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UniStar NUCLEAR ENERGY

October 14, 2009

UN#09-410

Marian Honeczy
Forest Conservation Act Coordinator
Maryland Department of Natural Resources
Forest Service
580 Taylor Avenue
Annapolis, MD 21401-2397

Subject: Forest Conservation Plan
Calvert Cliffs Nuclear Power Plant Unit 3 Project Area
Calvert County, Maryland

Enclosed please find the final Forest Conservation Plan for the proposed Calvert Cliffs Nuclear Power Plant Unit 3 Project Area at the Calvert Cliffs Power Plant Site. The enclosure includes both a bound copy and an electronic copy of the plan.

If you have any questions concerning the attached document, please call Mr. Dimitri Lutchenkov at (410) 470-5524.

Sincerely,

Greg Gibson

Enclosure – Final Forest Conservation Plan for Proposed Calvert Cliffs Nuclear Power Plant Unit 3 Project Area, Calvert Cliffs Nuclear Power Plant Site, Calvert County, Maryland, June 26, 2009, (Hard Copy + Compact Disc)

cc: Kathy Anderson – US Army Corps of Engineers (w/enclosures)
Marianne E. Dise - Critical Area Commission (w/o enclosures)
Susan Gray – Power Plant Research Program (w/enclosures)
Brent Hare - Maryland Energy Administration (w/o enclosures)
Laura Quinn – NRC Project Manager, Environmental Projects Branch 2 (w/hard copy of enclosure only)

UN#09-410

Enclosure
Final Forest Conservation Plan
for
Proposed Calvert Cliffs Nuclear Power Plant Unit 3 Project Area
Calvert Cliffs Nuclear Power Plant Site
Calvert County, Maryland
June 26, 2009
(Hard Copy + Compact Disc)

FINAL
FOREST CONSERVATION PLAN

for

Proposed Calvert Cliffs Nuclear Power Plant Unit 3 Project Area
Calvert Cliffs Nuclear Power Plant Site
Calvert County, Maryland

Prepared by:

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Revised June 26, 2009

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EXECUTIVE SUMMARY

This report presents a Forest Conservation Plan (FCP) for that portion of the Calvert Cliffs Nuclear Power Plant (CCNPP) Site in Lusby, Maryland, where UniStar Nuclear Energy (UNE) proposes to construct a third nuclear power reactor (CCNPP Unit 3). An FCP outlines mitigation requirements under the Maryland Forest Conservation Act for land development projects. The FCP draws upon baseline forest characterization data developed for the reactor project in a Forest Stand Delineation (FSD) report prepared previously. Mitigation can take one (or a combination) of three forms:

1. **Forest Retention**, which consists of designating areas of existing forest cover on a development site for permanent preservation;

2. **Reforestation**, which consists of planting forest cover in non-forested areas to offset the loss of forest cover during construction of a development project; and

3. **Afforestation**, which consists of planting forest cover in non-forested areas to offset the absence of existing forest cover on a development site.

The FCP presents a sequence of calculations performed by UNE to quantify how much of each type of mitigation must be performed to comply with the Maryland Forest Conservation Act. UNE proposes enough Forest Retention (preservation) on the CCNPP Site that additional mitigation in the form of Reforestation or Afforestation is not necessary to achieve compliance with the Conservation Act. When possible, preserving existing forest cover (i.e., Forest Retention) is superior to attempting to plant new forest cover (i.e., Reforestation or Afforestation) because this mitigation avoids the delay and uncertainties associated with nurturing planted seedlings into mature forest cover. The areas proposed for Forest Retention include approximately 92 acres surrounding the reactor construction site plus 58 acres of mature forest cover in a "Northwestern Tract" in the northwestern quadrant of the CCNPP Site. The FCP also outlines how UNE has designed the reactor to minimize the loss of forest cover and outlines specific measures for protecting the designated Forest Retention Areas.

INTRODUCTION

This report presents a Forest Conservation Plan (FCP) for that portion of the Calvert Cliffs Nuclear Power Plant (CCNPP) Site in Lusby, Maryland, where UniStar Nuclear Energy (UNE) proposes to construct a third nuclear power reactor (CCNPP Unit 3). The area addressed by the FCP is henceforth referred to as the "Project Site". The FCP follows procedures outlined in Chapter 3 of the *State Forest Conservation Technical Manual*, Third Edition (Maryland DNR, 1997) (henceforth referred to as the "Technical Manual"). The requirements for a FCP are established in the Maryland *Forest Conservation Act*. The FCP includes text, calculations, plans, and specifications. The calculations, plans, and specifications are provided on attachments that may be removed for use independently from the text.

Forest Stand Delineation: The FCP draws upon quantitative baseline forest condition data presented in a Forest Stand Delineation (FSD) prepared for the Project Site under separate cover. The FSD is incorporated by reference into the FCP. The FSD followed procedures for a "Full FSD" outlined in Section 2.2.3 of the Technical Manual. The FSD expanded upon vegetation data presented previously in a *Final Flora Survey Report* (Tetra Tech, 2007a), which mapped and qualitatively characterized vegetation on the entire CCNPP Site, including, but not limited to, the Project Site. The FSD also used data and information from the *Final Wetland Delineation Report* (Tetra Tech NUS, 2007b), which mapped the locations of wetlands and other waters of the United States, as defined by the Federal Clean Water Act in 33 CFR 328 and delineated using the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), on the Project Site.

Figure 1 depicts the spatial extent of each forest stand, as characterized in the FSD report. The FSD report also included an Environmental Features Map depicting wetlands, wetland and stream buffers, floodplains, and steep slopes; a Soils Map; and a map of Specimen Trees. Specimen Trees are defined under the Maryland Forest Conservation Act as trees measuring 30 inches in diameter at breast height (DBH) or more, or having 75 percent or more of the diameter of the current State champion tree of that species.

Determination of Priority Forest Areas for Retention: The forest stands characterized by the FSD are of varying priority for avoidance of impacts (i.e., retention during site preparation). The order of priority for retention is, from highest to lowest:

- Sycamore – Sweetgum – American Elm Forest stands;
- Chestnut Oak Forest stands;
- Sweetgum – Tulip Poplar Forest stands; and

- Virginia Pine – Oak Forest stands; Black Locust Forest stands; Virginia Pine Forest stands; Loblolly – Oak; and Oak Forest stands.

The Sycamore – Sweetgum – American Elm Forest comprises forested wetlands and riparian uplands in the bottoms of stream valleys and hence constitutes the highest priority forest for avoidance of impacts (i.e., retention during site preparation).

The Chestnut Oak Forest comprises mature, late successional deciduous forest cover on sloping uplands and is the next to highest priority forest for avoidance (retention). It does not include wetlands, but wetland and stream buffers extend into Chestnut Oak Forest on the low parts of slopes adjoining wetlands and stream valleys. Many of the dominant and codominant species are Specimen Trees (shown on Figure 1) or exceed 20 inches DBH and are of slow-growing species such as chestnut oak, white oak, and black oak. Many such trees are estimated to be over 100 years in age, and regeneration of similar forest cover could require 75 or more years.

Like the Chestnut Oak Forest, the Sweetgum – Tulip Poplar Forest includes many stream and wetland buffers as well as large, mature trees and many Specimen Trees (shown on Figure 1). But because sweetgum and tulip poplar are faster-growing species than most oak species, Sweetgum – Tulip Poplar Forest is of lower priority for retention than Chestnut Oak Forest. Furthermore, Sweetgum – Tulip Poplar Forest tends to occupy flatter areas of richer soil rather than the steeper and drier settings occupied by Chestnut Oak.

The Virginia Pine – Oak Forest, Black Locust Forest, Virginia Pine Forest, Loblolly Pine – Oak Forest, and Oak Forest, stands are of the lowest priority for retention. All of these stands are dominated by saplings and young trees of relatively fast growing species such as Virginia pine, loblolly pine, and black locust. None of these stands contain Specimen Trees. The Virginia Pine – Oak Forest stands constitute regeneration on areas of former Chestnut Oak Forest that was logged in the 1980s. The Black Locust Forest stands are early successional forest stands that have established on areas of dredged spoils or graded areas originating from the construction of CCNPP Units 1 and 2 in the 1970s. The Virginia Pine Forest stand occupies an area of graded soil adjacent to the Camp Conoy Fishing Pond.

Determination of Other Priority Areas for Retention: Other priority areas for retention within the "Net Tract" are described in Maryland Natural Resource Article NRA Sec. 5-1607(c)(1) as 1) trees, shrubs, and plants located in sensitive areas including the 100-year floodplain, streams and their buffers, steep slopes (25 percent), critical habitats, and wetlands; 2) contiguous forest; 3) rare, threatened, and endangered species; 4) trees associated with historic features and 5) champion or large diameter trees (in excess of

30" DBH). The Maryland Forest Conservation Act requires that these areas are also avoided to the extent practicable during project siting.

No mapped 100-year floodplains occur within the Net Tract. Wetlands, streams, and their buffers occupy over 234 acres of the Net Tract. Steep slopes (25 percent or greater) occur primarily in areas leading to riparian zones within the Net Tract. No critical habitats have been identified as occurring within the site.

Two state threatened plant species, Shumard oak (*Quercus shumardii*) and showy goldenrod (*Solidago speciosa*), are found in the project site as depicted in the attached CCNPP Unit 3 Rare Plant Survey Report (**Attachment A**). Shumard oak trees identified during the floral survey are located at least 100 feet outside the proposed limits of disturbance. Therefore, this species would be avoided during construction and no direct or indirect impacts are anticipated. A small stand of showy goldenrod was identified along the forest edge in the baseball field area of Camp Conoy. The approximate size of this stand covers 1-2 acres. One state rare plant species, spurred butterfly pea (*Centrosema virginianum*), was potentially found during the rare plant survey of the project site; however, this species is located over 1,000 feet outside the limits of disturbance. While the morphological characteristics of the individual found appear to be consistent with this species, the habitat is not the habitat typically associated with this plant. Therefore, the identification of this species is in question.

Large diameter tree locations are depicted in Figure 1 of this report. The total of 62 large diameter trees mapped within the project site are distributed somewhat evenly across the stands, with some small concentrations occurring on steep slopes and within bottomlands outside of the limits of disturbance.

SUMMARY OF FOREST STAND AND PRIORITY AREA IMPACTS

The total area of forest that must be cleared to construct CCNPP Unit 3 (**Figure 2**) is approximately 256 acres. UNE has minimized the need for forest clearing by taking advantage of existing unforested areas on the CCNPP Site, especially the grassy lawns of a former recreational facility termed Camp Conoy and an area of old field vegetation on dredge spoils termed the Lake Davies Dredged Material Disposal Area. By positioning much of the power block and adjoining permanent laydown area in what is now Camp Conoy; UNE has minimized the extent of forest clearing necessary in the Chesapeake Bay Critical Area (CBCA) to the east and on forested slopes in the headwaters of Johns Creek to the west.

Some specific changes to the footprint that have reduced forest clearing include:

- Moving the proposed location for a concrete batch plant from a forested area in the western part of the CCNPP Site to a proposed permanent construction laydown area just southeast of the proposed power block;

- Reducing the width of clearing to accommodate a construction entrance road traversing forested areas in the western part of the CCNPP Site;

- Moving some proposed temporary construction staging areas from forested areas to old field areas in the western part of the CCNPP Site; and

- Redesigning the stormwater management facilities for the project to eliminate the need for a stormwater detention basin in a forested area northwest of the proposed power block and for basins in certain forested wetlands in the western part of the CCNPP Site.

Of the approximately 256 acres of forest clearing proposed at this time, just over 22 acres are in the CBCA, where forest clearing is regulated under the Maryland Chesapeake Bay Critical Areas Act rather than the Maryland Forest Conservation Act. UNE has prepared separate documentation for submittal to the Chesapeake Bay Critical Area Commission describing forest impacts in the CBCA and outlining mitigation measures. The FCP therefore focuses only on approximately 234 acres of forest clearing necessary outside of the CBCA, under jurisdiction of the Maryland Forest Conservation Act. The Technical Manual refers to an entire development property, including any lands in the CBCA, as the "Total Tract" and that part of a development property outside the CBCA (and hence under jurisdiction of the Maryland Forest Conservation Act) as the "Net Tract".

Table 1 quantifies proposed forest clearing in each stand characterized in the FSD. Separate columns provide forest clearing acreage in each stand for the "Total Tract" (which includes the CBCA) and the "Net Tract", which is the focus of the FCP. The approximately 234 acres of proposed forest clearing in the "Net Tract", and hence the subject of the FCP includes:

- Approximately 130.9 acres of Chestnut Oak Forest;
- Approximately 48.0 acres of Virginia Pine – Oak Forest;
- Approximately 38.2 acres of Sweetgum – Tulip Poplar Forest;
- Approximately 8.1 acres of Sycamore – Sweetgum – American Elm Forest;
- Approximately 7.7 acres of Black Locust Forest;
- Approximately 0.7 acres of Virginia Pine Forest;
- Approximately 0.3 acres of Loblolly Pine - Oak Forest and
- Approximately 0.4 acres of Oak Forest.

As noted above, the Sycamore – Sweetgum – American Elm Forest constitutes the highest priority for avoidance of impacts (i.e., retention during site preparation). UNE is able to site the proposed facilities in a manner avoiding the need for clearing or grading in a broad, mature stand of Sycamore – Sweetgum – American Elm Forest (Stand 4-14) on bottomlands directly adjoining John's Creek. However, it is not possible to avoid Sycamore – Sweetgum – American Elm Forest associated with certain seeps and unnamed headwater tributaries flowing toward Johns Creek (Stands 4-3, 4-11, and 4-12) or the Chesapeake Bay (Stands 2-6, 2-10 through 2-12, 9-4, and 9-5). The need for establishing broad, uniformly graded surfaces to accommodate the power block, switchyard, cooling tower, and other industrial facilities prevents UNE from building around wetlands, seeps, and other localized environmental features.

UNE's design also minimizes encroachment into Chestnut Oak Forest, the next highest priority for retention. The unavoidably large extent of Chestnut Oak Forest impact reflects its spatial predominance over much of the CCNPP Site. However, UNE is still able to avoid much of the steepest Chestnut Oak Forest on slopes adjoining Johns Creek, especially in Stands 4-9 and 4-15. The alignment chosen by UNE for the Construction Access Road avoids most of the steep Chestnut Oak Forest in Stands 7-7 and 7-8.

