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5.0 ENVIRONMENTAL EFFECTS OF SITE PREPARATION AND CONSTRUCTION

5.1 CONSTRUCTION ACTIVITIES AND IMPACTS

In this section we will describe the activities associated with the construction of the facility that have the potential of impacting the environment. The following is a list of activities that will affect the environment during this construction phase:

- Clearing, Grubbing, and Grading – Spoils, backfill borrow, and topsoil storage areas will be established on parts of the CCNPP property. Clearing and grubbing of the site begins with harvesting trees, vegetation removal, and disposal of tree stumps. Topsoil will be moved to a storage area (for later use) in preparation for excavation. The general plant area including the switchyard and CWS cooling tower area will be brought to plant grade in preparation for foundation excavation and installation. Approximately 420 acres (170 hectares) of land will be cleared for road, facility construction, laydown, concrete batch plant, parking and other construction-related uses.

- Road Construction – A new and upgraded intersection at Nursery Road on MD 2/4, south of the existing Calvert Cliffs Parkway to CCNPP Units 1 and 2, will be built and utilized as a construction access route into the CCNPP Unit 3 construction area. Approximately 2 mi (3 km) of road will be upgraded and built to accommodate traffic into the construction area. The existing barge slip heavy haul road will also be upgraded and extended to the Unit 3 site area and construction laydown areas. The maximum slope for the existing and extended haul road is 4% grade. A CCNPP Unit 3 site perimeter road system will be installed including an access road from the cooling tower area to the power block area.

- Temporary Utilities – Temporary utilities including above-ground and underground infrastructure for power, communications, potable water, wastewater and waste treatment facilities, fire protection, and construction gas and air systems must be constructed and installed.

- Temporary Construction Facilities – Temporary construction facilities including offices, warehouses, sanitary toilets, a changing area, a training area, and personnel access facilities must be built. The site of the concrete batch plant includes the cement storage silos, the batch plant, and areas for aggregate unloading and storage. From lessons learned at other EPR construction sites, the Co-Applicants anticipate that the batch plant will be located as close as practicable to the site of construction of safety-related structures, thus ensuring quality control (safety-grade) concrete.

- Parking, Laydown, Fabrication, and Shop Preparation Areas - The parking, laydown, fabrication and shop areas will require preparation of the parking and laydown areas by grading and stabilizing the surface with gravel. The shop and fabrication areas include the concrete slabs for formwork, laydown, module assembly, equipment parking and maintenance, and fuel and lubricant storage. Concrete pads for cranes and crane assembly will be installed.

- Underground Installations – Concurrent with the power block earthworks, the initial non-safety-related underground fire protection, water supply, sanitary and hydrogen gas piping, and electrical power and lighting duct banks will be installed and backfilled. These installations will continue as construction progresses.

- Unloading Facilities Installation – The existing barge slip will be upgraded. New sheet pile will be installed, and the existing crane foundations will be removed from the water. The slip will be widened by dredging to receive larger barge shipments that have roll-on, roll-off capability. Concurrently, crane foundations will be placed to erect a new heavy lift crane.

- Intake/Pumphouse Cofferdams – A sheet pile cofferdam and dewatering system will be installed on the south side of the CCNPP Units 1 and 2 intake structure to facilitate the construction of the CCNPP Unit 3 makeup water intake structures and pump houses. Pilings may also be driven to facilitate construction of the new discharge system piping.

  Excavation and dredging of the intake structures, erection of pump houses, and installation of mechanical, piping, and electrical systems follow the piling operations and continue through site preparation into plant construction. Excavated and dredged material will be transported to an onsite spoils area located outside the boundaries of designated wetlands.

- Power Block Earthwork (Excavation) – The deepest excavations in the power block area are for the CCNPP Unit 3 reactor and auxiliary building foundations that extend to approximately 40 ft (12 m) below plant grade. The next deepest excavations are for the turbine building foundation area which will be excavated approximately 21 ft (6.4 m) below plant grade with the circulating water piping excavation areas extending down to 33 ft (10 m) below plant grade.

  The excavations will take place concurrent with the installation of any required dewatering systems, slope protection, and retaining wall systems. At a minimum, drainage sumps will be installed at the bottom of the excavations from which surface drainage and groundwater infiltration will be pumped to a stormwater discharge point. Monitoring of construction effluents and stormwater runoff will be performed as required in the stormwater pollution prevention plan, the National Pollutant Discharge Elimination System (NPDES) permit, and other applicable permits obtained for construction. Excavated material will be transferred to the spoils and backfill borrow storage areas. Acceptable material from the excavations will be stored and reused as structural backfill.

- Power Block Earthwork (Backfill) – The installation of suitable backfill to support structures or systems occurs as part of the site preparation activities. Backfill material will come from the concrete batch plant, onsite borrow pit and storage areas, or offsite sources. Excavated areas will be backfilled to reach the initial level of the building foundation grade. Backfill will continue to be placed around the foundation as the building rises from the excavation until final plant grade is reached.

- Nuclear Island Base Mat Foundations – The deepest foundations in the power block are installed early in the construction sequence. Detailed steps include: installation of the grounding grid, mud-mat concrete work surface, reinforcing steel and civil, electrical, mechanical/piping embedded items, forming, and concrete placement and curing.

- Transmission Corridors – A new transmission substation/switchyard will be installed adjacent to the power block area for CCNPP Unit 3. A new onsite transmission corridor will be installed from the CCNPP Unit 3 switchyard to the existing CCNPP Units 1 and 2 switchyard. Tower foundations will be installed as well as an access road running along the corridor.

- Offsite Areas – No offsite areas will be impacted by the construction activities for CCNPP Unit 3. The existing offsite transmission corridor and towers will be utilized for the high voltage lines for CCNPP Unit 3.

- Concrete Batch Plant – The project will include two (2) temporary concrete batch plants each with a peak production of 200 cubic yards (152.9 cubic meters) per hour. The total cement production is estimated to be 500,000 cubic yards (382,000 cubic meters) over the four-year construction period of the facility. This is approximately 125,000 cubic yards (95,000 cubic meters) per year. The batch plant will use a baghouse to abate air emissions.

5.2 LAND USE IMPACTS OF CONSTRUCTION

This section describes the impacts of site preparation and construction to the CCNPP site and the surrounding area. Section 5.2.1 describes impacts to the site and vicinity. Section 5.2.2 describes impacts that could occur along transmission lines. Section 5.2.3 describes impacts to historic and cultural resources at the site.

5.2.1 The Site and Vicinity

The CCNPP site use activities will not change as a result of the proposed action. Table 4.2-1 depicts existing land use on the CCNPP campus. The CCNPP site acreage was purchased by the predecessor to Constellation Energy for the purpose of generating electricity. The CCNPP site will conform to all applicable local, state, and federal land use requirements and restrictions as they pertain to the proposed action. Figure 5.2-1 shows the current Calvert County zoning categories for the CCNPP site. Some of the proposed facilities associated with the project are located on land currently zoned and used as light industrial. The remainder is zoned as Farm and Forest District. CCNPP Unit 3 will be exempt from the Calvert County Zoning Ordinance once the CPCN for CCNPP Unit 3 is issued.

The State of Maryland and Calvert County have land use plans that encourage smart growth primarily through zoning ordinances. Through regulation, the federal, state, and county governments limit potential environmental impacts in coastal areas including the Chesapeake Bay. The CCNPP site would follow all applicable local, state, and federal requirements that pertain to the Coastal Zone Management (CZM) Program regulations and those regulations pertaining to the Chesapeake Bay Critical Area (CBCA). During construction, site activities are required to be authorized by the agencies and programs listed in Section 1.

Table 5.2-1 provides an estimate of the land areas that would be disturbed during construction of CCNPP Unit 3 and supporting facilities, including temporary features such as laydown areas, stormwater retention ponds, and borrow areas. Approximately 420 acres (170 hectares) of the CCNPP site would be disturbed by site preparation and construction. Approximately 281 acres (114 hectares) would be permanently dedicated to CCNPP Unit 3 and its supporting facilities, and lost to other uses until after decommissioning. Approximately 139 acres (62 hectares) would be temporarily impacted. Approximately fifteen acres may have to have vegetation removed to accommodate large construction equipment but it will not be necessary to disturb the soil. Acreage not containing permanent structures would be reclaimed to the extent practical.

From Figure 5.2-1, an estimate was made regarding the amount of land currently zoned as Farm and Forest within the CCNPP site boundary that would be affected by the proposed construction activities. Approximately 147 acres (59 hectares) of land currently zoned Farm and Forest will be permanently (134 acres (54 hectares)) or temporarily (13 acres (5.2 hectares)) impacted by the construction activities. Approximately 5 acres zoned Intensively Developed Area (IDA) will be impacted.

An estimated 191 acres (77 hectares) of mature forest cover will be lost during construction activities, approximately 28 acres (11 hectares) of which would be temporary.

The footprint for the proposed unit and supporting facilities will be partially located on land and facilities associated with Camp Conoy, a recreational facility formerly used by CCNPP employees. This area is not open to the public.

Heavy equipment and reactor components would be barged up the Chesapeake Bay to the existing barge slip. The slip area would be dredged and the existing heavy haul road from the barge slip would be modified and extended to the new construction site and laydown areas. A new access road, approximately 2.5 mi (4 km) long, would be constructed from MD 2/4 to the construction site providing access to the construction areas without impeding traffic to the existing units. A site perimeter road system and access road around the cooling tower area to the power block would be built. Another road would be constructed to the proposed water intake structure.

Table 5.2-1 Construction Areas Acreage and Operations Acreage, Land Use and Zoning

Construction Area	Construction Acreage (Hectares)	Current Land Use	Current Zoning
Unit 3 Power Block	45.8 (18.5)	Forest and Urban or Built Up	I-1 and FF
Unit 3 Switchyard	59.3 (24)	Forest	I-1 and FF
Unit 3 Cooling Tower Area	18.1 (7.3)	Forest	FF
Permanent Laydown Area	59 (23.9)	Urban or Built Up	I-1
Parking Area	17.7 (7.2)	Urban or Built Up	I-1
Connector Transmission Lines (Onsite)	11.7 (4.7)	Forest and Urban or Built Up	I-1
Desalination Plant	0.46 (0.18)	Forest	FF
Waste Water Treatment Facility	0.29 (0.12)	Forest	FF
Heavy Haul Road	15.7 (6.4)	Urban or Built Up	I-1
Construction Access Road	42.8 (17.3)	Urban or Built Up	I-1 and FF
Borrow Area	4.8 (1.9)	Urban or Built Up	I-1
Stormwater Sediment Basins Adjacent to the Permanent Construction Features	5.3 (2.2)	Forest and Urban or Built Up	FF and I-1
Total Acreage of Disturbed Area for Permanent Construction Features	280.95 (113.7)[1]	--	--
Temporary Laydown Areas	106.7 (43.2)	Urban or Built Up and Forest	I-1 and FF
Concrete Batch Plant, Material Storage (Location to be determined)	26.2 (10.6)	(TBD)	(TBD)
Sediment Basins Adjoining Temporary Features	6.2 (2.5)	Urban or Built Up and Forest	I-1 and FF
Total Acreage of Disturbed Area for Temporary Construction Features	139.1 56.3[2]	--	--

Notes:
I-1 = Light industrial
FF = Farm and Forest

The proposed construction activities would result in the permanent loss, through filling, of approximately 14.3 acres (5.8 hectares) of nontidal wetland habitat and approximately 48 acres (19 hectares) of nontidal wetland buffer. There will also be 1.6 acres (.65 hectares) of temporary nontidal wetlands loss.

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1 Of the 280.95 acres (113.7 hectares) disturbed, 134 acres (54.2 hectares) are zoned Farm and Forest.

2 Of the 139.1 acres (56.3 hectares) temporarily disturbed by construction activities, 13 acres (5.7 hectares) are zoned Farm and Forest.

Construction would also impact 30.3 acres (12.3 hectares) within the CBCA including approximately 0.4 acres (0.16 hectares) within the CBCA buffer zone that extends 100 ft (30.5 m) landward of mean high tide. The intrusion into the CBCA buffer occurs in the vicinity of the proposed intake and discharge pipelines and the heavy haul road. The remaining impact to the CBCA is for construction of storm water sediment basins, bio-retention drainage ditches, and security-related fencing and open space for the power block. The intrusion into the CBCA buffer also includes the regrading of a parcel near the intake structure to accommodate construction equipment. These intrusions are within areas designated IDA. The Co-Applicants expect to work with the CAC to develop appropriate mitigation alternatives.

Land in the vicinity of the CCNPP site is rural, with development generally occurring in town centers per current Calvert County zoning and planning requirements. Land use within 8 mi (13 km) of the site is predominantly forest as shown on Figure 5.2-2.

The construction activities that would degrade the visual aesthetics of the land will be limited to those activities potentially seen from the new construction access road and the Chesapeake Bay. Because of the forested nature of the area surrounding the proposed site, it is unlikely that construction activities for the proposed facilities will be seen directly from the adjacent highway, MD 2/4, with the exception of the activities to build or upgrade the CCNPP site access road. Once the proposed facility construction extends above the tree line, some construction will be seen from roadways or other areas in the vicinity of the site depending on the area's topography and the immediate land cover. Construction of the new water intake and discharge structure and the upgrade to the barge pier, barge pier crane, and related roadways will be visible from Chesapeake Bay.

5.2.2 Transmission Corridors and Offsite Areas

The additional electricity generated from CCNPP Unit 3 will not require the addition of new offsite right-of-way for any transmission lines. However, the proposed CCNPP Unit 3 construction activities on the CCNPP site will require the following transmission system changes:

- One new 500 kV substation to transmit power from CCNPP Unit 3,
- Two new 500 kV, 3,500 MVA circuits connecting the new CCNPP Unit 3 substation to the existing CCNPP Units 1 and 2 substation and indirectly to the grid, and
- Two existing 500 kV, 3,500 MVA circuits that are currently connected to the existing CCNPP Units 1 and 2 substation will be disconnected from that substation and extended 1.0 mi (1.6 km) to the CCNPP Unit 3 substation.

Numerous breaker upgrades and associated modifications will also be required at Waugh Chapel substation, Chalk Point Substation, and other existing substations.

The North and South Circuits of the CCNPP power transmission system are located in corridors totaling approximately 65 miles (105 km) of 350 to 400 ft (100 to 125 m) wide rights of way owned by BGE. The lines cross mostly secondary-growth hardwood and pine forests, pasture, and farmland as well as CCNPP Units 1 and 2 infrastructure. CCNPP Units 1 and 2 are also connected to the Southern Maryland Electric Cooperative's Bertha substation via a 69 kV underground transmission line.

The transmission line work to support this project will require new towers and transmission lines to connect the CCNPP Unit 3 switchyard to the existing switchyard for CCNPP Units 1 and 2 and the grid. Line routing will be conducted to avoid or minimize impact on the existing Independent Spent Fuel

Storage Installation, wetlands, and threatened and endangered species identified in the local area. No new offsite corridors or widening of existing corridors are required.

5.2.3 Historic Sites

Tables 5.2-2 and 5.2-3 list resources within the proposed project's Area of Potential Effect (APE) that are potentially eligible (archaeological resources) or eligible (architectural resources) for listing on the National Register of Historic Places (NRHP). These tables reflect the comments received from the Maryland State Historic Preservation Office (SHPO).

The cultural resource survey of the CCNPP site identified fourteen archaeological sites, four of which are considered potentially eligible for inclusion on the NRHP. The survey also identified five architectural resources, four of which are considered eligible for the NRHP. These sites are described in Table 5.2-3.

The SHPO was consulted during completion of the Phase Ia and Ib surveys to ensure compliance and maintain a strong working relationship. The results of the Phase Ia and Ib surveys were documented in the March 2007 CCNPP Unit 3 Draft Interim Report – Phase 1b Cultural Resources Investigation. This report was submitted to the SHPO for review and consultation under Section 106 of the National Historic Preservation Act. Comments from the Phase Ia and Ib surveys were received from the SHPO in a letter dated June 7, 2007.

In addition, consultation with potentially interested Native American tribes is pending. Information from the tribal consultation could influence the NRHP status of any of the recorded resources.

The preliminary assessment of adverse effects to the eight NRHP-eligible or potentially eligible resources (4 archaeological and 4 architectural) from project construction activities is as follows. Because the four identified archaeological sites cannot be avoided they will be destroyed. Phase II archaeological investigations and subsequent ongoing consultation with the SHPO will be performed relating to the potentially eligible sites to determine eligibility and mitigation plans. Of the four architectural resources, the Baltimore and Drum Point Railroad roadbed and Camp Conoy would be adversely impacted. These architectural resources are located within the 600 acre (243 hectares) project impact area. The Baltimore Drum Point Railroad roadbed would be heavily damaged by construction activities and use, resulting in an adverse effect to this resource. Camp Conoy will be reduced in size. During Phase II architectural investigation, a mitigation strategy will be adopted in consultation with the SHPO.

The Preston Cliffs property would not be damaged by construction activities and use because it is located approximately 1,500 ft (457 m) away from the outer boundary of the project area. There would also be no adverse effect on the setting of this property, as CCNPP Units 1 and 2 are adjacent to this property and lie between the property and CCNPP Unit 3 and its cooling tower facility. The Parran's Park property is within the 600 acre (243 hectares) project effect area but it is located in a portion of the project site that would only include development of a construction access road and the above-ground structures would not be damaged by construction activities and use. There would also be no effect on the setting of this property, as another road is already in existence on this property and facilities associated with CCNPP Units 1 and 2 are adjacent to this property.

Table 5.2-2 Summary of Potentially Eligible Archaeological Sites [a]

Site (MHT No.)	Site Type	Age	NRHP Status	Recommended Action
Site 1 (18CV474)	Artifact Scatter/ Foundation	19th century	Insufficient Data	Avoid/Phase II
Site 7 (18CV480)	Domestic Site	Mid 19th to 20th century	Insufficient Data	Avoid/Phase II
Site 8 (18CV481)	Domestic Site	19th to early 20th century	Insufficient Data	Avoid/Phase II
Site 9 (18CV482)	Domestic Site	Mid19th to early 20th century	Insufficient Data	Avoid/Phase II

Notes:
NRHP = National Register of Historic Places
MHT = Maryland Historic Trust
(a) Based on Maryland SHPO comments

Table 5.2-3 Summary of Eligible Architectural Resources [a]

MHT No.	Name	Date	Resource Type	Location	Recommended NRHP Status
CT-58	Parran's Park	c1750	Abandoned Farmstead; 3 tobacco barns	In the 600 acre (243 hectare) APE	NRHP Eligible under Criterion A
CT-59	Preston's Cliff, Charles's Gift, The Wilson Farm	c1690	Ruins; 3 tobacco barns and house ruins	In the APE for visual effects	NRHP Eligible under Criteria A and C
CT-1295	Baltimore and Drum Point Railroad	c1890	Abandoned Railroad; railroad bed	In the APE	Offsite portions determined NRHP eligible; project portions NRHP Eligible under Criteria A and C
CT-1312	Camp Conoy	c1930	YMCA Camp; 4 buildings, pavilion, playground, swimming pool, tennis courts	In the APE and adjacent area	NRHP Eligible under Criterion A

Notes:
APE = Area of Potential Effect
NRHP = National Register of Historic Places
MHT = Maryland Historical Trust
(a) Based on Maryland SHPO comments

There has been no evaluation of underwater archaeology but no such evaluation is required. Some areas in the Chesapeake Bay have been previously dredged for the existing discharge conduit and channel, cooling water intake channel, the barge dock and channel, and the shore protection revetment. Construction of the new intake channel and discharge conduit would occur within areas previously dredged or disturbed by construction. Thus, there would be no impacts to underwater historic properties from construction of these facilities.

With construction activities, there is always the possibility for inadvertent discovery of previously unknown cultural resources or human remains. Prior to initiation of land disturbing activities, procedures will be developed which include actions to protect cultural, historic, or paleontological resources or human remains in the event of discovery. These procedures will comply with applicable Federal and State laws. These laws include the National Historic Preservation Act, and Code of Maryland, Criminal Law, Title 10, Subtitle 4, Sections 10-401 through 10-404 and the Code of Maryland, Title 4, Subtitle 2, Section 4-215.

5.3 IMPACTS OF CONSTRUCTION ON GEOLOGY

Based on the site and vicinity geologic conditions described in the previous subsection, long-term adverse impacts on the geology are not anticipated as a result of construction or operation of CCNPP Unit 3. For example:

- The absence of capable faults at the CCNPP site eliminates the possibility for a surface fault rupture as a result of construction or operation of the proposed facility.
- Surface settlement (as a result of facility construction) could affect the drainage of surface water. However, should such settlement occur it will likely take place during construction and can be mitigated by re-grading the CCNPP Unit 3 area.
- The geologic units are not subjected to dissolution and permanent dewatering is not needed.
- There are no natural slopes in proximity to the proposed facility that could be adversely impacted by foundation excavation, loading resulting from construction of the proposed structures, or infiltration of precipitation as a result of surface modifications.
- Any potentially negative impacts that could result from the placement of fill in the proposed plant area will be mitigated by the earthwork design.
- Some short-term geologic impacts could occur during construction. These impacts could be a result of excavation, or temporary dewatering.
- Disposal of excavated material will likely be required either onsite or offsite. Generally accepted methods will be used to mitigate the potential for erosion of this material at the disposal site. Such methods may include the use of silt fences, seeding, and drainage control. Excavated soil surfaces exposed during construction will be protected to mitigate their erosion and control surface runoff.
- Temporary dewatering of foundation excavations could result in an impact on water levels in the water table aquifer. However, these impacts are not expected to be significant.

5.4 IMPACTS OF CONSTRUCTION ON HYDROLOGY

The following sections describe the hydrologic alterations and water use impacts that result from the construction of the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3. Section 5.4.1 describes the hydrologic alterations resulting from construction activities including the physical effects of these alterations on other users, the best management practices to minimize any adverse impacts and how the project will comply with the applicable Federal, State and local standards and regulations. Section 5.4.2 describes the potential changes in water quality and an evaluation of the impacts resulting from construction activities on water quality, availability, and use.

In summary, Co-Applicants seek permission to use excess groundwater not currently being used by CCNPP Units 1 and 2 under State Water Appropriation and Use Permit No. CA69G-010(05). CCNPP Units 1 and 2 have consented to Co-Applicants' use of these previously authorized withdrawals and Calvert Cliffs Nuclear Power Plant, Inc. will simultaneously seek conforming modification of its groundwater appropriation permit. Any additional freshwater needed during construction will be trucked to the site and stored in temporary water storage tanks. The Co-Applicants are also considering the feasibility of using water recovered from dewatering activities (associated with foundation excavations) to supply additional freshwater during construction. By the fourth year of construction activity, the proposed desalination plant will supply freshwater needs during construction.

5.4.1 Hydrologic Alterations

This section discusses the proposed construction activities, including site preparation, the resulting hydrologic alterations and physical effects of these activities on other water users, best management practices to minimize adverse impacts, and compliance with applicable federal, state and local environmental regulations.

5.4.1.1 Description of Surface Water Bodies and Groundwater Aquifiers

The CCNPP site covers an area of approximately 2,070 acres (838 hectares) and is located on the western shore of Chesapeake Bay in Calvert County near MD 2/4 as shown in Figure 5.2-1. The topography at the CCNPP site is gently rolling with steeper slopes along stream courses. Local relief ranges from sea level up to an elevation of 130 ft (40 m) with an average relief of approximately 100 ft (30 m). The CCNPP site is well drained by short, intermittent, and perennial streams. Six existing surface water impoundments are present on the site. A drainage divide (ridge) runs approximately from southeast to northwest across the CCNPP site as shown in the Site Utilization Plot Plan in Figure 5.4-1. Approximately 20% of the existing CCNPP site surface runoff is directed to drainages discharging into Chesapeake Bay. The remaining 80% of the runoff flows into tributaries of Johns Creek.

Surface Water Bodies

The surface water bodies (Figure 5.4-1) within the hydrologic system at CCNPP that may be affected by the construction and operation of CCNPP Unit 3 are:

- Two unnamed streams designated (Branch 1 and 2) on the eastern side of the drainage divide, Branch 1 being downstream of the Camp Conoy fishing pond,
- Johns Creek, Branch 3 and Branch 4, and the unnamed headwater tributaries,
- Goldstein Branch,

- Laveel Branch,
- Camp Conoy fishing pond and two downstream impoundments,
- Lake Davies and two unnamed impoundments within the Lake Davies dredge spoils disposal area, and
- Chesapeake Bay and Patuxent River.

The streams listed above are perennial and are typically fed by springs and seeps.

The Camp Conoy fishing pond is a man-made impoundment with an earthen dam on the northeast side. Water depth increases slowly away from the shoreline, with a depth of less than 1 ft (0.3 m) over most of the lake and may exceed 3 ft (1 m) near the center. An outlet pipe conveys water from the fishing pond to a single stream channel which continues northeast toward Chesapeake Bay. Two smaller impoundments were created along this channel, and water depth in these two impoundments does not appear to exceed 1 to 2 ft (0.3 to 0.6 m) in most locations. These two impoundments are within the CBCA boundary.

A series of three man-made impoundments are present south of the existing dredge spoils disposal area near the center of the CCNPP site. These sequentially connected basins convey stormwater runoff from the dredge spoils disposal area to Johns Creek. Water levels in Johns Creek appear to be heavily influenced by surface runoff from the dredge spoils disposal area. The upper pond closest to the spoils pile (Lake Davies) appears to extend to a depth below the water table and has open water of unmeasured depth at its center. The downstream impoundments do not typically contain surface water but persist as wetlands. Additional details on the surface water drainage and hydrology are presented Section 4.4 and in the Final Wetland Delineation Report submitted herewith.

Groundwater Aquifers

The local aquifer systems that could be impacted by project construction activities at the CCNPP site are, from shallow to deep: the surficial aquifer, the Piney Point - Nanjemoy aquifer, and the Aquia aquifer. The hydrostratigraphic column for the CCNPP site and surrounding area, identifying geologic units, confining units, and aquifers is shown in Figure 5.4-2. The physical characteristics of the groundwater aquifers are provided in Section 4.4 along with schematic cross-section of the southern Maryland hydrostratigraphic units (Figure 4.4-3)

The surficial aquifer is primarily tapped by irrigation wells, and some old farm and domestic wells. It is not widely used as a potable water supply because of its vulnerability to contamination and unreliability during droughts. The Piney Point - Nanjemoy aquifer and underlying Aquia aquifer are the chief sources of groundwater in Calvert County and St. Mary's County. The Piney Point - Nanjemoy aquifer is primarily used for domestic water supply. The Aquia aquifer is the primary source of groundwater for major groundwater appropriation in southern Maryland.

5.4.1.2 Water Sources and Amounts Needed for Construction

Construction activities for CCNPP Unit 3 will require an estimated average 250 gallons per minute (gpm) (946 lpm). It is currently estimated that a peak water demand of up to approximately 1,200 gpm (4,500 lpm) may be required (demands include those for construction personnel, concrete manufacturing, dust control, hydro testing and flushing, and filling tanks and piping). Over the entire 68 month construction period, the project will require an estimated average of 168,000 gpd (636,000 lpd).

The potential sources of water for construction include (1) available onsite groundwater under the CCNPP Units 1 and 2 current appropriation limits, (2) water collected during dewatering of onsite excavations for use in dust control, (3) desalinated Chesapeake Bay water from the Desalination Plant in construction years five and six, (4) offsite water trucked to the construction site and stored until used, and (5) as a last resort, additional wells for use strictly as a temporary source of water. Table 5.4-1 shows the estimated amounts of fresh water needed by construction year. The water use estimates are based on an expected maximum number of construction workers and extensive dust control in all construction years, and therefore should be considered high estimates of actual water use. The current CCNPP Units 1 and 2 groundwater usage varies markedly but averaged 387,000 gpd (1,465,000 lpd) from July 2001 through June 2006 as shown in Table 5.4-2. The current groundwater appropriations allow for a daily average of 450,000 gpd (1,700,000 lpd) with a limit of 865,000 gpd (3,270,000 lpd) daily average for the month of maximum use as shown in Table 5.4-3. If the Commission approves the Co-Applicants' use of the remainder of CCNPP Units 1 and 2's previous water appropriation, CCNPP Unit 3 will draw a portion of this excess water leaving Units 1 and 2 with adequate margin for continued operation. On average, 63,000 gpd should be available to support Unit 3 construction needs.

The Co-Applicants are also considering the feasibility of using water recovered from dewatering activities (associated with foundation excavations) to provide for certain construction water needs, particularly dust control, and possibly for use by the concrete plant. Dust control requirements should also decrease in later years as structures are completed and disturbed earth stabilized. Dewatering of the excavation sites will generate on average 75,000 gpd (284,000 lpd) with as much as 100,000 gpd (379,000 lpd). This water will be considered as the source for the 40,000 gpd (151,000 lpd) that may be required for dust control. The dewater volume will be stored in tanks or impoundments and transferred to watering trucks or pumping system for applying to exposed soils and road surfaces. These water sources will eventually be replaced upon commissioning and start-up when the onsite Desalination Plant is completed and is able to supply the necessary water for the remaining construction activities. The design of the Desalination Plant is to provide 1,750,000 gpd (662,000 lpd).

Water may also be trucked to the site and stored in temporary storage tanks for use when needed. However, to meet potential construction water shortages, possibly during construction years 2, 3 and 4, authorization may be sought for the temporary installation of additional wells. A temporary additional source of 50,000 gpd (189,000 lpd) to 100,000 gpd (379,000 lpd) of water may be required. Further refinements in the construction water needs may confirm the need of an additional authorization.

Table 5.4-1 Estimated Annual Amounts of Fresh Water by Construction Year Needed for CCNPP Unit 3[f]

Construction Year	1	2	3	4	5	6
People	8,550,000[a] gal (32,365,000 L)	34,200,000[b] gal (129,461,000 L)	34,200,000[b] gal (129,461,000 L)	34,200,000[b] gal (129,461,000 L)	34,200,000[b] gal (129,461,000 L)	
Concrete Mixing and Curing[c]	2,220,000 gal (8,403,000 L)	2,220,000 gal (8,403,000 L)	2,220,000 gal (8,403,000 L)	2,220,000 gal (8,403,000 L)	2,220,000 gal (8,403,000 L)	
Dust Control[d]	11,400,000 gal (43,154,000 L)	11,400,000 gal (43,154,000 L)	11,400,000 gal (43,154,000 L)	11,400,000 gal (43,154,000 L)	11,400,000 gal (43,154,000 L)	
Subtotal	22,120,000 gal (83,922,000 L)	47,800,000 gal (181,000,000 L)	47,800,000 gal (181,000,000 L)	47,800,000 gal (181,000,000 L)	47,800,000 gal (181,000,000 L)	31,868,000[e] gal (126,633,000 L)

Notes:

(a) Estimated at 1,000 persons using 30 gal (113.6 L) per day for 285 days per year.
(b) Estimated at 4,000 persons using 30 gal (113.6 L) per day for 285 days per year.
(c) Estimated at 6,700 cubic yards (5,122.5 m3) per month using 27.61 gal (104.5 L) per cubic yard and 12 months per year.
(d) Estimated at 40,000 gal (151,400 L) per day for 285 days per year.
(e) Estimated at two-thirds of the amount used in any year 2 through 5.
(f) Water for construction would largely come from the existing onsite groundwater production wells. For construction years 1-4, the construction water would be supplied by a combination of onsite well water, trucked in supply, and storage tanks. The desalination plant would be operational to meet freshwater supply needs during construction years five and six.

