evaluated, in general, to be distributed throughout a relatively large area with minor localized impacts to the communities in which the construction or operating workers (and their families) reside. Impacts to principally used transportation routes during commuting periods are expected to be SMALL and within the capacity of the transportation networks. Given the likelihood of selecting a similarly located greenfield site in a relatively remote, non-urban setting, transportation networks may have to be substantially improved for various reasons. The use of a greenfield site may not have the advantage of these improved roadways, thus resulting in greater transportation related impacts. Therefore, the impact on transportation for a generic greenfield site is SMALL to MODERATE. Therefore, the greenfield alternative environmental impact may be larger and not obviously superior.

9.3.2.5.8 Historic, Cultural, and Archeological Resources

Regarding impacts to historic, cultural, and archeological resources, relative assessments of the CCNPP site vs. a hypothetical greenfield site are dependent on the specific greenfield site location. However, such an impact from a new nuclear facility on the CCNPP site and surrounding area were evaluated, in general, to be SMALL. Given the likelihood of selecting a similarly located greenfield site in a relatively remote, non-urban setting, historic, cultural and archeological resources impacts are expected to be SMALL. Therefore, the greenfield alternative may be generally equivalent but not obviously superior.

9.3.2.5.9 Environmental Justice

The environmental justice analysis of the CCNPP site identified the presence of minority and low income groups residing in communities within a 50 mile radius of the CCNPP site. Calvert County population is similar to the U.S. as a whole. A new facility was evaluated to have no significant adverse environmental impacts and, as such, does not result in a disproportionate impact to the minority and/or low income populations. It is likely that a similar conclusion would be reached regarding a greenfield site as the site would likely be located in a largely rural area. Therefore, the environmental justice impacts for the greenfield alternative would be similar to the CCNPP site and be SMALL. Therefore, the greenfield alternative may be generally equivalent but not obviously superior.

9.3.2.5.10 Transmission Corridors

A new nuclear facility at the proposed site would use the current switchyard. For the greenfield site, additional land would be required to meet this need. It is also likely that additional land would be required, overall, for transmission line corridors to support the greenfield site. It is conceivable that the greenfield site may be located near a well-developed transmission system. However, General Design Criteria 17 (GDC 17) of Appendix A to 10 CFR 50 contains demanding requirements for offsite physical independence and the number of separate transmission lines. This requirement may not be met by a greenfield site simply located near a transmission line or even near a typical industrial site that is not subject to GDC 17. The criteria related to physical independence and the number of separate

transmission lines would likely require additional transmission corridors to support most greenfield sites. While a new nuclear facility at the CCNPP site may require additional transmission line support in the existing right of way (ROW), it is likely that most greenfield sites, in meeting GDC 17 requirements, would require substantially more transmission line construction and, therefore, have greater related land use impacts.

For impacts resulting from transmission line operation and transmission line ROW maintenance, the assumption is made in the Generic Environmental Impact Statement (NRC, 1996) that any existing transmission lines at a greenfield site would not have the capacity to carry the power that would be generated by a new nuclear unit. Therefore, it is assumed that any transmission system upgrades would require the addition of new lines that would result in expansions of the existing ROWs and that such expansions could consist of doubling current corridor widths.

Given these assumptions, the need for new transmission corridors for a generic greenfield site would result in a MODERATE to LARGE environmental impact. Therefore, the greenfield alternative environmental impact may be larger and not obviously superior.

9.3.3 SUMMARY AND CONCLUSIONS

The detailed site evaluations are contained in the Calvert Cliffs Alternate Site Evaluation, July 2009 (UniStar, 2009). Table 9.3-4, Weighted Scoring of Candidate Sites, compares the weighted numerical scores of the Selected and Candidate sites derived from the above referenced Alternate Site Evaluation. Table 9.3-8 is a Comparison of Proposed and Alternate Sites using the NRC Three-level Standard of significance. The Summary and Conclusions based upon the foregoing are discussed below.

The advantages of the CCNPP site over the alternative sites are summarized as follows:

- The postulated consumptive use of water by a new unit at the CCNPP site would be no greater than water use at the alternative sites.
- The CCNPP3 project site contains habitat suitable for the federally-listed endangered Puritan tiger beetle and the federally protected bald eagle. Four bald eagle nests are present on the CCNPP site, although all may not be active. One nest is in the CCNPP3 project construction footprint and would be impacted by the development. The suitable beach habitat for the Puritan tiger beetle is south of the barge dock and would not be impacted by the development due to the implementation of appropriate mitigative activities. Therefore, impacts of development of a new unit at the proposed site on endangered species are not greater than impacts postulated for the alternative sites after the proposed mitigation measures are considered.
- The CCNPP site does not contain spawning grounds for any threatened or endangered species. Thus, the impacts on spawning areas are not greater than impacts at the alternative sites.
- The CCNPP site impact review does not postulate effluent discharge beyond the limits of existing National Pollutant Discharge Elimination System permits or regulations. Based on the information available for the alternative sites, the impacts from effluent discharge at the proposed site would be no greater than impacts at the alternative sites.

- The siting of the new unit at the CCNPP site would require the pre-emption of lands currently zoned farm and forest district, and light industrial for construction and operation. Therefore, land impacts at the proposed site would be greater than the impacts at the alternative sites.
- The potential impacts of a new nuclear facility on terrestrial and aquatic environments at the CCNPP site would be no greater than the impacts at the alternative sites.
- The CCNPP site is in a generally rural setting and has a population density that meets the population criteria of 10 CFR Part 100.
- The CCNPP site does not require decommissioning or dismantlement of an existing facility, as would be required for the Bainbridge or Thiokol Sites.

As summarized in Table 9.3-8, no alternative sites are environmentally preferable, and therefore cannot be considered obviously superior, to the CCNPP site. Development of a greenfield or brownfield site would offer no advantages and would increase both the cost of the new facility and the severity of impacts. Collocation of the new reactor unit at an existing site would allow existing infrastructure and transmission lines to be used.

The existing facility currently operates under an NRC license, and the proposed location has already been found acceptable under the requirements for that license. Further, operational experience at the CCNPP site has shown that the environmental impacts are SMALL, and operation of a new unit at the site should have essentially the same environmental impacts.

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Table 9.3-1 Candidate Sites

Site	County	State	Type	Acres (Hectares)
Beiler Property	Kent	MD	Brownfield	553 (224)
East ALCO Aluminum Company	Frederick	MD	Brownfield	1,312 (531)
Former Thiokol Site	St. Marys	MD	Brownfield	619 (251)
Morgantown	Charles	MD	Coal	427 (173)
Vienna	Dorchester	MD	Oil	>420 (>170)
Conowingo	Harford	MD	Hydroelectric	>420 (>170)
Bainbridge Naval Training Center	Cecil	MD	Brownfield	1,200 (486)

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
1. Land use, including availability, and areas requiring special consideration		
1a. Ability to support the combined EPR footprint including the protected area, cooling towers, ponds, switchyard, construction support areas SCORED BY EXPERT PANEL	Size and configuration of site	5 = No changes needed in layout and no restrictions for construction work area 3 = Limited changes needed in layout and/or some restrictions for construction work area 1 = Substantive changes needed in layout and/or substantive restrictions for construction work area
1b. Hazardous waste or spoils areas SCORED BY EXPERT PANEL	Based on anticipated need for environmental remediation at the site or interconnects due to known current or previous uses (i.e. listed RCRA, CERCLIS, LUST or other designation)	5 = No/limited anticipated environmental remediation necessary 3 = Unknown if site needs environmental remediation 1 = Expected environmental remediation necessary
1c. Zoning SCORED BY EXPERT PANEL	Compatibility with existing land use planning and proposed development	5 = Area zoned for industrial facilities/operations; no zoning restrictions; known ownership 3 = Area unzoned or unclear if zoning would be an issue; no known zoning restrictions for nuclear/industrial facilities; known ownership 1 = Area zoned for use other than industrial facilities/operations; likely zoning restrictions for nuclear/industrial facilities if zoning change is attempted; ownership unclear, or unknown
1d. Dedicated land SCORED BY EXPERT PANEL	Distance to dedicated land (e.g., Federal, State, Tribal) from site	5 = No dedicated land within 10 miles of the site 3 = Dedicated land located greater than or equal to 5 but less than 10 miles of site 1 = Dedicated lands located within 5 miles of the site
1e. Topography SCORED BY EXPERT PANEL	Site topography and resulting cut-and-fill requirements for construction	5 = Site topography is flat or has less than 50 feet of relief; no/limited cut-and-fill required. 3 = Site topography is hilly with greater than or equal to 50 feet but less than 100 feet of relief in the area to be developed; significant amounts of cut-and-fill required 1 = Site has steep topography with greater than 100 feet of relief in the area of the site to be developed

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
2. Hydrology, water quality, and water availability		
2a. Water Quality (chemistry)	Applicable State water quality standards (salt, brackish, fresh, polluted) as related to condenser CT cycles prior to blowdown	5 = Fresh water 4 = Fresh/Tidal water 3 = Oligohaline water 2 = Mesohaline water 1 = Salt or gray water
2b. Receiving Body Water Quality	Applicable State water quality classification Tier I, Tier II (as described and defined in COMAR 28.02.08.04-1) and Tier III (Outstanding National Resource Waters [ONRW] as described and defined in COMAR 28.02.08.04-2)	5 = Tier 1 waters (i.e., no special state classification) 3 = Tier II waters (i.e., require antidegradation review of new or amended water/sewer plans and discharges) 1 = Tier III waters (i.e., ONRW)
2c. Water Availability	Metric based on lowest 7-day average flow in a ten year period (i.e., 7Q10) and need for 50 mgd water supply	5 = Source water body exceeds 7Q10 by 6-to 10% or equal to 10 times the needed volume for the annual requirement [182,500 MGD] 3 = Source water body exceeds 7Q10 by 2 to 5% or source water body is less than or equal to 5 times the needed volume for the annual requirement [91,250 MGD] 1 = Source water body 7Q10 does not meet 50 mgd or source water body is below needed volume for the annual requirement [18,250 MGD]

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
3. Terrestrial resources (including endangered species)		
3a. T&E habitats	Existence of mapped Federal and State T&E species habitat on or adjacent to site	5 = No T&E estimated habitat types onsite 3 = T&E estimated habitat types mapped within 1 mile of the site but not onsite 1 = T&E estimated habitat types onsite
3a. Floodplains	Existence of mapped Federal Emergency Management Area (FEMA) 100 or 500 year floodplain or State floodplain zones affecting site footprint	5 = No 100 or 500 year FEMA floodplain or State floodplain zones affecting approximate footprint of site 4 = 100 or 500 year FEMA floodplain or State floodplain zones affecting less than 10% of site footprint 3 = 100 or 500 year FEMA floodplain or State floodplain zones affecting 11% to 20% of site footprint 2 = 100 or 500 year FEMA floodplain or State floodplain zones affecting 21% to 30% of site footprint 1 = 100 or 500 year FEMA floodplain or State floodplain zones affecting greater than 30% of site footprint
4. Aquatic biological resources (including endangered species)		
4a. T&E habitats	Existence of mapped Federal and State T&E species habitat on or adjacent to site	5 = No T&E estimated habitat types onsite 3 = T&E estimated habitat types mapped within 1 mile of the site but not onsite 1 = T&E estimated habitat types onsite
4b. Thermal Discharge Sensitivity	Designated finfish/shellfish and/or other resource areas within intake or discharge waters	5 = No designated aquatic resources or habitats located within intake or discharge waters 3 = Designated warm water aquatic resources located within intake or discharge waters 1 = Designated cold water or marine aquatic resources located within intake or discharge waters

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
5. Socioeconomics (including aesthetics, demography, and infrastructure)		
5a. Emergency services	Availability of existing emergency services infrastructure (police, fire, emergency medical service (EMS), and hospital services) to support increased construction and operation workforce	5 = At least two or more of each full time police, fire, EMS, and hospital services within the county of the proposed site 3 = At least one of each police, fire, EMS, and hospital services within the county of the proposed site 1 = At least one of any of the services part-time or volunteer police, fire, EMS, and hospital services within the county of the proposed site. Some services (e.g., hospital may require flights to other communities).
5b. Construction traffic	Ability of existing transportation infrastructure to support construction traffic	5 = State route or interstate highway within 1 mile 3 = State route or interstate highway greater than 1 but less than 5 miles 1 = State route or interstate highway greater than 5 miles
5c. Construction workforce	Availability of local construction workforce based on State, County, or local planning, zoning and industrial development commission databases. Availability of suitable population within commuting distance from which to draw the construction workforce.	5 = Workforce needed represents less than 5% of construction workforce within -50-mile region. 3 = Workforce needed represents 5 to 20% of construction workforce within 50-mile region. 1 = Workforce needed represents greater than 20% of construction workforce within 50-mile region.
5d. Housing and necessities	Availability of housing units, shopping and other services to support the peak construction workforce	5 = Number of vacant housing units is greater than 10 times the projected peak construction workforce within the counties in a 50 mile radius of the site and population centers of 25,000 or more are located within 5 miles of the site 3 = Number of vacant housing units is greater than 5 times but less than 10 times the projected peak construction workforce within the counties within a 50 mile radius of the site and population centers of 25,000 or more are located within 10 miles of the site. 1 = Number of vacant housing units is less than 5 times the projected peak construction workforce within the counties in a 50 mile radius of the site and population centers of 25,000 or more are located greater than 10 miles from site.

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
5e. Schools	Availability of existing schools to support increased construction and operation workforce	5 = Greater than 1,000 public and/or private high, middle, and elementary schools within a 50 mile radius of the site. 4 = 751 to 1,000 public and/or private high, middle, and elementary schools within a 50 mile radius of the site. 3 = 501 to 750 public and/or private high, middle, and elementary schools within a 50 mile radius of the site. 2 = 251 to 500 public and/or private high, middle, and elementary schools within a 50 mile radius of the site. 1 = Less than or equal to 250 public and/or private high, middle, and elementary schools) within a 50 mile radius of the site.
6. Environmental Justice (EJ)		
6a. Minority population	Presence of minority population within or abutting site	5 = Minority population in census block group (or adjacent census block group) less than 5 percent and minority population percentage in census block group less than 5 percentage points higher than county or state minority population percentage 4 = Minority population in census block group (or adjacent census block group) greater than 5 but less than 20 percent or minority population percentage in census block group greater than 5 but less than 10 percentage points higher than county or state minority population percentage 3 = Minority population in census block group (or adjacent census block group) greater than 20 but less than 35 percent or minority population percentage in census block group greater than 10 but less than 15 percentage points higher than county or state minority population percentage 2 = Minority population in census block group (or adjacent census block group) greater than 35 but less than 50 percent or minority population percentage in census block group greater than 15 but less than 20 percentage points higher than county or state minority population percentage 1 = Minority population in census block group (or adjacent census block group) greater than 50 percent or minority population percentage in census block group greater than 20 percentage points higher than county or state minority population percentage

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
6b. Low-income population	Presence of low-income population within or abutting site	5 – Low income population in census block group (or adjacent census block group) less than 5 percent and low income population percentage in census block group less than 5 percentage points higher than county or state low income population percentage 4 = Low income population in census block group (or adjacent census block group) greater than 5 but less than 20 percent or low income population percentage in census block group greater than 5 but less than 10 percentage points higher than county or state low income population percentage 3 = Low income population in census block group (or adjacent census block group) greater than 20 but less than 35 percent or low income population percentage in census block group greater than 10 but less than 15 percentage points higher than county or state low income population percentage 2 = Low income population in census block group (or adjacent census block group) greater than 35 but less than 50 percent or low income population percentage in census block group greater than 15 but less than 20 percentage points higher than county or state low income population percentage 1 = Low income population in census block group (or adjacent census block group) greater than 50 percent or low income population percentage in census block group greater than 20 percentage points higher than county or state low income population percentage
7. Historic and Cultural Resources		
7a. Historic buildings, structures, objects and sites	Distance to site and number of National Register of Historic Places (NRHP) listed buildings, structures, objects and sites	5 = 0 NRHP buildings, structures, objects and sites within 1 mile or less from site 3 = Less than 5 NRHP buildings, structures, objects and sites within >1 to 5 miles from site 1 = 5 or more NRHP buildings, structures, objects and sites within >1 to 5 miles from site
7b. Historic districts	Distance to mapped NRHP listed historic districts from site	5 = 0 historic districts within 1 mile or less from site 3 = 1 historic district within >1 to 5 miles from site 1 = Greater than 1 historic district within >1 to 5 miles from site