Table 2 quantifies and/or describes proposed impacts to other priority areas. Note that area and linear distance calculations within Table 2 do not include areas to be affected within the Critical Area. Impacts to forest resources, including priority areas, within the critical area are described in the Calvert Cliffs Unit 3 Critical Area Mitigation Plan.

As stated previously, no 100-year floodplains are located within the Net Tract. Therefore, project related impacts to this resource would be avoided. Impacts to wetlands, streams, and buffers were largely avoided during project siting and include approximately 19.4 acres. This represents about 8 percent of the total area of wetlands in the Net Tract. Unavoidable impacts to wetland, streams and buffers are also proposed to be mitigated at a ratio of 3:1 as described in the Calvert Cliffs Joint Wetland Permit Application.

Impacts to steep slopes have been reduced by nearly 30 percent based on the project layout. The largest concentrations of steep slopes are in the immediate vicinity of Johns Creek and along the Chesapeake Bay within the Critical Area. These areas were almost entirely avoided and the site plan has been designed to minimize both direct and indirect impacts to these areas.

Nearly all of the forest area within the Net Tract meets the definition of contiguous forest. However, siting the facility further south or west would have impacted a larger amount of contiguous forest. Also, siting the facility further east would cause greater impact to the Critical Area. The facility could not be sited further north due to the location of the existing facility.

Siting of the proposed facility was done to completely avoid impact to the state threatened species, Shumard oak. In addition, individuals of this species are at least 100 feet from the Limits of Disturbance; therefore, no indirect impacts to this species are anticipated and no special impact minimization measures are proposed. The small stand of showy goldenrod located within the Limits of Disturbance could not be avoided due to its location near the center of the proposed power block facility. This facility must be constructed in the manner depicted per safety requirements. Mitigation for this impact will include relocation of a large portion of this stand to a suitable location nearby to preserve the local gene stock. It is expected that relocation will be successful due to the ability to root divide this species.

Large diameter trees are scattered widely and are somewhat evenly distributed across the Net Tract. Therefore, avoidance of individual large diameter trees was done where possible; however, complete avoidance was not achievable.

FOREST RETENTION, REFORESTATION, AND AFFORESTATION CALCULATIONS

There are three categories of compensatory mitigation for forest loss impacts under the Maryland Forest Conservation Act:

1. **Forest Retention** consists of designating areas of existing forest cover on a development site for permanent preservation;

2. **Reforestation** consists of planting forest cover in non-forested areas to offset the loss of forest cover during construction of a development project; and

3. **Afforestation** consists of planting forest cover in non-forested areas to offset the absence of existing forest cover on a development site.

Calculation of Mitigation Requirements: The Technical Manual prescribes detailed calculations to determine the area of Forest Retention, Reforestation, and Afforestation required to achieve compliance with the Maryland Forest Conservation Act. The calculations involve quantifying the areas of existing forest cover and projected losses, followed by comparing them against two benchmark levels of forest cover termed the Conservation Threshold and Afforestation Threshold. The benchmarks are calculated

by multiplying a project site's area by specific percentages based on the tract's zoning (the percentages are higher for low density zoning categories and lower for high density and commercial and industrial zoning categories). **Reforestation** requirements are calculated by multiplying forest losses by specific factors based on whether the losses cause forest cover to decrease below the Conservation Threshold. Forest cover losses that do not bring overall forest cover below the Conservation Threshold may be offset by a Reforestation ratio of 0.25: 1 (i.e., 0.25 acre of Reforestation per acre lost). Additional forest cover losses must be offset by a Reforestation ratio of 2:1 (i.e., 2 acres of reforestation per acre lost). The total reforestation requirement may be offset by **Forest Retention** on an acre for acre (1:1) basis.

Afforestation is an additional mitigation requirement under the Maryland Forest Conservation Act for development tracts that lack substantial areas of existing forest cover. The requirement is met by planting forest cover to bring the resulting forest cover up to the Afforestation Threshold. Because of the extensive existing forest cover on the Project Site, no Afforestation is required.

Calculation Worksheet: Because of the abundance of mature existing forest cover on the CCNPP Site and the ability to designate large areas of that forest cover for permanent preservation, UNE seeks to meet its mitigation requirements under the Maryland Forest Conservation Act entirely via Forest Retention. Forest Retention is superior to Reforestation or Afforestation because it avoids the delays and uncertainties associated with raising planted fields of tree seedlings into mature forest cover. For example, chestnut oak, the dominant tree in Chestnut Oak Forest, is a slow growing tree species that reportedly attains only 20 feet over 20 years (a rate of 1 foot per year) and requires 200 to 300 years to reach maturity (Hightshoe, 1988). Mountain laurel, the dominant shrub in the understory of Chestnut Oak Forest, is also slow-growing, reportedly attaining only 4 to 8 feet over 10 years (roughly 0.5 foot per year) (Hightshoe, 1988). Even though a planted cluster of chestnut oak and mountain laurel seedlings might achieve the appearance of mature Chestnut Oak Forest in 50 to 100 years, it is uncertain whether the new forest would match the natural diversity and spatial stratification inherent in existing naturally generated Chestnut Oak Forest. The ability of chestnut oak and mountain laurel to attain dominance in the climax forest of today reflects environmental conditions over the past couple of centuries, and changes in climate and other environmental factors may prevent future duplication of many nuances in the present vegetation. Furthermore, the planted seedlings would have to withstand exposure to pests, disease, herbivory by wildlife, and other adverse stresses. Attempts to replant forest types dominated by faster growing species, such as Sweetgum – Tulip Poplar Forest, would be subject to the same uncertainties even if less time would be necessary for attainment of mature canopy height.

Figure 3 is a worksheet from the Technical Manual presenting the mitigation requirements calculations for the Project Site. To allow for meeting the mitigation requirements entirely enough Forest Retention, UNE expanded the Project Site to include an area of existing forest cover in the northwestern part of the

CCNPP Site that will not be cleared during construction of the proposed CCNPP Unit 3. This Northwestern Tract consists of 58.64 acres between the existing 500-kilovolt (kV) electric transmission line right-of-way (ROW) and Maryland Route 2-4. A 200-foot wide strip of forest cover directly adjacent to the ROW is excluded from the Northwestern Tract to allow for possible future expansion of the ROW. By adding this land area to the Project Site, UNE agrees to permanently dedicate the land to Forest Retention. The Total Tract Area (A) is therefore expanded from the approximately 599 acres addressed in the FSD to a total of approximately 658 acres (the original Total Tract Area of 599 acres plus the Northwestern Tract of 59 acres). That portion of the original 599 acres in the CBCA (B), approximately 98 acres, was then deducted, leaving a Net Tract Area (C) of approximately 560 acres.

The CCNPP Site is an industrial property. Hence, the Land Use Type used for the calculations is "Commercial and Industrial Use Area". According to the Technical Manual, the Afforestation Threshold and Conservation Threshold for a "Commercial and Industrial Use Area" must be 15 percent of the Net Tract Area. Hence, the Afforestation Threshold (D) and Conservation Threshold (E) used in the calculations are approximately 84 acres (15 percent of 560 acres).

The total existing forest cover on the Net Tract (F) is approximately 384 acres, which includes approximately 326 acres in the original forest stands (excluding the CBCA) plus approximately 58 acres of forest cover in the Northwestern Tract. Subtracting the Conservation Threshold (E) (84 acres) from the total existing forest cover (F) (384 acres) leaves an area (G) of approximately 301 acres of forest cover over the Conservation Threshold. Under the Maryland Forest Conservation Act, retaining a minimum of 0.2 times the area of forest cover over the Conservation Threshold (0.2 X G) plus the Conservation Threshold (E) allows an applicant to meet the full mitigation requirement without the need for supplemental planting (Reforestation and/or Afforestation). This Forest Retention target is termed the "Breakeven Point" (H), which calculates at approximately 144 acres for the Project Site. For the Project Site, the Act permits clearing a maximum (I) of approximately 241 acres of forest cover without the need for supplemental planting.

UNE proposes to clear approximately 234 acres (J) of forest cover, thereby leaving approximately 150 acres (K) of existing forest for Forest Retention. Because the 150 acres of Forest Retention (K) exceeds the Breakeven Point (H), the Maryland Forest Conservation Act allows the mitigation requirement to be met exclusively via Forest Retention, without any supplemental planting.

FOREST RETENTION

Figure 2 depicts areas proposed for Forest Retention. The proposed Forest Retention Areas encompass approximately 150 acres, including approximately 92 acres of the forest stands characterized by the FSD

plus approximately 58 acres of forest in the Northwestern Tract. The Forest Retention Areas specifically include:

- Approximately 42.4 acres of Chestnut Oak Forest;
- Approximately 15.8 acres of Sweetgum – Tulip Poplar Forest;
- Approximately 16.4 acres of Virginia Pine – Oak Forest;
- Approximately 12.3 acres of Sycamore – Sweetgum – American Elm Forest;
- Approximately 4.6 acres of Black Locust Forest; and
- Approximately 58 acres of forest cover in the Northwestern Tract.

Most of the designated Forest Retention Areas (other than the Northwestern Tract) are at the outer edge of the proposed construction footprint. Constructing the power block, switchyard, cooling tower, and permanent laydown areas requires establishing a smooth grade over broad land areas; hence, preservation of individual trees and small patches of trees is not practicable over most of the Project Site. However, the designated Forest Retention Areas include several small patches of forest cover between the new construction area and the existing Independent Spent Nuclear Fuel Storage Facility and the Lake Davies Dredged Materials Disposal Area.

The Northwestern Tract was not addressed in the FSD. However, according to the flora survey map completed in 2007, the 58 acres of Forest Retention in the Northwestern Tract includes approximately 50 acres of Mixed Deciduous Forest (which generally corresponds to Sweetgum – Tulip Poplar Forest or Chestnut Oak Forest) and approximately 8 acres of Bottomland Deciduous Forest (which generally corresponds to Sycamore – Sweetgum – American Elm Forest). The Northwestern Tract includes approximately 8 acres of forested wetlands plus approximately 10 acres of land within 50 feet of wetland (wetland buffer). Several localized slope areas exceed 25 percent in grade.

The limits of each Forest Retention Area (as well as other forest areas) adjacent to construction areas will be marked using orange safety fencing or silt fence, as designated by the Soil Erosion and Sediment Control Plan. Orange safety fencing provides a highly visible barrier to protect adjacent forest areas from construction activities. All fencing will be well-anchored, approved by the DNR Forest Service in the field before site preparation activities commence, and be in place and maintained as needed until construction completion, final inspection, and an occupancy permit is issued. In addition, signs will be posted at approximately 100-foot spacing to prohibit physical disturbance of the Forest Retention Areas. **Figure 4** represents the approximate locations of where orange safety and silt fencing will be installed between the limits of disturbance and adjacent Forest Retention, priority (wetlands, streams, buffers, and steep slopes), and other sensitive resource areas. Note that orange safety and/or silt fencing will not be installed in certain areas including a portion of the Heavy Haul Road, the Lake Davies Dredge Disposal

Area, and the Northwest Tract Forest Retention Area, because the limits of disturbance in these areas either borders the existing facility or areas where there would be no concern of disturbance to natural resources. In addition, orange safety or silt fencing will be installed in appropriate locations adjacent to forest and other sensitive resources within the critical area.

Figure 5 provides details and installation specifications for typical silt fencing to be installed to protect sensitive resources including wetlands and streams. These specifications are in accordance with the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Complete details of the installation of orange safety and silt fencing are provided in the Calvert Cliffs Unit 3 Soil Erosion and Sediment Control Plan. A copy of the Sediment and Erosion Control Plan will be provided to the DNR Forest Service upon completion.

In addition, the Sediment and Erosion Control Plan will specify the following conditions/details:

- Notify the DNR Forest Service, 48 hours in advance at (301) 260-8511 or (301) 260-8661 for the pre-construction meeting, inspection of retention line (tree protection device), completion of construction activities and for inspection of the reforestation/afforestation planting site as it is being installed, if planting is occurring.

- Fires permitted in the construction area shall conform to State and local regulations for fire control, and may not enter the retention area or its canopy.

- No equipment, vehicles, machinery, dumping, storage, other construction activities, burial, fire, or other disposal of construction materials shall be located inside forest retention areas, subject to approval by the DNR Forest Service, or amended forest conservation plan.

Each Forest Retention Area will be visually inspected by a Qualified Professional following completion of construction activities and after one year. Any non-native invasive plants, as listed in Appendix F of the Technical Manual, will be killed or removed. Trees on the new forest edge will be pruned, in accordance with professional practice, as necessary to remove dead or damaged limbs and protect overall tree health. Dead trees within 50 feet of the forest edge (and farther, if necessary for human safety) will be removed. Any edge trees displaying more than a 10 percent lean will be removed. Trees over 12 inches DBH that have experienced soil disturbance deeper than 6 inches within 30 percent or more of their critical root zone, as defined in the Technical Manual, will be fertilized in accordance with professional practice using a low nitrogen, slow release fertilizer. Any resulting canopy gaps greater than 1,000 square feet will be filled by supplemental planting at a density of at least 2 seedlings per 100 square feet. The seedlings will be of species identified as dominant or codominant for the corresponding stand in the

FSD. Any other actions deemed necessary by the professional to protect the overall forest integrity, such as disease or insect control actions, will be performed.

Forest retention areas will be permanently protected through a conservation easement. A copy of this document will be provided to the DNR Forest Service when prepared.

REFORESTATION AND AFFORESTATION

Because UNE proposes an area of Forest Retention exceeding the "Breakeven Point" defined by the Maryland Forest Conservation Act, no Reforestation or Afforestation is proposed for purposes of complying with the Conservation Act.

REFERENCES

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Maryland DNR (Department of Natural Resources), 1997. *State Forest Conservation Technical Manual.* Third Edition, Ginger Page Howell and Todd Ericson, Editors.

Tetra Tech, 2007a. *Final Flora Survey Report for Proposed UniStar Nuclear Project Area, Calvert Cliffs Nuclear Power Plant Site, Calvert County, Maryland*, May 2007.