Table 5.4-2 CCNPP Units 1 and 2 Water Use Report, State of Maryland Water Appropriation Permit CA69G010 (05)

	2001 gallons (liters)	2002 gallons (liters)	2003 gallons (liters)	2004 gallons (liters)	2005 gallons (liters)	2006 gallons (liters)
January		14,495,320 (54,870,755)	11,392,300 (43,124,546)	14,992,760 (56,753,770)	11,148,840 (42,202,950)	10,041,320 (38,010,531)
February		10,342,670 (39,151,264)	10,857,000 (41,098,215)	12,414,190 (64,992,821)	11,607,670 (43,939,810)	10,346,610 (39,166,179)
March		9,481,760 (35,892,366)	10,165,800 (38,481,739)	11,692,830 (44,262,176)	12,870,800 (48,721,277)	10,012,940 (37,903,101)
April		9,742,450 (36,879,185)	11,195,700 (42,380,334)	10,572,530 (40,021,379)	8,977,320 (33,982,852)	14,271,134 (54,022,118)
May		10,653,390 (40,327,468)	15,828,550 (59,917,579)	12,288,900 (52,343,689)	13,827,740 (52,343,689)	11,781,229 (44,596,803)
June		11,305,160 (42,794,685)	14,877,230 (56,316,441)	15,858,200 (60,029,817)	11,987,770 (45,378,645)	10,936,940 (41,400,821)
July	12,106,107 (45,826,600)	15,271,750 (57,809,862)	12,902,030 (48,839,496)	13,892,440 (52,588,606)	8,336,940 (31,558,750)	
August	13,012,084 (49,256,096)	13,006,370 (49,234,466)	12,537,070 (47,457,972)	13,045,600 (49,382,967)	87,86,380 (33,260,066)	
September	12,573,675 (47,596,537)	13,707,430 (51,888,267)	11,507,340 (43,560,020)	11,817,990 (44,735,958)	8,343,530 (31,583,696)	
October	11,603,068 (43,922,390)	11,100,240 (42,018,979)	10,885,500 (41,206,099)	13,004,910 (49,228,939)	9,394,250 (35,561,104)	
November	12,220,342 (46,259,026)	13,171,740 (49,860,459)	12,553,100 (47,518,652)	10,932,310 (41,383,295)	7,566,650 (28,642,886)	
December	11,051,880 (41,835,916)	10,740,610 (40,657,631)	14,021,400 (53,076,772)	11,456,340 (43,366,964)	9,629,400 (36,451,244)	
Annual Totals	72,567,156 (274,696,567)	143,018,890 (541,385,391)	148,723,020 (562,977,872)	151,969,000 (575,265,243)	122,477,290 (463,626,976)	67,390,173 (255,099,555)

Table 5.4-3 CCNPP Units 1 and 2 State of Maryland Water Appropriation Permits

Permit Number	Location	Limit (gpd (lpd))	Expires	Report	Aquifer	Wells	Well Depth (ft)
CA69G010 (05)	CCNPP	450,000/865,000 (1,073,425/3,374,381)	7/1/2012	Yes	Aquia	5	≈600
CA63G003 (07)	Camp Conoy	500/5,000 (1,892/18,927)	7/1/2012	No	Piney Point	4	≈350
CA83G008 (03)	Visitor's Center	300/500 (1,135/1,892)	7/1/2012	No	Piney Point	1	≈350
CA89G007 (02)	Firing Range	500/1,000 (1,892/3,785)	7/1/2012	No	Piney Point	1	≈350
CA89G107(01)	PUP Trailers	300/500 (1,351/1,892)	7/1/2012	N/A	Piney Point	1	≈350
None	Old Bay Farm	None	N/A	N/A	Aquia	1	≈600

<u>Field Explanations</u>

Permit Number: MD Water Appropriation and Use Permit
Location: Location of permitted site well(s) in CCNPP
Limit: Daily average of gallons on a yearly basis/daily average of gallons for the month of maximum use
Expires: Permit Expiration Date
Report: Requirements to report semi-annual groundwater withdrawals
Aquifer: Aquifer source
Wells: Number of permitted site wells

The proposed desalination plant will treat Chesapeake Bay brackish water to produce up to 1,750,000 gpd (6.62E+6 lpd) of desalinated water. The plant will use the seawater reverse osmosis desalination process to treat Chesapeake Bay water to provide water to the CCNPP Unit 3 process users. The plant will have three portions consisting of a centralized pump center, an energy recovery center, and a reverse osmosis center. The plant will contain a pretreatment filtration system and chemical conditioning equipment to prevent fouling and mitigate corrosion in pipes and equipment. The desalination plant is expected to reduce the salinity of the water to a level of approximately 1.67E-3 lbs/gal (200 to 300 mg/l), with the general characteristics of softened well water.

5.4.1.3 Surface Water Bodies Receiving Construction Effluents that Could Affect Water Quality

The surface water bodies as shown in Figure 4.4-2 and Figure 5.4-1 within the hydrologic system at the CCNPP site that could receive effluents during CCNPP Unit 3 construction include:

- Two unnamed streams (Branch 1 and Branch 2) on the eastern side of the drainage divide, Branch 1 being downstream of the Camp Conoy fishing pond,
- Camp Conoy fishing pond and two downstream impoundments,
- Johns Creek, Branch 3 and Branch 4, and the unnamed headwater tributaries,
- Goldstein and Laveel Branches of Johns Creek,
- Lake Davies and two unnamed impoundments within the Lake Davies dredge spoils disposal area, and
- Chesapeake Bay and Patuxent River.

Several sediment basins will be constructed to catch stormwater and sediment runoff from the various construction areas. Modeling of the runoff from the probable maximum flood during plant operation bounds the possible runoff amounts, characteristics, and impacts that might occur during construction due to unpaved surfaces allowing for greater stormwater infiltration into the ground. The basins will be sized so as to prevent fast flowing, sediment laden stormwater from reaching the creeks or Chesapeake Bay prior to allowing the sediments to settle out. The flow velocities will be controlled to prevent erosion of creek and stream banks. The allowable flow rates and physical characteristics of stormwater runoff will be specified in the State discharge permits.

Maximum runoff flow rate for the entire western basin, see § 4.4.1.1, during the probable maximum flood is estimated at 21,790 cubic feet per second (cfs). The maximum high water level elevation in Johns Creek is 65 ft (19.8 m) above mean sea level (NGVD 29), which is below the approximate 84.6 ft (25.8 m) elevation of the final site grade in the power block, switchyard, and cooling tower area.

5.4.1.4 Construction Impacts

Construction of CCNPP Unit 3 with its associated cooling tower will impact several of the current drainages and impoundments at the CCNPP site. Runoff from the finished grade of the CCNPP Unit 3 power block, switchyard, cooling tower, parking areas and permanent laydown areas will be directed by sloping towards a series of bio-retention ditches around most of the periphery of these permanent features. Any excess runoff from the bio-retention ditches will in turn flow into stormwater impoundments. The bio-retention ditches will be constructed of base materials that promote water quality.

The four planned stormwater impoundments will be unlined basins with a simple earth-fill closure on the downstream end and will include a piping system that will direct any discharge to the adjacent watercourses. One impoundment is northeast of the power block and will discharge into the Branch 2 channel that flows into Chesapeake Bay. The CCNPP Unit 3 power block and adjacent permanent laydown area will have an impoundment on its east side that will discharge into the Branch 1 channel, the two impoundments downstream of the fishing pond, and ultimately, the Chesapeake Bay. Branch 3 will be filled in by the construction, and excess runoff from the switchyard and adjacent parking areas to the north will flow into an impoundment in the Branch 3 channel, and in turn discharge to Johns Creek. Runoff from the impoundment adjacent to the cooling tower will also discharge into Johns Creek.

Grading of the dredge spoils pile for a temporary laydown area, access road, and construction parking areas could increase runoff into the existing impoundments downstream of the dredge spoils pile and into temporary impoundments along the southern edge of the new access road.

Construction impacts to the existing surface water bodies are summarized as follows:

- Increasing runoff from the approximately 333 acres (135 hectares) of impervious and relatively impervious surfaces for the CCNPP Unit 3 power block pad, cooling tower pad, switchyard, laydown, and parking areas,

- Infilling and eliminating the upper reaches of Branch 2 and Branch 3, and an unnamed tributary to Johns Creek,

- Isolating portions of the upper reach of Branch 1 by construction of the laydown areas south of the CCNPP Unit 3 power block foundation,

- Disruption of the drainage in the Lake Davies dredge spoils disposal area with possible impacts on the two downstream impoundments,

- Wetlands removal and disruptions, and

- Possibly increasing the sediment loads into the proposed impoundments and downstream reaches.

The CCNPP Unit 3 power block will be located in the Maryland Western Shore watershed as shown in Figure 4.4-2. The CWS cooling towers and switchyard will be located in the St. Leonard Creek watershed. Site grading for CCNPP Unit 3 will affect the headwaters of the unnamed creek, Branch 1, in the Maryland Western Shore watershed. In the St. Leonard Creek watershed, the unnamed creek, Branch 3, will be affected by the switchyard. Post-construction drainage from the CCNPP Unit 3 power block area will be directed towards the Chesapeake Bay, while drainage from the area of the CWS cooling tower and switchyard will be directed to Johns Creek.

The design basis flood elevation at the power block area is 81.5 ft (24.8 m) above sea level (NGVD 29). However, the maximum water level associated with a safety-related structure is 81.4 ft (24.8 m) above sea level, which is 3.2 ft (1.0 m) below the reactor complex grade slab at elevation 84.6 ft (25.8 m). The design basis flood elevation at the safety-related Ultimate Heat Sink (UHS) makeup water intake structure is 39.4 ft (12 m) above sea level.

The overall site drainage basin areas are not directly affected by the proposed site grading plan. The 80% / 20% drainage proportion to the west and east respectively, will stay the same during and after construction. Approximately 15 to 20 acres (6 to 8 hectares) will be added to the east drainage basin and removed from the west drainage basin.

The mitigation measures associated with the wetlands and wetland buffers are described in Section 5.6.3.

5.4.1.5 Identification of Surface Water and Groundwater Users

There are no users of onsite surface water.

Groundwater resources in the vicinity of the CCNPP site are described in Section 4.4.2. The nearest permitted MDE groundwater well (beyond the boundary of the CCNPP property boundary and downgradient from the site), is conservatively presumed to lie adjacent to the southeastern boundary of the CCNPP site. At this location, the distance between the boundary and the center of CCNPP Unit 3 is approximately 1.1 mi (1.8 km) as shown in Figure 5.4-3. The flow direction was based on the regional direction of flow within the Aquia aquifer as shown in Figure 5.4-4.

5.4.1.6 Compliance with Applicable Hydrological Standards and Regulations

The regulations guiding the implementation of Best Management Practices (BMP) during construction are provided by MDE (1994 Standards and Specifications for Soil Erosion and Sediment Control). These regulations contain BMP installation instructions and typical construction activities that require BMP. Monitoring of construction effluents and stormwater runoff will be performed as required in the stormwater pollution prevention plan, NPDES general permit, and other applicable permits obtained for the construction.

The following BMP will be implemented to limit or minimize expected hydrologic alterations:

- Maintaining clean working areas,
- Removing excess debris and trash from construction areas,
- Properly containing and cleaning up all fuel and chemical spills,
- Installing erosion prevention devices in areas with exposed soils,
- Installing sediment control devices in construction areas,
- Retaining and controlling stormwater and wash-down water onsite,
- Implementation of a Storm Water Pollution Prevention Plan (SWPPP),
- Controlling site runoff,
- Monitoring runoff, groundwater, and surface water bodies for contaminants, and
- Implementing controls, such as a spill prevention program, to protect against accidental discharge of contaminants (fuel spills, other fluids and solids that could degrade groundwater).

5.4.1.7 Proposed Practices to Limit or Minimize Hydrologic Alterations

The bio-retention ditches are designed to protect water quality. Monitoring of construction effluents and stormwater runoff will be performed as required in the stormwater pollution prevention plan, NPDES general permit, and other applicable permits obtained for the construction.

In addition, CCNPP Unit 3 will comply with the requirements and conditions of the various permits issued to support construction. Environmental compliance personnel will monitor construction activities and provide direction to add, modify or replace site practices to ensure compliance with hydrological standards and regulations.

In summary, the impact to hydrology is expected to be minimal due to design of the surface water management systems and use of best management practices to control surface water runoff.

5.4.2 Water Use Impacts

This section discusses the proposed construction activities and resulting hydrologic alterations that could impact water use, an evaluation of potential changes in water quality resulting from construction activities and hydrologic changes, an evaluation of proposed practices to minimize adverse impacts, and compliance with applicable federal, state and local environmental regulations.

5.4.2.1 Description of the Site and Vicinity Water Bodies

The CCNPP site covers an area of approximately 2,070 acres (838 hectares) and is located on the western shore of Chesapeake Bay in Calvert County near MD 2/4 as shown in Figure 5.2-1.

The surface water bodies, as shown in Figure 5.4-1, within the hydrologic system at the CCNPP site that may be affected by the construction and operation of CCNPP Unit 3 are discussed in Section 5.4.1.1. Additional details on the surface water drainage and hydrology are presented in Section 4.4 and in the Final Wetland Delineation Report.

The aquifers that could be impacted by project construction activities at the CCNPP site are the surficial aquifer, the Chesapeake aquifer/confining unit, and the Castle Hayne-Aquia aquifer. These, and the other aquifers in the regional groundwater system, are described in Section 4.4. For southern Maryland, hydrogeologists refined the aquifer nomenclature system based on local hydrostratigraphic conditions. From shallow to deep, the local aquifer systems are as follows: surficial Aquifer, Piney Point-Nanjemoy aquifer, Aquia aquifer, Magothy aquifer, and the Potomac Group of aquifers. In southern Maryland, the Chesapeake aquifer is treated as a confining unit and the Castle Hayne-Aquia aquifer system has been subdivided into the Piney Point-Nanjemoy and Aquia aquifers. Site-specific hydrogeologic cross-sections are provided in Figure 5.4-5 and Figure 5.4-6.

5.4.2.2 Hydrologic Alterations and Related Construction Activities

Construction impacts to the existing surface water bodies are summarized as follows:

- Increasing runoff from the approximately 333 acres (135 hectares) of impervious and relatively impervious surfaces for the CCNPP Unit 3 power block pad, cooling tower pad, switchyard, permanent laydown, and parking areas,
- Infilling and eliminating the upper reaches of Branch 2 and Branch 3, and an unnamed tributary to Johns Creek,
- Isolating portions of the upper reach of Branch 1 by construction of the laydown areas south of the CCNPP Unit 3 power block foundation,

- Disruption of the drainage in the Lake Davies dredge spoils disposal area with possible impacts on the two downstream impoundments,
- Wetlands removal and disruptions, and
- Possibly increasing the sediment loads into the proposed impoundments and downstream reaches.

The hydrologic alterations to groundwater that could result from the project related construction activities are:

- Creation of a local and temporary depression in the surficial aquifer potentiometric surface due to dewatering for foundation excavations,
- Disruption of current surficial aquifer recharge and discharge areas by plant construction. Hilly, vegetated areas would be cleared and graded; some streams would be backfilled and construction areas would be covered by less permeable materials and graded to increase runoff into bio-retention ditches. The locations of, or quantity of, water produced at springs and seeps could change downgradient of the construction areas,
- Stormwater runoff from the flat, non-vegetated foundation pads, switchyard and laydown areas would be directed and concentrated into bio-retention ditches and new impoundments that could affect recharge to the surficial aquifer. Because the ditches and impoundments are unlined, they could act as smaller, focused recharge areas and might increase the amount of water recharging the surficial aquifer,
- Additional drawdown in the Aquia aquifer when the water needed for CCNPP Unit 3 construction is supplied by the CCNPP Units 1 and 2 onsite wells, and
- Minor shifting of the surficial aquifer recharge area(s) to the underlying Chesapeake aquifer/confining unit.

5.4.2.3 Physical Effects of Hydrologic Alterations

Impacts from the construction of CCNPP Unit 3 are similar to those associated with any large construction project. The construction activities that could produce hydrologic alterations to surface water bodies and groundwater aquifers are described at the beginning of Section 5.4. The potentially affected surface water bodies and groundwater aquifers are described in Section 5.4.1.1. The potential construction effects on surface water bodies and groundwater aquifers are presented in Section 5.4.1.4.

Surface Water Impacts

Because of the potential for impacting surface water resources, a number of environmental permits are needed prior to initiating construction. Table 1.3-1 provides a list of construction-related consultations and permits that have to be obtained prior to initiating construction activities.

The construction activities expected to produce the greatest impacts on the surface water bodies occur from:

- Reducing the available infiltration area,
- Grading and the subsequent covering of the 46 acre (19 hectare) CCNPP Unit 3 power block foundation,
- Grading and covering of the 18 acre (7 hectare) CCNPP Unit 3 cooling tower pad,
- Grading and covering of the 59 acre (24 hectare) CCNPP Unit 3 switchyard/substation,
- Vegetation removal and grading of 151 acres (61 hectares) for temporary construction laydown areas, concrete batch plant, offices, parking, warehouses, and shop preparation areas,
- Creation of impoundments, and
- Elimination of certain branches of Johns Creek.

Site grading and new building foundations will cover and reduce existing infiltration and recharge areas. Runoff will be directed into bio-retention ditches that could discharge to new impoundments, altering the surficial aquifer recharge areas. Possible increases in runoff volume and velocity in the downstream creeks may cause erosion and adversely affect riparian habitat if not controlled.

Dewatering for the proposed foundation excavations could also impact surface water bodies. Effluent from the dewatering system, and any stormwater accumulating during the excavation, would be pumped to a stormwater discharge point or into onsite impoundments. If pollutants (e.g., oil, hydraulic fluid, concrete slurry) exist in these effluents from construction activities, they could enter the impoundments, downstream channel sections, or other surface water bodies. Monitoring of construction effluents and stormwater runoff would be performed as required in the stormwater management plan, NPDES permit, and other applicable permits obtained for the construction. Depending on the design of the stormwater impoundments and discharge systems, and the proposed wetland mitigation areas, outflow rates into the surface streams could be altered.

All water bodies within the CCNPP site boundary could have the potential to indirectly receive untreated construction effluents. The water bodies listed in Section 5.4.1.1 are potentially subject to receiving untreated construction effluents directly. It will be necessary to implement proper BMP under state regulations including a General NPDES Permit for Stormwater associated with Construction Activity, an Erosion and Sediment Control Plan, and a SWPPP. Table 1.3-1 lists additional information on the federal, state and local authorizations associated with this project.

If proper BMP are implemented under these permits, treated construction effluents could be released to the site water bodies without adverse impacts. Flow rates for untreated construction effluents will depend upon the usage of water during site construction activities and the amount of precipitation contacting construction debris during construction activities. The characteristics of the construction effluents are discussed in Section 5.4.1.4. A quantitative calculation and evaluation of the construction effluents and runoff will be done as part of the state construction permit process. BMP would be implemented to control runoff, soil erosion, and sediment transport. Good housekeeping practices and engineering controls will be implemented to prevent and contain accidental spills of fuels, lubricants, oily wastes, sanitary wastes, etc.

BMP are implemented under a Spill Prevention Plan, a SWPPP, and an Erosion Control Plan, as described in Section 5.4.1.6 and Section 5.4.2.10. Environmental control systems installed to minimize impacts related to construction activities will comply with all federal, state and local environmental regulations and requirements. Once the initial controls are in place, they are maintained through the completion of construction and during plant operation, as needed.

Surface water use impacts are expected to be moderate, primarily due to the loss of wetlands and wetland buffers, and will require mitigation. The mitigation measures associated with the wetlands and wetland buffers are described in Section 5.6.4.

Groundwater Impacts

Depending on the design of both the stormwater impoundments and discharge systems and the proposed wetland mitigation projects, outflow velocity and volume in the surface streams could change, and change the volume of water available to infiltrate and recharge the surficial aquifer.

The hydrologic alterations that could be produced in the groundwater aquifers are expected to be localized and possibly temporary. Most of the effects are expected to occur in the surficial aquifer. Any effects in the deeper aquifers are expected to be minor, due to remaining within the existing permit withdrawal limits, and dependent to a large extent on groundwater travel time, thickness and physical properties of the intervening stratigraphic units, and the nature of the hydraulic connection between aquifers.

The construction activities that are expected to produce the greatest impacts on the surficial aquifer are related to:

- Changing the existing recharge and discharge areas,
- Possibly changing the amount of runoff available for infiltration, and
- Dewatering of foundation excavations during construction.

Site grading and leveling for the building foundations and laydown areas will cover and possibly eliminate existing recharge areas. Runoff from the graded areas will be directed into bio-retention ditches and several proposed impoundments including newly established wetlands mitigation areas, possibly creating new "focused" recharge areas. Runoff velocity may be increased in the channels downstream of the impoundments, which could decrease the amount of runoff available for infiltration and recharge. Fine-grained sediments could settle out in the impoundments and channels and create less-permeable areas for infiltration and recharge. These changes affect local recharge to the surficial aquifer. Impacts on the deeper Aquia aquifer are likely to be minimal.

Dewatering foundation excavations also produces localized impacts on the surficial aquifer. The deepest excavations anticipated are for the proposed reactor and auxiliary building foundations, and extend approximately 40 ft (12 m) below plant grade and approximately 60 ft (18.3 m) below pre-construction grade. The dewatering system and activities are not expected to have any significant impact on the deeper Aquia aquifer because the main recharge area of the Aquia aquifer is to the north. Hence, the Aquia aquifer is insensitive to perturbances of the surficial aquifer. Effluent from the dewatering system will be pumped to a stormwater discharge point. Monitoring of construction effluents and stormwater runoff will be performed as required in the SWPPP, NPDES permit, and other applicable permits obtained for the construction.

The locally lowered surficial aquifer water level would be expected to eventually recover after the dewatering and other subsurface construction activities are complete. Although it would be altered by buildings and paved areas, rainwater is still allowed to infiltrate in other plant areas to recharge the aquifier.

The impact to groundwater is small and localized, changes to the surficial aquifer water level are expected to eventually recover once construction is complete.

5.4.2.4 Water Quantities Available to Other Users

At present no surface water withdrawals are made in Calvert County for public potable water supply. Water use projection in Maryland for 2030 does not include surface water as a source for public water supply in southern Maryland counties including Calvert County. Groundwater use and trends in southern Maryland and at the CCNPP site are presented in Section 4.4.2.

Water required for CCNPP Unit 3 construction is estimated at 250 gpm (946 lpm) or 360,000 gpd (1,363,000 lpd). This water is expected to come from the existing onsite wells into the Aquia aquifer at the CCNPP site and from offsite sources until the desalination plant becomes operational and can supply the necessary water.

The surficial aquifer is not used as a potable water source in the vicinity of the CCNPP site. The impacts expected from foundation dewatering or other construction activities will not impact any local users. The razing of the Camp Conoy facilities that are under the construction footprint may require abandonment of the four wells that supply those facilities. These wells draw from the Piney Point aquifer and have an appropriation limit of 500 gpd (1,900 lpd). The impact on the local area water supply resulting from the abandonment of these wells will be minor.

5.4.2.5 Water Bodies Receiving Construction Effluents

The surface water bodies directly downstream of the proposed construction activities could be impacted during clearing, grubbing, and grading. Locations of surface water and its users that could be impacted by construction activities are provided in Section 5.4.1.3.

Because most of the water for construction would be used for consumptive uses such as grading, soil compaction, dust control, and concrete mixing, little infiltration would be expected. Any effluents that might infiltrate would recharge the surficial aquifer, and, potentially, the underlying Chesapeake aquifer/ confining unit, and the Castle Hayne-Aquia aquifer.

If contaminants enter the surface water bodies unchecked, there would be a potential for infiltration and subsequent groundwater contamination. If contaminants do enter groundwater, they may impact the quality of water withdrawn for industrial and commercial applications.

Any construction effluents infiltrating into the subsurface could potentially reach the surficial aquifer if they are of sufficient volume and concentration. The plume migration would be downgradient and, depending on location, flow either eastward toward the Chesapeake Bay or westward toward the Patuxent River. The horizontal groundwater flow in the surficial aquifer is generally bi-directional. A northwest trending groundwater divide roughly follows a line extending through the southwestern boundary of the proposed power block area. Northeast of this divide, horizontal groundwater flow is northeast toward the Chesapeake Bay to small seeps and springs or onsite streams. Groundwater southwest of this divide flows to the southwest.

It is also possible that this groundwater could discharge locally at seeps or springs. Any possible impacts on deeper aquifers would also depend on the infiltrating volume and the hydrologic connection with the surficial aquifer.

The composition of possible construction effluents that could infiltrate into the surficial aquifer would depend on several factors related to the physical nature of the effluent material, i.e., solids versus liquids, solubility, vapor pressure, mobility, compound stability, reactivity in the surface and subsurface environments, dilution, and migration distance to groundwater. It is expected that proper housekeeping and spill management practices would minimize potential releases and volumes and physically contain any releases. Pesticides and herbicides are expected to be applied in limited site areas for insect and weed/brush control.

Several impoundments are planned to catch stormwater and sediment runoff from the various construction areas. Bio-retention ditches are planned to drain the proposed CCNPP Unit 3 power block, cooling tower pad, switchyard, and laydown areas. Modeling of the runoff from the probable maximum flood during plant operation bounds the possible runoff amounts, characteristics, and impacts that might occur during construction due to unpaved surfaces allowing for greater stormwater infiltration to ground. The retention ditches will discharge excess runoff into impoundments and in some cases into proposed wetland mitigation areas. The impoundments will be sized so as to prevent fast flowing, sediment laden stormwater from reaching the creeks or Chesapeake Bay prior to allowing the sediments to settle out. The flow velocities will be minimized to prevent erosion of creek and stream banks. The allowable flow rates and physical characteristics of stormwater runoff will be specified in State discharge permits.

Maximum runoff for the entire basin during the probable maximum flood is estimated at 21,790 cfs (617 cms). The maximum high water level elevation in Johns Creek is 65 ft (19.8 m) NGVD 29, which is below the approximate 84.6 ft (25.8 m) NGVD 29 elevation of the final site grade in the power block, switchyard, and cooling tower area.

5.4.2.6 Baseline Water Quality Data

Baseline water quality data for surface water bodies and groundwater is provided and discussed in Section 4.4.

5.4.2.7 Measures to Control Construction Related Impacts

The following measures will be taken to avoid runoff from the construction areas entering and potentially impacting downstream surface water bodies and groundwater, as applicable:

- Implementation of a SWPPP,
- Controlling runoff and potential spills using dikes, earthen berms, seeded ditches, and impoundments,
- Monitoring for contaminants within construction area impoundments and impoundments downstream of disturbed areas,
- Implementation of BMP to protect against accidental discharge of contaminants (fuel spills, other fluids and solids that could degrade groundwater and surface water resources), and

- Performing additional onsite surface and groundwater monitoring compared to established water quality benchmarks and historical site data.

Bio-retention ditches are planned for the periphery of the power block, laydown, cooling tower and switchyard areas. The ditches are constructed of base materials that protect water quality. The stormwater basins are unlined impoundments with simple earth-fill closure on the down stream end and include discharge piping to the adjacent watercourses.

Following the acquisition of the required permits and authorizations, site preparation activities include the installation or establishment of environmental controls to assist in controlling construction impacts to groundwater. These environmental controls include:

- Cofferdams,
- Stormwater management systems,
- Spill containment controls,
- Silt screens,
- Settling basins, and
- Dust suppression systems.

These controls assist in protecting the surficial aquifer by minimizing the potential for construction effluents to infiltrate directly into the subsurface or to carry possible contaminants to aquifer recharge areas.

Mitigation measures for barge slip dredging and construction activities in the area of the new intake structure and discharge outfall include:

- Restricting dredging only during certain times of the year to minimize impacts to aquatic species,
- Restricting dredging to only the areas identified for dredging,
- Installing a silt curtain around each dredge or active dredge area to minimize sediment release, as far as practicable, at the seabed/silt curtain interface and at the surface water level/silt curtain interface,
- Ensuring clam-shell dredges are fully closed and hoisted slowly to limit the amount of spillage,
- Not filling spoils barges to levels which will cause overflowing of materials during loading and moving,
- Not allowing vessel decks to be washed in such a way that allows material to be released overboard,

- Installing a sheet pile cofferdam and dewatering system to facilitate construction of the Unit 3 intake structure, and

- Carrying out water-quality monitoring in accordance with any permit requirements.

Additional measures to minimize or contain accidental releases of contaminants will be the establishment, maintenance, and monitoring of:

- Solid waste storage areas,

- Backfill borrow, spoils, and topsoil storage areas, and

- Site drainage patterns.

Groundwater monitor wells will be installed to assess gradient changes toward the excavation dewatering areas and potential groundwater quantity and quality changes. Construction groundwater use impacts might be expected in the Aquia aquifer and the groundwater withdrawals and potentiometric surface depression will be monitored. As explained in Section 5.4.2.7, any contamination that might be introduced into the surficial aquifer would be attenuated by the time it might reach deeper aquifers.

5.4.2.8 Potential Changes to Surface Water and Groundwater Quality

The following section describes the potential water quality impacts resulting from the construction of CCNPP Unit 3.

The CCNPP site is a private facility that operates as a nontransient, noncommunity public water system as defined by COMAR 26.04.01.01. All water currently used onsite is drawn from the Chesapeake Bay or subsurface aquifers. During construction additional water needs will be supplied from offsite sources or the planned desalination plant. There are 13 groundwater supply wells onsite as listed in Table 5.4-3. Figure 5.4-7 shows the locations of the onsite supply wells. Four wells supply fresh water for CCNPP Units 1 and 2 operations; eight wells supply ancillary site facilities such as the rifle range and Camp Conoy. The Old Bay Farm well, identified in Table 5.4-3, is no longer in use.

Potential Changes to Surface Water Quality

Any potential surface water quality impacts are associated with the site clearing and grading activities.

The addition of sediment and organic debris to the local streams resulting from clearing, grubbing, and grading could decrease water quality. Organic debris could dam or clog existing streams, increase sediment deposition, and increase potential for future flooding. Organic debris decomposing in streams can cause dissolved oxygen and pH imbalances and subsequent releases of other organic and inorganic compounds from the stream sediments. Sediment laden waters are prone to reduced oxygen levels, growth of algae, and increases in pathogens. If heavy metals or chemical compounds spill and/or wash into surface waters, there could be a direct toxicity to aquatic organisms. These potential pollutant releases could impact aquatic species and in turn affect the recreational aspects associated with fishing, canoeing, or kayaking.

The water bodies downstream of the proposed construction areas could be directly and indirectly affected by construction activities onsite. Construction debris residing on the pads and temporary staging areas could mix with construction wash-down water or stormwater, exit the site via untreated runoff and produce chemical reactions adverse to downstream ecology. Possible contaminants include: sediment, alkaline byproducts from concrete production, concrete sealants, acidic byproducts, heavy metals, nutrients, solvents, and hydrocarbons (fuels, oils, and greases). There could be a high potential for contaminants to mix with site wash-down water or rainwater/precipitation runoff and be washed downstream into surface water bodies existing on the CCNPP site due to the persistent nature of local precipitation. There could also be the potential for spills within the construction areas consisting of fuels, solvents, sealants, paints, or glues. Construction dusts not suppressed could drift outside of the construction zones and contaminate nearby water supplies. If these contaminants enter the surface water bodies unchecked there could be a potential for infiltration and subsequent groundwater contamination.

The proposed removal of onsite wetlands could reduce the ability of microbiotic organisms and fauna to naturally attenuate contaminants and pollutants produced onsite.

The impacts to surface water quality downstream of the construction site are expected to be minimal due to the use of BMP to control dust, runoff, and spills.

Potential Changes to Groundwater Quality

The spoils for CCNPP Units 1 and 2 were deposited in the dredge spoils disposal area of the site known as the Lake Davies area. Dredge spoils generated during the dredging of the barge slip area and construction of the intake/discharge structures may contain elevated levels of metals and salts. Runoff containing saline residue from the spoils could enter the impoundment just southeast of the spoils disposal pile, which is likely in direct hydraulic contact with the surficial aquifer. Any impact on groundwater quality would probably be minor due to dilution. Little, if any, water quality impacts would be expected if this diluted water were to reach the deeper aquifers.

Dewatering for the foundation excavations may increase the oxidation of some sedimentary constituents by placing them in direct contact with the atmosphere. The oxides might have an increased solubility and could migrate down gradient when the potentiometric head is reestablished following construction completion. Possible impacts to the surficial aquifer water quality would be minimal and decrease with migration and dilution.

5.4.2.9 Potential Impacts to Surface Water and Groundwater Users in the Absence of Mitigation and Controls

Surface water users downstream of the site may experience impacts from potential water quality changes if construction effluent concentrations and volumes are large enough and the release enters directly into a surface water body bypassing the overflow catch basins and sediment ponds. The surface water users that could be impacted in the event of a release are those downstream of the CCNPP site along the tributaries flowing to the Patuxent River and the Chesapeake Bay. Any impacts to the larger surface water bodies receiving the discharge are expected to be minor.

5.4.2.10 Predicted Impacts on Water Users

Potential increased sediment loads in site runoff during construction will be controlled through BMP resulting in minimal impacts to downstream surface water users and affected areas.

Because groundwater from CCNPP Units 1 and 2 onsite wells will be used for construction, there could be impacts on local users that also make withdrawals from the Aquia aquifer.

Potential construction effluent impacts on aquifer groundwater quality would first be manifested in the surficial aquifer. Construction activities are only expected to produce limited and temporary impacts in the surficial aquifer. As described in Section 4.4, the surficial aquifer is not used as a potable water source in the vicinity of the CCNPP site. Therefore, potential groundwater quality changes would not be expected to have any impact on possible users. Potential impacts to the deeper aquifers are dependant on the nature of the hydraulic connection between aquifers described in Section 5.4.1.1. Groundwater quality impacts on the deeper aquifer users are small due to dilution and other contaminant attenuation effects that could occur along any effluent plume migration path.

5.4.2.11 Water Quality Standard

In a separate application to MDE, Co-Applicants will seek an NPDES discharge permit that will be developed with a view toward achieving and maintaining ambient water quality standards in the receiving water.

5.5 AIR QUALITY IMPACTS DURING CONSTRUCTION

Construction activities will result in the release of pollutants to the atmosphere. Fugitive dust and fine particulate emissions will be generated as a result of vehicular traffic on paved and unpaved roadways as well as earth moving and material handling activities. The construction activities will require the temporary installation of material processing equipment onsite including a concrete batch plant, another potential source of particulate emissions. Off-road construction equipment (e.g., backhoes, bulldozers, generators, and compressors) will consume diesel fuel and will generate air emissions from fuel combustion including carbon monoxide, oxides of nitrogen, fine particulates, and to a lesser extent, sulfur dioxide and other pollutants. Painting, coating, and similar operations will generate emissions from the evaporation of solvents, i.e., volatile organic compounds (VOC).