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
8. Air Quality (Climate & Meteorology)		
8a. Weather risks/conditions	Estimation of potential severe weather impacts on operation of a new nuclear station	5 = Area exposed to a low frequency of occurrence or less severe tornadoes3 and/or hurricanes 4 = Low frequency of occurrence of potentially damaging storms 3 = Moderate frequency of occurrence of area storms 2 = High frequency of occurrence of less severe area storms 1 = Area exposed to a high frequency or more severe tornadoes3 and/or hurricanes
8b. Prevention of Significant Deterioration (PSD) Class I Area, Attainment / Non-attainment Area	In or out of an attainment / non-attainment area and Prevention of Significant Deterioration (PSD) Class I area	5 = In attainment area and outside PSD Class I area 3 = In non-attainment area and not in PSD Class I area 1 = In non-attainment area and/or within PSD Class I area
9. Human Health		
9a. Emergency preparedness program– proximity of residences/businesses for exclusion zone	Ability to evacuate area around site in event of an emergency	5 = 25 or less residences or businesses within 1 mile of site, and no schools or hospitals within 1 mile of site 3 = Greater than 25 and less than or equal to 75 residences or businesses within 1 mile of site, and no schools or hospitals within 1 mile of site 1 = Greater than 75 residences or businesses within 1 mile of site, or one or more schools or hospitals within 1 mile of site
9b. Radiological Pathways - Water	Based on distance to drinking water supply from site (ground and surface)	5 = Distance to any primary source aquifer or public water supply intake greater than 5 miles from the site 4= Distance to any primary source aquifer or public water supply intake greater than 3 miles but less than or equal to 5 miles from the site 3 = Distance to any primary source aquifer or public water supply intake greater than 2 miles but less than or equal to 3 miles from the site 2 = Distance to any primary source aquifer or public water supply intake greater than 1 mile but less than or equal to 2 miles from the site 1 = Distance to any primary source aquifer or public water supply intake less than 1 mile from the site

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
9c Radiological Pathways - Food	Distance to food pathways (e.g., shellfish beds, farms,)	5 = Agricultural land (based on land use/zoning map) or shellfish beds (measured by distance to bay) greater than 5 mile from site 4 = Agricultural land or shellfish beds greater than 3 mile and less than or equal to 5 mi from site 3 = Agricultural land or shellfish beds greater than 2 mile and less than or equal to 3 mi from site 2 = Agricultural land or shellfish beds greater than 1 mi and less than or equal to 2 mile from site 1 = Agricultural land or shellfish beds less than or equal to 1 mile from site
10. Postulated Accidents		
10a. Distance to nearby potentially hazardous facilities	Distance to hazardous facilities (e.g., military facilities, such as munitions storage or ordnance test ranges; chemical plants; refineries; mining and quarrying operations; oil and gas wells; gas and petroleum product installations; or air, waterway, pipeline or rail transport facilities for hazardous materials) and major airports	5 = No potentially hazardous facilities within 5 miles from site or no major airports within 10 miles from site 3 = Potentially hazardous facilities greater than 2 miles but less than 5 miles from site or major airports 5 miles to less than 10 miles from site 1 = Potentially hazardous facilities less than or equal to 2 miles from site or major airports within 5 miles from site
11. Fuel Cycle Impacts (Transport of Radioactive Material)		
11a. Transport of nuclear fuel and wastes	Distance and route to low level disposal site(s) and spent fuel repository (i.e., Yucca Mountain) from site	5 = Site is adjacent to disposal sites. 4 = Distance to Yucca Mountain is less than 1000 mi, and distance to low-level waste disposal site(s) is less than 500 mi. 3 = Distance to Yucca Mountain is less than 2000 mi, and distance to low-level waste disposal site(s) is less than 1000 mi. 2 = Distance to Yucca Mountain is greater than 2000 mi, and distance to low-level waste disposal site(s) is greater than 1000 mi. 1 = Distance to Yucca Mountain is greater than 2000 mi, and distance to low-level waste disposal site(s) is greater than 1000 mi, AND population densities within first 10 mi of route(s) are greater than 12601 person/mi^2.

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
12. Transmission corridors (land used, feasibility, and resources affected)		
12a. Environmental impact of proposed transmission interconnection	Length of proposed right-of-way (ROW) from site to point of transmission interconnection, including assessment of environmental impact (i.e., existing ROW vs. greenfield)	5 = 345 kV or greater transmission on site. 4= Point of interconnection (POI) less than or equal to 5 miles with no existing ROW or less than or equal to 10 miles with existing ROW requiring expansion 3 = POI greater than 5 miles but less than or equal to 10 miles with no existing ROW or greater than 10 miles but less than or equal to 30 miles with existing ROW requiring expansion 2 = POI greater than 10 miles but less than or equal to 20 miles with no existing ROW or greater than or equal to 30 miles with existing ROW requiring expansion 1 = POI less than 30 miles with no existing ROW
13. Population distribution and density		
13a. Distance to population centers	Distance to US Census Populated Places population centers of 25,000 or more persons from site	5 = No population centers within 20 miles 4 = One or more population centers greater than 15 miles but less than or equal to 20 miles 3 = One or more population centers greater than 10 miles but less than or equal to 15 miles 2 = One or more population centers greater than 5 miles but less than or equal to 10 miles 1= One or more population centers within 5 miles
13b. Population density	Existing population density within 20 mi radius of site	5 = Population density within 20 mi radius less than or equal to 50 persons per square mile (ppsm) 4 = Population density within 20 mi radius greater than 50 ppsm but less than or equal to 200 ppsm 3 = Population density within 20 mi radius greater than 200 ppsm but less than or equal to 350 ppsm 2 = Population density within 20 mi radius greater than 350 ppsm but less than or equal to 500 ppsm 1= Population density within 20 mi radius greater than 500 ppsm

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
14. Facility costs [Transportation Access]		
14a. Barge access and capacity – distance, construction, or upgrade requirements	Availability of nearest barge access or ability to construct new barge landing	5 = Viable barge access existing at site 3 = No existing barge access at site, but existing barge access within 5 mi or landing may be built at site 1 = No barge access possible at or within 5 mi of site
14b. Rail line access and capacity – distance, spur requirements, line capacity, or upgrade requirements	Estimated distance and condition of nearest accessible active rail line	5 = Active rail line less than 1 mile from site 4 = Rail line less than 1 mile from site but inactive or needing refurbishment 3 = Active rail line 1 mile to less than 5 mile from site 2 = Rail line 1 mile to less than 5 mile from site but inactive or needing refurbishment and needing refurbishment 1 = Rail line greater than or equal to 5 mile from site
15. Geology/Seismology		
15a. Vibratory ground motion – seismic peak ground acceleration	Peak ground acceleration (PGA)	5 = PGA is < 0.10g with a 2% probability of exceedance in 50 years (4x 10^{-4}) 4 = PGA is 0.10 to 0.15g with a 2% probability of exceedance in 50 years (4x 10^{-4}) 3 = PGA is 0.15 to 0.25g with a 2% probability of exceedance in 50 years (4x 10^{-4}) 2 = PGA is 0.25 to 0.30g with a 2% probability of exceedance in 50 years (4x 10^{-4}) 1 = PGA is > 0.30g with a 2% probability of exceedance in 50 years (4x 10^{-4})
15b. Depth to bedrock soil stability	Depth to bedrock; soil stability including liquefaction potential, bearing strength and general foundation conditions	5 = Bedrock or recognized highly competent soil at or within 20 feet of the ground surface 3 = Tertiary-aged or older soil at or within 20 feet of the ground surface 1 = Quaternary-aged soil extends greater than 20 feet below the ground surface
15c. Surface faulting and deformations	Presence of surface faulting based on USGS Quaternary fault database	5 = Site greater than 100 mi from any capable fault 4 = Site 100 to 50 mi from any capable fault 3 = Site 50 to 25 mi from any capable fault 2 = Site 25 to 5 mi from any capable fault 1 = Site with capable or questionable aged fault(s) within 5 mi

Table 9.3-2 Site Ranking Criteria

Ranking Criteria	Metric	Scoring Basis
15d. Other geological hazards	Presence of other geologic hazards, such as karst features, subsurface mines, and volcanoes	5 = Hazards present or likely within 50 miles of the site 4 = Hazards present or likely within 20 miles of the site 3 = Hazards present or likely within 10 miles of the site 2 = Hazards present or likely within 3 miles of the site or a moderate risk 1 = Hazards present or likely at or within 0.5 miles of the site or a serious risk
16. Wetlands		
16a. Total Wetlands Within Property Boundary	Percent of wetlands within property boundary	5 = Less than 10% of site classified as wetlands based on National Wetland Inventory (NWI) or state-mapped wetlands 4 = Greater than or equal to 10% and less than 20% of site classified as wetlands based on NWI or state-mapped wetlands 3 = Greater than or equal to 20% and less than 30% of site classified as wetlands based on NWI or state-mapped wetlands 2 = Greater than or equal to 30% and less than 40% of site classified as wetlands based on NWI or state-mapped wetlands 1 = Greater than or equal to 40% of site classified as wetlands based on NWI or state-mapped wetlands
16b. Total Acres of Wetlands Within Site	Acres of wetlands onsite	5 = Less than 1 acre of site classified as wetlands based on NWI or state-mapped wetlands 3 = Greater than 1 acre and less than 5 acres of site classified as wetlands based on NWI or state-mapped wetlands 1 = Greater than 5 acres of site classified as wetlands based on NWI or state-mapped wetlands
16c. High Quality Wetlands Within Site	Presence of state-designated high quality wetlands onsite	5 = No high quality wetlands onsite 1 = High quality wetlands onsite

Table 9.3-3 Site Ranking Rationale

Ranking Criteria	Metric	Rationale
1. Land use, including availability, and areas requiring special consideration		
1a. Land Area and Existing Facilities: Ability to support the combined EPR footprint including the protected area, cooling towers, ponds, switchyard, construction support areas	Size and configuration of plot	Adequate land area within a single location to accommodate EPR development is critical to avoiding impacts to greenfield sites, fragmentation of natural habitat, safety during facility construction and operation, and for optimization of plant operations, including appropriately designed features to protect the environment such as stormwater management systems, wastewater treatment facilities, waste storage areas, and emissions control systems.
1b. Hazardous waste or spoils areas	Based on the site's anticipated need for environmental remediation due to known current or previous uses.	Avoidance of unremediated hazardous waste facilities prevents inadvertent release of toxic materials to the environment and disruptions to the site development process resulting from discovery of unanticipated waste sources.
1c. Zoning	Current Zoning and Ownership based on the site's existing zoning classification(s) by area community (ies)	Individual communities implement zoning ordinances to protect the integrity and character of a town, including environmental resources. Conformance with zoning preserves lands with documented values to a community and socioeconomic benefits associated with designated land uses.
1d. Distance to dedicated land	Proximity to federal, state, county and local parks, forests, preserves, historic sites, Native American Reservations, National Parks, Monuments, Forests, wildlife refuges, scenic river parkways, recreation areas and other significant sites based on the linear distance from the site boundary.	In accordance with regulatory standards, the siting of industrial facilities such as a nuclear power station is preferred at locations not encroaching upon dedicated lands whose aesthetics, recreational opportunities, access, or integrity may be diminished in perception or in fact by nearby development.
1e. Topography	Site topography and resulting cut-and fill requirements for amount of site preparation required for proposed facility construction	Flat to moderate relief is critical to avoidance of large scale land disturbance (cut and fill) actions requiring excessive blasting, earth management including off site materials disposal, and potential secondary impacts such as erosion and sedimentation.

Table 9.3-3 Site Ranking Rationale

Ranking Criteria	Metric	Rationale
2. Hydrology, water quality, and water availability		
2a. Water Quality	Ground and surface water intake water quality (salt, brackish, fresh, polluted) based on US EPA or State classifications Candidate site must have access to 50 MGD or more makeup	Increased water source purity lends to reduced particulate emissions, and avoids the need to pre-treat the cooling water source via desalinization or other energy-requiring filtration operations.
2b. Receiving Body Water Quality	Applicable State water quality classification Tier I, Tier II (as described and defined in COMAR 28.02.08.04-1) and Tier III (Outstanding National Resource Waters [ONRW] as described and defined in COMAR 28.02.08.04-2)	Consideration of cooling water source quality is made to discourage impacts to protected or high quality water bodies, as well as those waters already impaired by other uses or contaminant sources.
2c. Water availability	Metric based on lowest 7-day average flow in a ten year period (i.e., 7Q10) and need for 50 mgd water supply	Adequate water volume is necessary to accommodate the consumptive use proposed and to avoid potential impacts to aquatic biota, wetlands, water quality, and other downstream uses when a water source is drawn beyond its safe yield.
3. Terrestrial resources (including endangered species)		
3a. Endangered/threatened habitats	Existence of mapped T&E species habitat on or adjacent to site	Documented T&E species and their habitats must be avoided in accordance with state and federal law and to respect their intrinsic value.
3b. Floodplains	Existence of mapped FEMA 100 or 500 year floodplain affecting site footprint	Federally mapped floodplains serve to accommodate floodwaters and protect downstream property, and represent a potential safety risk.
4. Aquatic biological resources (including endangered species)		
4a. Endangered/threatened habitats	Existence of mapped T&E species habitat in makeup/ cooling water supply, or on or adjacent to site	Documented T&E species and their habitats must be avoided in accordance with state and federal law and to respect their intrinsic value.
4b. Thermal Discharge Sensitivity	Designated finfish/shellfish and/or other resource areas within intake or discharge waters	Considers potential impacts to sensitive aquatic biota that may be impacted by a high temperature discharge to a cooling water a source.

Table 9.3-3 Site Ranking Rationale

Ranking Criteria	Metric	Rationale
5. Socioeconomics (including aesthetics, demography, and infrastructure)		
5a. Emergency services	Availability of existing emergency services (police, fire, EMS, hospital services) based on full-time, part-time or volunteer local or county police, fire and emergency response services	Emphasizes project siting in communities with increasingly comprehensive emergency services.
5b. Construction traffic	Ability of existing transportation infrastructure to support construction traffic	Evaluates the infrastructure and efficacy of existing roadways and traffic to prioritize siting within areas where construction traffic will not exacerbate poor transportation infrastructure conditions.
5c. Construction workforce	Availability of local construction workforce based on State, County, or local planning, zoning and industrial development commission databases Availability of suitable population within commuting distance from which to draw the construction workforce	Evaluates construction workforce available and ranks sites based on worker availability, emphasizing use of local labor forces.
5d. Housing and necessities	Availability of housing units, shopping and other services to support the peak construction workforce	Considers existing available housing, prioritizing sites with increasing nearby housing facilities (based on vacancy) and supporting infrastructure availability.
5e. Schools	Availability of existing schools to support increased construction and operation workforce	Prioritizes sites with comprehensive or high ranking educational facilities to accommodate needs of construction workforce.
6. Environmental Justice (EJ)		
6a. Minority population	Presence of minority population within or abutting site	Seeks to avoid unnecessary impacts to minority populations by prioritizing development outside of areas with predominant minority residents based on census block data.
6b. Low-income population	Presence of low-income population within or abutting site	Seeks to avoid unnecessary impacts to low-income populations by prioritizing development outside of areas with predominant low-income residents based on census block data.

Table 9.3-3 Site Ranking Rationale

Ranking Criteria	Metric	Rationale
7. Historic and Cultural Resources		
7a. Historic buildings, structures, objects and sites	Distance to site and number of National Register of Historic Places (NRHP) listed buildings, structures, objects and sites	Considers potential aesthetic and other associated impacts to historic sites based upon nearby facility siting, and prioritizes site selection in areas lacking in documented NHRP listed buildings, structures, objects and sites.
7b. Historic districts	Distance to mapped NRHP listed historic districts from site	Considers potential aesthetic and other associated impacts to a historic district based upon nearby facility siting, and prioritizes site selection in areas lacking in/further from listed historic districts.
8. Air Quality (Climate & Meteorology)		
8a. Weather risks/conditions	Estimation of potential severe weather impacts on operation of a new nuclear station	Prioritizes plant siting in locations with reduced frequency of weather conditions potentially hazardous to nuclear plant operation.
8b. Prevention of Significant Deterioration (PSD) Class I Area, Attainment / Non-attainment Area	In or out of an attainment / non-attainment area and Prevention of Significant Deterioration (PSD) Class I area	Seeks to preserve air quality by discouraging plant siting within a non-attainment area for one or more pollutants or within a Class I PSD mapped location.
9. Human Health		
9a. Emergency preparedness program– proximity of residences/businesses for exclusion zone	Ability to evacuate area around site in event of an emergency	Prioritizes plant siting in areas where a full exclusion zone may be established without inclusion of nearby residences or businesses.
9b. Radiological pathways - water	Distance to drinking water supply from site (ground and surface)	Promotes avoidance of potential human ingestion of contaminated water in the case of an accident.
9c. Radiological pathways - food	Distance to food pathways from site (e.g., shellfish beds, farms)	Promotes avoidance of potential human ingestion of contaminated food sources in the case of an accident.