Tetra Tech, 2007b. *Final Wetland Delineation Report for Proposed UniStar Nuclear Project Area, Calvert Cliffs Nuclear Power Plant Site, Calvert County, Maryland*, May 2007.

Table 1
Summary of Proposed Impacts to Forest Stands
Proposed Calvert Cliffs Nuclear Power Plant Unit 3 Project Site
Calvert Cliffs Nuclear Power Plant Site, Lusby, Maryland
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Stand	Forest Stand Description	Total Tract	Net Tract (Excludes CBCA)		
		Existing Forest*	Existing Forest*	Cleared Forest*	Retained Forest*
1-1	Sweetgum – Tulip Poplar Forest	13.4	12.5	12.5	0.0
1-2	Sweetgum – Tulip Poplar Forest	14.1	14.0	14.0	0.0
1-3	Sweetgum – Tulip Poplar Forest	12.6	0.2	0.2	0.0
1-4	Sweetgum – Tulip Poplar Forest	11.3	0.7	0.7	0.0
1-5	Sweetgum – Tulip Poplar Forest	8.8	0.0	N/A	N/A
2-1	Chestnut Oak Forest	4.8	4.8	4.8	0.0
2-2	Chestnut Oak Forest	6.9	6.4	6.4	0.0
2-3	Sweetgum – Tulip Poplar Forest	6.1	0.0	N/A	N/A
2-4	Chestnut Oak Forest	5.4	0.0	N/A	N/A
2-5	Sweetgum – Tulip Poplar Forest	6.6	1.5	1.5	0.0
2-6	Sycamore – Sweetgum – American Elm Forest	0.8	0.4	0.4	0.0
2-7	Chestnut Oak Forest	17.3	0.0	0.0	0.0
2-8	Chestnut Oak Forest	12.2	5.7	2.8	2.8
2-9	Chestnut Oak Forest	8.1	8.1	7.9	0.2
2-10	Sycamore – Sweetgum – American Elm Forest	0.3	0.3	0.2	0.1
2-11	Sycamore – Sweetgum – American Elm Forest	0.4	0.4	0.4	0.0
2-12	Sycamore – Sweetgum – American Elm Forest	0.2	0.2	0.2	0.0
2-13	Virginia Pine Forest	0.7	0.7	0.7	0.0
4-1	Virginia Pine – Oak Forest	29.0	29.0	21.5	7.5
4-2	Chestnut Oak Forest	8.2	8.2	8.2	0.0
4-3	Sycamore – Sweetgum – American Elm Forest	4.1	4.1	3.6	0.5
4-4	Chestnut Oak Forest	9.4	9.4	9.4	0.0
4-5	Virginia Pine – Oak Forest	4.5	4.5	4.5	0.0
4-6	Chestnut Oak Forest	7.2	7.2	7.2	0.0
4-7	Chestnut Oak Forest	21.6	21.6	18.1	3.5
4-8	Virginia Pine – Oak Forest	3.2	3.2	3.2	0.0
4-9	Chestnut Oak Forest	30.7	30.7	25.4	5.3
4-10	Virginia Pine – Oak Forest	9.1	9.1	9.1	0.0
4-11	Sycamore – Sweetgum – American Elm Forest	0.9	0.9	0.8	0.1
4-12	Sycamore – Sweetgum – American Elm Forest	1.6	1.6	1.2	0.4
4-13	Chestnut Oak Forest	21.4	21.4	19.4	2.0
4-14	Sycamore – Sweetgum – American Elm Forest	5.3	5.3	0.0	5.3
4-15	Chestnut Oak Forest	13.2	13.2	5.4	7.8
4-16	Chestnut Oak Forest	2.0	2.0	0.9	1.1
6-1	Black Locust Forest	8.6	8.6	7.5	1.1
6-2	Chestnut Oak Forest	3.2	3.2	1.6	1.6
7-1	Sweetgum – Tulip Poplar Forest	3.7	3.7	0.8	2.9
7-2	Sweetgum – Tulip Poplar Forest	16.8	16.8	4.6	12.2
7-3	Virginia Pine – Oak Forest	1.7	1.7	0.1	1.6
7-4	Sycamore – Sweetgum – American Elm Forest	2.3	2.3	0.3	2.0
7-5	Black Locust Forest	1.6	1.6	0.0	1.6
7-6	Sycamore – Sweetgum – American Elm Forest	0.4	0.4	0.1	0.3
7-7	Chestnut Oak Forest	8.5	8.5	0.9	7.6
7-8	Chestnut Oak Forest	13.4	13.4	2.9	10.5

Table 1
Summary of Proposed Impacts to Forest Stands
Proposed Calvert Cliffs Nuclear Power Plant Unit 3 Project Site
Calvert Cliffs Nuclear Power Plant Site, Lusby, Maryland
Page 2 of 2

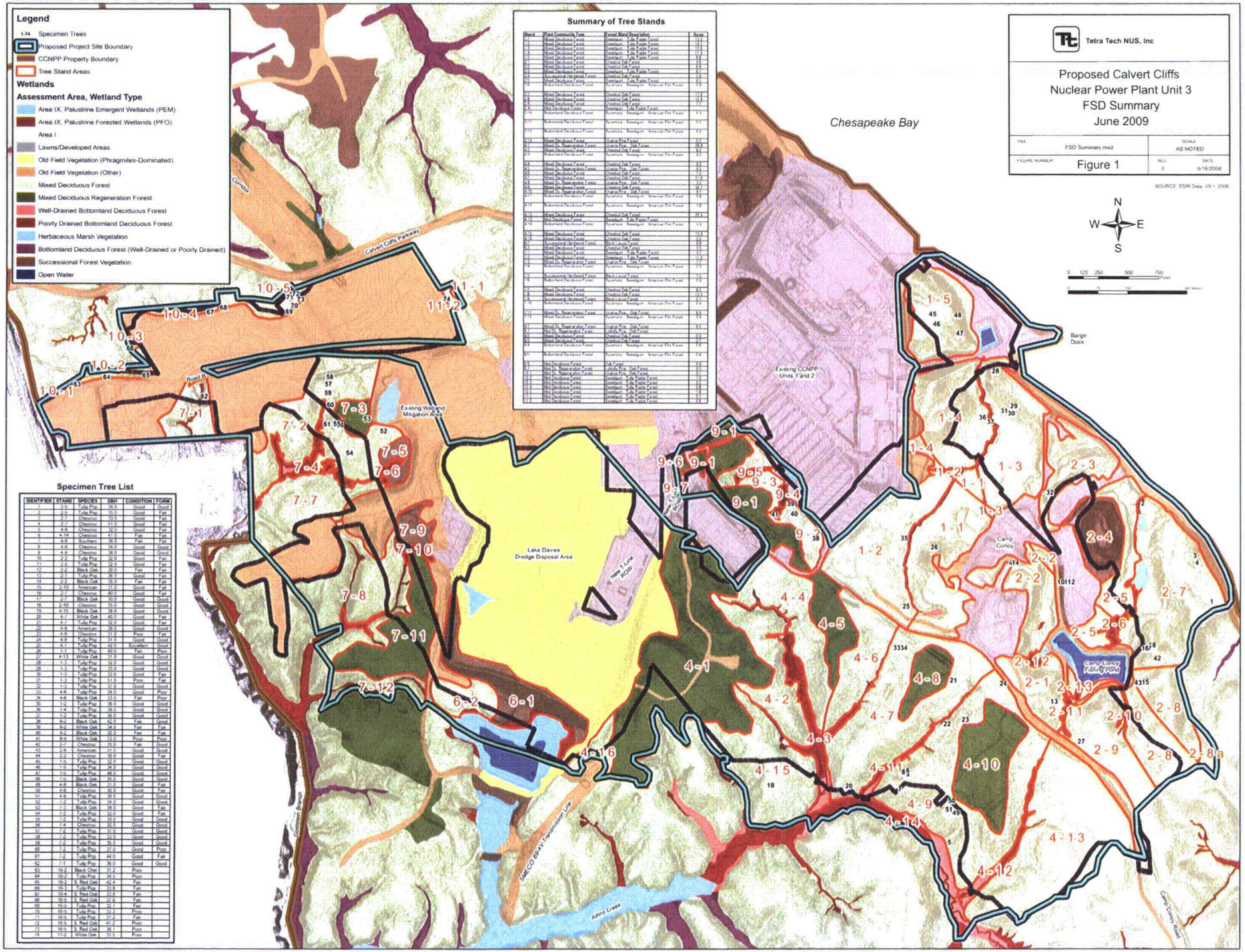
Stand	Forest Stand Description	Total Tract	Net Tract (Excludes CBCA)		
		Existing Forest	Existing Forest	Cleared Forest	Retained Forest
7-9	Black Locust Forest	2.1	2.1	0.2	1.9
7-10	Sycamore – Sweetgum – American Elm Forest	0.4	0.4	0.1	0.3
7-11	Virginia Pine – Oak Forest	8.9	8.9	2.7	6.2
7-12	Sycamore – Sweetgum – American Elm Forest	3.3	3.3	0.0	3.3
9-1	Virginia Pine – Oak Forest	7.9	7.9	6.8	1.1
9-2	Chestnut Oak Forest	2.3	2.3	2.3	0.0
9-3	Chestnut Oak Forest	2.7	2.7	2.7	0.0
9-4	Sycamore – Sweetgum – American Elm Forest	0.4	0.4	0.4	0.0
9-5	Sycamore – Sweetgum – American Elm Forest	0.4	0.4	0.4	0.0
Additional Areas of Chestnut Oak Forest		4.6	4.6	4.6	0.0
9-6	Oak Forest	0.4	0.4	0.4	0.0
9-7	Loblolly Pine – Oak Forest	0.3	0.3	0.3	0.0
10-1	Virginia Pine – Oak Forest	0.1	0.1	0.1	0.0
10-2	Sweetgum – Tulip Poplar Forest	1.0	1.0	0.9	0.1
10-3	Sweetgum – Tulip Poplar Forest	0.3	0.3	0.1	0.2
10-4	Sweetgum – Tulip Poplar Forest	0.8	0.8	0.7	0.1
10-5	Sweetgum – Tulip Poplar Forest	1.8	1.8	1.6	0.2
11-1	Sweetgum – Tulip Poplar Forest	0.1	0.1	0.1	0.0
11-2	Sweetgum – Tulip Poplar Forest	0.6	0.6	0.5	0.1
Totals		400	325.9	234.3	91.5

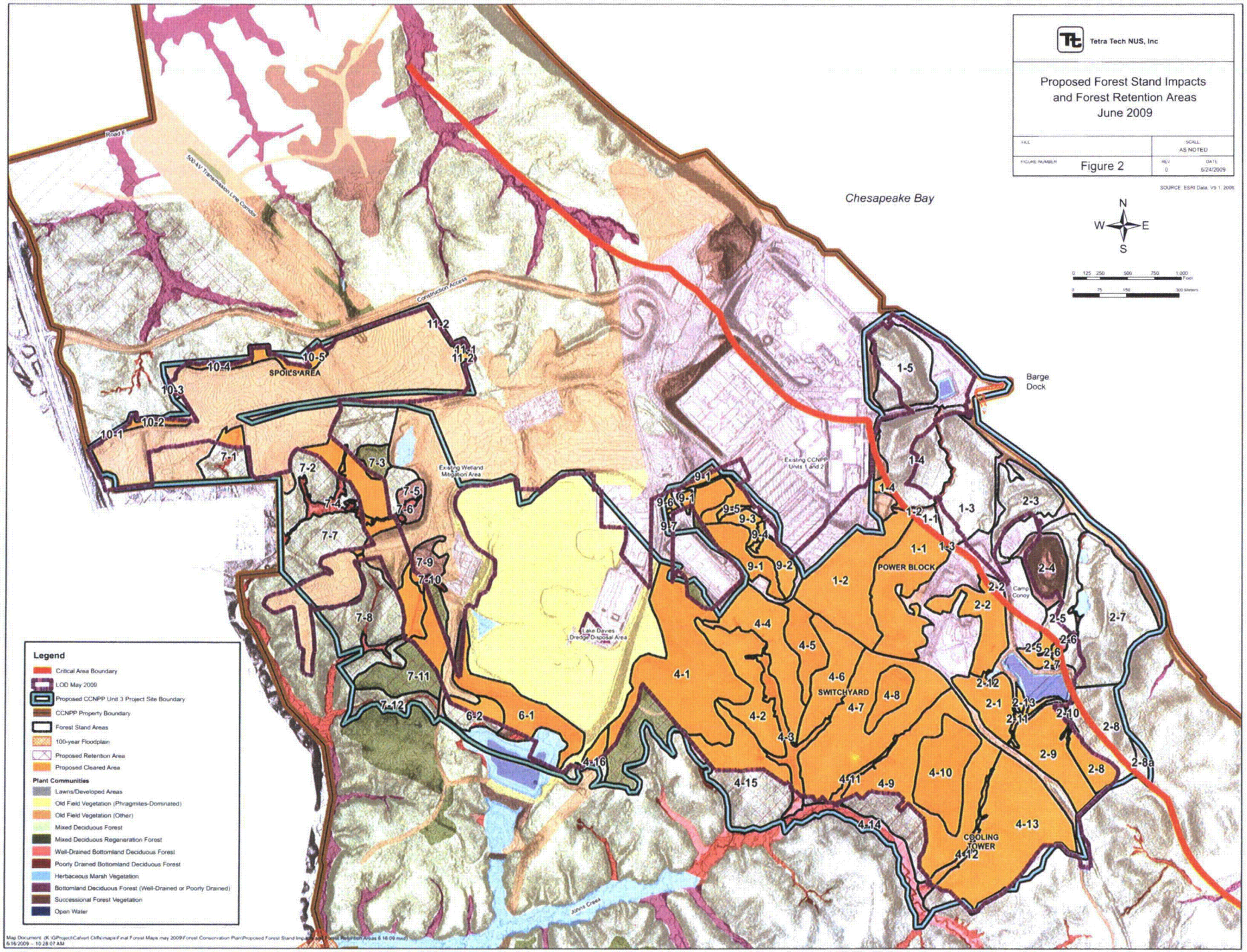
* Area and Linear Distance Calculations are Approximate; Final Calculations Will be Provided in the Final Site Grading Plan

