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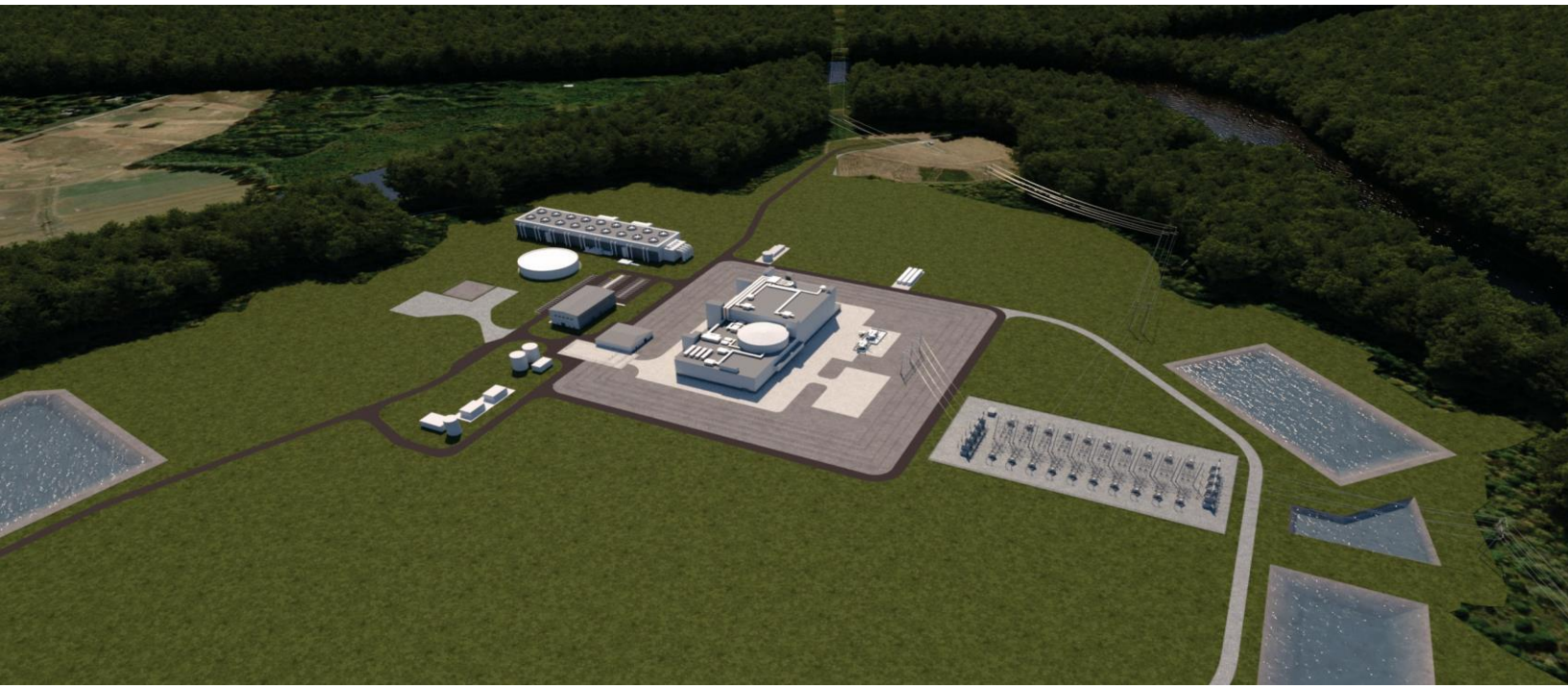
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR A CONSTRUCTION PERMIT AT THE CLINCH RIVER NUCLEAR SITE

Draft Report for Comment

Docket Number: 50-615

Issued: November 2025



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Environmental Center of Expertise

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Division of Rulemaking, Environmental, and Financial Support
Office of Nuclear Material Safety and Safeguards

COMMENTS ON DRAFT REPORT

Proposed Action Issuance of construction permit for small modular reactor at the Clinch River Nuclear Site, in Roane County, Tennessee

Type of Statement Draft Supplemental Environmental Impact Statement

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Comments:

Any interested party may submit comments on this draft supplemental environmental impact statement. The public commenting process affords an opportunity for public input on the U.S. Nuclear Regulatory Commission (NRC or the Commission) decision-making and allows the public an opportunity to comment on alternatives and on the NRC's analysis of potential environmental effects. Public commenting allows the NRC to make better informed decisions.

The deadline for submitting comments on this draft supplemental environmental impact statement is 45 days after the date that it is published in the *Federal Register*. Comments received after the expiration of the comment period will be considered if it is practical to do so, but assurance of consideration of late comments cannot be given. The NRC encourages electronic comment submission through the Federal Rulemaking website (https://www.regulations.gov) or via email to ClinchRiverEnvironmental@nrc.gov. Please include Docket ID NRC-2024-0146 in your comment submission. The NRC cautions you not to include identifying or contact information that you do not want to be publicly disclosed in your comment submission. The NRC will post all comment submissions at https://www.regulations.gov, as well as enter the comment submissions into Agencywide Documents Access and Management System. The NRC does not routinely edit comment submissions to remove identifying or contact information.

If you are requesting or aggregating comments from other persons for submission to the NRC, then you should inform those persons not to include identifying or contact information that they do not want to be publicly disclosed in their comment submission. Your request should state that the NRC does not routinely edit comment submissions to remove such information before making the comment submissions available to the public or entering the comment into Agencywide Documents Access and Management System.

COVER SHEET

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ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC or the Commission) prepared this supplemental environmental impact statement in response to an application submitted by Tennessee Valley Authority to construct a small modular reactor at the Clinch River Nuclear Site. This supplemental environmental impact statement includes the preliminary analysis that evaluates the environmental impacts of the proposed action and environmental impacts of a combination of replacement energy generating capacity as part of the no-action alternative.

The NRC staff's preliminary recommendation to the Commission related to the environmental aspects of the proposed action is that the construction permit be issued. The NRC staff's evaluation of the safety and security aspects of the proposed action will be addressed in the staff's safety evaluation report.

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EXECUTIVE SUMMARY

By letter dated April 28, 2025, the Tennessee Valley Authority (TVA) submitted to the U.S. Nuclear Regulatory Commission (NRC or the Commission) an application for a construction permit (CP) for the construction and operation of a nuclear power plant with one GE Vernova Hitachi Nuclear Energy (previously GE-Hitachi Nuclear Energy) BWRX-300 small modular reactor (SMR) at the Clinch River Nuclear (CRN) Site in Oak Ridge, Roane County, Tennessee (TVA 2025-TN11927). In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51 (TN10253), the NRC staff noted the start of the environmental review process on July 18, 2025 (90 FR 34015-TN12310), by publishing a Notice of Intent to prepare an environmental impact statement (EIS), which is a supplement to the Commission's NUREG-2226, *Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site* (hereafter referred to as the ESP EIS) (NRC 2019-TN6136). The ESP itself was issued on December 19, 2019, and NRC approved the CRN Site as suitable for the construction and operation of two or more SMRs (NRC 2019-TN10325). As permitted by regulations, the CP application references the CRN ESP.

The proposed Federal action by NRC is the issuance of a CP, under the provisions of 10 CFR Part 50 (TN249), for one BWRX-300 SMR at the CRN Site with a power rating of 870 megawatts thermal (MW(t)). The U.S. Army Corps of Engineers, Nashville District, Regulatory Division, is a cooperating agency with the NRC, entrusted to verify that the information presented in this supplement to the ESP EIS is adequate to support a future U.S. Department of the Army (DA) permit application review, streamline regulatory review processes, avoid unnecessary duplication of effort, and ensure that the issues and concerns related to impacts on waters of the U.S. and navigable waters of the U.S., are identified and addressed early in the NRC's review process. The proposed U.S. Army Corps of Engineers Federal action would be the issuance of a DA permit when TVA applies for a DA permit.

The NRC is required to consider a range of reasonable alternatives to the agency's proposed action; however, the only reasonable alternative identified by the NRC staff is an action by the agency to not grant the CP (the no-action alternative). Because the determination of need and decision to build a reactor are at the discretion of an applicant, alternative energy sources were not further evaluated in this SEIS. Additionally, alternative sites were not evaluated in this SEIS, as they were already evaluated in the ESP EIS.

This SEIS evaluates the potential environmental impacts of the proposed action and reasonable alternatives to that action. In the context of a CP application that references an ESP, the term "new" in the phrase "new and significant information" is defined as any information that was both (1) not considered in preparing the ESP ER or EIS (as may be evidenced by references in these documents—applicant responses to NRC Requests for Confirmatory Information, NRC Request for Additional Information, comment letters, etc.) and (2) not generally known or publicly available during the preparation of the ESP EIS (such as information in reports, studies, and treatises). For new information to be "significant," it must be material to the issue being considered; that is, it must have the potential to affect the finding or conclusions of the NRC staff's evaluation of the issue. The applicant for a CP need only provide information in the application about a previously resolved environmental issue if it is both new and significant (72 FR 49352-TN4796).

The NRC staff's preliminary recommendation to the Commission related to the environmental aspects of the proposed action is that the CP be issued for the construction and operation of a nuclear power plant with one GE Vernova Hitachi Nuclear Energy BWRX-300 SMR at the CRN

Site in Oak Ridge, Roane County, Tennessee. The NRC staff's evaluation of the safety and security aspects of the proposed action will be addressed in the staff's safety evaluation report. This recommendation is based on (1) TVA's CP ER (TVA 2025-TN11927) and responses to NRC staff requests for additional information; (2) the NRC staff's review conducted for the ESP application and the assessment documented in the ESP EIS (NRC 2019-TN6136); (3) consultation with Federal, State, and Tribal agencies; (4) the NRC staff's own independent review of potential new and significant information available since the preparation and publication of the ESP EIS; and (5) the assessments summarized in this SEIS, including the potential mitigation measures identified.

ABBREVIATIONS AND ACRONYMS

°C	degree(s) Celsius
°F	degree(s) Fahrenheit
µg	microgram(s)
µg/L	microgram(s) per liter
µm	micron(s) or micrometer(s)
µSv/cm	microsievert(s) per centimeter
ac	acre(s)
ADAMS	Agencywide Documents Access and Management System
ALARA	as low as is reasonably achievable
APE	area of potential effects
ARAP	Aquatic Resource Alteration Permit
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BTA	barge traffic area
building activities	For the purposes of this document, building activities represent preconstruction and construction activities together
BWR	boiling water reactor
CAA	Clean Air Act
CDC	U.S. Center for Disease Control and Prevention
CFR	*Code of Federal Regulations*
cfs	cubic foot/feet per second
Ci	Curie(s)
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COC	cycles of concentration
CP	construction permit
CRN	Clinch River Nuclear
CW	condenser water
CWA	Clean Water Act
CWS	circulating water system
DA	U.S. Department of the Army
dBA	A-weighted decibels
DOE	U.S. Department of Energy
DRR	data review report
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order

GEH	General Electric-Hitachi Nuclear Energy
GEIS	generic environmental impact statement
GHG	greenhouse gas
GNF	Global Nuclear Fuels-Americas, LLC
gpm	gallon(s) per minute
GVH	General Electric Vernova Hitachi
GW	gigawatt(s)
GWL	global warming levels
ha	hectare(s)
HPA	Habitat Protection Area
ICS	Isolation Condenser System
IPaC	Information for Planning and Consultation Report
IPPP	Integrated Pollution Prevention Plan
IRP	Integrated Resource Plan
ISFSI	independent spent fuel storage installation
kg	kilogram(s)
km	kilometer(s)
kV	kilovolt(s)
kW	kilowatt(s)
lpm	liter(s) per minute
MBtu	one million British thermal units
mi	mile(s)
MOU	Memorandum of Understanding
mrem	millirem(s)
MT	metric ton(s)
MW	megawatt(s)
MWD/MTU	megawatt-day(s) per metric ton of uranium
MWe	megawatt(s) electrical
MWt	megawatt(s) thermal
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NHS	normal heat sink
NLEB	northern long-eared bat
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places

OL	operating license
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PA	programmatic agreement
PCW	plant cooling water
PM	particulate matter
PPE	plant parameter envelope
PSAR	preliminary safety analysis report
RCP	representative concentration pathways
review team	For the purposes of this document and effort, the review team refers to the U.S. Nuclear Regulatory Commission and the U.S. Army Corps of Engineers staff.
Reservoir	In this document, the Clinch River arm of the Watts Bar Reservoir has been referred to as the “Reservoir.”
RFA	reasonably foreseeable actions
RHA	Rivers and Harbors Act
RO	reverse osmosis
ROI	region of influence
ROW	right-of-way
SACTI	Seasonal and Annual Cooling Tower Impact
SEIS	supplemental environmental impact statement
SER	safety evaluation report
SHPO	State Historic Preservation Officer
SMR	small modular reactor
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control and Countermeasures
SR	State Route
SSP	socioeconomic pathways
SW	service water
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TSP	total suspended solid
TVA	Tennessee Valley Authority
UF	ultrafiltration
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compounds
WWC	wet-weather conveyances

1 INTRODUCTION

On April 28, 2025, Tennessee Valley Authority (TVA), submitted to the U.S. Nuclear Regulatory Commission (NRC or the Commission) an application for a construction permit (CP) for the construction and operation of a nuclear power plant with one GE Hitachi (GEH; also known as GE-Vernova Hitachi [GVH]) Nuclear Energy BWRX-300 small modular reactor (SMR) at the Clinch River Nuclear (CRN) Site in Oak Ridge, Roane County, Tennessee. The CRN Site and existing infrastructure are owned by TVA. To operate the one-unit BWRX-300 facility (also referred to as CRN-1) at the CRN Site, TVA would need to submit an additional application for an operating license (OL) and the NRC would need to issue an OL (TVA 2025-TN11927).

1.1 Background

On December 19, 2019, the NRC approved an early site permit (ESP) to TVA for development of new nuclear power units demonstrating the feasibility of SMR technology (NRC 2019-TN10325). TVA did not request a limited work authorization at that time. The ESP approval was supported by information contained in NUREG-2226, *Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site* (hereafter referred to as the ESP EIS) (NRC 2019-TN6136). The ESP resolved many safety and environmental issues and allowed TVA to "bank" the CRN Site for up to 20 years. The ESP was approved for a combined nuclear generating capacity at the CRN Site to not exceed 2,420 megawatts thermal (MWt) and 800 megawatts electrical (MWe) (NRC 2019-TN10325).

1.2 Proposed Federal Actions

The proposed Federal action by NRC is the issuance of a CP, under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, for one BWRX-300 SMR at the CRN Site with a power rating of 870 megawatts thermal (MW(t)). The proposed unit would use a closed-cycle cooling-water system and would require condenser cooling via a mechanical draft cooling tower (TVA 2025-TN11927).

The U.S. Army Corps of Engineers (USACE), Nashville District, Regulatory Division, is a cooperating agency with the NRC, entrusted to verify that the information presented in this supplement to the ESP EIS could support a future U.S. Department of the Army (DA) permit application review, streamline regulatory review processes, avoid unnecessary duplication of effort, and assure that the issues and concerns related to impacts on waters of the U.S. and navigable waters of the U.S. are identified and addressed early in the NRC's review process. The proposed USACE Federal action would be the issuance of a DA permit when TVA applies for a DA permit. Hereafter, the term "review team" would refer to NRC and USACE staff.

1.3 Purpose and Need

TVA is a corporate agency in the United States providing electricity to business customers and local power distributors. The proposed project is needed to demonstrate the feasibility to license, construct, and operate a SMR at the CRN Site and to support the recommendations outlined in TVA's 2019 Integrated Resource Plan (IRP) (TVA 2025-TN11927).

The determination of need and the decision to build a reactor are at the discretion of applicants, such as TVA. This definition of purpose and need aligns with NRC understanding that unless there are findings in the safety review required by the Atomic Energy Act of 1954, as amended, or findings in the environmental analysis under National Environmental Policy Act of 1969

(NEPA) that would lead the NRC to reject a CP application, the NRC does not have a role in the planning decisions as to whether a particular reactor should be constructed and operated. A permit and a license from NRC to construct and operate a nuclear power plant, respectively, are necessary, but not sufficient for construction and operation of the power plant. Certain long lead-time activities, such as ordering and procuring certain components and materials necessary to construct the plant, may begin before the CP is granted. TVA must obtain and maintain permits or authorizations from USACE and other Federal, State, and local agencies and permitting authorities before undertaking certain activities.

1.3.1 The USACE Purpose and Need

TVA has not yet applied for a DA permit. The following information is provided to generally describe how the USACE plans to use information in this SEIS to make a decision on TVA's future DA permit application.

A DA permit would be required for discharges of dredged or fill material into waters of the U.S., pursuant to Clean Water Act (CWA) Section 404 (33 U.S.C. § 1344-TN1019). Components of a complete application are outlined in 33 CFR 325.1(d) (TN425). TVA would apply for a DA permit when the designs of relevant plant facilities reach a certain maturity level (TVA 2025-TN12285). As part of the evaluation of permit applications subject to CWA Section 404 (TN1019), the USACE must define the overall project purpose in addition to the basic project purpose.

The overall project purpose establishes the scope of the alternatives analysis and is used for evaluating practicable alternatives under the 404(b)(1) Guidelines (40 CFR Part 230-TN427). In accordance with the guidelines and the USACE Headquarters guidance, the overall project purpose must be specific enough to define the applicant's needs but not so narrow and restrictive as to preclude a proper evaluation of alternatives. The USACE is responsible for controlling every aspect of the 404(b)(1) Guidelines (40 CFR Part 230-TN427) analysis. Hence, defining the overall project purpose is the sole responsibility of the USACE. While generally focusing on the applicant's statement, the USACE will, in all cases, exercise independent judgment in defining the purpose of and need for the project (33 CFR Part 333-TN12332). Where the activity associated with a discharge is proposed for a special aquatic site (as defined in the 404(b)(1) Guidelines, 40 CFR Part 230, Subpart E) and does not require access or proximity to or siting within these types of areas to fulfill its basic project purpose (i.e., the project is not "water dependent"), practicable alternatives that avoid special aquatic sites are presumed to be available unless clearly demonstrated to be otherwise (404(b)(1) Guidelines, 40 CFR 230.10(a)(3)).

Section 230.10(a) of the 404(b)(1) Guidelines (40 CFR Part 230-TN427) requires that, "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." Section 230.10(a)(2) of the 404(b)(1) Guidelines states that, "an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant that could reasonably be obtained, used, expanded, or managed to fulfill the basic purpose of the proposed activity may be considered." Thus, this analysis, which meets the USACE's purpose and need, is necessary to determine which alternative is the least environmentally damaging practicable alternative.

1.4 Construction Permit Application and Review

The CP application references the CRN Site ESP. The proposed design specified in the CP application is for one new unit of the BWRX-300 thermal fission boiling water reactor (BWR) that is light water moderated, cooled with natural circulation, and designed with passive safety systems. TVA did not request a limited work authorization with the CP application; however, TVA submitted an exemption request in November 2023 (TVA 2023-TN10326), which requested exemption from portions of 10 CFR 50.10(c) (TN249) to allow TVA to conduct certain excavation support activities at the CRN Site prior to issuance of a CP. The exemption request was granted on December 10, 2024 (NRC 2024-TN11016). The NRC's environmental assessment and finding of no significant impact (FONSI) for that request was published in the *Federal Register* (FR) on December 16, 2024 (89 FR 101643-TN12274).

TVA would submit its application to USACE prior to work in waters of the U.S. Under Section 10 of the Rivers and Harbors Act of 1899 (RHA) (33 U.S.C. § 401 et seq.-TN660), a Section 10 DA permit is normally required for work or structures in or affecting navigable waters of the U.S. Under Section 404 of the CWA (TN1019), a DA permit is normally required for the discharge of dredged or fill material (e.g., fill, excavation, or mechanized land clearing) into waters of the U.S., including wetlands and navigable waters of the U.S. TVA and the DA have a memorandum of understanding (MOU) that applies to any TVA activities for which a DA permit may be required (TVA 1985-TN12322). TVA's RHA Section 10 permitting needs would be met under the terms of the MOU. Under Section 14 of RHA, TVA may need to obtain a Section 408 permission from USACE for potential impacts to the federally authorized navigation channel (33 U.S.C. § 408-TN4746).

Because the CP application references the ESP EIS, it must identify new and significant information in relation to the ESP EIS. In the context of a CP application that references an ESP, the term "new" in the phrase "new and significant information" is defined as any information that was both (1) not considered in preparing the ESP environmental report (ER) or EIS (as may be evidenced by references in these documents, applicant responses to NRC Requests for Confirmatory Information [RCIs], NRC Request for Additional Information [RAIs], comment letters, etc.) and (2) not generally known or publicly available during the preparation of the ESP EIS (such as information in reports, studies, and treatises). For new information to be "significant," it must be material to the issue being considered; that is, it must have the potential to affect the finding or conclusions of the NRC staff's evaluation of the issue. The applicant for a CP need only provide information in the application about a previously resolved environmental issue if it is both new and significant (72 FR 49352-TN4796).

Issuance of a CP constitutes a major Federal action and requires that an EIS be issued in accordance with 10 CFR Part 51 (TN10253). The NRC, along with the USACE as a cooperating agency, prepared this supplemental environmental impact statement (SEIS) in accordance with 10 CFR 51.75(c)(1) as part of its review of the CP application referencing the CRN Site ESP. This SEIS was prepared in accordance with 10 CFR Part 50 (TN249), which specifies regulations for the licensing of production and utilization facilities, and the applicable provisions of 10 CFR Part 51, which implement the NEPA (TN661), as well as the stipulations in the CRN Site ESP. As required by 10 CFR 51.26, the NRC published in the *Federal Register* a Notice of Intent (90 FR 34015-TN12310) to prepare and publish a draft SEIS. The SEIS for the CP was prepared in the same manner as the final EIS for the ESP except that NRC determined that it would not conduct a formal scoping process in accordance with 10 CFR 51.26(d). Pursuant to 10 CFR Part 51.75(c)(1) and the stipulations in the CRN Site ESP, the review team prepared this supplement to the ESP EIS in accordance with 10 CFR 51.92(e). Therefore, the review

team “tiered off” the ESP EIS at the CP stage and disclosed the review team’s conclusion for matters resolved in the ESP review. Such matters will not be subject to litigation at the CP license stage unless new and significant information is identified. Because the CRN Site CP application references the CRN Site ESP, the review team relied on the analysis in the ESP EIS as the basis for preparing the SEIS and incorporated the ESP EIS by reference in accordance with 10 CFR 51.92(e)(2). NRC’s regulatory standards for review of a CP application are listed in 10 CFR 50.23. A separate safety evaluation report (SER) will also be prepared in accordance with 10 CFR Part 50.

Detailed procedures for conducting the environmental portion of the review are found in guidance set forth in NUREG-1555, *Environmental Standard Review Plan: Standard Review Plans for Environmental Review for Nuclear Power Plants* (NRC 2000-TN1160; NRC 2007-TN614) and updates. According to 10 CFR Part 50 (TN249), an application for a CP must contain an ER, which provides the applicant’s input to the NRC’s EIS. NRC’s regulations related to the contents of an ER for a CP application are found in 10 CFR Part 51 (TN10253).

In accordance with 10 CFR 51.45 and 10 CFR 51.50(c)(1) (TN10253), TVA submitted an ER as part of its CP application (TVA 2025-TN11927) (TVA’s CP ER hereafter is referred to as CP ER in this document). In accordance with 10 CFR 51.50(c)(1), the ER submitted with the CP application is not required to contain information or analysis that was previously submitted in the ER for the ESP application or to address issues that were resolved in the ESP EIS and associated proceedings. This SEIS, together with the ESP EIS (NRC 2019-TN6136), the ESP hearing proceedings, and the exemption request environmental assessment, provides the review team’s evaluation of the environmental effects of constructing and operating one BWRX-300 SMR at the CRN Site. The review team evaluated the environmental effects of operations to the extent that operational information was available; the impacts of operating the BWRX-300 at the CRN Site will be addressed in detail during an OL application review, to the extent that they differ from those discussed or reflect new information in addition to that discussed in this SEIS. In addition to considering the environmental effects of the proposed action, this SEIS addresses new and significant information with respect to alternatives to the proposed action and the benefits of the proposed action (e.g., the need for power). TVA’s CP application references an ESP; therefore, in accordance with 10 CFR 52.39 (TN251), issues resolved as part of the ESP proceeding remain resolved except under conditions set forth in 10 CFR 52.39(a)(2). In addition, measures and controls previously identified to limit adverse impacts are evaluated along with any new or significant information that could affect the findings or conclusions reached in the ESP EIS.

The SEIS addresses preconstruction and construction (i.e., those that are authorized by the NRC) activities. As defined in the rule dated October 9, 2007, “Limited Work Authorizations (LWA) for Nuclear Power Plants” (72 FR 57416-TN260), the Commission defined “construction” (10 CFR 50.10 [TN249] and 10 CFR Part 51[TN10253]) to be consistent with the NRC’s jurisdiction over activities having a nexus to radiological health and safety and/or common defense and security, as many of the activities required to build a nuclear power plant are not part of any future NRC action to license the facility. Activities associated with building the facility that are not within the purview of the NRC are grouped under the term “preconstruction,” such as clearing, grading, excavating, erection of support buildings and transmission lines. Because the preconstruction activities are not under the purview of the NRC, their impacts are considered in the context of reasonably foreseeable actions. See Section 1.1.4 of the ESP EIS for more information on this topic (NRC 2019-TN6136). Hereafter, preconstruction and construction activities together are termed building activities.

Upon acceptance of the CP ER (Part 1 of the CP application), the NRC began the environmental review process by publishing an Acceptance for Docketing in the *Federal Register* on June 10, 2025 (90 FR 24425-TN12445). The Acceptance for Docketing published on July 15, 2025 in the Federal Register announced NRC's intent to perform a detailed technical review and conduct a hearing in accordance with Subpart L, "Informal Hearing Procedures for NRC Adjudications," of 10 CFR Part 2 (TN6204;90 FR 31709-TN12312). To guide its assessment of environmental impacts of a proposed action or alternative actions, the NRC has established a standard of significance for impacts as presented in the NUREG-1555 guidance (NRC 2013-TN3547):

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

This SEIS presents the review team's analysis, which considers and weighs the environmental impacts of the proposed action at the CRN Site, including the environmental impacts associated with building and operation of CRN-1, the environmental impacts of alternatives to granting the CP, and the mitigation measures available for reducing or avoiding adverse environmental effects. The SEIS also provides the NRC staff's recommendation to the Commission regarding the issuance of the CP for the CRN Site.

Two public outreach meetings were held in Oak Ridge, Tennessee on May 6, 2025 (NRC 2025-TN12373). During these public meetings, the NRC staff described the results of the past NRC ESP environmental review, described the proposed project at the CRN Site, described the permitting and licensing process, and provided members of the public with information to assist them in formulating comments on the CP SEIS when it is published as a draft.

1.4.1 TVA's New and Significant Information Review Process

TVA developed a process to identify new and significant information relevant to the issues and conclusions presented in the ESP EIS. TVA's process was designed to satisfy the requirements of 10 CFR 51.50(c)(1) (TVA 2025-TN11927). TVA used a four-step process that was implemented by qualified subject matter experts (SMEs), licensing specialists, engineers, and environmental professionals (TVA 2025-TN11927).

In the first step, TVA identified key inputs for each resource area. TVA defined key inputs as information or assumptions that the review team relied on for findings and conclusions in the ESP EIS. Site characteristics and plant parameter values included in ESP EIS Appendix I and representations and assumptions included in ESP EIS Appendix J were also used.

In the second step, TVA reviewed key input to determine if new information existed (TVA 2025-TN11927). Information was defined by TVA to be "new" if it was (1) not considered in the preparation of TVA's ESP ER and the ESP EIS, and (2) not generally known or publicly available during the preparation of the ESP EIS. TVA categorized the "new" information as "confirmatory" or "notable." New information that was consistent with past characterization of the environment in the ESP EIS was deemed confirmatory. New information that was substantially different from

past characterization of the environment in the ESP EIS was deemed notable. TVA generally did not use quantitative metrics to distinguish between confirmatory and notable information; however, TVA's SMEs relied on their expertise and knowledge to determine if new information was confirmatory or notable (TVA 2025-TN12285).

In the third step, TVA assessed environmental impacts considering the new information (TVA 2025-TN11927). TVA compared the updated environmental impacts with those stated in the ESP EIS and identified the resource areas where impact levels changed from those determined in the ESP EIS. TVA used both confirmatory and notable new information in the third step (TVA 2025-TN12285). Finally, in the fourth step, TVA documented the findings in the CP ER.

1.4.2 Review Team's Evaluation of TVA's New and Significant Information Review Process

The 10 CFR 51.92 (TN10253) specifies details of the preparation of a supplement to a prior final EIS. As stated in 10 CFR 51.92(e), a SEIS for a CP referencing an ESP shall contain an analysis of those issues related to the impacts of construction and operation that were resolved in the proceeding ESP for which new and significant information has been identified. If there is no new and significant information for matters resolved at the ESP stage, the review team may adopt the ESP EIS findings at the CP stage and disclose the conclusions for matters considered during the ESP review.

A CP applicant should have a reasonable process to ensure it becomes aware of new and significant information that may have a bearing on the earlier conclusion and should document the results of this process in an auditable form. The NRC staff will verify that the applicant's process for identifying new and significant information is effective (72 FR 49352-TN4796).

The review team's evaluation of TVA's new and significant information methodology began with the review of TVA's process as described in the CP ER (TVA 2025-TN11927). In July 2025, the review team performed an assessment of TVA's process for identifying new and significant information during a virtual audit of the CP ER (NRC 2025-TN12528). Prior to the virtual audit, the review team was provided access to an electronic reading room that included supporting material that TVA used to develop the CP ER. The supporting material included selected references cited in CP ER, a data review report (DRR), surveys and analyses, and relevant communications with other agencies.

The review team evaluated the supporting information provided in the electronic reading room. This evaluation focused on TVA's DRR to determine if TVA's new and significant information identification method was robust and comprehensive and had the ability to capture any new information developed since completion of the ESP EIS and authorization of the ESP. To make these determinations, the review team examined TVA's process in detail for all the resource areas discussed in the ESP EIS, assessed the results of TVA's review for new and significant information, and participated in a site tour including potential transmission line rights-of-way, the locations of the proposed intake and discharge structures, reactor building and associated structures, ecologically important areas, and cultural and historic resources on the CRN Site (NRC 2025-TN12373).