Table 9.3-3 Site Ranking Rationale

Ranking Criteria	Metric	Rationale
10. Postulated Accidents(a)		
10a. Distance to nearby potentially hazardous facilities	Distance to hazardous facilities (e.g., military facilities, such as munitions storage or ordnance test ranges; chemical plants; refineries; mining and quarrying operations; oil and gas wells; gas and petroleum product installations; or air, waterway, pipeline or rail transport facilities for hazardous materials) and major airports	Prioritizes plant siting in locations where risk of exacerbating an accident starting at the generation facility from a missile impact or inadvertent release of hazardous materials may affect nearby hazardous facilities.
11. Fuel Cycle Impacts (Transport of Radioactive Material)		
11a. Support/challenges to transport of nuclear fuel and wastes	Distance and route to low level disposal site(s) and spent fuel repository (i.e., Yucca Mountain) from site	Ease of transport based on road conditions and distance to disposal locations is evaluated with the assumption that shorter routes on major arteries have less potential hazard to human health and the environment.
12. Transmission corridors (land used, feasibility, and resources affected)		
12a. Proximity/availability of power corridors	Based upon proximity of adequate (345/500 kV) transmission.	Considers the likely potential for expanded land clearing and impact to undeveloped lands and biota resulting from construction of new or significantly widened transmission corridor.
13. Population distribution and density		
13a. Distance to population centers	Distance to US Census Populated Places population centers of 25,000 or more persons from site	In accordance with regulatory standards, the siting of a nuclear power station is discouraged nearby centers of high population.
13b. Population density	Existing population density within 20 mi radius of site	In accordance with regulatory standards, the siting of a nuclear power station is discouraged nearby regions with high population density.
14. Facility costs [Transportation Access]		
14a. Barge access and capacity – distance, construction, or upgrade requirements	Based upon availability of nearest barge access or ability to construct new landing.	Use of existing barge slips reduces environmental impact associated with the need for slip construction of alternate means of site access. Criteria promotes sites with existing barge access.
14b. Rail line access and capacity – distance, spur requirements, line capacity, or upgrade requirements	Based upon estimated distance and condition of nearest active rail line.	Use of existing rail lines reduces environmental impact associated with the need for line construction of alternate means of site access. Criteria promotes sites with existing active rail access.

Table 9.3-3 Site Ranking Rationale

Ranking Criteria	Metric	Rationale
15. Geology/Seismology		
15a. Vibratory ground motion – seismic peak ground acceleration	Peak ground acceleration (PGA)	Criteria promotes siting in locations where PGA does not represent a significant potential hazard to reactor stability.
15b. Depth to bedrock, soil stability, and compaction	Depth to bedrock; soil stability including liquefaction potential, bearing strength and general foundation conditions	Criteria promotes siting in locations where bedrock and soil conditions are optimal for reactor construction and safety.
15c. Surface faulting and deformations	Presence of surface faulting based on USGS Quaternary fault database	Criteria promotes siting in locations where surface faults and fault activity do not represent a significant potential hazard to reactor stability.
15d. Other geological hazards	Presence of other geologic hazards, such as karst features, subsurface mines, and volcanoes	Criteria promotes avoidance of locations considered intrinsically hazardous based upon subsurface conditions.
16. Wetlands		
16a. Total Wetlands Within Property Boundary	Percent of wetlands within property boundary	Considers net total acreage of wetlands for comparison among sites and prioritization of sites without regulatory wetlands and waterways.
16b. Total Acres of Wetlands Within Site	Acres of wetlands onsite	In order to avoid sites comprised predominantly of wetlands, percent wetlands is considered to allow promotion of locations with reduced wetland acreage in comparison to the entire property.
16c. High Quality Wetlands Within Site	Presence of state-designated high quality wetlands onsite	Considers wetlands of exceptional value and promotes impact avoidance in site selection.

Table 9.3-4 Weighted Scoring of Candidate Site

	CCNPP	Bainbridge	Beiler	Conowingo	East ALCO	Thiokol
1. Land Use	26.5	23.7	19.9	20.3	22.9	19.4
2. Hydrology	36.0	42.0	39.0	42.0	39.0	36.0
3. Terrestrial Resources	21.8	18.2	21.8	18.2	29.1	18.2
4. Aquatic Biological Resources	7.3	7.3	7.3	7.3	21.8	7.3
5. Socioeconomics	18.7	22.0	18.7	24.2	27.5	19.8
6. Environmental Justice	16.5	18.9	14.2	18.9	11.8	11.8
7. Historical and Cultural Resources	14.8	4.9	14.8	4.9	9.9	19.8
8. Air Quality	14.0	14.0	18.0	14.0	16.0	18.0
9. Human Health	18.2	6.1	18.2	12.1	16.2	20.2
10. Postulated Accidents	4.6	4.6	4.6	4.6	4.6	13.7
11. Transport of Radioactive Material	6.0	6.0	6.0	6.0	3.0	6.0
12. Transmission Corridors	34.7	30.9	15.4	27.0	30.9	23.2
13. Population	39.0	21.7	34.7	21.7	13.0	39.0
14. Facility costs	16.5	25.6	16.2	11.8	17.6	8.5
15. Geology	28.4	28.4	26.7	32.0	26.7	26.7
16. Wetlands	30.5	41.7	36.1	30.5	41.7	30.5
Total:	**333.5**	**316.0**	**311.6**	**295.5**	**331.7**	**318.1**

Note: The scoring for the Proposed Site (CCNPP) is not required when ranking the Candidate Sites to select the Alternative Sites but is included here for reference.

Table 9.3-5 Current and Historical Rare, Threatened, and Endangered Species of Cecil County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Animals					
Acipenser brevirostrum	Shortnose Sturgeon	G3	S1	E	LE
Cicindela puritana	Puritan Tiger Beetle	G1G2	S1	E	LT
Cryptobranchus alleganiensis	Hellbender	G3G4	S1	E	
Glyptemys muhlenbergii	Bog Turtle	G3	S2	T	LT
Graptemys geographica	Map Turtle	G5	S1	E	
Haliaeetus leucocephalus	Bald Eagle	G5	S2S3B	T	
Ixobrychus exilis	Least Bittern	G5	S2S3B	I	
Lampsilis radiata	Eastern Lampmussel	G5	SU		
Leptodea ochracea	Tidewater Mucket	G3G4	S1S2		
Percina caprodes	Logperch	G5	S1S2	T	
Percopsis omiscomaycus	Trout-perch	G5	SX	X	
Sciurus niger cinereus	Delmarva Fox Squirrel	G5T3	S1	E	LE
Speyeria idalia	Regal Fritillary	G3	SH	X	
Strophitus undulatus	Creeper	G5	S2	I	
Plants					
Agalinis obtusifolia	Blunt-leaved Gerardia	G4G5Q	S1	E	
Agalinis setacea	Thread-leaved Gerardia	G5?	S1	E	
Agrimonia microcarpa	Small-fruited Agrimony	G5	SU		
Agrimonia striata	Woodland Agrimony	G5	S1	E	
Alnus maritima	Seaside Alder	G3	S3.1		
Ammannia latifolia	Koehne's Ammannia	G5	S2		
Antennaria solitaria	Single-headed Pussytoes	G5	S2	T	
Arnica acaulis	Leopard's-bane	G4	S1	E	
Asplenium pinnatifidum	Lobed Spleenwort	G4	S1	E	
Betula populifolia	Gray Birch	G5	SU		
Bidens bidentoides var. mariana	Maryland Bur-marigold	G3T3	S3.1		
Bromus latiglumis	Broad-glumed Brome	G5	S1	E	
Buchnera americana	Blue-hearts	G5?	SH	X	
Cacalia muehlenbergii	Great Indian-plantain	G4	SH	X	
Campanula rotundifolia	Harebell	G5	S2		
Cardamine longii	Long's Bittercress	G3	S1	E	
Carex buxbaumii	Buxbaum's Sedge	G5	S2	T	
Carex hitchcockiana	Hitchcock's Sedge	G5	S1	E	
Carex hystericina	Porcupine Sedge	G5	S1	E	
Carex interior	Inland Sedge	G5	S1		
Carex lacustris	Lake-bank Sedge	G5	S2		
Carex lucorum	A Sedge	G4	S1		
Carex lupuliformis	Hop-like Sedge	G4	S2		
Carex polymorpha	Variable Sedge	G3	SH	X	
Carex tenera	Slender Sedge	G5	SH	X	
Carex tetanica	Rigid Sedge	G4G5	SH	X	

Table 9.3-5 Current and Historical Rare, Threatened, and Endangered Species of Cecil County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Carex vestita	Velvety Sedge	G5	S2	T	
Castilleja coccinea	Indian Paintbrush	G5	S1	E	
Chenopodium standleyanum	Standley's Goosefoot	G5	S1	E	
Cicuta bulbifera	Bulb-bearing Water Hemlock	G5	S1	E	
Clematis occidentalis	Purple Clematis	G5	S1	E	
Clematis ochroleuca	Curly-heads	G4	SH	X	
Corallorhiza wisteriana	Wister's Coralroot	G5	S1	E	
Coreopsis tripteris	Tall Tickseed	G5	S1	E	
Cyperus dentatus	Toothed Sedge	G4	SH	X	
Cyperus refractus	Reflexed Cyperus	G5	S2?		
Cyperus retrofractus	Rough Cyperus	G5	S2		
Deschampsia cespitosa	Tufted Hairgrass	G5	S1	E	
Desmodium pauciflorum	Few-flowered Tick-trefoil	G5	S1	E	
Desmodium rigidum	Rigid Tick-trefoil	GNRQ	S1	E	
Desmodium sessilifolium	Sessile-leaved Tick-trefoil	G5	SH	X	
Dichanthelium oligosanthes	Few-flowered Panicgrass	G5	S2S3		
Dirca palustris	Leatherwood	G4	S2	T	
Elatine minima	Small Waterwort	G5	S1	E	
Eleocharis compressa	Flattened Spikerush	G4	S1	E	
Eleocharis halophila	Salt-marsh Spikerush	G4	S1	E	
Epilobium ciliatum	Northern Willowherb	G5	S1	E	
Epilobium strictum	Downy Willowherb	G5?	S1	E	
Equisetum fluviatile	Water Horsetail	G5	S1	E	
Equisetum sylvaticum	Wood Horsetail	G5	S1	E	
Eriocaulon aquaticum	Seven-angled Pipewort	G5	S1	E	
Eriocaulon parkeri	Parker's Pipewort	G3	S2	T	
Erythronium albidum	White Trout Lily	G5	S2	T	
Euphorbia purpurea	Darlington's Spurge	G3	S1	E	
Eurybia radula	Rough-leaved Aster	G5	S1	E	
Festuca paradoxa	Cluster Fescue	G5	SU	X	
Galium boreale	Northern Bedstraw	G5	S1	E	
Galium trifidum	Small Bedstraw	G5	SU		
Gentiana andrewsii	Fringe-tip Closed Gentian	G5?	S2	T	
Gentiana villosa	Striped Gentian	G4	S1	E	
Gentianopsis crinita	Fringed Gentian	G5	S1	E	
Hasteola suaveolens	Sweet-scented Indian-plantain	G4	S1	E	
Helianthemum bicknellii	Hoary Frostweed	G5	S1	E	
Helonias bullata	Swamp Pink	G3	S2	E	LT
Hydrastis canadensis	Goldenseal	G4	S2	T	
Iris prismatica	Slender Blue Flag	G4G5	S1	E	
Juglans cinerea	Butternut	G4	S2S3		
Juniperus communis	Juniper	G5	SH	X	

Table 9.3-5 Current and Historical Rare, Threatened, and Endangered Species of Cecil County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Lathyrus palustris	Vetchling	G5	S1	E	
Leptochloa fascicularis	Long-awned Diplachne	G5	SU		
Lilium philadelphicum	Wood Lily	G5	SH	X	
Limnobium spongia	American Frog's-bit	G4	S1	E	
Limosella australis	Mudwort	G4G5	S2	E	
Linum intercursum	Sandplain Flax	G4	S2	T	
Lithospermum latifolium	American Gromwell	G4	S1	E	
Lygodium palmatum	Climbing Fern	G4	S2	T	
Lysimachia hybrida	Lowland Loosestrife	G5	S2	T	
Matelea carolinensis	Anglepod	G4	S1	E	
Matteuccia struthiopteris	Ostrich Fern	G5	S2		
Melanthium latifolium	Broad-leaved Bunchflower	G5	S1	E	
Minuartia michauxii	Rock Sandwort	G5	S2	T	
Myosotis macrosperma	Large-seeded Forget-me-not	G5	S2S3		
Najas gracillima	Thread-like Naiad	G5?	SU	X	
Nelumbo lutea	American Lotus	G4	S2		
Oligoneuron rigidum	Hard-leaved Goldenrod	G5	SH	X	
Pedicularis lanceolata	Swamp Lousewort	G5	S1	E	
Platanthera peramoena	Purple Fringeless Orchid	G5	S1	T	
Platanthera psycodes	Small Purple Fringed Orchid	G5	SH	X	
Pluchea camphorata	Marsh Fleabane	G5	S1	E	
Poa alsodes	Grove Meadow-grass	G4G5	S2		
Polygala incarnata	Pink Milkwort	G5	S2S3		
Polygala senega	Seneca Snakeroot	G4G5	S2	T	
Polygonum robustius	Stout Smartweed	G4G5	S1?	X	
Potamogeton amplifolius	Large-leaved Pondweed	G5	SH	X	
Potamogeton perfoliatus	Clasping-leaved Pondweed	G5	S2		
Potamogeton pusillus	Slender Pondweed	G5	S1		
Potamogeton richardsonii	Redheadgrass	G5	SH	X	
Potamogeton robbinsii	Robbins' Pondweed	G5	SH	X	
Potamogeton spirillus	Spiral Pondweed	G5	S1		
Potamogeton zosteriformis	Flatstem Pondweed	G5	S1	E	
Prunus alleghaniensis	Alleghany Plum	G4	S2	T	
Pycnanthemum torrei	Torrey's Mountain-mint	G2	S1	E	
Pycnanthemum verticillatum	Whorled Mountain-mint	G5	S1	E	
Pycnanthemum virginianum	Virginia Mountain-mint	G5	S2		
Ranunculus ambigens	Water-plantain Spearwort	G4	SH	X	
Ranunculus hederaceus	Long-stalked Crowfoot	G5	S1	X	
Ranunculus hispidus var. nitidus	Hispid Buttercup	G5T5	S1?	X	
Rhynchospora globularis	Grass-like Beakrush	G5?	S1	E	
Ruellia strepens	Rustling Wild-petunia	G4G5	S1	E	
Rumex altissimus	Tall Dock	G5	S1	E	

Table 9.3-5 Current and Historical Rare, Threatened, and Endangered Species of Cecil County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Sagittaria calycina	Spongy Lophotocarpus	G5	S2		
Sagittaria longirostra	Long-beaked Arrowhead	GNRQ	SU		
Salix discolor	Pussy Willow	G5	SU		
Salix exigua	Sandbar Willow	G5	S1	E	
Salix lucida	Shining Willow	G5	SH	X	
Salix tristis	Dwarf Prairie Willow	G4G5	S1		
Sanguisorba canadensis	Canada Burnet	G5	S2	T	
Schoenoplectus novae-angliae	Salt-marsh Bulrush	G5	S2		
Schoenoplectus torreyi	Torrey's Clubrush	G5?	SH	X	
Scleria reticularis	Reticulated Nutrush	G4	S2		
Scutellaria leonardii	Leonard's Skullcap	G4T4	S2	T	
Scutellaria nervosa	Veined Skullcap	G5	S1	E	
Sida hermaphrodita	Virginia Mallow	G3	S1	E	
Smilax pseudochina	Halberd-leaved Greenbrier	G4G5	S2	T	
Solidago speciosa	Showy Goldenrod	G5	S2	T	
Solidago stricta	Wandlike Goldenrod	G5	SU		
Sphenopholis pensylvanica	Swamp-oats	G4	S2	T	
Spiranthes lucida	Wide-leaved Ladys' Tresses	G5	S1	E	
Sporobolus clandestinus	Rough Rushgrass	G5	S2	T	
Sporobolus heterolepis	Northern Dropseed	G5	S1	E	
Stachys aspera	Rough Hedge-nettle	G4?	S1	E	
Stachys hyssopifolia	Hyssop-leaved Hedge-nettle	G4G5	SU		
Stellaria alsine	Trailing Stitchwort	G5	S1	E	
Stenanthium gramineum	Featherbells	G4G5	S1	T	
Symphyotrichum depauperatum	Serpentine Aster	G2	S1	E	
Symphyotrichum laeve var. concinnum Steele's Aster	G5T4	SH	X		
Talinum teretifolium	Fameflower	G4	S1	T	
Thaspium trifoliatum	Purple Meadow-parsnip	G5	S1	E	
Triadenum tubulosum	Large Marsh St. John's-wort	G4?	S1		
Triosteum angustifolium	Narrow-leaved Horse-gentian	G5	S1	E	
Triphora trianthophora	Nodding Pogonia	G3G4	S1	E	
Valeriana pauciflora	Valerian	G4	S1	E	
Wolffia papulifera	Water-meal	G4	S2		

* This report represents a compilation of information in the Wildlife and Heritage Service's Biological and Conservation Data system as of the date on the report. It does not include species considered to be "watchlist" or more common species.