Table 2
Summary of Proposed Impacts to Other Priority Areas
Proposed Calvert Cliffs Nuclear Power Plant Unit 3 Project Site
Calvert Cliffs Nuclear Power Plant Site, Lusby, Maryland
Page 1 of 1

Priority Area Type	Net Tract (Excludes CBCA)		
	Existing Condition (within the Net Tract or Project Site)*	**Impacts (within the Limits of Disturbance (LOD)***	**Avoidance, Minimization, and Mitigation Measures**
100-Year Floodplains	No Mapped 100-Year Floodplains Occur Within the Project Site	N/A	N/A
Wetlands, Streams, and Buffers (50-foot)	234	19.4	Avoidance of 92% of wetland area; mitigation to include ratio of 3:1 as described in the Calvert Cliffs Joint Wetland Permit Application
Steep Slopes (25 Percent)	Occur in areas leading to riparian zones	Reduced impact from project layout	Avoidance of 39% of steep slopes
Contiguous Forest	234 acres	234	Avoidance not possible. Greater impacts to contiguous forest and/or critical area would occur if facility moved in any direction.
Rare, Threatened, and Endangered Species	~ 1 acre area of showy goldenrod (state threatened) in Camp Conoy; Several individuals of Shumard oak along Johns Creek	~ 1 acre of showy goldenrod; avoidance of Shumard oak	Mitigation of showy goldenrod will include relocation; mitigation expected to bring impacts to below a level of significance
Trees Associated with Historic Features	Refer to Calvert Cliffs Unit 3 Historic Resources Report for a description of historic resources found within the property	Refer to Calvert Cliffs Unit 3 Historic Resources Report for potential impacts to historic resources	Refer to Calvert Cliffs Unit 3 Historic Resources Report for mitigation for impacts to historic resources
Large Diameter Trees	Total of 74 individuals evenly distributed across stands	Approximately 30 large diameter trees	Impacts to large diameter trees were reduced to the extent practicable

* Area and Linear Distance Calculations are Approximate; Final Calculations Will be Provided in the Final Site Grading Plan

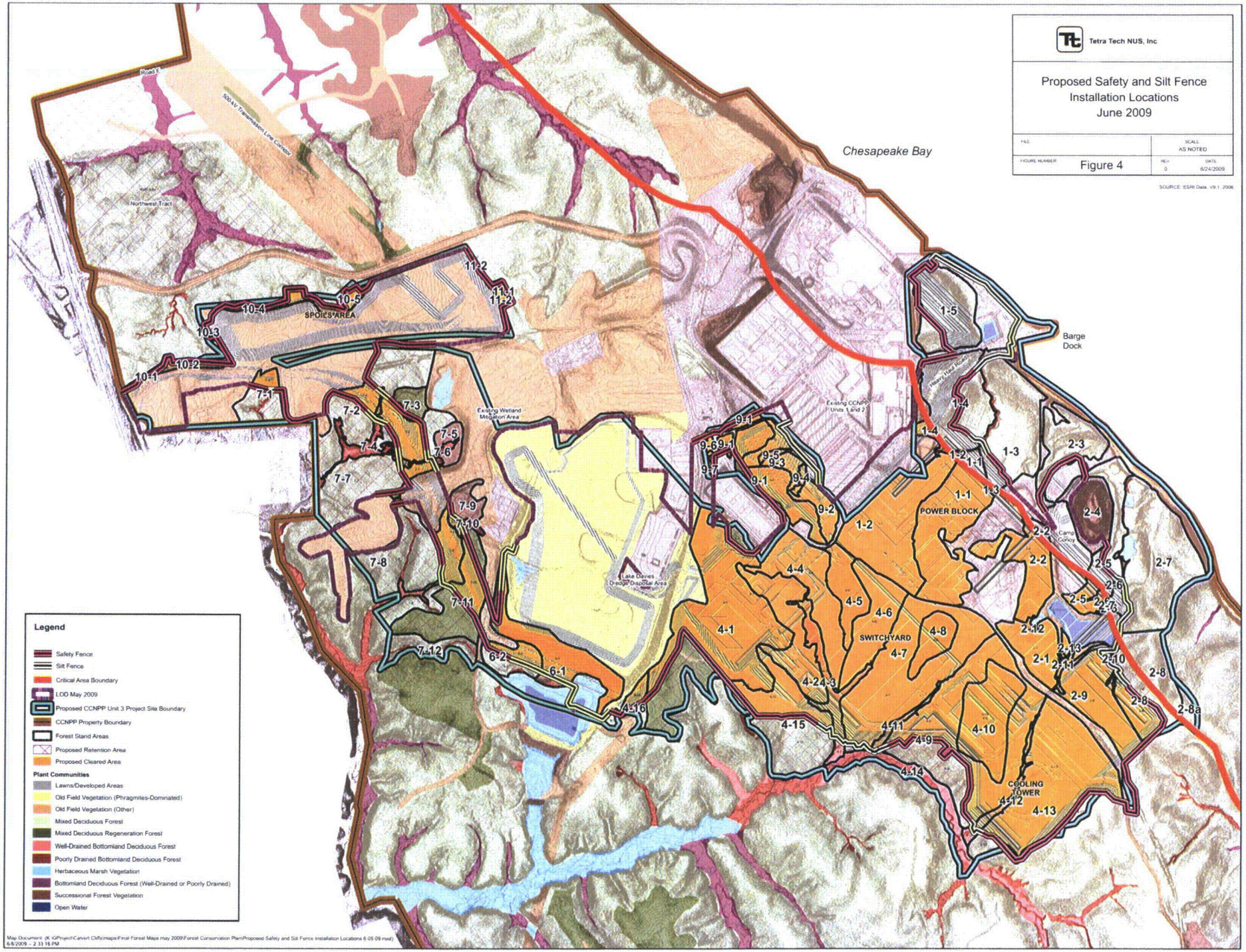

Legend
Specimen Trees
Proposed Project Site Boundary
CCNPP Property Boundary
Tree Stand Areas
Wetlands
Assessment Area, Wetland Type
Area IX, Palustrine Emergent Wetlands (PEM)
Area IX, Palustrine Forested Wetlands (PFO)
Area I
Lawns/Developed Areas
Old Field Vegetation (Phragmites-Dominated)
Old Field Vegetation (Other)
Mixed Deciduous Forest
Mixed Deciduous Regeneration Forest
Well-Drained Bottomland Deciduous Forest
Poorly Drained Bottomland Deciduous Forest
Herbaceous Marsh Vegetation
Bottomland Deciduous Forest (Well-Drained or Poorly Drained)
Successional Forest Vegetation
Open Water
Summary of Tree Stands
Specimen Tree List
Tetra Tech NUS, Inc
Proposed Calvert Cliffs
Nuclear Power Plant Unit 3
FSD Summary
June 2009
FILE: FSD Summary.mxd
SCALE: AS NOTED
FIGURE NUMBER: Figure 1
REV: 0
DATE: 6/16/2006
SOURCE: ESRI Data VS 1, 2006
Chesapeake Bay
Calvert Cliffs Parkway
Existing CCNPP Units 1 and 2
Barge Dock
Existing Wetland Mitigation Area
Lake Davies Dredge Disposal Area
New T-Line ROW
Camp Conoy
Camp Conoy Public Access
Goldman Branch
SMECO 69kV Transmission Line
Johns Creek
Camp Conoy Road
N
W
E
S


Tetra Tech NUS, Inc
Proposed Forest Stand Impacts and Forest Retention Areas June 2009
Figure 2
SCALE: AS NOTED
REV: 0
DATE: 6/24/2009
SOURCE: ESRI Data, VS 1: 2006
Chesapeake Bay
Road F
500 kV Transmission Line Corridor
Construction Access
SPOILS AREA
Existing Wetland Mitigation Area
Existing CCNPP Units 1 and 2
Barge Dock
POWER BLOCK
SWITCHYARD
COOLING TOWER
Camp Conoy
Lake Davies Dredge Disposal Area
Johns Creek
Legend
Critical Area Boundary
LOD May 2009
Proposed CCNPP Unit 3 Project Site Boundary
CCNPP Property Boundary
Forest Stand Areas
100-year Floodplain
Proposed Retention Area
Proposed Cleared Area
Plant Communities
Lawns/Developed Areas
Old Field Vegetation (Phragmites-Dominated)
Old Field Vegetation (Other)
Mixed Deciduous Forest
Mixed Deciduous Regeneration Forest
Well-Drained Bottomland Deciduous Forest
Poorly Drained Bottomland Deciduous Forest
Herbaceous Marsh Vegetation
Bottomland Deciduous Forest (Well-Drained or Poorly Drained)
Successional Forest Vegetation
Open Water

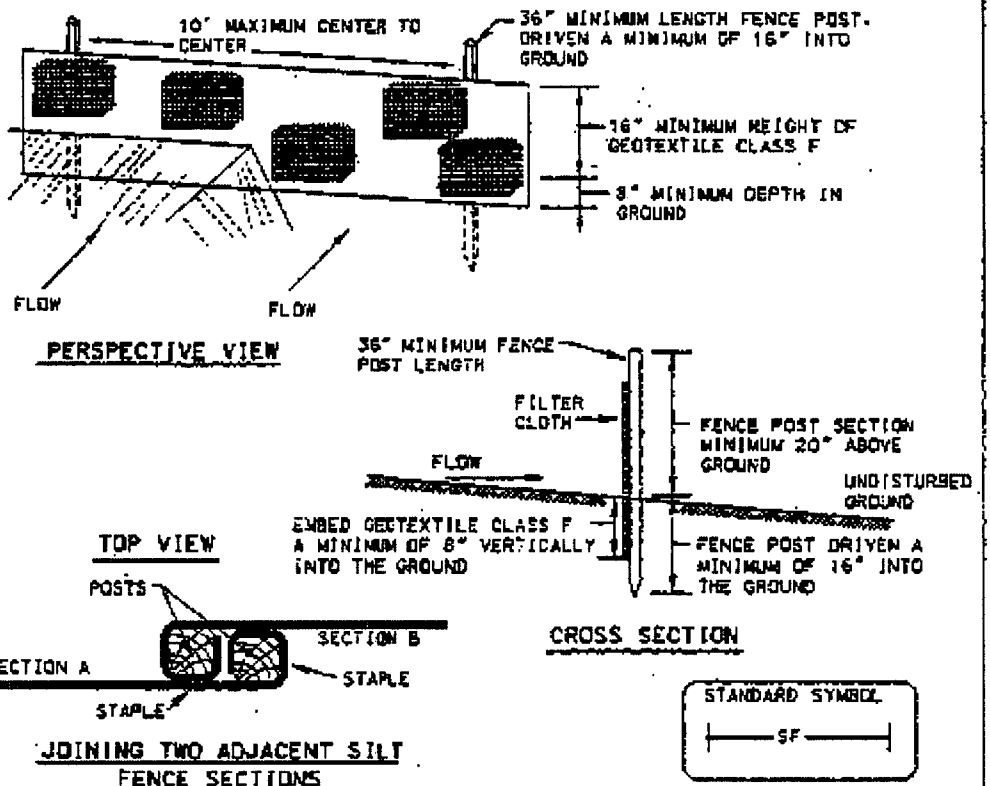
Note: Use 0 for all negative numbers that result from the calculations.				
Net Tract Area				
A.	Total Tract Area		A =	657.47
B.	Deductions (Critical Area, area restricted by local ordinance or program)		B =	97.79
C.	Net Tract Area	Net Tract Area = Total Tract Area (A) - Deductions (B)	C =	559.68
Land Use Category				
D.	Afforestation Threshold	(Net Tract Area [C] X 15 %)	D =	83.95
E.	Conservation Threshold	(Net Tract Area [C] X 15 %)	E =	83.95
Existing Forest Cover				
F.	Existing Forest Cover within the Net Tract Area		F =	384.54
G.	Area of Forest Above Conservation Threshold		G =	300.59
	If the Existing Forest Cover (F) is greater than the Conservation Threshold (E), then G = F - E; otherwise, G = 0.			
Breakeven Point				
H.	*Breakeven Point* (Amount of forest that must be retained so that no mitigation is required)		H =	144.07
	(1) If the Area of Forest Above Conservation Threshold (G) is greater than 0, then H = (0.2 X the Area of Forest Above Conservation Threshold (G)) + the Conservation Threshold (E);			
	(2) If the Area of Forest Above Conservation Threshold (G) is equal to 0, then H = Existing Forest Cover (F)			
I.	*Forest Clearing Permitted Without Mitigation*		I =	240.47
	I = Existing Forest Cover (F) - Breakeven Point (H)			
Proposed Forest Clearing				
J.	Total Area of Forest to be Cleared		J =	234.30
K.	Total Area of Forest to be Retained		K =	150.24
	K = Existing Forest Cover (F) - Forest to be Cleared (J)			
Planting Requirements				
	If the Total Area of Forest to be Retained (K) is at or above the Breakeven Point (H), no planting is required, and no further calculations are necessary (L=0, M=0, N=0, P=0, Q=0, R=0).			
	Otherwise, calculate the planting requirement(s) as follows.			
L.	*Reforestation for Clearing Above the Conservation Threshold*		L =	0.00
	(1) If the Total Area of Forest to be Retained (K) is greater than the Conservation Threshold (E), then L= the Area of Forest to be Cleared (J) X 0.25;			
	(2) If the Total Area of Forest to be Retained (K) is less than or equal to the Conservation Threshold (E), then L= Area of Forest Above Conservation Threshold (G) X 0.25			
M.	*Reforestation for Clearing Below the Conservation Threshold*		M =	0.00
	(1) If Existing Forest Cover (F) is greater than the Conservation Threshold (E) and the Forest to be Retained (K) is less than or equal to the Conservation Threshold (E), then M= 2.0 X (Conservation Threshold (E) - Forest to be Retained (K))			
	(2) If Existing Forest Cover (F) is less than or equal to the Conservation Threshold (E), then M= 2.0 X Forest to be Cleared (J)			
N.	*Credit for Retention Above the Conservation Threshold*		N =	0.00
	If the area of Forest to be Retained (K) is greater than the Conservation Threshold (E), then N = K - E; Otherwise N = 0			
P.	*Total Reforestation Required* P = L + M - N		P =	0.00
Q.	*Total Afforestation Required*		Q =	0.00
	If Existing Forest Cover (F) is less than the Afforestation Threshold (D), then Q = Afforestation Threshold (D) - Existing Forest Cover (F)			
R.	*Total Planting Requirement* R = P + Q		R =	0.00