Following the review of the description of TVA's new and significant information review process in the CP ER and the DRR, the review team discussed TVA's data review process during the virtual audit of the CP ER (NRC 2025-TN12528). Following the virtual audit, the NRC staff issued two requests for clarification of information (RCI) related to TVA's new and significant information review process (NRC 2025-TN12374, NRC 2025-TN12375). TVA confirmed the following:

1. new information found during the preparation of the CP ER was evaluated by TVA's SMEs who relied on their expert judgment to determine if new information was confirmatory (i.e., consistent with past characterization of the affected environment) or notable (i.e., significantly different or distinguishable from past characterization of the affected environment)
2. for certain resource areas, TVA's SMEs compared seasonal trends, ranges of environmental variables, and derived environmental characteristics (e.g., groundwater gradients and velocities) with those available during the ESP proceedings
3. for certain resource areas, TVA performed site-specific investigation to characterize differences in the affected environment since the ESP EIS (e.g., a survey of aquatic ecology of the Clinch River arm of the Watts Bar Reservoir (hereafter referred to simply as "Reservoir") found that new information related to aquatic biota and non-native species were notably different than the characterization during the ESP proceedings)
4. TVA used all new information (both confirmatory and notable new information) to assess if impacts estimated during the ESP proceedings may change.

In addition, the review team also performed an independent search for new information from appropriate Federal, State, Tribal, and local agencies to verify the presence or absence of new and potentially significant information. The review team's findings related to new and potentially significant information are described in Chapter 3.

Based on the review team's evaluation of TVA's new and significant information evaluation process combined with the review team's independent search for new and potentially significant information, the review team determined that TVA's process was adequate to identify new and significant information concerning environmental issues addressed in the ESP EIS (NRC 2019-TN6136). The review team concluded that TVA's process for identifying new and significant information was effective.

Table I.1 and I.2 of the ESP EIS listed CRN Site characteristics and design parameters, respectively (NRC 2019-TN6136). The CRN Site characteristics and design parameters were also included in the ESP (NRC 2019-TN10325). TVA provided a comparison of ESP EIS and CP site characteristics and reported that CRN Site characteristics remain the same as stated in the ESP EIS (TVA 2025-TN11927).

TVA also provided a comparison of CRN-1 design parameters from those stated in the ESP (TVA 2025-TN11927). Table 3.1-2 of the CP ER is incorporated here by reference. The CP design parameters that exceeded the values reported in the ESP included the following:

- blowdown constituents and concentrations: some values were higher and some lower than the corresponding values reported in the ESP
- blowdown temperature: higher than the value reported in the ESP
- cooling-tower temperature range: higher than the value reported in the ESP

- thermal power output: higher than the value reported in the ESP for a single SMR unit
- laydown areas: higher than the value reported in the ESP
- noise: higher than the value reported in the ESP
- fuel characteristics: higher burnup than the value reported in the ESP
- fuel assemblies: higher number of assemblies than the value reported in the ESP
- maximum average assembly burnup: higher than the value reported in the ESP

TVA provided a comparison of representations and assumptions listed in the ESP EIS and those that apply to CRN-1 during the CP stage (TVA 2025-TN11927). This comparison is included in Appendix H and the review team will rely on the CP stage representations and assumptions during the OL review.

1.4.3 Concurrent Reviews

In a review separate from the environmental review process, the NRC analyzes the safety and security aspects of construction and operation of the proposed new SMR at the site, including the applicant's emergency planning information. These analyses will be documented in an SER. The SER will present the conclusions reached by the NRC regarding whether there is reasonable assurance that one BWRX-300 SMR can be constructed at the CRN Site without undue risk to the health and safety of the public and whether issuance of the license will be inimical to the common defense and security.

For this SEIS, the USACE is part of the review team that makes a determination based on the three significance levels established by the NRC. In addition, the USACE could use the information in this SEIS to support the review of the DA permit application when TVA submits a DA permit application. In general, the decision of whether to issue a DA permit would be based on an evaluation of the probable impacts, including cumulative impacts of the activity, on the public interest. That decision would reflect the national concern for both protection and use of important resources. The benefit that reasonably may be expected to accrue from the work must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the work will be considered, including the cumulative effects thereof; encompassing aspects of conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people. The USACE's evaluation of the impact of the activity on the public interest would include application of the guidelines promulgated by the U.S. Environmental Protection Agency, under authority of Section 404(b)(1) of the CWA (40 CFR Part 230-TN427).

On September 12, 2008, the NRC and the USACE signed a MOU regarding the review of nuclear power plant license applications (USACE and NRC 2008-TN637). On May 2, 2017, the USACE Nashville District agreed by letter (USACE 2017-TN5003) to become a cooperating agency as defined in 10 CFR 51.14 (TN10253). As described in the MOU, the NRC is the lead Federal agency and the USACE is a cooperating agency in the development of the EIS. Under Federal law, each agency has jurisdiction related to portions of the proposed project as major Federal actions that could significantly affect the quality of the human environment. The goal of this cooperative agreement is the development of a single EIS that serves the needs of the NRC

license decision process and the USACE DA permit decision process. While both Federal agencies must comply with the requirements of NEPA (TN661), each also has independent or individual mission requirements that must be met. The NRC makes license decisions under the Atomic Energy Act of 1954, as amended (42 U.S.C. § 2011 et seq.-TN663), and the USACE makes permit decisions under the RHA (TN660) and CWA (33 U.S.C. § 1251 et seq.-TN662). The USACE is cooperating with the NRC to ensure that the information presented in the CP NEPA documentation is adequate to support a DA permit application. As a cooperating agency, the USACE is part of the NRC review team and is involved in all aspects of the environmental review, including scoping, public meetings, public comment resolution, and EIS preparation. A cooperating agency may adopt the EIS of a lead Federal agency without recirculating it when the cooperating agency concludes, after an independent review of the EIS, that its comments and suggestions have been satisfied and issues a Record of Decision. The goal of the process is that the USACE will have all the information necessary to make a permit decision when the final SEIS is issued. Any conditions required by the USACE, such as compensatory mitigation, will be addressed in the USACE permit application review process. Compensation may only be used after all appropriate and practical steps to avoid and minimize adverse impacts on aquatic resources, including wetlands and streams, have been taken. All remaining unavoidable impacts must be compensated to the extent appropriate and practicable. Upon review of estimated impacts on waters of the U.S. (in a separate DA permit application), the USACE would include special conditions to the effect that TVA must confirm that any wetland compensation efforts have achieved their established goals and requirements in accordance with Compensatory Mitigation for Losses of Aquatic Resources, Final Rule (73 FR 19594-TN1789; 33 CFR Part 325-TN425, 33 CFR Part 332-TN1472).

1.5 Alternatives to the Proposed Action

Section 102(2)(C)(iii) of NEPA states that an EIS is to include a detailed statement on alternatives to the proposed action. This SEIS addresses the following categories of alternatives: (1) the no-action alternative, (2) energy source alternatives, (3) alternative plant and transmission systems, and (4) cost-benefit analysis of alternatives. In accordance with 10 CFR 51.92(e)(3), this SEIS does not contain a separate discussion of alternative sites. The NRC's detailed evaluation of alternative sites is documented in Chapters 9 and 10 of the ESP EIS (NRC 2019-TN6136).

1.6 Compliance and Consultations

Prior to construction and operation of the new SMR, TVA is required to hold certain Federal, State, and local permits, as well as meet applicable statutory and regulatory requirements. TVA provided a list of environmental approvals and consultations associated with the CRN Site proposed SMR in Section 1.5 of its CP ER (TVA 2025-TN11927). Potential authorizations and consultations relevant to the proposed CP are included in Appendix G. Before TVA can obtain a CP from NRC, it will be necessary for TVA to obtain a CWA Section 401 Certification. This certification, which will be issued by the Tennessee Department of Natural Resources, ensures that the project does not conflict with water quality management programs in Tennessee. Furthermore, the State of Tennessee issued a General Permit for Discharges of Stormwater Associated with Construction Activities (referred to as a Construction General Permit) on September 27, 2021. In October 2025, TVA applied to the Tennessee Department of Environment and Conservation for coverage of upcoming tree clearing activities under the existing Construction General Permit and included a Stormwater Pollution Prevention Plan with the application (SWPPP) (NRC 2025-TN12331).

In accordance with the Clean Air Act (42 U.S.C. § 7401-TN4539), Federal agencies may not issue a license or a permit in a designated maintenance or nonattainment area that does not conform to an applicable State Implementation Plan. Therefore, under the General Conformity Rule, a conformity determination may need to be completed for projects that are located in or near a maintenance or nonattainment area. Because a portion of Roane County, west of the CRN Site, and Loudon County, adjacent to Roane County and within the 6 mi (10 km) radius of the CRN Site, are designated as maintenance areas, in Section 3.2.2, the NRC staff evaluated the effects of emissions from building activities to determine whether a conformity analysis is needed.

The review team has contacted the appropriate Federal, State, Tribal, and local agencies to identify any compliance, permit, or significant environmental issues of concern to the reviewing agencies that relate to the construction and future operation of the proposed SMR. A list of organizations contacted is included in Appendix B. See Sections 3.5, 3.6, and Appendix F for information regarding ecological consultations. See Section 3.7 for information regarding historic and cultural consultations. The NRC staff contacted the U.S. Department of Energy (DOE) to determine if that agency wanted to be a participant in this SEIS proceeding, as a portion of land TVA is proposing to use is currently under DOE ownership (see Section 3.1). DOE staff declined to participate in this SEIS proceeding (NRC 2025-TN12459).

1.7 Report Contents

The subsequent chapters of this SEIS are organized as follows. Chapter 2 describes the proposed project, site location, and site layout. Chapter 3 describes the affected environment; assesses the impacts from building, operation, and decommissioning of CRN-1; and assesses reasonably foreseeable actions that could contribute to the environmental impacts in the region. Chapters 4 describes alternatives and Chapter 5 examines the need for power. Chapter 6 summarizes the findings of the preceding chapters, presents the review team's conclusions, and NRC staff's recommendations with respect to Commission approval of the CP. Chapter 7 lists the references.

The appendices provide the following additional information:

- Appendix A—Contributors to the Environmental Impact Statement
- Appendix B—Organizations Contacted
- Appendix C—Chronology of Environmental Review Correspondence
- Appendix D—Comments Received on the Environmental Review
- Appendix E—Summary of Reasonably Foreseeable Actions and Climate Change
- Appendix F—Terrestrial Habitat and Species Analysis
- Appendix G—Regulatory Compliance and List of Federal, State and Local Permits and Approvals
- Appendix H—Resolution of Issues

2 PROPOSED PROJECT

The CRN Site is located on the Clinch River arm of the Watts Bar Reservoir in Roane County, Tennessee (Figure 2-1). The project overview is described in Section 2.1, the proposed site location and layout is described in Section 2.2, site workers and vehicular deliveries are described in Section 2.3, materials and equipment used for site preparation are described in Section 2.4, and facility utilities are described in Section 2.5.

2.1 Project Overview

TVA proposes building and operating one GEH BWXR-300 SMR (i.e., CRN-1) and its associated facilities on 1,200 acres (ac) (486 hectares [ha]) of TVA's Clinch River property, which includes the 265 ac (107.2 ha) Grassy Creek Habitat Protection Area (HPA) and the 935 ac (378 ha) CRN Site. The BWRX-300 is a thermal fission BWR that is light-water moderated, cooled with natural circulation, and designed with passive safety systems, with a nominal generating capacity of 300 MWe (NRC 2019-TN6136).

TVA expanded the TVA-managed Grassy Creek HPA by an additional 14 ac (6 ha) to better protect two State-listed plant species—the rigid sedge and the pale green orchid—found in the area. This action was taken to address potential habitat loss caused by a new 161 kilovolt (kV) transmission corridor that runs through the Grassy Creek HPA. This transmission corridor is a new development and was not considered in the ESP EIS. The revised boundaries of the Grassy Creek HPA are shown in Figure 2-2 (TVA 2025-TN11927).

Figure 2-2 shows the CRN Site Utilization Plan, including updated information specific to CRN-1. It depicts the plant layout and highlights key project components needed to support CRN-1, such as proposed transmission corridors, the barge landing area, roadway access, and other important site features.

TVA proposes to build a 161 kV switchyard and loop in the Kingston FP–Fort Loudoun HP #1 (including a relocated portion within the CRN Site boundary) and Kingston FP–Bethel Valley HP #2 161 kV lines to interconnect CRN-1. Vegetation in the transmission corridors will be managed under TVA's Vegetation Management Programmatic Environmental Impact Statement (PEIS) and updated best management practices, with measures to establish low-growing vegetation and promote biodiversity incorporated during and after building activities. The ESP EIS stated that transmission line-related activities on the CRN Site and those offsite extending to the first transmission line interconnection at Bear Creek Road are directly attributable to CRN-1. The CP ER stated that the relocated 161 kV line will run parallel to the existing 500kV line for approximately 1.41 miles (mi) (2.27 kilometers [km]), down the east side of the site, for approximately 0.75 mi (1.21 km) to the switch yard, then run 0.49 mi (0.79 km) from the switch yard to rejoin the existing line. The corridor extending from the 500 kV line to the interconnect at Bear Creek Road will be approximately 280 ft (85 m) to accommodate a 120 feet (ft) (37 meters [m]) wide corridor for the 161 kV tie in. This corridor is approximately 0.48 mi (0.77 km) long at the northeastern edge of the Grassy Creek HPA, 0.08 mi (0.13 km) long between the Grassy Creek HPA and the Bear Creek Road interconnect. The applicant stated in the CP ER that no changes to the 500 kV line are planned (TVA 2025-TN11927).

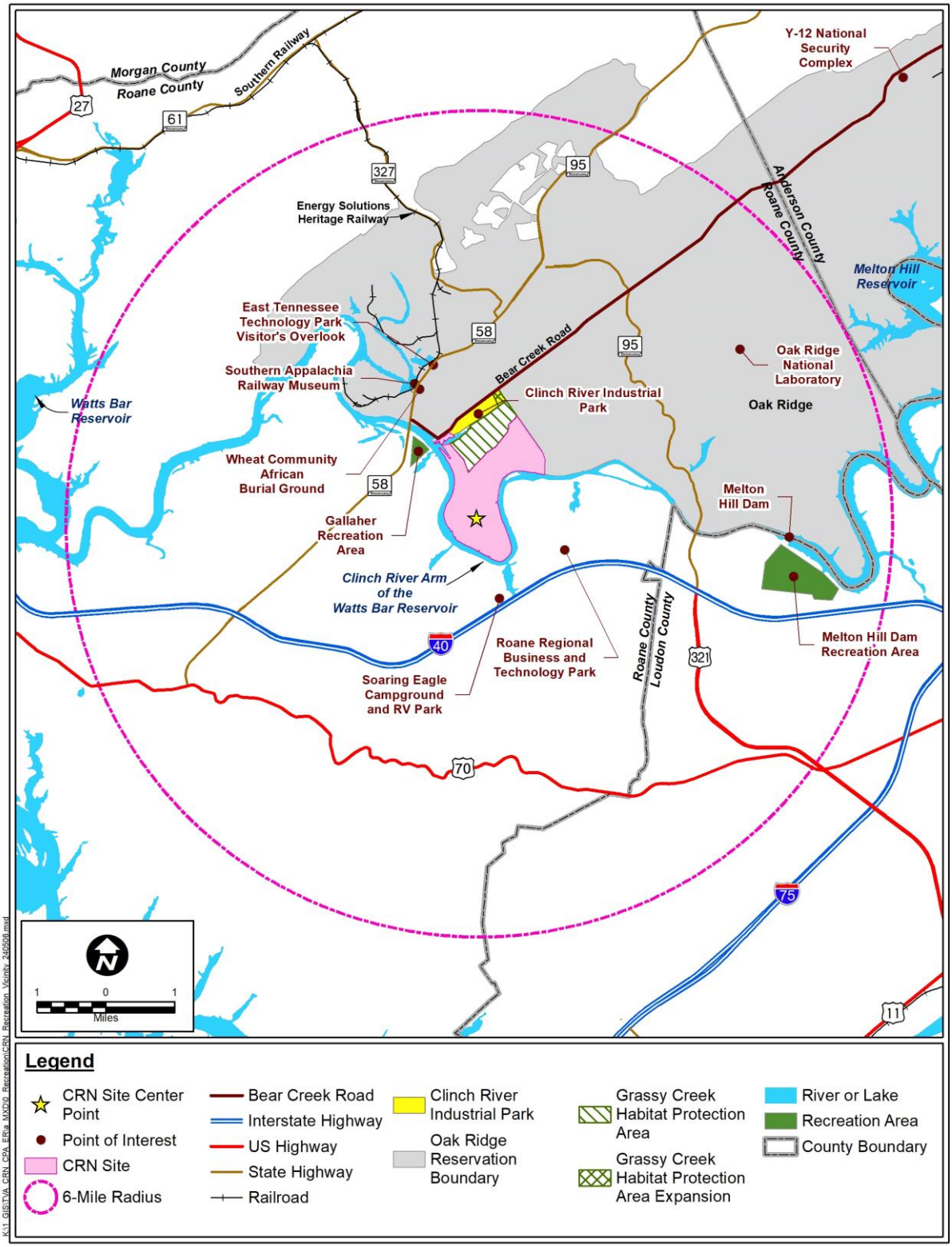

Figure 2-1 Clinch River Nuclear Site 6 mi Vicinity Map. Source: TVA 2025-TN11927.

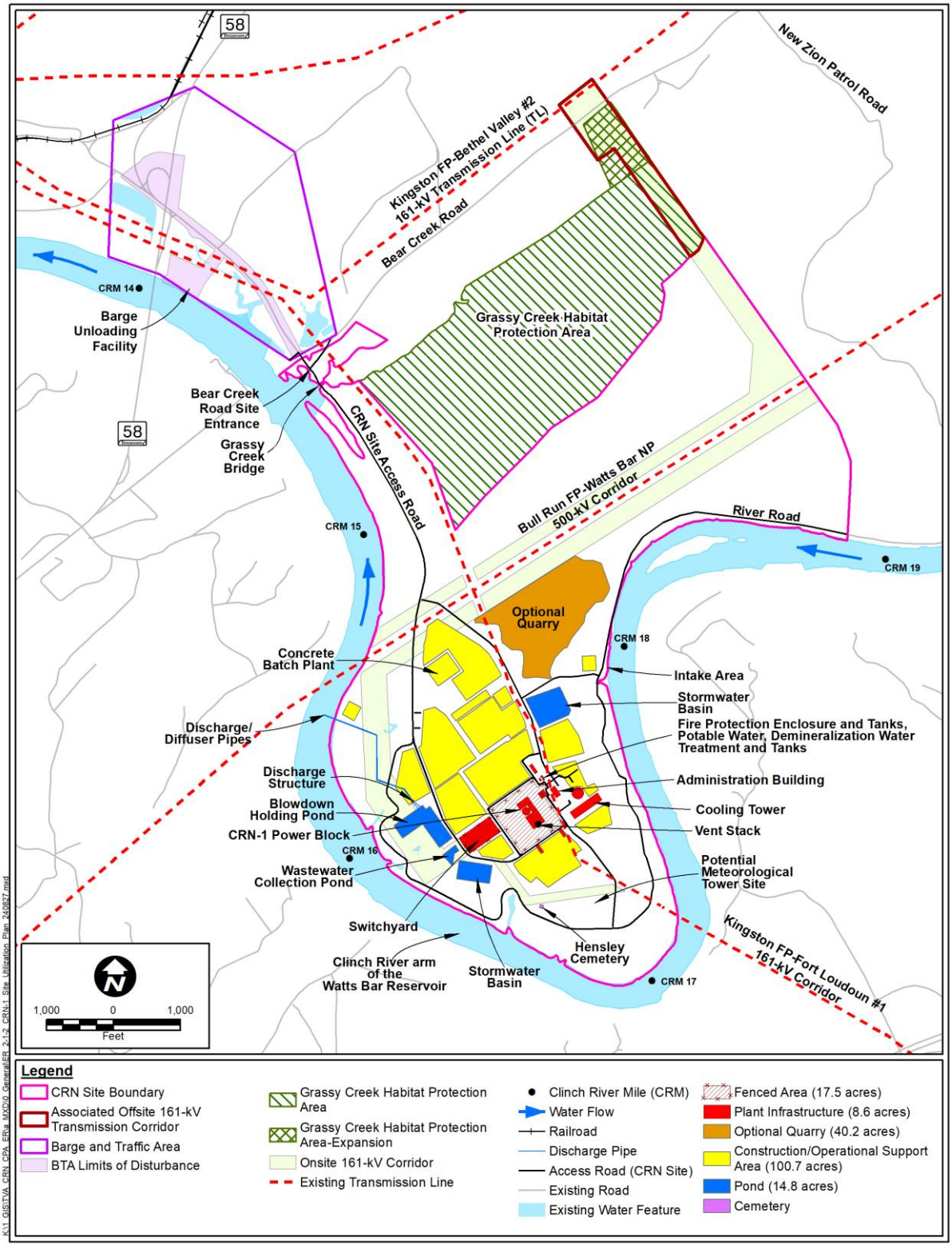

Figure 2-2 Clinch River Nuclear Site Utilization Plan. Source: TVA 2025-TN11927.

2.2 Site Location and Layout

As described in Section 2.1 of the ESP EIS, the CRN Site is situated in the southwestern part of the city limits of Oak Ridge approximately 10 mi (16 km) south of the Oak Ridge urban center; 16 mi (26 km) west of Knoxville, Tennessee; and 7 mi (11 km) east of Kingston, Tennessee. Figure 2-1 depicts the location of the CRN Site in relation to nearby counties, while Figure 2-2 depicts the potential CRN Site layout for CRN-1.

TVA identified new information regarding the site location in Section 2.1 of the CP ER. The Grassy Creek HPA was expanded by 14 ac (6 ha) as mitigation to provide additional protection to the State-listed rigid sedge and pale green orchid species that are located within the 161 kV transmission corridor and newly expanded HPA. The 161 kV transmission line corridor is new and was also not addressed in the ESP EIS. TVA noted the locations of the proposed TRISO-X fuel fabrication facility and the Kairos Hermes test reactor project sites, which also were not considered in the ESP EIS. See Figure 2-3 for new information regarding the CRN Site layout for CRN-1. The site layout configuration is new, as the ESP EIS considered two or more SMRs, instead of one BWRX-300 to be located on the CRN Site. The potential onsite quarry is new but is within the footprint of disturbance in the ESP EIS. The unloading area within barge traffic area (BTA) was expanded by approximately 133 feet (ft) (41 meters [m]) to the west and 435 ft (133 m) to the north but is still within the BTA footprint of the ESP EIS.

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the NRC staff stated in Section 1.4.2, is reasonable. The review team performed its own independent search for new and potentially significant information during the audit of the CP application. The review team did not find any additional new information regarding site location and plant layout.

2.3 Site Workers and Vehicular Deliveries

As described in Section 4.4.1 and 5.4.1 of the ESP EIS, the peak construction workforce at the proposed CRN Site for building two or more SMRs was estimated to be 3,300 workers, and the operation workforce was estimated to be 500 (NRC 2019-TN6136). In the CP ER, TVA has updated the peak construction employment for CRN-1 to be approximately 1,300 workers (TVA 2025-TN11927), and the workforce number for operations to be 205 workers (TVA 2025-TN11927). The ESP EIS also estimated approximately 1,000 temporary workers would be needed to conduct refueling and major maintenance activities. The CP ER has updated this estimate to 280.

The ESP EIS estimated that up to 2,412 worker vehicles would be expected to use local roads to access or exit the CRN Site during shift changes at peak employment. On average, 90 vehicles per day was estimated to deliver construction materials, equipment, and supplies to the site (NRC 2019-TN6136). TVA updated the peak onsite traffic during construction period to 1,001 vehicles reflecting a significantly smaller construction workforce (TVA 2025-TN11927). The ESP EIS estimated approximately 1,200–1,300 vehicles per day during the operation period (NRC 2019-TN6136). TVA updated the onsite traffic during operation to approximately 150 vehicles because of the reduced operation workforce (TVA 2025-TN12284).

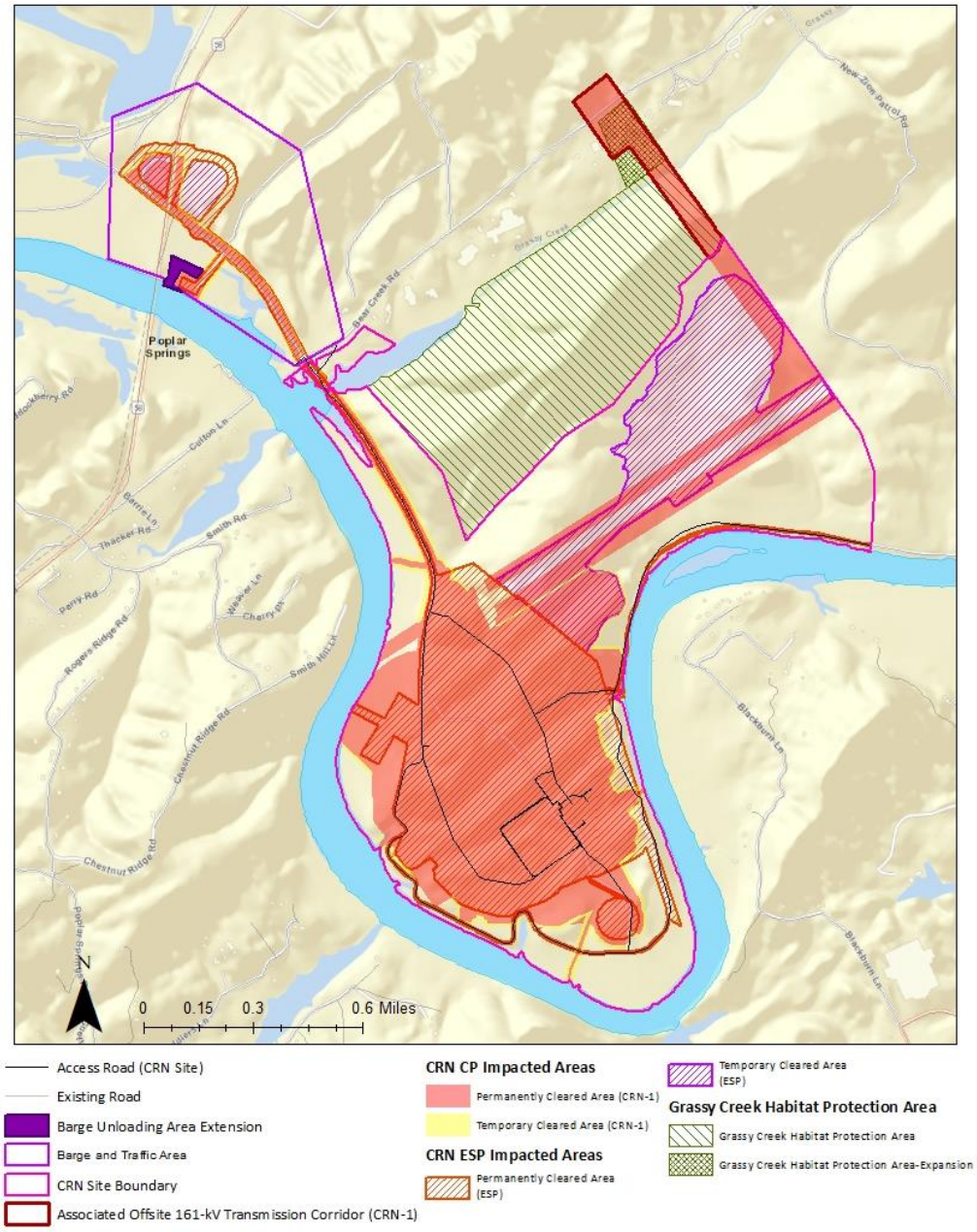

Figure 2-3 Map Showing a Comparison of the Impacted Areas Associated with the Early Site Permit and the Construction Permit for the Small Modular Reactor at the Clinch River Nuclear Site. Source: TVA 2025-TN11927.

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the NRC staff stated in Section 1.4.2, is reasonable. The review team performed its own independent search for new and potentially significant information during the audit of the CP application. The review team did not find any additional new information regarding site workers and vehicular deliveries.

2.4 Site Preparation—Material Use and Equipment

As described in Sections 3.3 and Appendix M of the ESP EIS (NRC 2019-TN6136), site preparation activities will occur for landscaping and stormwater drainage and preparing the main plant area, cooling-water intake and discharge structures, roads, rail lines, pipelines, barge-unloading facilities, concrete batch plant, laydown and parking areas, crane footings, and transmission lines. These activities involve clearing, site grading, grubbing, excavation, dewatering, and placement of structural fill and fabrication, and staging. The majority of site preparation activities can occur during preconstruction prior to any issuance of the CP. Site preparation activities would be performed by qualified contractors using typical heavy construction equipment. Heavy construction equipment includes backhoes, compactors, dozers, excavators, loaders, graders, and rollers. Table 3-1 of the ESP EIS states definitions and examples of activities associated with the proposed project.

TVA identified new information regarding the power block and cooling tower, cooling-water intake and discharge structures, rail and barge facilities, borrow material, transmission lines, and the Melton Hill Hydroelectric Dam flow bypass system.

The power block consists of the reactor, radwaste, turbine, control, and service buildings. The reactor building is primarily below grade and requires deep excavation that consists of vertical shaft excavation methods using conventional construction equipment. The radioactive waste, turbine, control, and service buildings are above-grade structures that require minimal excavation. The turbine building is supported on drilled shaft piers that requires excavation, cleaning for concrete preparation, and placing reinforcement and concrete.

The radioactive waste building is a cast-in-place, reinforced concrete structure that will be built utilizing traditional cast-in-place means and methods. The control and service buildings are three-story, engineered metal buildings set on a cast-in-place floor slab following similar construction methods (TVA 2025-TN11927).

TVA is considering two alternative designs for the cooling-water intake structure. The first alternative consists of a recessed shoreline intake structure located with an intake channel that connects the structure to the Reservoir. Building activities would involve two stages: (1) excavation of the onshore facility and part of the connecting channel, with a portion of the shoreline kept intact to act as a dam and (2) removal of the portion of the shoreline acting as a dam to complete the channel connection to the Reservoir. Excavation will use onshore equipment.

The second alternative is an offshore intake system with a submerged intake structure connected via a conduit to a vertical shaft wet well on the bank. Building activities involve the excavation of an onshore vertical shaft wet well foundation that will serve as a launch point for a micro-tunnel boring machine. The boring will advance through the substrate to the offshore retrieval pit. A cofferdam will create a dry working environment to construct the retrieval pit portion of the intake and install the intake screens.