Table 9.3-6 Current and Historical Rare, Threatened, and Endangered Species of Frederick County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Animals					
Alasmidonta undulata	Triangle Floater	G4	S1	E	
Alasmidonta varicosa	Brook Floater	G3	S1	E	
Bartramia longicauda	Upland Sandpiper	G5	S1B	E	
Caecidotea sp. 4	An Isopod	GNR	S1		
Cicindela patruela	Green-patterned Tiger Beetle	G3	S1	E	
Cottus sp. 7	Checkered Sculpin	G4Q	S1S2		
Dendroica fusca	Blackburnian Warbler	G5	S1S2B	T	
Elliptio lanceolata	Yellow Lance	G2G3	SU		
Elliptio producta	Atlantic Spike	G3Q	S2	I	
Gallinula chloropus	Common Moorhen	G5	S2B	I	
Haliaeetus leucocephalus	Bald Eagle	G5	S2S3B	T	
Ixobrychus exilis	Least Bittern	G5	S2S3B	I	
Lampsilis cariosa	Yellow Lampmussel	G3G4	SU		
Lanius ludovicianus	Loggerhead Shrike	G4	S1B	E	
Lasmigona subviridis	Green Floater	G3	S1	E	
Margariscus margarita	Pearl Dace	G5	S1S2	T	
Mustela nivalis	Least Weasel	G5	S2S3	I	
Neotoma magister	Allegheny Woodrat	G3G4	S1	E	
Notropis amoenus	Comely Shiner	G5	S2	T	
Podilymbus podiceps	Pied-billed Grebe	G5	S2B		
Porzana carolina	Sora	G5	S1B		
Satyrium edwardsii	Edwards' Hairstreak	G4	S1	E	
Strophitus undulatus	Creeper	G5	S2	I	
Stygobromus pizzinii	Pizzini's Amphipod	G3G4	S1		
Stygobromus sp. 14	Roundtop Amphipod	GNR	S1		
Thryomanes bewickii altus	Bewick's Wren	G5T2Q	S1B	E	
Plants					
Adlumia fungosa	Climbing Fumitory	G4	S2	T	
Agalinis auriculata	Auricled Gerardia	G3	S1	E	
Agastache scrophulariifolia	Purple Giant Hyssop	G4	S1S2	T	
Agrimonia microcarpa	Small-fruited Agrimony	G5	SU		
Amelanchier stolonifera	Running Juneberry	G5	S2		
Asplenium bradleyi	Bradley's Spleenwort	G4	SH	X	
Asplenium pinnatifidum	Lobed Spleenwort	G4	S1	E	
Azolla caroliniana	Mosquito Fern	G5	SU		
Botrychium oneidense	Blunt-lobe Grape-fern	G4Q	S1	E	
Bromus ciliatus	Fringed Brome	G5	SU	X	
Calopogon tuberosus	Grass-pink	G5	S1	E	
Carex aestivalis	Summer Sedge	G4	S1	E	
Carex davisii	Davis' Sedge	G4	S1	E	
Carex shortiana	Short's Sedge	G5	S2	E	

Table 9.3-6 Current and Historical Rare, Threatened, and Endangered Species of Frederick County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Castilleja coccinea	Indian Paintbrush	G5	S1	E	
Chelone obliqua	Red Turtlehead	G4	S1	T	
Coeloglossum viride	Long-bracted Orchis	G5	S1	E	
Coptis trifolia	Goldthread	G5	S1	E	
Corallorhiza wisteriana	Wister's Coralroot	G5	S1	E	
Cornus rugosa	Round-leaved Dogwood	G5	S1	E	
Cyperus refractus	Reflexed Cyperus	G5	S2?		
Cystopteris tennesseensis	Tennessee Bladder-fern	G5	S1		
Dirca palustris	Leatherwood	G4	S2	T	
Dryopteris campyloptera	Mountain Wood-fern	G5	S1	E	
Epilobium leptophyllum	Linear-leaved Willowherb	G5	S2S3		
Equisetum sylvaticum	Wood Horsetail	G5	S1	E	
Erythronium albidum	White Trout Lily	G5	S2	T	
Eupatorium maculatum	Spotted Joe-pye-weed	G5	SU	X	
Euphorbia purpurea	Darlington's Spurge	G3	S1	E	
Eurybia radula	Rough-leaved Aster	G5	S1	E	
Filipendula rubra	Queen-of-the-prairie	G4G5	S1	E	
Gentiana andrewsii	Fringe-tip Closed Gentian	G5?	S2	T	
Geranium robertianum	Herb-robert	G5	S1		
Glyceria acutiflora	Sharp-scaled Mannagrass	G5	S1	E	
Hasteola suaveolens	Sweet-scented Indian-plantain	G4	S1	E	
Helianthus hirsutus	Hirsute Sunflower	G5	SU		
Helianthus microcephalus	Small-headed Sunflower	G5	S1	E	
Houstonia tenuifolia	Slender-leaved Bluets	G4G5	S1		
Hydrastis canadensis	Goldenseal	G4	S2	T	
Juglans cinerea	Butternut	G4	S2S3		
Krigia dandelion	Potato Dandelion	G5	S1	E	
Ligusticum canadense	American Lovage	G4	SH	X	
Lycopodiella inundata	Bog Clubmoss	G5	S2		
Lythrum alatum	Winged Loosestrife	G5	S1	E	
Melanthium latifolium	Broad-leaved Bunchflower	G5	S1	E	
Minuartia glabra	Mountain Sandwort	G4	S1	E	
Nymphoides cordata	Floating-heart	G5	S1	E	
Oligoneuron rigidum	Hard-leaved Goldenrod	G5	SH	X	
Oryzopsis racemosa	Black-fruited Mountainrice	G5	S2	T	
Platanthera ciliaris	Yellow Fringed Orchid	G5	S2	T	
Platanthera flava	Pale Green Orchid	G4	S2		
Platanthera grandiflora	Large Purple Fringed Orchid	G5	S2	T	
Platanthera peramoena	Purple Fringeless Orchid	G5	S1	T	
Platanthera psycodes	Small Purple Fringed Orchid	G5	SH	X	
Pycnanthemum pycnanthemoides	Southern Mountain-mint	G5	SH	X	
Pycnanthemum torrei	Torrey's Mountain-mint	G2	S1	E	

Table 9.3-6 Current and Historical Rare, Threatened, and Endangered Species of Frederick County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Quercus macrocarpa	Mossy-cup Oak	G5	S1		
Quercus shumardii	Shumard's Oak	G5	S2	T	
Rhododendron calendulaceum	Flame Azalea	G5	S1		
Rumex altissimus	Tall Dock	G5	S1	E	
Sagittaria rigida	Sessile-fruited Arrowhead	G5	S1	E	
Schoenoplectus smithii	Smith's Clubrush	G5?	SU	X	
Scutellaria leonardii	Leonard's Skullcap	G4T4	S2	T	
Scutellaria nervosa	Veined Skullcap	G5	S1	E	
Scutellaria saxatilis	Rock Skullcap	G3	S1	E	
Sida hermaphrodita	Virginia Mallow	G3	S1	E	
Smilacina stellata	Star-flowered False Solomon's-seal	G5	S1	E	
Spiranthes ochroleuca	Yellow Nodding Ladys' Tresses	G4	S1	E	
Stenanthium gramineum	Featherbells	G4G5	S1	T	
Trichophorum planifolium	Bashful Bulrush	G4G5	S2S3		
Triosteum angustifolium	Narrow-leaved Horse-gentian	G5	S1	E	
Vernonia gigantea	Giant Ironweed	G5	SU		
Viola incognita	Large-leaved White Violet	G4G5	S1		
Zanthoxylum americanum	Northern Prickly-ash	G5	S1	E	

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Table 9.3-7 Current and Historical Rare, Threatened, and Endangered Species of St. Mary's County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Animals					
Alasmidonta heterodon	Dwarf Wedge Mussel	G1G2	S1	E	LE
Ameiurus catus	White Catfish	G5	SU		
Centrarchus macropterus	Flier	G5	S1S2	T	
Cicindela dorsalis dorsalis	Northeastern Beach Tiger Beetle	G4T2	S1	E	LT
Circus cyaneus	Northern Harrier	G5	S2B		
Cistothorus platensis	Sedge Wren	G5	S1B	E	
Elliptio producta	Atlantic spike	G3Q	S2	I	
Fundulus luciae	Spotfin Killifish	G4	S2?		
Gastrophryne carolinensis	Eastern Narrow-mouthed Toad	G5	S1S2	E	
Haliaeetus leucocephalus	Bald Eagle	G5	S2S3B	T	
Lucanus elephus	Giant Stag Beetle	G3G5	SU		
Notropis amoenus	Comely Shiner	G5	S2	T	
Notropis chalybaeus	Ironcolor Shiner	G4	S1	E	
Sternula antillarum	Least Tern	G4	S2B	T	
Tachopteryx thoreyi	Gray Petaltail	G4	S2		
Plants					
Ammannia latifolia	Koehne's Ammannia	G5	S2		
Arnica acaulis	Leopard's-bane	G4	S1	E	
Azolla caroliniana	Mosquito Fern	G5	SU		
Carex buxbaumii	Buxbaum's Sedge	G5	S2	T	
Carex pellita	Woolly Sedge	G5	S2?		
Carex venusta	Dark Green Sedge	G4	S2	T	
Centrosema virginianum	Spurred Butterfly-pea	G5	S2		
Chelone obliqua	Red Turtlehead	G4	S1	T	
Chenopodium leptophyllum	Narrow-leaved Goosefoot	G5	SX		
Cuscuta coryli	Hazel Dodder	G5	SH	X	
Desmodium pauciflorum	Few-flowered Tick-trefoil	G5	S1	E	
Drosera capillaris	Pink Sundew	G5	S1	E	
Eleocharis albida	White Spikerush	G4G5	S2	T	
Elephantopus tomentosus	Tobaccoweed	G5	S1?	E	
Gratiola viscidula	Short's Hedge-hyssop	G4G5	S1	E	
Ilex decidua	Deciduous Holly	G5	S2		
Iris prismatica	Slender Blue Flag	G4G5	S1	E	
Juncus brachycarpus	Short-fruited Rush	G4G5	SU		
Kyllinga pumila	Thin-leaved Flatsedge	G5	S1	E	
Leptochloa fascicularis	Long-awned Diplachne	G5	SU		
Linum intercursum	Sandplain Flax	G4	S2	T	
Myosotis macrosperma	Large-seeded Forget-me-not	G5	S2S3		
Polygonum glaucum	Seaside Knotweed	G3	S1	E	
Polygonum ramosissimum	Bushy Knotweed	G5	SH	X	
Potamogeton perfoliatus	Clasping-leaved Pondweed	G5	S2		

Table 9.3-7 Current and Historical Rare, Threatened, and Endangered Species of St. Mary's County, Maryland

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status
Prunus maritima	Beach Plum	G4	S1	E	
Sarracenia purpurea	Northern Pitcher-plant	G5	S2	T	
Spiranthes praecox	Grass-leaved Ladys' Tresses	G5	S1		
Symphyotrichum concolor	Silvery Aster	G5	S1	E	
Torreyochloa pallida	Pale Mannagrass	G5	S1S2	E	
Trachelospermum difforme	Climbing Dogbane	G4G5	S1	E	
Utricularia inflata	Swollen Bladderwort	G5	S1	E	

* This report represents a compilation of information in the Wildlife and Heritage Service's Biological and Conservation Data system as of the date on the report. It does not include species considered to be "watchlist" or more common species.

Table 9.3-8 Comparison of Proposed and Alternative Sites

	CCNPP	Bainbridge	East ALCO	Thiokol	Greenfield
Land Use	Small	Moderate	Small	Small to Moderate	Moderate to Large
Air Quality	Moderate	Small	Small	Small	Small
Water	Small	Moderate	Moderate	Small	Small to Large
Terrestrial Ecology and Sensitive Species	Small	Moderate	Moderate	Small to Large	Small to Large
Aquatic Ecology and Sensitive Species	Small	Large	Moderate	Small to Large	Small to Large
Socioeconomics	Small	Moderate	Small to Moderate	Small	Moderate to Large
Transportation	Small to Moderate	Small	Moderate	Small to Moderate	Small to Moderate
Historic, Cultural, and Archeological	Small	Large	Moderate	Small	Small
Environmental Justice	Small	Small to Moderate	Moderate	Small	Small
Transmission Corridors	Small	Small to Moderate	Small to Moderate	Small to Large	Moderate to Large
Environmentally Preferable:	Proposed	No	No	No	No
Obviously Superior:	Proposed	No	No	No	No

Table 9.3-9 Race, Ethnicity, and Poverty Data for the Bainbridge Naval Training Center and adjacent Census Tracts, Cecil County, Maryland

Race	Bainbridge Proposed Site Block Group 3, Census Tract 31201	Block Group 2, Census Tract 31201	Block Group 4, Census Tract 31201	Cecil County, Maryland	State of Maryland
White alone	490	1,099	2,350	80,491	3,391,021
Black or African American alone	46	209	84	3,152	1,468,243
American Indian and Alaska Native alone	0	10	0	231	15,651
Asian alone	0	0	0	564	209,713
Native Hawaiian and Other Pacific Islander alone	0	0	0	6	2303
Some other race alone	0	5	0	395	96,773
Two or more races	0	8	18	1,112	113,055
Total Population	536	1,331	2,452	85,951	5,296,486
Hispanic [a]	0	13	0	1,302	227,105
Minority Population	8.6%	17.4%	4.2%	6.4%	36.0%
Hispanic Population	0.0%	1.0%	0.0%	1.5%	4.3%
Income below poverty level					
Total in Census Tract	51	155	266	6,066	438,676
% of population below poverty level	9.5%	11.6%	10.8%	7.1%	8.3%

Table 9.3-10 Race, Ethnicity, and Poverty Data for the Bainbridge Naval Training Center and adjacent Census Tracts, Frederick County, Maryland

Race	Block Group 2, Census Tract 7523	Block Group 2, Census Tract 7522	Block Group 1, Census Tract 7523	Block Group 4, Census Tract 7523	Block Group 3, Census Tract 7510	Block Group 4, Census Tract 7510	Frederick County, Maryland	State of Maryland
White alone	2, 734	1,156	770	1,455	4,262	1,060	174,293	3,391,021
Black or African American alone	204	83	5	0	322	569	12,191	1,468,243
American Indian and Alaska Native alone	0	4	0	0	53	0	466	15,651
Asian alone	0	0	54	12	229	93	3,327	209,713
Native Hawaiian and Other Pacific Islander alone	0	0	0	0	0	0	45	2303
Some other race alone	24	0	21	0	66	0	1,863	96,773
Two or more races	127	21	0	0	6	56	3,092	113,055
Total Population	3,089	1,294	850	1,467	4,983	1,778	195,277	5,296,486
Hispanic [a]	91	5	21	7	93	50	4,598	227,105
Minority Population	11.5%	8.5%	9.4%	0.8%	13.7%	40.4%	10.7%	36.0%
Hispanic Population	2.9%	0.4%	2.5%	0.5%	1.9%	2.8%	2.4%	4.3%
Income below poverty level								
Total in Census Tract	179	44	52	112	102	97	8,550	438,676
% of population below poverty level	5.8%	3.5%	6.1%	7.6%	2.1%	5.5%	4.4%	8.3%

Table 9.3-11 Race, Ethnicity, and Poverty Data for the Bainbridge Naval Training Center and adjacent Census Tracts, St. Mary's County, Maryland