Forest Conservation Worksheet

Figure 3


Tetra Tech NUS, Inc
Proposed Safety and Silt Fence Installation Locations June 2009
FILE:
SCALE: AS NOTED
FIGURE NUMBER: Figure 4
REV: 0
DATE: 6/24/2009
SOURCE: ESRI Data, V9.1, 2006
Chesapeake Bay
Road 2
500 kV Transmission Line Corridor
Northwest Tract
SPOILS AREA
Existing Wetland Mitigation Area
Existing CCNPP Units 1 and 2
Heavy Haul Road
Barge Dock
POWER BLOCK
SWITCHYARD
COOLING TOWER
Lake Davies Dredge Disposal Area
Legend
Safety Fence
Silt Fence
Critical Area Boundary
LOD May 2009
Proposed CCNPP Unit 3 Project Site Boundary
CCNPP Property Boundary
Forest Stand Areas
Proposed Retention Area
Proposed Cleared Area
Plant Communities
Lawns/Developed Areas
Old Field Vegetation (Phragmites-Dominated)
Old Field Vegetation (Other)
Mixed Deciduous Forest
Mixed Deciduous Regeneration Forest
Well-Drained Bottomland Deciduous Forest
Poorly Drained Bottomland Deciduous Forest
Herbaceous Marsh Vegetation
Bottomland Deciduous Forest (Well-Drained or Poorly Drained)
Successional Forest Vegetation
Open Water
Map Document: (K:\GProject\Calvert Cliffs\maps\Final Forest Maps may 2009\Forest Conservation Plan\Proposed Safety and Silt Fence Installation Locations 6 05 09.mxd)
6/8/2009 - 2:33:16 PM

DETAIL 22 – SILT FENCE



Construction Specifications

1. Fence posts shall be a minimum of 36" long driven 16" minimum into the ground. Wood posts shall be 1½" x 1½" square (minimum) cut; or 1¾" diameter (minimum) round and shall be of sound quality hardwood. Steel posts will be standard T or U section weighting not less than 1.00 pond per linear foot.

2. Geotextile shall be fastened securely to each fence post with wire ties or staples at top and mid-section and shall meet the following requirements for Geotextile Class F:

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal ft²/ minute (max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322

3. Where ends of geotextile fabric come together, they shall be overlapped, folded and stapled to prevent sediment bypass.

4. Silt Fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reached 50% of the fabric height.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PAGE E - 15 - 2	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

FILE Silt Fence Diagram.mxd	Tetra Tech NUS, Inc	DATE 10/3/08
SOURCE 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control	SILT FENCE INSTALLATION DIAGRAM	FIGURE 5

Attachment 1

Rare Plant Survey Report for Proposed UniStar Nuclear Project Area,
Calvert Cliffs Nuclear Power Plant Site,
Calvert County, Maryland, May 2007

FINAL RARE PLANT SURVEY REPORT

For

Proposed UniStar Nuclear Project Area
Calvert Cliffs Nuclear Power Plant Site
Calvert County, Maryland

Prepared by:
Tetra Tech NUS
20251 Century Blvd., Suite 200
Germantown, Maryland 20874

Principal Investigator: J. Peyton Doub, PWS, CEP

Prepared for:
UniStar Nuclear Development, LLC

May 2007

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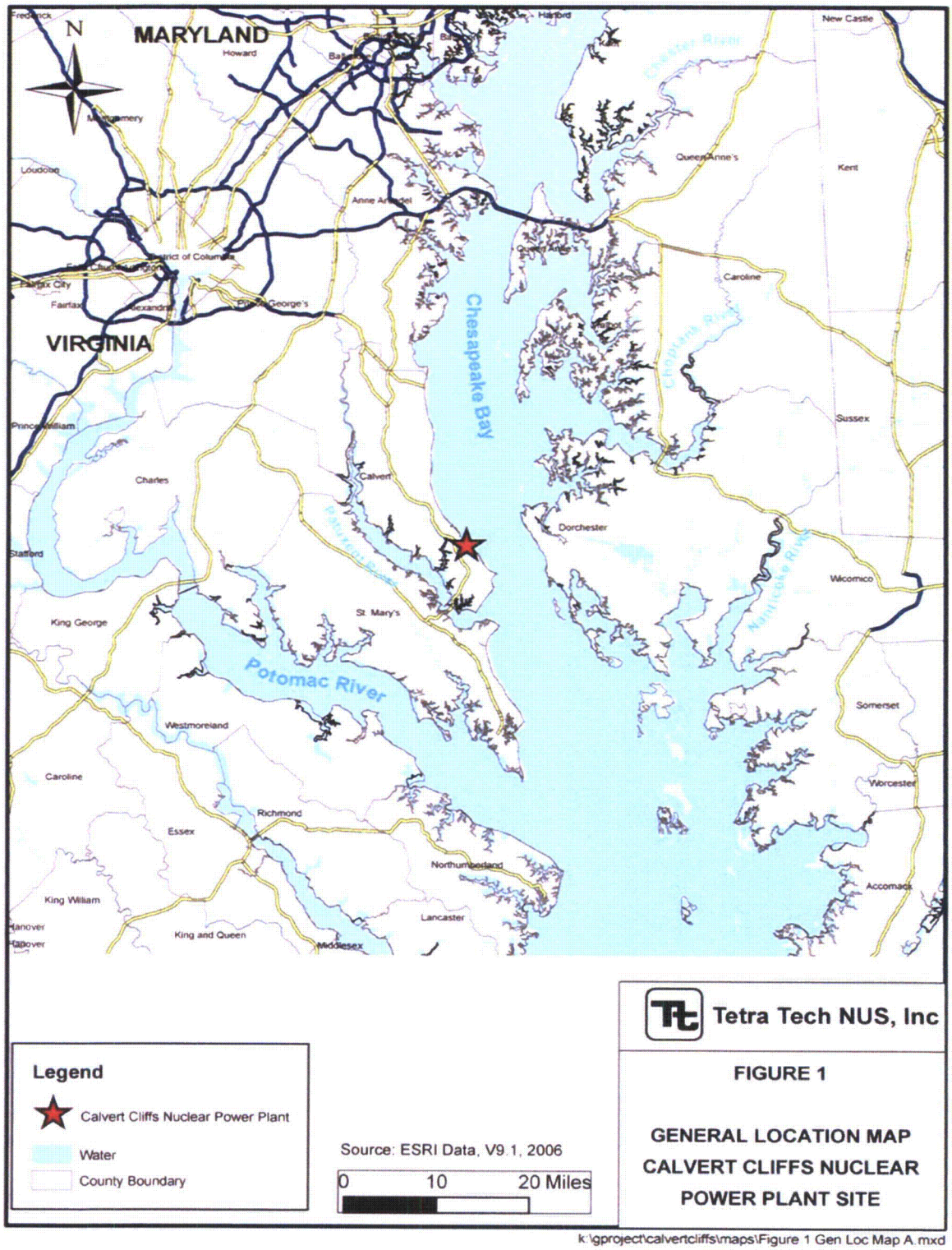
LIST OF PHOTOS

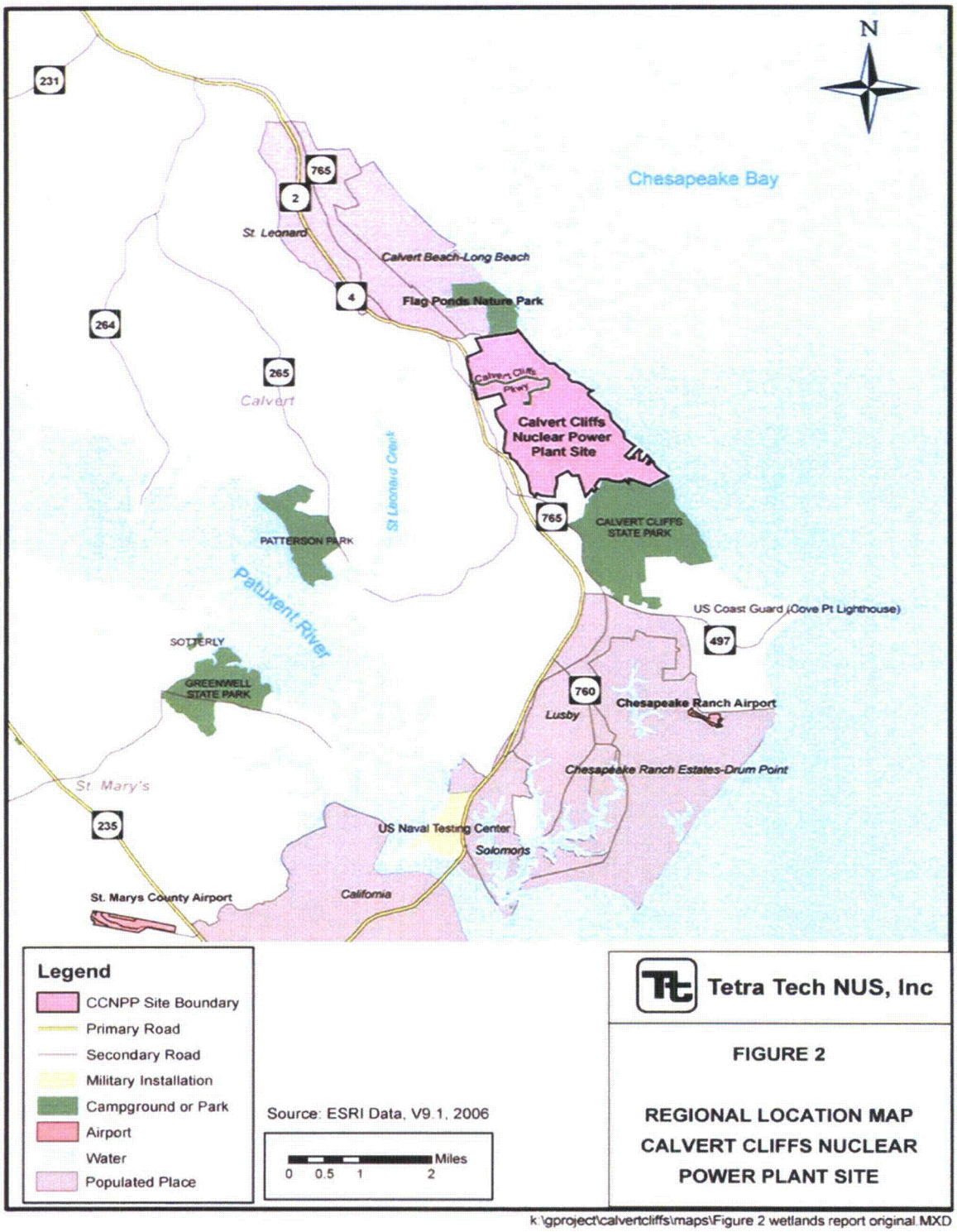
INTRODUCTION

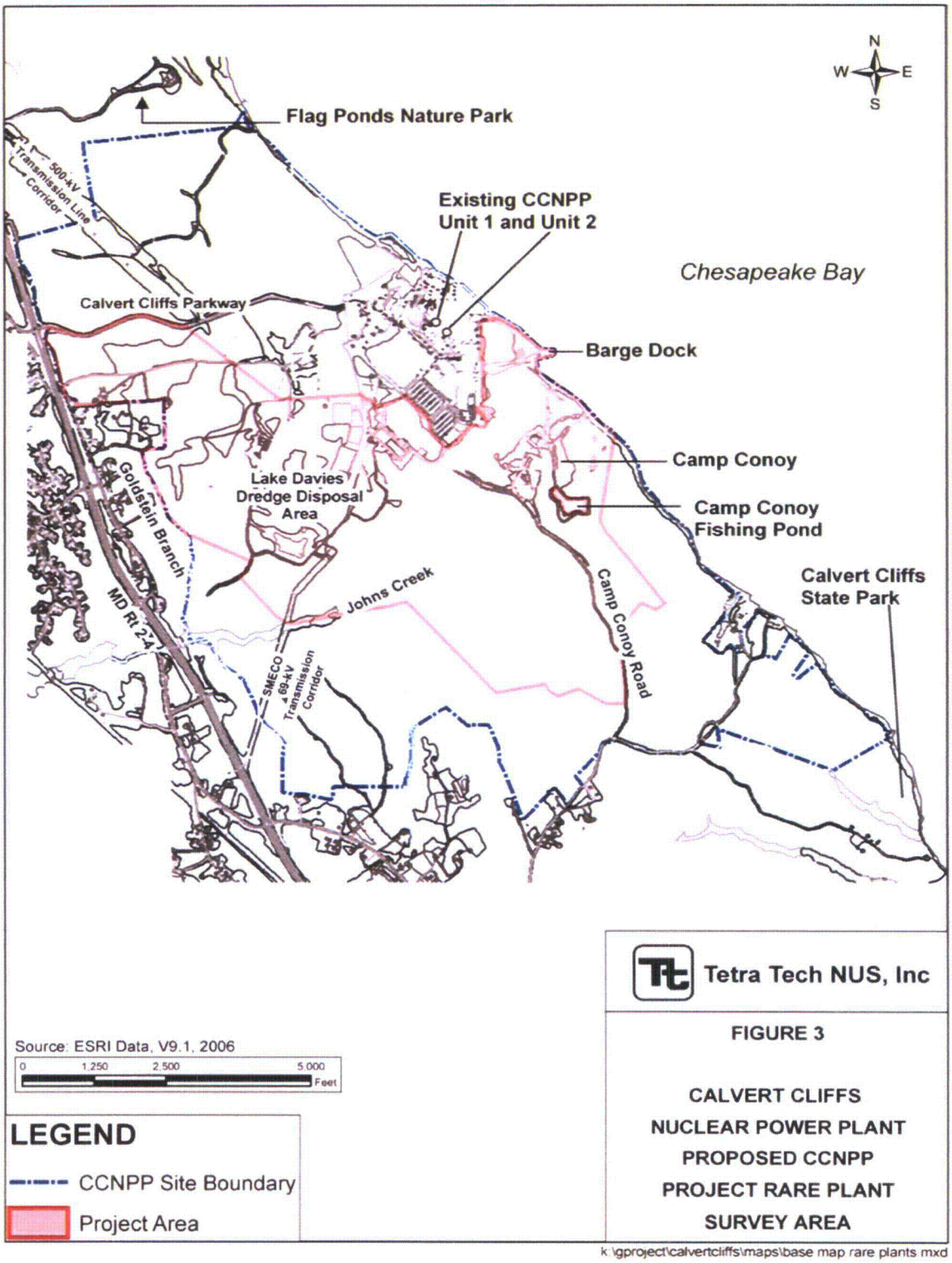
This Rare Plant Report addresses a tract of land on the Calvert Cliffs Nuclear Power Plant (CCNPP) Site in Calvert County, Maryland, where UniStar Nuclear Development, LLC (UniStar) is considering construction of a new nuclear power plant unit. Development of the new plant would require approval by the U.S. Nuclear Regulatory Commission (NRC) of a combined (construction and operating) license application (COLA), including an environmental report (ER), which documents the safety and environmental impact analyses for the facility. Plant development would also require approval by the Maryland Public Service Commission (PSC) of an application for a Certificate of Public Convenience and Necessity (CPCN), which similarly documents environmental impacts. This report provides background data on rare plants intended to support these environmental impact assessments.