The discharge system involves a blowdown holding pond, underground piping, and a diffuser. The diffuser structure will require underwater excavation.

The BTA will be used for material and equipment deliveries. Improvements to the area include reducing the height of the sheet pile wall, replacement of the culvert, limited placement of fill, widening and resurfacing of the access road, and installation of temporary support of overhead lines.

TVA is evaluating two alternatives to obtain approximately 400,000 cubic yards (yd^3) (305,822 cubic meters [m^3]) of borrow material over a 2-year period. The first alternative involves obtaining the borrow material from an offsite quarry. The second alternative is the development of an onsite quarry near the center of the CRN Site to supply borrow material using drilling and blasting to establish the quarry. Unsuitable material such as overburden and weathered rock would be stripped from the site. Drilling on blast benches would be used during quarrying operations. Haul roads, temporary utilities, parking areas, and stockpile areas will be included in the design of the onsite quarry.

As stated in the ESP EIS, numbers provided in the DOE NP2010 Nuclear Power Plant Construction Infrastructure Assessment (DOE 2005-TN5335), were used as the basis for SMR construction material amounts. TVA stated that quantities of construction materials required for CRN-1 can be scaled to approximately 38 percent because of the smaller scale of CRN-1. (TVA 2025-TN11927).

See Section 2.2 for information regarding the offsite transmission line corridor location. The methods mentioned in the ESP EIS for the transmission line building activities will be followed.

TVA does not anticipate using the railroad for deliveries. In addition, the operation of the CRN-1 does not require a new underground 69 kV line or improving the Melton Hill Hydroelectric Dam.

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the NRC staff stated in Section 1.4.2, is reasonable. The review team performed its own independent search for new and potentially significant information during the audit of the CP application. The review team did not find any additional new information regarding material use and equipment.

2.5 Construction Activities

Building activities considered in the ESP EIS Section 3.3 include the structural construction and completion of structures, systems, and components associated with building SMRs (NRC 2019-TN6136). Structural building activities include, but are not limited to, deep excavations for subgrade foundations; installation of subgrade foundation walls; installation of grade foundations and placement of structural concrete; erection of above-grade steel; installation of support equipment; and placement of roofing and wall panels. Structures, systems, and components with environmental interfaces are considered relevant to the assessment of the potential environmental impacts of facility building activities described in Chapter 3. Structures, systems, and components that are relevant to this review include, but are not limited to, landscaping and stormwater drainage, systems for water intakes and discharges, waste systems, dewatering systems, and power transmission systems.

2.5.1 Reactor Power Conversion System

Section 3.2.1 of the ESP EIS (NRC 2019-TN6136) described the reactor power conversion systems based on a plant parameter envelope (PPE) developed for use in evaluating potential environmental impacts in advance selection of a specific plant technology.

The CRN-1 reactor has a thermal power output of approximately 870 MWt and a nominal gross electrical output of 300 MWe. The plant is planned to operate at a capacity factor of 95 percent. It uses uranium dioxide fuel enriched to less than 5 percent, with an initial core loading of 45 metric tons of uranium (MTU). The core consists of 240 GNF2 fuel assemblies, each arranged in a 10 × 10 configuration containing 78 full-length fuel rods, 14 part-length rods, and two large water rods in the center. By the end of its operational life, the average burnup per assembly reaches up to 65,000 megawatt-days per metric ton of uranium (MWD/MTU), with peak fuel rod exposure reaching 62,000 MWD/MTU (TVA 2025-TN11927).

Table 3.1-2 of the CP ER (TVA 2025-TN11927) compares the CRN-1 reactor's specifications with those outlined in the PPE. While CRN-1's thermal power output is within the PPE's overall limit of 2,420 MWt, the PPE assumed multiple SMRs, each with a maximum core rating of 800 MWt—lower than CRN-1's 870 MWt. However, the electrical output, capacity factor, and peak fuel rod exposure of CRN-1 still fall within the PPE's bounds. Like the PPE design in ESP-006, CRN-1 uses uranium dioxide fuel, though it differs in the number and weight of fuel assemblies (TVA 2025-TN11927).

Notably, the electrical output for a single reactor at the CRN Site and its maximum average burnup exceed those in the PPE. The implications of CRN-1's higher thermal power and how they relate to new and significant information are analyzed in detail in Chapter 5 of the CP ER, which evaluates the environmental impacts of plant operations. Similarly, the impacts of the higher burnup levels are addressed in the conclusions of Chapters 5.10 and 6.2 of the CP ER (TVA 2025-TN11927).

The engineered safety features of CRN-1 mitigate design-basis and loss-of-coolant accidents. These include fission product containment, containment cooling, and an emergency core cooling system provided by the isolation condenser system (ICS) (TVA 2025-TN11927).

Figure 2-4 shows a simplified diagram of the power conversion system for the BWRX-300 reactor design. The reactor uses two steam lines to transfer steam from the reactor vessel to the turbine-generator system. After powering the turbine, the steam is condensed back into water in the condenser and then returned to the reactor vessel. The condenser is cooled by the circulating water system (CWS). While specific materials and equipment for the system have not yet been selected, all components are being planned for a 60-year design life, with appropriate considerations for future maintenance and replacements. Under normal operating conditions, the plant is expected to discharge about 570 MWt of waste heat to the environment through a mechanical draft cooling tower (TVA 2025-TN11927).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the NRC staff stated in Section 1.4.2, is reasonable. The review team performed its own independent search for new and potentially significant information during the audit of the CP application. The review team did not find any additional new information regarding the reactor power conversion system.

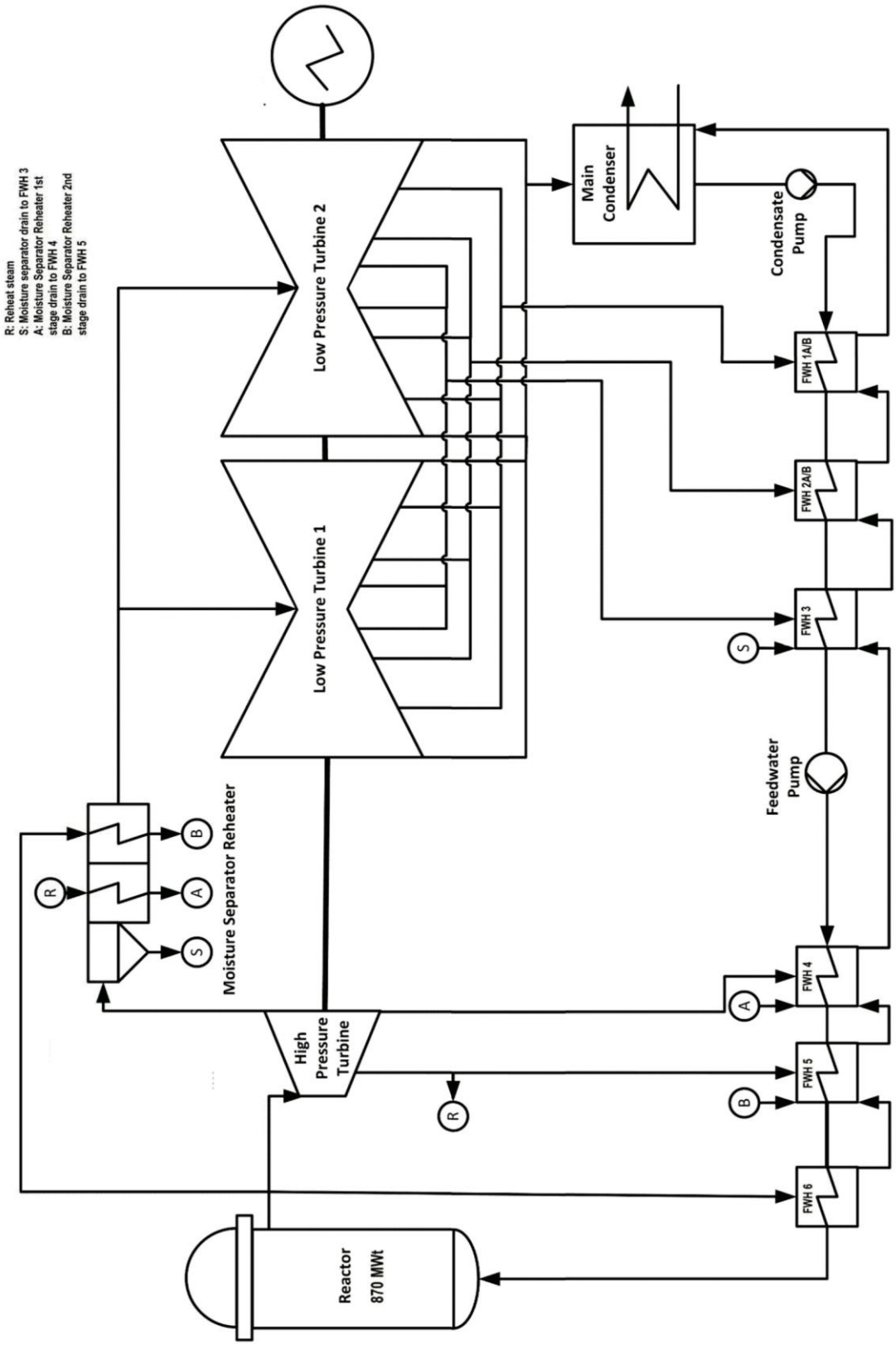

Figure 2-4 Simplified Power Conversion Flow Diagram for the BWRX-300 Reactor Design. Source: TVA 2025-TN11927.

2.5.2 Plant Water Use

Section 3.2.2 of the ESP EIS (NRC 2019-TN6136) provided initial descriptions of plant structures with a major environmental interface, such as the landscape and stormwater drainage, cooling tower, barge-unloading facility, concrete batch plant, dewatering systems and in-water structures (i.e., the cooling-water intake and discharge structures).

During building activities, water will be used for dust control, excavation washdowns, concrete production, and providing potable and sanitary water for workers, drawing primarily from municipal or treated surface-water sources (TVA 2025-TN11927). During operation, water will support systems such as the CWS, fire protection, demineralized water, potable and sanitary needs, and liquid radioactive waste treatment (TVA 2025-TN11927). More details regarding water use are provided in Section 3.4.

The primary operational water source for the CRN-1 is the nearby Reservoir, with an average intake of 4,147 gallons per minute (gpm) or 9.2 cubic feet per second (cfs) (15,698 liter per minute [lpm] or 0.26 cubic meter per second [m^3/s]) and a peak summer intake of 5,414 gpm or 12.1 cfs (20,494 lpm or 0.34 m^3/s). Most of this water supports CWS, which uses a mechanical draft cooling tower that loses water through evaporation, drift, and blowdown. Blowdown and limited demineralized water discharges return to the Reservoir via a discharge structure. The reactor also relies on internal pools for emergency cooling (ultimate heat sink) and uses municipal water from Oak Ridge for potable, sanitary, and fire protection needs, with minimal consumptive use. A water-use diagram for the proposed facility is provided in Figure 2-5. More details related to the intake structure and mechanical draft cooling system can be found in Sections 3.2.2.2 and 3.2.3.1.2 of the CP ER (TVA 2025-TN11927).

The ESP EIS did not include detailed water treatment methods, but CRN-1 will treat raw Reservoir water for cooling-tower makeup and demineralized water production using greensand and walnut shell filters to remove manganese, iron, oil, and suspended solids. Chemicals like sodium hypochlorite, potassium permanganate, and sulfuric acid are used for oxidation and alkalinity control, while additional agents are added for biocide, scaling, and de-chlorination. Demineralized water is further treated through ultrafiltration, reverse osmosis, and mixed bed ion exchange. All chemical use will follow a Biocide/Corrosion Treatment Plan submitted with the National Pollutant Discharge Elimination System (NPDES) permit, and CRN-1 is designed to operate with a minimum of four cycles of concentration (COC), with the potential for more depending on water chemistry (TVA 2025-TN11927). Table 2-1 identifies the expected addition rate at four COC for the proposed chemicals.

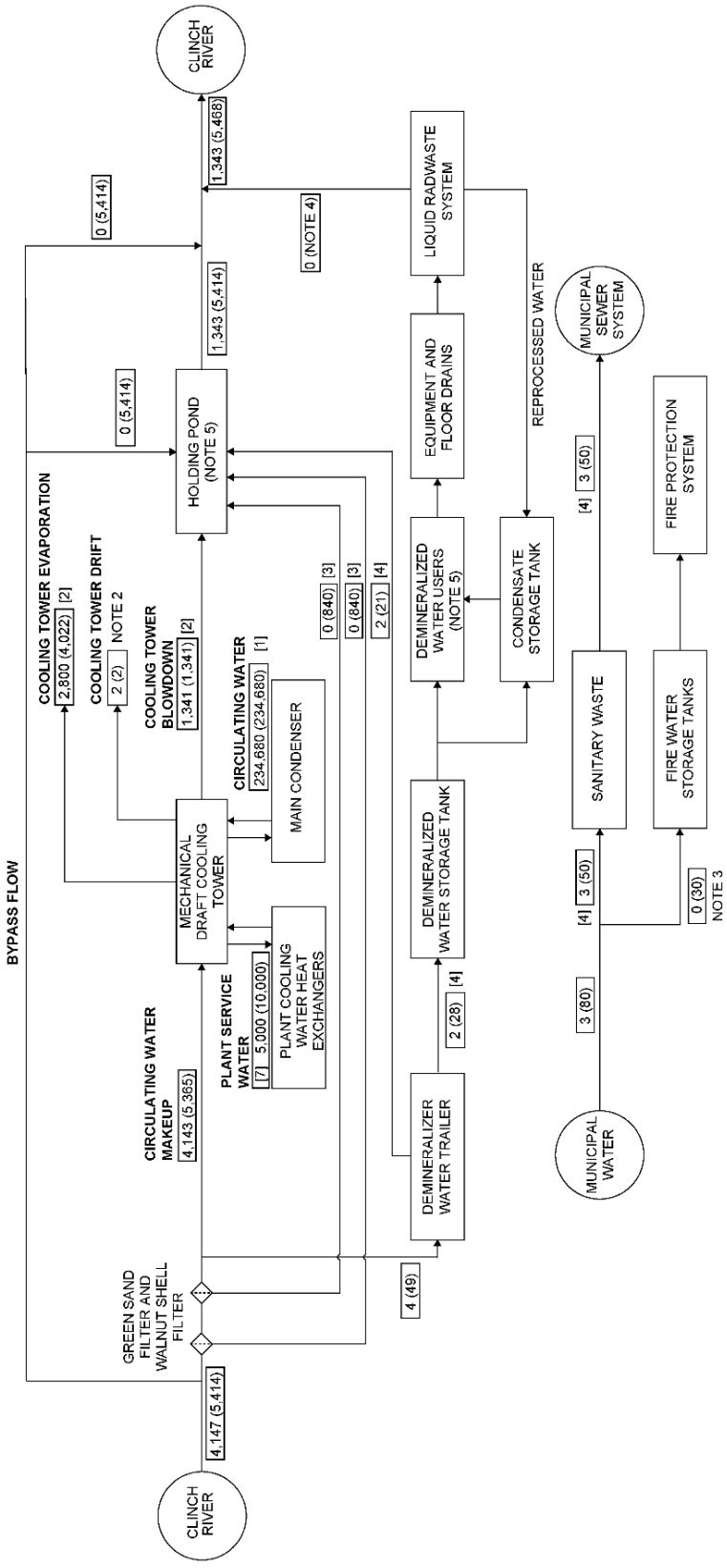

Figure 2-5 Clinch River Nuclear Site Water Use Diagram. Source: TVA 2025-TN11927.

Table 2-1 Water Treatment Chemicals. Source: TVA 2025-TN11927.

Chemical	Addition Rate (gph)
Sulfuric acid (CWS)	1.1
Sodium hypochlorite	10.8
Sodium bisulfite	-
Blowdown	0.8
Demineralized water production makeup	0.03
Filter backwash	0.05
Total	0.88
CL1355	-
CWS makeup	2.4
Demineralized water production makeup	0.017
Total	2.417
CL5633 for RO and UF cleaning	20 gallons per month
Sodium hydroxide for RO cleaning	10 gallons per month
Sodium hypochlorite for UF cleaning	10 gallons per month

CWS = circulating water system; gph = gallon(s) per hour; RO = reverse osmosis; UF = ultrafiltration.
"-" no data in table cell.

Cooling Systems

Section 3.2.2.2 of the ESP EIS (NRC 2019-TN6136) provided initial descriptions of the cooling system to be used at CRN-1. TVA updated the cooling systems details in their CP ER (TVA 2025-TN11927).

CWS at CRN-1 provides cooling for the main condenser and dissipates heat to the environment via the normal heat sink. It consists of two subsystems: the condenser water (CW) supply, which cools the main condenser and auxiliaries, and the service water (SW) supply, which cools plant systems via the plant cooling-water (PCW) heat exchangers. CWS operates as a closed-cycle system using a mechanical draft cooling tower, with makeup water sourced from the Reservoir. Water circulates through the condenser and heat exchangers, then returns to the cooling tower, with some lost to evaporation and drift. Blowdown water is sent to a holding pond and then discharged back to the Reservoir. The system can also support once-through cooling to the PCW heat exchanger, if the cooling tower is unavailable. Additionally, the ICS uses isolation condenser pool water to remove heat from the reactor in off-normal conditions, with each isolation condenser handling about 33 MWt (TVA 2025-TN11927). More details related to the ICS can be found in Section 3.2.2.1 of the CP ER.

CWS supports cooling during all normal operating modes of CRN-1 by removing heat from both the main condenser and the PCW system. The condenser (CW subsystem) handles a heat load of about 570 MWt, while the PCW subsystem uses one of two heat exchangers (each with full capacity) to manage less than 10 MWt during normal operation. Heat is rejected to the atmosphere through a mechanical draft cooling tower. During power operation, the CW pumps circulate cooling water to the condenser. During shutdown, both PCW heat exchangers and SW pumps operate to support cooldown, and SW components remain active in all reactor modes to ensure the PCW system has a continuous heat sink (TVA 2025-TN11927). Table 2-2 lists the five reactor modes for CRN-1 and the CWS subsystem.

Table 2-2 Reactor Modes of the Small Modular Reactor at Clinch River Nuclear Site. Source: TVA 2025-TN11927.

Mode	Cooling Source
Power Operation	CW and SW
Startup	CW and SW
Hot Shutdown	CW and SW
Cold Shutdown	SW
Refueling	SW

CRN = Clinch River Nuclear; CW = condenser water; SW = service water.

During power operation, CRN-1 is expected to generate up to 1,945 one million British thermal units (MBtu) per hour of heat. Most of this heat (about 1,935 MBtu/hour) is released to the atmosphere via the cooling tower, while approximately 10.3 MBtu/hour is discharged to the Reservoir through cooling-tower blowdown. During planned outages when the cooling tower is unavailable and once-through cooling is used, the heat load to the Reservoir may reach up to 13 MBtu/hr. TVA will provide mode-specific heat load details in the OL application (TVA 2025-TN11927).

During steady-state operation, CRN-1 withdraws up to 5,414 gpm or 12.1 cfs (20,494 lpm or 0.34 m^3/s) of water from the Reservoir—5,365 gpm or 12 cfs (20,309 lpm or 0.34 m^3/s) for the CWS and 49 gpm or 0.11 cfs (185 lpm or 0.003 m^3/s) for the demineralizer. Intake can temporarily increase to 6,254 gpm or 14 cfs (23,674 lpm or 0.39 m^3/s) during filter backwash. Normal discharge flow is 1,343 gpm or 3 cfs (5,084 lpm or 0.08 m^3/s) but can reach 5,414 gpm or 12.1 cfs (20,494 lpm or 0.34 m^3/s) when the cooling tower is bypassed. Maximum consumptive losses are approximately 4,024 gpm or 9 cfs (15,232 lpm or 0.25 m^3/s), primarily due to evaporation (4,022 gpm or 9 cfs [15,225 lpm or 0.25 m^3/s]), and a minor amount of drift (2 gpm or 0.004 cfs [7.6 lpm or 0.0001 m^3/s]). Blowdown flow is approximately 1,341 gpm or 3 cfs (5,076 lpm or 0.08 m^3/s), and total maximum discharge during normal operation, including filter backwash and demineralizer output, is approximately 2,202 gpm or 5 cfs (8,335 lpm or 0.14 m^3/s). CRN-1 is designed to operate without discharging radioactive waste; however, if recycling is not feasible, such waste may be released at not greater than 1:100 gpm ratio to nonradioactive liquid discharge (TVA 2025-TN11927). Water flow details are illustrated in Figure 2-6.

TVA is considering two design alternatives for the CRN-1 cooling-water intake to allow flexibility during final design. Alternative 1 is a recessed shoreline intake located outside the navigation channel to avoid interference with vessel traffic. The design consists of a concrete intake structure with separate pump bays, debris raking systems, trash racks, and fish screens equipped with spray bars and conveyors to handle debris and impinged fish (Figure 2-7 and Figure 2-8). The intake elevation is 729 ft (222.2 m), while the minimum Reservoir level is 735 ft (224 m) under the TVA Watts Bar Operating Guide, providing a minimum water depth of 6 ft (1.8 m) at the screens (TVA 2025-TN11927). Building activities of Alternative 1 will disturb less than 0.5 ac (0.2 ha) and occur in two phases, with the second phase including removal of less than 350 yd^3 (267.6 m^3) of shoreline material to complete the channel connection into the river (TVA 2025-TN12285).

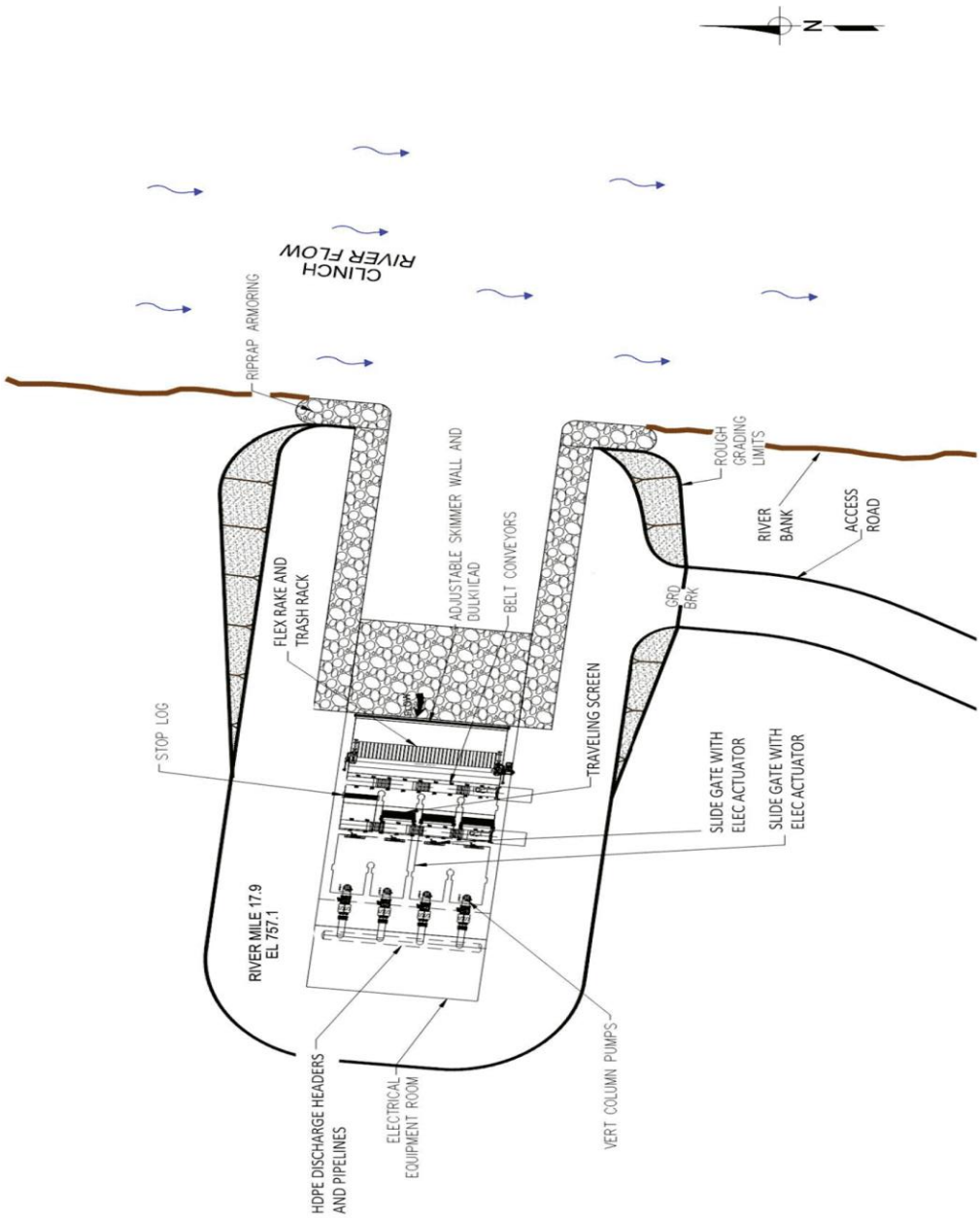

Figure 2-6 Alternative 1—Recessed Intake Structure Plan at the Clinch River Nuclear Site. Source: TVA 2025-TN11927.

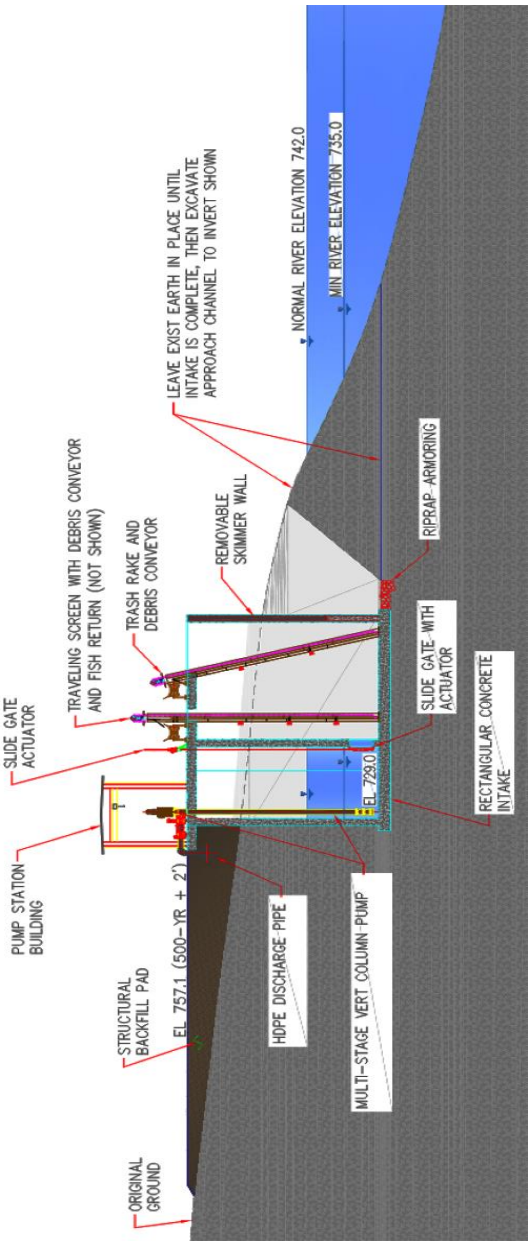

Figure 2-7 Alternative 1—Recessed Intake Structure Profile for Clinch River Nuclear Site. Source: TVA 2025-TN11927.

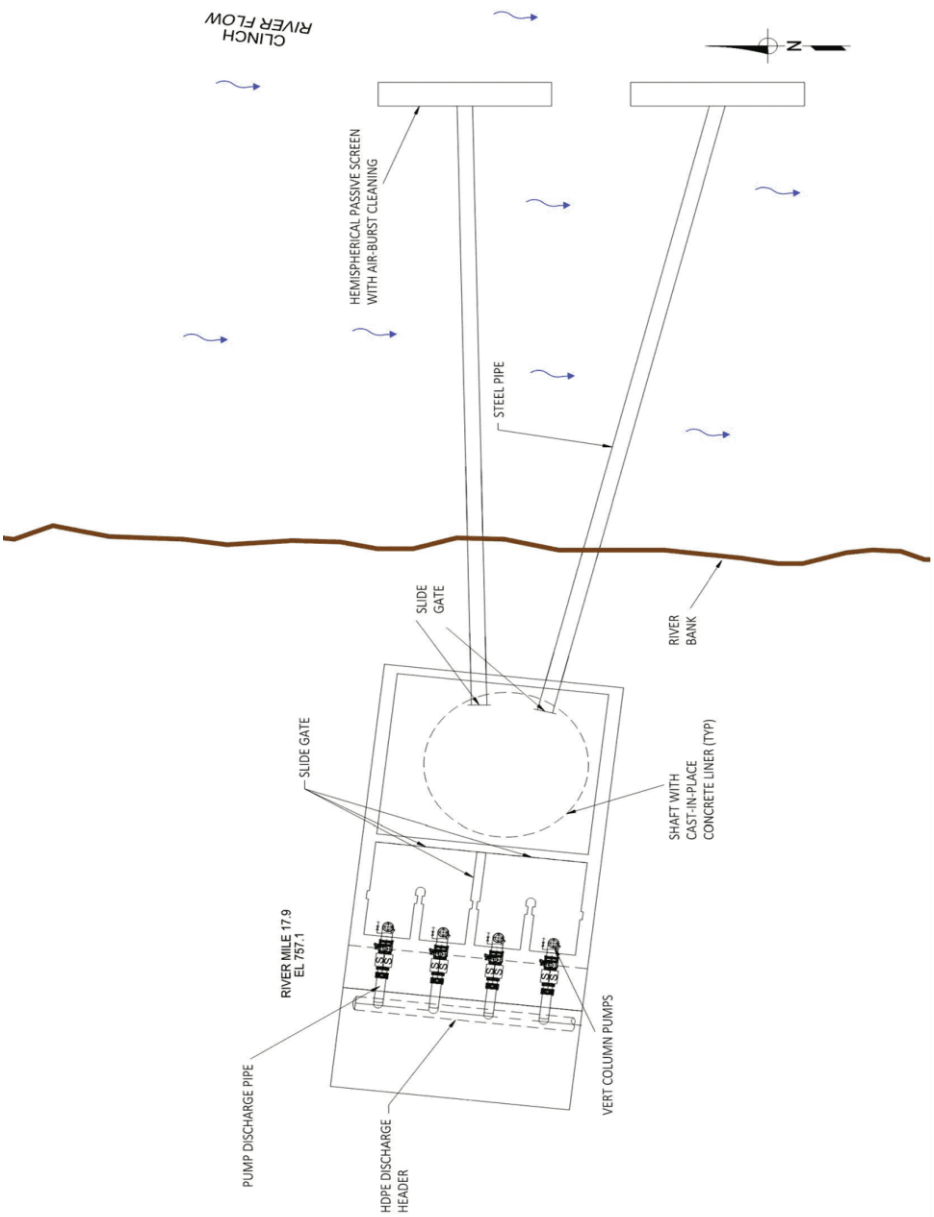

Figure 2-8 Alternative 2—Submerged Offshore Intake Alternative Structure Plan for Clinch River Nuclear Site. Source: TVA 2025-TN11927.