Race	Block Group 3, Census Tract 9956	Block Group 2, Census Tract 9956	Block Group 4, Census Tract 9956	Block Group 1, Census Tract 995	Block Group 3, Census Tract 9955	Block Group 4, Census Tract 9957	St. Mary's County, Maryland	State of Maryland
White alone	761	1180	750	2256	610	1867	70,320	3,391,021
Black or African American alone	39	68	405	339	138	41	12,003	1,468,243
American Indian and Alaska Native alone	1	9	3	4	0	5	291	15,651
Asian alone	1	6	0	15	2	8	1553	209,713
Native Hawaiian and Other Pacific Islander alone	0	0	1	0	3	0	67	2303
Some other race alone	5	9	1	11	1	7	525	96,773
Two or more races	5	4	20	38	7	27	1452	113,055
Total Population	812	1276	1180	2663	761	1955	86, 211	5,296,486
Hispanic [a]	6	19	12	22	1	15	1720	227,105
Minority Population	6.3%	7.5%	36.4%	15.3%	19.8%	4.5%	18.4%	36.0%
Hispanic Population	0.7%	1.5%	1.0%	0.8%	0.1%	0.8%	2.0%	4.3%
Income below poverty level								
Total in Census Tract	199	30	26	156	162	116	6301	438,676
% of population below poverty level	24.5%	2.4%	2.2%	5.9%	21.3%	5.9%	7.3%	8.3%