The U.S. EPA, along with several state and local air pollution control agencies, have developed methodologies and emission factors that are routinely used to characterize air emissions from construction activities. Once emissions are defined, EPA's air dispersion models are used in conjunction with local meteorological data to predict the impact on air quality levels in the surrounding area. The predicted impacts can then be compared to ambient air quality standards established to protect the public's health and welfare or other health criteria to determine whether any further measures are needed to reduce emissions to meet air quality criteria.

5.5.1 Estimated Air Emissions During Construction

The CCNPP site will be cleared for roads, facility construction, construction laydown areas, parking and other construction-related uses. The current site elevation varies from 40 feet to 130 feet, with an average elevation of around 100 feet. The final site grading plan leaves the majority of the impacted area at an elevation between 90 and 100 feet, with the power block and adjacent areas at an elevation between 80 and 85 feet. Higher elevation areas will be cut, and acceptable materials used as fill in lower elevation areas.

Major earth moving activities that will generate air emissions include:

- Creation of construction access road from MD 2/4 to CCNPP Unit 3 construction areas,
- Upgrading and extending of heavy haul road from barge landing to CCNPP Unit 3 construction areas,

- Establishing general plant area grade,
- Excavation for building foundations, and
- Backfilling around foundations.

A variety of diesel powered equipment will be required to support construction activities. This includes:

- Bulldozers, scrapers, and graders for land clearing, road construction, and grading,
- Backhoes and loaders for excavating foundations and material transfer,
- Cranes for moving heavy equipment and transferring materials from barges including sand and aggregate,
- Dump trucks for moving excavated earth to storage and returning as backfill material and for transferring sand and aggregate materials from barges, and
- Support vehicles, trucks and compressors.

Vehicular traffic on the construction access road and the heavy haul road to and from the barge area will also generate fugitive emissions. This includes construction workers in their personal vehicles traveling to and from the parking areas and trucks moving excavated materials to and from storage areas. During the construction of CCNPP Unit 3 approximately 4,000 workers (full time equivalents or FTE) will be employed. A concrete batch plant will be used to produce the estimated 500,000 cubic yards of concrete required. Trucks will bring sand and aggregate from barges to storage piles at the concrete plant and mixed concrete to the construction locations.

In general, the process of estimating construction emissions involves the use of activity parameters and emission factors based on those parameters along with appropriate correction factors. The bulk of the activity parameter data used is summarized in Table 5.5-1 and was provided by Bechtel Power Corporation, the design firm for Unit 3. Information is provided in the table for each of the various construction activities and the year that the activity will occur. In estimating emissions, the highest activity level from any year was applied. This provides a worst-case annual estimate of emissions because the maximum level of activity in each activity area will not occur during the same year. The individual activities listed in Table 5.5-1 were grouped into categories with the same inventory methodology. Bechtel provided projected activity data for the combustion equipment that is shown in Section 5.5.1.6. The primary source of emission factor data and methodologies was the U.S. Environmental Protection Agency (EPA). Both AP-42, "Compilation of Air Pollutant Emission Factors" (Fifth Edition), and "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition" (2004) were used. Documentation for the approach used to estimate emissions for each source category is provided in the following sections.

Table 5.5-1 Construction Activity Data

Item No.	Construction Activity	Operation Type	Units	Amount Per Year						
				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	TOTAL
	SITEWORK									
	Clear & Grub									
1	Vegetations Removal	Bulldozing (w/Item 8)	Hours							
2	Scrapers removing topsoil		Tons	310,000	0	0	0	0	0	310,000
3	Scrapers in travel	Unpaved Roads	VMT	5,060	0	0	0	0	0	5,060
4	Scrapers unloading topsoil	Batch Drop	Tons	310,000	0	0	0	0	0	310,000
	General Site Grading & Fill									
5	Scrapers removing overburden		Tons	2,158,000	2,158,000	644,000	0	0	0	4,960,000
6	Scrapers in travel	Unpaved Roads	VMT	35,160	35,160	10,500	0	0	0	80,820
7	Scrapers unloading overburden	Batch Drop	Tons	2,158,000	2,158,000	644,000	0	0	0	4,960,000
8	Bulldozing	Includes Items 1, 13, 17	Hours	7,800	7,800	4,100	2,000	500	0	
9	Compaction	Includes Items 18, 24	Hours	5,200	5,200	2,600	1,000	500	0	
	BUILDING EXCAVATION									
10	Load Excavated Mat'l into Trucks	Batch Drop	Tons	3,410,000	0	0	0	0	0	3,410,000
11	Haul to Stockpile Area	Unpaved Roads	VMT	546,000	0	0	0	0	0	546,000
12	Truck-Dump	Batch Drop	Tons	3,410,000	0	0	0	0	0	3,410,000
13	Spread material	Bulldozing (w/Item 8)	Hours							
	STRUCTURAL BACKFILL									
14	Load Stockpile into Off-Road Truck	Batch Drop	Tons	0	2,790,000	0	0	0	0	2,790,000
15	Haul to Powerblock	Unpaved Roads	VMT		447,000					447,000
16	Truck-Dump	Batch Drop	Tons	0	2,790,000	0	0	0	0	2,790,000
17	Spread material	Bulldozing (w/Item 8)	Hours							
18	Compaction	Included with Item 9	Hours							
	UNPAVED ROAD CONSTRUCTION									
23	Motor Grading		VMT	2,500	3,800	2,500	1,300	0	0	10,100
24	Compaction	Included with Item 9	Hours							
	CONCRETE OPERATIONS									
25	Material transfer from Barge	See separate data submittal								
26	Material Transport - Barge to Plant	Unpaved Roads	VMT	35,200	70,380	35,200	0	0	0	140,780
27	Material Transport to Pile	See separate data submittal								

Item No.	Construction Activity	Operation Type	Units	Amount Per Year						
				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	TOTAL
28	Material Transfers - Pile to Silo/Plant	See separate data submittal								
29	Ready Mix Transport	Unpaved Roads	VMT	13,300	41,200	54,000	52,800	13,200	0	174,500
	OPEN AREAS									
19	Power-Block & Cooling Tower Areas	Wind & Erosion	Acres	45	45	45	0	0	0	n/a
20	Switchyard Area	Wind & Erosion	Acres	43	43	43	0	0	0	n/a
21	Soils Stockpile	Wind & Erosion	Acres	60	60	60	60	0	0	n/a
22	Temporary Gravel Parking Areas	Wind & Erosion	Acres	70	70	70	70	70	70	n/a
	VEHICLE TRAFFIC									
30	Commuters	Paved Road	VMT	44,000	179,000	356,000	540,000	184,000	15,000	1,318,000
31		Unpaved Road	VMT	205,000	838,000	1,670,000	2,536,000	863,000	69,000	6,181,000
32	Commercial Deliveries	Paved Road	VMT	5,500	6,100	4,100	760	100	0	16,560
33		Unpaved Road	VMT	19,400	21,700	14,500	2,730	350	0	58,680

VMT = vehicle miles travelled

Recommended Controls: roadway watering as necessary; disturbed and open area watering as necessary.

5.5.1.1 Vehicle Travel

Vehicle travel will occur on both paved roads and disturbed earth. Travel on roads will be by commuters, commercial vehicles, and construction vehicles. Commuters will travel on paved and unpaved roads from the CCNPP site boundary to and from the various parking lots. Commercial vehicles will make deliveries using paved and unpaved roads to and return from various site locations. Construction vehicles (trucks in transport and scrapers in travel) will operate on roads from the barges to the concrete plant, from the concrete plant to the application points, from soil excavation points to storage and from storage to building backfill locations. Bulldozers and graders will travel on disturbed earth for purposes of site clearing, grading, compaction, excavating, backfilling, and road construction.

Some commuter and commercial vehicle travel will be on paved roads, which will be periodically cleaned with water. However, there will routinely be soil carryout from vehicles traveling on unpaved roads and disturbed earth. As a result, the unpaved road emission estimation procedure was applied to paved roads to be conservative. The procedure for estimating PM10 and PM2.5 emissions from travel on unpaved roads and disturbed earth came from AP-42 Section 13.2.2 Unpaved Roads for industrial sites – emission factor calculation in pounds per vehicle mile based on silt content of road surface and weight of vehicle multiplied by vehicle miles traveled. Based on the use of roadway watering, a control efficiency of 98% was applied for the calculation of emissions. An example calculation for PM2.5 emissions from total vehicle traffic on unpaved roads in tons per year follows.

$E = k\ (s/12)^a (W/3)^b$, where:

E = size-specific emission factor (lb/VMT)
k, a and b = empirical constants, k in lb/VMT and a and b are dimensionless
s = surface material silt content (%)
W = mean vehicle weight (tons)

$E = 0.15\ (4/12)^{0.9} (2/3)^{0.45} = 0.05$ lb/VMT

Emissions (tons/yr) = E (annual VMT)(1- % control efficiency)/2,000 lbs/ton = 0.05 (3,079,490)(1-0.98)/2,000 = 1.43 tons/yr

5.5.1.2 Disturbed Earth Movement

This category covers earth movement, loading and unloading activities by construction equipment. The specific activities and equipment involved are scrapers removing and unloading topsoil and site overburden, loading into trucks and dumping into storage of excavated material, loading into trucks and dumping for backfill of excavated material and grading for construction roads.

The application of water as necessary is planned for these operations. The procedure for estimating PM10 and PM2.5 emissions from disturbed earth movement came from AP-42 Section 13.2.3 Heavy Construction Operations and 13.2.4 Aggregate Handling and Storage Piles. The emission factor calculation in pounds per ton of material transferred is based on mean wind speed and material moisture content. The emission factor is multiplied by the amount of material transferred to determine emissions for that activity. No emission reduction credit was included for area watering. An example calculation for PM2.5 emissions from loading excavated material in trucks for dumping into storage in tons per year follows.

$E = k\ (0.0032)\ (U/5)^{1.3} / (M/2)^{1.4}$, where:

E = size-specific emission factor (lb/ton)
K = particle size multiplier (dimensionless)
U = mean wind speed (miles per hour)
M = material moisture content (%)

$E = 0.053 (0.0032)(6.2/5)^{1.3}(3/2)^{1.4} = 0.000127$ lb/ton

Emissions (tons/yr) = E (annual tons excavated)/2,000 lbs/ton = 0.000127 (3,410,000)/2,000 = 0.22 tons/yr

5.5.1.3 Aggregate Movement

This category consists of unloading aggregate from barges into trucks and then unloading the trucks at the concrete batch plant. The maximum amount of aggregate moved in any year was determined based on the maximum amount of concrete produced in any year and the relative amount of aggregate (sand and gravel) required for that amount of concrete. The data for this determination was provided by Bechtel.

The application of water as necessary is planned for these operations. As with disturbed earth movement category above, the procedure for estimating PM10 and PM2.5 emissions from aggregate movement came from AP-42 Section 13.2.4 Aggregate Handling and Storage Piles. The emission factor calculation in pounds per ton of material transferred is based on mean wind speed and material moisture content. The emission factor is multiplied by the amount of material transferred to determine emissions for that activity. No emission reduction credit was included for watering. An example calculation for PM2.5 emissions from unloading aggregate from the barge to the truck in tons per year follows.

$E = k (0.0032) (U/5)^{1.3}/(M/2)^{1.4}$, where:

E = size-specific emission factor (lb/ton)
K = particle size multiplier (dimensionless)
U = mean wind speed (miles per hour)
M = material moisture content (%)

$E = 0.053 (0.0032)(6.2/5)^{1.3}(2.8/2)^{1.4} = 0.000139$ lb/ton

Emissions (tons/yr) = E (annual tons moved)/2,000 lbs/ton = 0.000139 (331,734)/2,000 = 0.02 tons/yr

5.5.1.4 Wind Erosion

The wind erosion category represents fugitive particulate matter losses due to wind blowing over exposed construction areas. The total acres of open construction areas are shown in Table 5.5.1 and were provided by Bechtel. The maximum annual acreage shown in the table was increased to 420 acres to be consistent with the total disturbed acreage for permanent and temporary construction as provided in Table 5.2-1 Construction Areas Acreage and Operations Acreage, Land Use and Zoning.

As indicated for the earlier categories, area watering as necessary is planned for these open areas. The procedure for estimating PM10 emissions from wind erosion came from the Clark County, Nevada Department of Air Quality and Environmental Management (DAQEM). DAQEM uses a PM10 emission factor of 1.66 lbs/acre/day to estimate wind erosion losses. This is thought to be a conservative emission factor for use at the CCNPP site. DAQEM also provided data on the effectiveness of watering for reducing uncontrolled emissions. According to DAQEM data, maintaining a moisture content of 3%

results in a reduction of over 90% in emissions. Again, to be conservative, a control efficiency of 90% was applied. Because no information was available on PM2.5 fraction, it was conservatively assumed that PM10 and PM2.5 emissions are equivalent for this category. An example calculation for PM10 emissions from wind erosion in tons per year follows.

Emissions (tons/yr) = Emission factor lb/acre/day (365 days/yr)(annual acreage)(1- % control efficiency)/2,000 lbs/ton = 1.66 (365)(420)(1-0.90)/2,000 = 12.7 tons/yr

5.5.1.5 Concrete Batch Plant

A concrete plant will be used to produce all the concrete required for construction operations. The individual operations evaluated are aggregate (sand and gravel) delivery to the plant, sand and gravel transfer to conveyor, sand transfer to elevated storage, cement and supplement loaded into the storage silo, weigh hopper loading of sand, gravel and cement, and loading into mix trucks of sand, gravel and cement.

A baghouse will be used on the storage silo for control of emissions generated as a result of pneumatically loading cement and supplement into the silo. In addition appropriate controls will be applied to the loading of cement and supplement into the mix trucks. The procedure for estimating PM10 and PM2.5 emissions from material transfer was based largely on AP-42 Section 11.12 Concrete Batching. Specifically, Tables 11.12-5, Plant-wide Emission Factors per Yard of Truck Mix Concrete, and 11.12-2, Emission Factors for Concrete Batching, were used. Controlled factors were applied for loading cement and supplement in the storage silo and for loading sand, gravel, cement and supplement into the weigh hopper and mix truck. The application of water as necessary is planned for the other transfer operations. An emission reduction of 90% corresponding to an aggregate moisture content of 3% was applied for the other transfer operations. An example calculation for PM10 emissions from mix truck loading in tons per year follows.

Emissions (tons/yr) = Controlled Emission Factor lbs/ton (0.282 tons/cubic yard)(annual cubic yards of concrete produced)/2,000 lbs/ton = 0.0160 (0.282)(206,061)/2,000 = 0.46 tons/yr

5.5.1.6 Combustion Equipment

This category addresses emissions from the combustion of fuel to operate all required construction equipment. The types of equipment that will be used are pumps, scrapers, dozers, backhoes, loaders, trucks, compactors, graders, concrete plant chiller and heater, compressors, cranes, forklifts, and automobiles and pickup trucks (gasoline). For example, included in this category are all barge unloading operations for aggregate, steel, and other construction materials and the transport of those materials to the appropriate construction area.

Diesel fuel combustion emissions are based on the methodologies in the EPA report, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition" (2004). This document describes the derivation of emission factors for combustion pollutants in grams per horsepower-hour. The emission factors used herein are based on EPA's "Tier 2" emission limits. Actual emission rates at the time of construction are expected to be lower since the more stringent "Tier 4" non-road new engine performance requirements will be in effect at the time of construction. The equipment mix used by contractors is expected to include Tier 2, Tier 3, and Tier 4 engines.

The basic emission factors for VOC, CO, NOx and PM in the EPA report are zero-hour, steady-state factors to which transient adjustment and deterioration factors and a sulfur content adjustment for PM emissions are applied. The factors are a function of model year and horsepower. Sulfur dioxide emissions are determined based on fuel sulfur content and the portion of sulfur that converts to PM. For the gasoline-fueled vehicles, composite emission factors for year 2010 in grams/mile for the default vehicle mix were obtained from MOBILE6. Those factors were converted to grams/HP-hr assuming a vehicle speed of 15 miles/hour and an average horsepower rating of 231. Based upon information in the EPA report, PM2.5 emissions were estimated at 97% of PM10 emissions.

The activity parameters for each equipment type including horsepower rating and hours of operation for each construction year were provided by Bechtel and are shown in Table 5.5-2. Data for five 30 cubic yard dump trucks for transporting sand and gravel to the concrete plants were added using information provided by Bechtel. Adjusted emission factors (diesel engines) and resulting annual emission estimates for fuel combustion in engines powering construction equipment are presented in Table 5.5-3. These estimates represent the construction year with the maximum expected hours of equipment operation. i.e., construction year two. An example calculation for PM10 emissions from concrete transport trucks (10 cubic yards) for construction year 2 (maximum emissions) in tons per year follows.

Emissions (pounds/yr) = Adjusted Emission Factor grams/HP-hr (equipment HP)(annual hours of operation)/453.6 grams/lb = 0.1330 (250)(13,100)/453.6 = 960 lbs/yr

There are two pieces of equipment that may be stationary sources. These are the dewatering deep well/wellpoint pumps that will operate 24 hours per day and the chillers and heaters associated with the concrete plant. The chillers and heaters will be electrically operated and thus will have no emissions to the atmosphere. The worst-case NOx emissions from the dewatering pumps are just under 14 tons per year.

A summary of emission estimates for PM10 and PM2.5 is presented in Table 5.5-4. The worst-case estimate of PM10 and PM2.5 emissions is 56.7 and 21.7 tons per year, respectively. A summary of maximum emission estimates for CO, VOC, NOx and SO2 for fuel combustion by construction equipment is provided in Table 5.5-5.

Table 5.5-2 Activity Data for Construction Equipment Fuel Combustion

Equipment Type	Fuel Type	Quantity	Motor Size (hp)	Construction Year						
				1	2	3	4	5	6	7
				Combined Yearly Total Hours of Use						
DEWATERING & EARTHWORK										
Dewatering Deep Well or Wellpoint Pumps (24-Hr/Day)	Diesel	4	180	35,000	17,500	0	0	0	0	0
Scraper, Self-Propelled, 24cy Struck	Diesel	10	450	13,000	13,000	3,900	0	0	0	0
CAT D9 Dozer	Diesel	4	410	5,200	5,200	2,600	1,500	0	0	0
CAT D6 Dozer	Diesel	2	185	2,600	2,600	1,500	500	500	0	0
CAT 330 Crawler/Hydraulic Backhoe, 3-1/4cy Struck	Diesel	4	268	2,600	5,200	2,600	2,000	1,000	0	0
CAT 953 Crawler/Loader, 2-1/2cy	Diesel	4	133	2,600	5,200	2,600	2,000	1,000	0	0
Case 521D Articulated 4X4 Wheel Loader, 2-1/4cy	Diesel	2	110	2,600	5,200	2,600	2,000	1,000	500	0
Kenworth t-800 Dump Trucks, 13/15cy	Diesel	10	250	6,500	13,000	6,500	2,000	1,000	0	0
CAT 825 Vibratory Compactor	Diesel	4	354	5,200	5,200	2,600	1,000	500	0	0
Case 580 Tractor Loader/Backhoe, 1cy/18"	Diesel	2	75	0	0	1,000	1,000	1,000	1,000	500
Case Skid Loader, 1/2cy	Diesel	2	50	0	0	1,000	1,000	1,000	1,000	500
JCB Mini Backhoe/Loader, 1/2cy/12"	Diesel	2	50	0	0	1,000	1,000	1,000	1,000	0
CAT 14H Motor Grader, 14' Blade	Diesel	1	220	1,000	1,500	1,000	0	0	0	0
Gradall	Diesel	1	220	1,000	1,000	500	500	500	0	0
GMC Truck w/6000 gal. water tank	Diesel	1	300	1,000	1,000	1,000	1,000	1,000	0	0
BATCH PLANT										
Central Mix Plant w/chiller & heater, ~ 130 cy/hr	Electric	2	0	400	1,200	1,600	1,600	400	200	100
CAT 966F Loader, 5cy Bucket @ Stockpiles	Diesel	1	266	400	1,200	1,600	1,600	400	200	100
CAT D6H Dozer @ Stockpiles	Diesel	1	165	400	1,200	1,600	1,600	400	200	100
Crawler/Backhoe, 1cy @ Spoils	Diesel	1	115	100	300	400	400	100	50	40
GMC 12/14cy Dump Truck @ Spoils	Diesel	1	300	100	300	400	400	100	50	40
IR 375cfm Air Compressor, Trailer Mounted	Diesel	1	113	100	300	400	400	100	50	40
Dump Trucks for Aggregate and Sand, 30 cy*	Diesel	5	480	1,600	5,000	6,500	6,500	1,600	800	400
CONCRETE										
Concrete Transport Trucks, Agitator/Mixer, 10cy capacity	Diesel	15	250	4,220	13,100	24,000	17,200	16,800	4,200	2,100
Creter Crane w/Grove RT990 Hydraulic Crane & 200ft Conveyor @ 200 cy/hr	Diesel	1	300	200	600	800	800	0	0	0
Concrete Pump Truck @ 170 cy/hr	Diesel	4	250	800	2,400	3,200	3,200	800	400	200
Concrete Pump, Trailer Mounted @ 115/120 cy/hr	Diesel	4	180	800	2,400	3,200	3,200	800	0	0
IR 375cfm Air Compressor, Trailer Mounted	Diesel	2	113	800	2,400	3,200	3,200	800	400	200
IR 750cfm Air Compressor, Trailer Mounted	Diesel	1	250	400	1,200	1,600	1,600	400	200	100
LIFTING/RIGGING										
Manitowoc 4600 S-5 Crawler Crane w/S-4 Ringer Attachment, 750-ton capacity	Diesel	1	685	0	1,000	2,000	2,000	2,000	1,000	0
Manitowoc M-250 S-2 Crawler Crane w/300' Boom	Diesel	2	450	0	1,000	2,000	2,000	2,000	500	0

Equipment Type	Fuel Type	Quantity	Motor Size (hp)	Construction Year						
				1	2	3	4	5	6	7
				Combined Yearly Total Hours of Use						
Attachment & Luffing Jib, 300-ton Capacity										
Manitowoc 4100 S-2 Crawler Crane 230-ton Capacilty, w/Tower Attachmentm 31-ton Capacity	Diesel	2	333	1,000	2,000	4,000	4,000	2,000	1,000	0
Manitowoc 3900W Crawler Crane, w/180' Boom & 30' Jib, 140-ton Capacity	Diesel	2	287	1,000	2,000	4,000	4,000	2,000	1,000	0
Linkbelt HC248 Lattice Boom Truck Crane w/ 200' Boom Attachment & Luffing Jib, 165-ton Capacity	Diesel	2	405	1,000	2,000	4,000	4,000	4,000	1,000	500
Kenworth T-800 Prime Mover for Heavy-Haul Trailers	Diesel	2	330	0	200	400	400	200	0	0
Grove RT-635 Rough Terrain Hyd. Crane, 35-ton Capacity	Diesel	2	152	2,000	4,000	4,000	4,000	4,000	200	1,000
Grove RT-865 Rough Terrain Hyd. Crane, 65-ton Capacity	Diesel	4	250	2,000	4,000	4,000	4,000	4,000	2,000	1,000
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	2	65	0	1,000	2,000	2,000	2,000	1,000	500
GMC 16-ft Flatbed Truck to haul rigging gear	Diesel	1	180	400	500	600	600	500	400	200
SHOP FABRICATION										
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	2	125	1,000	2,000	2,000	2,000	2,000	1,000	500
Grove AP308 Carry Deck Hyd. Crane, 8-1/2-ton	Diesel	1	76	500	750	1,000	1,000	1,000	750	500
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	2	65	500	750	1,000	1,000	1,000	750	500
GMC 18' Flatbed/Stakebed Trucks	Diesel	1	165	500	1,000	1,500	1,500	1,000	750	500
IR 375cfm Air Compressor, Trailer Mtd	Diesel	1	113	500	750	1,000	1,000	1,000	750	500
WAREHOUSE										
Linkbelt 228 Lattice Boom Truck Crane, 180-ft Boom, 30-ft Jib	Diesel	1	250	500	750	750	750	750	500	250
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	2	125	1,000	2,000	2,000	2,000	2,000	1,000	500
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	2	65	500	750	1,000	1,000	1,000	750	500
GMC Topkick Knuckle Boom Truck w/6-ton Capacity	Diesel	2	180	0	500	750	750	750	500	500
Grove AP308 Carry Deck Hyd. Crane, 8-1/2-ton	Diesel	1	76	500	750	750	750	750	500	500
GMC 18' Flatbed/Stakebed Trucks	Diesel	4	165	1,000	2,000	3,000	3,000	3,000	1,500	1,000
EQUIPMENT MAINTENANCE										
GMC Fuel Truck w/Meters, 4000gal Diesel Fuel	Diesel	3	250	1,500	1,500	1,500	1,500	1,000	500	0
GMC Fuel & Lubrication Truck w/Pwr Wash; Cont/Waste Oil Tank; 2000 gal Diesel Fuel	Diesel	2	250	1,000	1,000	1,000	1,000	1,000	500	500
GMC 3500 HD Mechanics Truck, w/Tools, Welder, Air Comp;	Diesel	2	180	1,000	1,000	1,000	1,000	1,000	500	0
GMC Wrecker & Tire Service Truck	Diesel	1	300	500	500	500	500	250	0	0
Utility, Gasoline-powered Pick-up Trucks & Automobiles	Gasoline	100	231	26,400	52,800	105,600	105,600	105,600	52,800	26,400

* Equipment and related data added by MACTEC.

Table 5.5-3 Emissions for Construction Equipment Fuel Combustion

Equipment Type	Fuel Type	Emission Factors (g/hp-hr)					Maximum Annual Emissions (lbs) (Construction Year 2)				
		HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2
DEWATERING & EARTHWORK											
Dewatering Deep Well or Wellpoint Pumps (24-Hr/Day)	Diesel	0.3085	0.7475	4.0000	0.0583	0.1624	2,142	5,191	27,778	405	1,128
Scraper, Self-Propelled, 24cy Struck	Diesel	0.1788	1.3658	4.1402	0.1330	0.1626	2,305	17,615	53,396	1,715	2,096
CAT D9 Dozer	Diesel	0.1788	1.3658	4.1402	0.1330	0.1626	840	6,420	19,460	625	764
CAT D6 Dozer	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	350	1,285	4,051	141	172
CAT 330 Crawler/Hydraulic Backhoe, 3-1/4cy Struck	Diesel	0.7115	1.9618	4.4083	0.1985	0.1620	2,186	6,027	13,544	610	498
CAT 953 Crawler/Loader, 2-1/2cy	Diesel	0.3624	1.4051	3.9157	0.2091	0.1624	553	2,142	5,970	319	248
Case 521D Articulated 4X4 Wheel Loader, 2-1/4cy	Diesel	0.7805	2.2747	4.5185	0.3033	0.1620	984	2,868	5,698	382	204
Kenworth t-800 Dump Trucks, 13/15cy	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	2,367	8,683	27,371	953	1,164
CAT 825 Vibratory Compactor	Diesel	0.1669	0.8425	4.3351	0.0583	0.1626	677	3,419	17,593	237	660
Case 580 Tractor Loader/Backhoe, 1cy/18"	Diesel	0.8469	6.2083	5.1798	0.4236	0.1801	0	0	0	0	0
Case Skid Loader, 1/2cy	Diesel	0.6432	4.0215	5.2105	0.6378	0.1803	0	0	0	0	0
JCB Mini Backhoe/Loader, 1/2cy/12"	Diesel	0.6432	4.0215	5.2105	0.6378	0.1803	0	0	0	0	0
CAT 14H Motor Grader, 14' Blade	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	240	882	2,779	97	118
Gradall	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	160	588	1,853	65	79
GMC Truck w/6000 gal. water tank	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	219	801	2,527	88	107
BATCH PLANT											
Central Mix Plant w/chiller & heater, ~ 130 cy/hr	Electric	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0	0	0
CAT 966F Loader, 5cy Bucket @ Stockpiles	Diesel	0.7115	1.9618	4.4083	0.1985	0.1620	501	1,381	3,102	140	114
CAT D6H Dozer @ Stockpiles	Diesel	0.3624	1.4051	3.9157	0.2091	0.1624	158	613	1,709	91	71
Crawler/Backhoe, 1cy @ Spoils	Diesel	0.7805	2.2747	4.5185	0.3033	0.1620	59	173	344	23	12
GMC 12/14cy Dump Truck @ Spoils	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	66	240	758	26	32
IR 375cfm Air Compressor, Trailer Mounted	Diesel	0.3384	0.8667	4.1000	0.1067	0.1624	25	65	306	8	12
Dump Trucks for Aggregate and Sand, 30 cy	Diesel	0.1788	1.3658	4.1402	0.1330	0.1626	946	7,227	21,906	704	860
CONCRETE											
Concrete Transport Trucks, Agitator/Mixer, 10cy capacity	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	2,386	8,749	27,582	960	1,173
Creter Crane w/Grove RT990 Hydraulic Crane & 200ft Conveyor @ 200 cy/hr	Diesel	0.3085	0.7475	4.0000	0.0583	0.1624	122	297	1,587	23	64
Concrete Pump Truck @ 170 cy/hr	Diesel	0.3085	0.7475	4.0000	0.0583	0.1624	408	989	5,291	77	215
Concrete Pump, Trailer Mounted @ 115/120 cy/hr	Diesel	0.3085	0.7475	4.0000	0.0583	0.1624	294	712	3,810	56	155
IR 375cfm Air Compressor, Trailer Mounted	Diesel	0.3384	0.8667	4.1000	0.1067	0.1624	202	518	2,451	64	97
IR 750cfm Air Compressor, Trailer Mounted	Diesel	0.3085	0.7475	4.0000	0.0583	0.1624	204	494	2,646	39	107
LIFTING/RIGGING											
Manitowoc 4600 S-5 Crawler Crane w/S-4 Ringer Attachment, 750-ton capacity	Diesel	0.1669	1.3272	4.1000	0.0583	0.1626	252	2,004	6,192	88	245
Manitowoc M-250 S-2 Crawler Crane w/300' Boom	Diesel	0.1669	0.8425	4.3351	0.0583	0.1626	166	836	4,301	58	161

Equipment Type	Fuel Type	Emission Factors (g/hp-hr)					Maximum Annual Emissions (lbs) (Construction Year 2)				
		HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2
Attachment & Luffing Jib, 300-ton Capacity											
Manitowoc 4100 S-2 Crawler Crane 230-ton Capacilty, w/Tower Attachmentm 31-ton Capacity	Diesel	0.1669	0.8425	4.3351	0.0583	0.1626	245	1,237	6,365	86	239
Manitowoc 3900W Crawler Crane, w/180' Boom & 30' Jib, 140-ton Capacity	Diesel	0.3085	0.7475	4.0000	0.0583	0.1624	390	946	5,062	74	206
Linkbelt HC248 Lattice Boom Truck Crane w/ 200' Boom Attachment & Luffing Jib, 165-ton Capacity	Diesel	0.1669	0.8425	4.3351	0.0583	0.1626	298	1,504	7,741	104	290
Kenworth T-800 Prime Mover for Heavy-Haul Trailers	Diesel	0.1788	1.3658	4.1402	0.1330	0.1626	26	199	602	19	24
Grove RT-635 Rough Terrain Hyd. Crane, 35-ton Capacity	Diesel	0.3384	0.8667	4.1000	0.1067	0.1624	454	1,162	5,496	143	218
Grove RT-865 Rough Terrain Hyd. Crane, 65-ton	Diesel	0.3085	0.7475	4.0000	0.0583	0.1624	680	1,648	8,818	128	358
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	0.3933	3.8349	4.4887	0.3035	0.1623	56	550	643	43	23
GMC 16-ft Flatbed Truck to haul rigging gear	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	66	240	758	26	32
SHOP FABRICATION											
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	0.3384	0.8667	4.1000	0.1067	0.1624	187	478	2,260	59	90
Grove AP308 Carry Deck Hyd. Crane, 8-1/2-ton	Diesel	0.3672	2.3655	4.7000	0.1667	0.1624	46	297	591	21	20
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	0.3933	3.8349	4.4887	0.3035	0.1623	42	412	482	33	17
GMC 18' Flatbed/Stakebed Trucks	Diesel	0.3624	1.4051	3.9157	0.2091	0.1624	132	511	1,424	76	59
IR 375cfm Air Compressor, Trailer Mtd	Diesel	0.3384	0.8667	4.7000	0.1067	0.1624	63	162	878	20	30
WAREHOUSE											
Linkbelt 228 Lattice Boom Truck Crane, 180-ft Boom, 30-ft Jib	Diesel	0.3085	0.7475	4.0000	0.0583	0.1624	128	309	1,653	24	67
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	0.3384	0.8667	4.1000	0.1067	0.1624	187	478	2,260	59	90
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	0.3933	3.8349	4.4887	0.3035	0.1623	42	412	482	33	17
GMC Topkick Knuckle Boom Truck w/6-ton Capacity	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	66	240	758	26	32
Grove AP308 Carry Deck Hyd. Crane, 8-1/2-ton	Diesel	0.3672	2.3655	4.7000	0.1667	0.1624	46	297	591	21	20
GMC 18' Flatbed/Stakebed Trucks	Diesel	0.3624	1.4051	3.9157	0.2091	0.1624	264	1,022	2,849	152	118
EQUIPMENT MAINTENANCE											
GMC Fuel Truck w/Meters, 4000gal Diesel Fuel	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	273	1,002	3,158	110	134
GMC Fuel & Lubrication Truck w/Pwr Wash; Cont/Waste Oil Tank; 2000 gal Diesel Fuel	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	182	668	2,105	73	90
GMC 3500 HD Mechanics Truck, w/Tools, Welder	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	131	481	1,516	53	64
GMC Wrecker & Tire Service Truck	Diesel	0.3304	1.2118	3.8202	0.1330	0.1624	109	401	1,263	44	54
Utility, Gasoline-powered Pick-up Trucks & Automobiles	Gasoline	0.0438	0.4728	0.0748	0.0021	0.0006	1,177	12,713	2,011	58	15
						Totals (lbs)	**24,103**	**107,588**	**323,770**	**9,477**	**12,865**
						Totals (tons)	**12.1**	**53.8**	**161.9**	**4.74**	**6.43**
						PM2.5 Total (lbs)				**9,193**	
						PM2.5 Total (tons)				**4.60**	

* PM2.5 emissions equal 0.97 times PM-10 emissions per *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression Ignition* (2004)

Table 5.5-4 Summary of Maximum Annual PM10 and PM2.5 Emissions from Construction Activities

Construction Category	Maximum Annual PM10 Emissions Tons/Yr	Maximum Annual PM2.5 Emissions Tons/Yr
Vehicle Travel	31.00	3.10
Disturbed Earth Movement	7.34	1.11
Aggregate Movement	0.31	0.05
Wind Erosion	12.70	12.70
Concrete Plant	0.60	0.13
Combustion Equipment	4.74	4.60
Total	**56.70**	**21.70**

Table 5.5-5 Estimates of Maximum Emissions from Fuel Combustion During Construction Activities

Pollutant	Carbon Monoxide (CO)	Volatile Organic Compounds (VOC)	Nitrogen Oxides (as NO2)	Sulfur Oxides (as SO2)
Tons/Year	53.8	12.1	161.9	6.43

5.5.2 Air Pollution Control Measures

During construction of CCNPP Unit 3 several measures will be utilized to minimize the generation of emissions. The emissions data were calculated assuming that the contractor will employ the watering practices and engines outlined below.