The CCNPP Site consists of 2,057 acres (832 hectares) on the western shore of the Chesapeake Bay in Calvert County (Figures 1 and 2). The two existing CCNPP units (Units 1 and 2) are located in the east-central part of the CCNPP Site. The remainder of the CCNPP Site not associated with the existing power plant facilities is predominantly forest with some cleared land. The Chesapeake Bay shoreline (eastern perimeter) consists mostly of steep cliffs with little beach area. South of the existing units is a former recreational area known as Camp Conoy. Camp Conoy is accessed using a single-lane paved roadway (Camp Conoy Road) that runs north from the southern perimeter of the CCNPP Site. Camp Conoy facilities include various cabins, outbuildings, swimming pool, softball field, tennis courts, and a fishing pond formerly used by Constellation employees and their families.

Under current plans, the new generating unit and associated construction and operation-phase facilities would be located within an area of the CCNPP Site south and west of the existing CCNPP Units 1 and 2, termed for convenience in this report the "Project Area" (Figure 3). Elevations in the Project Area range from sea level to nearly 150 feet (46 meters) (USGS 1987). Topography is rolling, dissected by a dendritic pattern of stream valleys. Slopes on the sides of the stream valleys frequently exceed 15 to 25 percent. Slopes elsewhere are gentle. Most lands east of Camp Conoy Road drain east, directly into the Chesapeake Bay. Most lands west of Camp Conoy Road drain into a system of headwaters that coalesce to form the west-flowing Johns Creek. John's Creek flows roughly west and exits the western perimeter of the Project Area and then the western perimeter of the CCNPP Site. It then flows west to St. Leonard Creek, a tidal tributary of the Patuxent River. Lands in the northern part of the Project Area drain to Goldstein Branch, a tributary of Johns Creek (USGS, 1987). Tidal water on the CCNPP Site is limited to the Chesapeake Bay shoreline; all streams in the Project Area, and elsewhere on the CCNPP Site, are non-tidal (MDNR, 2005 and onsite observations in 2006).


N
MARYLAND
VIRGINIA
Chesapeake Bay
Potomac River
Howard
Loudoun
Fairfax
Alexandria
Prince William
Charles
Calvert
Stafford
King George
St. Mary's
Westmoreland
Caroline
Essex
Richmond
King William
King and Queen
Middlesex
Lancaster
Northumberland
Dorchester
Caroline
Queen Anne's
Kent
New Castle
Sussex
Wicomico
Somerset
Worcester
Accomack
Legend
Calvert Cliffs Nuclear Power Plant
Water
County Boundary
Source: ESRI Data, V9.1, 2006
0 10 20 Miles
Tetra Tech NUS, Inc
FIGURE 1
GENERAL LOCATION MAP
CALVERT CLIFFS NUCLEAR
POWER PLANT SITE
k:\gproject\calvertcliffs\maps\Figure 1 Gen Loc Map A.mxd


N
231
765
2
St. Leonard
Chesapeake Bay
Calvert Beach-Long Beach
4
Flag Ponds Nature Park
264
265
Calvert
Calvert Cliffs Pkwy
Calvert Cliffs Nuclear Power Plant Site
St Leonard Creek
765
CALVERT CLIFFS STATE PARK
PATTERSON PARK
Patuxent River
US Coast Guard (Cove Pt Lighthouse)
497
SOTTERLY
GREENWELL STATE PARK
760
Chesapeake Ranch Airport
Lusby
Chesapeake Ranch Estates-Drum Point
St. Mary's
235
US Naval Testing Center
Solomons
St. Marys County Airport
California
Legend
CCNPP Site Boundary
Primary Road
Secondary Road
Military Installation
Campground or Park
Airport
Water
Populated Place
Source: ESRI Data, V9.1, 2006
Miles
0 0.5 1 2
Tetra Tech NUS, Inc
FIGURE 2
REGIONAL LOCATION MAP
CALVERT CLIFFS NUCLEAR
POWER PLANT SITE
k:\gproject\calvertcliffs\maps\Figure 2 wetlands report original.MXD


N
W
E
S
Flag Ponds Nature Park
500-kV Transmission Line Corridor
Existing CCNPP Unit 1 and Unit 2
Chesapeake Bay
Calvert Cliffs Parkway
Barge Dock
Camp Conoy
Lake Davies / Dredge Disposal Area
Camp Conoy Fishing Pond
Goldstein Branch
MD Rt 2-4
Johns Creek
Camp Conoy Road
Calvert Cliffs State Park
SMECO 69-kV Transmission Corridor
Source: ESRI Data, V9.1, 2006
0 1,250 2,500 5,000 Feet
LEGEND
CCNPP Site Boundary
Project Area
Tetra Tech NUS, Inc
FIGURE 3
CALVERT CLIFFS
NUCLEAR POWER PLANT
PROPOSED CCNPP
PROJECT RARE PLANT
SURVEY AREA
k:\gproject\calvertcliffs\maps\base map rare plants.mxd

GENERAL VEGETATION DESCRIPTION

An accompanying flora survey report describes and maps the types of vegetation (plant community types) on the CCNPP Site (Tetra Tech NUS, 2007a). The following information is summarized from that report. According to the report, the vegetation can be broadly differentiated into the following plant community types (See Tetra Tech NUS, 2007a for a map of the plant community types):

Lawns and Developed Areas. Lawns and developed areas occur in the east-central part of the CCNPP Site (around the two existing reactor units) and in Camp Conoy. Camp Conoy includes several athletic fields and other lawn areas surrounding recreational facilities. Other than scattered trees and shrubs planted as ornamental landscaping, the lawns consist only of a groundcover stratum. Most of the lawns consist of cool season grasses (grasses that typically seed during spring and fall) such as tall fescue (*Festuca arundinacea*), bluegrass (*Poa pratensis*), large crabgrass (*Digitaria sanguinalis*), and Bermuda grass (*Cynodon dactylon*). Common broadleaf weeds typical of lawns are also present, such as white clover (*Trifolium repens*), broadleaf plantain (*Plantago major*), dandelion (*Taraxicum officinale*), and yellow hawkweed (*Hieracium pretense*).

Old Field. Two main areas of old field vegetation occur on the CCNPP Site. The largest is located on the dredge spoils in the central part of the site. The dredge spoils are covered by a dense stand of the invasive exotic grass phragmites (*Phragmites australis*). Phragmites is a perennial grass that can grow to more than 10 feet (3 meters) tall and typically infests brackish and fresh tidal and non-tidal marshes. It does not typically occur in well-drained old fields but is common on well-drained dredge spoil piles in coastal areas. Its presence on the dredge spoil piles is likely a result of propagules (seeds and rhizome fragments) contained in the dredge spoils. Other plants typical of old fields, such as common blackberry (*Rubus allegheniensis*) and tall fescue (*Festuca arundinacea*), are also present but are not as prevalent as phragmites.

The other old field vegetation is located in scattered forest clearings around the perimeter of the dredge spoils and in other developed areas, on previously farmed land, on transmission corridors, and along roadsides. Many such areas were disturbed during the initial construction of the existing reactors and various support facilities, and vegetation in many of these areas is maintained (e.g., by occasional mowing). Vegetation in these areas is dominated by tall fescue, sericea lespendeza (*Lespedeza cuneata*), common blackberry, Canada goldenrod (*Solidago canadensis*), and asters (*Aster* sp.).

Mixed Deciduous Forest. Most forested uplands on the CCNPP Site support deciduous forest dominated by tulip poplar (*Liriodendron tulifera*); chestnut oak (*Quercus prinus*); white oak (*Quercus alba*); red oaks such as black oak (*Quercus velutina*), southern red oak (*Quercus falcata*), and scarlet oak

(*Quercus coccinia*); American beech (*Fagus grandifolia*); and Virginia pine (*Pinus virginiana*). Other canopy trees include hickories such as pignut hickory (*Carya glabra*) and bitternut hickory (*Carya cordiformis*), red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), swamp chestnut oak (*Quercus michauxii*), and black gum (*Nyssa sylvatica*). The forest understory consists of dense patches of mountain laurel (*Kalmia latifolia*), pawpaw (*Asimina trilobata*), and American holly (*Ilex opaca*), with scattered but frequent saplings of canopy species. Ground cover is sparse except where recently fallen trees have left gaps in the tree canopy. Scattered patches of the following species are present in the groundcover: partridgeberry (*Mitchella repens*), Christmas fern (*Polystichum acrostichoides*), common violet (*Viola papilionacea*), and large whorled pogonia (*Isotria verticillata*).

Mixed Deciduous Regeneration Forest. Several areas of relatively level highlands that formerly supported mixed deciduous forest (described above) have been subjected to timber harvest activities within the past 10-30 years. These areas presently support dense thickets of deciduous trees and Virginia pines. The deciduous trees consist of tulip poplar, oaks, sweet gum, and red maple. Virginia pine is generally more frequent in the regenerating forest than in adjoining areas of mature mixed deciduous forest. The regenerating forest lacks a distinct understory, but does contain scattered mountain laurel and American holly. Little groundcover is present other than along fire roads or in other small openings.

Well-Drained Bottomland Deciduous Forest. Areas of well-drained soils in lowlands adjoining Johns Creek, Goldstein Branch, their headwaters, and other streams support bottomland deciduous forest dominated by tulip poplar, American beech, sweet gum, black gum, and red maple. This vegetation represents an ecotone (transition) between the mixed deciduous forest on the adjoining upland slopes and the bottomland hardwood forest in wetter areas closer to the stream channel. The understory is generally sparse, although some mountain laurel and American holly are present. While groundcover is sparse in many areas of well-drained bottomland deciduous forest, expansive dense patches of New York Fern (*Thelypteris noveboracensis*) occur, even in areas of dense canopy cover.

Poorly Drained Bottomland Deciduous Forest. Areas of poorly-drained, seasonally saturated soils in lowlands adjoining Johns Creek, Goldstein Branch, their headwaters, and other streams support bottomland hardwood forest dominated by red maple, sweet gum, and black gum. The shrub layer is generally sparse. The groundcover is dense throughout, dominated by ferns such as New York Fern, sensitive fern (*Onoclea sensibilis*), and royal fern (*Osmunda regalis*); sedges and rushes such as tussock sedge (*Carex stricta*), eastern bur-reed (*Sporangium americanum*), and soft rush (*Juncus effusus*); and forbs such as lizard tail (*Saururus cernuus*) and skunk cabbage (*Symplocarpus foetida*).

Herbaceous Marsh Vegetation. Herbaceous marsh vegetation occurs throughout much of the broad bottomland areas adjoining Johns Creek as well as in localized gaps in the forest cover in the narrower bottomlands adjoining the headwaters of Johns Creek, Goldstein Branch, and other streams. This vegetation is dominated in many places by phragmites. Other areas of herbaceous marsh vegetation are dominated by sedges, rushes, and bulrushes; lizard tail, which forms localized dense patches; and various other wetland forbs such as dotted smartweed (*Polygonum punctatum*), Pennsylvania smartweed (*Polygonum pensylvanicum*), jewelweed (*Impatiens capensis*), and halberd-leaved tearthumb (*Polygonum arifolium*). These areas include a marshy fringe surrounding the shore of Camp Conoy Fishing Pond, two smaller impoundments on the stream carrying the outflow from Camp Conoy Fishing Pond to the Chesapeake Bay, a constructed wetland (Wetland Mitigation Area) in an old field area west of the existing facilities, and a marshy fringe surrounding a stormwater detention pond immediately west of the CCNPP Barge Dock on the Chesapeake Bay.

Successional Forest Vegetation. Scattered areas on the CCNPP Site support forest cover dominated by fast-growing hardwoods such as black locust (*Robinia pseudoacacia*), black cherry (*Prunus serotina*), sweet gum, big-tooth aspen (*Populus grandidentata*) and pines such as Virginia pine and loblolly pine (*Pinus taeda*). All are native, fast-growing trees that rapidly form patches of forest cover in old fields, waste areas, roadsides, and fence rows in eastern and central Maryland (Brown and Brown, 1972). Other native tree species with scattered seedlings and saplings in old field vegetation include black cherry (*Prunus serotina*), eastern redcedar (*Juniperus virginiana*), and sweet gum (*Liquidambar styraciflua*). Non-native tree species present as scattered seedlings and saplings in successional forest vegetation on the Project Site include tree of heaven (*Ailanthus altissima*) and paulownia (*Paulownia tomentosa*). Although both tree species are listed as invasive exotic plants by the State of Maryland (MDNR, 1997), neither has formed dense patches on the Project Site.

RARE PLANT SURVEY METHODOLOGY

In June 2006, UniStar requested an Environmental Review from the Maryland Department of Natural Resources (MDNR) Natural Heritage Program (NHP) for federally listed and state-listed rare, threatened, and endangered species and critical habitats on the CCNPP Site. The Environmental Review letter response, dated July 31, 2006 (MDNR 2006), noted only one plant, the spurred butterfly-pea (*Centrosema virginianum*), for which a record exists for an occurrence in an open area along a fire road in the western part of the CCNPP site, south of Johns Creek. Although the NHP did not provide a map of the recorded location, the verbal description of the location in the letter indicates that it is south and west of Johns Creek, in the southwestern part of the CCNPP Site and southwest of the Project Area.