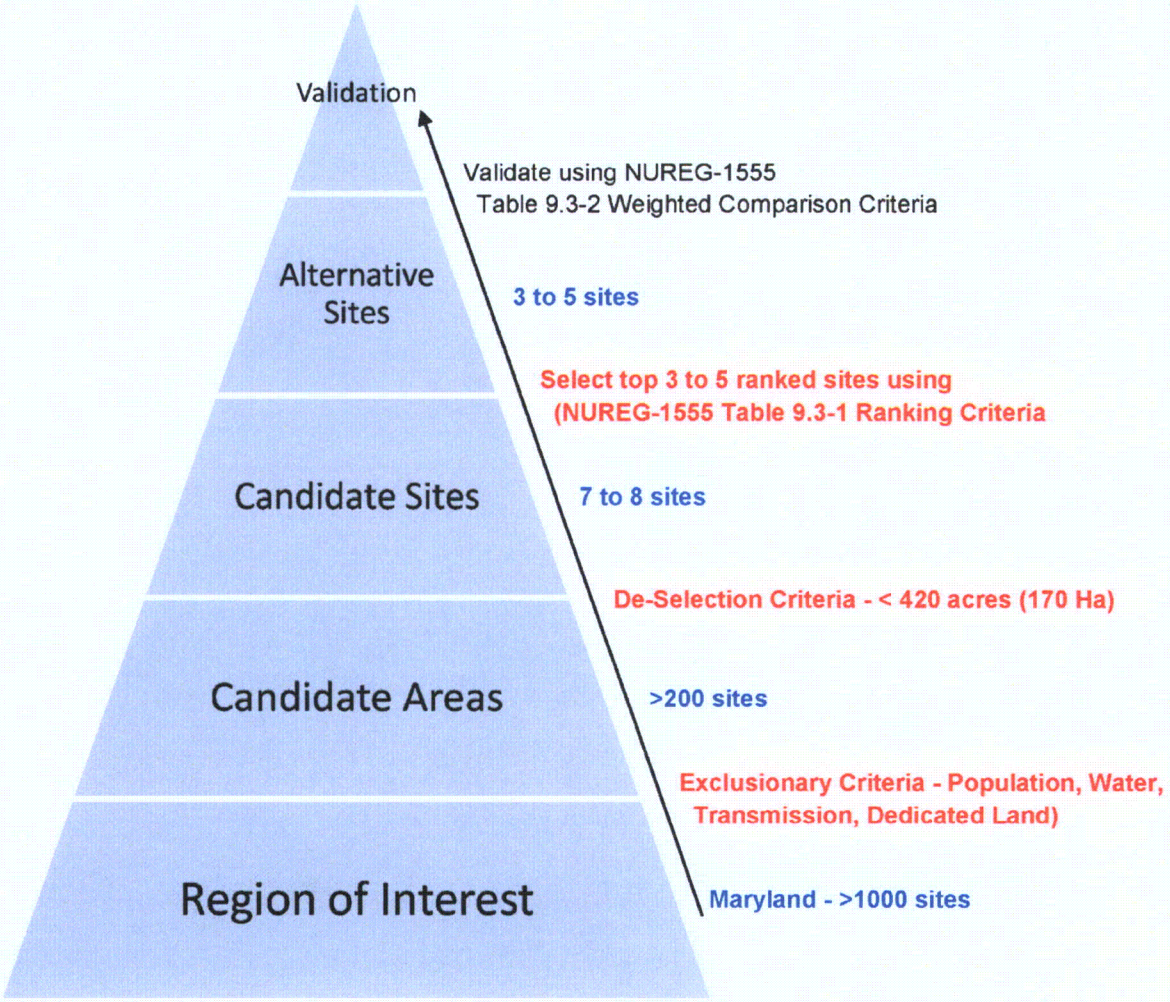

Figure 9.3-1 Site Selection Process

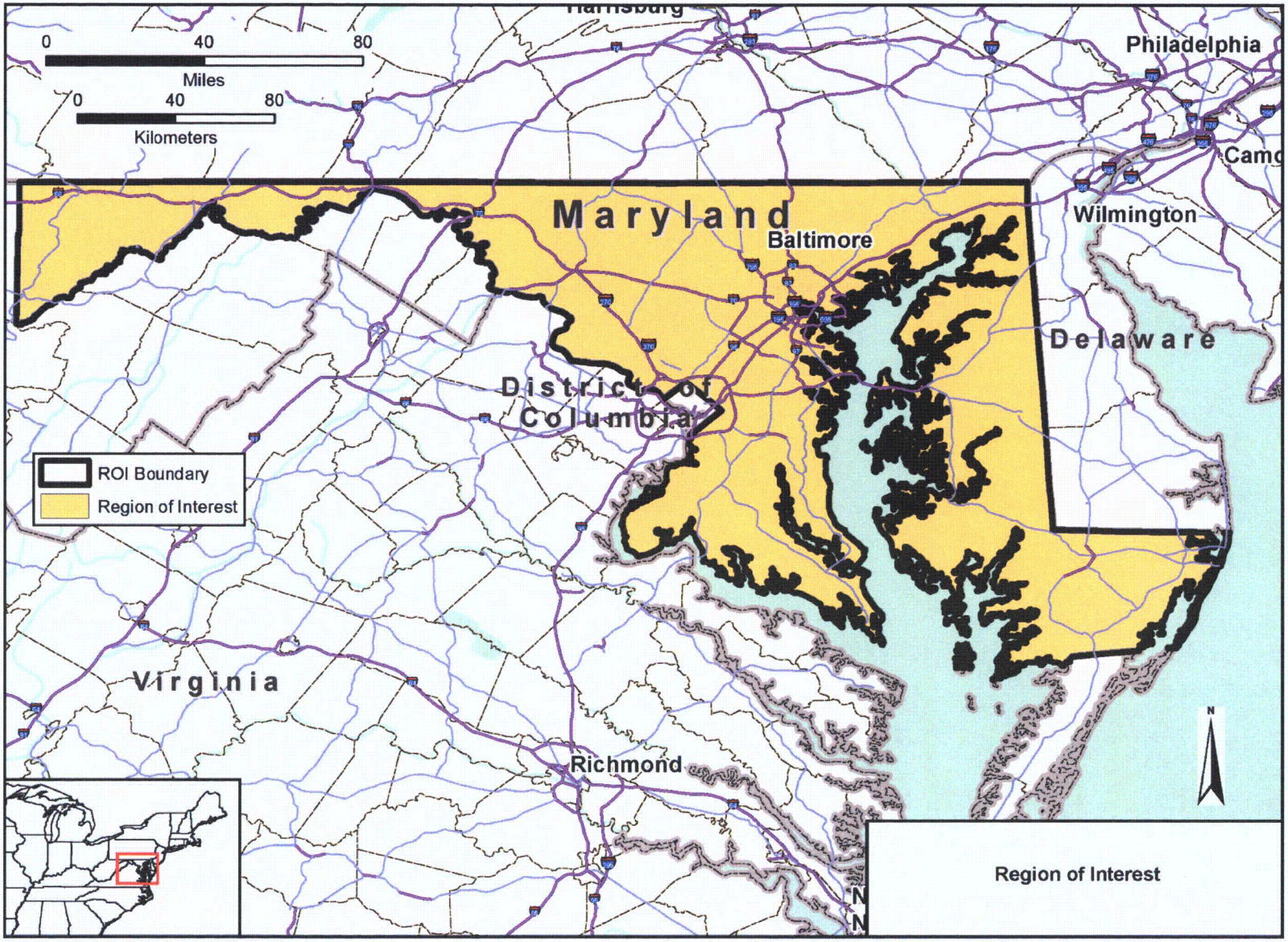

Figure 9.3-2 Region of Interest

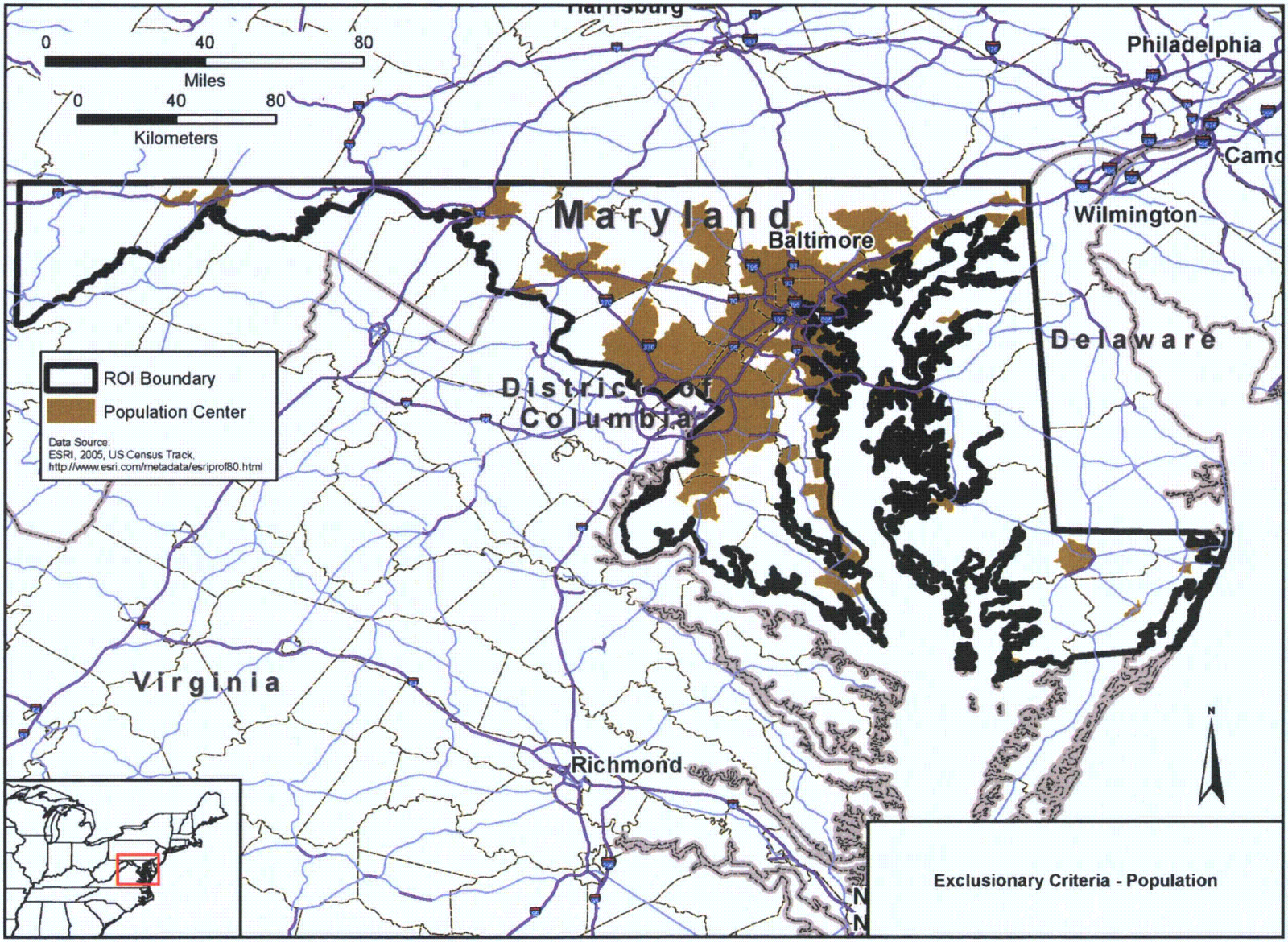

Figure 9.3-3 Candidate Area Exclusionary Criteria – Population Center

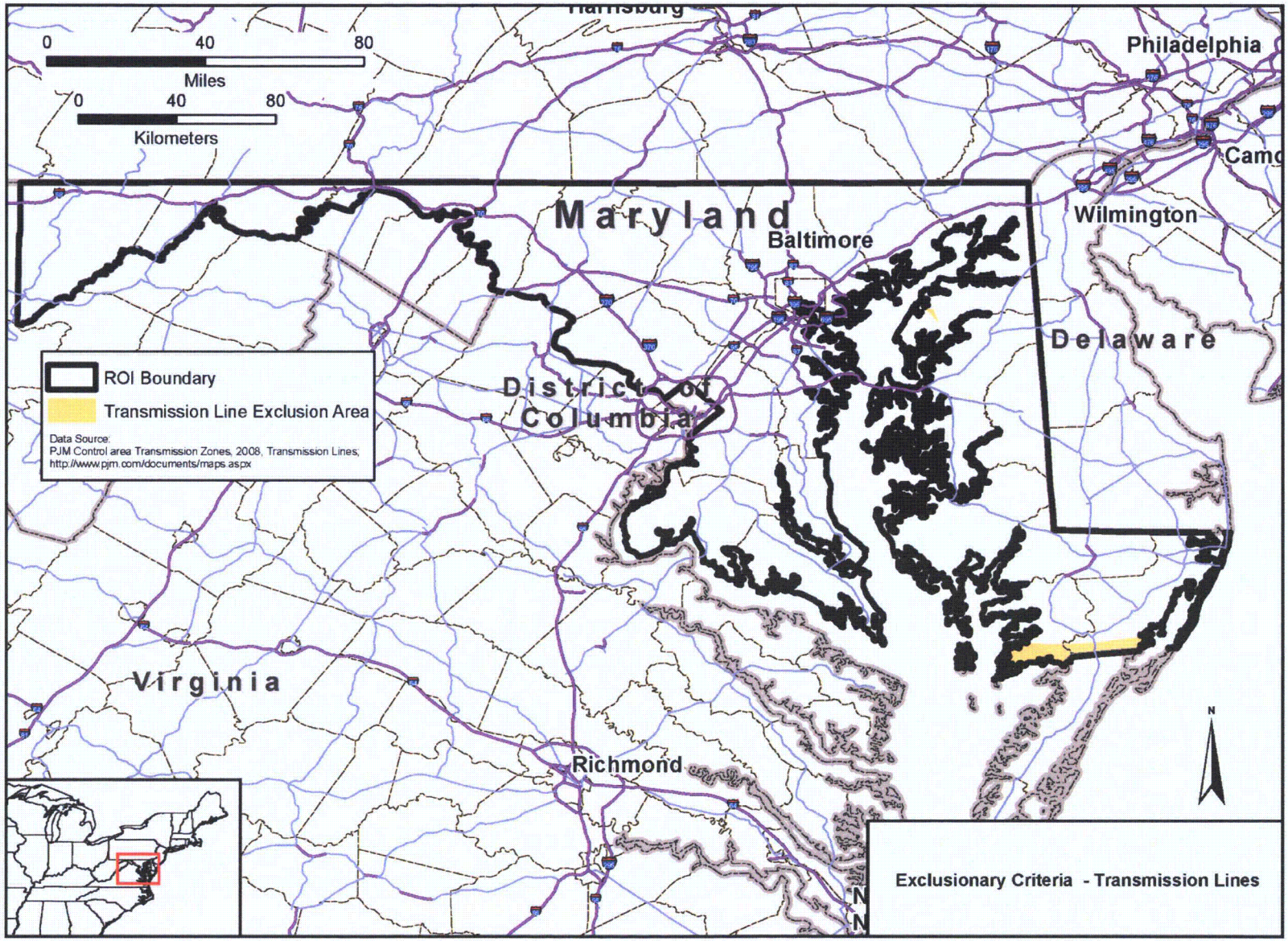

Figure 9.3-4 Candidate Area Exclusionary Criteria – Transmission Lines

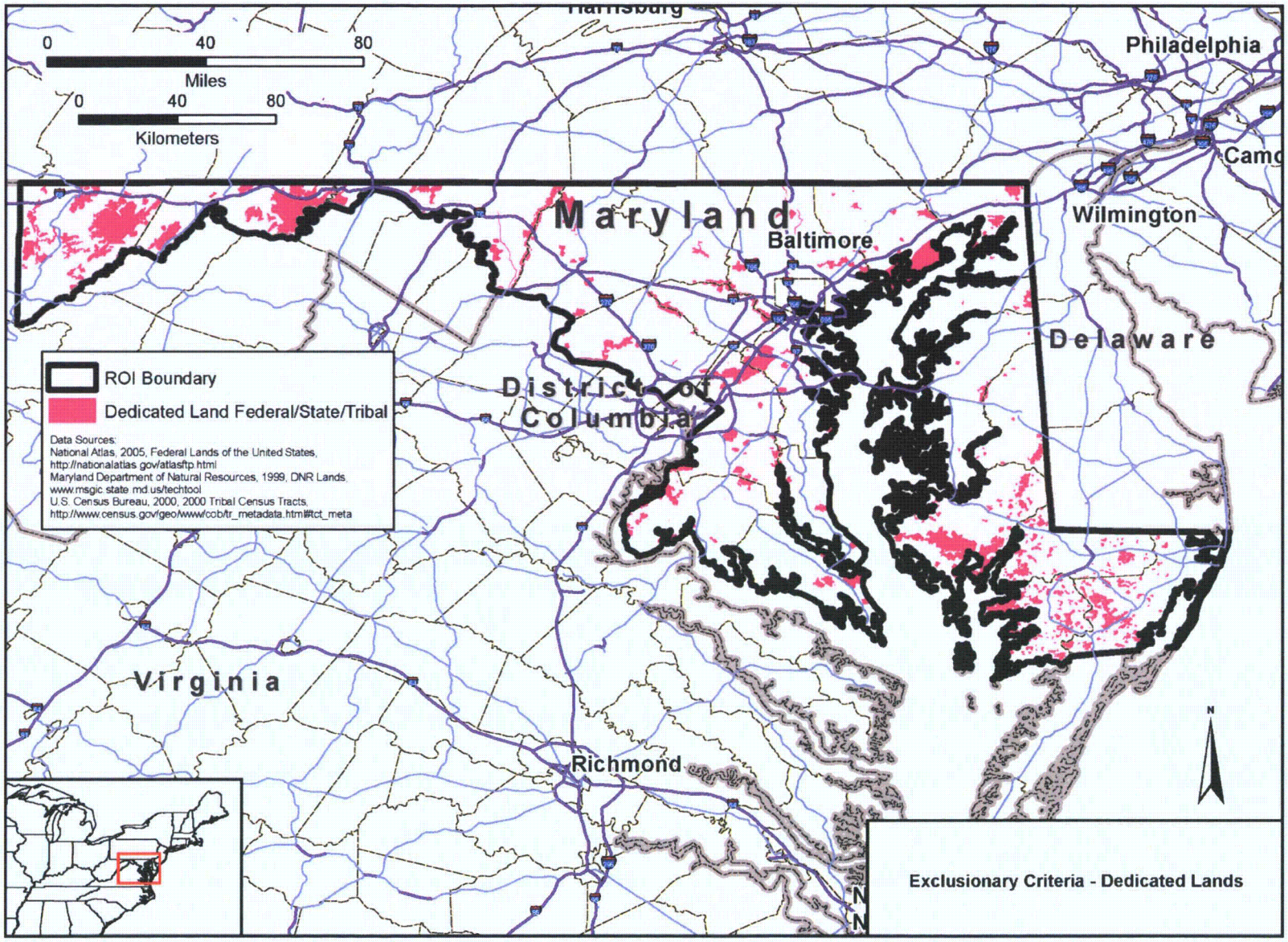

Figure 9.3-5 Candidate Area Exclusionary Criteria – Dedicated Lands

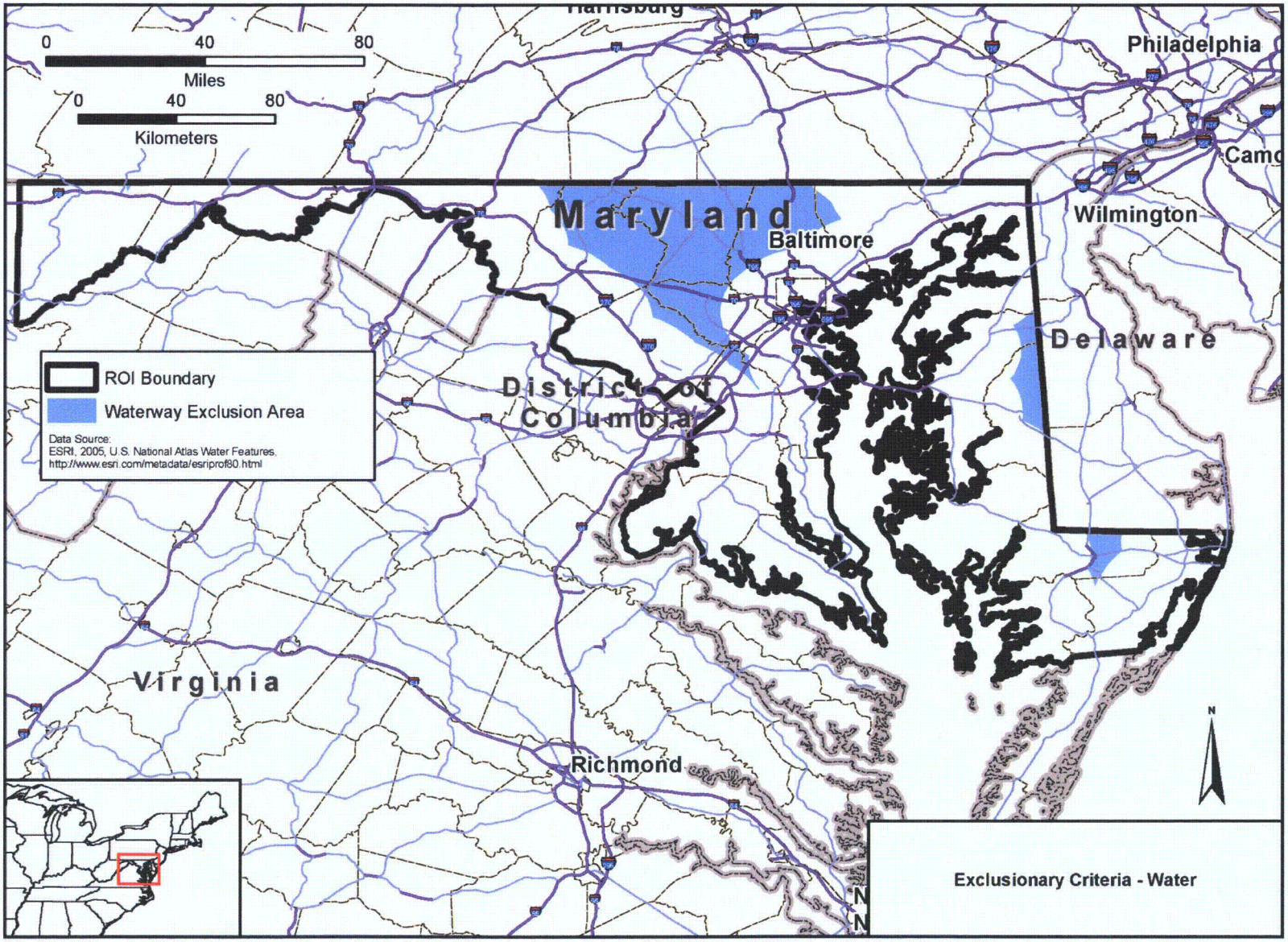

