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3.1 EXTERNAL APPEARANCE AND PLANT LAYOUT

The site for the proposed nuclear power plant is the **{**2,057 acre (832.4 hectares) Calvert Cliffs Nuclear Power Plant (CCNPP)**}** property located **{**on the western shore of the Chesapeake Bay in Lusby, Maryland**}**. The terrain is **{**flat to gently rolling with low to moderate relief**}** as shown in Figure 3.1-1. Ground surface elevations range from **{**mean sea level (msl) to approximately 130 ft (39.7 m)**}**, with an average elevation of approximately **{**100 ft (30.5 m)**}**. **{**Nearly vertical cliffs, over 100 ft (30.5 m) high in places are located along the shoreline.**}** References to elevation values in this section are based on National Geodetic Vertical Datum of 1929 (NGVD, 29), unless otherwise stated.

{The CCNPP property contains two existing pressurized water reactors (PWRs) designated as CCNPP Units 1 and 2. Existing plant structures occupy approximately 220 acres (89.0 hectares), with most of the power block structures located near the east edge of the site, about at the center of the 10,000 ft (3,048.0 m) long CCNPP site shoreline. CCNPP Units 1 and 2 share a Turbine Building and other support structures. The Turbine Building is oriented parallel and adjacent to the shoreline of the Chesapeake Bay. The two Reactor Buildings and associated Auxiliary Buildings are located west of the Turbine Building. The Service Building, Intake Structure and Discharge Structure are located east of the Turbine Building. An Independent Spent Fuel Storage Installation is located near the center of the property, west of the existing switchyard, which is west of the Reactor Buildings. A former summer camp, Camp Conoy, is located on the property south of existing plant structures. The remainder of the property is mostly densely wooded areas. Access to the existing plant is via an onsite road which intersects the highway west of the site, or by barge via the Chesapeake Bay.**}**

The proposed plant is a U.S. Evolutionary Power Reactor (EPR), referred to as **{**CCNPP Unit 3**}**. The U.S. EPR is a pressurized water reactor design with a rated core thermal power of 4,590 MWt. The rated and design gross electrical output for the EPR is approximately 1,710 MWe. Electrical power consumption is approximately 130 MWe for auxiliary loads, plus another 18 MWe for the cooling tower fans, resulting in a rated and design net electrical output of approximately 1,562 MWe. The plant is proposed to be constructed **{**south of the existing CCNPP Units 1 and 2, in the vicinity of Camp Conoy**}**. Construction related and new plant structures will occupy approximately **{**420 acres (170 hectares). **{**CCNPP Unit 3 will be separated from CCNPP Units 1 and 2 by a distance of approximately 2,500 ft (762.0 m). The CCNPP Unit 3 Reactor Turbine Buildings will be located farther inland than Units 1 and 2 and is at least 1,000 ft (304.8 m) from the shoreline.**}**

Due to the distance and location from **{**CCNPP Units 1 and 2, CCNPP Unit 3 will have a separate protected area and plant access road. The plant access road will connect to the highway to the west and will be built south of the existing CCNPP Units 1 and 2 plant access road. The existing barge slip/heavy haul road will be extended to accommodate CCNPP Unit 3.**}**

The **{**CCNPP Unit 3**}** design is a four-loop, pressurized water reactor, with a Reactor Coolant System composed of a reactor pressure vessel that contains the fuel assemblies, a pressurizer including ancillary systems to maintain system pressure, one reactor coolant pump per loop, one steam generator per loop, associated piping, and related control systems and protection systems. The **{**CCNPP Unit 3**}** Reactor Building and Turbine Building will be oriented side by side, with the Reactor Building oriented towards the **{**east**}**.

The Reactor Building will be surrounded by the Fuel Pool Building, four Safeguard Buildings, two Emergency Diesel Generator Buildings, the Reactor Auxiliary Building, the Radioactive Waste Processing Building and the Access Building. Figure 3.1-1 shows the layout for **{**CCNPP

Unit 3**}**, depicting the following features: exclusion area boundary (EAB), site boundary, liquid and gaseous release points (i.e., discharge piping, and vent stack and Cooling Tower, respectively) and their elevations and distances from the Reactor Building, meteorological towers, the construction zone, land to be cleared, waste disposal areas, and other buildings and structures both temporary (i.e., construction offices/ warehouses) and permanent.