Because the state had not previously conducted field surveys for rare plants on the CCNPP Site, UniStar directed Tetra Tech to inspect the Project Area for the possible presence of each threatened, endangered, or rare plant species recognized by the NHP for Calvert County. That list, which was last updated by the NHP in May 2004 (MDNR, 2004), is provided in Table 1. Table 1 provides information from *Gray's Manual of Botany* (Fernald, 1970) on the favored habitats and normal flowering seasons for each species on the state list for Calvert County.

J. Peyton Doub, PWS, CEP, of Tetra Tech performed three field visits to the Project Area specifically to look for the possible presence of the Table 1 plant species in the Project Area. The Project Area, which corresponds to the area where a wetland delineation was conducted to support the ER (Tetra Tech NUS, 2007b), was broadly defined early in the project planning process to include all land areas on the CCNPP Site that could potentially be subject to ground disturbance by construction of the proposed reactor units and permanent or temporary appurtenant facilities once the design was finalized. The first visit was on July 31 and August 1, 2006 and focused on looking for plants shown in Table 1 as easiest to identify in summer (summer-flowering herbaceous plants, based on information from Fernald, 1970). The second visit was on October 12 and 13, 2006 and focused on looking for plants shown in Table 1 as easiest to identify in fall (fall-flowering herbaceous plants, based on information from Fernald, 1970). The third visit was on April 18, 2007 and focused on looking for plants shown in Table 1 as easiest to identify in spring (spring-flowering herbaceous plants, based on information from Fernald, 1970). None of the plants in Table 1 are easiest to identify in winter.

The inspection process consisted of walking representative meander routes through habitats where the plants included in Table 1 could potentially occur. Descriptive information on the subject plant species from Fernald, 1970 was used as the basis for confirming observations of possible occurrences of species in Table 1. Table 2 describes each area walked, and Figure 4 shows the approximate locations. Because most of the plants listed in Table 1 are most likely to occur in wetland, bottomland, or rich forest habitats, the inspection routes focused on lands in and close to wetlands. However, representative areas of appropriate upland habitats were also walked to inspect for those plants in Table 1 that favor uplands.

Mr. Doub was also onsite on multiple occasions at irregular intervals between early May 2006 and mid-October 2006 to conduct other natural resource investigations, including a wetland delineation, flora survey, and fauna survey. Plants on Table 1 that were incidentally observed were noted. The flora survey report (Tetra Tech NUS, 2007a) includes a comprehensive list of all plant species observed on the CCNPP Site. The flora survey included inspection of vegetation for plants with floral characteristics as described in Fernald, 1970 for the species in Table 1.

Table 1
List of Rare, Threatened, or Endangered Plant Species for Calvert County, Maryland
Maryland Natural Heritage Program, May 2004

Scientific Name	Common Name	Form	Federal Status[a]	State Status[a]	Typical Habitat (According to Fernald, 1970)	Areas of Most Probable Occurrence on Project Area[b] (Based on Fernald, 1970)	Best ID Season
Aeschynomene virginica	Sensitive Joint-Vetch	Forb	T	E	Fresh to brackish tidal shores	None	Fall
Agalinis obtusifolia	Blunt-Leaved Gerardia	Forb	-	E	Pinelands, thickets, and openings	None	Summer
Agalinis setacea	Thread-Leaved Gerardia	Forb	-	E	Dry sandy woods and openings	None	Summer
Ammannia latifolia	Keohne's Ammannia	Forb	-	R	Swamps and tidal marshes	HMV and PD BDF along streams	Summer
Angelica atropurpurea	Great Angelica	Forb	-	X	Rich thickets, bottomlands, and swamps	WD and PD BDF along streams	Summer
Antennaria solitaria	Single-Headed Pussytoes	Forb	-	T	Rich woods and clearings	MDF and WD BDF	Spring
Apocynum sibiricum	Clasping-Leaved Dogbane	Forb	-	X	Rocky or gravelly soils, often along streams	None	Summer
Aristada curtissii	Curtis's Three-Awn	Grass	-	R	Dry sterile soil	None	Fall
Aristada lanosa	Wooly Three-Awn	Grass	-	E	Dry sterile soil	None	Fall
Aster concolor	Silvery Aster	Forb	-	E	Dry sandy open woods and barrens	None	Fall
Aster radula	Rough-Leaved Aster	Forb	-	E	Low woods, swamps, and bogs	WD and PD BDF along streams	Fall
Azolla caroliniana	Mosquito Fern	Fern	-	R	Quiet waters	Camp Canoy Fishing Pond and down-gradient ponds	Growing Season
Berberis canadensis	American Barberry	Shrub	-	X	Dry woodlands and bluffs	Primarily along cliffs at eastern edge of Project Site	Anytime
Bidens mitis	Small-Fruited Beggar-Ticks	Forb	-	E	Brackish to fresh swamps	None	Growing season
Carex hyalinolepis	Shoreline Sedge	Sedge	-	R	Calcareous or brackish swamps, swales, or shores	None	Summer

Table 1
List of Rare, Threatened, or Endangered Plant Species for Calvert County, Maryland
Maryland Natural Heritage Program, May 2004

Scientific Name	Common Name	Form	Federal Status[a]	State Status[a]	Typical Habitat (According to Fernald, 1970)	Areas of Most Probable Occurrence on Project Area[b] (Based on Fernald, 1970)	Best ID Season
Carex lacustris	Lake-Bank Sedge	Sedge	-	T	Calcareous or neutral swamps and shallows	None	Summer
Carex projecta	Necklace Sedge	Sedge	-	R	Swales, thickets, and damp woods	WD and PD BDF	Summer
Centrosema virginianum	Spurred Butterfly-Pea	Forb	-	R	Sandy woods and fields	MDF	Summer
Chelone oblique	Red Turtlehead	Forb	-	T	Cypress swamps and wet woods	No cypress on Project Site. PD BDF may be suitable.	Fall
Chenopodium standleyanum	Standley's Goosefoot	Forb	-	E	Waste places, cultivated land, and roadsides	Phragmites-free old field areas and roadsides	Summer
Desmodium lineatum	Linear-Leaved Tick-Trefoil	Forb	-	E	Sandy pinelands	None	Fall
Desmodium ochroleucum	Cream-Flowered Tick Trefoil	Forb	-	E	Sandy to loamy woods	MDF	Fall
Desmodium pauciflorum	Few-Flowered Tick Trefoil	Forb	-	E	Rich woods and wooded banks	WD and PD BDF	Summer
Desmodium rigidum	Rigid Tick-Trefoil	Forb	-	E	Dry sandy woods	None	Fall
Digitaria villosa	Shaggy Crabgrass	Grass	-	X	Sandy soil	None	Fall
Diplazium pycnocarpum	Glade Fern	Fern	-	T	Rich, calcareous, wooded slopes, ravines, and bottoms	MDF on slopes and WD and PD BDF	Fall
Eleocharus rostellata	Beaked Spikerush	Rush	-	R	Saline, brackish, or limy marshes	None	Fall
Elephantopus tomentosus	Tobaccoweed	Forb	-	E	Woodlands	MDF and WD BDF	Fall
Fimbristylus puberula	Hairy Fimbristylis	Rush	-	R	Brackish or saline sands, dune hollows, and flats	None	Fall
Fuirina pumila	Smooth Fuirina	Sedge	-	R	Bogs and wet peaty or sandy shores	PD BDF and HMV	Fall

Table 1
List of Rare, Threatened, or Endangered Plant Species for Calvert County, Maryland
Maryland Natural Heritage Program, May 2004

Scientific Name	Common Name	Form	Federal Status[a]	State Status[a]	Typical Habitat (According to Fernald, 1970)	Areas of Most Probable Occurrence on Project Area[b] (Based on Fernald, 1970)	Best ID Season
Gymnopogon brevifolius	Broad-Leaved Beardgrass	Grass	-	E	Dry sandy or rocky openings and thin woods	None	Fall
Lemna trisulca	Star Duckweed	Aquatic	-	E	Ponds and springy places	Camp Conoy Fishing Pond and down-gradient ponds, beaver-flooded areas along Johns Creek (HMV)	Growing season
Leptochloa fascicularis	Long-Awned Diplachne	Grass	-	R	Sandy soils	None	Fall
Limnobium spongia	American Frogs-Bit	Forb	-	E	Salt marshes	None	Fall
Lygodium palmatum	Climbing Fern	Fern	-	T	Moist acid soil of thickets, marshes, and open woods	HMV and PD BDF	Fall
Matelea carolinensis	Anglepod	Forb	-	E	Rich thickets	MDF regeneration areas	Summer
Melica mutica	Narrow Melicgrass	Grass	-	T	Dry open woods and thickets	None	Summer
Melothria pendula	Creeping Cucumber	Forb	-	E	Rich or damp thickets	MDF and WD BDF	Summer
Monotropis odorata	Sweet Pinesap	Forb	-	E	Sandy, chiefly pine, woods	None	Spring
Myosotis macrosperma	Large-Seeded Forget-Me-Not	Forb	-	R	Loamy calcareous woods and bottomlands	None	Spring
Myrica heterophylla	Evergreen Bayberry	Shrub	-	E	Dry and moist thickets and woods	MDF and WD BDF	Anytime
Orthilia secunda	One-Sided Pyrola	Forb	-	X	Dry or moist woods	MDF and WD BDF	Summer
Parnassia asarifolia	Kidneyleaf Grass-of-Parnassus	Forb	-	E	Bogs, wet woods, and rocky banks	PD BDF and HMV along streams	Fall
Platanthera flava	Pale Green Orchid	Forb	-	R	Swamps, bottomlands, swales, and wet shores	WD and PD BDF and HMV along streams	Summer
Pluchea camphorata	Marsh Fleabane	Forb	-	E	Fresh to brackish marshes, shores, and ditches	None	Fall
Polygonum densiflorum	Dense-Flowered Knotweed	Forb	-	E	Wet swamps, thickets, and margins of shallow pools	PD BDF and HMV along streams	Fall

Table 1
List of Rare, Threatened, or Endangered Plant Species for Calvert County, Maryland
Maryland Natural Heritage Program, May 2004

Scientific Name	Common Name	Form	Federal Status[a]	State Status[a]	Typical Habitat (According to Fernald, 1970)	Areas of Most Probable Occurrence on Project Area[b] (Based on Fernald, 1970)	Best ID Season
Polygonum setaceum	Bristly Smartweed	Forb	-	R	Low woods, swamps, shores, and wet clearings	WD and PD BDF and HMV along streams	Fall
Potomogeton foliosus	Leafy Pondweed	Aquatic	-	E	Fresh, often calcareous, or brackish waters	None	Fall
Potomogeton perfoliatus	Clasping-Leaved Pondweed	Aquatic	-	R	Calcareous to brackish waters	None	Fall
Potomogeton spirillus	Spiral Pondweed	Aquatic	-	R	Quiet waters	Camp Canoy Fishing Pond and smaller downstream impoundments	Fall
Quercus shumardii	Shumard's Oak	Tree	-	T	Rich woods, bottoms, or calcareous slopes	WD BDF	Anytime
Rhynchosia tomentosa	Hairy Snoutbean	Forb	-	T	Dry sandy woods and clearings	MDF	Summer
Sagittaria engelmanniana	Englemann's Arrowhead	Forb	-	T	Wet sand and peat	HMV along streams	Fall
Sagittaria longirostra	Long-Beaked Arrowhead	Forb	-	R	By springs, rills, and ponds	PD BDF and HMV along streams, especially at upper ends	Fall
Scutellaria galericulata	Common Skullcap	Forb	-	R	Gravelly, sandy, or rocky shores, meadows, swamps	PD BDF and HMV along streams	Summer
Sesuvium maritinum	Sea-Purselane	Forb	-	E	Damp coastal sands	None	Fall
Solidago speciosa	Showy Goldenrod	Forb	-	T	Dry to moist thickets, open woods, and prairies	MDF, OFV	Fall
Sporobolus clandestinus	Rough Rushgrass	Grass	-	T	Dry sandy or rocky soil	None	Fall
Sporobolus neglectus	Small Rushgrass	Grass	-	X	Dry, sterile, often calcareous, soil	None	Fall
Zizaniopsis milicea	Southern Wildrice	Grass	-	E	Swamps and margins of streams, often tidal	None	Spring

Table 1
List of Rare, Threatened, or Endangered Plant Species for Calvert County, Maryland
Maryland Natural Heritage Program, May 2004

[a] R: Rare
T: Threatened
E: Endangered
X: Extirpated

[b] HMV: Herbaceous Marsh Vegetation
MDF: Mixed Deciduous Forest (including Mixed Deciduous Regeneration Forest)
OFV: Old Field Vegetation
PD BDF: Poorly Drained Bottomland Deciduous Forest
WD BDF: Well-Drained Bottomland Deciduous Forest

Table 2
Representative Areas Inspected for Rare Plants in UniStar Project Area, Calvert County, Maryland