Alternative 2 is a submerged offshore intake located within the navigation channel. It consists of two underwater intake points connected by a subsurface conduit to an onshore wet well, where pumps are located. Water flows to the wet well by gravity. The intake screens are fitted with an airburst system for debris control and are limited to a maximum of 3 ft (0.9 m) in height to avoid navigation impacts (TVA 2025-TN11927). The structure is buried to protect it from future dredging (Figure 2-9 and Figure 2-10). Building activities would require installation of a temporary cofferdam approximately 55 ft × 20 ft (16.8 m × 6.1 m) in size along the bank for about 6 months. The footprint is less than 10,000 square feet (ft^2) (929 square meters [m^2]) onshore and about 1,100 ft^2 (102.2 m^2) in the river. Dredging of roughly 100 ft^2 (9.3 m^2) of river bottom would be required for the intake screens, with excavation estimated at 1,300 yd^3 (994 m^3) (TVA 2025-TN12285).

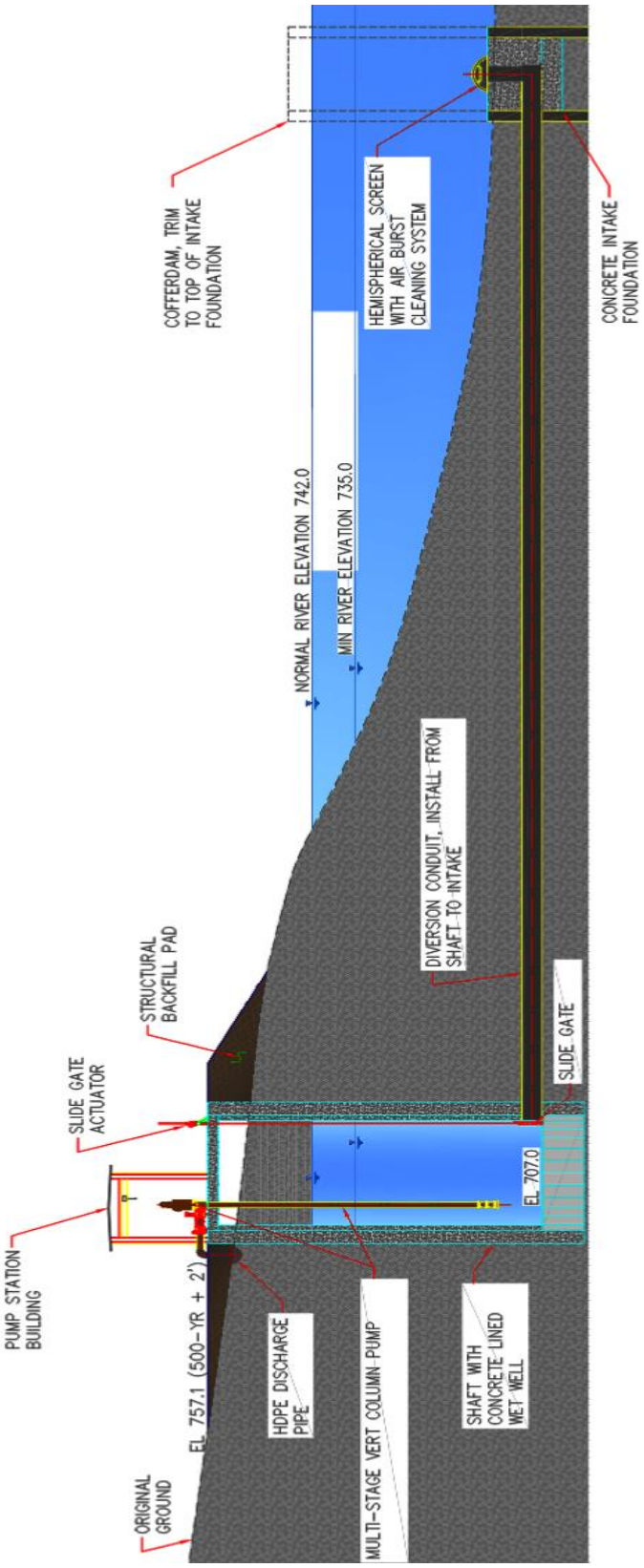

Figure 2-9 Alternative 2—Submerged Offshore Intake Alternative Structure Profile for Clinch River Nuclear Site. Source: TVA 2025-TN11927.

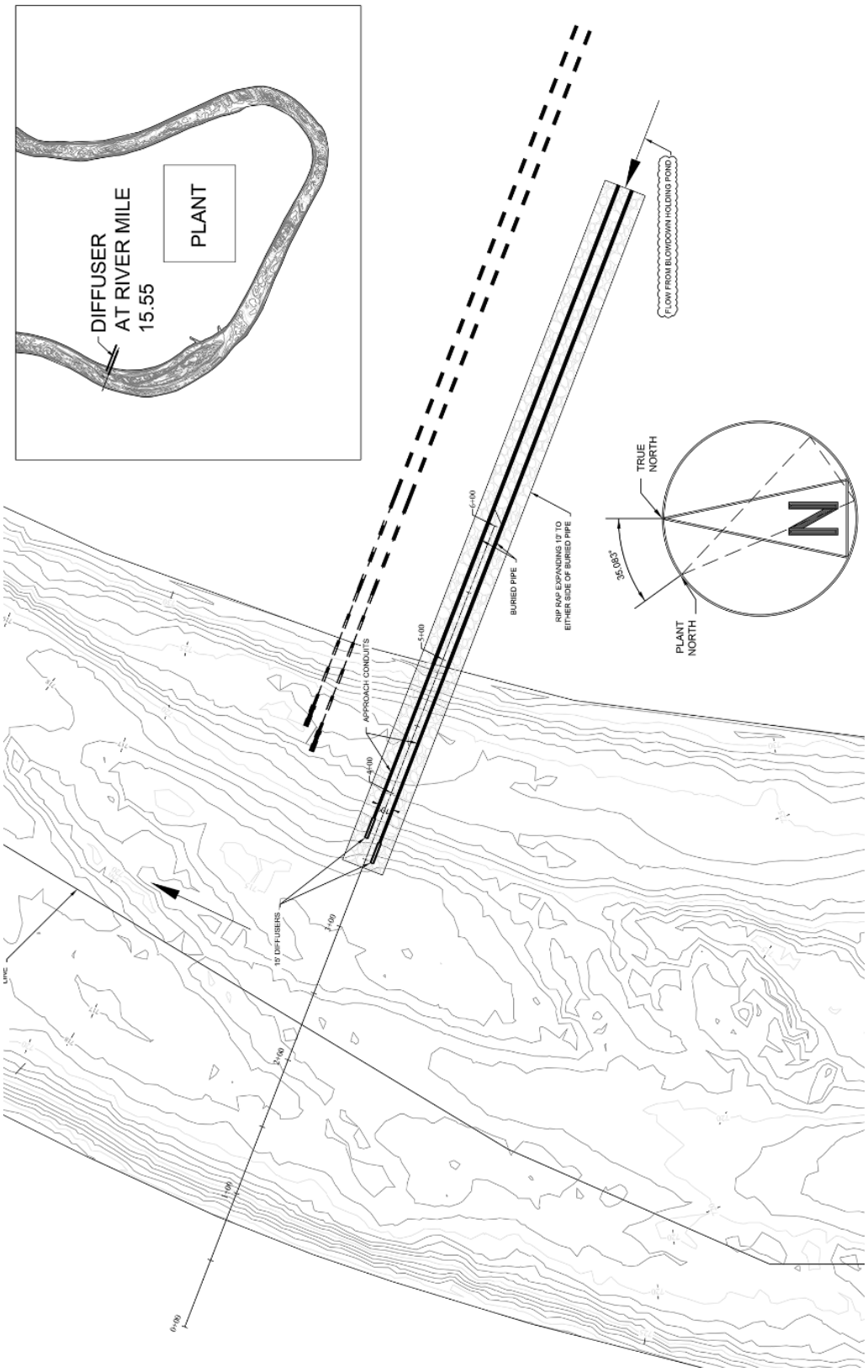

Figure 2-10 Diffuser and Discharge Piping Plan View at the Clinch River Nuclear Site. Source: TVA 2025-TN11927.

Both intake alternatives are compliant with CWA Section 316(b), with screen approach velocities maintained below 0.5 feet per second (ft/s) (0.15 meters per second [m/s]) (TVA 2025-TN11927).

In addition to the intake options, building activities of the discharge structure will involve excavation of less than 2,272 yd^3 (1737 m^3) of material, including about 491 yd^3 (375.4 m^3) from the river bottom. A riprap cover 32 ft (9.8 m) wide and 4 ft (1.2 m) deep will extend from the shoreline to the end of the diffusers. Excavation along the bank will occur in dry conditions within a temporary cofferdam, while river-bottom dredging will create a trench about 22 ft (6.7 m) wide and 20 inches (in.) (0.5 m) deep for the horizontal piping. The diffuser piping will extend approximately 2 ft (0.6 m) above the river bottom. Excavation at the river bottom includes about 480 yd^3 (367 m^3) removed between the riverbed and elevation 718 ft (218.8 m) and about 111 yd^3 (85 m^3) below the horizontal pipe, for a total of 591 yd^3 (452 m^3) associated with the discharge piping installation (TVA 2025-TN12285).

All excavation and stabilization activities associated with the cooling-water intake structure and discharge diffuser will be localized and temporary. Work will include instream dredging with removal and disposal of excavated material, conducted in compliance with applicable permit requirements: a CWA Section 404 permit, a RHA Section 10 permit from the USACE, and an Aquatic Resource Alteration Permit (ARAP) from the Tennessee Department of Environment and Conservation (TDEC). Instream work that disturbs Reservoir sediments will be coordinated under the 1991 Watts Bar Interagency Agreement and incorporate best management practices to minimize erosion and sedimentation (TVA 2022-TN10323).

Blowdown from the cooling tower, along with effluent from demineralized water production and raw water filter backwash, is directed to a blowdown holding pond west of the power block (see Figure 2-2). The pond is approximately 8 ft (2.4 m) deep, covers 55,300 ft^2 (5138 m^2), and holds about 442,200 ft^3 or 3.3 million gallons (12,522 m^3 or 12.5 million liter) of water. Final usable volume will be confirmed during detailed design. The pond is designed to provide adequate settling before discharging water to the Reservoir via a discharge pipe (TVA 2025-TN11927).

The discharge structure for CRN-1 is located near the blowdown holding pond, with the discharge diffuser positioned at CRM 15.55 in the Reservoir. It handles discharges from both the blowdown holding pond and, if needed, the liquid radioactive waste system—though routine radioactive discharges are not expected, as the plant plans to reuse this water. If recycling is not possible, limited discharges may occur. The diffuser is designed to promote mixing and reduce thermal impacts in the Reservoir (Figures 2-10 through 2-12). Water flows through a buried pipe, passing an instrumentation vault for flow and temperature monitoring, then through conduits to two bottom-mounted diffusers, which release water at 8–10 ft/s (2–3 m/s). TVA confirmed that chemical concentrations in the blowdown align with previous ESP EIS (TVA 2025-TN11927).

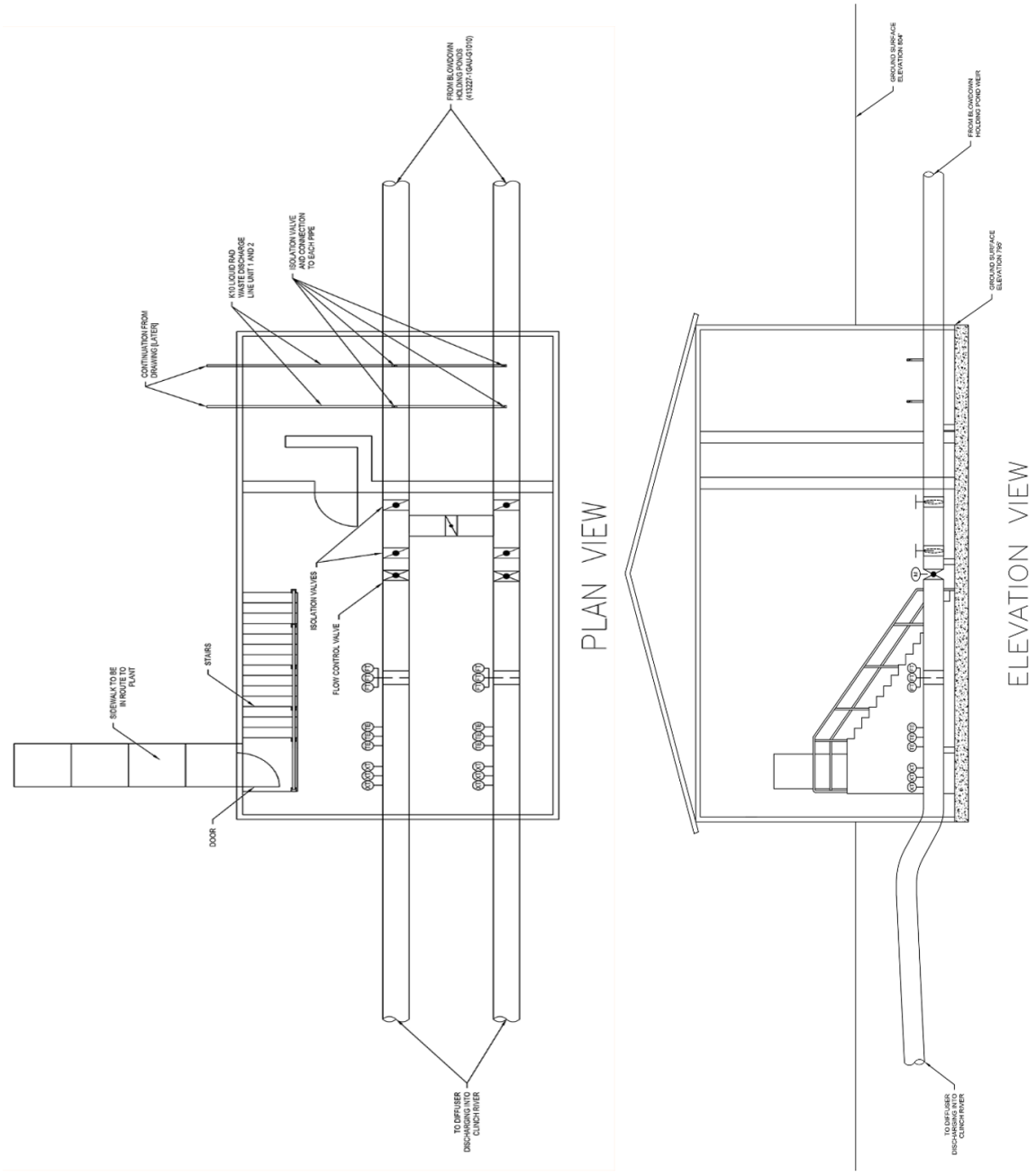

Figure 2-11 Discharge Structure Plan and Profile at the Clinch River Nuclear Site. Source: TVA 2025-TN11927.

The CRN-1 CWS dissipates heat using a mechanical draft cooling tower located east of the plant, occupying about 4 ac (2 ha) (Figure 2-2). The tower stands 64 ft (20 m) above plant grade, holds approximately 4.8 million gallon (18.2 million liter) in its basin, and circulates water at around 244,680 gpm or 545 cfs (926,215 lpm or 15.4 m^3/s). The system is designed to operate at four COC. The maximum blowdown temperature to the Reservoir is about 90.7 degrees Fahrenheit (°F) (32.6 degrees Celsius [°C]), which exceeds the bounding value in the ESP-006 PPE. Thermal discharge impacts are addressed in Section 5.2.3.1 of the CP ER (TVA 2025-TN11927).

All discharges are regulated by TDEC under an NPDES permit, which sets limits and monitoring requirements to ensure temperatures and chemical concentrations comply with environmental protection standards (TVA 2025-TN11927). Additional details related to design parameters can be found in Table 3.1-2 of the CP ER (TVA 2025-TN11927).

A bypass structure at Melton Hill Hydroelectric Dam was originally proposed in the ESP application ER to maintain a constant 400 cfs (11.3 m^3/s) flow for thermal compliance when hydropower units would be offline. However, TVA has determined that this bypass would not benefit CRN-1's thermal compliance. As a result, the bypass is not needed, and no changes to the Melton Hill Hydroelectric Dam are planned by TVA (TVA 2025-TN11927).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the NRC staff stated in Section 1.4.2, is reasonable. The review team performed its own independent search for new and potentially significant information during the audit of the CP application. The review team did not find any additional new information regarding plant water use.

2.5.3 Waste Systems

The ESP EIS discussed the radioactive waste system in Section 3.4.3. The ESP EIS noted that PPE bounding parameters provided a bounding analysis of liquid, gaseous, and solid radioactive waste. The radioactive waste-management system would collect and treat liquid, gaseous, and solid radioactive materials produced as byproducts of operating the reactor. The system would process the radioactive effluents to maintain their releases within regulatory limits and to levels as low as reasonably achievable before releasing them to the environment, per 10 CFR Parts 20 and 50 (TN283; TN249). Because a specific reactor design is selected, TVA provided new average normal liquid radioactive release rates, average normal gaseous radioactive release rates, and projected principal radionuclides in solid radioactive wastes activity in ER Tables 3.2-3 through 3.2-5. The tables compared the CRN-1 rates or activity with the PPE bounding rate or activity (TVA 2025-TN11927).

The ESP EIS discussed the nonradioactive waste-management system in Section 3.4.4. The ESP EIS did not identify any issues regarding nonradioactive waste management that were not resolved. TVA identified new information related to chemical concentrations in effluent streams, nonradioactive solid waste effluents, nonradioactive liquid waste effluents, and nonradioactive gaseous waste effluents. TVA provided new blowdown constituents and concentrations in ER Table 3.2-6 and new maximum annual emission estimates from standby diesel generators and other stationary sources in ER Table 3.2-7. The tables compared the CRN-1 emissions with the PPE bounding concentration or emission rate (TVA 2025-TN11927).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the NRC staff stated in Section 1.4.2, is reasonable. The review team performed its own independent search for new and potentially significant information during the audit of the CP application. The review team did not find any additional new information regarding the radioactive waste system or the nonradioactive waste-management system.

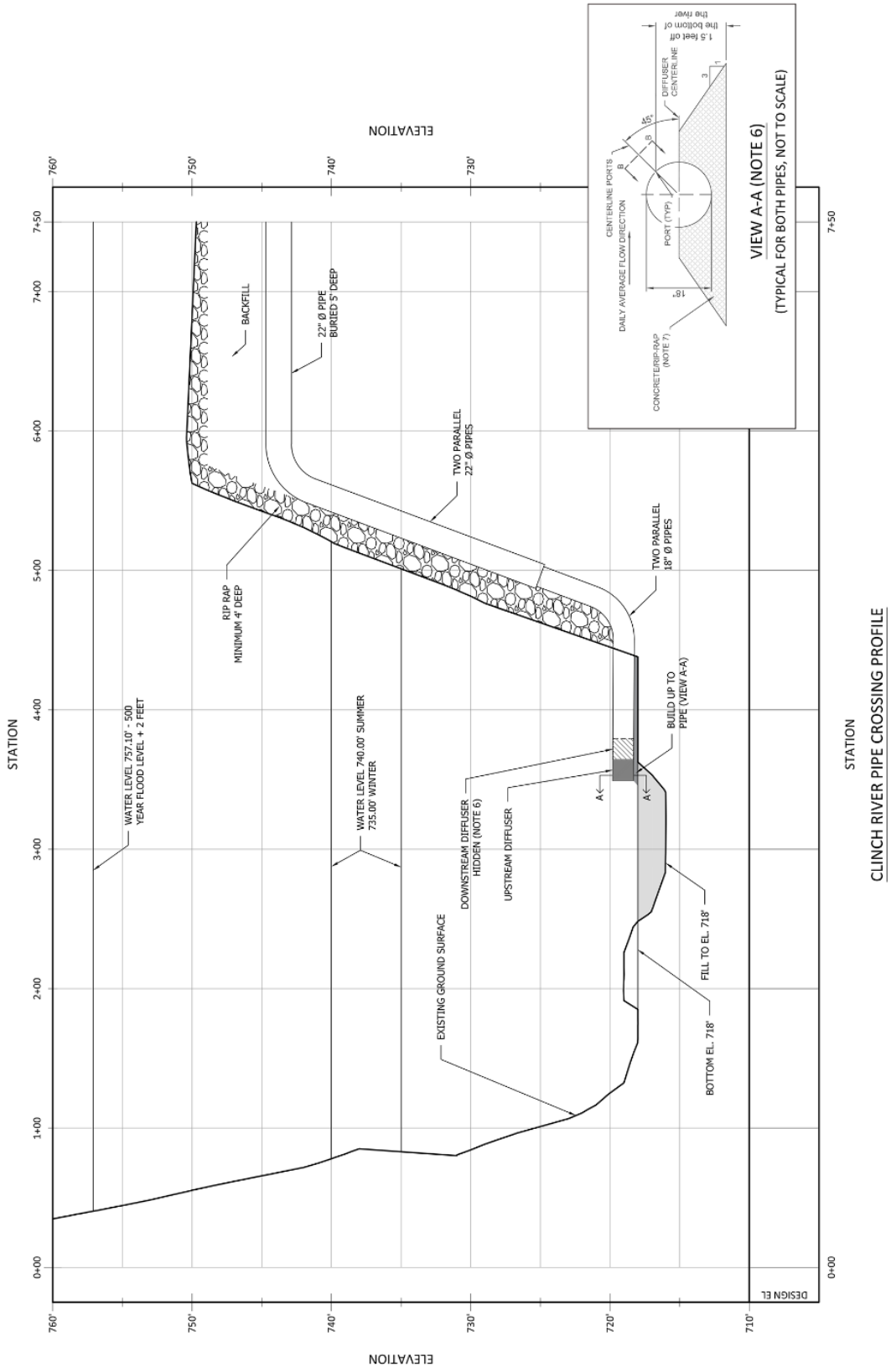

Figure 2-12 Diffuser Profile in the Clinch River Arm of the Watts Bar Reservoir. Source: TVA 2025-TN11927.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This section presents the affected environment and the potential environmental impacts of the proposed action of issuing a CP for the construction and operation of a nuclear power plant with one GE Vernova Hitachi Nuclear Energy BWRX-300 SMR at the CRN Site. This section is organized into separate subsections addressing specific environmental resource areas relevant to the proposed action. Each subsection addresses the affected environment for the resource area, the potential direct and indirect impacts on the resource area from the construction and operation of the SMR, decommissioning, and reasonably foreseeable actions (RFAs) in the region. Each subsection presents the review team's conclusions regarding the significance of the environmental impacts.

In Chapters 4, 5, 6, and 7 of the ESP EIS (NRC 2019-TN6136), the NRC staff provided an analysis of the environmental impacts from constructing and operating a nuclear power plant with two or more SMRs at the CRN Site. The applicant, TVA, in its CP ER evaluated new and potentially significant information related to the impacts of construction, operation, decommissioning, and past, present, and RFAs in the region as part of its CP application (TVA 2025-TN11927). The review team evaluated TVA's process for identifying new and significant information but also conducted its own independent search to verify whether new and significant information had been identified. The results of that review are presented in this chapter. Sections 3.1 through 3.15 discuss the potential new and significant information regarding the impacts to land use; meteorology and air quality; water use and quality; terrestrial and aquatic ecosystems; historic and cultural resources; socioeconomics; radiological health; nonradiological health; nonradiological waste; transportation of radioactive material; the uranium fuel cycle; and postulated accidents.

Because the TVA CP application references an approved ESP, the significance levels of the potential adverse impacts for the various areas evaluated will remain the same as documented in the ESP EIS unless new and significant information has been identified that would change the original significance level. The definition of new and significant information is documented in a 2007 *Federal Register* notice (72 FR 49352-TN4796) and is described in Chapter 1.

The review team recognizes that new and significant information regarding operation and decommissioning may become available subsequent to any issuance of a CP. The NRC staff would therefore review any application for an OL for a SMR at the CRN Site for new and significant information that might alter the conclusions made for the CP application. If TVA were to submit an OL application, the NRC staff would prepare a supplement to this SEIS in accordance with 10 CFR 51.95(b) (TN10253).

As explained in Chapter 1, some activities necessary to build a nuclear reactor do not fall within the purview of the NRC's regulatory authority over construction as defined in 10 CFR 50.10 (TN249) and 10 CFR 51.4 (TN10253) and are grouped under the term "preconstruction." The review team does not consider the effects of preconstruction to be direct or indirect impacts of a licensing action, but it does recognize the need to describe preconstruction activities as part of the affected environment. Identifying the impacts of preconstruction is also necessary to understand the setting for the impacts of NRC-authorized construction activities, as well as impacts of subsequent life-cycle phases (i.e., operation and decommissioning). For example, clearing portions of a site before beginning to build a nuclear reactor is preconstruction, but knowing the extent of the clearing is necessary to know what nearby ecological habitats might be affected by noise generated by the subsequent NRC-regulated activities of nuclear reactor construction. The subsections below therefore describe the impacts of preconstruction and

construction jointly for each resource area. The joint description, when combined with information on impacts from operation and decommissioning, other projects in the area, and potential climate change, provides a complete basis for drawing impact conclusions. The review team also recognizes that RFAs are resource specific and were used to assess whether the proposed action would have a cumulative effect in the resource-specific geographic area of influence (GAI).

3.1 Land Use

3.1.1 Affected Environment

Land use issues at the site, vicinity, and region were described in Section 2.2 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 2.2 of the ESP EIS is incorporated here by reference. Section 2.2 of the ESP EIS describes the land use and cover of the CRN Site, BTA, Grassy Creek HPA, and the 50 mi (80 km) region. The CRN Site land use zones are described in the Watts Bar Reservoir Land Management Plan (TVA 2009-TN4997). Nearby facilities for transportation by railroad and barge were discussed that could be used for delivery of large components to the site. Figures of land use and land cover, affected floodplains, transmission corridors, and potential offsite borrow pits on and within the vicinity and region of the CRN Site were provided in the ESP EIS.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Section 2.2.1 of the ESP EIS described the affected environment in relation to the CRN Site and vicinity. Regarding land use, the review team used the following new and potentially significant information related to:

- Watts Bar Reservoir Land Management Plan. The ESP EIS references the 2009 Watts Bar Reservoir Land Management Plan and the 2011 TVA Natural Resources Plan. In that plan, the majority of the CRN Site is designated as Zone 2–Project Operations. TVA has since determined that the entire CRN Site is a power asset and is therefore not subject to requirements of the Natural Resource Plan, and in the future the site will be reclassified in the Watts Bar Reservoir Land Management Plan (TVA 2025-TN11927, TVA 2025-TN12285). In addition, TVA has also reclassified an area north of the Grassy Creek HPA from Zone 5–industrial use to Zone 3–sensitive resource to include the State-protected species population. Some of this land is included in the new transmission line proposed since the ESP EIS (TVA 2025-TN11927)
- Onsite Quarry. The ESP EIS did not include land use specifics on the borrow pits and use of borrow material. Currently, TVA is evaluating the development of a 10 to 20 ac (4–8 ha) onsite quarry to supply borrow material for the CRN-1 construction near the center of the CRN Site (TVA 2025-TN11927). If the quarry were built at this location, it would result in a permanent disturbance of approximately 40 ac (16 ha) including utilities and parking and stockpiles areas that were not analyzed in the ESP EIS. The access roads to access the potential quarry are covered in the permanent disturbance calculations in the CP ER (TVA 2025-TN11927).
- Floodplain Encroachment. The ESP EIS indicated that there would be minimal temporary encroachment into the 100-year floodplain and less than 5 ac (2 ha) of permanent impacts. Instead, TVA's current construction plan calls for 27.7 ac (11.2 ha) of permanent impacts and 3.4 ac (1.4 ha) of temporary encroachment (TVA 2025-TN11927).

Regarding land use, the review team evaluated information provided in the CP ER and performed its own independent search for new and potentially significant information during the audit of the CP application. In addition to what TVA identified, the review team noted that the National Land Cover Dataset was recently updated in 2021 (NRC 2025-TN12331). The review team also noted that there are 466.7 ac (188.9 ha) of permanent impacts and 14.6 ac (5.9 ha) of temporary impact as the footprint has changed from the ESP EIS as shown in Figure 3-1. The review team also noted that dredging will be needed for building the discharge and the potential in-water intake structures.

Section 2.2 of the ESP EIS described the affected environment in relation to the transmission lines and other offsite areas (NRC 2019-TN6136). Regarding offsite areas, the review team used the following new and potentially significant information related to:

- 161 kV Transmission Corridor. The ESP EIS identified potential offsite transmission line connections including an underground 500 kV transmission corridor that extends from the CRN Site to the Bethel Valley substation. TVA has changed the transmission line corridor location and interconnection point. The offsite transmission line is instead now proposed as a 161 kV line extending from the CRN Site through the Grassy Creek HPA to an interconnection point on the existing Kingston Fossil Plant–Bethel Valley Hydroelectric Plant Line on DOE-managed land to the north (TVA 2025-TN11927). This 29 ac (11.7 ha) corridor is now mostly comprised of deciduous forest (TVA 2025-TN11927).
- Grassy Creek HPA. The ESP EIS indicates that the Grassy Creek HPA encompasses 265 ac (107.2 ha). Grassy Creek HPA has since been increased by 14 ac (5.7 ha) to encompass the locations of State-listed rigid sedge and pale green orchid populations (TVA 2025-TN11927). Some of this extended area lies within the currently proposed route for the 161 kV transmission line extending north of the site.
- Offsite Quarry. The ESP EIS identified multiple possible locations for offsite borrow pits to support construction activities. Currently, TVA is evaluating using the existing Midway Quarry in Mascot, Tennessee, or developing an onsite quarry (TVA 2025-TN11927). The Midway Quarry would not require expansion in order to fulfill the project's borrow material needs.