The **{**CCNPP Units 1 and 2**}** Reactor Buildings are a vertical cylinder, concrete structure with a dome and flat base, measuring approximately **{**137.5 ft (41.91 m)**}** in diameter with an overall height of about **{**195 ft (59.4 m)**}**. With the existing plant grade at an elevation of approximately **{**45 ft (13.7 m)**}** and the top of the Reactor Buildings at an elevation of approximately **{**193.4 ft (58.95 m)**}**, each Reactor Building rises about **{**148.5 ft (45.26 m)**}** above grade. Other existing plant buildings are **{**either concrete or steel with exterior metal siding**}**.

The **{**CCNPP Unit 3**}** Reactor Building is an upright cylinder concrete structure, capped with a spherical dome. The Reactor Building is 186 ft (56.7 m) in diameter with an overall height of 230 ft (70.1 m). The plant grade for **{**CCNPP Unit 3**}** will be at an elevation of approximately **{**85 ft (25.9 m)}. With the bottom of the Reactor Building foundation **{**40 ft (12.2 m)**}** below grade, the new Reactor Building will rise **{**190 ft (57.9 m)**}** above grade. The top of the Reactor Building will be at an elevation of approximately **{**275 ft (83.8 m)**}**.

The vent stack for **{**CCNPP Unit 3**}** will be the tallest new structure at approximately **{**197 ft (60.0 m)**}** above grade or about 7 ft (2.1 m) above the Reactor Building. In contrast to **{**CCNPP Units 1 and 2, which uses a once-through cooling system, CCNPP Unit 3**}** will have a closed-loop cooling system cooling system. The **{**CCNPP Unit 3**}** Cooling Tower will be a round concrete structure with an overall diameter of 528 ft (161 m) and approximate height of 164 ft (50.0 m). Similar to **{**CCNPP Units 1 and 2**}**, other **{**CCNPP Unit 3**}** buildings will be concrete or steel with metal siding. Figure 3.1-2 depicts an aerial view of **{**CCNPP Units 1 and 2**}** with the proposed **{**CCNPP Unit 3**}** superimposed on the photograph.

{The CCNPP Unit 3 ultimate heat sink (UHS) function will be provided by mechanical forced draft Essential Service Water System (ESWS) cooling towers situated above storage basin pools. Each of the four pools will be approximately 0.19 acres (0.08 hectares) in size and will not occupy significant land area beyond the tower footprint. The pools will normally be supplied with makeup water from the non-safety-related CCNPP Unit 3 desalination plant.

In the event of a design basis accident, the pools will be supplied with water from a safety-related makeup water system using Chesapeake Bay water. The ESWS cooling towers will be 96 ft (29 m) tall. The desalination plant footprint will be approximately 65 ft by 165 ft (20 m x 50 m) and situated adjacent to the east of the Circulating Water Supply System Cooling Tower. Bay water to the Desalination Plant will be taken from the Circulating Water Supply System makeup line to the Cooling Tower.**}**

Figures 3.1-3 through 3.1-5 are ground-level photographs of the **{**CCNPP**}** property taken from adjacent properties to the **{**north, south and west**}**. Major structures associated with **{**CCNPP Unit 3**}** have been superimposed on these photographs to depict potential visual impacts as viewed from **{**Calvert County Flag Ponds Nature Park to the north, Calvert Cliffs State Park to the south, and from Maryland State Highway 2/4 and residential properties to the west**}**.

{Due to heavily forested onsite areas, screening is provided by trees so that only the tops of the taller structures may be visible from adjacent properties at ground level. Many of the CCNPP Unit 3 buildings will not be visible since the taller structures will mask the lower rise structures. Due to onsite elevation changes, topographical features such as hills and valleys will also help to screen and seclude plant structures from surrounding properties even when foliage is