Stabilizing Areas with Gravel – Construction roads, parking lots, and laydown areas will be covered with gravel to stabilize surfaces and reduce the amount of materials that could become airborne as a result of wind movement and mechanical energy from movement of vehicles and equipment.

Application of Water – Application of water to unpaved and exposed areas will be very effective in reducing the generation of fugitive dust. Water will be applied on a daily basis to the unpaved roads and open areas cleared during construction. Daily application to unpaved roads reduces fugitive dust generation by 98 percent or more. Application of water to open areas reduces the potential for dust generation by wind erosion by 90 percent.

Concrete Batch Plant – The concrete batch plant will utilize a high efficiency baghouse or other equivalent techniques to control emissions from material transfer operations. The contractors that will be responsible for operating these plants will be required to obtain the necessary permits as temporary sources before bringing equipment on site, ensuring that the units will be capable of operating in full compliance with MDE's emission limitations and fuel quality requirements.

Storm Water Pollution Prevention Plan - A dust control program will be incorporated into the SWPPP.

Diesel Engines – EPA's tiered program of lowering emission limits for new off-road diesel engines will lead to the use of lower-emitting engines during the construction of CCNPP Unit 3. Heavy equipment used by contractors at the time of construction is expected to include older Tier 2 engines, but also newer equipment with Tier 3 and Tier 4 compliant engines. As the construction progresses, a larger segment of the fleet of equipment in use will be equipped with low-emitting Tier 4 engines.

5.5.3 Impact of Construction Emissions on Air Quality Levels

Sources of air pollution at a construction site are generally considered of a fugitive nature, i.e., not coming from a specific stack or source. As such there are only a few air pollution control agencies in the United States that specifically regulate the emissions from construction activities. In Maryland there are no specific requirements that pertain to air discharges from construction activities. However, there are Maryland regulations that will apply to certain construction emissions sources. U.S. EPA's AERMOD (Version 07026) was used to predict impacts at 155 receptors located on the property fenceline and off the property. The maximum emission rates described in Section 5.5.1 were used for the modeling. The receptor grid pattern was chosen to find the maximum off-property concentration, which then could be used to compare to Maryland air quality standards. Four years of on-site meteorological data were used in AERMOD along with upper air data from Washington Dulles Airport.

This modeling study focused on the emissions that will be generated from the CCNPP Unit 3 construction activities. There are no other major emitting units on-site except for the NO_x emissions from the CCNPP Unit 1 and 2 emergency generators.

MDE measures air quality levels at a number of stations around the State. The closest station where any measured data for particulate matter (aerodynamic diameter <10 microns) exists was at Glen Burnie, Maryland, which would more closely represent the air quality levels for an urbanized area. The more rural area around the CCNPP site is expected to have air quality that is better than the air quality in an urbanized area. The Glen Burnie data was used as a conservative estimate of the background air quality level at the CCNPP site. Model predictions were added to the background levels and the results were compared to Maryland standards.

The air quality impacts, associated with construction are summarized in Table 5.5-6 for particulate matter. The units of measure commonly used for concentration levels are micrograms per cubic meter ($\mu g/m^3$).

The worst-case construction impacts result in air quality concentrations that are within the Maryland standards. The very conservative analysis using the background concentration level from an urbanized (and more polluted) area was added to the predicted concentrations around the site and subsequently compared to the Maryland air quality standards shows that all standards will be achieved. No additional mitigation measures are needed to provide adequate protection to health and general welfare around the CCNPP site.

Table 5.5-6 Air Quality Impacts from Construction Activities

Averaging Period	Construction Impacts ($\mu g/m^3$)	Background (Glen Burnie) ($\mu g/m^3$)	Total Predicted Air Quality Levels ($\mu g/m^3$)	Maryland/U.S. EPA Standards ($\mu g/m^3$)
PM10 Annual	17.4	21	38.4	50
PM10 24-Hour Maximum	96.6	45	141.6	150
PM2.5 Annual	6.1			15
PM2.5 24-Hour Maximum	24.8			35

The NO_x emissions associated with the operation of off-road construction vehicles were also evaluated with the same model by prorating the emissions to the predicted air quality levels. All NO_x emissions were assumed to be NO_2. The maximum annual predicted concentration of 49.7 $\mu g/m^3$ was added to the background level of 20.8 $\mu g/m^3$, yielding a total impact of about 70.5 $\mu g/m^3$ at the fenceline. The Maryland NO_2 standard for annual NO_x emissions is 100 $\mu g/m^3$. There are no Maryland standards for shorter term averaging periods. The air quality impacts for sulfur dioxide are miniscule. The maximum impact from off-road equipment is 1/80th of the sulfur dioxide standard.

Because Calvert County is in the Northeast Ozone Transport Region and treated as non-attainment for ozone, reduction of ozone is part of Maryland's State Implementation Plan. Because NO_x emissions are precursors to ozone formation, the Co-Applicants propose to provide NO_x offsets with respect to anticipated NO_x emissions during construction to meet the requirements for General Conformity under the Clean Air Act. There are limited NO_x offsets available in the Air Quality Control Region covering Calvert County. However, there are abundant NO_x offsets available in Baltimore. In the Cove Point LNG case, EPA allowed the use of Baltimore NO_x offsets to fulfill this obligation and the Co-Applicants will seek the same approval.

In summary, air emission impacts from construction are expected to be small because emissions will be controlled at the sources where practicable and the distance between the construction site and the public will limit offsite exposures. Construction air emissions impacts are temporary because they will only occur during the actual use of the specific construction equipment or conduct of specific construction activities. Disturbed surfaces will be stabilized upon completion of construction activities.

5.6 ECOLOGICAL IMPACTS OF CONSTRUCTION

5.6.1 Terrestrial Ecosystems

This section describes the impacts of construction on the terrestrial ecosystem. Construction would require the permanent or temporary disturbance of approximately 420 acres (176 hectares) of terrestrial habitat on the CCNPP campus as described in § 5.2.1. This area is assumed to be the maximum area of soil to be exposed at any time. Approximately 264 acres (107 hectares) of the affected terrestrial habitat would be permanently converted to structures, pavement, or other intensively-maintained exterior grounds to accommodate the proposed power block, cooling tower, switchyard, roadways, construction laydown area, borrow area, retention basins, and permanent parking lots. The remaining disturbed area of approximately 171 acres (69 hectares) would be only temporarily disturbed to accommodate the batch plant, temporary construction laydown areas, temporary construction offices and warehouses, and temporary construction parking. The temporarily disturbed habitats would be restored to a naturally vegetated condition once construction activities are complete. The permanent loss of affected terrestrial habitat of 264 acres (107 hectares) is small compared to the 1,796,718 acres (724,242 hectares) in the region classified as forest and wetlands as shown in Table 5.6-1. Approximately 14.3 acres (5.8 hectares) of permanently lost terrestrial habitat is wetlands compared to 240,288 acres (97,245 hectares) of wetlands in the region as shown in Table 5.6-1. Figure 5.2-1 shows the CCNPP site boundary and the major buildings to be constructed. Figure 5.6-1 shows the delineated wetlands, site grading, and the construction zone.

Table 5.6-1 CCNPP Site 50 mi (80 km) Land Use Classifications

Classification	Acres	Hectares	Percent of Total
Forest	1,556,430	629,997.3	31.0
Water	1,548,769	626,786.8	30.8
Agriculture	1,023,108	414,051.7	20.4
Urban/Built-up	630,369	255,110.2	12.5
Wetlands	240,288	97,244.6	4.8
Barren Land	13,642	5,521.0	0.3
Undefined	12,822	5,188.9	0.3
Brushland	942	381.0	0.0
Total	5,026,370	2,034,172.0	100.0

Dredging will be required at the barge area to accommodate delivery of large components. Dredging will also be performed to allow for construction of the intake structure and the discharge line. Dredged material will be disposed of in the previously used disposal area known as Lake Davies.

The proposed footprint of construction within the CBCA would be limited to approximately 30.3 acres (12.3 hectares), including approximately 0.4 acres (0.16 hectares) in the CBCA buffer (extending 100 ft (30.5 m) landward of mean high tide) and approximately 29.9 acres (12.1 hectares) in the remainder of the CBCA. The CBCA encroachment is due to the water intake structures and pipelines, the discharge pipelines, the heavy haul road from the barge dock, stormwater retention basins, security fencing, and the security perimeter gravel path. Certain areas within the CBCA will be regraded for proposed wetland mitigation and the area to accommodate construction equipment of the intake structure. Certain of the affected land within the CBCA buffer has already been designated by Calvert County as an Intensively Developed Area (IDA) due to the presence of the barge dock serving the existing CCNPP Units 1 and 2.

None of the sandy cliff or beach areas on the CCNPP site that provide suitable habitat for the puritan tiger beetle or northeastern beach tiger beetle will be disturbed because their habitat is north of the construction footprint.

It is not possible to construct the proposed facilities without adversely impacting terrestrial ecosystems, including wetlands, wetland buffers as designated by Calvert County, and Forest Interior Dwelling (FID) species habitat.

5.6.1.1 Vegetation

Plant Communities and Habitats: Clearing and grubbing would result in the vegetation losses shown in Figure 5.6-2 and summarized in Table 5.6-2. The losses would include approximately 191 acres (77 hectares) of mature forest cover consisting of well developed tree canopy and understory strata and dominant trees over 12 in (30 cm) in diameter at breast height (DBH), including:

- Approximately 179 acres (72 hectares) of mixed deciduous forest,
- Approximately 1.4 acres (0.6 hectares) of well-drained bottomland deciduous forest, and
- Approximately 9.8 acres (4.0 hectares) of poorly drained bottomland deciduous forest.

The losses would also include approximately 61 acres (25 hectares) of younger, fast growing forest cover, including:

- Approximately 48 acres (19 hectares) of mixed deciduous regeneration forest, and
- Approximately 13 acres (5 hectares) of successional hardwood forest.

Other vegetation losses would include:

- Approximately 125 acres (51 hectares) of old field vegetation,
- Approximately 1.8 acres (0.7 hectares) of herbaceous marsh vegetation, and
- Approximately 51 acres (21 hectares) of lawns.

As indicated in Table 5.6-2, each of the affected types of vegetation is common throughout the CCNPP Site.

The boundaries of vegetated areas subject to clearing and grubbing will be prominently marked prior to site preparation. Merchantable timber within marked areas may be harvested prior to site preparation. Merchantable timber occurs only in areas of mixed deciduous forest, well-drained bottomland deciduous forest, and poorly drained bottomland deciduous forest. Remaining trees will then be felled. Stumps, shrubs, and saplings will be grubbed, and groundcover and leaf litter will be cleared to prepare the land surface for grading. Felled trees, stumps, and other woody material would be disposed of by burning, chipping and spreading the wood chips, and/or sending to an onsite landfill. Opportunities to recycle woody material for use elsewhere on the CCNPP site or for sale to the public may be considered. Recycling opportunities could include cutting logs into firewood, using wood chips to mulch landscaped areas, using logs to line pathways, piling logs and brush in open fields to improve terrestrial wildlife habitat, and placing stumps (root wads) in stream channels to prevent bank erosion and enhance aquatic habitat.

Table 5.6-2 Vegetation (Plant Community) Impacts in Acres (Hectares) of Construction of Proposed CCNPP Unit 3

Habitat (Plant Community Type)	Forest (DNR Definition)	Wetland (Federal and MDE Definition)	Permanent Losses					Temporary Losses					Total
			CBCA IDA 0-100' (0-30 meters)	CBCA IDA 100-1,000' (30 - 305 meters)	CBCA RCA 0-100' (0-30 meters)	CBCA RCA 100-1,000' (30 - 305 meters)	Rest of Site	CBCA IDA 0-100' (0-30 meters)	CBCA IDA 100-1,000' (30 - 305 meters)	CBCA RCA 0-100' (0-30 meters)	CBCA RCA 100-1,000' (30 - 305 meters)	Rest of Site	
Lawns [Developed] Areas	No	No	0.25 (0.10)	1.76 (0.71)	-	5.21 (2.11)	19.33 (7.82)	-	-	-	-	24.30 (9.80)	50.85 (20.58)
Old Field Vegetation	No	No	0.09 (0.04)	1.13 (0.46)	-	0.23 (0.09)	27.35 (11.07)	-	-	-	-	96.00 (38.80)	124.80 (50.50)
Mixed Deciduous Forest	Yes	No	0.01 (0.004)	13.96 (5.65)	-	5.20 (2.10)	133.81 (54.15)	-	-	-	-	26.44 (10.70)	179.42 (72.61)
Mixed Deciduous Regeneration Forest	Yes	No	-	-	-	-	36.28 (14.68)	-	-	-	-	12.00 (4.90)	48.28 (19.54)
Well-Drained Bottomland Deciduous Forest	Yes	No	-	-	-	-	1.37 (0.55)	-	-	-	-	0.05 (0.02)	1.42 (0.57)

Habitat (Plant Community Type)	Forest (DNR Definition)	Wetland (Federal and MDE Definition)	Permanent Losses					Temporary Losses					Total
			CBCA IDA 0-100' (0-30 meters)	CBCA IDA 100-1,000' (30 - 305 meters)	CBCA RCA 0-100' (0-30 meters)	CBCA RCA 100-1,000' (30 - 305 meters)	Rest of Site	CBCA IDA 0-100' (0-30 meters)	CBCA IDA 100-1,000' (30 - 305 meters)	CBCA RCA 0-100' (0-30 meters)	CBCA RCA 100-1,000' (30 - 305 meters)	Rest of Site	
Poorly Drained Bottomland Deciduous Forest	Yes	Yes	-	0.15 (0.06)	-	0.50 (0.20)	8.87 (3.59)	-	-	-	-	0.31 (0.13)	9.83 (3.98)
Herbaceous Marsh Vegetation	No	Yes	-	0.05 (0.02)	-	0.02 (0.01)	1.74 (0.70)	-	-	-	-	-	1.81 (0.73)
Successional Hardwood Forest	Yes	No	-	-	-	1.71 (0.69)	3.50 (1.40)	-	-	-	-	7.82 (3.16)	13.03 (5.27)
Open Water	No	Yes	-	0.02 (0.01)	-	0.01	2.66 (1.08)	-	-	-	-	-	2.69 (1.09)
Total			0.35 (0.14)	17.07 (6.91)	-	12.86 (5.20)	235.23 (95.17)	-	-	-	-	166.61 (67.35)	(175.89)
			Total Permanent: 263.86 (106.78)					Total Temporary: 170.77 (69.11)					

Because of the need for grading broad contiguous areas of land to construct the power block, switchyard, and cooling tower, there will be no practicable opportunities to preserve individual trees within those areas. However, a biologist will examine forested areas subject to clearing for the temporary construction parking areas, construction office and warehouse area, and construction laydown areas for aesthetically outstanding trees or clusters of trees that might be capable of preservation without interfering with construction activities. Only trees where a minimum of 70% of the critical root zone can be left ungraded without interfering with construction activities would be identified for preservation. The critical root zone is defined by the DNR as a circular zone surrounding a tree trunk with a radius of 1 ft (0.3 meter) for each inch DBH (and a minimum radius of 8 ft (2.4 m) (DNR, 1997)). The critical root zone would be marked consistent with DNR's State Forest Conservation Technical Manual.

Silt fences will be erected around the perimeter of the construction footprint to reduce the potential for sedimentation of adjoining vegetated areas. Detailed specifications for the silt fences and vegetative stabilization will be presented in a soil erosion and sediment control plan approved by the MDE prior to site disturbance. Soil piles will be covered with plastic or bermed until removed during backfill and final grading activities. Monitoring of construction effluents and storm water runoff will be performed as required by the Storm Water Management Plan (SWMP), the NPDES permit, and other applicable permits obtained for construction.

- Important Habitats: The construction footprint was designed to minimize encroachment into the three habitats on the CCNPP Site that were identified as important. Poorly drained bottomland deciduous forest and herbaceous marsh vegetation meet the definition of wetlands protected under federal and state regulations. Well-drained bottomland deciduous forest is important because of its occurrence in riparian settings. Site preparation will result in the permanent loss (filling) of approximately 14.3 acres (5.8 hectares) of wetland habitats, including approximately 9.8 acres (4.0 hectares) of poorly drained bottomland deciduous forest, and approximately 4.5 acres (1.8 hectares) of other wetlands. Site preparation also results in the permanent loss of approximately 1.4 acres (0.6 hectares) of well-drained bottomland deciduous forest. Wetland impacts are discussed in more detail in Section 5.6.3.

- Important Plant Species: The chestnut oak, tulip poplar, mountain laurel, and New York fern were identified as important because they are key contributors to the overall structure and ecological function of forested plant communities on the CCNPP site. Chestnut oak, which is dominant or codominant in the canopy throughout most of the mixed deciduous forest on the CCNPP site, is a slow growing tree species that is difficult to grow and transplant. Similarly hard to grow species common in the mixed deciduous forest on the CCNPP site include white oak, bitternut hickory, and pignut hickory. Mountain laurel, which forms a dense understory over much of the mixed deciduous forest, is also a slow growing species and is difficult to transplant. Even though mixed deciduous forest can be replanted, several hundred years could be necessary to restore the oaks, hickories, and mountain laurel to their present sizes in the restored forest cover. Any losses of cover by these species, even in areas of only temporary disturbance where forest vegetation can be replanted, must therefore be considered effectively permanent.

The showy goldenrod, Shumard's oak, and spurred butterfly pea were identified as important because they are listed by the State of Maryland as threatened or rare. Spurred butterfly pea was observed during a rare plant survey conducted in 2006 only in areas outside of the proposed construction footprint and therefore will not be adversely affected. Shumard's oak was observed outside of but very close to within 50 ft (15 m) of the western edge of the proposed construction area for the cooling tower. The observed specimens of Shumard's oak do not have to be cut down to allow site preparation, but portions of their root systems could experience compaction or other physical disturbances. Special precautions will be taken to protect trees at the edge of the cooling tower construction area to prevent mortality of the observed Shumard's oak specimens.

Clusters of showy goldenrod (listed as threatened by Maryland) were observed in the 2006 surveys within the proposed construction footprint for the power block, at the edges of forested areas within Camp Conoy. The clusters of showy goldenrod will be transplanted to open field areas outside of the construction footprint.

5.6.1.2 Fauna

The vegetation losses summarized in Table 5.6-2 will reduce the habitat available to mammals, birds, and other fauna that inhabit the CCNPP Site and surrounding region. Some smaller, less mobile fauna such as mice, shrews, and voles could be killed by heavy equipment used in clearing, grubbing, and grading. Larger, more mobile fauna will be displaced to adjoining terrestrial habitats, which could experience temporary increases in population density of certain species. If the increases exceed the carrying capacity of those habitats, the habitats could experience degradation and the displaced fauna could compete with other fauna for food and cover, resulting in a die-off of individuals until populations decline to the carrying capacity. Potential impacts to specific fauna species considered to be important are discussed below.

- <u>White-tail Deer</u>: White-tail deer, which are identified as important because of their recreational value to hunters, are abundant throughout the CCNPP site and throughout Maryland. Deer populations have generally increased rather than decreased as Maryland and Virginia have become more densely developed. When deer populations exceed the carrying capacity of forested habitats, as is common in Maryland and Virginia, shrubs and saplings can be killed or stunted by over-browsing. Although some CCNPP personnel have noticed browse damage to understory forest vegetation on the CCNPP site, the damage is not yet severe. Displaced deer can be expected to cause greater browsing and trampling of the understory of forested areas surrounding the proposed construction. The effects from increased browsing by displaced deer could be at least partially offset by increased hunting in public lands to the north and south.

- <u>Scarlet Tanager and Other Forest Interior Dwelling (FID) Species</u>: The scarlet tanager was identified as important because it represents one of several DNR-designated FID species (listed in "A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area") observed on the CCNPP Site in 2006. The construction footprint was designed to minimize fragmentation of forest cover to the extent possible. The proposed power block will be situated in an area where the forest cover has already been fragmented by the fields of Camp Conoy. The proposed batch plant, construction laydown areas, construction office and warehouse area, and construction parking area will be situated in areas where the forest cover has already been fragmented by former agricultural fields, dredge spoil disposal, and existing roadways. Construction of CCNPP facilities will not substantially contribute to increased fragmentation of forest cover or loss of habitat for the scarlet tanager or other FID species.

  Construction of the proposed switchyard, cooling tower, and construction offices and warehouses would encroach into areas of unfragmented forest north and east of the headwaters to Johns Creek and south of Camp Conoy. The only alternative to siting the facilities in the forested areas west and south of the proposed power block location would be to site them to the east, which would encroach into the CBCA. Construction of the facilities would therefore reduce the availability of suitable habitat in the region to the scarlet tanager and other FID species. However, the reduction would be minimized because the forest clearing would take place in blocks beginning at the edge of the forested landscapes rather than as clearings or strips that encroach deeper into the forest interior.

- Bald Eagles: The Co-Applicants will regularly monitor and routinely update DNR regarding bald eagle nests on the Calvert Cliffs campus. In 2006, there were two active and one inactive nests on the southern portion of the Calvert Cliffs site. In April of 2007 a new nest was observed in the project area for CCNPP Unit 3. In June of 2007 a neighboring tree fell against the nest tree, threatening the nest. DNR has given the Co-Applicants guidelines (1) prohibiting land use changes (including timber harvesting or development) within a 330-foot radius of the nest; (2) prohibiting construction activities (including clearing and grading) but permitting selective timber harvesting within a 660-foot radius of the nest; and (3) prohibiting seasonal construction or timber harvesting (between December 15 and June 15) within a 1320-foot (1/4 mile) radius of the nest.

  The regulatory environment concerning the protection of bald eagles has recently changed. On June 28, 2007, the U.S. Fish and Wildlife Service (U.S. FWS) delisted the bald eagle from the federal endangered species list, although it is still protected as a threatened species under both state and federal law. Moreover, the bald eagle is protected under the Bald and Golden Eagle Protection Act ("BGEPA") and Migratory Bird Treaty Act ("MBTA"). A federal "incidental taking" permit process, by which an applicant may obtain permission to relocate an eagle's nest, has been proposed for promulgation but at the time of this filing has not been finally adopted.

  The preferred method of relocating eagles' nests involves selecting an alternative site based on the eagle's preference for the tallest, strongest tree with a view of the coast. The uppermost branches of the surrounding trees are removed, making the new location even more favorable. The eagle is then lured to the new location. If successful, the eagle abandons its former nest.

  Given the precarious nature of the nest tree and the unsettled regulatory environment, the Co-Applicants propose the following conditions to the CPCN: (1) Co-Applicants will abide by the guidelines provided by DNR; and (2) in approximately three years, if the eagle's nest remains in the current location, Co-Applicants will attempt to induce the eagle to relocate its nest in the manner described above or, if permitted, provide at least 30 days notice to DNR so that DNR can take salvage actions or consider Co-Applicants' request for an incidental taking permit in accordance with COMAR 08.03.08.07B.(3).

- Puritan Tiger Beetle and Northeastern Beach Tiger Beetle: The proposed construction activities would have no potential to affect the puritan tiger beetle or northeastern beach tiger beetle, which were identified as important because of their federal threatened status. Both species have highly specific habitat requirements that limit their potential occurrence on the CCNPP site to the sandy cliffs adjoining undeveloped shoreline stretches of the Chesapeake Bay. No construction activities would take place on or within 500 ft (152 m) of any cliff or beach habitats which are all located further south of CCNPP Units 1 and 2. Because the beach south of the barge slip is favorable habitat for the puritan tiger beetle, mitigation measures may be necessary to restrict personnel access.

- Bird Collisions: The tallest structure constructed as part of CCNPP Unit 3 is the cooling tower, with a height of 164 ft (50 m). The tower will be the tallest structure in the vicinity, which is predominantly rural. Assuming a tree canopy height of approximately 80 ft (24 m), the tower would protrude 84 ft (36 m) over the surrounding tree canopy. Because the tower would be constructed at a location with a ground surface elevation of 98 ft (30 m) above mean sea level, its top would be approximately 262 ft (80 m) above mean sea level, and hence 262 ft (80 m) above the water surface of the Chesapeake Bay.

  Some bird mortality would likely result from collisions with the cooling tower, but the expected mortality would be low and unlikely to significantly affect populations of migratory bird species. There are few published data regarding bird collision mortality with cooling towers. However, research was conducted in the early 1970s on the potential for bird collisions with cooling towers at the Davis-Besse Nuclear Power Station. Over 80 bird mortalities were reported in 1973 due to collisions with a 495 ft tall cooling tower constructed on the southeast shore of Lake Erie as part of the Davis-Besse Nuclear Power Station. However, the Davis-Besse tower is 495 ft in height, more than 330 ft taller than the proposed CCNPP cooling tower.

  Monitoring conducted at the Davis-Besse Nuclear Power Station between fall 1972 and fall 1979 revealed a total of 1,561 bird carcasses, of which 78.7% (approximately 1,229 carcasses) were attributed to collisions with the cooling tower. Most of the carcasses were species that migrate at night such as warblers (Family *Parulidae*), vireos (Family *Vironidae*), and kinglets (Family *Sylvidae*). Many warbler and vireo species are suffering substantial population declines due at least in part to forest fragmentation and have been identified as FID species by the DNR. Substantial numbers of warblers, vireos, and kinglets likely migrate through the extensive forested lands on and around the CCNPP site, and warblers of multiple species as well as the red-eyed vireo (*Vireo olivaceus*) were observed on the CCNPP site in 2006. Some individual warbler and vireo mortality events due to collisions with the cooling tower must therefore be expected. Due to the low height of the proposed cooling tower, the mortality should not have an adverse effect on populations of any bird species. Measures such as reducing the lighting on the cooling tower to the minimum required by the Federal Aviation Administration and using flashing lights instead of floodlights have been shown to be effective in reducing the incidence of bird collisions.

  The construction of the onsite transmission lines could injure birds if they collide with the new conductors or towers or by electrocution if birds with large wingspans contact more than one conductor (i.e., cross phases). However, the transmission line connections will be constructed in, and adjoining other developed areas, and would not fragment natural bird habitats. Regularly occurring noise from human activity will also discourage frequent visitation by birds. The new transmission towers would not be higher that the existing towers on the CCNPP site, and thus would be no more likely to increase bird collisions than the existing towers.

  No new offsite transmission corridors and no offsite areas are impacted since no changes (other than certain transformer and related equipment upgrades) are required to the existing transmission lines or towers.

5.6.2 Aquatic Ecosystems

This section provides an assessment of the potential impact construction activities will have on aquatic ecosystems to impoundments and streams onsite and to the Chesapeake Bay offsite. New transmission lines and access corridors are limited to the CCNPP site. The existing transmission corridor will be used offsite.

Figure 5.2-1 shows the CCNPP site boundary and the major buildings to be constructed. Figure 5.6-1 shows the delineated wetland areas, site grading and the construction zone. A topographic map is provided as Figure 5.6-3, showing important aquatic habitats.

5.6.2.1 Impacts to Impoundments and Streams

The construction footprint of CCNPP Unit 3 covers approximately 420 acres (176 hectares) including many separate wetland and surface water areas. Construction effects to aquatic habitats in the immediate area range from temporary disturbance to complete destruction. The following surface water bodies are potentially affected by construction activities:

- Two unnamed streams (Branch 1 and Branch 2) on the eastern side of the drainage divide, Branch 1 being downstream of the Camp Conoy fishing pond,
- Johns Creek, Branch 3 and Branch 4, and the unnamed headwater tributaries,
- Goldstein Branch,
- Laveel Branch,
- Camp Conoy fishing pond and two downstream impoundments,
- Lake Davies and two unnamed impoundments within the Lake Davies dredge spoils disposal area, and
- Chesapeake Bay and Patuxent River.

Construction impacts to the existing surface water bodies are summarized as follows:

- Increasing runoff from the approximately 133 acres (53 hectares) of impervious and relatively impervious surfaces for the CCNPP Unit 3 power block pad, cooling tower pad, switchyard, laydown, and parking areas,
- Infilling and eliminating the upper reaches of Branch 2 and Branch 3, and an unnamed tributary to Johns Creek,
- Isolating portions of the upper reach of Branch 1 by construction of the laydown areas south of the CCNPP Unit 3 power block foundation,
- Disruption of the drainage in the Lake Davies dredge spoils disposal area with possible impacts on the two downstream impoundments,
- Wetlands removal and disruptions, and

- Possibly increasing the sediment loads into the proposed impoundments and downstream reaches.

The overall site drainage basin areas are not directly affected by the site grading plan. The 80%/20% drainage proportion to the west and east respectively, would stay the same during and after construction. Approximately 15 to 20 acres (6 to 8 hectares) would be added to the east drainage basin and removed from the west drainage basin.

Dredging will take place at the barge slip area to accommodate delivery of large components. Dredging will also be performed for construction of the discharge line from the circulating water system. Dredged material will be deposited in the previously used disposal area known as Lake Davies.

When a surface water body is filled by construction activities, impacts to aquatic life are expected. If the water body has an outlet, and the disturbance is gradual rather than abrupt, some fish may relocate. Oftentimes, however, construction impacts to small impoundments or stream reaches result in loss of the fish and invertebrates.

Extensive surveys of the onsite streams and impoundments documented that no rare or unique aquatic species occur in the construction zone. The aquatic species that occur onsite are ubiquitous, common, and easily located in nearby waters. Typical fish species include the eastern mosquito fish and the bluegill. The most important aquatic invertebrate species in the impoundments and streams are the juvenile stages of flying insects; these species readily recolonize available surface waters, and so would not be lost to the area. No important aquatic habitats were identified in the freshwater systems in the project vicinity. The fish in the Camp Conoy pond are most likely to perish during construction activities as the overflow from the pond flows down to the Chesapeake Bay via two small impoundments. The fish in the tributaries of Johns Creek would most likely swim away from the affected areas to other parts of the creek outside the construction footprint.

Table 5.6-3 provides a list of important species and habitats found in the Chesapeake Bay. One important species, because it is commercially harvested, is the American eel (*Anguilla rostrata*). It is found in most of the water bodies onsite and in the Chesapeake Bay and is abundant year round in all tributaries to the Chesapeake Bay.

Onsite streams and ponds were described in terms of the typical surface water habitats in the area. Headwater streams in general are considered important; however, there is nothing of regional significance about these particular streams. All of the onsite aquatic species mentioned in this section are common in the area. No loss of critical habitat is anticipated.

Although the wetland areas themselves are considered a sensitive and valuable resource, the particular wetlands that will be impacted onsite are not substantively distinguishable from other wetland acreage in the vicinity. Additional details of the specific plants that will be lost in each area are presented in the final Wetland Delineation Report.