Regarding transmission lines and other offsite areas, the review team evaluated information in the CP ER and TVA's new and significant information process and performed its own independent search for new and potentially significant information related to noise during the audit of the CP application. The review team identified new information regarding the Federal actions associated with the potential land acquisition for the new 161 kV transmission corridor in the Grassy Creek HPA and the BTA. An easement or lease will be obtained for any work on the DOE-managed lands (TVA 2025-TN12285). DOE is in the process of transferring the barge landing parcel including the access road to the barge landing from Bear Creek Road to TVA by the end of the 2025 (TVA 2025-TN12285). In addition, the review team identified new information regarding the principal agricultural land, commercial forest products, and timber harvesting of the new 161 kV transmission line. The ESP EIS covered the prime agricultural land on the 161 kV transmission line as the prime agricultural land in the vicinity of the site. No timber will be harvested in the 161 kV transmission corridor and a plan will be developed with the contractor for the final disposal of the trees cleared onsite (TVA 2025-TN12285).

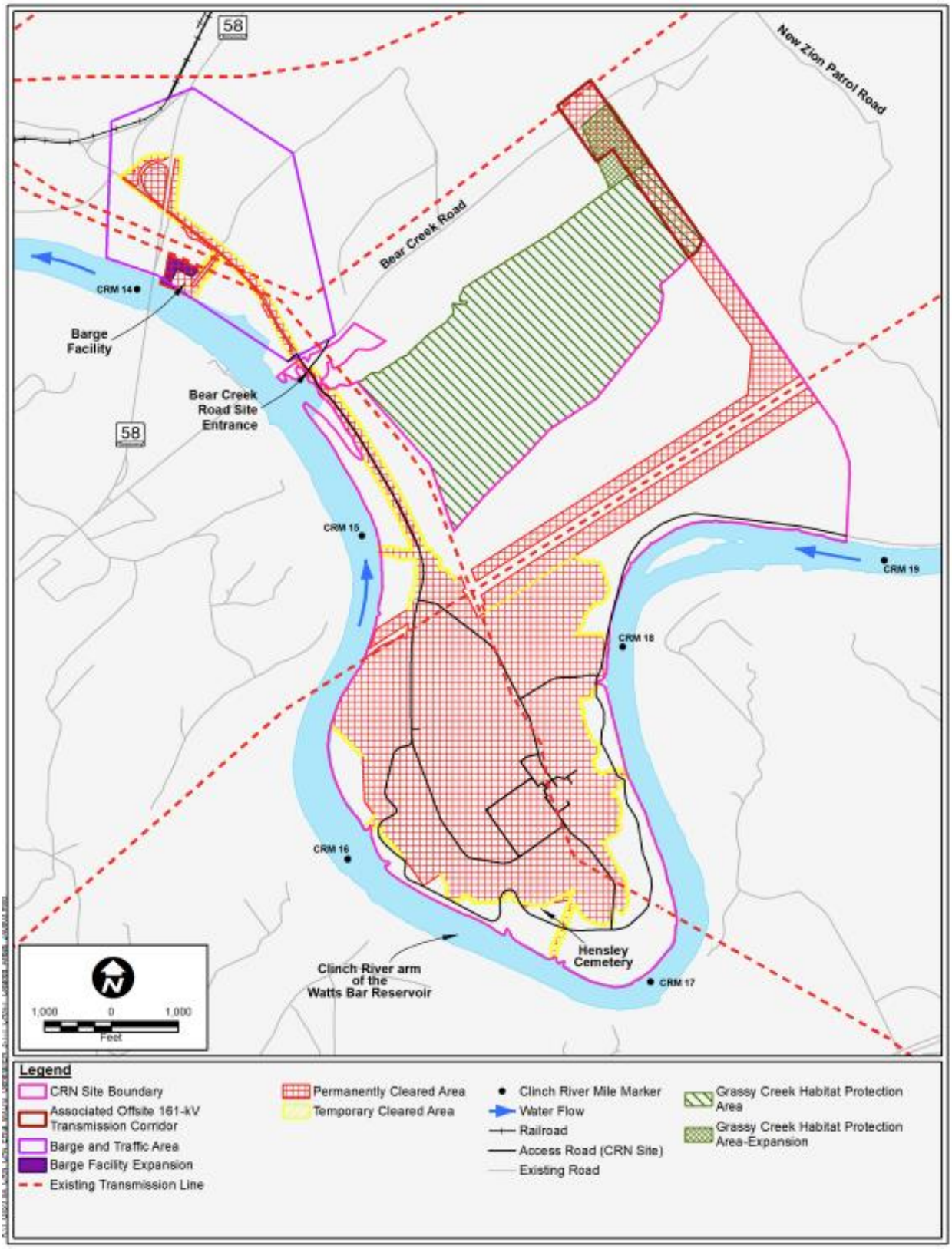

Figure 3-1 Permanent and Temporary Impacts on the Clinch River Nuclear Site, Barge Traffic Area, and Offsite Transmission Corridor. Source: TVA 2025-TN11927.

In addition, the ESP EIS analyzed the impacts of improving the rail offload and new highway access ramps for State Route (SR) 58 within BTA to support the building and operation of the project. As of July 2025, the rail improvements and highway improvements are not included in this scope (TVA 2025-TN12285).

Section 2.2.3 of the ESP EIS described the affected environment in relation to the region (NRC 2019-TN6136). TVA did not identify any new information related to the effected environment and the region in its CP application. The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. Besides the updated 2021 National Land Cover Dataset (NRC 2025-TN12331), the review team did not identify any further new information in its independent evaluation.

3.1.2 Environmental Impacts of Construction

The review team concluded impact levels determinations for all issues, which included site, vicinity, and offsite areas impacts from construction. The impacts are described in Section 4.1 of the ESP EIS.

3.1.2.1 Site and Vicinity Impacts

Section 4.1.1 of the ESP EIS described the construction-related impacts to the site and vicinity and determined the impacts to be MODERATE (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Taking into consideration the increased area of permanent disturbance of the 40 ac (16 ha) onsite quarry, dredging which is described in detail in Section 3.5, and increased extent of floodplain encroachment as described in Section 3.1.1, the review team determined that the conclusion of MODERATE presented in the ESP EIS remains bounding and valid.

3.1.2.2 Offsite Areas Impacts

Section 4.1.2 of the ESP EIS described the construction-related impacts on offsite areas and determined the impacts to be MODERATE (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team considered additional new and significant information regarding the Federal actions associated with the potential land acquisition for the new 161 kV transmission line in the Grassy Creek HPA and the interconnection, as well as the barge parcel. No timber harvesting will occur onsite. Based on the new 161 kV transmission corridor and the transfer of the barge parcel from DOE to TVA, and the removal of new highway access ramps for SR 58 and rail offload from the scope as mentioned in Section 3.1.1, the review team determined that the conclusion of MODERATE presented in the ESP EIS remains bounding and valid.

3.1.3 Environmental Impacts of Operation

The review team reached impact levels determinations for all issues, which included site, vicinity, and offsite areas impacts from operations. The impacts are discussed in Section 5.1 of

the ESP EIS. This SEIS evaluates the potential impacts of a CP on the environment; therefore, a detailed analysis of the impacts of operations of CRN-1 will be provided during the subsequent review of the application for the OL. The analysis below provides a summary of possible operational impacts.

3.1.3.1 The Site and Vicinity Impacts

Section 5.1.1 of the ESP EIS described the operational-related impacts of land use at the CRN Site and in the vicinity and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify additional new information. Based on the review of the Watts Bar Reservoir Land Management Plan where 14 ac (5.7 ha) will be allocated to sensitive resources (i.e., Grassy Creek HPA as noted in Section 3.1.1) and given that a majority of the land use impacts will occur during construction, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.1.3.2 Offsite Area Impacts

Section 5.1.2 of the ESP EIS described the land use impacts within offsite area and the impacts were determined to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the majority of impacts occur during the construction phase and that the operational impacts are typically limited to transmission line maintenance, the review team determined that the offsite area impacts would be SMALL.

3.1.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the review team evaluated TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.1.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.1 of the ESP EIS identified land use impacts that could occur based on projects outlined in Table 7-1 of the ESP EIS, in combination with building and operating two or more SMRs and determined that the cumulative impacts to land use would be MODERATE. The ESP EIS determined that NRC-authorized activities would be a significant contributor to the cumulative impact (NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the NRC staff stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in

Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own independent search for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause impacts to land resources similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact on land use from RFAs in the GAI would be MODERATE.

The review team further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. The review team determined that CRN-1 building and operation-related land use conversion to industrial, which were determined to cause MODERATE impacts, would be the only factors that may cause cumulative effects in the GAI. There are several DOE operations, construction activities, and building and operating activities, as well as a regional airport project, within the immediate vicinity of CRN-1. The review team assessed the incremental impact as described above and determined that CRN-1 would cause a cumulative effect in the GAI.

Therefore, the ESP EIS finding of MODERATE for cumulative impacts in the GAI remains bounding and valid. The NRC-authorized activities would be a significant contributor to the cumulative impact.

3.1.6 Conclusions

Based on the analysis in Section 3.1.2, the review team found the land use impacts from building activities on the CRN Site and offsite areas to be MODERATE. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.1.3, the review team found the land use impacts from operation activities related to site maintenance to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.1.4, the review team found the land use impacts from decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.1.5, the review team found that the cumulative impacts on land use from RFAs would be MODERATE and the NRC-authorized activities would be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.2 Meteorology and Air Quality

3.2.1 Affected Environment

Meteorology and air quality of the region were described in Section 2.9 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 2.9 of the ESP EIS is incorporated here by reference. Section 2.9 of the ESP EIS provides a description of the climate of the region and meteorological conditions, regional air quality, atmospheric dispersion, and meteorological monitoring. The site experiences a humid subtropical climate with moderate conditions due to the jet stream situated to the north of the site during warmer months, which

allows maritime tropical air masses from the Gulf of America, or, to a lesser extent, the Atlantic Ocean, to influence the region. During winter months, the jet stream shifts toward the south, but with a west-to-east orientation, and conditions remain moderate. Meteorological measurements from weather stations in the region surrounding CRN Site and taken at the CRN onsite meteorological tower indicate prevailing winds are primarily southwesterly or northeasterly. The CRN Site experiences warm summers and mild winters with an average annual temperature of 59°F (15°C), and annual total precipitation ranges from 41–52 in. (104–132 cm), with January through March being the wettest season. Short-term and long-term dispersion values (χ/Q) are presented in Table 2-45 and Table 2-46 of ESP EIS. The CRN Site experiences extreme weather including thunderstorms, lighting, extreme winds, tornadoes, hail, snowstorms, ice storms, tropical cyclones, droughts, and heavy fog. With respect to atmospheric stability, there is a predominance of slightly stable (Pasquill stability class E) and neutral (Pasquill stability class A) conditions at the CRN Site.

With respect to air quality, Section 2.9.2 of the ESP EIS identifies that the CRN Site is located in an area within Roane County that is designated in attainment for all national ambient air quality standard (NAAQS). However, a portion of Roane County, west of the CRN Site, and Loudon, Knox, and Anderson Counties, adjacent to Roane County, are maintenance areas with respect to the 2006 24-hour $PM_{2.5}$ (particulate matter less than 2.5 microns [µm]) NAAQS. There are two nearby Class I Federal areas, the Great Smoky Mountains National Park and the Joyce Kilmer-Slickrock Wilderness Area at distances of 31 mi (50 km) and 36 mi (58 km), respectively to the southeast of the site.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Section 2.9 of the ESP EIS described the affected environment in relation to meteorology and air quality. Regarding the meteorological and air quality affected environment, the review team evaluated information provided in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information. The review team identified new and significant information with respect to air quality designations in the counties adjacent to Roane County. As discussed above, the ESP EIS identified that a portion of Roane County, west of the CRN Site, and Loudon; Knox; and Anderson Counties, adjacent to Roane County, are maintenance areas with respect to the 2006 24 hour $PM_{2.5}$ NAAQS (NRC 2025-TN12331). In 2024, U.S. Environmental Protection Agency (EPA) revised the primary standard for annual $PM_{2.5}$ concentrations from 12 micrograms per cubic meter (µg/m^3) to 9 µg/m^3. However, the designation of attainment status for individual counties is still in process. Since publication of the ESP EIS, the review team has identified that the counties of Anderson, Blount, and Knox, are in marginal maintenance with respect to the 8 hour ozone (2008) standard (NRC 2025-TN12331). Therefore, Federal actions located in these designed maintenance areas are subject to the General Conformity Rule under the Clean Air Act (CAA) (TN1141).

3.2.2 Environmental Impacts of Construction

Section 4.7 of the ESP EIS described the preconstruction and construction-related air quality impacts and determined the impacts to be SMALL and that no further mitigation would be warranted (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 4.7 of the ESP EIS is incorporated here by reference. The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. The review team evaluated the information in the CP ER and TVA's new and significant

information review process and performed its own independent search for new and potentially significant information during the audit of the CP application.

Section 4.7 of the ESP EIS discusses that air criteria pollutants would be emitted as part of building activities from land clearing, material processing and replacement, driving piles and erecting structures, machinery operation and maintenance, truck deliveries, soil transport, and workforce commuting. Fugitive dust and other particulate matter such as PM_{10} and $PM_{2.5}$ (i.e., particulate matter with a mean aerodynamic diameter of less than or equal to 10 and 2.5 μm, respectively) can be released into the atmosphere during any site excavations, grading, and vehicular traffic on unpaved roads. Most of these activities that generate fugitive dust are short in duration and can be mitigated. TVA will implement a mitigation plan to minimize fugitive dust emissions. The mitigation measures identified in Section 4.5.2 of the ESP EIS included watering unpaved roads, phasing activities and equipment use, and minimizing soil storage piles. The ESP EIS did not present quantified air emissions associated with building activities and did not identify facilities that could provide borrow material for construction activities at the CRN Site as this information was not available at that time. In its CP ER, TVA identified that it is evaluating the development of an onsite quarry as an option to supply borrow material needed for construction of CRN-1 (ER Section 2.2.2). As an alternative to an onsite quarry, TVA identified an existing permitted offsite quarry (approximately 59 mi [95 km] northeast of the CRN Site) where suitable backfill is available. The quarry would operate only for the first 2 years of the building activities. TVA will secure applicable air permits needed to operate the onsite quarry (TVA 2025-TN12285). Table 3-1 presents air emission estimates during building activities. Estimates consider emissions from fuel combustion of construction equipment, workforce vehicles, fugitive dust, and truck deliveries. Emissions for an offsite quarry are presented as a bounding scenario since the driving distance of truck deliveries from an offsite quarry to the CRN Site would be greater than those for an onsite quarry.

As discussed above, a portion of Roane County, west of the CRN Site, and Loudon County, adjacent to Roane County and within the 6 mi (10 km) radius of the CRN Site, are designated as maintenance areas with respect to the 2006 24-hour $PM_{2.5}$ NAAQS. Because areas within Roane County and Loudon County are designated as maintenance areas, the NRC staff used the CAA thresholds contained in 40 CFR 93.153 (TN2495) for maintenance areas when determining the impacts from building activity emissions to determine if the project could potentially further degrade the air quality in those maintenance areas. Based on the emissions presented in Table 3-1, the project emissions are below de minimis levels and thus do not require conformity analyses. On average the NO_x and $PM_{2.5}$ emissions from the proposed building activities will be less than 3 percent of the total 2021 facility emissions in Roane County (NRC 2025-TN12331).

While not in Roane County, the Great Smoky Mountains National Park near Gatlinburg, TN is approximately 31 mi (50 km) east-southeast of the CRN Site. Great Smoky Mountains National Park is a Federal Class I that is afforded additional protection under Section 169A of the CAA (42 U.S.C. § 7401 et seq.-TN1141) for visibility criteria. The review team assessed the impact on 8 hour ozone and daily $PM_{2.5}$ concentration from CRN-1 building activities. In applying the method outlined in Tennessee Air Pollution Control Division's guidance document (TNEC 2019-TN12314), the review team's estimates that the maximum concentration increase due to building emissions would be less than 0.16 ppb for 8 hour ozone and 0.09 $\mu g/m^3$ of 24 hour $PM_{2.5}$. Therefore, the potential air quality impact of building activities to the Great Smoky Mountains National Park is very small.

Table 3-1 Roane County Facility Emissions, De Minimis Levels for Maintenance Areas, and Annual Estimated Emissions during Building Activities of the One-Unit BWRX-300 Facility (CRN-1) at the Clinch River Nuclear Site

Criteria Pollutant	Roane County 2021 Facility Emissions (tons/year)[(a)]	De minimis levels[(b)] for Maintenance Areas (tons/year)	Estimated Annual Emissions During the First 2 Years[(c)] of Building Activities (tons/year)	Estimated Annual Emissions After the First 2[(d)] Years of Building Activities (tons/year)
VOC	67	50	4.9	5.58
CO	449	100	42.77	45.70
PM_{10}	354	100	31.08[(e)]	25.38[(e)]
$PM_{2.5}$	308	100	5.26[(e)]	4.68[(e)]
SO_2	2,014	100	0.08	0.09
NO_x	1,311	100	41.14	40.71

CO = carbon monoxide; NO_x = nitrogen oxides; PM_{10} = particulate matter less than 10 µm; $PM_{2.5}$ = particulate matter less than 2.5 µm; SO_2 = sulfur dioxide; TSP = total suspended solids; TVA = Tennessee Valley Authority; VOC = volatile organic compounds.

(a) Roane County Facility (Point Sources Only) Emissions Data. Source: NRC 2025-TN12331.

(b) De minimis levels from 40 CFR 93.153(b) (TN2495).

(c) Estimated emissions during the first 2 years of building activities account for quarry operations at an offsite facility as a bounding analysis. The quarry would not be in operation after the first 2 years. Emissions account for equipment/heavy machinery use, fugitive dust, 80 truck deliveries per day delivering material from an offsite quarry to the CRN Site, and 700 workers commuting vehicles to the CRN Site. Detailed calculations and assumptions provided in TVA 2025-RAI (TVA 2025-TN12318).

(d) Estimated emissions from building activities at the CRN Site after second year. Emissions account for equipment/heavy machinery and fugitive emissions at the CRN Site and 1,000 worker commuting vehicles. Detailed calculations and assumptions provided in TVA 2025-RAI (TVA 2025-TN12318).

(e) The total particulate emissions calculated as a sum of the fugitive dust and combustion emissions from the equipment and workforce vehicles. Detailed calculations and assumptions are provided in TVA 2025-RAI (TVA 2025-TN12318). With respect to fugitive dust, TVA estimated TSP emissions of 72 tons annually for the first two years of building activities and 57.6 tons annual after the first two years of activity. TSP calculations assumed considered wet suppression to be used as a dust control measure are based on EPA AP-42 emission factors (NRC 2025-TN12331), which is conservative due to inherent assumptions of semiarid climate and 30 days per month of activity. Of the TSP, only a portion will become airborne with aerodynamic diameters of less than 2.5 µm and 10 µm. Review team determined that 5 percent and 40 percent of TSP will result in $PM_{2.5}$ and PM_{10}, respectively, based on Zhao et al. 2017 (TN12317).

Section 4.7 of the ESP EIS discusses that greenhouse gas (GHG) emissions would be emitted as part of building activities, such as operation of on-road construction vehicles, commuter vehicles, and nonroad construction equipment. Appendix K of the ESP EIS estimated that building activities and vehicular traffic would result in GHG emissions of about 12,912 tons (11,714 MT) carbon dioxide equivalent (CO_2e) annually. However, the ESP EIS did not consider GHG emissions from activities related to quarry operations. Furthermore, the GHG emissions estimate presented in the ESP EIS were based on constructing two or more SMRs with a maximum total electrical output of 800 MWe. This information has been updated in the CP ER. Construction will consist of one SMR, a BWRX-300, with a nominal electrical output of 300 MWe. Quarry activities will result in approximately 6,640 tons (6,024 MT) CO_2e per year (TVA 2025-TN12318). Total GHG emissions during building activities of CRN-1 for the first 2 years from building activities will emit 13,568 tons (12,309 MT) of CO_2e per year (TVA 2025-TN12285). Once quarry operations cease, building activities at the CRN Site and annual GHG emissions will result in approximately 6,928 tons (6,285 MT) of CO_2e (TVA 2025-TN12285). Therefore, GHG emissions from building activities during the first 2 years are greater than what

was considered the ESP EIS. However, annual GHG emissions for the first 2 years of building activities are not significantly higher (5 percent higher) than the ESP EIS.

Based on emissions provided in Table 3-1, the review team determined that emissions from building activities, and therefore construction, are below the 100 tons per year threshold for major sources and below de minimis levels in maintenance areas. Estimated GHG emissions are not significantly higher than those presented in the ESP EIS. Therefore, the review team concludes that the impacts on air quality from construction activities are SMALL and the conclusions presented in the ESP EIS remain bounding and valid.

3.2.3 Environmental Impacts of Operation

Section 5.7 of the ESP EIS described the operational-related impacts on local meteorology and air quality and determined the impacts to be SMALL (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 5.7 of the ESP EIS is incorporated here by reference. The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application.

The ESP EIS discusses that the primary impacts of operating a new nuclear power plant at the CRN Site on local meteorology would be releases to the environment of heat and moisture from the primary cooling system. The primary impact of operating a new nuclear power plant at the CRN Site on air quality would be from the operation of auxiliary equipment and vehicles (e.g., worker vehicles).

The ESP EIS presents Seasonal and Annual Cooling Tower Impact (SACTI) modeling results for visible plumes, ground-level fogging/icing, plume shadowing, and salt deposition for two mechanical draft cooling towers. TVA updated the SACTI analysis for operation of one mechanical draft cooling tower with considerably lower water circulation rate and consequently lower drift rate than values used in the ESP EIS (TVA 2025-TN12285). The drift rate is 177 g/s in the revised design compared to 200 g/s in ESP EIS. All other inputs remain the same, including droplet size distribution and total dissolved solids (TVA 2025-TN12285). The SACTI results within ESP EIS on visible plume, ground fogging and icing, plume shadowing, and salt deposition are thus bounding. No fogging or icing hours were predicted with the SACTI model using the onsite meteorological data (TVA 2025-TN12285).

The ESP EIS identified that air emissions sources during operation of CRN-1 would include cooling towers, auxiliary boilers for heating and startup, engine-driven emergency equipment, and emergency power supply system diesel generators and/or gas turbines, vehicles, and transmission lines. Since publication of the ESP EIS, TVA has determined that auxiliary boilers and gas turbines will no longer be installed (TVA 2025-TN12285). Sources of criteria air pollutant emissions during operation of the facility will now consist of two standby diesel generators, a diesel driven fire pump, a security generator, one cooling tower, worker vehicles, and transmission lines.

The transmission lines connecting to the CRN Site switchyard are 161 kV. Small amounts of ozone and substantially smaller amounts of nitrogen oxides are produced during corona, a phenomenon that occurs when air ionizes near isolated irregularities on the conductor surface

of transmission lines. Field studies have shown that high voltage lines up to 765 kV do not generate emissions above ambient measurements (Lee et al. 1989-TN7481; TVA 2013-TN7899; NRC 2015-TN5842). Therefore, the review team does not expect that the transmission lines associated with operation of CRN-1 will be a significant contributor of ozone or nitrogen oxides.

Table 3-2 presents air emissions from two standby diesel generators, a diesel driven fire pump, a security generator, one cooling tower, and worker vehicles. With respect to cooling-tower particulate matter emissions, the cooling-tower releases water laden droplets that will have aerodynamic diameter greater than 10 μm. Most of the droplet mass is water and will eventually evaporate during plume travel. Emissions from operations at CRN-1 are below de minimis thresholds for maintenance areas (see Table 3-1).

Table 3-2 Estimated Annual Emissions (tons per year) from Operations of One-Unit BWRX 300 Facility (CRN-1) at the Clinch Nuclear River Site

	VOC	CO	PM_{10}	$PM_{2.5}$	SO_2	NO_X
Onsite Stationary Combustion Source[(a)]	0.012	0.62	0.04	0.04	0.86	1.35
Vehicles[(b)]	0.5	6.19	0.11	0.02	0.01	0.11
Cooling Tower[(c)]	N/A	N/A	3.7	3.7	N/A	N/A
Total	0.51	6.81	3.85	0.06	0.87	1.46

CO = carbon monoxide; NO_x = nitrogen oxides; PM_{10} = particulate matter less than 10 μm; $PM_{2.5}$ = particulate matter less than 2.5 μm; SO_2 = sulfur dioxide; VOC = volatile organic compounds.

(a) Combustion sources include two 3,150 kW standby diesel generators, one 500 horsepower diesel drive fire pump, and one 100 kW security diesel generator. Each diesel generator is estimated to operate 20.5 hours a year, the diesel drive fire pump 60 hours a year, and the security diesel 34 hours a year. Source: TVA 2025-TN12285.

(b) Emissions for 200 worker vehicles commuting to/from the CRN Site. Source: TVA 2025-TN12318.

(c) TVA estimated the particulate emission to be 30.68 tons/year for the entrained water droplets from the cooling tower based by applying methods from Reisman & Frisbie (2002) (Reisman and Frisbie 2002-TN12319). Review team estimates particulate matter for PM_{10} and $PM_{2.5}$ to represent 3.7 tons/year based on the droplet size distribution in Table 5.3-3 of the ESP ER (TVA 2019-TN12412).

The ESP EIS identified that sources of GHG emissions from operating a nuclear power plant would primarily include onsite combustion sources and workforce vehicles. The ESP EIS identified approximately 8,736 tons (7,925 MT) of CO_2e would be emitted annually. Since publication of the ESP EIS, TVA has updated the workforce during operation of CRN-1 and onsite combustion sources. As discussed above, onsite combustion sources will now include two standby diesel generators, a diesel driven fire pump, and a security generator. Onsite combustions source would result in 123 tons (111.9 MT) of CO_2e a year (TVA 2025-TN12285). The estimated workforce during operations at CRN-1 will be approximately 200. Worker vehicles would result in 1,129 tons (1,025 MT) of CO_2e being emitted annually (TVA 2025-TN12285). Therefore, a total of 1,252 ton (1,136 MT) of CO_2e would be emitted annually as a result of operation of CRN-1. This value is less than what was considered in the ESP EIS.

Based on the review of emissions data and cooling tower plume drift rate, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.2.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the review team evaluated TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.2.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.6 of the ESP EIS identified air quality impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs. In the ESP EIS, the review team concluded that cumulative impacts from the proposed action and other past, present, and reasonably foreseeable future actions on air quality resources in the GAI, Roane County, would be SMALL for criteria pollutants and MODERATE for GHGs. In the ESP EIS, the review team concluded that the incremental contribution of NRC-authorized activities on air quality resources for both criteria pollutants and GHGs would not be a significant contributor to the cumulative impact (NRC 2019-TN6136). In the ESP EIS, the review team concluded that national and worldwide cumulative impacts of GHG emissions are noticeable but not destabilizing, with or without the contribution of GHG emissions from a new nuclear power plant at the CRN Site. The review team recognized that GHG emissions, including CO_2, from individual stationary sources and cumulatively from multiple sources, can contribute to climate change.

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the NRC staff stated in Section 1.4.2, is reasonable. Table 7-1 in the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own independent search for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause impacts to air resources similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact on air resource from RFAs in the GAI would be SMALL for criteria pollutants and MODERATE for GHGs.

The review team further evaluated whether the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria.

Regarding air quality impacts, various projects fall within the GAI for air quality including roadway improvements, airport development, Roane Regional Business and Technology Park, the Horizon Center Industrial Park, Helium Test Facility, and retirement and replacement of Kingston Fossil Plant. Retirement of the coal-fired Kingston Fossil Plant units will improve air quality. The NRC staff has concluded that air quality impacts from construction of Hermes and Hermes 2 would be SMALL (NRC 2023-TN9771, NRC 2024-TN12413). Air quality impacts from roadway improvement projects and from construction for development projects will be temporary. The review team has concluded that the incremental impacts from the building and operation of CRN-1 on meteorological and air quality are SMALL. For these reasons, the

review team concludes that building and operating CRN-1 would not cause cumulative effects on air quality resources for both criteria pollutants and GHGs in the GAI. The review team acknowledges that national and worldwide cumulative effects of GHG emissions are noticeable but not destabilizing, with or without the contribution of GHG emissions from building and operation of CRN-1.

Therefore, the ESP EIS cumulative impacts findings of SMALL for criteria pollutants and MODERATE for GHG emissions in the GAI remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.2.6 Conclusions

Based on the analysis in Section 3.2.2, the review team found meteorology and air quality impacts from building activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.2.3, the review team found the meteorology and air quality impacts from operation activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.2.4, the review team found the meteorology and air quality impacts from decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.2.5, the review team found that the cumulative impacts on meteorology and air quality from RFAs would be SMALL for criteria pollutants and MODERATE for GHGs, and the NRC-authorized activities would not be a significant contributor to the cumulative impact. Therefore, conclusions presented in the ESP EIS remain bounding and valid.

3.3 Geology

3.3.1 Affected Environment

The general surface and subsurface geology at the CRN Site was described in Section 2.8 of the ESP EIS (NRC 2019-TN6136) and in Section 2.5 of the preliminary safety analysis report (PSAR) (TVA 2025-TN12293). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 2.8 of the ESP EIS is incorporated here by reference. Section 2.8 of the ESP EIS notes that CRN Site resides within the Valley and Ridge Physiographic Province, a region characterized by northeast-trending sequences of folded and thrust-faulted sedimentary rocks predominantly Ordovician (485.4–443.8 million years ago) and Cambrian (538.8–485.4 million years ago) in age. Geologic units, comprising the Chickamauga Group, Knox Group, Conasauga Group, and the Rome Formation are depicted in Figure 2-33 and 2-34 of the ESP EIS. Surface materials, which have been altered by previous Clinch River Breeder Reactor Project (CRBRP) construction activities, vary in thickness across the site and include residual soils, artificial fill, and alluvial/colluvial soils along the Clinch River and drainage channels. The PPE power-block extends from Knox Group through the Benbolt Formation, while the Chickamauga Group dominates remaining excavation areas.

Section 2.8 of the ESP EIS described the affected environment in relation to geology. Regarding geology, TVA did not identify any new and potentially significant information. The review team evaluated information provided in the CP ER and PSAR and performed its own independent

search for new and potentially significant information during the audit of the CP application. TVA completed new geotechnical borings to provide additional information for the PSAR (TVA 2025-TN11927). During the audit of the CP application, the review team discussed with TVA that no indication of hypogenic karst was observed in these new borings. TVA confirmed that the new data verified karst characterization as reported in the ESP EIS (NRC 2019-TN6136; TVA 2025-TN12285). The review team, therefore, determined that there is no new and significant information regarding geology at the CRN Site.