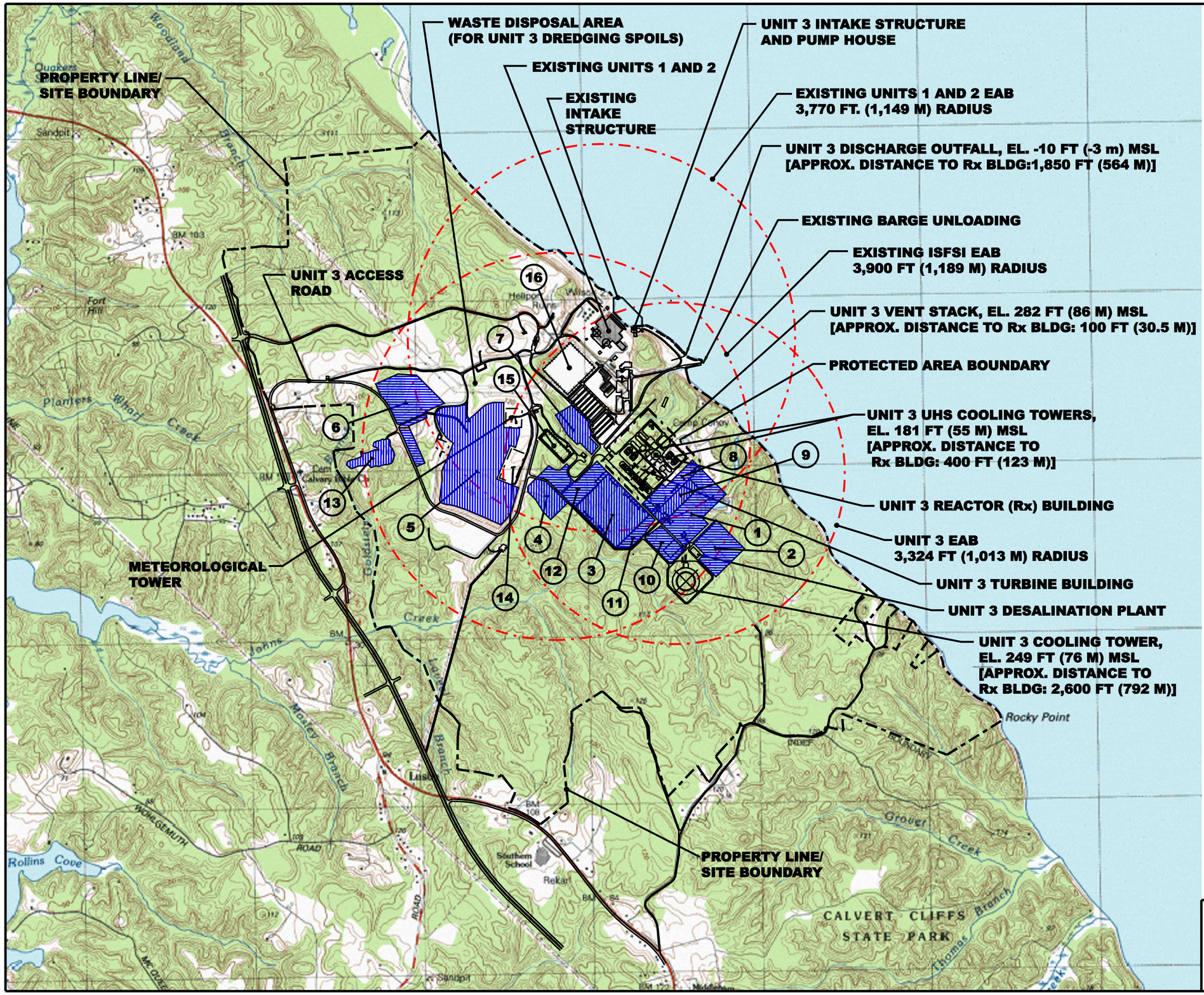
seasonally absent. In addition, since CCNPP Unit 3 will be located approximately 3,000 ft to 4,000 ft (914.4 m to 1,219.2 m) from the nearest residential properties, distance will help shield the plant from view.