Several other drainages and impoundments at the CCNPP site will be moderately to severely impacted. It is possible, and even likely, that some sediment will be deposited in wetlands, including impoundments and stream channels, with rainfall runoff during and immediately following construction. Best construction management practices will reduce the amount of erosion and sedimentation associated with construction, however, and would limit impacts to aquatic communities in down-gradient water bodies. Although unlikely, it is also possible that excavated soil placed in the proposed spoils and overflow storage area will be disturbed and move with runoff into streams onsite. Details are summarized herein:

- Increased runoff from 133 acres (53 hectares) of impervious surfaces for the power block pad, the cooling tower pad, and the switchyard,

- Creation of a large impoundment southeast of the power block pad by construction of a dam, discharge structure and piping and a proposed wetland mitigation area that will discharge to the impoundment down stream of the Camp Conoy fishing pond,

- Creation of bio-retention ditches on the periphery of the power block, laydown, cooling tower and switchyard areas. The ditches are constructed of base materials that promote infiltration of runoff from low intensity rainfall events. However, for large storms the infiltration capacity of the base materials will be exceeded and the overflow pipes are provided to direct the runoff to the stormwater basins. The stormwater basins are unlined impoundments with simple earth-fill closure on the down stream end and may include discharge piping to the adjacent watercourses,

- Creation of new impoundments southwest of the proposed switchyard and cooling tower pads for stormwater detention with associated discharge structures and outlet piping to the unnamed tributary of Johns Creek,

- Disruption of the drainage in the Lake Davies dredge spoils disposal area with possible impacts on the two downstream impoundments,

- Wetlands removal and associated impacts, and

- Increased sediment loads into the proposed impoundments and downstream reaches of Johns Creek and its associated tributaries, Branch 1 and Branch 2.

Table 5.6-3 Important Species in the Chesapeake Bay Near the CCNPP Site

Species (Scientific Name)	Commercially Harvested	Recreational Target	Keystone Species	Indicator Species
Threatened and Endangered Species				
Shortnose Sturgeon * *Acipenser brevirostrum*				
Atlantic Sturgeon *Acipenser oxyrhynchus*	X (Moratorium since 1997)			
Atlantic Loggerhead Turtle * *Caretta caretta*				
Kemps Ridley Turtle * *Lepidochelys kempii*				
Harvested Fish				
American Shad *Alosa sapidissima*	X			
Bay Anchovy *Anchoa mitchilli*	X		X	
Atlantic Menhaden *Brevoortia tyrannus*	X		X	X
Atlantic Croaker *Micropogonias undulatus*	X	X		
Striped Bass *Morone saxitilis*	X	X		
Spot *Leiostomus xanthurus*	X	X		
White Perch *Morone americana*	X	X		
Bluefish *Pomatomus saltatrix*	X	X		
American Eel *Anguilla rostrata*	X	X		
Harvested Invertebrates				
Blue Crab *Callinectes sapidus*	X	X		
American Oyster *Crassostrea virginica*	X			X
Other Important Resources				
Submerged Aquatic Vegetation (SAV)			X	X
Plankton			X	X

Note:

* Threatened and Endangered Species are not allowed to be taken in the Chesapeake Bay.

A report on human impacts to stream water quality listed siltation as the primary cause of stream degradation by a wide margin. In a 1982 nationwide survey by the U.S. FWS on impacts to stream fisheries, sedimentation was named the most important factor.

Three major groups of aquatic organisms are typically affected by the deposition of sediment in streams: (1) aquatic plants, (2) benthic macro invertebrates, and (3) fish. The effects of excess sediment in streams, including sediment generated by construction activities, are influenced by particle size. Finer particles may remain suspended, blocking the light needed for primary producers photosynthesis, and initiating a cascade of subsequent effects. Turbidity associated with suspended sediments may reduce photosynthetic activity in both periphyton and rooted aquatic plants. Suspended particles may also interfere with respiration in invertebrates and newly hatched fish, or reduce their feeding efficiency by lowering visibility. Slightly larger particles fall out of suspension to the stream bed, where they can smother eggs and developing fry, fill interstitial gaps, or degrade the quality of spawning grounds. As the gaps in the substrate are filled, habitat quality is decreased for desirable invertebrates such as *Ephemeroptera*, *Plecoptera*, and *Trichoptera*, and less desirable *oligochaetes* and *chironomids* become dominant. Such changes in the benthic community assemblage result in a loss of fish forage, and a subsequent reduction in fish populations.

Construction sites contribute to erosion, which can lead to sedimentation in streams. Construction-related activities such as excavation, grading for drainage during and after construction, temporary storage of soil piles, and use of heavy machinery all disturb vegetation and expose soil to erosive forces. Reducing the length of time that disturbed soil is exposed to the weather is an effective way of controlling excess erosion and sedimentation.

Preventing onsite erosion by covering disturbed areas with straw or matting is also a preferred method of controlling sedimentation. When erosion cannot be prevented entirely, intercepting and retaining sediment before it reaches a stream is a high priority.

Several measures will be taken to minimize the unavoidable adverse effects to the aquatic ecology. The use of silt fences, temporary and permanent vegetative stabilization, and other soil erosion and sediment control practices will reduce the risk of sediment runoff into intact wetlands adjoining the areas of fill. Bio-retention ditches will be constructed around the periphery of the power block, construction laydown area, cooling tower and switchyard areas to help catch surface runoff and prevent degradation of adjoining terrestrial and aquatic habitats. The ditches will be constructed of base materials that promote infiltration of runoff from low intensity rainfall events. However, for large storms the infiltration capacity of the base materials will be exceeded and the overflow pipes will direct the runoff to the stormwater retention basins. The stormwater retention basins will be unlined impoundments, vegetated with regionally indigenous wetland grasses and herbs, with simple earth-fill closure on the down stream end and will include discharge piping to the adjacent watercourses.

Construction impacts to water resources will be avoided or minimized through best management practices and good construction engineering practices such as stormwater retention basins and silt screens. The SWPPP, which provides explicit specifications to control soil erosion and sediment intrusion into wetlands, streams and waterways will be followed. The Spill Prevention, Control and Countermeasures (SPCC) Plan will also be used to clean up and contain oil spills from construction equipment to avoid or minimize the impact to wetlands and waterways.

5.6.2.2 Impacts to Chesapeake Bay

The Chesapeake Bay is considered an important estuarine habitat to most, if not all, of the estuarine species identified in the area. Estuarine species that use the Chesapeake Bay as nursery grounds need the submerged aquatic vegetation (SAV) and tidal marshes for nutrient-rich forage for the larvae and young-of-the-year, as well as for protective cover from predators. The area near the CCNPP site has no SAV, and does not provide critical habitat for any species.

The National Marine Fisheries Service (NMFS) designated Essential Fish Habitat (EFH) for each life stage of federally managed marine fish species in the Chesapeake Bay area; the bluefish is the only important species in the CCNPP site area that is federally managed, and for which EFH has been designated. Bluefish eggs and larvae are found only offshore, so no EFH occurs in Chesapeake Bay. For juvenile bluefish, all major estuaries between Penobscot Bay (Maine) and St. Johns River (Florida) are EFH. Generally juvenile bluefish occur in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from May through October, and South Atlantic estuaries March through December, within the "mixing" and "seawater" zones. Adult bluefish are found in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from April through October, and in South Atlantic estuaries from May through January in the "mixing" and "seawater" zones. Bluefish adults are highly migratory and distribution varies seasonally and according to the size of the individuals comprising the schools. Bluefish adults are generally found in waters with normal shelf salinities (greater than 25 parts-per-thousand).

The threatened and endangered species known to occur in the area are two species of sturgeon and two of sea turtles. No sturgeon is known to have spawned in the Chesapeake in decades. The sea turtles that occasionally visit the Chesapeake Bay nest much farther south, outside the Chesapeake Bay watershed.

Minimal effects of sedimentation or runoff into the Chesapeake Bay are expected. However, construction of the intake structure and discharge pipeline, and enlargement of the barge slip, will cause some disturbance in the Chesapeake Bay. A sheet pile cofferdam and dewatering system will be installed on the south side of the CCNPP Units 1 and 2 intake structure to facilitate the construction of the CCNPP Unit 3 CWS and ESWS intake structures and pump houses. Pilings may also be driven into the seabed to facilitate construction of new discharge system piping. Enlargement of the barge slip is estimated to require removal of about 15,000 cubic yards (11,500 cubic meters) of sediment. Dredging of the barge slip would result in increased suspended sediment in the immediate area for approximately two weeks. Excavation and dredging of the intake structure would have similar effects.

Dredging inevitably causes an increase in suspended sediment in the immediate area, and may result in a plume of suspended sediment some distance from the site. In a study of the effects of hopper dredging in Chesapeake Bay, near-field concentrations of suspended sediment, < 980 ft (< 300 m) from the dredge, reached 840 to 7,200 mg/L or 50 to 400 times the normal background level. Far-field concentrations (> 980 ft (> 300 m)) were enriched 5 to 8 times background concentrations and persisted 34% to 50% of the time during a dredging cycle (1.5 to 2.0 hr).

The ecological effect of the suspended sediment depends on a variety of factors, including the type of dredge used, the timing and duration of the dredging, the particle size of the suspended sediment, the presence of toxins in the sediment, the success of environmental controls to contain suspended sediment, and the life stage of the species present. Both short term direct behavioral effects (such as entrainment, turbidity, fish injury, and noise) and long term cumulative effects (such as possible contaminant release and habitat alteration) on marine organisms can result from dredging.

Small-scale dredging like that required to construct CCNPP Unit 3 is not considered a significant impact to the Chesapeake Bay. A report by the National Oceanic and Atmospheric Administration (NOAA) Chesapeake Bay Office, developed by a Technical Advisory Panel comprised of top fisheries scientists from area universities and senior government fisheries scientists, presented a Fisheries Ecosystem Plan for the Chesapeake Bay. The effects of dredging in the 450-page report were described in the following two general statements: "Dredging and the displacement of dredge spoil to other parts of the Chesapeake Bay can affect fish and shellfish by removing or inundating slow-moving or sessile species and their prey. Dredge spoil can also reintroduce sedimentary inventories of nutrients and contaminants into the water" (Chesapeake Bay Fisheries Ecosystem Advisory Panel).

Excavation and dredging of the intake structure, discharge pipe, and barge slip will continue through CCNPP site preparation into the first two years of plant construction. Excavated and dredged material will be transported to the onsite Lake Davies dredge spoils area as shown in Figure 5.6-2. Figure 5.6-4 shows the location for constructing the intake and outfall structures and the barge slip which is inside the existing cofferdam further reducing dredge impact.

Important species in the project area that may be temporarily affected by dredging include eggs, larvae, and adults of invertebrates and fishes. Recreationally or commercially important aquatic species near the CCNPP site include: blue crab, soft shell clam, eastern oyster, spot, bay anchovy, croaker, white perch, winter flounder, hogchoker, Atlantic menhaden, striped bass, silver perch, Atlantic tomcod, alewife, Atlantic herring, and blueback herring. Based on recent monitoring (2006-2007) of the baffle wall and intake screens for CCNPP Units 1 and 2, bay anchovy, *sciaenidae* (including spot and croaker), and Atlantic menhaden are the most common early life stages of fish in the immediate area. These species may be temporarily affected by high levels of suspended sediment, which can interfere with feeding and respiration, as well as cause dermal abrasion to delicate fishes. No invertebrate sampling data are available in the intake area. In a study of dredging in Chesapeake Bay, benthic communities survived the deposition of suspended sediment despite the exceedance of certain water quality standards. Moreover, the intake canal construction behind the cofferdam will mitigate water-related impacts.

No threatened or endangered species are expected to be affected by the proposed dredging. During the license renewal review process in 1999 for CCNPP Units 1 and 2, the National Marine Fisheries Service concluded that CCNPP license renewal would not adversely affect either the shortnose sturgeon or the loggerhead turtles because the CCNPP Units 1 and 2 discharge/intake do not lie within the areas normally used by either species. Neither the shortnose sturgeon nor the loggerhead turtle has been found impinged on the CCNPP Unit 1 and 2 intake screens during the 30 years of CCNPP operation.

The assemblage of aquatic species present near the CCNPP site varies throughout the year, due to spawning and migration patterns of individual fish and invertebrate species. The season of the year in which dredging and construction occur would determine to a large extent the impact on specific aquatic resources within the Chesapeake Bay. However, because the area to be dredged is small and in a protected near shore area that is already dedicated to intake functions, the overall impact on eggs and larvae is expected to be temporary and of minimal consequence.

5.6.2.3 Impacts on the Transmission Corridor and Offsite Areas

The new transmission lines do not cross over any onsite water bodies. At one point, the transmission corridor right-of-way is near Johns Creek. No important aquatic species or its habitat will be impacted by the transmission corridor.

Transmission line construction will be limited to onsite construction of short connections from the new switchyard to the existing 500 kV transmission line that runs from near the center of the CCNPP site northward. Construction of a 500 kV transmission line from the CCNPP Unit 3 switchyard to the existing 500 kV transmission line on the CCNPP site will require clearing trees in 0.31 acres (0.13 hectares) of additional forested wetlands in Wetland Assessment Area IV (adjoining 520 linear feet (158 m) of intermittent stream channel), as well as in 1.85 acres (0.75 hectares) of additional forested uplands designated as nontidal wetland buffer by Calvert County. No grading will be conducted in the subject wetlands or wetland buffer; disturbance will be limited to tree and shrub removal only. Surface soils within the affected wetlands and buffer will remain undisturbed, as will the pattern of surface runoff. The vegetation impacts to the affected wetlands and buffer are necessary because trees growing close to a 500 kV electric conductor must be removed to prevent possible outages. The transmission line is needed to convey electric power generated by the CCNPP Unit 3 power block to existing transmission lines that connect to the regional power grid.

The onsite transmission corridor for CCNPP Unit 3 is within the construction area. The information provided above pertaining to control of erosion and sedimentation applies to streams and wetlands within the transmission corridor.

No incremental effect on aquatic resources beyond what currently occurs within the transmission corridor is expected for the construction of CCNPP Unit 3.

The existing offsite transmission corridor will be used for CCNPP Unit 3. No new offsite transmission corridors and no offsite areas are impacted because no changes are required.

5.6.2.4 Summary

Construction activities that may cause erosion that could lead to harmful deposition in aquatic water bodies would be (1) of relatively short duration, (2) permitted and overseen by state and federal regulators, and (3) guided by an approved SWPP. Any small spills of construction-related hazardous fluids, such as petroleum products, would be mitigated according to our SPCC Plan. Some sensitive habitats occur within the area expected to be affected by construction activities. Impacts to aquatic communities from construction would be minimal and temporary, and would not warrant mitigation.

No incremental effect on aquatic resources beyond what currently occurs within the transmission corridor is expected.

5.6.3 Wetlands

5.6.3.1 Overview

The construction footprint for the proposed facilities has been designed to minimize adverse impact to areas delineated as wetlands or other waters of Maryland and the U.S. However, construction of the proposed facilities would not be possible without permanently filling approximately 12,590 linear feet (3,837 m) of intermittent and upper perennial stream channels and approximately 14.3 acres (5.8 hectares) of the delineated wetland areas. The project will therefore require an Individual Permit (IP) under Section 404 of the Federal Water Pollution Act from the Baltimore District of the U.S. Army Corps of Engineers (USACE). The project does not qualify for approval under the Maryland Programmatic General Permit-3 because of the extent of the affected regulated areas and because constructing the intake and discharge pipelines and dredging to allow larger vessels to access the existing CCNPP barge slip requires work within the traditionally navigable waters of the Chesapeake Bay.

Because all of the affected wetlands are nontidal, the project would also require authorization pursuant to the requirements of the Maryland Nontidal Wetlands Protection Act. The project would also disturb approximately 48 acres (19.4 hectares) of land defined as nontidal wetland buffer by Calvert County under the Maryland Nontidal Wetlands Protection Act. Nontidal wetland buffer is defined by Calvert County as lands within 50 ft (15 m) of the landward (up-gradient) edge of nontidal wetlands, as delineated using the federal delineation methodology. The act also regulates expanded nontidal wetland buffers extending as far as 100 ft (30.5 m) from the landward edge of Wetlands of Special State Concern. However, no Wetlands of Special State Concern have been identified for the CCNPP site.

Most of the wetland fill would take place in Wetland Assessment Areas I and IV described in the wetland delineation report. Only small areas of wetlands would be filled in Wetland Assessment Areas VI or VII. None of the wetlands directly adjacent to Johns Creek (in Wetland Assessment Area V) or Goldstein Branch (in Wetland Assessment Area VII) would be filled, although some wetlands adjacent to headwaters to those streams would be filled. No wetlands or nontidal wetland buffers would be disturbed in Wetland Assessment Area III, which is located more than 500 ft (152 m) south of where the permanent laydown area south of the power block would be constructed, or Wetland Assessment Area VIII, which is located more than 500 ft (152 m) north of where the construction access road would be constructed. In sum, the major components of the project will have the following wetland impacts:

- Construction of the **power block** (reactor, turbine and safety-related structures) will impact 0.87 acres (0.35 hectares) of wetlands all of which is in Wetlands Assessment Area I.

- Construction of the **heavy haul road** will impact 0.05 acres (0.02 hectares) of wetlands all of which is in Wetlands Assessment Area I.

- Creation of **retention basins** will impact 1.87 acres (0.75 hectares) of wetlands in Wetlands Assessment Area II.

- Construction of the **permanent laydown** will impact 3.10 acres (1.25 hectares) of wetlands in Wetland Assessment Area II and 0.47 acres (0.20 hectares) of wetlands in Wetland Assessment Area IV.

- **Temporary construction laydown** will impact 0.56 acres (0.23 hectares) in Wetlands Assessment Area VII.

- Construction of the **cooling tower** will impact 0.79 acres (0.32 hectares) of wetlands all of which is in Wetlands Assessment Area IV.

- Construction of the **switchyard** will impact 5.2 acres (1.36 hectares) of wetlands all of which is in Wetlands Assessment Area IV.

- The **construction access road** will impact 0.84 acres (0.34 hectares) of wetlands in Wetlands Assessment Area VII and 0.84 acres (0.34 hectares) in Wetlands Assessment Area VI.

- Construction of a **parking lot** will impact 1.13 acres (0.46 hectares) of wetlands all of which is in Wetlands Assessment Area IX.

These wetland impacts are summarized in Table 5.6-4.

The State wetlands regulatory program requires an applicant to avoid adversely impacting wetlands by all practicable means, and then to mitigate the effects that are determined to be unavoidable. COMAR 26.23.04.02. The federal wetlands program requires an applicant to consider all practicable alternatives to a project or project component, and then to mitigate the unavoidable effects. 40 C.F.R. § 230.10. The Co-Applicants undertook an extensive site analysis (attached to this Technical Report) that considered many factors, including environmental impacts and nuclear regulatory requirements, in determining that CCNPP Unit 3 should be located on the South Parcel. Location at the north or west end of the site would have resulted in substantially more wetlands and habitat impacts. Thereafter, a specific site layout was developed that took into consideration the magnitude of the construction that would be required to build CCNPP Unit 3 and nuclear-specific construction requirements. After that layout was developed, the Co-Applicants undertook a further analysis whose sole objective was to determine whether wetlands impacts could be further avoided by moving or reconfiguring certain components of the site layout. As a result, the 14.3 acres (5.8 hectares) of permanent wetlands impacts and 1.6 acres (.07 hectares) of temporary impacts are impacts for which there is no practicable alternative. Below, as to each wetland assessment area, the Co-Applicants explain why remaining impacts cannot be avoided. Thereafter, Co-Applicants provide a conceptual Phase I plan for mitigation of these impacts.

Table 5.6-4 Nontidal Wetland and Nontidal Wetland Buffer Losses in Acres (Hectares) Construction of Proposed CCNPP Unit 3

Wetland Assessment Area	Permanent Grading Losses				Temporary Grading Losses				Permanent Non-Grading Losses (Forest Clearing for Transmission Line)				Total Losses	
	PFO	PEM	Open Water	Buffer	PFO	PEM	Open Water	Buffer	PFO	PEM	Open Water	Buffer	Wetland	Buffer
I- Total	0.85 (0.34)	0.05 (0.02)	0.02 (0.01)	6.45 (2.61)	-	-	-	-	-	-	-	-	0.92 (0.37)	6.45 (2.61)
I-Outside CBCA	0.52 (0.21)	-	-	3.79 (1.53)	-	-	-	-	-	-	-	-	0.52 (0.21)	3.79 (1.53)
I-Inside CBCA-IDA	0.15 (0.06)	0.05 (0.02)	0.02 (0.01)	1.42 (0.57)	-	-	-	-	-	-	-	-	0.22 (0.09)	1.42 (0.57)
I-Inside CBCA-RCA	0.18 (0.07)	-	-	1.24 (0.50)	-	-	-	-	-	-	-	-	0.18 (0.07)	1.24 (0.50)
II- Total	1.50 (0.6)	0.78 (0.32)	2.67 (1.08)	7.18 (2.91)	-	-	-	-	-	-	-	-	4.95 (2.00)	7.18 (2.91)
II-Outside CBCA	1.18 (0.48)	0.76 (0.31)	2.66 (1.08)	6.33 (2.56)	-	-	-	-	-	-	-	-	4.60 (1.90)	6.33 (2.56)
II-Inside CBCA-RCA	0.32 (0.13)	0.02 (0.01)	0.01 (0.004)	0.85 (0.34)	-	-	-	-	-	-	-	-	0.35 (0.14)	0.85 (0.34)
III-Total	No Impacts to Wetland Assessment Area III													
IV-Total	5.29 (2.14)	-	-	15.34 (6.21)	-	-	-	-	0.31 (0.13)	-	-	1.85 (0.75)	5.60 (2.30)	17.19 (6.96)
V-Total	No Impacts to Wetland Assessment Area V													
VI-Total	0.36 (0.15)	0.50 (0.20)	-	1.12 (0.45)	-	-	-	-	-	-	-	-	0.86 (0.35)	1.12 (0.45)
VII-Total	0.88 (0.36)	-	-	3.44 (1.39)	1.61 (0.65)	-	-	4.66 (1.88)	-	-	-	-	2.49 (1.00)	8.10 (3.28)
VIII-Total	No Impacts to Wetland Assessment Area VIII													
IX-Total	0.64 (0.24)	0.48 (0.19)	-	3.34 (1.35)	-	-	-	-	-	-	-	-	1.12 (0.45)	3.34 (1.35)
Total	9.52 (3.85)	1.81 (0.73)	2.69 (1.09)	36.87 (14.92)	1.61 (0.65)	-	-	4.66 (1.88)	0.31 (0.13)	-	-	1.85 (0.75)	15.94 (6.45)	43.38 (17.55)

Notes:

PFO: Palustrine Forested CBCA: Chesapeake Bay Critical Area RCA: Resource Conversation Area

PEM: Palustrine Emergent IDA: Intensively Developed Area

5.6.3.2 Wetland Assessment Area I

Grading to construct the power block and heavy haul road will fill 0.92 acres (0.37 hectares) of Wetland Assessment Area I. Most of the fill would encompass approximately 2,160 linear feet (658 m) of intermittent and upper perennial stream channels and adjacent forested wetlands, totaling 0.90 acre (0.36 hectares). The affected stream channels have been deeply scoured by surface runoff and are adjoined by very narrow strips of forested wetlands that are less than 5 ft (1.5 m) in width and bounded by steep, eroding banks. Grading to build the heavy haul road would also require filling approximately 0.02 acres (0.01 hectares) of open water at the southern edge of an existing stormwater retention basin near the barge dock. Construction activities will also disturb 6.45 acres (2.61 hectares) of uplands within 50 ft (15 m) of Wetland Assessment Area I which is designated as nontidal wetland buffer by Calvert County. The affected buffer consists mostly of undeveloped forested land. Because the structural components of the power block must be closely spaced over an evenly graded surface for effective operation, it is not possible to fragment the pad to allow preservation of the stream or wetlands.

Together, the nuclear island and turbine island requires a square of approximately 28 acres. For security reasons, the protected area boundary around the nuclear and turbine islands encompasses approximately 48 acres. All the facilities within this square have a distinct function and all are necessary to function together. These facilities could not be economically or functionally separated to avoid impacted wetlands. The power block is located to limit the impact to the critical area and take advantage of the Units 1 and 2 supporting facilities, such as shops, office space and parking.

Approximately 0.40 acres (0.16 hectares) of the affected portions of Wetland Assessment Area I are located in the CBCA. However, none lie within 100 ft (30.5 m) of mean high tide on the Chesapeake Bay shoreline (i.e., the CBCA buffer). Construction within the CBCA, including the eastern (down-gradient) portions of Wetland Assessment Area I, is necessary to connect the proposed power block via a heavy haul road to an existing barge dock that presently serves CCNPP Units 1 and 2.

The losses of the wetland features in Wetland Assessment Area I would not represent a substantial loss in terms of wetland functions or values. Wetland functions are physical, chemical, and biological processes or attributes of wetlands that are vital to the integrity of a wetland system, independent of how those benefits are perceived by society. Wetland values are attributes that are not necessarily important to the integrity of a wetland system but which are perceived as valuable to society. A functional assessment included in the wetland delineation report identified only two functions (and no values) present in Wetland Assessment Area I: groundwater recharge/discharge and wildlife habitat. Neither was identified as principal, i.e., of high importance to regional ecosystems or society at a local, regional, or national level. The low number of functions and values identified for Wetland Assessment Area I generally reflects the severely eroded and scoured condition of the stream channels and banks, the narrowness of the adjacent vegetated wetlands, and proximity to existing developed areas associated with CCNPP Units 1 and 2.

5.6.3.3 Wetland Assessment Area II

Preparation of the proposed permanent construction laydown area south of the power block will fill 4.95 acres (2.0 hectares) of Wetland Assessment Area II. Filled areas will include 2.66 acres (1.08 hectares) of open water comprising the Camp Conoy fishing pond as well as approximately 0.78 acres (0.32 hectares) of emergent wetlands and 1.50 acres (0.6 hectare) of forested wetlands fringing the pond and the adjoining 1,150 linear ft (351 m) of intermittent and upper perennial stream channels flowing into or out of the pond. Construction would also disturb 7.18 acres (2.91 hectares) of uplands within 50 ft (15 m) of Wetland Assessment Area II designated as nontidal wetland buffer by Calvert County. The affected buffer consists mostly of undeveloped forested land.

Impacts within the CBCA to Wetland Assessment Area II would be to 0.35 acres (0.14 hectares), limited to the most landward (westernmost) 200 ft (61 m) of the CBCA. Approximately 0.85 acres (0.34 hectares) of uplands, all undeveloped forest land, in the CBCA designated by Calvert County as nontidal wetland buffer would also be impacted. No areas of Wetland Assessment Area II within 800 ft (244 m) of the Chesapeake Bay will be impacted, including the two small impoundments on the stream flowing northeast from the Camp Conoy fishing pond to the Bay.

In the construction of a nuclear power station various facilities are necessary to perform safety-related construction and maintain the security of the site.

Space allocated for construction activities, laydown, parking, and office space south of Unit 3 is necessary for its proximity to the power block and turbine block construction site. This impacts the Camp Conoy fishing pond because this area would be filled to an elevation of 85 ft msl. The power block and turbine block construction site has limited accessibility on two sides. The critical area to the east and the heavy haul road and existing parking for Units 1 and 2 limit access to the north. Construction congestion will be further compounded because the western perimeter will be closed off two to three years into the schedule for construction of the switchyard. Consequently, it is crucially important for maintaining construction flow that the entire south side be available for construction activities.

A climate controlled warehouse for storage of safety-related components and sensitive electrical and electronic equipment would be located in this laydown area on the south side of the power block/turbine block construction site. A test laboratory would also be located within this area. This laboratory would contain, for example, non-destructive examination and radiograph equipment and a calibration lab. Items tested include concrete, rebar, etc. Several different fabrication shops would be located within this area. Some of these shops would construct safety-related components and would require controlled processes to achieve the required level of quality. In addition, the construction of certain large components, such as the bottom shell of the containment liner, will require precise fabrication in an area adjacent to the power block and will then be lifted in place by large construction cranes. The containment liner is safety-related and is approximately 175 ft in diameter. Other facilities that are planned for location on the south side include security, badging, first aid, safety, training, change facility, and lunch room. Location of these facilities near the work site is important as they support a controlled, secure, and safe work environment. Maintaining a controlled construction site is especially important because of the proximity to Units 1 and 2 and the requirement to maintain security for these facilities.

The evaluation of wetland functions and values included in the wetland delineation report identified seven functions (groundwater recharge/discharge, fish and shellfish habitat, sediment/toxicant retention, nutrient removal, production export, sediment/shoreline stabilization and wildlife habitat) and three values (recreation, educational/scientific value, and uniqueness/heritage) present in Wetland Assessment Area II. Of these, wildlife habitat and recreation have been identified as principal. Wildlife habitat was identified as a principal function because of the diversity of vegetative cover in the wetlands and adjoining uplands. Recreation was identified as a principal value because of the trails, dock, and other facilities at the Camp Conoy fishing pond. The loss of the wetlands and wetland buffer in Wetland Assessment Area II therefore represents a substantial reduction in the local availability of quality wildlife habitat. The loss of the Camp Conoy fishing pond would not, however, constitute the loss of an outdoor recreational facility because the property has been closed to recreational use as a result of heightened security concerns related to Units 1 and 2.

5.6.3.4 Wetland Assessment Area III

No part of Wetland Assessment Area III or its associated nontidal wetland buffer designated by Calvert County would be filled.

5.6.3.5 Wetland Assessment Area IV

Construction of the proposed switchyard will require permanently filling 5.3 acres (2.1 hectares) of wetlands and other waters of the state and U.S. in Wetland Assessment Area IV, including approximately 4,870 linear feet (1,484 m) of intermittent and perennial wetland to Johns Creek and adjacent forested wetlands. The affected area includes intermittent and perennial stream channels, forested wetlands, and forested springs associated with a generally southwest-flowing headwater of Johns Creek. Construction will also disturb 15.3 acres (6.2 hectares) of uplands within 50 ft (15 m) of Wetland Assessment Area IV designated as nontidal wetland buffer by Calvert County. The affected buffer consists mostly of undeveloped forest land. The wetland and wetland buffer impacts are unavoidable because of the need to construct the switchyard adjacent to the power block.

The switchyard contains the electrical equipment necessary to connect the generator output to the high voltage transmission system. The switchyard provides the interface point between the power plant and the 500kV electric transmission system. As such, it has been located so as to provide the most advantageous location with respect to the power plant, and to the existing transmission system. The various electrical switches, breakers and transformers need to be located on an area of land adjacent to the turbine building where the transformers are located. Transmission lines connect the transformers with the switchyard and the planned configuration provides for the least intrusive transmission line routing, avoiding the use of large expanses of land to accommodate transmission towers and the transmission line routing and bending radius transition. The further west the switchyard is located, the greater the impact to Johns Creek. Its current location at the headwaters of Johns Creek causes the least impact to wetlands.

The switchyard is an electrically interconnected set of breakers and take-off towers. The interconnection of all the components in the switchyard provides the functionality and reliability that the connection to the grid requires to support safe plant operation. Splitting the switchyard into separate areas would decrease the reliability and flexibility of the installation. Therefore, the switchyard is designed as a continuous block of approximately 24 acres.

The size of the switchyard is dictated by the transmission system voltage, 500kV, and the number and the configuration of the breakers, and the number of lines leaving the switchyard. The Unit 3 switchyard provides the optimum combination of operational and economic considerations and is widely employed in switchyard layouts. The design dictates that the switchyard must be deep enough to accommodate three 500kV breakers in each bay, in addition to the buses and take-off towers. The width of the switchyard is dictated by the number of bays required to service the connections to the switchyard. A total of six bays are required to connect four transmission lines, six transformers, and provide an allowance for two additional future connections.

The power block of Unit 3 is laid out with all the power transformers located on the west end of the power block. Consequently, in order to facilitate overhead EHV line connections, the switchyard should be arranged closest to the west side of the power block area.

The three existing transmission lines enter the area from the north, and two of the three will be rerouted to the new Unit 3 switchyard. In order to avoid crossing lines, the two lines closest to Unit 3 will be extended along their existing trajectory on the Calvert Cliffs property, and angled into the new switchyard. Placing the new switchyard at an angle to reduce the route length would only provide a small benefit, and would require a larger overall switchyard footprint if the switchyard is expanded in the future.

New transmission lines are planned to connect the existing Units 1 and 2 switchyard to the new Unit 3 yard. This is required in order to avoid disruption to the existing offsite power supply connections to Units 1 and 2. This provides the additional benefit of allowing Unit 3 the option to receive or transmit power through these lines. These new connecting lines are routed along the same right of way area as the rerouted transmission lines mentioned above. This prevents creation of a second 500kV corridor and minimizes the overall acreage that is required to route the power lines.

The switchyard cannot be moved to the north to shorten the new lines due to existing structures and improvements in this area. Moving the switchyard to the south or west would increase the area required to install the new transmission lines and towers.

The switchyard area is used initially as a construction laydown area to lessen the impact to land use and to stage equipment/materials near the construction site. As construction progresses, this area would transition to switchyard construction. If the switchyard were not located in this area, a large portion would still be required to be disturbed.

Conversion of the area from a construction lay down/production/access area is expected to take place approximately two to three years into the plant construction process.

Lands east of the power block are in the CBCA, lands south are needed for the cooling tower and laydown area, and lands north contain existing facilities. Hence, the only practicable location for the switchyard is west of the power block. The need for closely clustering the switchyard facilities over a contiguous, evenly graded area would prevent preserving the subject stream channels, springs, and wetlands.