The NRC staff's description of site and vicinity geologic features and the detailed analyses and evaluations of geologic, seismic, and geotechnical data as required for an assessment of (1) site suitability for a plant of the general size and type proposed, or (2) site-safety issues related to the specific proposed plant are, or will be, included in the NRC staff's SER and/or supplemental SER.

3.4 Water Resources

3.4.1 Surface Water

3.4.1.1 Affected Environment

Surface-water resources were described in Section 2.3 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 2.10 of the ESP EIS is incorporated here by reference. Section 2.3.1.1 of the ESP EIS describes the Clinch River watershed and the Tennessee River along with releases from the Watts Bar Reservoir and Fort Loudoun Dam that affect the flow and water level of the Clinch River arm of the Watts Bar Reservoir.

The following discussion provides context and presents new and potentially significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. TVA provided updated information on the affected environment in relation to surface-water resources in the CP ER (TVA 2025-TN11927). Regarding surface-water resources, the review team used the following new and potentially significant information:

- Updated data on Watts Bar Reservoir elevations from 2004–2022. TVA maintains winter pool levels at 735–737 ft (224–224.6 m) mean sea level, raises them to 740–741 ft (225.6–225.9 m) mean sea level in spring, and lowers them back to the winter range in late fall. Major runoff events occasionally cause exceedances above this range. The Watts Bar Dam operating guide data overlain with the 2024 and 2025 reservoir elevation data is shown in Figure 3-2.
- Delineation and functional assessment of streams and ponds at the CRN Site revised in 2021 (TVA 2022-TN10323, TVA 2025-TN11927) (Figure 3-3 and Table 3-3). The survey identified fewer ponds, perennial streams, and wet-weather conveyances (WWC) but identified two additional intermittent streams. These changes reflect reclassification from field observations and the inclusion of the 161 kV offsite transmission corridor.
- Updated drainage areas and stream characteristics at the CRN Site (TVA 2025-TN11927).
- Alterations to the flow bypass system at Melton Hill Hydroelectric Dam not needed (TVA 2025-TN11927).

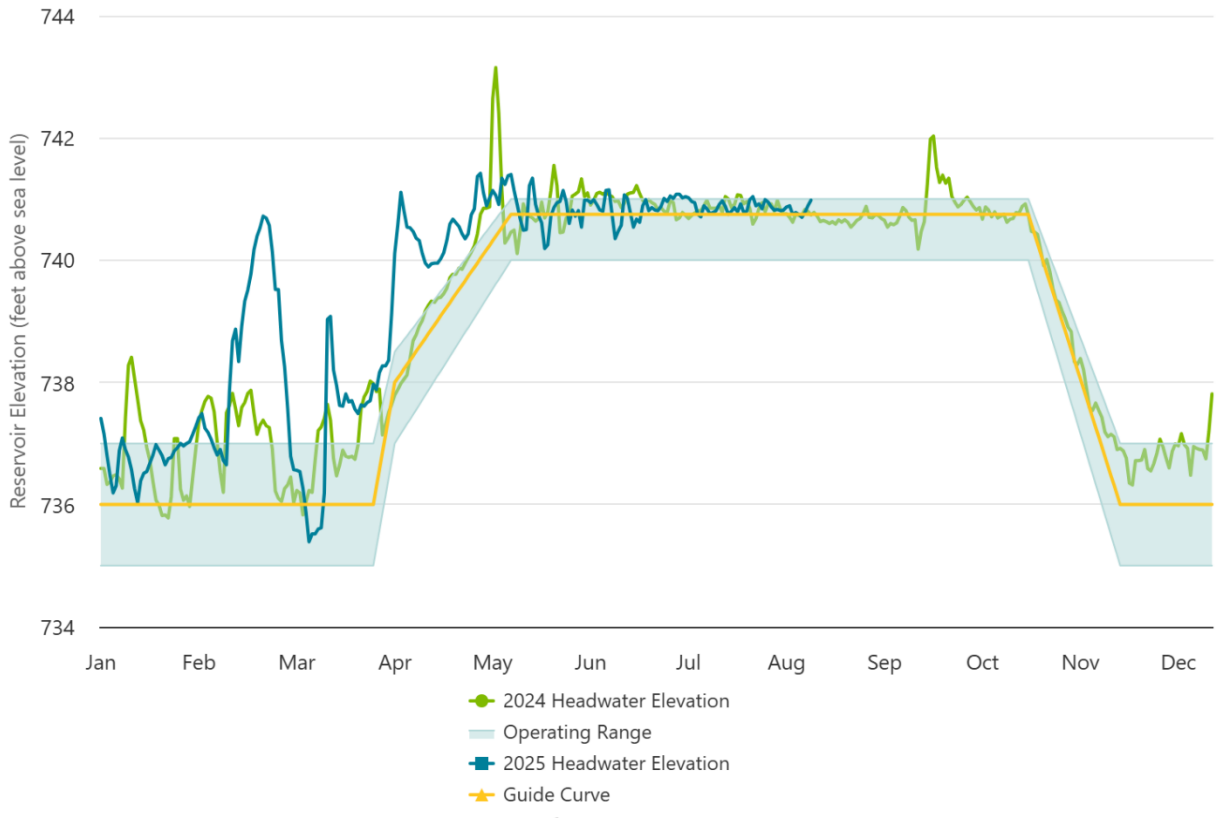

Figure 3-2 Operating Guide for Headwater Elevation at Watts Bar Dam with Headwater Elevation Data for 2024 and 2025 Year-to-Date. Source: NRC 2025-TN12331.

Table 3-3 Updated Surface-Water Resources Delineations on the Clinch River Nuclear Site and Associated Offsite Areas. Source: TVA 2025-TN11927.

Location[a]	Type	ESP EIS Number	Number	Length (feet)	Area (acres)
CRN Site	Ponds	6	3	-	0.65
CRN Site	Perennial Streams	5	3	2,777	-
CRN Site	Intermittent Streams	1	4	878	-
CRN Site	WWCs	19	14	6,056	-
Barge and Traffic Area	Ponds	2	0	-	0
Barge and Traffic Area	Perennial Streams	2	1	1,666	-
Barge and Traffic Area	Intermittent Streams	4	1	335	-
Barge and Traffic Area	WWCs	15	2	1,107	-
161 kV Offsite Transmission Line	Ponds	-	0	-	0
161 kV Offsite Transmission Line	Perennial Streams	-	1	384	-
161 kV Offsite Transmission Line	Intermittent Streams	-	2	1,301	-
161 kV Offsite Transmission Line	WWCs	-	1	242	
Project Area Total	Ponds	8	3	-	0.65
Project Area Total	Perennial Streams	7	5	4,827	-
Project Area Total	Intermittent Streams	5	7	2,514	-

Location[a]	Type	ESP EIS Number	Number	Length (feet)	Area (acres)
Project Area Total	WWCs[b]	34	16	7,405	-

CP = construction permit; CRN = Clinch River Nuclear; EIS = environmental impact statement; ER = environmental report; ESP = early site permit; WWC = wet-weather conveyances.
Note: - = not applicable.
(a) Wetlands are excluded from this table. See Section 2.4 of the CP ER (TVA 2025-TN11927).
(b) WWC EPH18 crosses from the CRN Site into the 161 kV transmission corridor and is only counted once in the project area total.

Regarding surface-water use, the review team used the following new and potentially significant information:

- Updated surface-water use data from 2015–2020, with projected withdrawals for 2045, covering both Melton Hill and Watts Bar Reservoirs. The dataset also includes 2020 nonconsumptive and consumptive use information (Sharkey and Springston 2022-TN11361), as well as updated data on water demand and capacity for the City of Oak Ridge (NRC 2025-TN12331).
- The proposed optional onsite quarry northeast of the power-block area represents a new feature not assessed in the ESP EIS. Based on the CP ER and CRBRP borings (TVA 2025-TN11927; PMC 1982-TN6190), the quarry will be excavated into the Knox Formation and is expected to intercept shallow groundwater that normally discharges to onsite streams, ponds, and ultimately the Clinch River. The quarry footprint lies adjacent to streams STR06, STR07, ephemeral stream EPH10, wetland W017, and pond P04. The nearest site boundary is approximately 180 ft (55 m) to the east, as noted in Section 3.4.2.1. Dewatering rates of 1,000–3,000 gpm (3,785–11,356 lpm) could be needed during the building phase and is expected to continue during the operation phase of CRN-1 to prevent accumulation of water in the excavation. Section 3.4.2.2 provides groundwater drawdown estimates at the site boundary.

Regarding surface-water quality, the review team used the following new and potentially significant information:

- Updated onsite and vicinity surface-water quality data from 2022 through 2023 seasonal sampling at the CRN Site including stormwater retention ponds.
- Clinch River arm tailwater temperature records for the period 2004–2022, with average values shown in Figure 3-4 (TVA 2025-TN11927).
- Updated 2022 303(d) list (TDEC 2025-TN12414).

The 2023 sediment sampling at CRMs 14.0, 15.0, 18.0, and 21.5 to assess contaminants in benthic sediments. Analytical results were compared with upstream (Melton Hill Reservoir, CRM 24.5) and downstream (Watts Bar Reservoir, TRM 532.5 and 560.8) locations, showing improved sediment quality near the CRN Site relative to prior characterization (TVA 2025-TN11927).

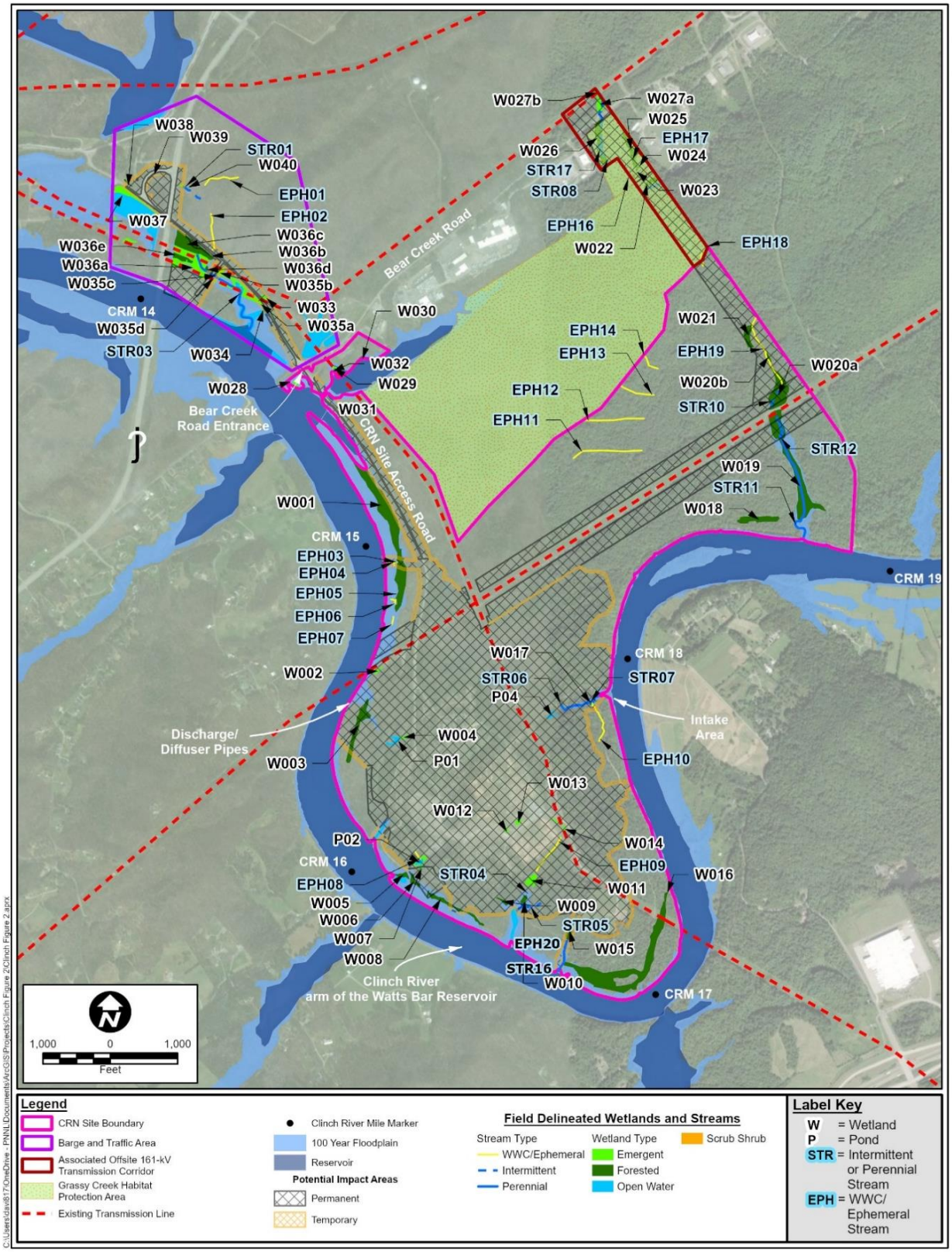

Figure 3-3 Identified Surface-Water Resources on the Clinch River Nuclear Site and Associated Offsite Areas. Source: TVA 2025-TN11927.

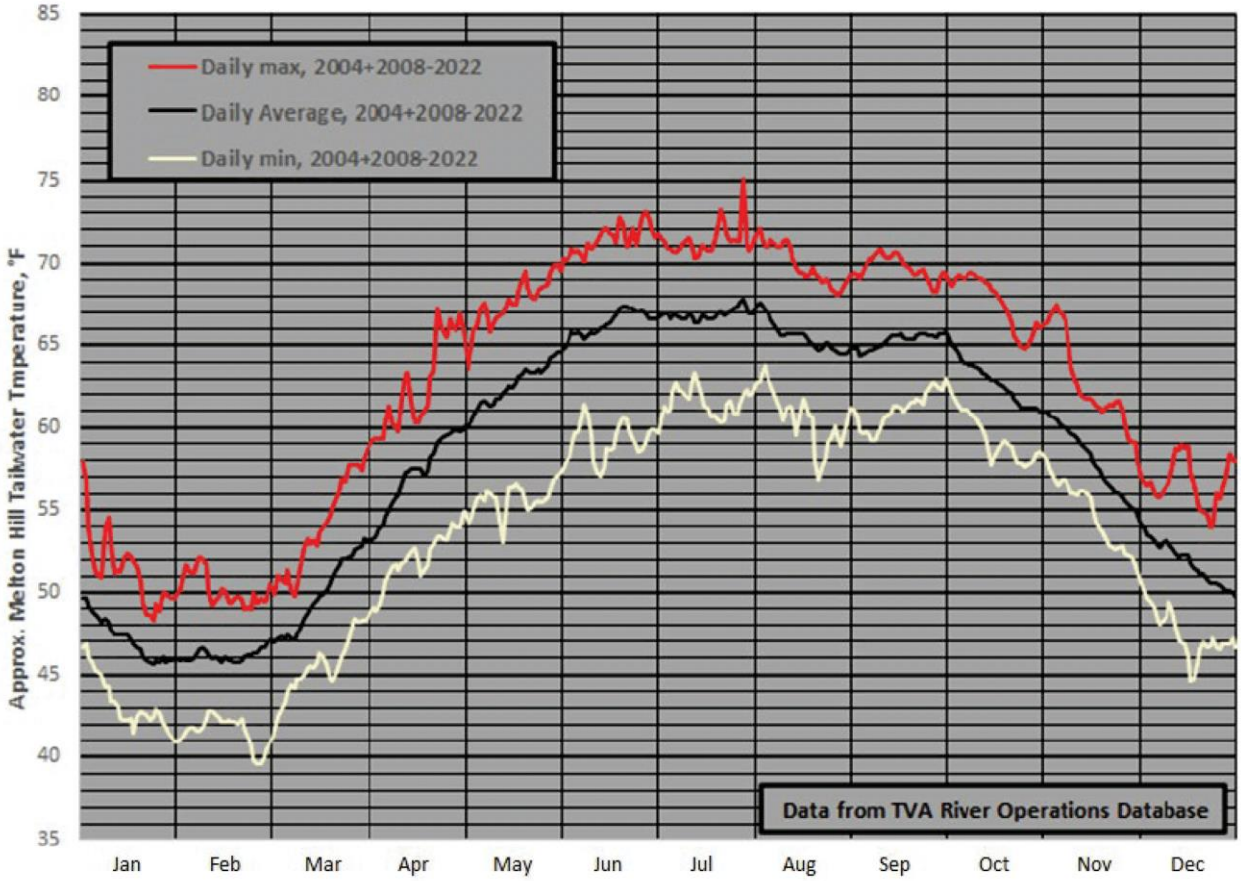

Figure 3-4 Average and Range of Hourly Water Temperature in the Tailwater Below Melton Hill Hydroelectric Dam, 2004–2022. Source: TVA 2025-TN11927.

Regarding surface water, the review team evaluated the information in the CP ER (TVA 2025-TN11927) and TVA's new and significant information review process and performed its independent search for new and potentially significant information related to surface-water resources during the audit of the CP application. The NRC staff did not identify any further new information in its independent evaluation.

3.4.1.2 Environmental Impacts of Construction

Hydrologic Alteration

Section 4.2.1 of the ESP EIS described building activities that could produce hydrologic alterations (NRC 2019-TN6136). The review team evaluated the information presented in TVA's CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. The review team considered updated information on hydrologic alterations to onsite and offsite streams, ponds, and wet-weather conveyances (TVA 2025-TN11927). The review team determined that the proposed CRN-1 alterations are similar to those described in the ESP EIS with the exception that the flow bypass system at Melton Hill Dam is not needed. TVA will comply with applicable permits, including a CWA Section 404 permit from USACE, an ARAP from TDEC, and a SWPPP to address erosion control, sediment detention, and stormwater

management through best management practices (BMPs) to address potential adverse effects related to hydrologic alterations to surface-water resources (TVA 2025-TN11927).

In addition to the activities evaluated in the ESP EIS, the proposed optional onsite quarry northeast of the power-block area could also alter local surface water hydrology. Quarry excavation and associated dewatering would intercept shallow groundwater flow that contribute baseflow to nearby onsite surface water features (including streams STR06, STR07, ephemeral streams EPH10, wetland W017, and pond P04) and ultimately to the Clinch River (TVA 2025-TN11927; PMC 1982-TN6190). Some of these features are also fully or partially within the permanently impacted area of the CRN Site. Lower groundwater levels from dewatering of the quarry would alter groundwater–surface water exchanges. As stated in Section 3.4.2.1, drawdown at the site boundary (about 180 ft [55 m] east of the quarry) is estimated to be approximately 6 ft (1.8 m) using base assumptions, with and greater drawdown for sensitivity cases. Permanent or intermittent streams, ephemeral streams, ponds, and wetlands farther from the quarry could also be affected by the drawdown. These conditions are likely to produce noticeable, localized changes in timing and volume of discharge to nearby streams and ponds. TVA will implement stormwater controls, route dewatering product to onsite basins, and discharge to the Reservoir under the CRN-1 NPDES program, with monitoring to manage and minimize effects on surface water hydrology (TVA 2025-TN11927).

Section 4.2.1 of the ESP EIS also described alterations to the floodplains near the CRN Site. The review team's assessment of the effects on floodplains in the ESP EIS was based on approximately 5 ac (2 ha) of disturbance. Building activities associated with CRN-1 are expected to affect 27.7 ac (11.2 ha) of floodplains within the permanent disturbance area and 3.4 ac (1.4 ha) within the temporary disturbance area (TVA 2025-TN11927). Table 3-4 summarizes these affected areas. TVA stated and the review team expects that building activities will comply with directions in Executive Order (EO) 11988 on Floodplain Management and the TVA Flood Storage Loss Guide (TVA 2025-TN11927). Therefore, the review team determined that the effects on floodplains from CRN-1 building activities would be minor. Because a flow bypass system at Melton Hill Dam is not needed to augment flows in the Reservoir, the review team determined that no flow alterations and sediment disturbances would occur from the flow bypass considered in the ESP EIS.

Table 3-4 Land Use Impacts Associated with Floodplain Encroachment Near the Clinch River Nuclear Site

Project Area	Permanent Area (acres)	Permanent Percent (%)	Temporary Area (acres)	Temporary Percent (%)
Barge and Traffic Area	3.6	12.8	0.7	20.1
CRN Site	24.2	87.2	2.7	79.9
Associated Offsite 161 kV Transmission Line Corridor	0	-	0	-
Total	27.7	100.0	3.4	100.0

CRN = Clinch River Nuclear.
"-" denoted no data in table cell.
Notes: Column total may not be equal to the sum of individual values due to rounding.
Sources: NRC 2025-TN12331, TVA 2025-TN11927.

Water Use

Section 4.2.2.1 of the ESP EIS determined that surface-water use impacts from construction activities would be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. Water needed to support the building activities would be supplied by the City of Oak Ridge. Concrete batch plant demand is estimated at 5,000–10,000 gpd (0.008–0.016 cfs), which is lower than the 231,660 gpd (0.358 cfs) identified in the ESP EIS. However, 30,000–40,000 gpd (0.046–0.062 cfs) will be withdrawn from the Reservoir for dust control and washdown of Reactor Building excavation surfaces—greater than the ESP EIS maximum withdrawal rate of 5,000 gpd (0.008 cfs) (TVA 2025-TN11927). Although the volume of water proposed to be withdrawn from the Reservoir is larger than what was considered in the ESP EIS (NRC 2019-TN6136), the volume withdrawn is only a minor amount of the available water within the Reservoir.

In addition, the optional onsite quarry northeast of the power-block area will require continuous dewatering at an estimated rate of 1,000–3,000 gpm (3,785–11,356 lpm) to prevent accumulation of water in the excavation (TVA 2025-TN11927; PMC 1982-TN6190). The dewatering product would be routed to onsite basins or stormwater controls and discharged to the Reservoir following the site's NPDES permit requirements, rather than used consumptively. In the context of Watts Bar Reservoir flows, these managed discharges represent only a minor change in surface water use.

Because water needed for concrete batch plant use is less than that identified in the ESP EIS, the volume withdrawn from the Reservoir for dust control is only a minor amount of the available water within the Reservoir, and because building-related water use from the Reservoir would be temporary, the review team determined that the impact of CRN-1 building activities on surface-water use will be SMALL. Therefore, the review team concluded that the impacts to surface-water resources from building activities presented in the ESP EIS remain valid.

Water Quality

Section 4.2.3.1 of the ESP EIS determined that surface-water quality impacts from building activities would be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified new information regarding instream disturbance in the Reservoir. TVA described two options for the cooling-water intake structure—a recessed shoreline intake structure and a submerged offshore intake structure (TVA 2025-TN11927). Building any of the two options for intake structure would require some work in the waters of the Reservoir and may temporarily increase turbidity and disturb sediments. TVA would obtain required permits from TDEC and a Section 404 permit from USACE before performing any work in the Reservoir.

The review team expects that potential impacts to surface-water quality from building activities in the Reservoir will be managed by complying with the 1991 Watts Bar Interagency Agreement, implementing BMPs to reduce sedimentation and erosion, and testing/disposal of all dredged material in accordance with agreement conditions. Therefore, the review team determined that building-related impacts to surface-water quality would be SMALL, and the conclusions presented in the ESP EIS for building-related impacts to surface-water quality remain bounding and valid.

3.4.1.3 Environmental Impacts of Operation

Hydrologic Alteration

Section 5.2.1 of the ESP EIS described the effects of hydrologic alterations related to operations (NRC 2019-TN6136). The review team evaluated the information presented in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. The review team considered updated information on hydrologic alterations during the operations of CRN-1.

In addition, operation of the optional onsite quarry northeast of the power-block area will require continued dewatering at an estimated rate of 1,000–3,000 gpm (3,785–11,356 lpm) to prevent accumulation of water in the excavation (TVA 2025-TN11927; PMC 1982-TN6190). As described in Section 3.4.2.2, these sustained withdrawals are likely to result in localized drawdown of groundwater levels—estimated at about 6 ft (1.8 m) at the site boundary under base assumptions—with potential effects extending to nearby streams, ponds, and wetlands such as streams STR06 and STR07, ephemeral steam EPH10, wetland W017, and pond P04. The altered gradients between the aquifer and surface waters would persist during operations, resulting in localized changes in timing and volume of discharge to onsite surface water features and induced exchanges with the Clinch River. The effects could potentially extend to more distant streams, ponds, and wetlands. TVA proposes to manage and discharge pumped water under the site's NPDES permit and to continue groundwater and surface water monitoring to minimize potential effects on surface water hydrology.

The CRN-1 average and maximum water withdrawal rates from the Reservoir are 4,147 gpm (9.2 cfs) and 5,414 gpm (12.1 cfs), respectively. These withdrawal rates are less than the ESP EIS estimates of 18,423 gpm (41.0 cfs) and 30,708 gpm (68.4 cfs) (TVA 2025-TN11927; NRC 2019-TN6136). The average and maximum rates of cooling-water blowdown and plant system wastewater discharge (1,343 gpm [3.0 cfs] and 5,468 gpm [12.2 cfs], respectively) are also lower than those described in the ESP EIS (5,615 gpm [12.5 cfs] and 17,900 gpm [39.9 cfs], respectively) (TVA 2025-TN11927; NRC 2019-TN6136). Because the water withdrawal and discharge rates are lower than those reported in the ESP EIS, the review team determined that the physical impacts of cooling water withdrawal and discharge, including benthic scour, are expected to be less than those estimated in the ESP EIS (TVA 2025-TN11927; NRC 2019-TN6136). The review team also determined that the average and maximum cooling water withdrawals for CRN-1 would result in a smaller reduction in Reservoir flow at the point of withdrawal than was previously estimated in the ESP EIS. Therefore, the review team determined that the hydrologic alterations during CRN-1 operations would have a minor effect on surface-water resources near the CRN Site.

Water Use

Section 5.2.2.1 of the ESP EIS evaluated surface-water use during operations and determined that the impacts to surface-water resources would be SMALL (NRC 2019-TN6136). The review team evaluated information presented in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. As stated above in the Hydrologic Alterations section, the CRN-1 water withdrawal rates are smaller than those considered in the ESP EIS. Similarly, the maximum consumptive water use for CRN-1 (4,024 gpm [8.9 cfs]) is also lower than that assessed in the ESP EIS (12,808 gpm [28.5 cfs]) (TVA 2025-TN11927; NRC 2019-TN6136).

In addition, continued dewatering of the optional onsite quarry northeast of the power-block area will generate managed flows on the order of 1,000–3,000 gpm (3,785–11,356 lpm) during operations. This water would be routed to onsite basins or stormwater controls and discharged under the site's NPDES permit rather than used consumptively, and thus represents only a minor change in overall surface water use.

Therefore, the review team determined that water use during CRN-1 operations will result in a SMALL impact on surface-water resources near the CRN Site and the conclusions presented in the ESP EIS for operations-related impacts to surface-water use remain bounding and valid.

Water Quality

Section 5.2.3.1 of the ESP EIS determined that surface-water quality impacts from operation would be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. While the CRN-1 cooling-water blowdown and plant system wastewater discharge rates are smaller than those evaluated in the ESP EIS, some constituents in the blowdown discharge would have concentrations higher than those evaluated in the ESP EIS (TVA 2025-TN11927). The blowdown discharge temperature would also be greater than that evaluated in the ESP EIS (TVA 2025-TN11927).

TVA evaluated the potential for thermal effects of CRN-1 operation on the Reservoir using two complementary modeling approaches. A two-dimensional CE-QUAL-W2 model (Version 4.1) was developed to simulate longitudinal temperature distributions in the Reservoir by segmenting the system into 1 m (3 ft) vertical layers. Simulations considered both summer and winter conditions under a range of flow scenarios influenced by operations at Melton Hill and Fort Loudoun dams (TVA 2025-TN11927). Results showed that summer low-flow conditions create the most challenging cases for river temperature changes, including overall temperature increases and rapid rates of temperature change (Figure 3-5). Winter operations can also lead to instances of both elevated temperature differences and higher rates of temperature change (Figure 3-6). These extreme events are driven largely by displacement of the upstream portion of a naturally occurring warm-water "thermal pancake" in Watts Bar Reservoir, which forms when Melton Hill is not continuously operated. The modeling indicated that, in summer, the discharge plume is not a major factor in thermal compliance, and in winter, temperature impacts from CRN-1 operation are negligible. No supplemental releases from Melton Hill were needed to support mixing, and the bypass option was determined to provide no additional compliance benefit (TVA 2025-TN11927).

Mixing at the diffuser was also evaluated using CORMIX Version 12.0GT to capture near-field plume behavior under stagnant and flow-reversal conditions that occur in this reach of the Reservoir. The diffuser design, consisting of unidirectional ports angled 45 degrees upstream, promotes rapid mixing. Simulation results indicated that the discharge does not create barriers to fish passage, as the entire cross-sectional area of the Reservoir remains available as a zone of passage. The plume dimensions remain within the 150 ft (45.7 m) mixing zone considered in the ESP EIS (TVA 2025-TN11927).

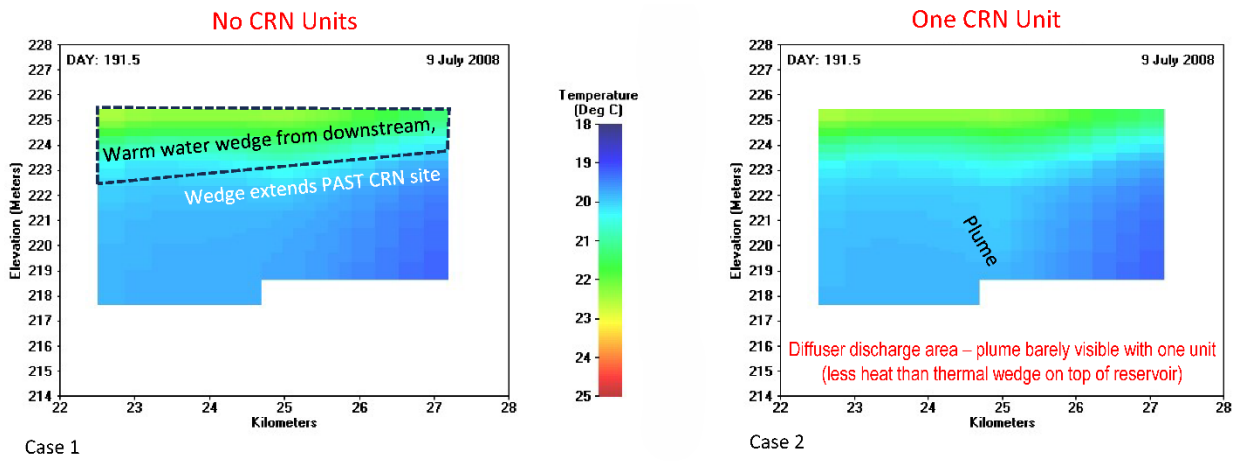

Figure 3-5 Two-Dimensional Model of the Discharge Plume at the Clinch River Arm of the Watts Bar Reservoir During Reactor Operations Under Summer Low-Flow Conditions. Source: TVA 2025-TN11927.