From the east, considering that the approximate 2 m (3.2 km) long shoreline bordering the CCNPP property comprises steep cliffs with little beach area, views of the new plant from the shoreline should be limited due to elevation differences between the Chesapeake Bay and land, and the forested, 1,000 ft (304.8 m) setback. The Intake Structure and Pump House, and associated discharge piping at the shoreline for CCNPP Unit 3 should also have minimal visual impact considering the proposed locations near the CCNPP Units 1 and 2 intake structure and barge slip facility, respectively. No other visual impacts from nearby ground level vantage points are expected.**}**

Aesthetic principles and concepts used in the design and layout of **{**CCNPP Unit 3**}** include the following:

- **{**Preserving most woodlands on site.
- Developing land zoned for industrial use for portions of the construction and operation of the new plant to minimize the development of land zoned as Farm and Forest District.
- Selecting the southern portion of the CCNPP property, where natural valleys exist, for the location of the new power block structures. This area will provide a low profile for the new plant and should require less excavation for site preparation and less clearing due to pre-existing, cleared areas around Camp Convoy.
- Locating many of the plant structures at least 1,000 ft (304.8 m) from the shoreline.
- Placing the Intake Structure and Pump House and associated discharge piping in the existing, developed section of shoreline.
- Constructing buildings similar in shape, size and material to existing buildings.
- Utilizing cooling systems that minimize visual impacts.
- Minimizing tree removal by locating the concrete batch plant, construction lay-down areas, parking areas and construction offices and warehouses in either cleared fields or lightly forested areas.
- Transporting excavated and dredged material to an onsite spoils area outside designated wetlands.
- Upgrading existing onsite roads as applicable to minimize the addition of new roads. However, proposed new roads will provide direct routes to CCNPP Unit 3 for construction and will minimize disruption of CCNPP Units 1 and 2 traffic patterns.

In addition to the above, exterior finishes for plant buildings will be similar in color and texture to those of the CCNPP Units 1 and 2 buildings. This provides for a consistent, overall appearance, by architecturally integrating the buildings on the CCNPP site.**}** Areas that are cleared supporting construction activities will be either maintained or restored by reseeding and replanting with native trees and vegetation, so that the **{**CCNPP Unit 3**}** landscape blends with the **{**CCNPP Units 1 and 2**}** landscapes and the remaining undisturbed areas on the **{**CCNPP**}** site. Figure 3.1-6 is an architectural rendering of **{**CCNPP Unit 3**}**, depicting profiles of major buildings and landscaping features.



True North

NOTES:

1. PLANT GRADE IS AT EL. 85 FT (25.9 M) MSL.
2. FOR THE CONSTRUCTION ZONE, REFER TO LEGEND ITEMS 1 through 13.
3. FOR LAND TO BE CLEARED, REFER TO FIGURES IN SECTION 4.3 DEPICTING TEMPORARY AND PERMANENT DISTURBED AREAS.

LEGEND:

1. CONSTRUCTION PARKING (18 ACRES/7.3 HECTARES)
2. CONSTRUCTION PARKING (13 ACRES/5.3 HECTARES)
3. CONSTRUCTION LAYDOWN AREA (24 ACRES/9.7 HECTARES)
4. CONSTRUCTION LAYDOWN AREA (7 ACRES/2.8 HECTARES)
5. CONSTRUCTION LAYDOWN AREA (61 ACRES/24.7 HECTARES)
6. CONSTRUCTION BATCH PLANT (22 ACRES/8.9 HECTARES)
7. CONSTRUCTION PARKING (8 ACRES/3.2 HECTARES)
8. CONSTRUCTION LAYDOWN AREA (8 ACRES/3.2 HECTARES)
9. CONSTRUCTION OFFICE (6 ACRES/2.4 HECTARES)
10. CONSTRUCTION WAREHOUSE (6 ACRES/2.4 HECTARES)
11. CONSTRUCTION PARKING (3 ACRES/1.2 HECTARES)
12. CONSTRUCTION PARKING (12 ACRES/4.9 HECTARES)
13. CONSTRUCTION LAYDOWN AREA (6 ACRES/2.4 HECTARES)
14. EXISTING UNIT 1 & 2 LAYDOWN
15. EXISTING ISFSI
16. EXISTING SWITCHYARD

0 800 1600 2400
SCALE: FEET

0 250 500 750 1000
SCALE: METERS

FIGURE 3.1-1 **Rev. 2**

{CCNPP} SITE AREA TOPOGRAPHIC MAP

CCNPP UNIT 3 ER

FIGURE 3.1-2 **Rev. 2**

AERIAL VIEW OF {CCNPP UNITS 1 AND 2 WITH CCNPP UNIT 3 SUPERIMPOSED}

CCNPP UNIT 3 ER