Construction of a 500 kV transmission line from the proposed switchyard to the existing 500 kV transmission line on the CCNPP site will require clearing trees in 0.31 acres (0.13 hectares) of additional forested wetlands in Wetland Assessment Area IV (adjoining approximately 520 linear feet (158 m) of intermittent stream channel), as well as in 1.85 acres (0.75 hectares) of additional forested uplands designated as nontidal wetland buffer by Calvert County. No grading would be constructed in the subject wetlands or wetland buffer; disturbance would be limited to tree and shrub removal only. Surface soils within the affected wetlands and buffer will remain undisturbed, as would the pattern of surface runoff. The vegetation impacts to the affected wetlands and buffer are necessary because trees growing close to a 500 kV electric conductor must be removed to prevent possible outages. The transmission line is needed to convey electric power generated by the proposed power block to existing transmission lines that connect to the regional power grid.

Construction of the proposed CWS cooling tower will require permanently filling .79 acres (.32 hectares) of wetlands and other waters of the state and U.S. in Wetland Assessment Area IV. The cooling tower should be located as close as practicable to the turbine island. Locating the cooling tower further from the turbine island increases the construction and operating cost. Additional piping lengths increase the material, excavation, and labor costs during construction. Operating costs increase due to greater auxiliary loads from larger pumps and motors to move the cooling water greater distances.

The Unit 3 cooling tower will be located to minimize salt deposition in forested areas and in the CBCA. The location of the cooling tower also minimizes drift over the substation structures to avoid safety and engineering concerns. Finally, locating the Unit 3 cooling tower in this area will allow for potential site expansion. This location permits use of the area to the east for cooling tower expansion. Construction of a second cooling tower would be accomplished without having the 4 large (11' diameter) circulating water pipes crossing over each other which presents significant engineering concerns.

The evaluation of wetland functions and values included in the wetland delineation report identified five functions (groundwater recharge/discharge, sediment/toxicant retention, nutrient removal, production export, and wildlife habitat) and three values (recreation, educational/scientific value, and uniqueness/heritage) present in Wetland Assessment Area IV. Of these, wildlife habitat and uniqueness/heritage were identified as principal. Wildlife habitat was identified as principal because of the presence of the wetlands within a large block of contiguous forest that provides habitat for FID species. Uniqueness/heritage was identified as principal because of the fact that Johns Creek and its headwaters east of MD 2/4 represent one of the few stream systems in southern Calvert County that still remains largely free of development. The loss of the wetlands and wetland buffer in Assessment Area IV therefore represents a reduction in the local availability of quality wildlife habitat, including FID species habitat, and a reduction in the availability of outdoor passive recreation facilities in the region.

5.6.3.6 Wetland Assessment Area V

No part of Wetland Assessment Area V or its associated nontidal wetland buffer will be filled. The functional assessment included in the wetland delineation report identified more principal functions and values for Wetland Assessment Area V than for any other Wetland Assessment Area. The principal functions included wildlife habitat, fish and shellfish habitat, sediment/toxicant retention, nutrient removal, and production export. Uniqueness/heritage was identified as a principal value. Some key properties of Wetland Assessment Area V contributing to its functional superiority include the juxtaposition of forest and emergent wetland vegetation, the meandering and braided course of Johns Creek through the wetlands, and the extensive coverage by mature forest cover in the adjoining uplands. Avoiding encroachment into Wetland Assessment Area V and its associated nontidal wetland buffers was therefore a key objective when selecting a route for the construction access road.

5.6.3.7 Wetland Assessment Area VI

Construction of an access road linking the power block to MD 2/4 will require filling 0.86 acres (0.35 hectares) of wetlands and other waters in Wetland Assessment Area VI. The affected area consists of 0.50 acres (0.20 hectares) of emergent wetland and 0.36 acres (0.15 hectares) of forested wetland comprising part of a former sediment basin associated with the Lake Davies dredged material disposal area. Construction will also disturb 1.12 acres (0.45 hectares) of uplands within 50 ft (15 m) of Wetland Assessment Area VI designated as nontidal wetland buffer by Calvert County. The affected buffer consists mostly of undeveloped land supporting forest and old field vegetation. The access road was routed across the up-gradient (eastern) part of Wetland Assessment Area VI to avoid disturbing wetlands closer to Johns Creek and to avoid encroaching into the uplands to the east needed for temporary construction laydown.

Construction impacts to Wetland Assessment Area VI will not result in a substantial loss of wetland values or functions. The evaluation of wetland functions and values included in the wetland delineation report identified five functions (sediment/toxicant retention, nutrient removal, production export, sediment/shoreline stabilization, and wildlife habitat) but no values for Wetland Assessment Area VI. None of the identified functions were reported to be principal. The former Lake Davies sediment basins are man-made features rather than natural wetlands and are infested throughout by dense growth of the non-native invasive grass phragmites (*Phragmites australis*), which is of low value as food or cover by wildlife. The phragmites cover extends over most of the emergent wetlands and under the tree canopy in most of the forested wetlands, as well as most of the 50 ft (15 m) wetland buffer.

5.6.3.8 Wetland Assessment Area VII

Construction of the construction access road will require filling 2.49 acres (1.0 hectares) of wetlands and other waters of the state and U.S. in Wetland Assessment Area VII, including 2,000 linear feet (609 m) of headwaters to Goldstein Branch and adjacent forested wetlands. The affected area includes intermittent and perennial stream channels, forested wetlands, and forested springs associated with headwaters to Goldstein Branch, but construction will not involve disturbing the main channel of Goldstein Branch or its directly adjoining wetlands. The Co-Applicants propose to use bridges and culverts to minimize disruption to these streams. Construction will also disturb 8 acres (13.3 hectares) of uplands within 50 feet (15 m) of Wetland Assessment Area VII designated as nontidal wetland buffer by Calvert County. The affected buffer consists mostly of undeveloped forested land. A portion of the temporary construction laydown area north of Lake Davies consists of a 0.62 acre emergent marsh wetland. This wetland and its 50-foot buffer totaling 2.07 acres will not be impacted, but protected by a maintained super silt fence. Co-Applicants originally sited the construction access road near Johns Creek as this was the most direct route, given the existing topography, to the power block construction site. To minimize the impact to the wetlands associated with Johns Creek and the Goldstein Branch the construction road has been relocated to avoid or minimize these impacts. In addition, Co-Applicants moved the original proposed location of a concrete batch plant so as to preserve the maximum amount of wetlands and wetland buffer in Assessment Area VII.

The evaluation of wetland functions and values included in the wetland delineation report identified six functions (groundwater recharge/discharge, fish and shellfish habitat, sediment/toxicant retention, nutrient removal, production export, and wildlife habitat) and one value (recreation) present in Wetland Assessment Area VII. Of these, nutrient removal and wildlife habitat have been identified as principal. Nutrient removal was identified as principal because it contains emergent vegetation in places and receives runoff from lawns on private property close to MD 2/4. Wildlife habitat was identified as principal because it is a largely intact natural system largely free of urban or agricultural development. This area was considered important based on the quality of its wildlife habitat and on its contribution to nutrient removal in the local region.

5.6.3.9 Wetland Assessment Area VIII

No part of Wetland Assessment Area VIII or its associated nontidal wetland buffer designated by Calvert County would be filled.

5.6.3.10 Wetland Assessment Area IX

Construction of the parking lot will require filling the entirety of Wetland Assessment Area IX (1.12 acres (0.45 hectares)), including 0.64 acres (0.26 hectares) of emergent wetlands and 0.48 acres (0.19 hectares) of forested wetlands. Wetland Assessment Area IX consists of 1,200 linear feet (366 m) of multiple springs and small fragments of intermittent stream channels and ditches within a small remnant area of forest land surrounded by existing roadways and parking lots. Construction will also disturb 3.34 acres (1.35 hectares) of uplands within 50 ft (15 m) of Wetland Assessment Area IX designated as nontidal wetland buffer by Calvert County. The affected buffer consists of undeveloped forested land and mowed grassland adjoining existing roadways. This area provided an opportunity for additional parking that is reasonably convenient to the construction area. There will be as many as 4,000 construction workers onsite during peak construction and approximately 40 acres of parking are required.

The affected wetlands and associated buffers are of low functional quality. The evaluation of wetland functions and values included in the wetland delineation report identified only one function (wildlife habitat) and one value (visual quality/aesthetics). Neither was identified as principal. While the isolated forest area, including its wetlands, might have some value as an "oasis" for wildlife traversing the existing developed areas west of CCNPP Units 1 and 2, its small size and proximity to areas of heavy human and vehicular use make it generally unattractive to most terrestrial wildlife. Surface flow in the wetlands is all directed into existing storm sewers rather than into natural streams, hence the opportunity for the wetlands to perform water quality functions or production export to aquatic food chains is minimal. The loss of Wetland Assessment Area IX therefore represents a minimal loss of wetland functions and values.

5.6.3.11 Summary

The losses of the wetland features in Wetland Assessment Area I would not represent a substantial loss in terms of wetland functions or values. Only two wetland functions (i.e., groundwater recharge/discharge and wildlife habitat) would be affected as a result of the proposed development (impacts) within Wetland Assessment Area I. Neither was identified as principal, i.e., of high importance to regional ecosystems or society at a local, regional, or national level. No wetland values would be affected by the proposed development within this assessment area. Space for construction activities, laydown, parking, and fabrication space is needed during construction in close proximity to the Unit 3 power block. However, lands east of the power block are in the CBCA, lands to the west are needed for the switchyard, and lands north contain existing Unit1 and Unit 2 facilities. As a result, it is necessary to use the area immediately to the south during construction, thus permanently impacting the former Camp Conoy fishing pond in Wetland Assessment Area II. No wetlands within Wetland Assessment Area III would be impacted through the proposed development activities. Five wetland functions (groundwater recharge/discharge, sediment/toxicant retention, nutrient removal, production export, and wildlife habitat) and three values (recreation, educational/scientific value, and uniqueness/heritage) would be affected from proposed impacts to wetlands within Wetland Assessment Area IV. The proposed wetland impacts in this assessment area are unavoidable, however. No wetlands within Wetland Assessment Area V would be impacted through the proposed development activities. Proposed impacts within Wetland Assessment Area VI will not result in a substantial loss of wetland functions. Five functions (sediment/toxicant retention, nutrient removal, production export, sediment/shoreline stabilization, and wildlife habitat) were reported for this assessment area; however, none of the identified functions were reported to be principal. No wetland values would be affected by the proposed development within this assessment area. Six wetland functions (groundwater recharge/discharge, fish and shellfish habitat, sediment/toxicant retention, nutrient removal, production export, and wildlife habitat) and one value (recreation) would be affected from proposed impacts to wetlands within Wetland Assessment Area VII. Of these, nutrient removal and wildlife habitat were reported to be principal. The proposed wetland impacts in this assessment area are unavoidable. No wetlands within Wetland Assessment Area VIII would be impacted through the proposed development activities. Only one wetland function (wildlife habitat) and one value (visual quality/aesthetics) would be affected as a result of the proposed development (impacts) within Wetland Assessment Area IX. Neither was identified as principal.

In general, the CCNPP Unit 3 construction facilities, including the batch plant, access road, parking, and laydown areas, have been designed to lessen the impact on wetlands. Large existing wetlands/surface waters, have been avoided to the extent practicable by the planned location of construction parking and laydown areas. The power block, switchyard, and cooling tower areas require large blocks of land where little design modification can be done to avoid wetlands. The power block will be physically located to lessen the impact to the critical areas. As a result, the location will minimize the impacts to the Johns Creek watershed. Relocating the power block and the switchyard further west of the currently designed location would cause a greater impact to this watershed.

5.6.4 Compensatory Wetland Mitigation Plan Components

Wetland mitigation will be required by conditions established in an individual permit to be issued by the USACE and under Section 404 of the Federal Water Pollution Control Act and in the CPCN in accordance with the requirements of the Maryland Nontidal Wetlands Protection Act. Wetland mitigation follows a sequencing process beginning with avoidance of wetland impacts, then minimization of wetland impacts, and lastly compensatory mitigation to offset impacts. The proposed facilities have been sited, and the proposed construction has been configured, to avoid encroaching into wetlands (and a surrounding 50 ft (15 m) wide buffer) to the extent practicable. Other factors such as minimizing encroachment into the CBCA, keeping NRC-required buffers within the CCNPP site boundaries, and situating the power block close to the existing CCNPP units were considered; hence, the wetland impacts detailed above are considered unavoidable.

Several measures will be taken to minimize the unavoidable adverse effects to wetlands. The use of silt fences, temporary and permanent vegetative stabilization, and other soil erosion and sediment control practices will reduce the risk of sediment runoff into intact wetlands adjoining the areas of fill. Bio-retention ditches will be constructed around the periphery of the power block, construction laydown area, cooling tower and switchyard areas to help catch surface runoff and prevent degradation of adjoining terrestrial and aquatic habitats. The ditches would be constructed of base materials that promote infiltration of runoff from low intensity rainfall events. However, for large storms the infiltration capacity of the base materials would be exceeded and the overflow pipes would direct the runoff to the stormwater retention basins. The stormwater retention basins would be unlined impoundments, vegetated with regionally indigenous wetland grasses and herbs, with simple earth-fill closure on the down stream end and could include discharge piping to the adjacent watercourses.

The mitigation plan is divided into four categories: (1) on-site forested wetland in-kind creation; (2) on-site herbaceous wetland enhancement; (3) on-site stream enhancement via stream bank stabilization; and (4) off-site forested wetland restoration. The details of each mitigation plan component are presented below.

5.6.4.1 Forested Wetland In-Kind Creation

The first component in the proposed compensatory wetland mitigation plan is onsite in-kind creation of forested wetlands. A grass field that is located to the west of the existing visitor center on the North Parcel will, subject to further verification, provide an opportunity for wetland in-kind creation. The potential mitigation site will encompass the lower elevation portion of the grass field. At this location, the grass field abuts forested uplands. Approximately two (2) acres of forested wetlands will be created in this location through excavation of soil material and the addition of hydrological inputs (stormwater). The mitigation site will be planted with seedlings of hydrophytic tree and shrub species.

In addition, based on information provided by the project engineer, the proposed stormwater retention basins that are located between the existing tennis courts and the Camp Conoy fishing pond (Assessment Areas I and II) will be designed to retain the 1,000 year storm event. These retention basins will be further designed to impound stormwater to a level that would be sufficient to meet wetland hydrologic criteria. The basins will be planted with seedlings of hydrophytic tree and shrub species. This mitigation strategy should not inhibit the use of the basins for flood protection. Approximately five (5) acres of forested wetlands will be created in this location. Finally, wildlife habitat for wetland dependent and wetland independent species will be created. These "greentree reservoirs" will provide waterfowl habitat; i.e., winter flooded conditions for resident and migratory species, with drawdown in the spring to maintain the vitality of the planted tree species and provide a suitable substrate for plant regeneration. A total of two basins will be impounded and planted to achieve forested wetland in-kind creation. These retention basins are both located in the CBCA.

The 2-acre mitigation site and the 5-acre impounded basins will be planted with native hydrophytic trees and shrubs. The tree and shrub species will be planted at a density of 680 stems per acre (eight-foot centers). The plant material will be representative of the species composition of the adjacent forested wetlands and native to the region. The final selection of plant stock may be determined to some extent by availability. The selected trees and shrubs will consist of two gallon containerized stock protected by tree shelters (i.e.: TUBEX® or Miracle Tube tree shelters). The tree shelters will provide protection from wildlife depredation, wind, or other influences. The tree material for installation will include bald cypress (*Taxodium distichum*), willow oak (*Quercus phellos*), water oak (*Quercus nigra*), black gum (*Nyssa sylvatica*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and/or tulip tree (*Liriodendron tulipifera*). The shrub material will include silky dogwood (*Cornus amomum*), inkberry (*Ilex glabra*), shadbush (*Amelanchier canadensis*), highbush blueberry (*Vaccinium corymbosum*), possum-haw (*Viburnum nudum*), elderberry (*Sambucus canadensis*), and Virginia willow (*Itea virginica*). The palette of tree and shrub species will be finalized before installation. Additional species may be added if they are determined to be highly suitable for installation in the target wetland in-kind creation areas.

5.6.4.2 Herbaceous Wetland Enhancement

The second component in the proposed compensatory wetland mitigation plan is on-site enhancement of herbaceous wetlands. The emergent freshwater marsh communities within the existing sediment basins (ponds) that occur to the south of the proposed temporary construction laydown area (Assessment Area VI) and Johns Creek (Assessment Area V) will be enhanced through the eradication of common reed (*Phragmites australis*) and the planting of native emergent plant species. Approximately 20 acres of herbaceous wetland enhancement will be achieved through this activity.

The 20-acre marsh area will be planted with native hydrophytic herbaceous species. The herbaceous species will be planted at a density of 2,720 stems per acre (four-foot centers). The plant material will be representative of the species composition of adjacent herbaceous wetlands and native to the region. The final selection of plant stock may be determined to some extent by availability. The herbaceous material for installation will include arrow arum (*Peltandra virginica*), duck potato (*Sagittaria latifolia*), water plantain (*Alisma subcordatum*), and/or pickerelweed (*Pontederia cordata*). The palette of herbaceous species will be finalized before installation. Additional species may be added if they are determined to be highly suitable for installation in the target wetland enhancement areas. The eradication of common reed will be conducted through the application of approved herbicide. The eradication of common reed will be completed before the installation of plant material.

5.6.4.3 Stream Enhancement

An incised stream channel originates in the southern portion of the aforementioned grass field (west of existing visitor center) and flows to the west through the CCNPP site. The banks of the stream are eroding, as based on visual observations made in August 2007. Approximately 1,500 linear feet of stream channel will be enhanced through stream bank stabilization.

A second incised stream channel originates at the intersection of Calvert Cliffs Parkway Road and three electric power transmission trunk lines (location is approximately intermediate between Solomon Island Road and the existing visitor center) and flows to the northwest through the CCNPP site. The banks of the stream are eroding, as based on visual observations made in August 2007. Approximately 1,300 linear feet of stream channel will be enhanced through stream bank stabilization.

The banks of the aforementioned two stream reaches will be planted with native woody species, at a planting density of 10,890 stems per acre (two-foot centers). The plant material will be representative of the species composition of adjacent stream reaches and native to the region. The final selection of plant stock may be determined to some extent by availability. The woody material for installation will include silky dogwood, elderberry, Carolina willow (*Salix caroliniana*), and/or wax myrtle (*Myrica cerifera*). The palette of woody species will be finalized before installation. Additional species may be added if they are determined to be highly suitable for installation in the target stream bank areas.

5.6.4.4 Offsite Forested Wetland Restoration

Up to 17 acres (6.9 hectares) of offsite forested wetland restoration will be provided if mitigation acreage requirements are not met through the proposed implementation of the aforementioned three mitigation plan components; i.e., onsite forested wetland in-kind creation, herbaceous wetland enhancement, and stream enhancement.

5.6.4.5 Mitigation Monitoring Program

Following the completion of the on-site wetland in-kind creation and wetland enhancement activities, a five-year annual monitoring plan will be implemented pursuant to the MDE, Water Management Administration (WMA) mitigation monitoring guidelines and protocols. This effort will entail the establishment of sample plots and/or belt transects within the mitigation areas to obtain data on survivorship, growth, and vitality of the planted vegetation. Additional data to be reported at the mitigation areas will include: (1) species composition of recruited, desirable plant species; (2) species composition and area cover of nuisance/exotic plant species; (3) wildlife utilization and depredation; (4) hydrologic conditions (surface inundation or depth to groundwater); and (5) current site conditions at fixed photographic points.

The monitoring program will include an initial baseline (time-zero) monitoring event, to be conducted immediately following the planting of the mitigation areas. After the baseline event is completed, a five-year monitoring schedule will be initiated, to include annual sample events during September-October of each year. A baseline report and five annual monitoring reports will be prepared for review by regulatory staff of USACE and the WMA. The reports will include the vegetative sampling results, current hydrologic conditions, photo-documentation, descriptions of problems encountered, and discussion of maintenance actions taken. Monitoring reports will be submitted within 90 days of each monitoring event. Monitoring reports will be submitted to the USACE and the WMA. Following agency review and coordination, remedial/contingency measures will be implemented, if required.

The targets for the in-kind creation and enhancement efforts will be divided into two specific areas: (1) in-kind creation and enhancement of wetland communities and enhancement of stream reaches and (2) in-kind creation or sustainment of adequate hydrology. The specific success criteria for the monitoring program will be identified prior to the implementation of planting and monitoring activities, but will include, at a minimum, the success of the planted vegetation, as measured through survivorship counts and observations of vitality and growth, and the existence of adequate hydrology. If success criteria have been satisfied at the completion of the five-year monitoring program, a request for release from monitoring will be made to the U.S. ACE and/or WMA.

5.6.4.6 Flora and Fauna

Mitigation to replace temporary and permanent impacts to upland areas will consist of reforestation as well as development of other appropriate naturally vegetated areas (e.g., meadows, shrub/scrub communities). Some areas on the CCNPP site may be available for mitigation, including lawns and old agricultural fields. Consideration will be given to mitigation within the CBCA as well as areas further inland. Because the areas of projected forest losses in the CBCA are already fragmented by roads and lawns in Camp Conoy and the roadways and open areas adjoining the barge dock, reforestation within the CBCA will contribute to the State of Maryland's goal of increased FID species habitat in the CBCA. In addition, the remaining unforested upland, not impacted by the construction of Unit 3, will be kept as old field habitat to maintain site biodiversity and provide a suitable location to transplant the showy goldenrod from the Camp Conoy area.

The reforestation process is designed to ultimately generate a mixed deciduous forest. Mixed deciduous forest is the climax vegetation, i.e., the permanently-sustaining vegetation that would result following an extended period without disturbance, for uplands in central Maryland, including Calvert County. The process by which unvegetated land reverts to climax vegetation is termed natural succession. Left undisturbed, abandoned agricultural land in central Maryland typically passes through a series of intermediate forest stages termed seres. The initial seres consist of vegetation dominated by grasses and other herbaceous plants; then vegetation dominated by shrubs and tree saplings; then forest vegetation dominated by Virginia pine (*Pinus virginiana*) and hardwoods such as black locust (*Robinia pseudoacacia*) and black cherry (*Prunus serotina*) that grow rapidly in conditions of full sunlight; and finally forest dominated by oaks (*Quercus* spp.), tulip poplar (*Liriodendron tulipifera*), and other hardwoods that can regenerate under their own shade. The next two seres correspond to the old field vegetation on the CCNPP site, the intermediate seres corresponds to the successional hardwood forest, and the final (climax) seres corresponds to the mixed deciduous forest. The mixed deciduous regeneration forest is the result of logging mixed deciduous forest without killing the stumps and associated root systems; i.e., it consists of a mixture of stump sprouts of climax tree species and fast-growing successional tree species and is intermediate in character between mixed deciduous forest and successional hardwood forest.

An optimal mix of tree species for planting includes tulip poplar, sweet gum (*Liquidambar styraciflua*), green ash (*Fraxinus pennsylvanica*), black locust, Virginia pine, and loblolly pine (*Pinus taeda*). All are relatively fast growing when properly planted, are easily transplanted and widely available as nursery stock, and are components of the existing successional hardwood forest and/or mixed deciduous forest on the CCNPP site.

Oaks, beeches (*Fagus grandifolia*), and other shade-tolerant climax species would be expected to voluntarily establish in the shade of the stand as their nuts are dispersed naturally by squirrels and other wildlife. Mountain laurel (*Kalmia latifolia*) and other understory and groundcover vegetation typical of mixed deciduous forests would also be expected to gradually become established under the shade of the closed canopy. The floristic composition of the stand will gradually approach that of the existing mixed deciduous forest on the CCNPP site, a process that could require more than 100 years.

A field survey will be needed during construction activities to determine the appropriate areas for onsite mitigation as forested and other naturally vegetated areas (meadows, shrub/scrub) and the best old field habitats to replant with the showy goldenrod. Therefore, the exact locations and habitat type will be determined at a later date. As stated previously, mitigation plans will be developed in consultation with the State and local resource agencies.

5.7 SOCIOECONOMIC IMPACTS FROM CONSTRUCTION

This analysis presents information about the potential impacts to key social and economic characteristics that could arise from the construction of the power plant at the CCNPP site. The analysis was conducted for the 50 mi (80 km) comparative geographic area and for Calvert County and St. Mary's County, Maryland, where appropriate. The discussion focuses on physical impacts in Section 5.7.1 and social and economic impacts in Section 5.7.2 including impacts to population settlement patterns, housing, employment and income, tax revenue generation, and public services and facilities.

5.7.1 Physical Impacts

Construction activities at the CCNPP site will cause temporary and generally localized physical impacts such as increased noise, vehicle exhaust, and dust. This section addresses these potential impacts as they might affect people (the local public and workers), buildings, transportation routes, and the aesthetics of areas located near the plant site.

As discussed below, the potential for direct physical impacts to the surrounding communities from plant construction is expected to be minimal.

5.7.1.1 The Public and Workers

People who work at or live near the CCNPP site will be subject to physical impacts resulting from construction activities. Onsite construction workers will be impacted the most, with workers at the existing adjacent operating units subject to slightly reduced, similar impacts. People living or working adjacent to the site will be impacted significantly less due to site access controls and distance from the construction site where most activities will occur. Transient populations and recreational visitors will be impacted the least for similar reasons, and also because their exposure to any effects of construction will be limited in duration.

5.7.1.2 Dust and Other Air Emissions

Section 5.5.3 described the impact on air quality caused by the generation of dust and air emissions during construction. Practices that will mitigate those potential impacts are described in Section 5.5.2.

5.7.1.3 Buildings

The primary buildings in the immediate area with potential for impact from construction are those associated with CCNPP Units 1 and 2. Some peripheral onsite buildings will be removed during construction. Information about historic properties and the impacts of construction on them is provided in Sections 4.2.3 and 5.2.3.

Many existing onsite buildings related to safety of the existing facility were constructed to meet seismic qualification criteria which make them resistant to the effects of vibration and shock similar to that which could occur during construction. Other onsite facilities were constructed to the appropriate building codes and standards which include consideration of seismic loads. Regardless of the applicable design standard, construction activities will be planned, reviewed, and conducted in a manner that ensures no adverse effect on the operating nuclear units and that buildings are adequately protected from adverse impact.

Construction activities are not expected to affect offsite buildings due to their distance from the construction site. For example, the nearest residences are located approximately 3,000 to 4,000 ft (914.4

to 1,291.2 m) from the Calvert Cliffs Unit 3. Offsite vibrations are limited by state regulations and compliance with those regulations will further prevent mechanical interaction with offsite facilities.

The impact of construction activities on nearby buildings will be small and temporary because of the design of onsite buildings and the administrative programs that will ensure no adverse interaction with the operating units, while offsite buildings are located at greater distances that isolate them from potential interaction.

5.7.1.4 Transportation Routes

The major transportation routes in the area are described in Section 4.7.2.4.

Traffic will increase substantially on MD 2/4 during peak construction periods and will be at its highest during shift changes. Construction workers will use the public highways in the area around the site to commute to work. Additionally, public roadways will be used to transport most construction materials and equipment to the site. Impact on area transportation resources will generally decrease with increased distance from the site as varied routes are taken by individual vehicles.

As a result of the expected increase in traffic around the site, Constellation Energy conducted a Traffic Impact Analysis (TIA) of the area during construction and operation of the additional unit planned at the CCNPP. The TIA study area was based on input from the State of Maryland and Calvert County. The area extended 4 miles (6.4 km) from the site access road in the north and south direction (as shown on Figure 5.7-1) and included the following intersections along MD 2/4:

- Calvert Beach Road (intersection with signal control),
- Calvert Cliffs Parkway (intersection with signal control),
- Pardoe Road (intersection without signal control), and
- Cove Point Road (intersection without signal control).

The TIA based its conclusions on the ability of the MD 2/4 roadway network to accommodate projected construction traffic volumes utilizing techniques to measure capacity in the form of Critical Lane Volume (CLV) at intersections with signals (e.g., stop lights) and level of service (LOS) at intersections without signals (e.g., use of signage only such as stop or yield signs). Any signal-controlled intersection with a CLV of 1450 vehicles/hour (vph) or less was considered acceptable, based on the state and county guidelines. LOS, on the other hand, is an ordinal scale that is defined from A to F, with "A" being the best level of service. Typically, the LOS is determined for the peak hour during the identified periods as it represents "worst case" conditions. A LOS with scale of "E" or better (delays of less than 50 seconds) at an intersection without signal control was considered acceptable.

As expected, the major concern identified in the TIA was the traffic related to the construction staff and the daily peak travel period and patterns in and around the start and end of the day shift. Since there are no major highway development or improvement projects planned within the area to influence the capacity of the roadway system, a new site access road connecting directly to MD 2/4 at Nursery Road south of the plant will be built to reduce traffic impacts related to construction activities.

Nonetheless, the TIA concluded that the existing roadway system has insufficient capacity to handle this peak demand. Table 5.7.1 shows intersection ratings. The intersections of Calvert Beach Road and

Nursery Road are the most affected during the morning and afternoon peak traffic hour. The critical element in the increased traffic levels is the construction crew and not traffic delivering materials arriving to the site.

As a result, additional mitigation during the construction period is needed. For example, the TIA noted that the anticipated area future growth rate of 2.5% per year will require that signals be placed at Pardoe Road and Cove Point Road, the two intersections along MD 2/4 without signals. Additionally, a Phase 2 TIA will be performed to determine the mitigation necessary to achieve the target value CLV of 1450 vph at intersections with signals. Examples of the type of mitigation that will be considered include both physical improvements such as traffic control signals, turning and merging lanes. Additionally, management measures, such as staggered shift changes and increasing average vehicle capacity will be considered. Thus, the potential impacts to the surrounding communities from construction traffic, although expected to be moderate, will be temporary and manageable.

Table 5.7-1 Projected Traffic Conditions During Construction

Intersection at MD 2/4	Morning Peak 6:30-7:30 AM		Afternoon Peak 4:00-5:00 PM	
	LOS	CLV (vph)	LOS	CLV (vph)
Calvert Beach Road	F	1796	F	1986
Calvert Cliffs Parkway	B	1005	E	1558
Pardoe Road	C	1293	E	1471
Cove Point Road	D	1371	E	1577
Nursery Road	F	2303	F	2525

LOS: Level of Service
CLV: Critical Lane Volume
Note: LOS Ratings
A: Best Service
F: Worst Service
E or better indicates a wait of <50 seconds at an intersection without signal control

Large components/equipment will be transported by barge to the site and delivered to the existing site barge unloading facility. The barge unloading facility will be refurbished and upgraded to meet the equipment delivery needs as well as to comply with applicable regulatory requirements. The refurbishment will include new sheet pile, widening of the slip to receive large barge shipments, upgrading the existing onsite, heavy-haul road and extending it to the construction area, and construction of a new crane facility. Neither the unloading facility refurbishment nor the heavy-haul road extension is expected to have an impact to the public as each activity is confined to an access-restricted area.

5.7.1.5 Aesthetics

Construction activities generally will not be visible from points outside the CCNPP site boundary due to the heavily wooded area surrounding the site. Section 2.1 provides a description of the site and figures that illustrate the appearance of the facility after completion. Construction activities will be visible on those portions of the facility visible in the illustrations, for example construction equipment such as cranes will be visible during use. Federal regulations require that any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 ft (61 m) above ground level be appropriately marked with lighting. The tallest new structures on the site will be below this height;

however temporary cranes will be used to construct structures that are likely to require lighting during their use.

Recreational users of the Chesapeake Bay to the north and east will generally be unable to view the construction site due to its elevation above the water and setback distance from the shoreline. Portions of the construction may be visible from certain locations on the Bay, including elevated activities and those conducted along the shoreline such as the barge unloading facility, and installation of water intake and discharge equipment. Construction of the heavy haul road, related heavy equipment staging area, and new water intake structure will require removal of a portion of cliff area near Units 1 and 2 causing those facilities to be exposed to a wider field of view from the Chesapeake Bay. Construction of the intake structure and pump house and associated discharge piping at the shoreline for CCNPP Unit 3 should have minimal visual impact considering their proposed locations near the CCNPP Units 1 and 2 intake structure and barge slip facility, respectively. No other visual impacts will be visible from nearby ground-level vantage points.

The existing transmission line corridor will be used to provide power to the grid. No new transmission line towers are needed offsite.

Water turbidity may be present during construction and dredging activities. Measures to control water turbidity or other related activity impacts include implementation of the SWPPP, transportation of excavated and dredged material to an onsite spoils area, and compliance with the required federal and state regulations and permit conditions.

Aesthetic impacts are expected to be small and temporary because the CCNPP Unit 3 site is set back from, and only limited portions of the construction will be visible from, publicly accessible areas. Most construction activities will be shielded from public view and construction activities are by nature temporary.

5.7.2 Socioeconomic Impacts of Construction

This section presents information about the potential impacts to key social and economic characteristics that could arise from the construction of the power plant at the CCNPP site. Table 5.7-2 summarizes the numbers of construction workers that are expected to be employed during each year of construction:

Table 5.7-2 Estimated Average FTE Construction Workers by Construction Year/Quarter

Year / Quarter of Construction	Average FTE Construction Workforce
Year 1:	
1	350
2	800
3	1,250
4	1,600
Year 2:	
1	1,900
2	2,200
3	2,500
4	2,800
Year 3:	
1	3,050
2	3,200
3	3,350
4	3,500
Year 4:	
1	3,683
2	3,867
3	3,950
4	3,950
Year 5:	
1	3,950
2	3,917
3	3,700
4	3,400
Year 6:	
1	3,050
2	1,967
3*	768*

*The third "quarter" of construction year 6 has only two months; the length of the total construction period is estimated to be 68 months.