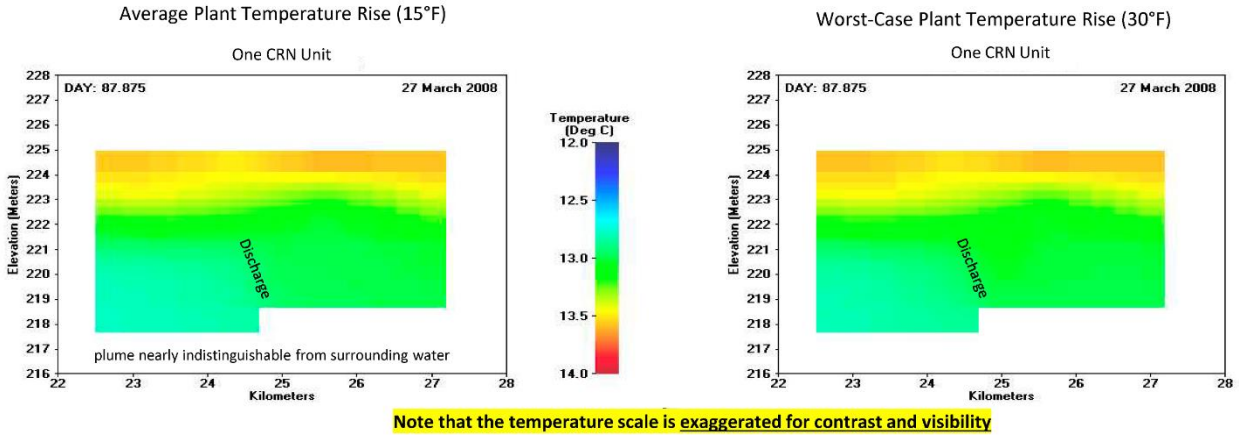

Figure 3-6 Two-Dimensional Model of the Discharge Plume at the Clinch River Arm of the Watts Bar Reservoir During Reactor Operations Under Winter Conditions with Average and Extreme Plant Temperature Rise. Source: TVA 2025-TN11927.

The review team concluded that the thermal effects of CRN-1 discharge are less than those estimated in the ESP EIS, although the naturally occurring thermal pancake can occasionally result in exceedances of water temperature standards independent of plant operation (TVA 2025-TN11927, TVA 2025-TN12285). The review team expects that all plant effluents, including water temperatures, will be monitored and controlled under the TDEC NPDES permit to assure any pollutant concentrations remain within limits protective of ambient water quality. TVA plans to coordinate with TDEC during the NPDES permitting process to establish conditions that minimize thermal discharge impacts during CRN-1 operation (TVA 2025-TN11927).

Based on the evaluation of the information provided in the CP ER and during the audit of the CP application, the review team determined that compliance with applicable permits, permit conditions, and required mitigation measures will result in a SMALL impact on surface-water quality near the CRN Site. The conclusions presented in the ESP EIS for operations-related impacts to surface-water quality remain bounding and valid.

3.4.1.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the review team evaluated TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information related to decommissioning. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.4.1.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.2.1 of the ESP EIS identified surface-water use and surface-water quality impacts that could occur from projects outlined in Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impact on surface-water resources would be MODERATE. The ESP EIS determined that NRC-authorized activities would not be a significant contributor to the cumulative impact (NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process and found it to be reasonable, as stated in Section 1.4.2. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own search for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause impacts on surface-water resources similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact on surface water resources from RFAs in the GAI would be MODERATE.

The review team further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. In Sections 3.4.1.3 and 3.4.1.4, the review team determined that the impacts from building and operating the proposed BWRX-300 reactor on the CRN Site on surface-water resources would be SMALL. Because the incremental impacts of CRN-1 on surface-water resources is SMALL and the effects are expected to be localized, the review team determined that CRN-1 incremental impacts to surface-water resources would not have a cumulative effect in the GAI.

Therefore, the ESP EIS finding of MODERATE for cumulative impacts in the GAI remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.4.1.6 Conclusions

Based on the analysis in Section 3.4.1.2, the review team found the surface-water resources impacts from building activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.4.1.3, the review team found the surface-water resources impacts from operation activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.4.1.4, the review team found the surface-water resources impacts from decommissioning of the proposed action to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.4.1.5, the review team found that the cumulative impacts on surface-water resources from RFAs would be MODERATE and the NRC-authorized activities would not be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.4.2 Groundwater

3.4.2.1 Affected Environment

Groundwater resources, including existing water use and water quality, were described in Section 2.3 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51.92(e)(2) (TN10253), Section 2.3 of the ESP EIS is incorporated here by reference. Section 2.3 of the ESP EIS notes that groundwater at the CRN Site is largely unconfined within unconsolidated surface materials and the weathered rock, with depths ranging from the surface to about 25 ft (8 m). Groundwater flow is primarily along rock fractures and bedding planes. Hydrologic data indicates groundwater recharge occurs in the center of the site, while groundwater discharge is largely to the Clinch River and small streams and ponds present onsite. Groundwater monitoring at the CRN Site has previously detected low-level Oak Ridge Reservation (ORR) legacy contaminants and naturally derived petroleum products in onsite groundwater. Section 2.3.2.2 of the ESP EIS states groundwater will not be used during CRN Site construction or operation, except for dewatering of excavations during building. Any extracted groundwater would be managed as part of the CRN Site stormwater-management system. The section also indicates TVA completed quarterly groundwater monitoring in the period 2013–2014 in 21 wells at 9 locations.

The following discussion provides context and presents new information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bears on the proposed action or its impact. Regarding groundwater resources, the review team used the following new and potentially significant information related to:

- Hydrologic Alterations to Groundwater Due to Development of an Optional Onsite Quarry. The ESP EIS did not assess the impacts of constructing or maintaining an onsite quarry (not proposed at the time of publication), which can locally impact groundwater flow paths and may require additional dewatering during building and operation of CRN-1. The proposed quarry would be constructed to the northeast of the CRN-1 Power-Block area (TVA 2025-TN11927). The total quarry area would be approximately 40 ac (16 ha), with 10 to 20 ac (4 to 8 ha) allocated to the quarry pit that would be excavated to a depth of about 85 ft (26 m) below grade (TVA 2025-TN11927). The quarry area would not be restored following its construction (TVA 2025-TN11927). Based on geologic borings presented in the CRBRP PSAR (PMC 1982-TN6190) in the vicinity of the proposed quarry (borings 60-68), the base of the quarry would intersect the Knox formation and shallow groundwater. The Chickamauga Group is absent in the area of the quarry (PMC 1982-TN6190), whereas it overlies the Knox Formation in CRN-1 PowerBlock area and previous-Block area and previous CRBRP excavation site. Groundwater elevations in borings 60-68 ranged from

33–78 ft (10–24 m) bgs in December 1973 (PMC 1982-TN6190). As stated in the ESP EIS, groundwater flow is primarily in weathered bedrock and at shallow depths in fractures in the competent rock. Fracturing is less at approximately 150 ft bgs (45.7 m), and therefore, groundwater flow at depth is consequently reduced (TVA 2016-TN5018). Shallow groundwater discharges to small streams and ponds onsite or directly to Clinch River. The base grade of the northern area of the site in the vicinity of the proposed quarry ranges from 845–876 ft (257–267 m) NAVD88. Therefore, the base of the quarry will be above the bed of the Clinch River. TVA confirmed stormwater-management practices will be in place to prevent runoff from entering the quarry pit, and the pit will not accumulate standing water during construction or operations. Therefore, a permanent dewatering mechanism will be in place during construction and operation to manage water ingress. As reported in the ESP EIS, karstic features in the Knox Group dolomites are much more common than in the rocks of the Chickamauga Group. Formations of the Knox Group are the most transmissive and serve as the principal source of groundwater in the region (NRC 2019-TN6136). TVA estimated the rate of dewatering into the proposed quarry to be bounded by the dewatering rate estimates for the CRBRP excavation in the southern portion of the site (TVA 2025-TN11927). This estimate ranged from 1,000–3,000 gpm (3,785–11,356 lpm) and aligns with the dewatering rate for the nearby Midway Quarry (TVA 2025-TN12285). The estimated normal flow into the excavation was based on an assumed conservative hydraulic conductivity value of 2.8 ft/day (0.001 cm/s) for the rock matrix. Maximum estimates of hydraulic conductivity from packer and slug tests within the Knox Formation at depth intervals comparable to that of the proposed quarry depth ranged from 2–12 ft/day (0.001–0.004 cm/s) (TVA 2016-TN5018). Midway Quarry confirmed in discussions with TVA that quarry dewatering is supported with a single, 125-horsepower pump rated for 1,000 gpm (3,785 lpm) (TVA 2025-TN12285).

- Seasonal Trends in Water Levels and Groundwater Flow Paths. The ESP EIS did not include seasonal maps of groundwater elevations and flow paths, but provided a TVA estimated average linear groundwater velocity of 3.9 ft/day (0.001 cm/s) from the area of the power block to the Clinch River. This estimate is based on groundwater elevation data from 2013–2014, of which maps are provided in the SSAR (TVA 2019-TN5855). The more recently updated PSAR provides maps of groundwater elevation and flow in the context of the new power-block area using the 2013–2014 data.
- Groundwater Levels in the Vicinity of the of the Optional Onsite Quarry. The ESP EIS did not assess the optional onsite quarry, therefore, groundwater data for this area of the site were not presented. Groundwater elevation data from December 1973 are available in the vicinity of the proposed quarry (borings 60–68) and indicate groundwater levels can fluctuate 10 to 25 ft (3 to 8 m) due to precipitation events (PMC 1982-TN6190).
- Onsite Groundwater Quality. No groundwater-quality data are presented in the ESP EIS for the area of the optional onsite quarry. However, prior to the construction of quarry, a detailed historical records evaluation and an intrusive ground investigation will be conducted to determine potential sources of contamination in the area of the proposed quarry and adjacent lands that may be disturbed during construction and operation (TVA 2025-TN12285). Groundwater monitoring will be conducted prior to and during the construction of the quarry, and all discharges from the dewatering activities will be controlled in a manner according to the terms of the NPDES permit (TVA 2025-TN12285). Figure 2-2 depicts the optional quarry footprint in relation to the NPDES-monitored discharge outlet from the blowdown holding pond, in addition to other onsite wastewater ponds and stormwater basins. The quarry design includes holding ponds within the disturbed area for managing runoff and wastewater generated by the quarry (TVA 2025-TN11927). The location of these

ponds and transfer method to the Clinch River or other onsite ponds have not been specified. A groundwater monitoring network and plan would be in place during plant operation which would include the area surrounding the proposed quarry, and would adhere to industry standards (e.g., NEI 07-07) (TVA 2025-TN12285).

- Well Cluster OW-422 Petroleum Product Contamination. Section 2.3.2.4 of the ESP EIS notes petroleum products were detected in OW-422L. The contamination is described as restricted to the area in the vicinity of the well, and the section states that the TVA would disposition the well cluster following a determination by TDEC. Since publication of the ESP EIS, TVA completed abandonment of the well cluster (OW-422U, OW-422L, and OW-422D) in 2023 in accordance with TDEC requirements (TVA 2025-TN11927).
- Closure of Abandoned CRBRP Groundwater Monitoring Wells. Section 4.2.3.2 of the ESP EIS notes that three abandoned wells used for groundwater monitoring characterization for the CRBRP could provide potential pathways for transport of contaminants to groundwater. Since publication of the ESP EIS, TVA completed the abandonment of four CRBRP wells in accordance with TDEC, Division of Water Resources regulations (TVA 2025-TN12285). Furthermore, TVA confirmed that any future wells that are not utilized for groundwater monitoring will be sealed and abandoned in accordance with TDEC regulations to prevent potential pathways for contamination (TVA 2025-TN12285).

Regarding groundwater, the review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information related to groundwater during the audit of the CP application. The staff did not identify any additional new information in its independent evaluation.

3.4.2.2 Environmental Impacts of Construction

The review team reached impact level determinations for all issues, which included groundwater use and groundwater quality. The impacts are described in Section 4.2 of the ESP EIS.

Groundwater-use Impacts

Section 4.2.2.2 of the ESP EIS determined that groundwater use impacts from construction would be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified new and significant information regarding a new, optional onsite quarry that was not previously assessed in the ESP EIS.

The review team assessed groundwater-use impacts with the inclusion of the new information related to the construction of the optional quarry. As previously stated, the proposed quarry is anticipated to intersect shallow groundwater within the Knox Formation that would ultimately discharge to the Clinch River. The quarry location (TVA 2025-TN11927), is to the north of the previously defined area of power block excavation, where the majority of groundwater control via dewatering was anticipated to occur. The subsurface conditions of the quarry and rate of dewatering are notably different from those of the powerbock area and therefore are not within the PPE as defined in the ESP EIS.

Due to the lack of site-specific data, the review team applied an analytical approach to estimate steady-state drawdown levels (see equation for gravity flow to fully-penetrating slots from a

single-line source in an unconfined aquifer, (USACE 2023-TN12426) as a simplified approximation of the groundwater drawdown at the nearest site boundary. Based on the 40 ac (16 ha) footprint of the quarry, the nearest site boundary is approximately 180 ft (55 m) to the east (TVA 2025-TN11927). The following parameters were used in the computation:

- Hydraulic Conductivity: 2–12 ft/day (0.001–0.004 cm/s) (TVA 2016-TN5018)
- Height of Water Table Above Lower Impervious Datum (H): 150 ft (45.7 m) is the depth at which fracturing greatly reduces (TVA 2016-TN5018)
- Height of Groundwater at the Base of the Quarry Pit Above Lower Impervious Datum (h_0): 67 ft (20.4 m)
- Distance to Seepage Source (L): 200 ft (61 m) based on the distance to the Clinch River from the quarry area.

Results from the analysis indicate groundwater levels at the site boundary could be drawn down about 6 ft (1.8 m) under steady-state conditions, although this estimate will vary based on the site-specific hydraulic conditions and over time. The analytical approach is sensitive to the source boundary term “L.” If aquifer storage is a large contributor to seepage compared to the Clinch River, the value may be larger than 200 ft (61 m). For “L” values between 300 and 1000 ft (91 and 305 m), the potential drawdown at the site boundary could range from 26 to 62 ft (8 to 19 m).

Several key assumptions were made for the analytical approach used, including:

- The aquifer is homogenous and isotropic.
- The aquifer has a defined recharge boundary.
- Groundwater flow is steady-state and horizontal.
- The slot can be idealized as a continuous line source.

Uncertainties of the site-specific hydrologic setting are not addressed by the model. For example, flow is largely controlled by the degree of fracturing and solutioning within the upper part of the Knox Formation, and flow over significant distances requires connected fractures over that distance (NRC 2019-TN6136). Steep bedding planes and thrust faults in the region may also mitigate the horizontal flow of groundwater and reduce the magnitude of impacts.

While several of the key assumptions are violated or have little data to support them, the simplified analysis provides a conservative approximation for bounding the magnitude of hydrologic alterations due to dewatering of the quarry. At the discharge rates specified for the optional quarry, the review team considers it likely that the upper portion of the Knox Formation will partially dewater in the northern area of the site. Furthermore, prolonged dewatering may reduce water levels near the river such that water from the river may flow toward the site (PMC 1982-TN6190). Based on the anticipated excavation depth, interaction with groundwater flow paths, and anticipated rate of dewatering during construction, the review team determined that there would be hydrologic alterations to groundwater due to quarry dewatering. The impacts of these alterations are discussed in relevant sections (e.g., terrestrial ecology).

As stated in Section 4.2.2.2 of the ESP EIS, the review team determined that the effects of dewatering would not be noticeable at the locations of offsite groundwater uses. No new or significant information was identified regarding existing groundwater users in the area of the site. The Clinch River to the west, east, and south of the site and the faulted/folded geologic

transition to the Conasauga Group to the north are likely to be effective hydrologic barriers to flow. Additionally, groundwater monitoring will be conducted prior to and during the construction and operation of the quarry, which will provide a basis to implement additional mitigation measures if necessary (TVA 2025-TN12285). Therefore, the review team determined that the conclusion of SMALL for groundwater use impacts remains bounding and valid.

Groundwater-quality Impacts

Section 4.2.3.2 of the ESP EIS determined that the groundwater-quality impacts of construction would be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified new information for groundwater characteristics that may impact the transport of contaminants and preconstruction groundwater-quality data. Based on the review of recent groundwater elevation data, updated groundwater parameters (gradient and velocity), and wells abandoned in accordance with local and State (i.e., TDEC) regulations, as described in Section 4.1, the review team determined that the information presented would not alter the conclusion presented in the ESP EIS. While groundwater is not anticipated to be used at the site, construction dewatering for site excavations and the optional quarry is anticipated to be a local activity. Groundwater may act as a preferential pathway for contaminant transport. As described in Section 4.2.3.2 of the ESP EIS, groundwater quality in the vicinity of the optional quarry will be monitored prior to and during construction, and any groundwater withdrawn during dewatering would be regulated as part of the NPDES permit issued by TDEC. Therefore, the review team determined that the conclusion of SMALL groundwater-quality impacts presented in the ESP EIS remains bounding and valid.

3.4.2.3 Environmental Impacts of Operation

The review team reached impact levels determinations for all issues, which included groundwater use and groundwater quality. The impacts are described in Section 5.2 of the ESP EIS.

Groundwater-use Impacts

Section 5.2.2.2 of the ESP EIS determined that the groundwater use impacts of operations would be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified and assessed an optional onsite quarry that will require dewatering during operation of CRN-1. Based on the permanent nature of dewatering of the optional quarry during operation and the estimated rate of dewatering discharge, as noted in Section 3.4.1, the ESP EIS is no longer bounding for determining the potential groundwater use conflicts due to operations-related dewatering.

The review team assessed groundwater-use impacts with the inclusion of the new information regarding the operation of the optional onsite quarry. Dewatering of the quarry pit is expected to continue through operation of CRN-1, therefore, anticipated changes in groundwater elevations and flow paths will persist long-term. As described in Section 3.4.2.1, the review team determined groundwater levels at the site boundary could be drawn down by approximately 6 ft (1.8 m), though this estimate will vary based on the site-specific hydraulic conditions and over

time. The review team determined that there would be hydrologic alterations to groundwater due to quarry dewatering, and the impacts of these alterations are discussed in relevant sections (e.g., terrestrial ecology).

The review team considered the location of offsite groundwater users in the context of the anticipated hydrologic alterations due to quarrying dewatering during operations. For those reasons described in Section 3.4.2.1, the review team determined that the conclusion of SMALL presented in the ESP EIS remains unchanged.

Groundwater-quality Impacts

Section 5.2.3.2 of the ESP EIS determined that the groundwater-quality impacts of operations would be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified and assessed an optional onsite quarry that will require dewatering during operation. Based on the expected groundwater quality in the vicinity of the optional quarry and the mitigating measures presented in Section 3.4.1 and 3.4.2.2 the review team determined that the conclusion of SMALL groundwater-quality impacts presented in the ESP EIS remains bounding and valid.

3.4.2.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the review team evaluated TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.4.2.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.2.1.2 of the ESP EIS identified groundwater water use impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts would be SMALL. Section 7.2.2.2 of the ESP EIS identified groundwater water quality impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts would be MODERATE, due to activities on the ORR that have noticeably altered the groundwater quality (NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own independent review for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause impacts on surface-water resources similar to those described in the ESP EIS. Therefore, the review team determined that

the cumulative impact from RFAs in the GAI on groundwater use would be SMALL, and groundwater quality would be MODERATE.

The review team further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. The review team determined that CRN-1 building and operation-related impacts to groundwater use and groundwater quality would be SMALL.

RFAs at the ORR site fall within the GAI determined for groundwater resources (Section 7.2.1.2 of the ESP EIS). As discussed in Section 3.4.2.1, the review team anticipates that impacts of dewatering during construction and operation would be limited to shallow groundwater at the CRN Site. Both the shallow groundwater at the CRN Site and at the ORR discharge to the Clinch River, therefore, interaction between the two sites is considered unlikely. Additionally, all discharges from dewatering operations at the CRN Site will be regulated by the site's NPDES permit. The occurrence of inadvertent spills would be minimized by the use of best management practices and any spills that could transport pollutants to groundwater would be controlled by emergency plans. Therefore, the review team determined that the incremental groundwater-related impacts from CRN-1 would not have a cumulative effect in the GAI.

Therefore, the ESP EIS cumulative impacts finding of SMALL to groundwater use and MODERATE to groundwater quality in the GAI remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.4.2.6 Conclusions

Based on the analysis in Section 3.4.2.2, the review team found the groundwater use and quality impacts from building activities would be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.4.2.3, the review team found the groundwater use and quality impacts from operation activities would be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.4.2.4, the review team found the groundwater impacts of decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.4.2.5, the review team found that the cumulative impacts from RFAs on groundwater use would be SMALL and on groundwater quality would be MODERATE. The NRC-authorized activities would not be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.5 Aquatic Ecology

3.5.1 Affected Environment

Aquatic habitats and species were described in Section 2.4.2 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 2.4.2 of the ESP EIS is

incorporated here by reference. Section 2.4.2.1 of the ESP EIS notes that the CRN Site is bordered on three sides by the Reservoir and contains multiple water features, including ponds, and perennial, intermittent, and ephemeral streams. Aquatic communities in the Watts Bar Reservoir were described as highly diverse for fish species, with a growing presence of zebra mussels. Perennial streams flow year-round and support aquatic life, while intermittent streams flow seasonally and may support aquatic life when water is present. In contrast, ephemeral streams flow only after rainfall and do not support aquatic life. The aquatic communities present in the four perennial streams and three intermittent streams onsite or within the BTA were not found to be robust and were observed to lack stable or suitable habitats to support fish communities. However, one adjacent perennial stream, Grassy Creek, was surveyed and found to support nine different fish species.

Section 2.4.2.2 of the ESP EIS did not address waterbodies that may be present for offsite transmission line corridors as those locations had not yet been identified.

Section 2.4.2.3 of the ESP EIS identified a number of recreationally important fish that are found in the Reservoir, and described the impact of two invasive mussel species, the Asiatic clam and Zebra mussel, that have significantly altered the native mussel communities in this region. Zebra mussels were particularly noted as increasing in number.

Protected species were discussed in Section 2.4.2.4 of the ESP EIS at both the Federal and State level. The three federally protected species that may be present in the vicinity of the CRN Site were not discussed further as there had been no evidence of their presence in the Reservoir, and their preferred habitats have degraded over several decades, or the species has been outcompeted for resources by invasive organisms. State-listed species that may occur within Roane County, Tennessee were listed but have not been observed since 1994.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Section 2.4.2 of the ESP EIS described the affected environment in relation to aquatic habitats and species. Regarding aquatic habitats and species, the review team used the following new and potentially significant information related to:

- Aquatic habitats that occur within the CRN Site and the project vicinity. The CP ER (2025-TN11927) provided updated habitat acre numbers that now include; the offsite 161 kV transmission corridor and the optional onsite quarry (not previously analyzed). With the exception of perennial and intermittent streams (also covered in Section 3.4), wetlands information is covered in Section 3.6. No additional ponds or open water were identified in Table 2.4-1 of the CP ER (2025-TN11927).
- Onsite and reservoir aquatic biological communities. Plankton, macrophytes, benthic macroinvertebrates, fish, including commercial and recreationally important ones, and non-native species are described in the ESP EIS. TVA conducted additional aquatic biota surveys in 2022 and 2023 and described updated information for macrophyte species and for non-native and nuisance species (TVA 2025-TN11927, TVA 2025-TN12284).
- Protected aquatic species. The ESP EIS described three federally protected aquatic species and considered a fourth species that was proposed for listing at that time as potentially occurring within the vicinity of the CRN Site. TVA only notes the proposed species as being within Roane County and within 5 mi (8 km) of the CRN Site and offsite areas (TVA 2025-TN11927). The review team pulled an updated list of species protected

under the Endangered Species Act of 1973 (ESA), potentially present at or in the vicinity (5 mi [8 km]) of the CRN Site (FWS 2025-TN12289).

Regarding aquatic habitats and species, the review team evaluated information provided in the CP ER and performed its own independent search for new and potentially significant information during the audit of the CP application. In addition to the new and significant information identified by TVA, the review team noted that the newly identified 161 kV offsite transmission corridor will permanently affect one perennial stream (STR09, known as Grassy Creek) and two intermittent streams (STR08 and STR017) that had not been evaluated in the ESP EIS. In April and May 2023, researchers sampled STR08 to identify any impacts to ESA-listed species, specifically the valley flame crayfish (*Cambarus deweesae*) (TVA 2025-TN12285). They did not sample the upper reaches of STR09 or STR17, which also lie within the new 161 kV transmission right-of-way (ROW). Although they did sample the lower reaches of STR09. They did not detect any listed species during sampling of STR08 but collected three crayfish species (*Cambarus cf. striatus, Cambarus bartonii cavatus*, and *Cambarus* cf. *dubius*) and two fish species (*Semotilus atromaculatus* and *Rhinichthys obtusus*) and in STR09 common species of fish collected included *Cottus carolinae, Lepomis macrochirus, Semotilus atromaculatus, Lepomis cyanellus, Micropterus salmoides, Campostoma oligolepis, Percina caprodes, Etheostoma tennesseense*, and *Lepomis gulosus* (TVA 2025-TN12285). The optional onsite quarry is expected to intercept shallow groundwater that normally discharges to onsite waterways and has the potential to permanently affect one additional WWC (EPH10). With or without the onsite quarry, the streams STR06 and STR07 would be permanently impacted from building activities (see Section 3.4.1.1). The WWC has flowing water only during or for a short duration after precipitation events and contains only limited habitat and biota.

The review team notes that in July 2022, researchers conducted an aquatic macrophyte survey in the Reservoir and Melton Hill Reservoir (TVA 2025-TN11927). The survey combined aerial observations with ground surveys to assess the abundance, distribution, and composition of aquatic plant communities. Surveyors identified eight macrophyte species in the Reservoir and mapped almost 36 ac (14.6 ha) of plant growth near the CRN Site. Native coontail (*Ceratophyllum demersum*) and water stargrass (*Heteranthera dubia*) dominated the Reservoir, with the densest water stargrass just below Mean Higher High Water at CRM 22.6 (upstream of the proposed intake). Coontail was most abundant downstream, often co-occurring with water stargrass. Other species present include State-listed Nuttal's waterweed (*Elodea nuttallii*), non-native hydrilla (*Hydrilla verticillate*), non-native Eurasian watermilfoil (*Myriophyllum spicatum)*, native small pondweed (*Potamogeton pusillus*), native southern naiad (*Najas guadalupensis*), and native sago pondweed (*Stuckenia pectinata*) (NRC 2025-TN12331). In Melton Hill Reservoir (upstream), surveyors recorded 11 species, with the invasive Eurasian watermilfoil as the most abundant followed by water stargrass. Three of these species which include coontail, water stargrass, and the State-listed Nuttall's waterweed are found in the area where the intake will be constructed, there were no macrophytes found in the area where the discharge will be constructed (TVA 2025-TN12285). When the ESP EIS was written no macrophytes were observed during sampling above and below the CRN Site.

The review team also identified changes to the federally listed aquatic species in the vicinity of the CRN Site and offsite areas including the Alabama lampmussel (*Lampsilis virescens*), pink mucket (*Lampsilis abrupta*), spectaclecase (*Cumberlandia monodonta*), Anthony's riversnail (*Athearnia anthonyi*), slender chub (*Erimystax cahni*), spotfin chub (*Erimonax monachus*), and yellowfin madtom (*Noturus flavipinnis*) (FWS 2025-TN12289). These 7 protected aquatic species all have ranges identified by U.S. Fish and Wildlife Service (FWS) that overlap the project area. The three fish species and spectaclecase have critical habitat identified but none

of the critical habitats identified overlap with the CRN Site. The review team have determined that none of the ESA-listed aquatic species are present in the action area and therefore there would be no effect on them, for additional information see Appendix F. The review team also confirmed that there were no new essential fish habitats or marine sanctuaries within the action area.

Two cooling-water intake designs are described in the CP ER (2025-TN11927) and will be constructed at CRM 17.9 (TVA 2025-TN12285). One option is to avoid in-water construction with a recessed intake on the shoreline wherein the design is CWA Section 316(b) compliant, the site disturbance footprint for the intake is less than 0.5 ac (0.2 ha), and the excavation is two-phased with the removal of the shoreline material (less than 350 y^3 [268 m^3]) performed in the second phase to complete the channel connection into the river (TVA 2025-TN12285). The other design will require construction of a submerged intake out into the Reservoir channel, a cofferdam will be required for the installation of the intake and screens, with onshore vertical shaft construction connecting to the intake via micro-tunnel boring to the intake location. The design is CWA 316(b) compliant, wherein an approximately 55 ft × 20 ft (16.8 m × 6 m) cofferdam will be built along the bank for a period of about 6 months to allow installation of intake screens, the site disturbance footprint for the intake will be less than 10,000 ft^2 (929 m^2) onshore and cover approximately 1,100 ft^2 (102 m^2) of the Reservoir, and approximately 100 ft^2 (9.3 m^2) of river bottom will be dredged for the intake screens removing about 1,300 y^3 (994 m^3) of material (TVA 2025-TN12285).

Additional details about the discharge are described in the CP ER (2025-TN11927), which are within the assumptions assessed in the ESP EIS. The discharge structure will be constructed at CRM 15.55, with dredge material removed from the river bank to the diffusers to install the discharge line being less than 2,272 y^3 (1737 m^3), of which approximately 591 y^3 (452 m^3) will be from the river bottom. The rip rap cover will be 32 ft wide and 4 ft deep (9.8 m × 1.2 m) and will extend from the shoreline to the end of the diffusers. A cofferdam will be constructed to allow the excavation along the river bank to occur in a dry condition but river bottom will be dredged to create a trench approximately 22 ft wide and 20 in. deep (6.7 m × 51 cm) for the horizontal piping, and the top of the diffuser piping will be approximately 2 ft (0.6 m) above the river bottom (TVA 2025-TN12285).