Area (Figure 3)	Description	Summer (7/31-8/1) 2006	Fall (10/12-13) 2006	Spring (4/18) 2007
1	Marshy fringe and old field vegetation surrounding Camp Conoy Fishing Pond (Herbaceous Marsh Vegetation and Old Field Vegetation)	X	X	X
2	Stream, wetlands, and two small man-made impoundments flowing northeast from Camp Conoy Fishing Pond to the Chesapeake Bay (Herbaceous Marsh Vegetation, Poorly Drained Bottomland Deciduous Forest, and Mixed Deciduous Forest)	X	X	X
3	Stream, wetlands, and forested uplands immediately northwest of Camp Conoy (Poorly Drained Bottomland Deciduous Forest and Mixed Deciduous Forest)	X	X	X
4	Stream and adjacent wetlands originating near southwest corner of Camp Conoy and flowing west to Johns Creek (Poorly Drained Bottomland Deciduous Forest and Mixed Deciduous Forest)	X	X	X
5	Seepages, streams, and forested uplands on slopes west of Lake Conoy (Herbaceous Marsh Vegetation, Poorly Drained Bottomland Deciduous Forest, and Mixed Deciduous Forest)	X	X	
6	Seepage and adjoining uplands southwest of upper (eastern) reach of Johns Creek (Herbaceous Marsh Vegetation, Poorly Drained Bottomland Deciduous Forest, Well-Drained Bottomland Deciduous Forest, and Mixed Deciduous Forest)	X		
7	Wetlands down-gradient (southwest) of largest pond in Lake Davies Area (Herbaceous Marsh Vegetation and Poorly Drained Bottomland Deciduous Forest)		X	
8	Bottomlands along upper (eastern) reach of Johns Creek; also forested uplands on lower part of adjacent slopes (Herbaceous Marsh Vegetation, Poorly Drained Bottomland Deciduous Forest, Well-Drained Bottomland Deciduous Forest, and Mixed Deciduous Forest)	X		X
9	Seepages and forested uplands north of Johns Creek in south-central part of Project Site (Mixed Deciduous Forest and Poorly Drained Bottomland Deciduous Forest)		X	
10	Bottomlands along uppermost (northernmost) headwaters to Goldstein Branch near northwestern corner of Project Site; also forested uplands on lower part of adjacent slopes (Poorly Drained Bottomland Deciduous Forest and Mixed Deciduous Forest)	X		
11	Bottomlands and forested uplands on slope east of central reach of Goldstein Branch (Poorly Drained Bottomland Deciduous Forest and Mixed Deciduous Forest)		X	

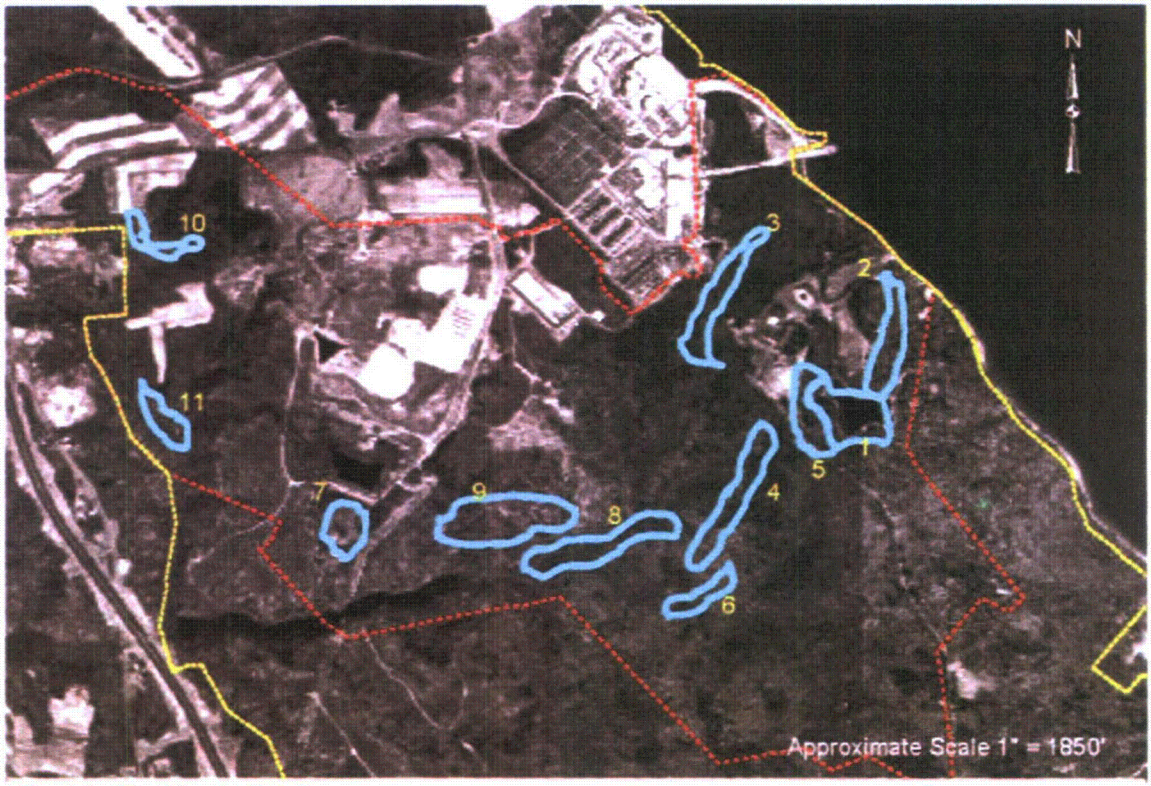


Figure 4
Approximate Locations:
Search Areas Walked to Inspect for Rare Plants
Yellow Dotted Line is CCNPP Site Boundary
Red Dotted Line is Project Area Boundary
No Potentially Suitable Rare Plant Habitat in Northwest Corner of Project Area (Not Shown)

RESULTS

Only one plant on the list of Federal or state rare, threatened, or endangered plants maintained by the Maryland Natural Heritage Program for Calvert County (Table 1) was definitively observed within areas subject to construction based on plans as of April 2007. The plant is showy goldenrod (*Solidago speciosa*), which is designated as state threatened. Several large patches of showy goldenrod were observed in lawn, old field, and mixed deciduous forest in and around the edge of Camp Conoy (Cover Photo, Area A on Figure 5).

Two other plant species listed in Table 1 were observed or potentially observed in other areas within the Project Area. One is Shumard's oak (*Quercus shumardii*), a state threatened species. Several specimens were observed in well-drained bottomland deciduous forest in the floodplain adjoining the southern of the two main headwaters to Johns Creek (Area B on Figure 5). Photos 1 and 2 depict a leaf and acorn from Shumard's oaks in Area B. No Shumard's oaks were observed more than 50 feet (15 meters) landward (roughly east) of the stream channel and adjoining wetlands (more than 50 feet [15 meters] east of the delineated wetland boundary segment marked using flag numbers WET I-25 to WET I-65).

The other species is spurred butterfly pea (*Centrosema virginianum*), a state rare species. A plant of similar morphology was observed on the northern edge of an emergent wetland (herbaceous marsh vegetation) adjoining Johns Creek in the central part of the CCNPP Site (Area C on Figure 5) in August 2006. The plant was in flower and displayed other characteristics expected for spurred butterfly pea, but the observation is noted as "possible" because the species is more typical of dry, open forest habitats than wetland habitats (Fernald, 1970). The MDNR NHP (MDNR 2006) stated that records of spurred butterfly pea occurred in an open area along a fire road south of Johns Creek in the southwestern part of the CCNPP Site (Area D on Figure 5). The ideal open upland forest habitat for this species does not occur on the Project Area. The upland forest plant communities consist of closed canopy cover with dense understory wherever the canopy is broken. Area C on Figure 5 is remote from areas currently anticipated to be disturbed by construction or operation of the proposed facilities. Therefore, no further effort was undertaken to confirm the status of this observation.

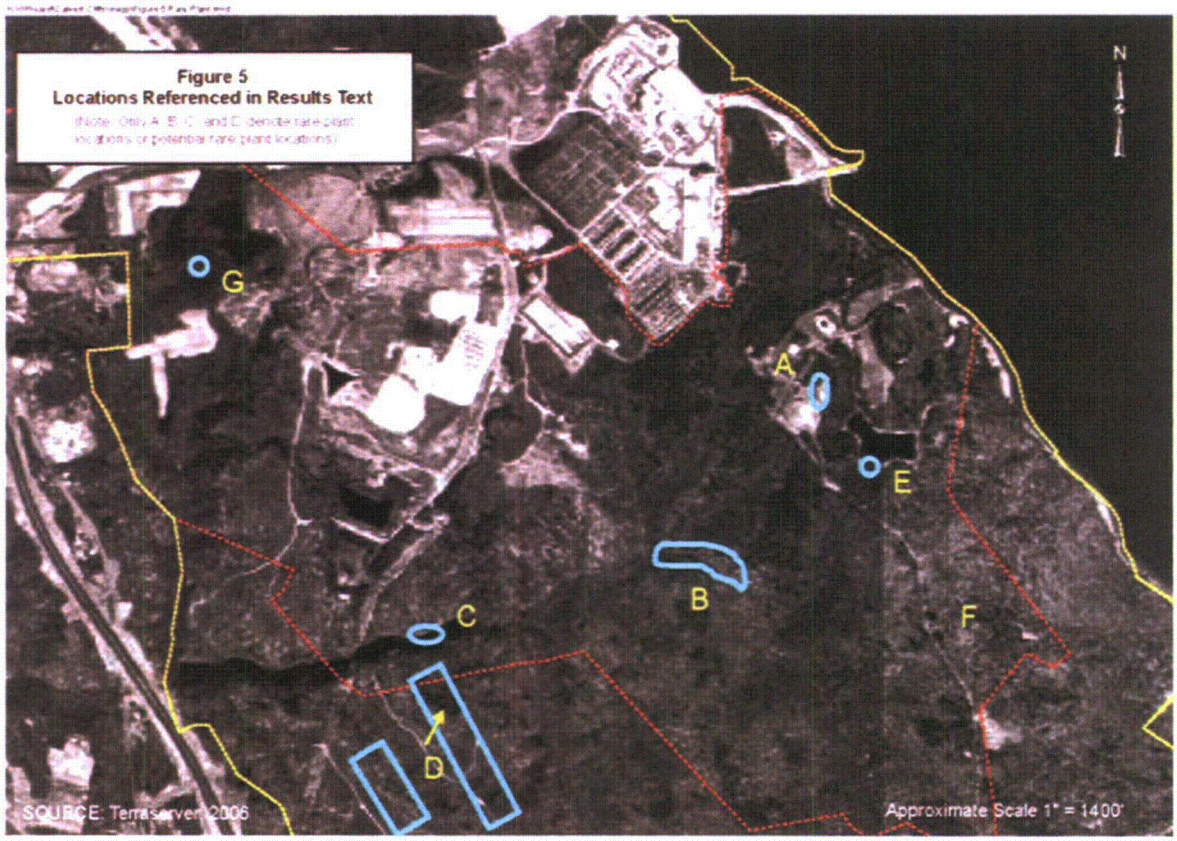


Figure 5
Locations Referenced in Results Text
(Note: Only A, B, C, and D denote rare plant locations.)
N
G
A
E
B
C
F
D
SOURCE: Terraserver 2006
Approximate Scale 1" = 1400'

Several large patches of Carolina elephant's foot (*Elephantopus carolinianus*) were observed in multiple forested areas in the Project Area, including an area directly west of Lake Conoy (Area E on Figure 5), an area east of Camp Conoy Road (Area F on Figure 5), and on a slope south of a barn in the northwestern part of the CCNPP Site (Area G on Figure 5). This species has no federal or state protected status, but is highlighted in this report because it is morphologically similar to tobacco weed (*Elephantopus tomentosa*), which is listed as endangered by the State of Maryland (Table 1). However, the *Elephantopus* plants in the Project Area displayed cauline leaves (leaves growing from a stem) as well as basal leaves (leaves growing very close to the ground surface). Possessing cauline as well as basal leaves is indicative of Carolina elephant's foot. Tobacco weed typically displays only basal leaves (Fernald 1970).

POTENTIAL MITIGATION OPTIONS

This rare plant survey found that specimens of two rare plant species, showy goldenrod and Shumard's oak, occur in or close to areas known as of April 2007 to be potentially subject to disturbance by construction or operation of the proposed facilities. Potential mitigation options that are available for these specimens, if mitigation is found to be necessary, are summarized in this section.

Showy Goldenrod: Various approaches are available for mitigating construction impacts to the showy goldenrod population in and around Camp Conoy. First, seed may be hand collected from existing showy goldenrod on the site during the late fall preceding anticipated groundbreaking. The seed can be dried and sown in peat pots by a commercial nursery, and the seedlings can be transplanted to a mitigation planting site the following spring. Second, the rhizomes (underground roots) can be hand dug in the fall preceding groundbreaking and immediately relocated to the mitigation planting site. Both of these approaches would preserve and propagate the localized gene pool. The redundancy of the two approaches would reduce the probability that the effort would fail to successfully preserve the gene pool. It would not be necessary to collect all of the seed or dig all of the rhizomes; collecting seed and rhizomes from only a few (10 or more) locations in existing stands of showy goldenrod on the site should adequately preserve the localized gene pool. Once established, the transplanted seedlings and/or rhizomes should gradually spread over the mitigation area until coverage eventually meets or exceeds existing coverage disturbed by construction.

A last resort approach would be to buy and plant showy goldenrod seedlings grown by commercial sources. Although it may be necessary to order seedlings several months or a year in advance, showy goldenrod is sold by some nurseries specializing in native plants. The disadvantage of this approach is that the seedlings would not carry the local gene pool from the site. Maryland is at the edge of the natural range of showy goldenrod, which is more common in prairie settings in the Midwest. Hence, much of the commercial supply of showy goldenrod is derived from Midwestern stock for prairie restoration projects.

Shumard's Oak: The observed Shumard's oaks are potentially located near areas subject to construction disturbance. An option to minimize direct construction impact is to establish construction barriers with prominent field marking at the drip-line for each specimen prior to ground disturbance. The drip-line constitutes an approximately circular area surrounding a tree trunk and extending outward horizontally as far as foliage on the outermost limb. The *State Forest Conservation Technical Manual* (MDNR, 1997) outlines specifications for temporary fencing and signage to protect specimen trees and forest vegetation on construction sites. If disturbance can be avoided within the drip-line, no further mitigation should be necessary to protect the Shumard's oak population on the site.

The *State Forest Conservation Technical Manual* (MDNR, 1997) outlines procedures such as deep fertilization that can be taken to enhance the probability of tree survival if partial encroachment into the drip-line is unavoidable. The trees on the site are too large to transplant (their diameters at breast height are all greater than 15 inches [38 centimeters]), even with modern tree transplanting equipment capable of transplanting trees with diameters up to 8 inches (20 centimeters). Acorns from the trees could be collected prior to groundbreaking and custom-grown in a greenhouse to generate seedlings carrying localized genes.

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USGS (U.S. Geological Survey), 1987. Cove Point, Maryland 7.5-minute topographical quadrangle.

Photo 1
Shumard Oak Leaf along Upper Reach of Johns Creek

Photo 2
Shumard Oak Acorn along Upper Reach of Johns Creek