Figure 9.3-6 Candidate Area Exclusionary Criteria – Waterway

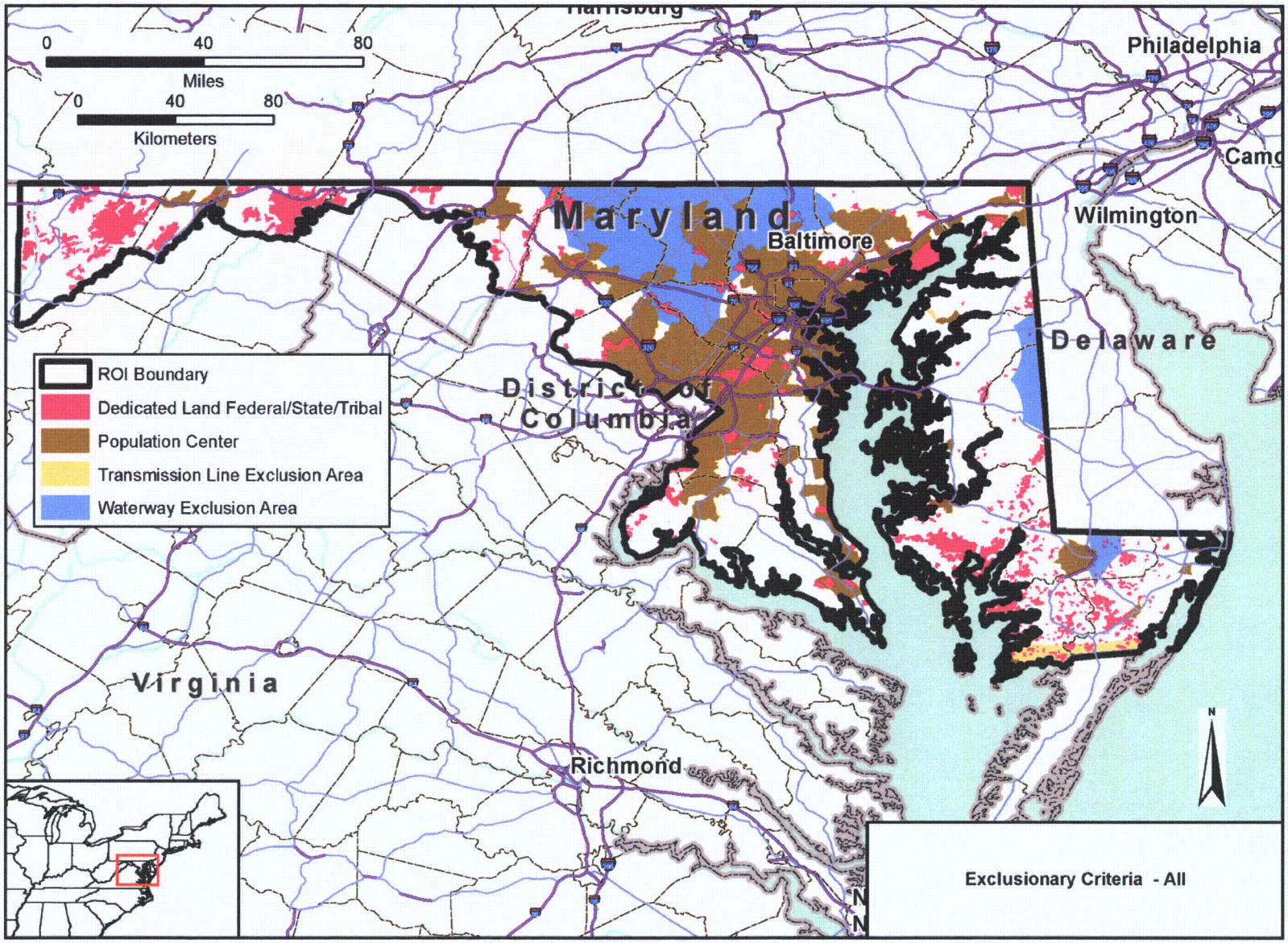

Figure 9.3-7 Candidate Area Exclusionary Criteria – All

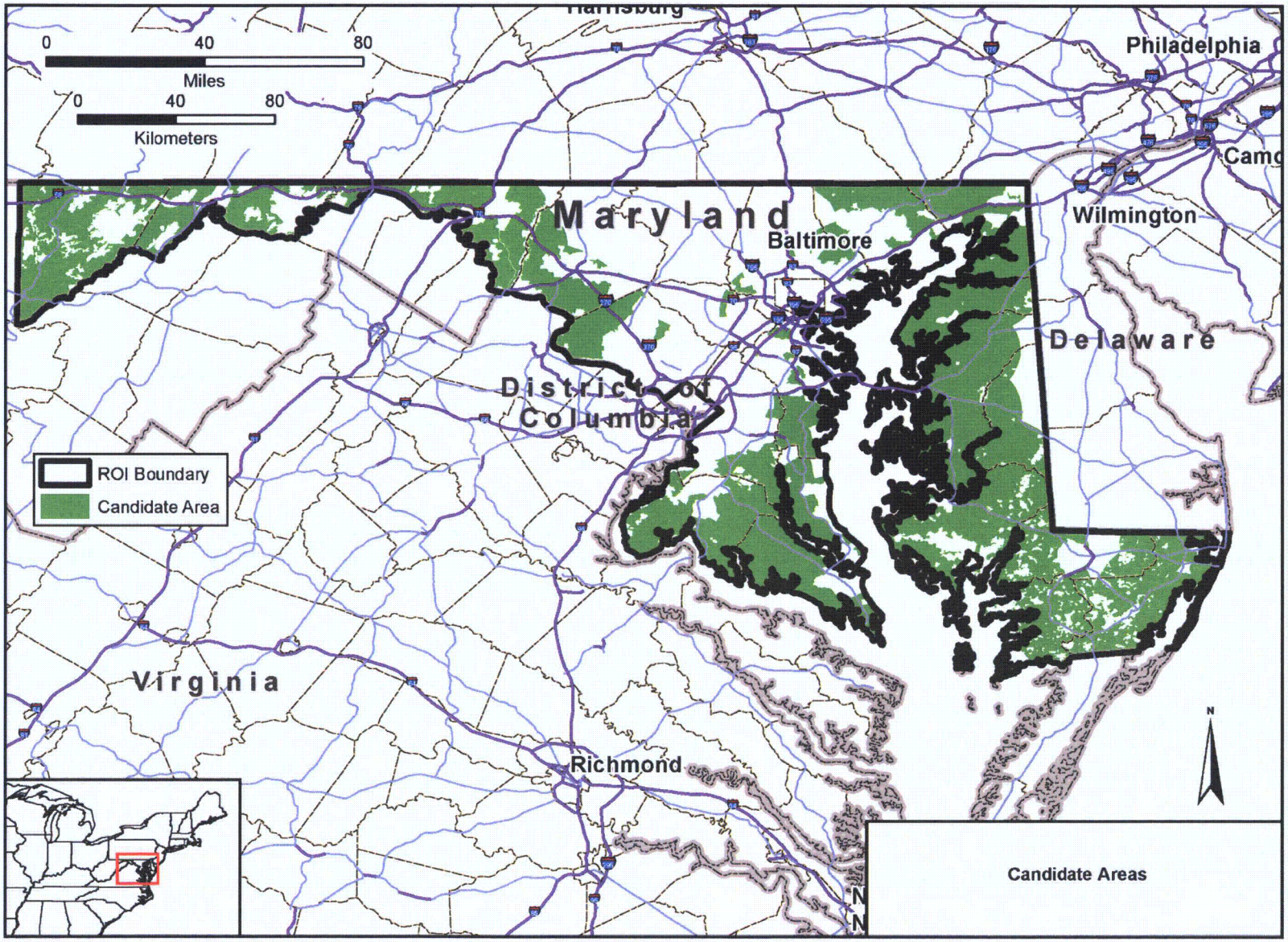

Figure 9.3-8 Candidate Areas

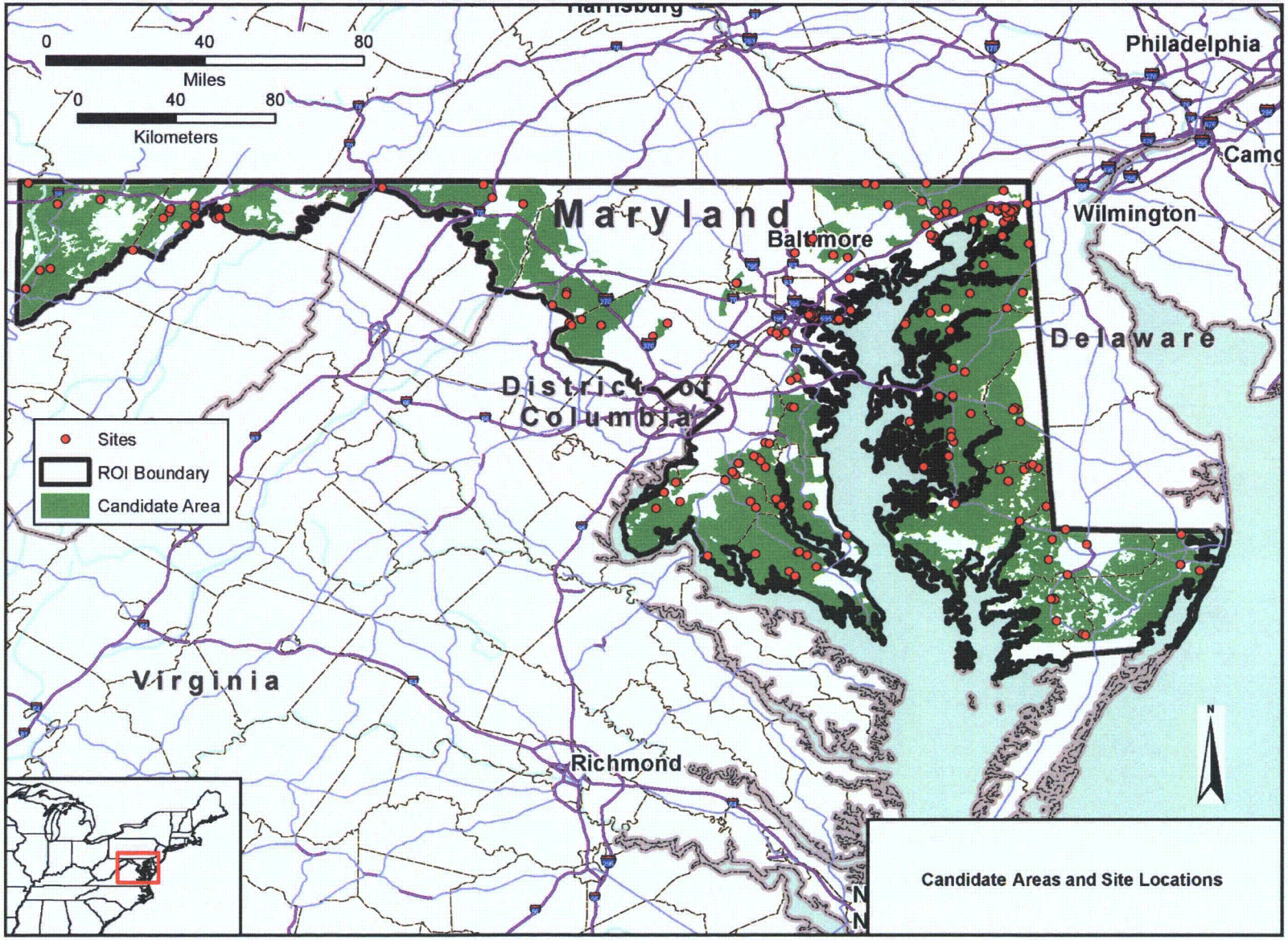

Figure 9.3-9 Locations of Sites within Candidate Areas

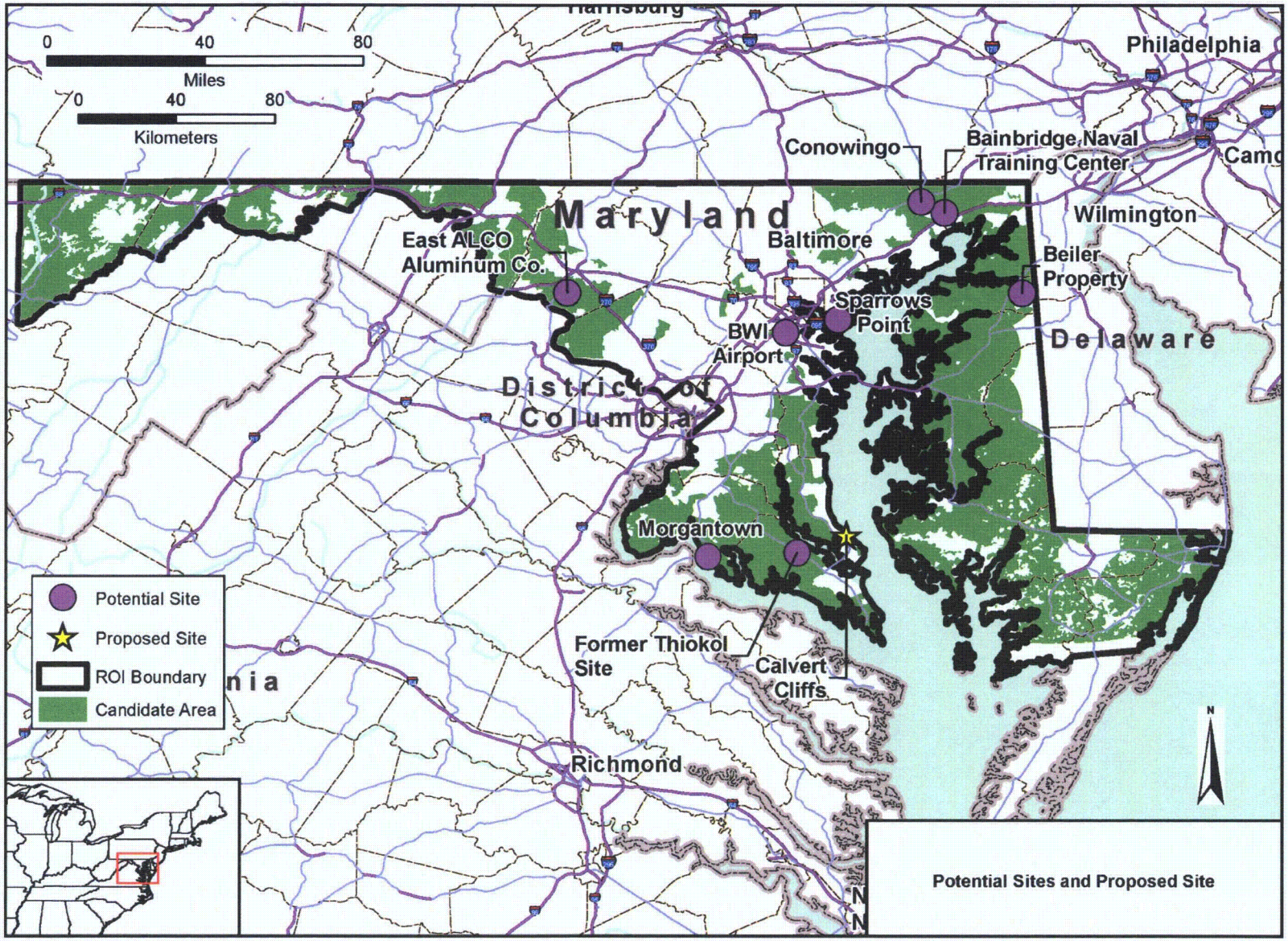

Figure 9.3-10 Candidate Sites

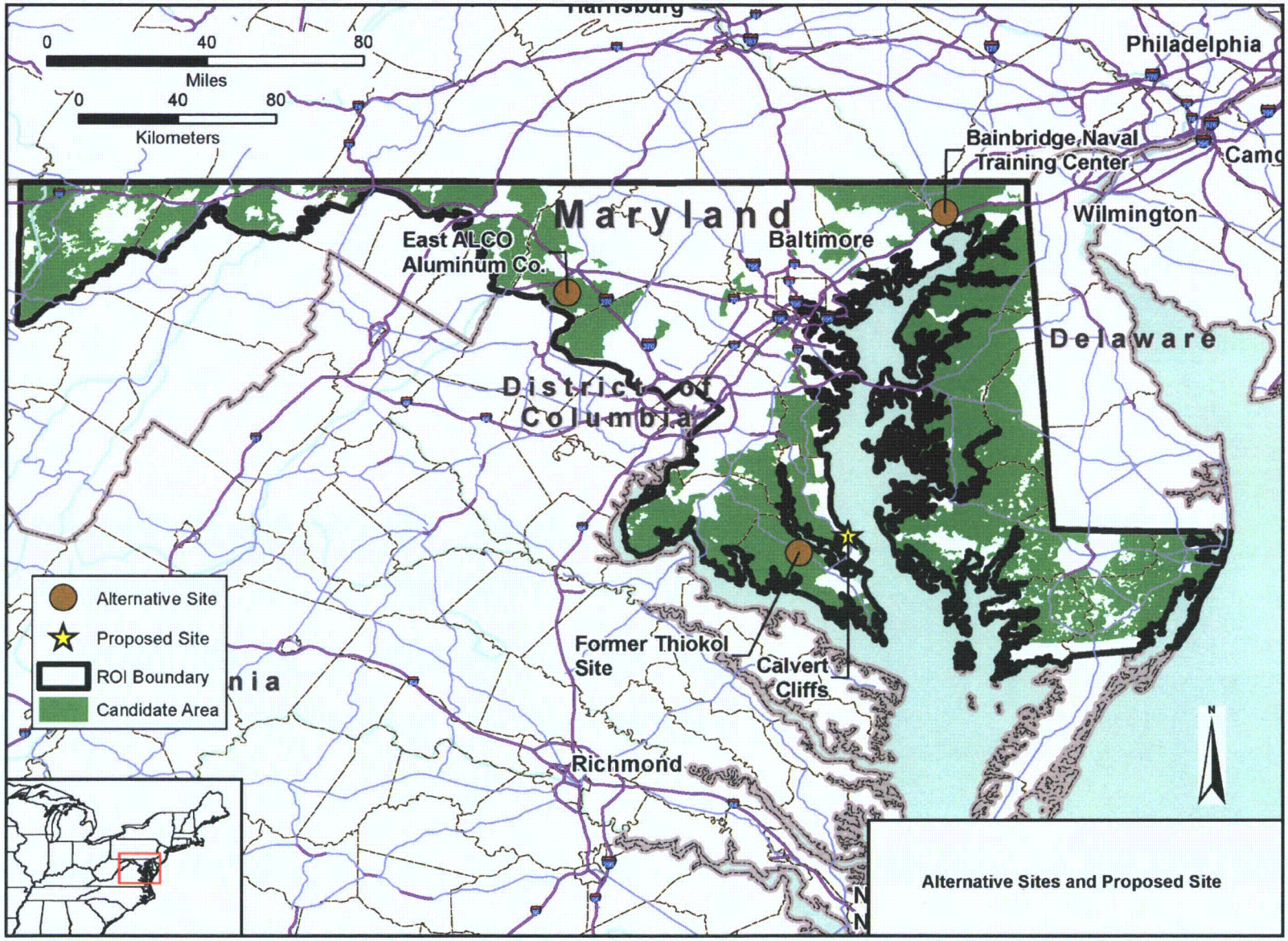

Figure 9.3-11 Alternative Sites and Proposed Site

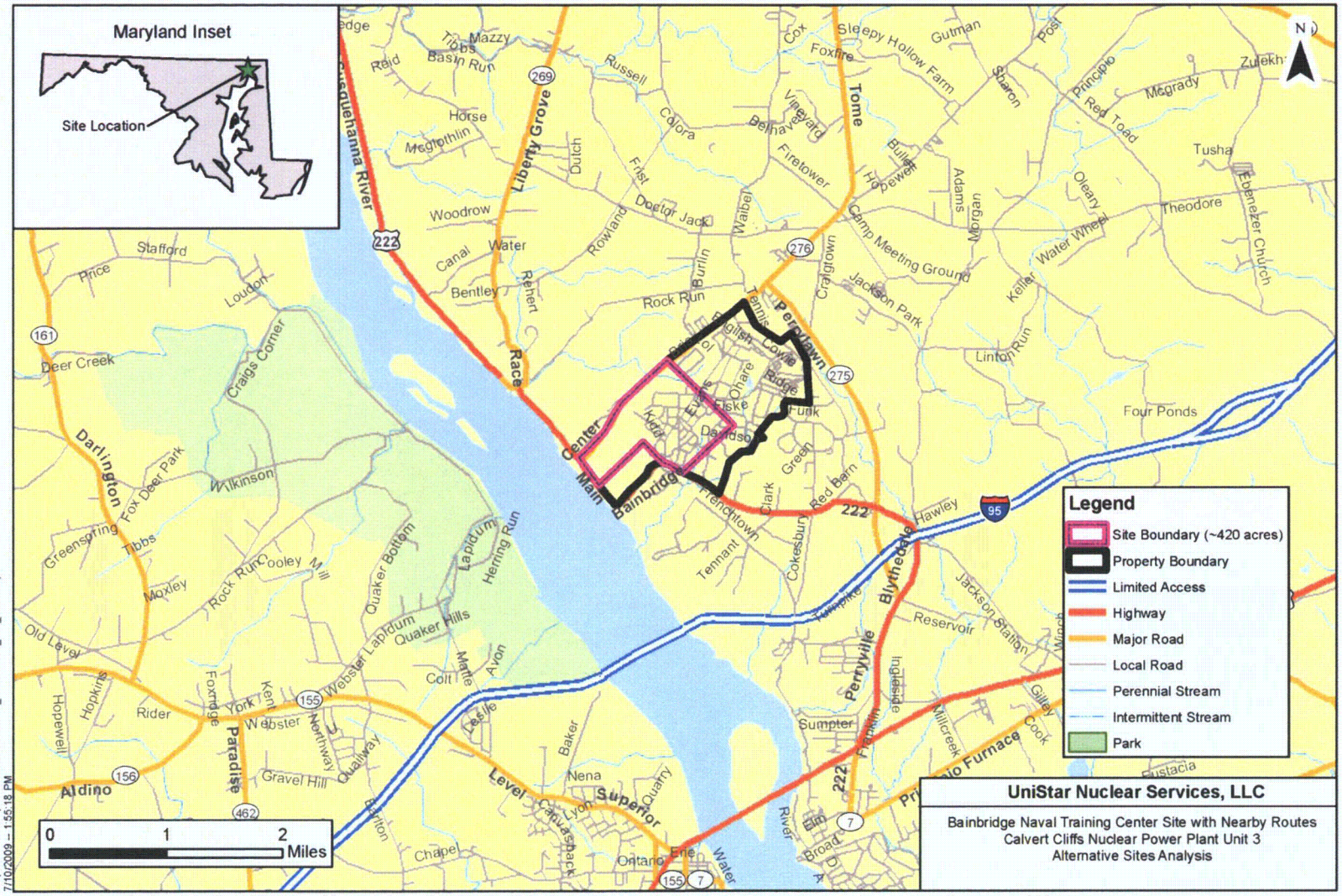