In addition to construction workers, CCNPP Unit 3 will begin to employ a managerial and clerical staff.

The potential demographic, housing, and public services and facilities impacts of the construction phase are discussed below only for the two-county area because those impacts derive from the presence of the in-migrating construction workforce in the two-county area. By contrast, impacts to employment and tax revenues are discussed below for the 50 mi (80 km) comparative geographic area as well as for the two-county area, because these impacts are generated by the entire construction labor pool which would be drawn from throughout the state, and for which the collection and distribution of income and sales tax revenues would likewise be statewide.

5.7.2.1 Construction Labor Force Needs, Composition and Estimates

There will be an estimated maximum 3,950 FTE person workforce constructing the CCNPP Unit 3 power plant between 2011 and 2015, representing a significant increase in the overall employment opportunities for construction workers. In comparison, Calvert County had 2,231 construction jobs in 2006 and St. Mary's County had 1,716 construction jobs. As shown in Table 5.7-2, this peak is estimated to last for about 12 months, from about the third quarter of the fourth year of construction through about the second quarter of the fifth year. Over the course of the entire construction period, staffing needs are estimated to increase relatively steadily from the third quarter of the first year until the peak is reached. Once the peak has passed, the staff levels again will drop steadily, until the last 5 months of construction when employment levels will drop significantly.

5.7.2.2 Demography

As noted above, an estimated peak of 3,950 FTE direct employees will be required to construct CCNPP Unit 3. To estimate indirect employment that would be generated by construction of CCNPP Unit 3, RIMS II software provided by the Regional Economic Analysis Division of the U.S. Bureau of Economic Analysis (BEA, 1997) generated a regional multiplier of 0.6855 based upon the construction industry in the region within 50 miles of the site. The number of direct jobs (3,950) multiplied by the region multiplier (0.6855), results in an estimated 2708 indirect jobs created in this region. An estimated 9% (355) of the maximum peak construction workforce will commute from outside of the two-county area on a daily basis. The remaining 91% of the workforce will reside in or commute on a weekly or longer term basis into the two-county area.

Analyzing 28 surveys of construction workforce characteristics for 13 nuclear power plants in 1981, the NRC found that 17% to 34% of the total construction workforces at most of these nuclear power plants had moved their families into the region. Following this approach, two in-migration impact scenarios were considered for the construction workforce. The first contemplated 20% of the peak construction workforce moving into the region with their families for the duration of construction; the second contemplated 35%. It is estimated that of the peak construction work force under the 20% scenario, 2,875 will commute into the two-county area on a weekly or longer basis and that under the 35% scenario, 2,340 will commute on a weekly or longer basis. Accordingly, an estimated 720 – 1,260 FTE direct employees can be expected to migrate into the region. With an average family size of 2.61 persons per family, the total expected migration to the region ranges from 1,875 – 3,285 individuals. Compared to a combined population of 160,774 in Calvert and St. Mary's Counties, this level of in-migration is a statistically small but noticeable increase in population.

As stated above, it is estimated that a peak of 3,950 FTE employees would be required to construct CCNPP Unit 3. Under the 20% in-migration scenario, an estimated peak of 720 construction workers would migrate into the two-county area along with about 1,160 family members, for a total of 1,880. Under the 35% in-migration scenario, an estimated peak of 1,260 direct workers would migrate into the two-county area along with about 2,025 family members, for a total of 3,285 people.

In addition, it is estimated that a maximum of 493 indirect jobs would be created within the two-county area under the 20% scenario and 860 indirect workforce jobs would be created under the 35% scenario (multiplying 3,595 two-county area peak direct workers (excluding daily commuters) by the U.S. Bureau of Economic Analysis (BEA) indirect employment/economic multiplier of 0.6855). Under both scenarios, all of these indirect jobs located within the two-county area could be filled by the spouses or family members of the direct workforce, because the number of in-migrating family members would exceed the number of indirect jobs created by the in-migrating direct workforce.

An in-migration of up to 1,880 people into the two-county area under the 20% scenario or up to 3,285 people under the 35% scenario would only represent a 1.2% to 2.0% increase in the total two-county area population of 160,774 people. Because these percentage changes are small, it is concluded that the impacts to population levels in the two-county area would be small, and would not require mitigation.

5.7.2.3 Housing

The in-migrating construction workforce would likely either rent or purchase existing homes, or would rent apartments and townhouses. Non-migrating (i.e., weekly or monthly) workers would likely stay in area hotels, motels, bed and breakfasts, or at area campgrounds and recreational vehicle (RV) parks. Of the estimated 720 households migrating into the region of impact to construct CCNPP Unit 3 under the 20% scenario and the 1,260 households in the 35% scenario, it is estimated that 535 to 940 households (75 percent) would reside in Calvert County and 180 to 320 (25 percent) would reside in St. Mary's County. This would represent a maximum of 12.9% to 22.6% of the 5,568 total housing units vacant in the two-county area in 2000 (see Section 4.11.2.3). Thus, the two-county area will have enough housing units available to meet the needs of the workforce, based upon 2000 housing information.

Despite the availability of adequate quantities of housing in the two-county area in 2000, the additional in-migrating workforce could place some additional pressure, above normal pre-construction pressures, on the housing sales market. At a minimum, it will reduce the vacancy rates in the area, and it could result in some changes in house sale values for certain portions of the market such as entry level homes that might be desired by the workforce for the short-term. However, this increased demand could be offset by increased construction of new homes in the two-county area. In addition, the U.S. housing market is now going through major changes that could stall housing prices or even reduce them. These changes include increases in interest rates, increases in mortgage defaults and foreclosures, reductions in the numbers of new homes constructed, and other economic factors. The effects of all of these combined factors cannot be estimated between now and when construction would begin.

It is more likely that pressures would be felt temporarily in the housing rental market, possibly resulting in increases in monthly rental rates. Existing owners of vacant homes for sale could respond to the demand by renting out their houses rather than trying to sell them. This would generate new or increased rental income for the owners, but could also affect rates to existing renters.

Because significantly more housing units are available than would be needed, the in-migrating workforce alone should not result in a significant increase in the demand for housing, or in significant increases in housing prices or rental rates. Also, construction is not scheduled to begin until 2011, providing adequate time for private developers to construct additional new homes and apartment complexes if the economy in the two-county area expands, in general, and demand warrants it. In addition, for about seven months out of the year there are noticeable quantities of vacant motel and hotel units that could be used by weekly and monthly commuters. Thus, because of the available housing, it is concluded that the impacts to area housing would be small.

5.7.2.4 Employment and Income

<u>50 mi (80 km) Comparative Geographic Area</u>

As stated above, it is estimated that a peak of 3,950 direct construction employees would build CCNPP Unit 3. Under the 20% peak in-migration scenario described above, it is implicit that the remaining 80% (3,160) either would be commuting from a reasonable distance on a daily basis or would stay at area hotels/motels and would be weekly/monthly commuters to the job site. Under the 35% in-migration scenario, an estimated 65% (2,570) of the peak direct construction workers would be daily or weekly/monthly commuters. The greatest proportion of these workers would likely commute from within or near the Washington D.C.; Alexandria, Virginia; Annapolis, Maryland; and the Baltimore, Maryland, metropolitan areas. However, a portion of these workers also would likely originate from outside of this 50 mi (80 km) radius, from throughout the mid-Atlantic seaboard and the remainder of the U.S. The greater the distance that workers would commute and the longer that they are employed on the construction site, the more likely workers would be to commute from home on a weekly or monthly basis and stay in area motels, or to become in-migrants into the Calvert County and St. Mary's County area as described in the housing section above. Because the employment opportunities and income would be spread over the 50 mi (80 km) radius, and an even larger geographic area and basis of comparison outside of the region, the beneficial impacts would be small.

Two-County Area

Direct construction workforce employment is already discussed in the demography section above. In addition to the 3,950 direct workforce, a peak of 495 indirect workforce jobs would be created in the two-county area under the 20% scenario and 860 indirect jobs would be created under the 35% scenario. This would result in a peak increase of 1,212 to 2,120 employed people in the two-county area, depending upon the scenario selected. The peak increase in employment would range from 905 to 1,585 people in Calvert County and 310 to 535 people in St. Mary's County. Unemployed or underemployed members of the labor force could benefit from these increased employment opportunities, to the extent that they have the craft skills required (e.g., laborers, carpenters, electricians, plumbers, welders) and are hired as part of the construction workforce. These increases would result in a noticeable but small impact to the area economy, representing a maximum 4.0% increase in the 39,341 total labor force in Calvert County in 2000 and 1.2% in the 46,032 total labor force in St. Mary's County.

It is estimated that the direct construction workforce will receive average salaries of $34.00/hour/worker, or about $70,720 annually. This would result in an annual total salary expenditure, for the peak construction workforce of 3,950 people, of $279.3 million. The average annual salary for the direct workforce would be moderately less than the $84,388 median income for an entire household in Calvert County in 2005, but larger than $62,939 median household income in St. Mary's County. Based upon the peak 35% scenario in-migration levels, Calvert County would experience an estimated $66.5 million increase in annual income during peak construction and St. Mary's County would receive an estimated $22.5 million annually. In addition, the working spouses and family members of the direct construction workers, who filled indirect jobs created by the power plant, would contribute substantially to individual household incomes. The additional direct and indirect workforce income would result in additional expenditures and economic activity in the two-county area. However, this would represent a small percentage of overall total income and economic activity in the two-county area. It is concluded that the beneficial impacts to employment and income would be small, relative to the overall labor force and two-county area income.

5.7.2.5 Tax Revenue Generation

THIS SECTION CONTAINS CONFIDENTIAL COMMERCIAL AND FINANCIAL INFORMATION THAT HAS BEEN REDACTED FROM THE TECHNICAL REPORT AND HAS BEEN SUBMITTED SEPARATELY TO THE PUBLIC SERVICE COMMISSION UNDER SEAL

5.7.2.6 Public Facilities

As discussed above, there is a sufficient quantity of vacant housing units in Calvert and St. Mary's Counties to meet the housing needs of the in-migrating direct construction workforce for CCNPP Unit 3, so no new housing units would likely be required. The excess capacity in the water and sewage services and the lack of new construction resulting from the power plant would result in no effects to those services. Although an increase in the population would likely place additional demands on area transportation and recreational facilities, the facilities appear to have enough capacity to accommodate the increased demand and impacts would likely be small. Area highways and roads would have increased traffic levels, particularly during shift changes at the CCNPP, resulting in a small traffic impact. These impacts are described in Section 5.7.2.

5.8 CONSTRUCTION NOISE

Section 4.8 provides information and data related to the background noise levels that exist at the construction site.

Noise levels in the site area will increase during construction primarily due to the operation of vehicles; earth moving, materials-handling, and impact equipment (such as pile drivers); and other tools.

Good practices such as maintenance of noise limiting devices on vehicles and equipment, and controlling access to high noise areas, duration of emission, or shielding high noise sources near their origin will limit the adverse effects of noise on workers. Non-routine activities with potential to adversely impact noise levels such as blasting will be conducted during weekday business hours and utilize good industry practices that further limit adverse effects. The exposure of the public to adverse effects of noise from construction activities will be reduced at the source by many of these measures and the additional distance, interposing terrain, and vegetation which provide noise attenuation. The noise levels at the nearest residential and other surrounding property boundary areas will be controlled to remain at or below Maryland state limits (COMAR 26.02.03). Pile driving will occur during some construction activities. State regulations define those periods during which these activities may occur to minimize the impact of the associated noise. The state regulations also set standards that limit the intensity of vibration that may be transmitted beyond the construction site property boundaries and that will be complied with during construction.

Traffic noise in the local area will increase as additional workers commute, and materials and waste are transported to and from the construction site. Noise impacts will occur primarily during shift changes and will not be extraordinary given the source and nature of vehicle noise and the normally varying nature of transient vehicle noise levels. Additionally, localized impacts will be reduced as distance from the construction site increases and traffic diverges outward.

5.9 DISPOSAL OF CONSTRUCTION DEBRIS

Construction of CCNPP Unit 3 will require clearing and grubbing of existing land on the site. Clearing and grubbing will result in the loss of various types of vegetation that currently exist at the specific locations where temporary or permanent construction will occur. The expected vegetation losses are shown in Figure 5.6-2 and summarized in Table 5.6-2. The losses will include approximately 191 acres (77 hectares) of mature forest cover consisting of well developed tree canopy and understory strata and dominant trees over 12 in (30 cm) in diameter at breast height. The losses will also include approximately 61 acres (25 hectares) of younger, fast growing forest cover. Other vegetation losses would include approximately 125 acres (51 hectares) of old field vegetation and approximately 54.3 acres (22.3 hectares) of lawns and herbaceous marsh vegetation. As indicated in Table 5.6-2, each of the affected types of vegetation is common throughout the CCNPP site.

The boundaries of vegetated areas subject to clearing and grubbing will be prominently marked prior to site preparation. Merchantable timber within marked areas may be harvested prior to site preparation. Merchantable timber occurs only in areas of mixed deciduous forest, well-drained bottomland deciduous forest, and poorly drained bottomland deciduous forest. Remaining trees will then be felled. Stumps, shrubs, and saplings will be grubbed, and groundcover and leaf litter will be cleared to prepare the land surface for grading. Felled trees, stumps, and other woody material will be disposed of by chipping and spreading the wood chips and/or sending to an offsite landfill. Opportunities to recycle woody material for use elsewhere on the CCNPP site or for sale to the public may be considered. Recycling opportunities could include cutting logs into firewood, using wood chips to mulch landscaped areas, using logs to line pathways, piling logs and brush in open fields to improve terrestrial wildlife habitat, and placing stumps (root wads) in stream channels to prevent bank erosion and enhance aquatic habitat.

Because of the need for grading broad contiguous areas of land to construct the power block, switchyard, and cooling tower, there will be no practicable opportunities to preserve individual trees within those areas. However, a biologist will examine forested areas subject to clearing for the temporary construction parking areas, construction office and warehouse area, and construction laydown areas for aesthetically outstanding trees or clusters of trees that might be capable of preservation without interfering with construction activities. Only trees where a minimum of 70% of the critical root zone can be left ungraded without interfering with construction activities will be identified for preservation.

In summary, merchantable timber or other wood materials that have merchantable value will be sold to the extent possible. Onsite uses will be found for as much as possible of the remaining land clearing vegetation. The remaining debris will be trucked to an off site landfill for disposal. No hazardous or other materials that require special handling or disposal are expected during construction activities for CCNPP Unit 3.

945995.6

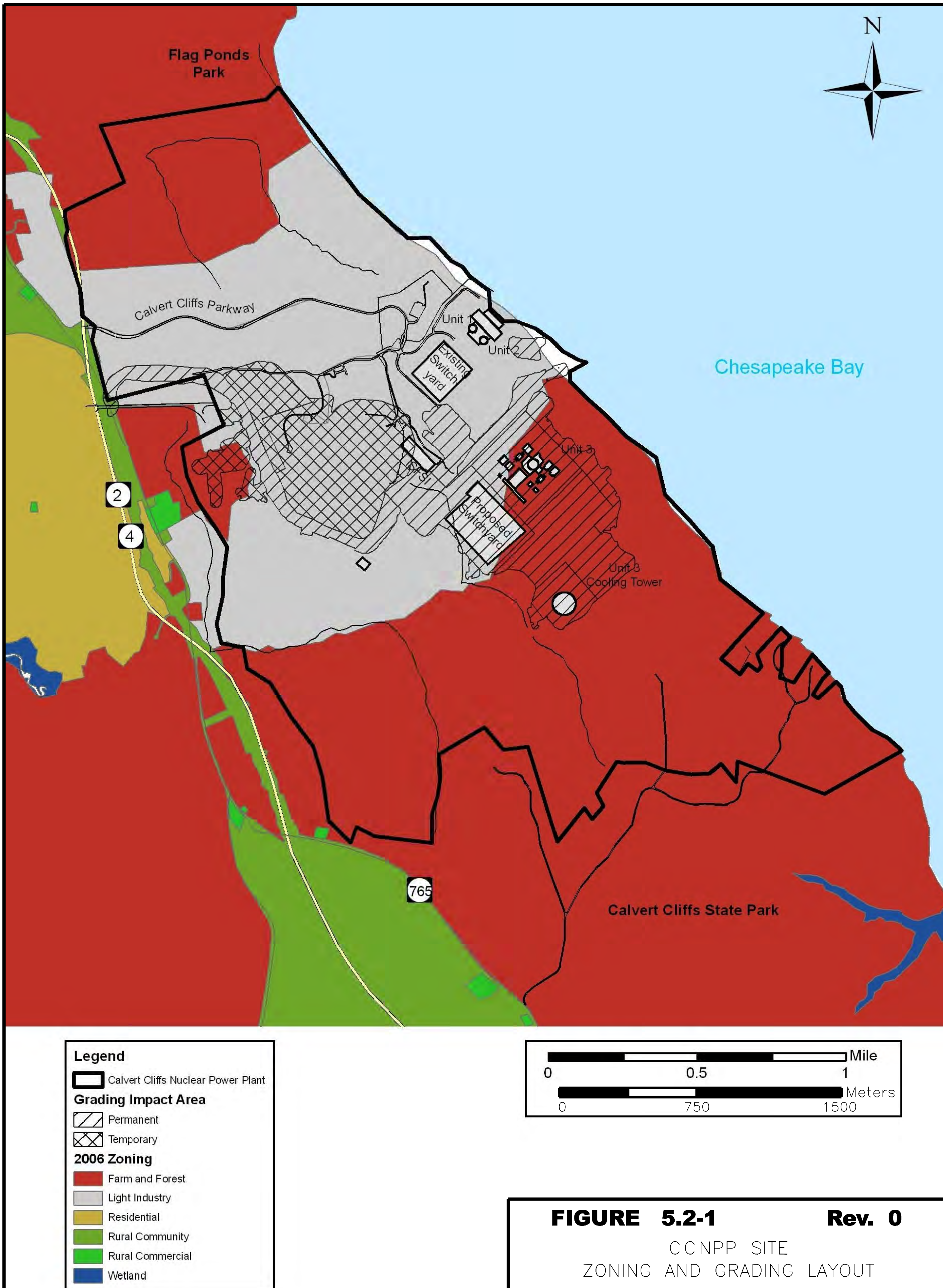


FIGURE 5.2-1 **Rev. 0**

CCNPP SITE

ZONING AND GRADING LAYOUT

CCNPP UNIT 3 CPCN

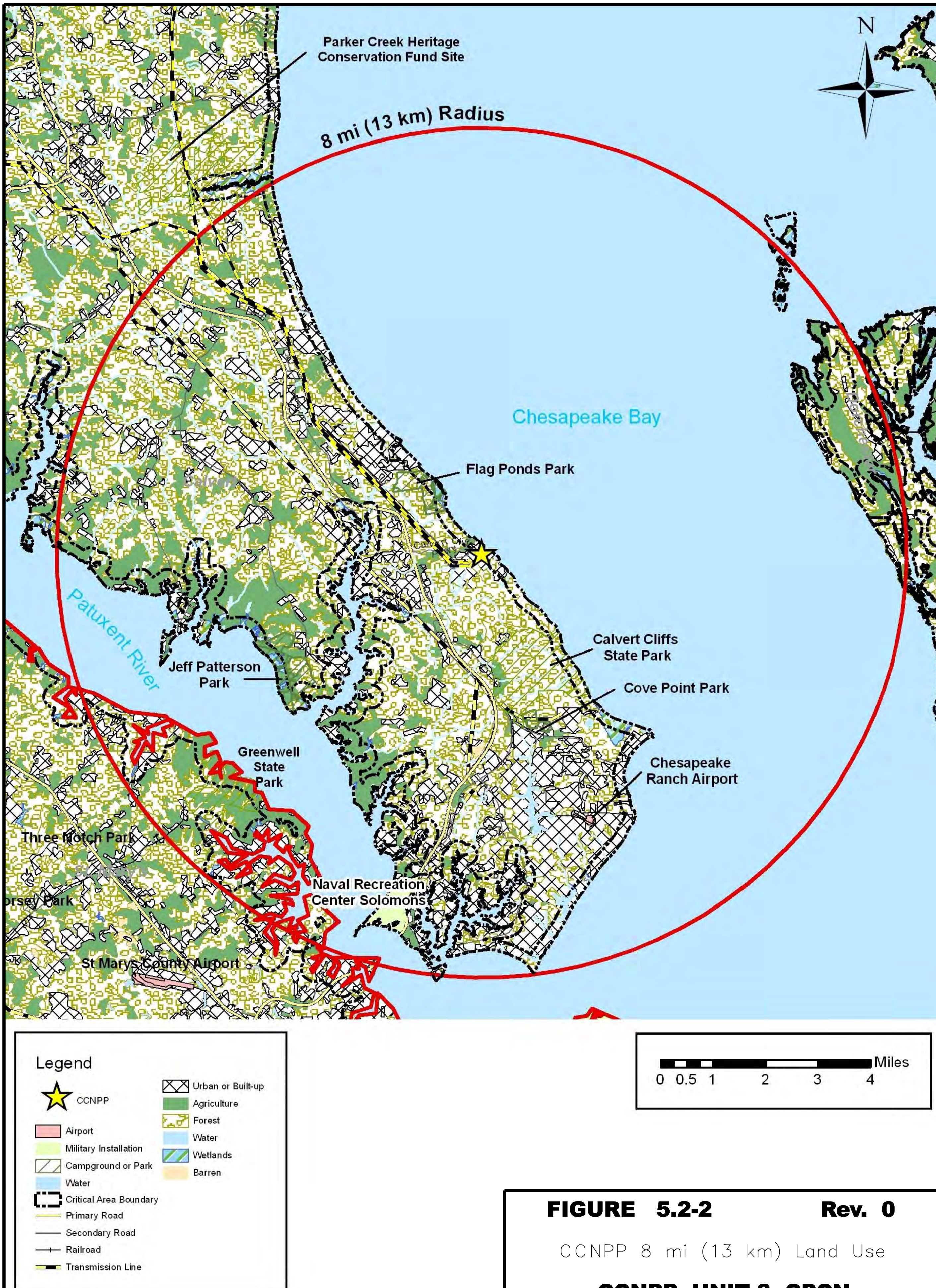
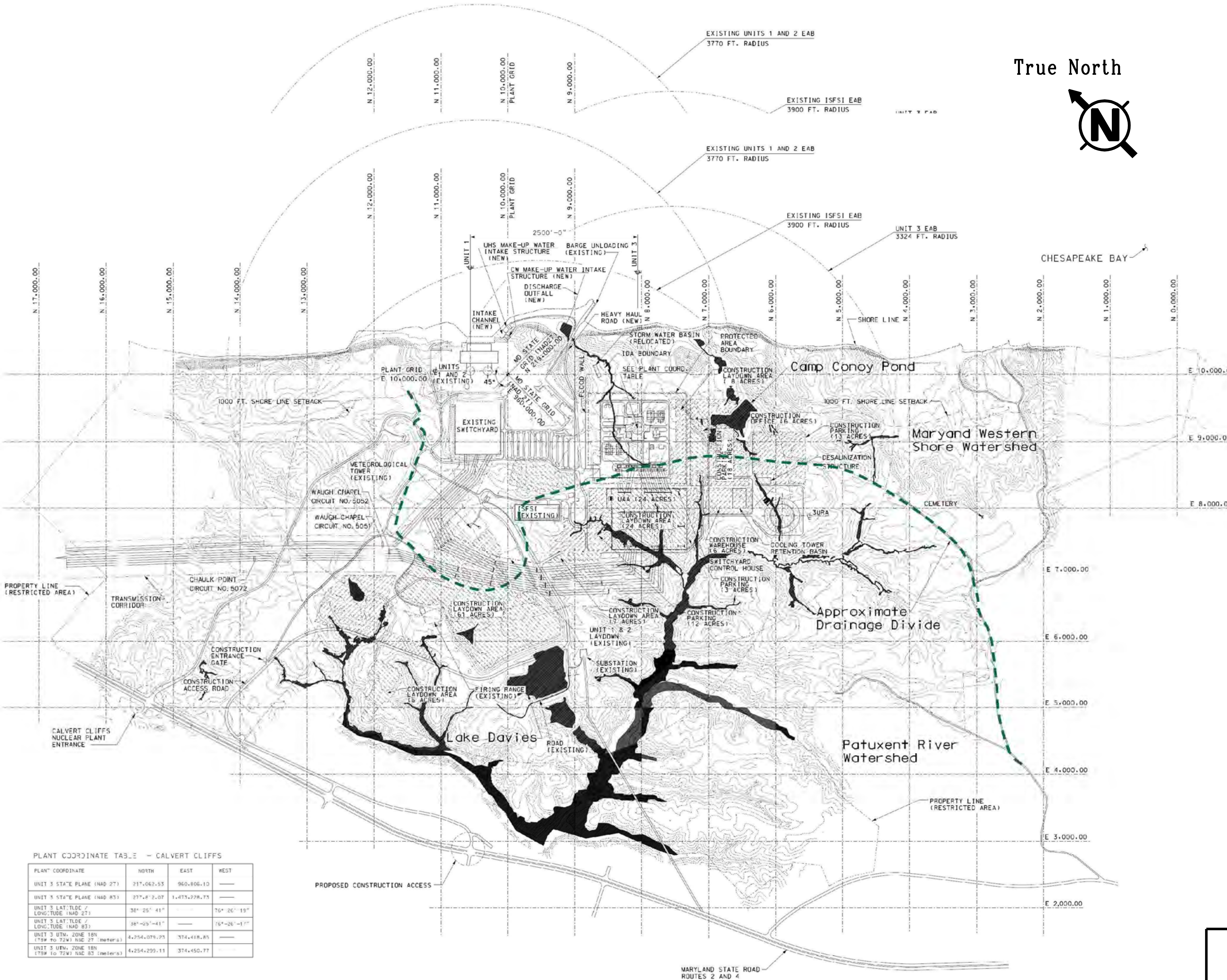


FIGURE 5.2-2 **Rev. 0**

CCNPP 8 mi (13 km) Land Use

CCNPP UNIT 3 CPCN



PLANT COORDINATE TABLE - CALVERT CLIFFS

PLANT COORDINATE	NORTH	EAST	WEST
UNIT 3 STATE PLANE (NAD 27)	217,062.53	960,806.10	——
UNIT 3 STATE PLANE (NAD 83)	277,8'2.07	1,473,228.73	——
UNIT 3 LATITUDE / LONGITUDE (NAD 27)	38° 25' 41"	——	76° 26' 19"
UNIT 3 LATITUDE / LONGITUDE (NAD 83)	38°-25'-41"	——	76°-26'-17"
UNIT 3 UTM, ZONE 18N (78W to 72W) NAD 27 (meters)	4,254,079.23	374,418.85	——
UNIT 3 UTM, ZONE 18N (78W to 72W) NAD 83 (meters)	4,254,299.11	374,450.77	——

FIGURE 5.4-1 **Rev. 0**

CCNPP UNIT 3 SITE UTILIZATION PLOT PLAN

CCNPP UNIT 3 CPCN

ERATHEM	SYSTEM	SERIES	FORMATION		THICKNESS (feet)	LITHOLOGY	HYDROSTRATIGRAPHIC UNIT
CENOZOIC	QUATERNARY	Holocene & Pleistocene	Lowland deposits		0-150	Sand, gravel, sandy clay, and clay.	SURFICIAL AQUIFER
	NEOGENE	Pliocene	Upland deposits		0-85	Irregularly stratified cobbles, gravel, sand, and clay lenses.	
			Chesapeake Group	St. Mary's Fm.	0-335	Sand, clayey sand, and sandy clay; fossiliferous and diatomaceous.	CHESAPEAKE CONFINING UNIT
		Miocene		Choptank Fm.			
				Calvert Fm.			
	PALEOGENE	Oligocene		Unnamed Oligocene Beds	0-5	Patchy distribution; clayey, glauconitic sand.	PINEY POINT-NANJEMOY AQUIFER
		Eocene	Pamunkey Group	Piney Point Fm.	0-90	Sand, slightly glauconitic, with intercalated indurated layers; fossiliferous.	
				Nanjemoy Fm.	0-240	Glauconitic sand with clayey layers.	
		Paleocene		Marlboro Clay	0-30	Pink and gray clay.	NANJEMOY CONFINING UNIT
				Aquia Fm.	30-205	Glauconitic, greenish to brown sand with indurated layers; fossiliferous.	AQUIA AQUIFER
				Brightseat Fm.	0-40	Gray to dark-gray micaceous silty and sandy clay.	BRIGHTSEAT CONFINING UNIT
MESOZOIC	CRETACEOUS	Upper	Monmouth Group Matawan Group	Formations undifferentiated	20-105	Sandy clay and sand, dark gray to black, with minor glauconitic; fossiliferous.	
			Magothy Fm.		0-230	Light gray to white sand and fine gravel with interbedded clay layers; contains pyrite and lignite. Includes two sand units in southern Anne Arundel County where the formation is the thickest.	MAGOTHY AQUIFER
		Lower	Potomac Group	Patapsco Fm.	0-1,200	Interbedded sand, clay, and sandy clay; color variegated, but chiefly hues of red, brown and gray; consists of several sandy intervals that function as separate aquifers.	Patapsco aquifer system: UPPER PATAPSCO CONFINING UNIT UPPER PATAPSCO AQUIFER MIDDLE PATAPSCO CONFINING UNIT LOWER PATAPSCO AQUIFER
				Arundel Fm.	0-400	Red, brown, and gray clay; in places contains ironstone nodules, carbonaceous remains, and lignite.	ARUNDEL CONFINING UNIT
				Patuxent Fm.	100-600	Interbedded gray and yellow sand and clay; kaolinized feldspar and lignite common. Locally clay layers predominate.	PATUXENT AQUIFER
PALEOZOIC PRECAMBRIAN	Undifferentiated pre-Cretaceous consolidated-rock basement				Unknown	Igneous and metamorphic rocks; sandstone and shale.	NOT RECOGNIZED

FIGURE 5.4-2 Rev. 0

SOUTHERN MARYLAND SCHEMATIC HYDROSTRATIGRAPHIC SECTION

CCNPP UNIT 3 CPCN

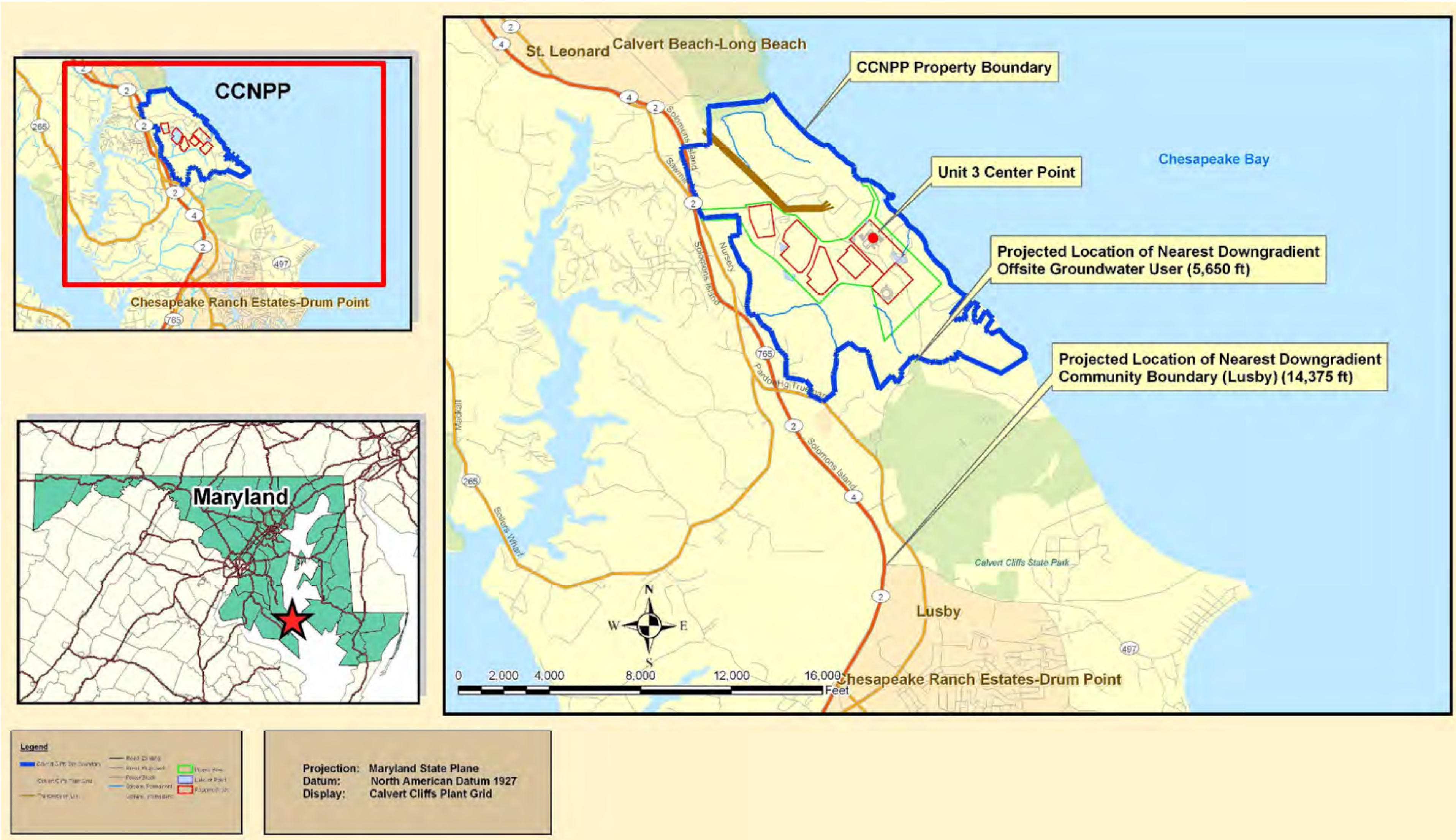


FIGURE 5.4-3 **Rev. 0**

PROJECTED LOCATION OF NEAREST OFF–SITE GROUNDWATER WELL AND COMMUNITY WATER SUPPLY SYSTEM

CCNPP UNIT 3 CPCN

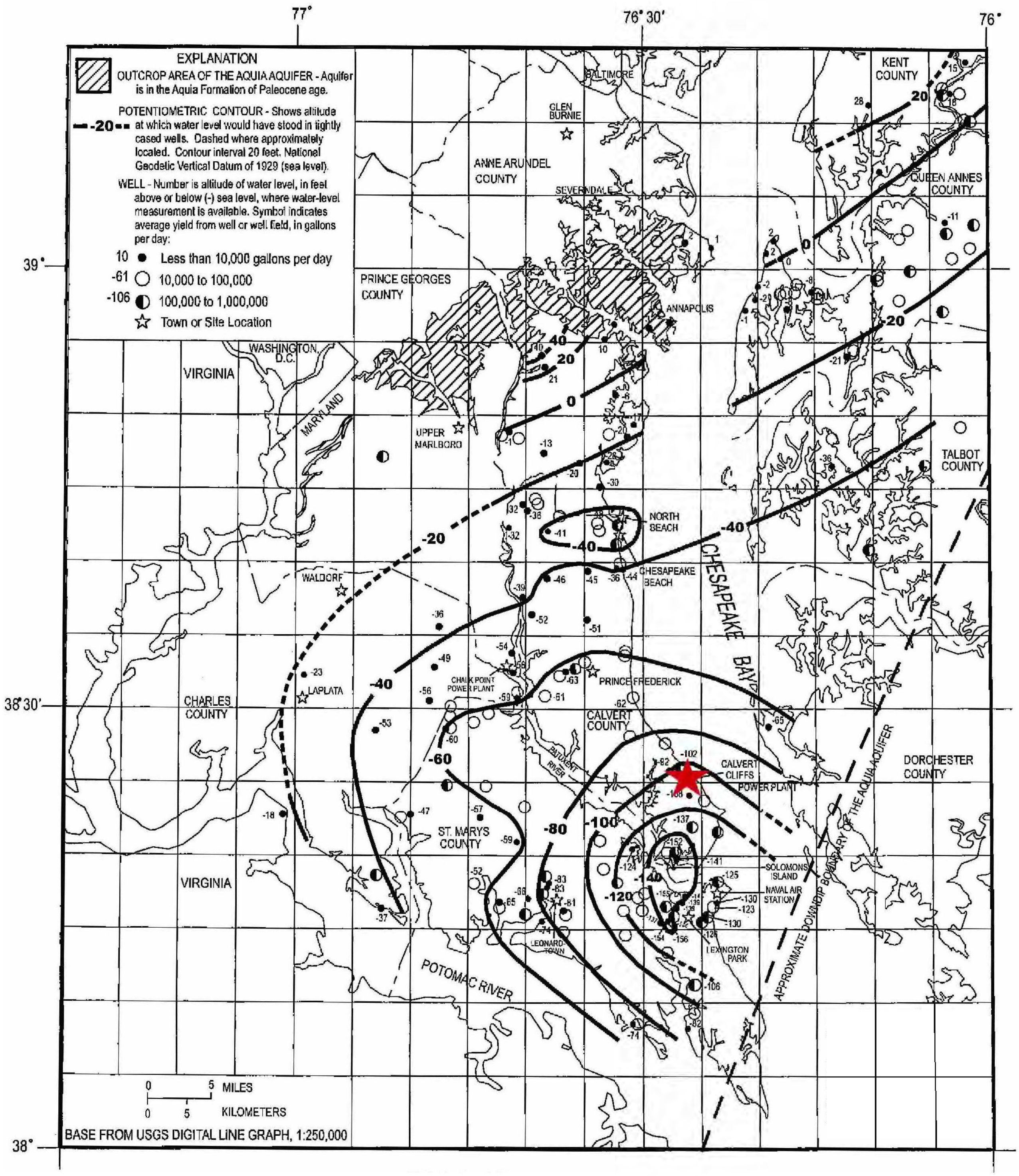
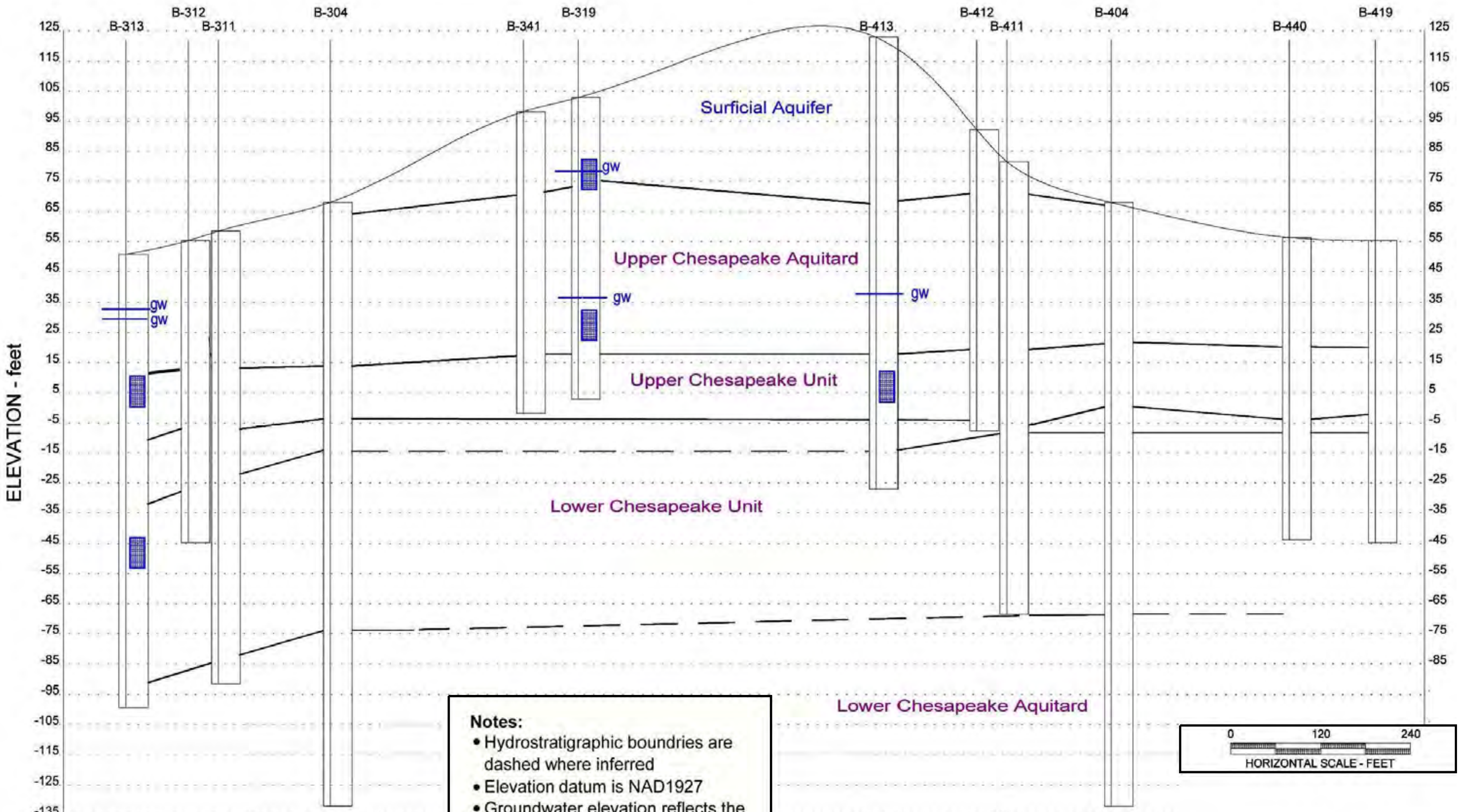


FIGURE 5.4-4 Rev. 0

POTENTIOMETRIC SURFACE OF THE AQUIA AQUIFER IN SOUTHERN MARYLAND, SEPTEMBER 2003

CCNPP UNIT 3 CPCN



Notes:
- Hydrostratigraphic boundries are dashed where inferred
- Elevation datum is NAD1927
- Groundwater elevation reflects the December 2007 measurements

FIGURE 5.4-5 Rev. 0

NORTHWEST–SOUTHEAST CROSS–SECTION A–A' THROUGH PROPOSED UNIT 3 POWER BLOCK AREA

CCNPP UNIT 3 CPCN

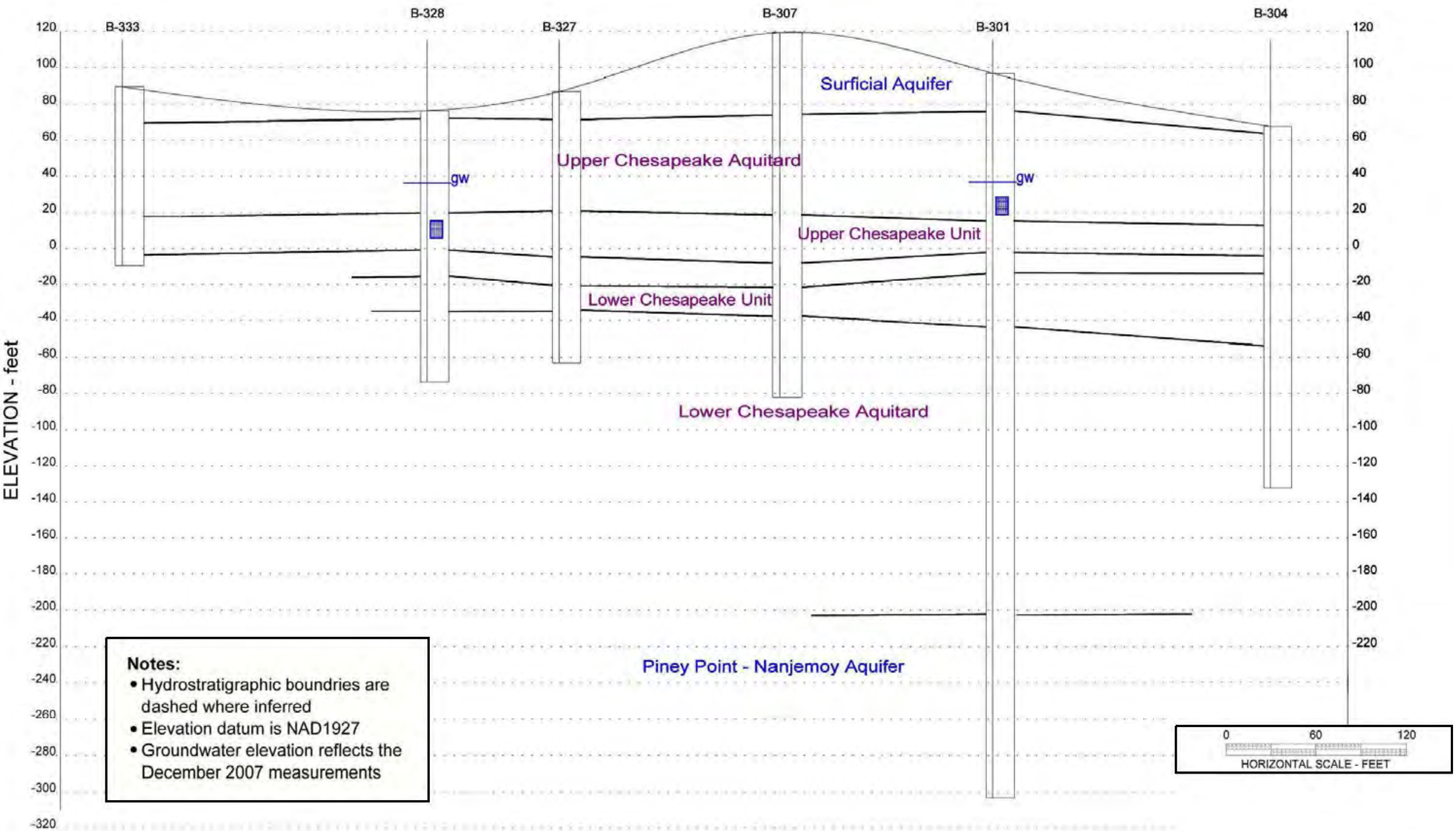


FIGURE 5.4-6 **Rev. 0**

SOUTHWEST–NORTHEAST CROSS–SECTION B–B' THROUGH PROPOSED UNIT 3 POWER BLOCK AREA

CCNPP UNIT 3 CPCN

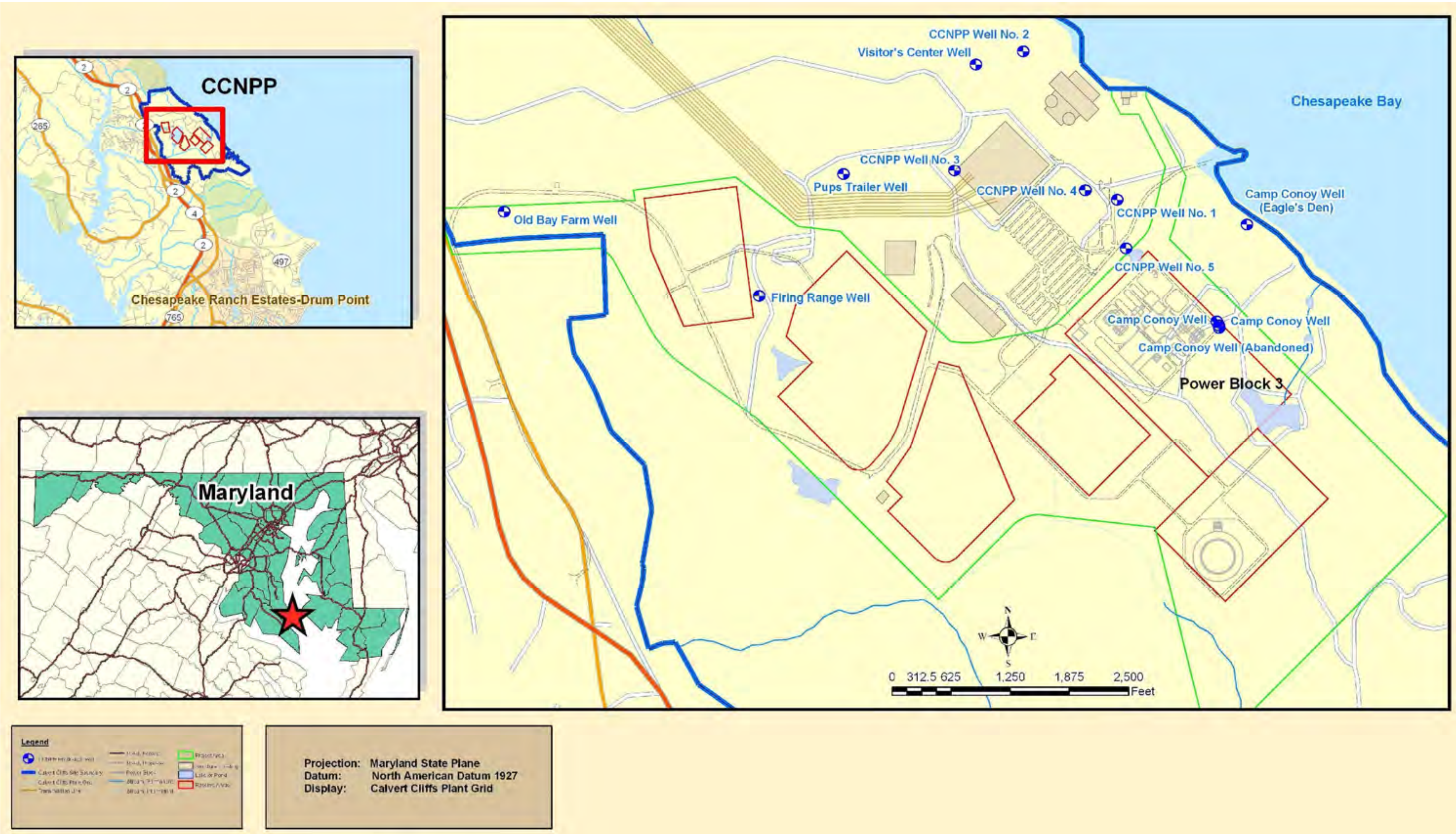


FIGURE 5.4-7 **Rev. 0**

CCNPP WATER PRODUCTION WELLS

CCNPP UNIT 3 CPCN

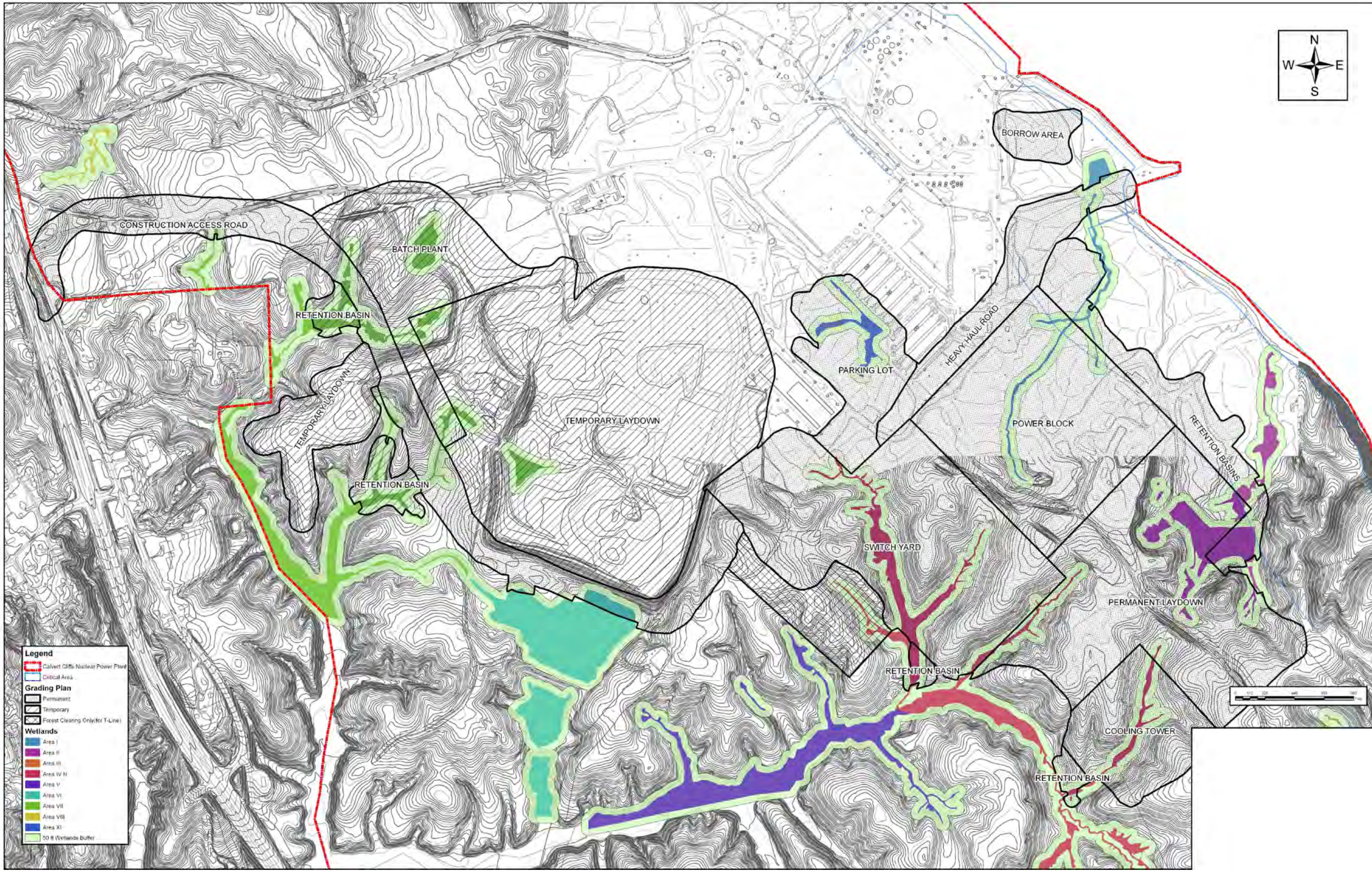


FIGURE 5.6-1 **Rev. 0**

CCNPP WETLAND IMPACTS

CCNPP UNIT 3 CPCN

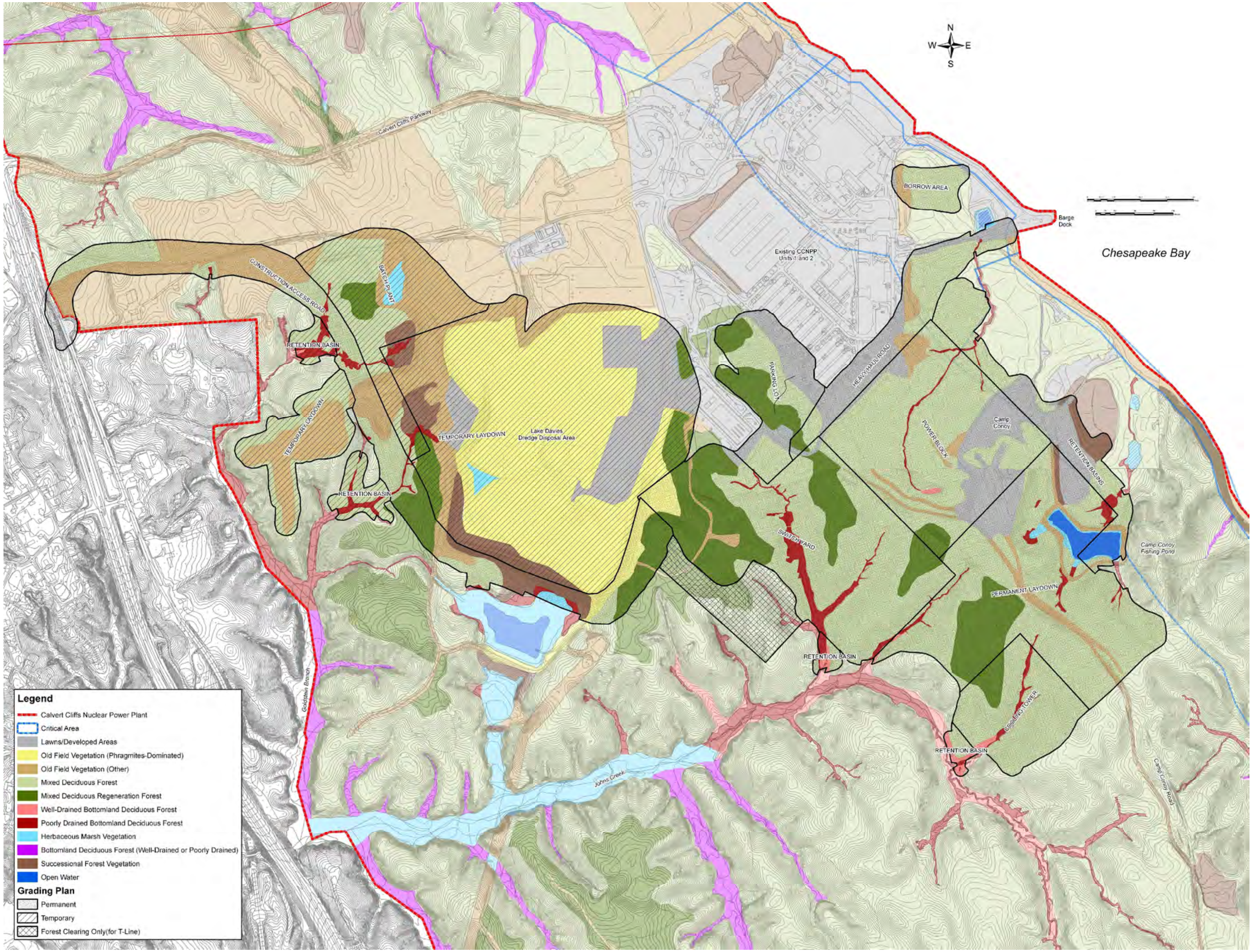


FIGURE 5.6-2 **Rev. 0**

CCNPP VEGETATION IMPACTS
FEBRUARY 2007

CCNPP UNIT 3 CPCN

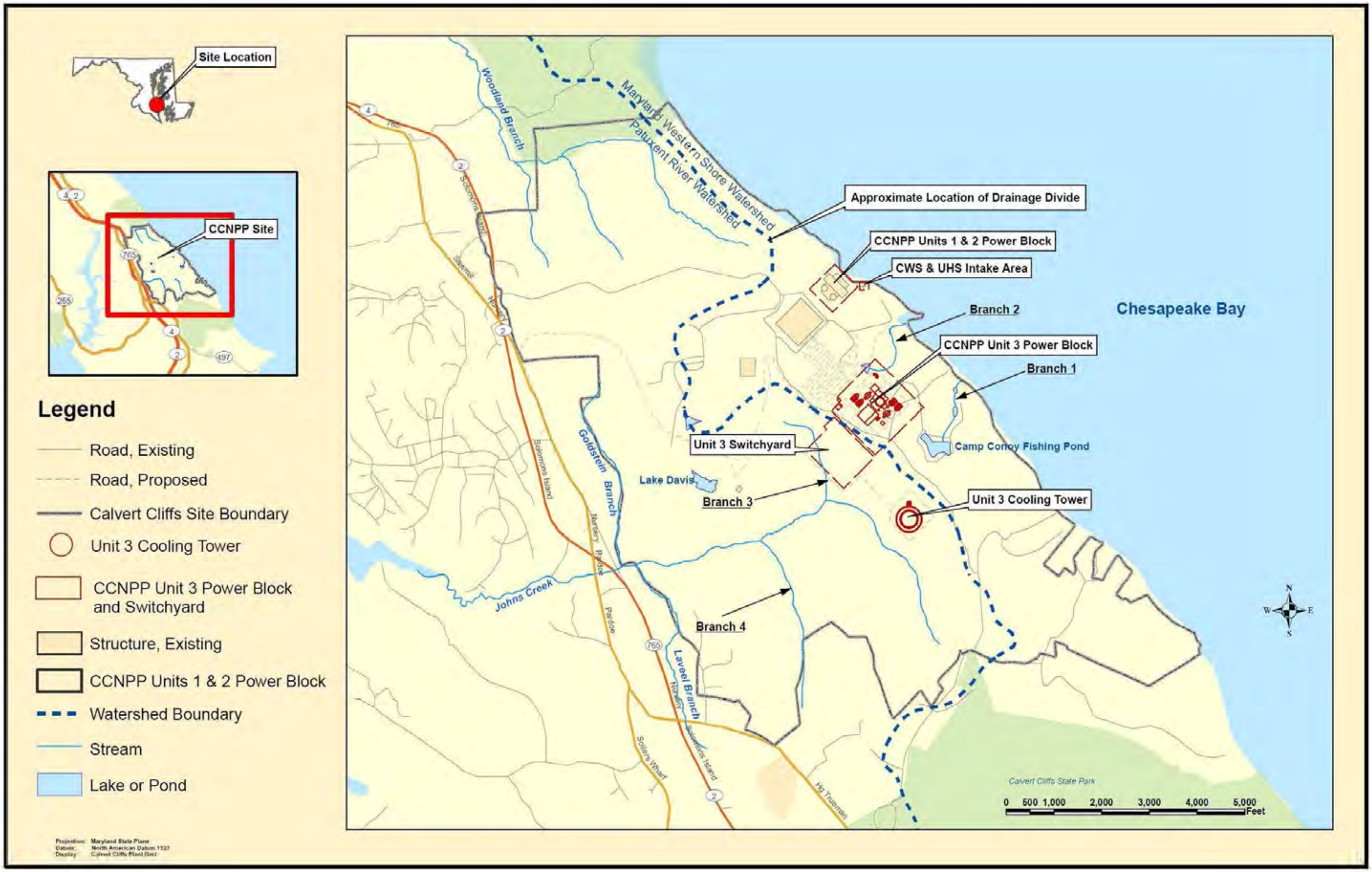


FIGURE 5.6-3 **Rev. 0**

CCNPP SITE AREA
TOPOGRAPHY AND DRAINAGE

CCNPP UNIT 3 CPCN

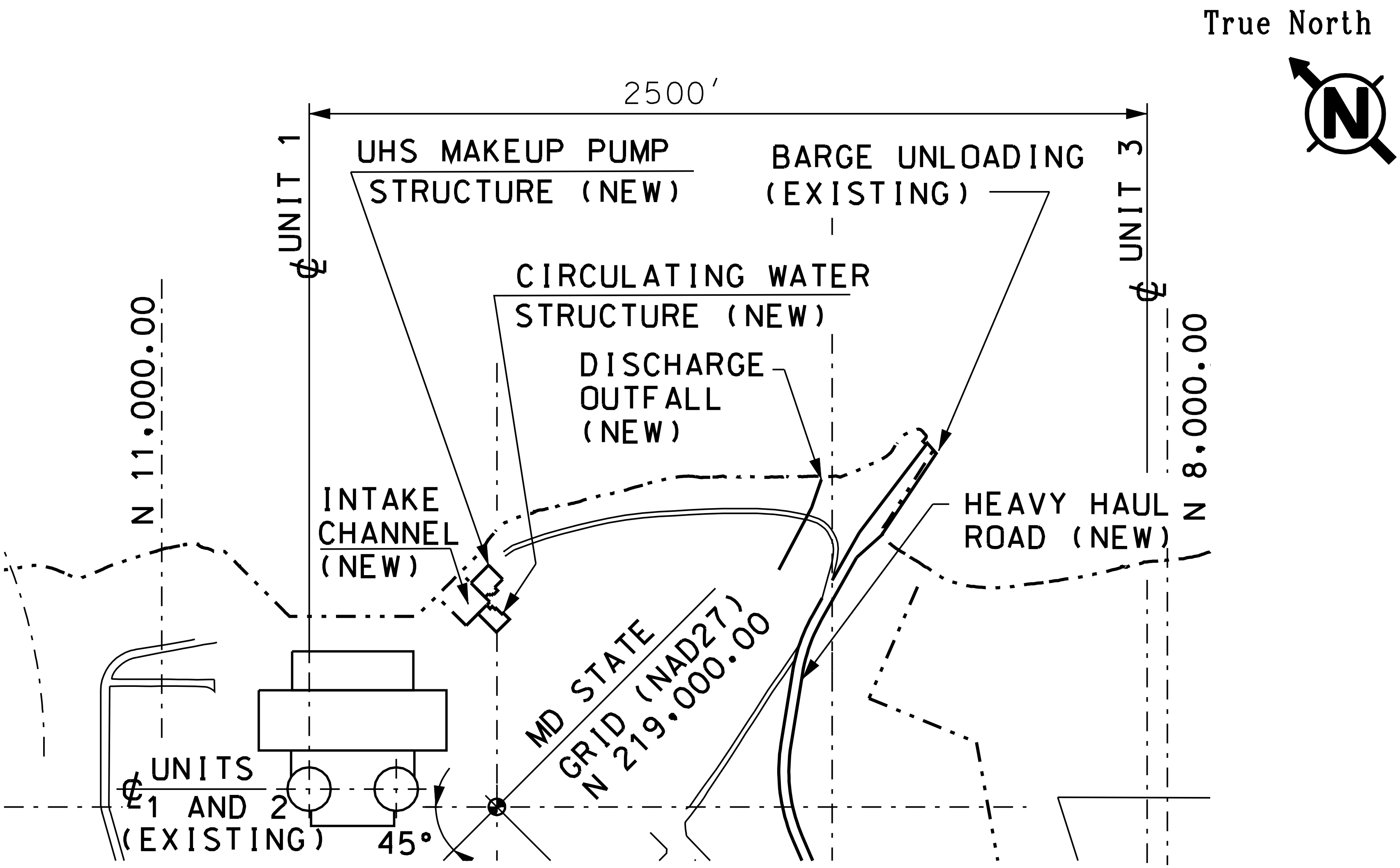


FIGURE 5.6-4 **Rev. 0**

CIRCULATING WATER INTAKE/DISCHARGE
STRUCTURE LOCATION PLAN

CCNPP UNIT 3 CPCN

FIGURE 5.7-1 **Rev. 0**

CCNPP TRAFFIC IMPACT ASSESSMENT STUDY AREA

CCNPP UNIT 3 CPCN