Figure 9.3-12 Bainbridge Naval Training Center Site Location

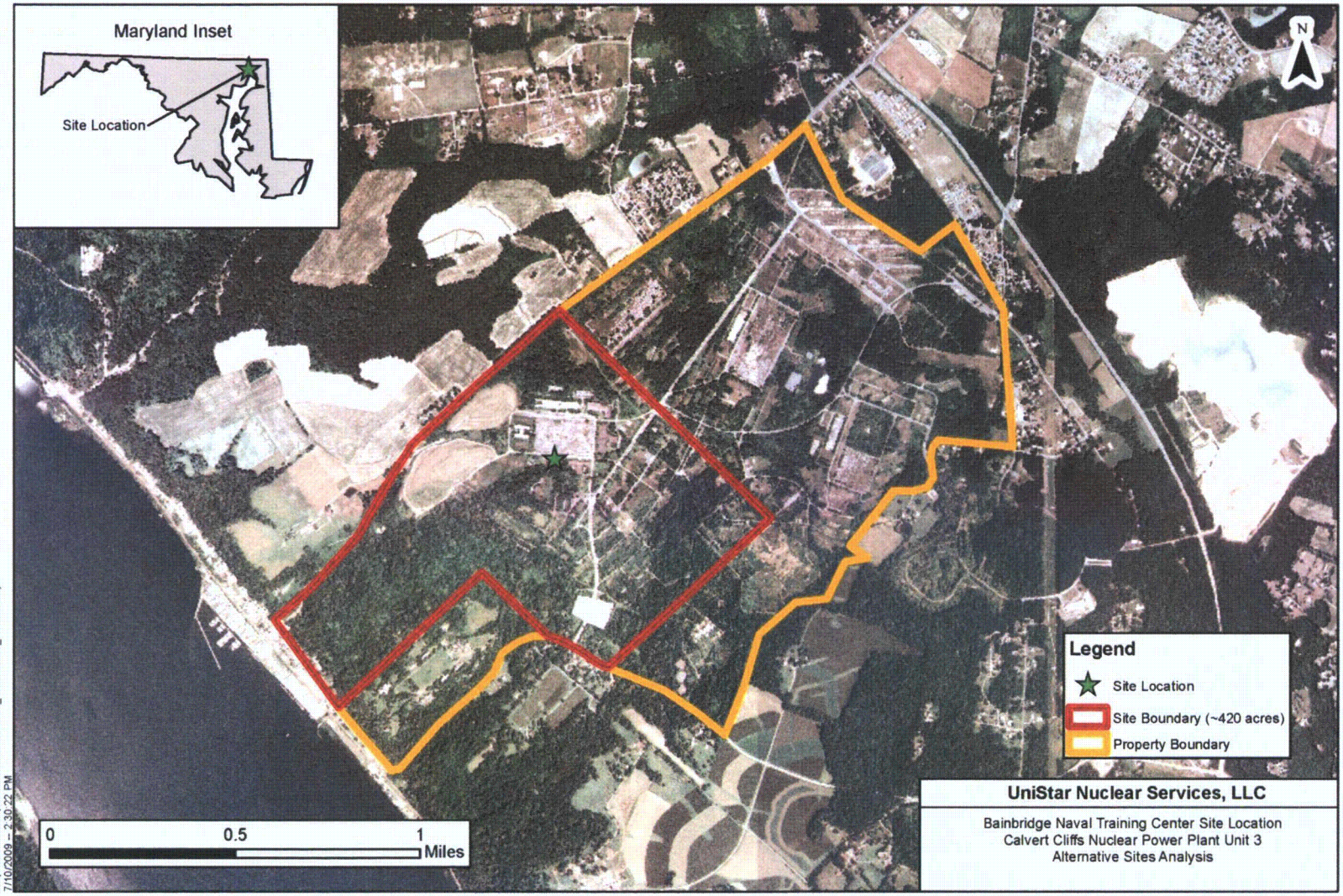

Figure 9.3-13 Bainbridge Naval Training Center Site Vicinity

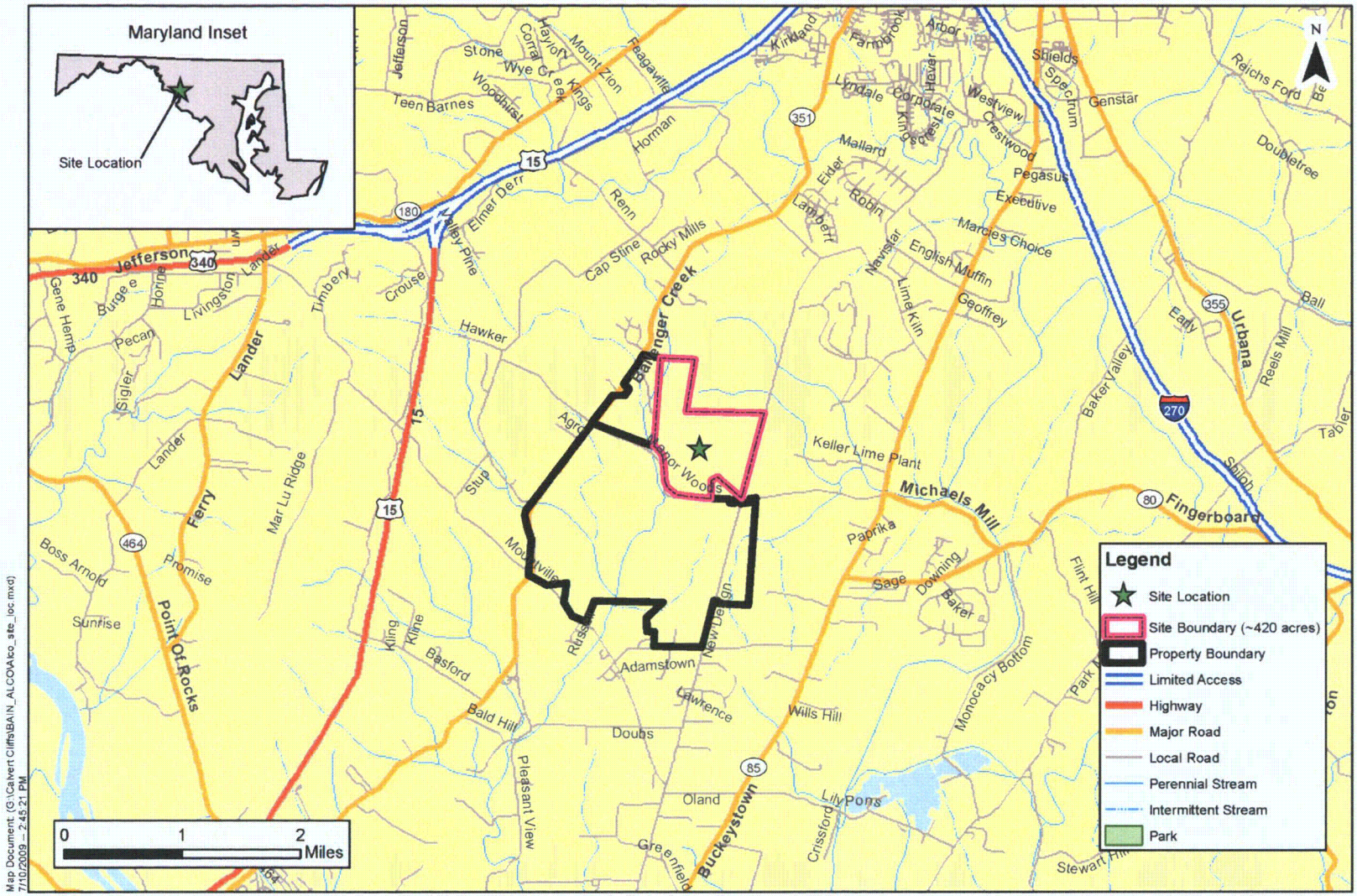

Figure 9.3-14 East ALCO Aluminum Company Site Location

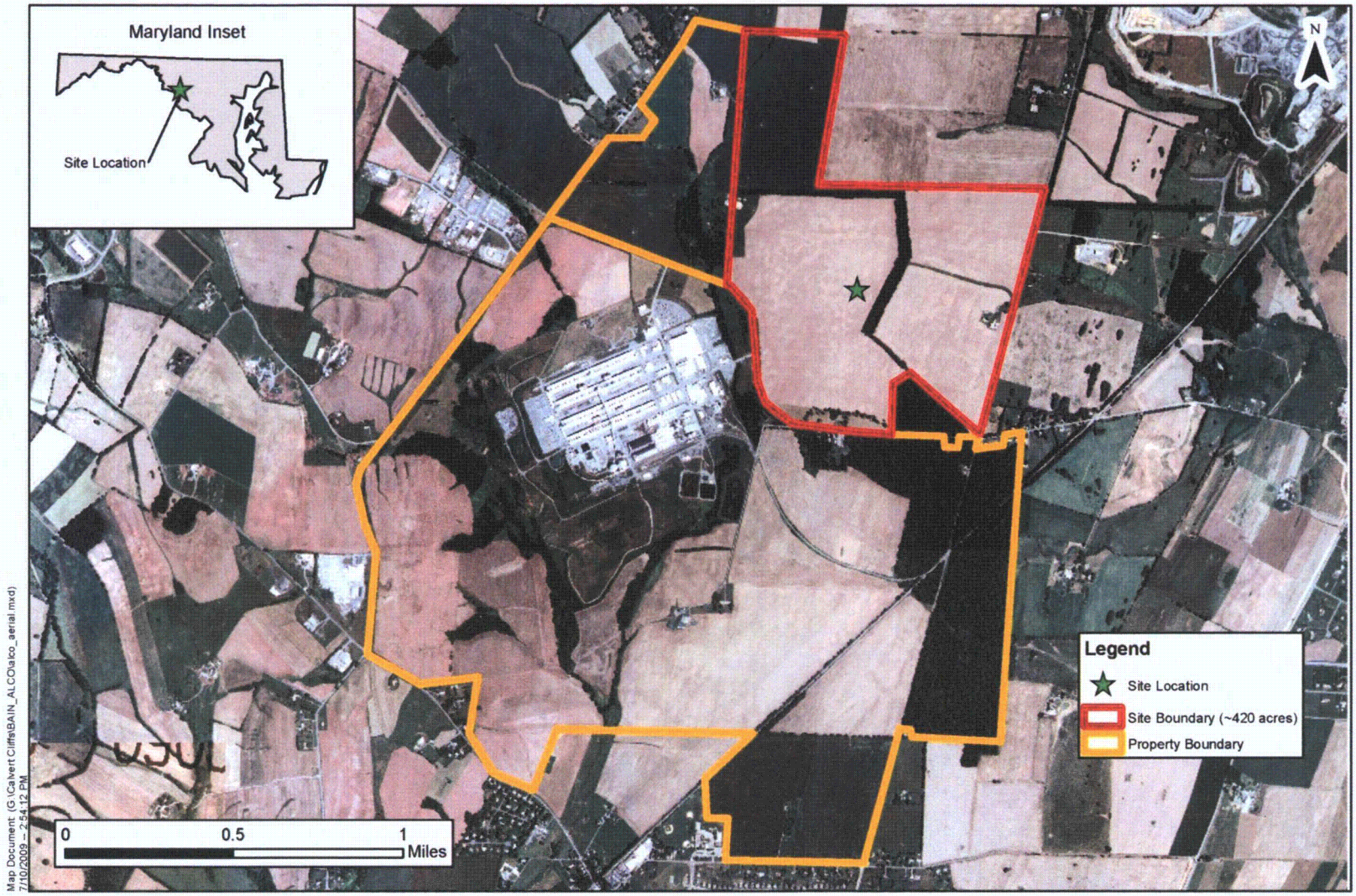

Figure 9.3-15 East ALCO Aluminum Company Site Vicinity

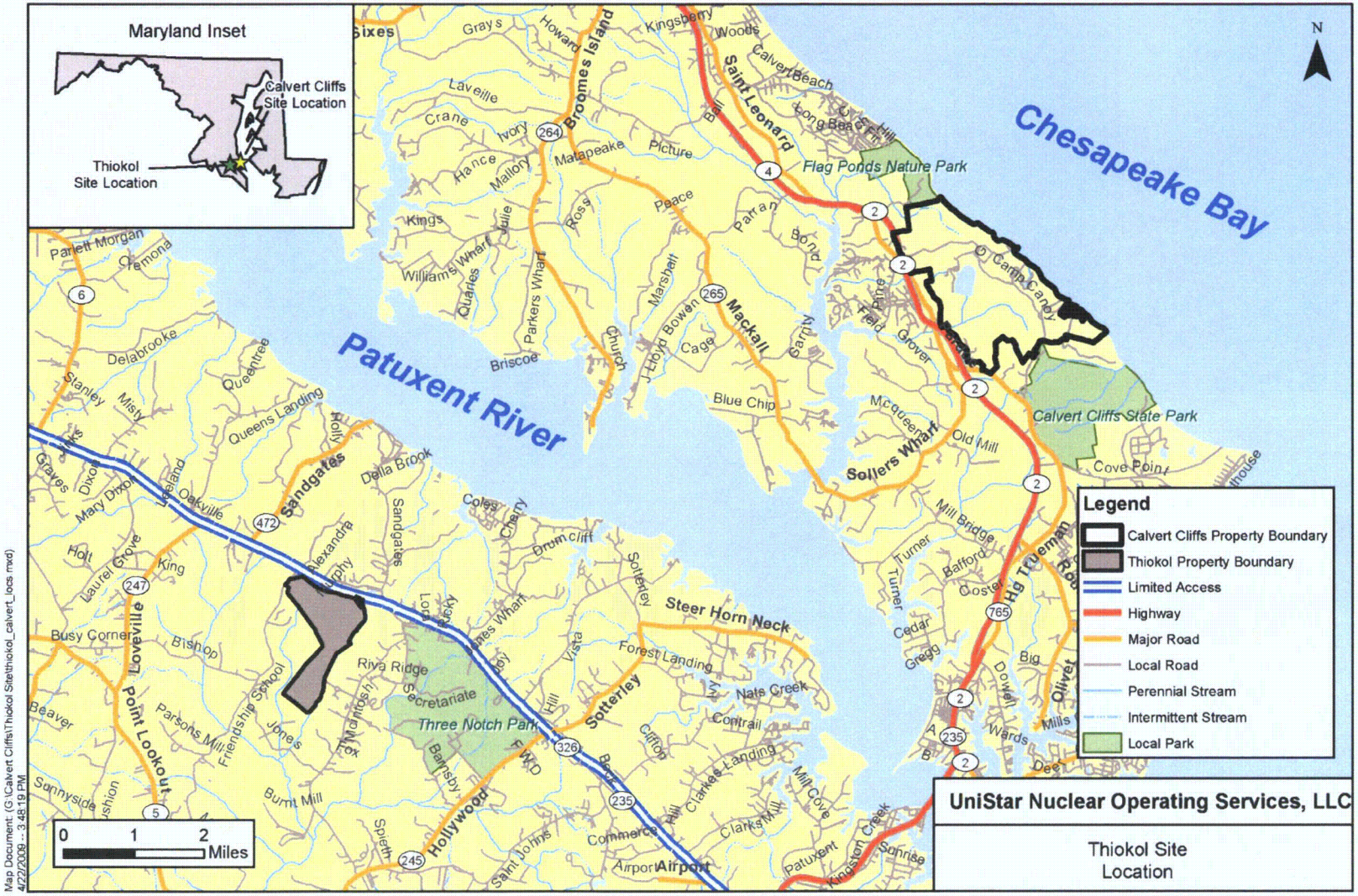

Figure 9.3-16 Former Thiokol Site Location

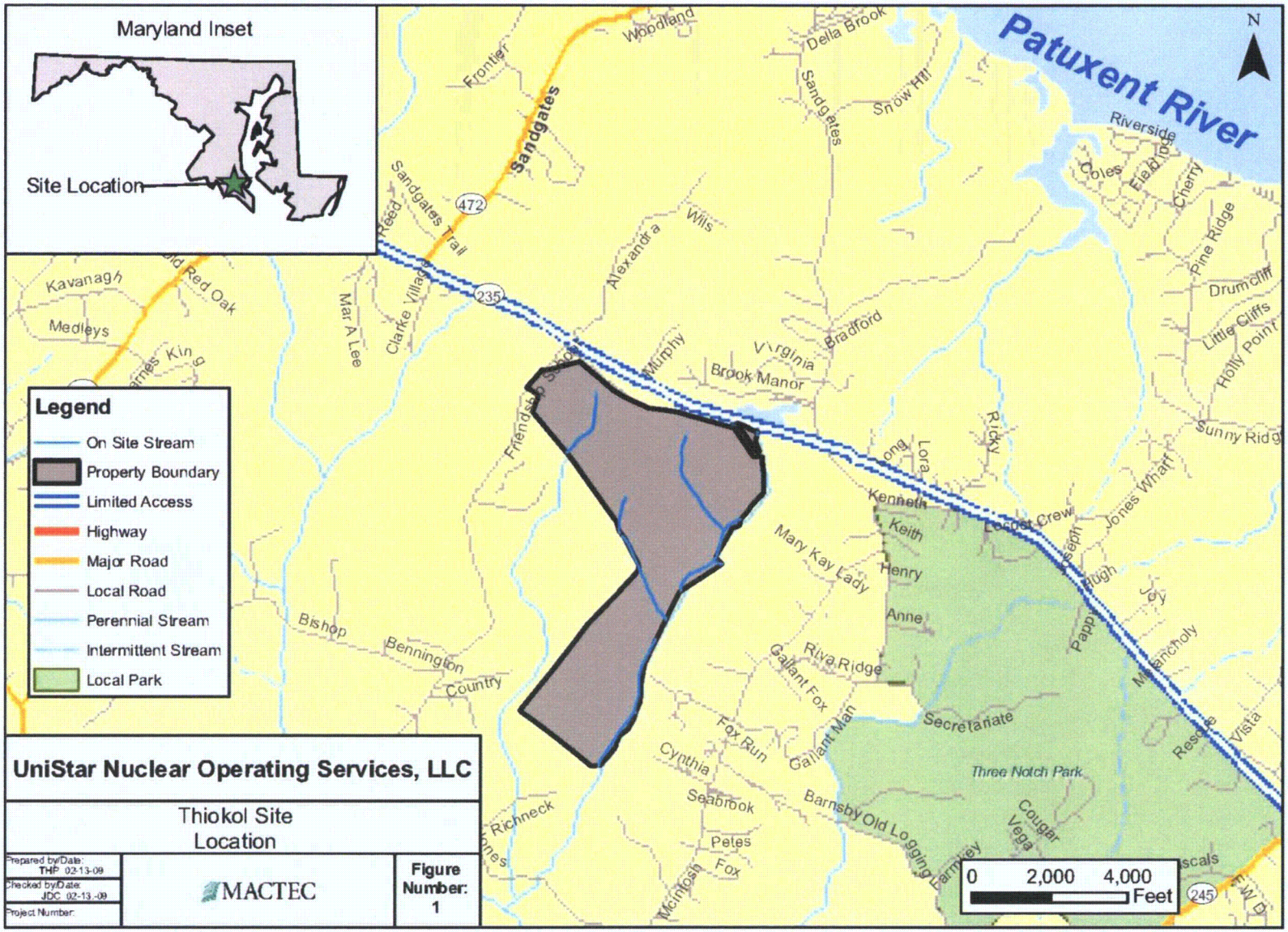

Figure 9.3-17 Former Thiokol Site Vicinity