3.5.2 Environmental Impacts of Construction

In the ESP EIS, the review team reached impact level determinations for all issues, which included aquatic habitats and species impacts from construction. The impacts are described in Section 4.3 of the ESP EIS and discussed further here for new information.

3.5.2.1 Habitat and Species Impacts

Section 4.3.2 of the ESP EIS described the construction-related impacts to aquatic habitats and species and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team reviewed new aquatic community information for streams that will be permanently affected by the 161 kV transmission corridor. Two intermittent streams (STR08 and STR17 totaling 1,301 linear ft [397 m]) and one perennial stream (STR09, 384 linear ft [117 m]) will be permanently affected by construction of this corridor. TVA will use streamside management zone provisions to reduce impacts to the surrounding areas (TVA 2022-TN10340). BMPs for in-water

construction work can be found in, “A Guide for Environmental Protection and Best Management Practiced for Tennessee Valley Authority Construction and Maintenance Activities,” (TVA 2022-TN10340) and will be developed on a case-by-case basis in compliance with permits issued (TVA 2025-TN12285). The optional onsite quarry also has the potential to permanently affect WWC EPH10, and streams STR06 and STR07 were expected to have permanent impacts due to construction activities regardless of the onsite quarry. The EPH10 has flowing water only during or for a short duration after precipitation events and contains only limited aquatic habitat and biota. Based on assumptions of the preliminary groundwater analysis (Sections 3.4.2.2 and 3.4.2.3) and the distance, topography, and sub-basin of the aquifer to be impacted the NRC staff does not anticipate any noticeable impacts to the aquatic habitats in permanent streams to the northeast of the potential onsite quarry location or to the Clinch River. TVA will monitor groundwater prior to and during the construction of the potential quarry and implement stormwater controls and discharge under the site NPDES program (TVA 2025-TN11927, TVA 2025-TN12285). The review team’s identification of changes to the federally listed species in the vicinity of the CRN Site and offsite areas is similar to the impact conclusions in the ESP EIS, in that it is likely that construction activities would not have a noticeable impact due to the lack of specific information noting these species occurring in the vicinity. Several macrophytes have been found in the area where the intake is planned to be constructed including coontail, water stargrass, and the State-listed Nuttall’s waterweed (TVA 2025-TN12285). Use of a cofferdam, micro-tunnel boring, and onshore intake construction is not expected to result in noticeable impacts to aquatic habitats and species and any impacts would be further reduced by the use of in-water construction BMPs. Based on the potential direct and indirect impacts from construction on aquatic habitats and species the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.5.2.2 Transmission Line Corridor

Transmission lines would be installed as overhead powerlines, spanning streams and wetlands, which drain to the Reservoir as described in the CP ER (2025-TN11927). Permanent impacts to streams within the new 161 kV transmission line corridor will be localized and minimized by following streamside management provisions outlines in “A Guide for Environmental Protection and Best Management Practices for Construction and maintenance Activities” (TVA 2022-TN10340). All hydrologic alterations to streams would comply with required permits which include a CWA Section 404 permit from USACE and an ARAP from TDEC (TVA 2025-TN11927). TVA will also implement a SWPPP that meets TDEC construction permit discharge requirements and uses BMPs to reduce erosion and stabilize sediments (TVA 2025-TN11927). Based on the information provided, and BMPs which will be implemented in the new 161 kV transmission line corridor, the impacts to the transmission line corridor, which was not analyzed in the ESP, would be SMALL.

3.5.3 Environmental Impacts of Operation

The review team was not able to make a determination about intake and discharge impacts during operations, however, it was able to reach impact level determinations for onsite and offsite facility and transmission corridor maintenance near aquatic habitats impacts from operations. The impacts are discussed in Section 5.3.2 of the ESP EIS. This SEIS evaluates the potential impacts of a CP on the environment; therefore, a detailed analysis of the impacts of operations of CRN-1 will be provided during the subsequent review of the application for the OL. The analysis below provides a summary of possible operational impacts.

3.5.3.1 Aquatic Habitats and Species

Section 5.3.2.1 of the ESP EIS described the site and vicinity aquatic habitats that would be managed maintained during operations and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified that the continued dewatering of the potential onsite quarry during CRN-1 operations at a rate of 1,000 to 3,000 gpm (3,785–11,356 lpm) could result in potential effects extending to nearby onsite waterways (TVA 2025-TN11927). With or without the onsite quarry, the streams STR06, STR07, and P04 would be permanently impacted from building activities. The WWC ephemeral stream EPH10 will likely also be permanently impacted due to dewatering activities at the optional onsite quarry but, has flowing water only during or for a short duration after precipitation events and contains only limited aquatic habitat and biota. Any new or additional data to assess operational impacts based on TVA's groundwater and surface water monitoring would be reevaluated when TVA submits an application for an OL (TVA 2025-TN12285). Based on the review of information provided in the CP ER (2025-TN11927), the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.5.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the review team evaluated TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not yield any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.5.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.3.2 of the ESP EIS identified aquatic habitats and species impacts that could occur based on projects outlined in Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts to aquatic habitats and species would be LARGE, largely due to past river impoundments, past toxic releases, and introduction of invasive species. The review team for the ESP EIS determined that NRC-authorized activities would not be a significant contributor to the cumulative impact (NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the review team found to be reasonable, as stated in Section 1.4.2. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own search for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause impacts on aquatic resources similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact on aquatic resources from RFAs in the GAI would be LARGE.

The review team further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. In Sections 3.5.2 and 3.5.3, the review team determined that the impacts from building and operating the proposed BWRX-300 reactor on the CRN Site on aquatic habitats and species impacts would be SMALL. Because the incremental impacts of CRN-1 on aquatic resources are SMALL and the effects are expected to be localized, the review team concludes that building and operating CRN-1 would not noticeably contribute to cumulative effects on aquatic habitats and species in the GAI.

Therefore, the ESP EIS finding of LARGE for cumulative impacts in the GAI remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.5.6 Conclusions

Based on the analysis in Section 3.5.2, the review team found the impacts on aquatic habitats and species from building activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.5.3, the review team found the impacts on aquatic habitats and species from operation activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.5.4, the review team found the impacts on aquatic habitats and species from decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.5.5, the review team found that the cumulative impacts on aquatic habitats and species from RFAs would be LARGE and the NRC-authorized activities would not be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.6 Terrestrial Ecology

3.6.1 Affected Environment

Terrestrial habitats, wetlands, wildlife, important species and habitats, invasive plant species, terrestrial pests and disease vectors, and species of commercial or recreational value were described in Section 2.4.1 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR Part 51. 92(e)(2) (TN10253), Section 2.4.1 of the ESP EIS is incorporated here by reference. The CRN Site was previously disturbed from farming and the 1982 CRBRP. The dominant plant communities and habitat types on the CRN Site are mixed evergreen-deciduous forest, deciduous forest, old-field community, and evergreen forest, while the dominant plant communities on the BTA are deciduous forest and herbaceous community. Overall, the project area primarily consists of forest and herbaceous communities in areas of previous disturbance.

Wetlands were delineated in 2011 and 2015 on the CRN Site and BTA, and the TVA Rapid Assessment Method was used to determine wetland functionality. Wetlands along offsite underground 69 kV transmission line route were categorized using the National Wetlands Inventory but a formal delineation for the transmission line corridor would be conducted as part of the CP application.

Section 7 consultation for species listed under the ESA has been initiated by TVA. This was an outstanding issue from the ESP EIS as there was no action for FWS to consult on during the ESP stage.

There is no new and significant information for Section 2.4.1.1 of the ESP EIS which described the affected environment in relation to ecoregions, landcover, and previous site disturbance.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Section 2.4.1.10 of the ESP EIS described the affected environment in relation to terrestrial resources in offsite areas. Regarding terrestrial resources near offsite areas, the review team used the following new and potentially significant information related to:

- Other Transmission Corridors. The ESP EIS references the upland habitat above the proposed underground 69 kV transmission corridor. The development of the 69 kV transmission line is not necessary to support operation of CRN-1 and is no longer being considered by TVA as part of the CRN-1 (TVA 2025-TN11927). Instead, TVA proposes a new offsite 161 kV transmission corridor (not previously analyzed).

The review team evaluated information provided in the CP ER and performed its own independent search for new and potentially significant information during the audit of the CP application. In addition to TVA's findings, the review team identified that the offsite transmission corridors considered in the ESP EIS included existing lines that will need uprating, reconductoring, or rebuilding as a result of the additional load. Potential transmission line upgrades beyond the first interconnection are dependent on future activities associated with other TVA power-generation assets. As such, TVA considers those improvements as system maintenance activities and impacts were not described in the CP.

In addition, the ESP EIS stated that the backfill plan and the required material properties identified by analyses performed in support of the CP. The options for obtaining 400,000 y^3 (305,822 m^3) of borrow material are using the Midway Quarry or quarrying onsite for required borrow material.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Sections 2.4.1.5 through 2.4.1.6 of the ESP EIS described the affected environment in relation to upland plant communities and habitat types in relation to the CRN Site, BTA, and the underground 69 kV transmission line route. Regarding upland plant communities and habitat, the review team used the following new and potentially significant information related to:

- Character and Quality of Upland Habitats. The ESP EIS states that the upland communities within the CRN Site and BTA were established from aerial photography and refined during field surveys conducted in 2011 and 2013. A 2021 refined coverage map of the dominant

habitats and other land cover types on the CRN Site and the associated offsite 161 kV transmission corridor and BTA was provided (TVA 2025-TN11927).

- Cedar Glade or Barren. TVA's ESP ER describes a 1.4 ac (0.57 ha) cedar glade located in the CRN Site within the existing transmission line corridor. The 2020 and 2021 vegetation field surveys identified an additional 5 ac (2.0 ha) cedar glade near the intake area of the CRN Site with many notable herbaceous species characteristic of cedar glades (TVA 2019-TN5854, TVA 2025-TN11927).
- The 161 kV Transmission Line Habitat. The ESP EIS references the upland habitat within the proposed ROW for an underground 69 kV transmission line; however, TVA no longer proposes to build that transmission line. Instead, TVA plans to build a 161 kV overhead transmission line within a new ROW extending 0.6 mi (1 km) north of the site across the Grassy Creek HPA and DOE-managed land along Bear Creek Road and tie in with an existing 161 kV line. The 2020 and 2021 field surveys identified a deciduous calcareous wetland forest within this new proposed ROW containing populations of State-listed threatened pale green orchid (*Platanthera flava* var. *herbiola*) and State-listed endangered rigid sedge (*Carex tetanica*). The dominant plant communities in this new offsite ROW are mixed evergreen-deciduous forest, deciduous forest, and wetlands (TVA 2025-TN11927).

Regarding upland plant communities and habitat, the review team evaluated information provided in the CP ER and performed its own independent search for new and potentially significant information during the audit of the CP application. In addition to what TVA identified, the review team noted that the National Land Cover Dataset was recently updated in 2021 (NRC 2025-TN12331).

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Sections 2.4.1.6 through 2.4.1.8 of the ESP EIS described the affected environment in relation to wetlands on the CRN Site, BTA, and the underground 69 kV transmission line route, as well as floodplains. Regarding wetlands and floodplains, the review team used the following new and potentially significant information related to:

- Wetlands Distribution and Functional Value. The ESP EIS references the 2011 and 2015 delineations where 12 wetlands (totaling ~15.5 ac [6.3 ha]) were present on the CRN Site and 5 wetlands (totaling 10.2 ac [4.1 ha]) on the BTA. In 2021 and 2023, TVA reviewed the previous wetlands delineations, and delineated a total of 30 wetlands (totaling 30.9 ac [12.5 ha]) on the CRN Site, and 10 wetlands (totaling 7.2 ac [2.9 ha]) on the BTA (TVA 2025-TN11927). TVA also delineated wetlands in the newly proposed ROW for the offsite 161 kV transmission line and delineated 6 wetlands (totaling an area of 3.6 ac [1.5 ha]).
- Wetland Functional Value. The ESP EIS references the TVA Rapid Assessment Method used to assess wetland conditions during the 2011 and 2015 delineations. The TVA Rapid Assessment Method scores using six criteria and ranks the wetlands as Category 1 (limited quality wetlands), Category 2 (moderate quality), or Category 3 (high quality). There were two wetlands classified as high quality on the CRN Site and one on the BTA. All other wetlands were moderate or low quality. For the delineations conducted in 2021 covering the CRN Site, BTA, and offsite transmission corridor, TVA qualified the wetland functions using a different method, the Tennessee Rapid Assessment Method, which ranks wetlands into three categories (low, moderate, or exceptional) based on six metrics. There was one exceptional ranked wetland on the CRN Site, while the rest of the wetlands were ranked low or moderate (TVA 2025-TN11927).

- Federal and State Jurisdiction. The ESP EIS mentioned that USACE will need to issue a jurisdictional determination verifying which wetlands and other waters are jurisdictional under the CWA prior to TVA receiving any DA Permit (i.e., CWA Section 404 certification). USACE issued a preliminary jurisdictional determination and approved jurisdictional determination for the CRN Site on April 9, 2025 (USACE 2025-TN12286). The jurisdictional wetlands are shown in Figure 3-7. In April 2025, Tennessee State Congress approved bill HB0541/SB0670, which updates the State permit and mitigation requirements for isolated wetlands (NRC 2025-TN12331). Conservatively, TVA has assumed that all identified wetland features are under the jurisdictions of the State for the ER impacts (TVA 2025-TN11927). Consideration of conditions related to the CWA Section 401 certification. As the ESP EIS did not authorize any activities, a CWA Section 401 certification was not required at the time. However, this certification is required prior to the issuance of a CP.

Regarding wetlands and floodplains, the review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information related to wetlands and floodplains during the audit of the CP application. The review team did not identify any further new information in its independent evaluation.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Sections 2.4.1.9 and 2.4.1.11 of the ESP EIS described the affected environment in relation to wildlife surveys and important species and habitat. Regarding wildlife and important species and habitat, the review team used the following new and potentially significant information related to:

- Federal Consultation. The ESP EIS addressed a 2017 list obtained from FWS of federally listed, proposed, and candidate species and critical habitat thought to potentially occur in the vicinity of the CRN Site at that time. The FWS specifically requested that the review team consider the little brown bat (*Myotis lucifugus*) and tricolored bat (*Perimyotis subflavus*), species which at that time were thought to be likely added in the future to the list of species protected under the ESA. The NRC staff prepared a draft Biological Assessment (BA) included as an appendix in the ESP EIS. TVA submitted their own BA to FWS for review in January 2025 and received a Biological Opinion in July 2025 (TVA 2025-TN11927).
- Listing Status Changes Within ESA. The ESP EIS identified three federally listed species: gray bat (*Myotis grisescens*) as endangered, Indiana bat (*Myotis sodalis*) as endangered, and northern long-eared bat (*Myotis septentrionalis*) as threatened. In addition, there were two species identified as petitioned for listing under the ESA including the tri-colored bat and little brown bat. Several of the listing statuses have changed within the ESA. The northern long-eared bat has since been reclassified as endangered in 2022, and the tricolored bat has been proposed as endangered (TVA 2025-TN11927). At the time of this SEIS, the little brown bat has not been listed.

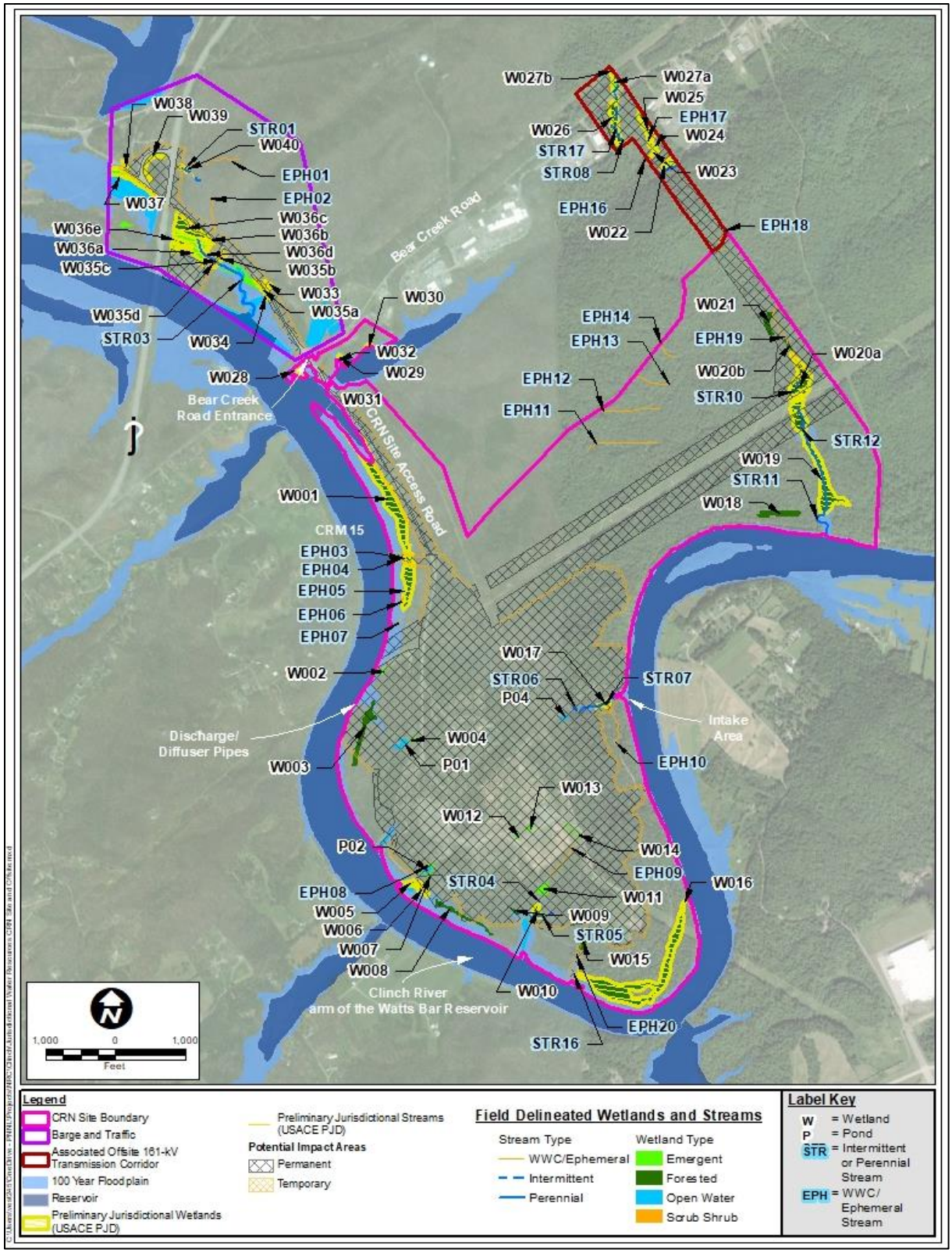

Figure 3-7 The Streams and Wetlands in the Clinch River Nuclear Site That Are Within the Preliminary Jurisdictional Determination Dated April 9, 2025. Source: TVA 2025-TN11927.

- Additional ESA-Listed Species Within Project Area. The ESP EIS listed three species under the ESA and two proposed to be listed. Since the publication of the ESP EIS, the number of species in the area under ESA protection has expanded. The FWS Information for Planning and Consultation (IPaC) (FWS 2025-TN12289) website now also records the monarch butterfly (*Danaus plexippus*; proposed threatened), the eastern hellbender (*Cryptobranchus alleganiensis*; proposed endangered), and the whooping crane (*Grus americana*; nonessential experimental population) within the project area. In addition, IPaC lists two federally listed plants: white fringeless orchid (*Platanthera integrilabia*; threatened) and Virginia spiraea (*Virginia Spiraea*; threatened) to potentially occur within the project area (TVA 2025-TN11927).
- Indiana Bats and Northern Long-Eared Bat Summer Roosting Habitat. The ESP EIS references the 2011 survey on the CRN Site that identified suitable roosting habitat for the Indiana bat and northern long-eared bat, and the 2015 vegetation survey on the BTA found the deciduous forest to be suitable habitat for both species. Field surveys conducted in 2021 identified potentially suitable summer roosting habitat for Indiana bat and northern long-eared bat across the CRN Site, though no Indiana bats or northern long-eared bat were captured or heard during the 2021 survey (TVA 2025-TN11927).
- Gray Bat Mist Net Survey and Transitional Roosting Cave. The ESP EIS states only one individual was captured in mist net surveys in 2011 and that no caves are known to be located on the CRN Site or BTA; however, Rennies Cave and 2-Batteries Cave are located within the Grassy Creek HPA, and there are three additional caves/karst openings near Grassy Creek. The review team concluded that the species likely uses the project area for foraging but does not roost there. Four gray bats, three of which were pregnant, were captured during mist net surveys in 2021; one of these was captured on the CRN Site and three were captured on adjacent DOE property near Jones Island Road approximately 1.7 mi (2.7 km) northeast from the proposed CRN-1 location (TVA 2025-TN12285). In addition, a transitional roosting cave for the gray bat was identified in 2021 across the Reservoir from the project area. Winter cave surveys documented one gray bat and five tricolored bats roosting inside the cave, but summer emergence counts did not observe bats emerging (TVA 2025-TN11927).
- Tricolored Bat Maternity Site and Updated Surveys. The ESP EIS mentioned that three tricolored bats were captured during 2011 mist net surveys on the CRN Site, indicating that there is a possible nearby hibernaculum. Field surveys conducted in 2021 identified potentially suitable summer roosting habitat throughout the CRN Site for tricolored bat. During the 2021 mist net surveys, a post-lactating female tricolored bat was captured on DOE property approximately 1.7 mi (2.7 km) from the site near Jones Island Road, indicating there is a maternity site in the vicinity of the project area (TVA 2025-TN12285). In addition, a small number of tricolored bats were observed inside three caves on the Grassy Creek HPA during cave surveys in 2021 (TVA 2025-TN11927).
- State-Listed Species. The ESP EIS described the little brown bat, sharp-shinned hawk (*Accipiter striatus*), shining ladies'-tresses (*Spiranthes lucida*), spreading false foxglove (*Aureolaria patula*), and American ginseng (*Panax quinquefolius*) as rare species in Tennessee that were observed or had suitable habitat within the project area within a 2 mi (3 km) radius of the CRN Site and BTA. The TVA Regional Natural Heritage database indicates that 19 plant species and 10 terrestrial wildlife species tracked by the State of Tennessee have been reported within 5 mi (8.0 km) of the CRN Site. New species reported for the area but previously not identified in the ESP EIS include rigid sedge, pale green orchid, Godfrey's thoroughwort (*Eupatorium godfreyanum*), and Ozark bunchflower (*Veratrum woodii*). Of these species, spreading false foxglove (*Aureolaria patula*), pale

green orchid, and rigid sedge were observed during 2021 field surveys in the new 161 kV transmission line corridor (TVA 2025-TN11927).

- Updated 2021 Vegetation Survey. The ESP EIS stated that spreading false foxglove was located in 2000 at the southern end of the BTA but was not observed in recent surveys. During the 2021 surveys that covered the CRN Site, associated 161 kV offsite transmission corridor, and in proximity to the offsite barge facility areas, the false foxglove was observed to be spreading in the steep calcareous deciduous forest associated with bluffs along the Reservoir, while approximately 0.5 ac (0.2 ha) of rigid sedge and several hundreds of pale green orchid were found within the 161 kV transmission corridor (TVA 2025-TN11927).
- Little Brown Bat Suitable Habitat. The ESP EIS mentioned that while little brown bat was not captured during the 2011 mist net surveys, acoustic surveys indicate a possible hibernaculum in the vicinity of the CRN Site or BTA. TVA delineated suitable roosting habitat for State-listed little brown bat in mature forests on the CRN Site and associated offsite areas (TVA 2025-TN11927).

Regarding wildlife habitat and important species and habitats, the review team evaluated information provided in the CP ER and performed its own independent search for new and potentially significant information during the audit of the CP application. The review team did not identify any further new information in its independent evaluation.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Sections 2.4.1.12 through 2.4.1.14 of the ESP EIS described the affected environment in relation to invasive species, terrestrial pests and disease vectors, and species of commercial or recreational value. Regarding invasive plants and terrestrial pest and disease vectors, the review team used the following new and potentially significant information related to:

- Invasive Plants on the 161 kV Transmission Corridor. The ESP EIS identified multiple invasive plant species on the CRN Site and the BTA. Vegetation surveys conducted in 2020 and 2021 found similar invasive species on the offsite 161 kV transmission corridor; however, there were fewer invasive populations (TVA 2025-TN11927).
- Distribution and Extent of Disease Vector, Invasive, and Pest Animal Species. The ESP EIS identified white-nose syndrome, transmitted by bats, as the only potential disease vector within the project area. Two species of imported fire ants, the black fire ant (*Solenopsis richteri*) and the red fire ant (*Solenopsis invicta*) were observed on the CRN Site. TVA follows the quarantine guidelines by restricting the movement of certain “articles,” mainly soil or baled hay and straw stored in contact with the ground, in areas where the fire ant is thought to occur (TVA 2025-TN11927). In addition, the feral hog (*Sus scrofa*) is another non-native, nuisance animal species that has the potential to occur on the CRN Site.

Regarding invasive species, terrestrial pest and disease vectors, and species of commercial or recreational value, the review team evaluated information provided in TVA’s ER and performed its own independent search for new and potentially significant information during the audit of the CP application. The review team did not identify any further new information in its independent evaluation.

3.6.2 Environmental Impacts of Construction

The review team reached impact levels determinations for site, vicinity, and offsite terrestrial resource issues from construction. The impacts are described in Section 4.3.1 of the ESP EIS. The review team initiated an informal consultation under Section 7 of the ESA for the ESP EIS; however, since the ESP did not authorize activities that may affect listed species, Section 7 consultation was not required. As noted above in Section 3.6.1, TVA initiated its own Section 7 consultation in January 2025 for this proposed action.

3.6.2.1 Onsite and Offsite

3.6.2.2 Site and Vicinity Impacts

Section 4.3.1.1 of the ESP EIS described the construction-related impacts to site and vicinity and offsite areas and determined the overall impacts to be MODERATE (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did identify additional new information regarding the site and vicinity.

Approximately 466.7 ac (188.9 ha) of terrestrial habitats on the CRN Site would be disturbed, which is greater than the 327 ac (132.3 ha) of impacts estimated in the ESP EIS. The temporary losses of terrestrial habitat on the CRN Site have decreased from 167 ac (67.6 ha) in the ESP EIS to 14.6 ac (5.9 ha) in the CP. The forest in the onsite transmission corridor will have 4.2 ac (1.7 ha) of woody wetlands converted to emergent/herbaceous wetlands, and 79.2 ac (32.1 ha) of forest will be converted from forested to scrub/shrub or herbaceous vegetation (TVA 2025-TN12285). The 5 ac (2 ha) cedar glade habitat that was found in the 2021 vegetation survey will be permanently impacted as the intake structure will be in this location (TVA 2025-TN12285).

Meanwhile, permanent and temporary terrestrial habitat impacts in the BTA have been reduced from the ESP EIS estimates. The permanent impacts have decreased from 30 ac (12.1 ha) to 21.8 ac (8.8 ha), and the temporary impacts from 15 ac (6.1 ha) to 2.9 ac (1.2 ha).

TVA will implement multiple post-construction sustainability measures including removal of invasive species, restoring the remanent cedar glade habitats onsite, improving host plants and foraging habitat for pollinators, and adaptive land management practices (TVA 2025-TN11927, TVA 2025-TN12285). Inclusion of the new transmission corridor within the Grassy Creek HPA allows for further monitoring and research of the habitats and species, as well as adaptive management practices.

TVA intends to manage the vegetation within the transmission corridors in accordance with TVA's *Transmission System Vegetation Management Final* Programmatic *Environmental Impact Statement* (TVA 2019-TN12287) only when and if a court of competent jurisdiction dissolves the *Sherwood* injunction, and with *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (TVA 2022-TN10340, TVA 2025-TN11927). Currently only danger trees (trees that are close enough to electric conductors to pose substantial risk of electric shock, fire, or power outages) are removed from the transmission line ROWs to comply with North American Electric Reliability Corporation requirements. If the Sherwood injunction is lifted, comprehensive vegetation management of the ROW as outlined in the Programmatic Vegetation Management Environmental Impact Statement and the tiered Environmental Assessment: Transmission System Routine Periodic Vegetation Management Fiscal Year 2025 and 2026 will be conducted (TVA 2025-TN12285).

TVA now estimates in its CP ER that approximately 4.3 ac (1.7 ha) of wetlands would be filled, 4.2 ac (1.7 ha) would be converted from forested to herbaceous or shrub/scrub, for a total of 9.2 ac (3.7 ha) of wetlands permanently impacted and 0.6 ac (0.3 ha) of wetlands will be temporarily impacted across the CRN Site. This is an increase from the projected 1.2 ac (0.5 ha) of permanent impacts in the ESP EIS. The optional onsite quarry also has the potential to permanently affect wetland W017, which was expected to be impacted from building activities regardless of the onsite quarry. Based on assumptions of the preliminary groundwater analysis (Sections 3.4.2.2 and 3.4.2.3) and the distance, topography, and contributing area, the review team does not anticipate any noticeable impacts to the terrestrial habitats in wetlands to the northeast of the potential onsite quarry location. TVA will monitor groundwater prior to and during the quarrying activities, implement stormwater controls, and manage discharges under the site's NPDES program (TVA 2025-TN11927, TVA 2025-TN12285). The one exceptionally rated wetland would be converted from forested wetland to herbaceous or scrub/shrub wetland. On the BTA, approximately 1.3 ac (0.5 ha) of wetlands will be permanently impacted and 0.4 ac (0.2 ha) temporarily impacted. This is greater than the estimated 1.2 ac (0.5 ha) of permanent impacts in the ESP EIS. TVA will implement a wetland and stream mitigation plan in accordance with USACE and TDEC requirements (TVA 2025-TN11927).

3.6.2.3 Offsite Areas Impact

Section 4.3.1.2 of the ESP EIS described the construction-related impacts on offsite and onsite impacts terrestrial areas and determined the overall impacts to be MODERATE (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did identify additional new information regarding impacts on the new 161 kV transmission corridor.

Most of the potential impact within the 280 ft (85.3 m) wide corridor would be permanent conversion of forested habitat to a mixture of herbaceous and shrub/scrub habitats. TVA now estimates the forest in the offsite 161 kV transmission line corridor will be converted to approximately 21.7 ac (8.8 ha) herbaceous vegetation or scrub/shrub habitat and 2.9 ac (1.2 ha) of emergent/herbaceous wetlands. On the offsite transmission corridor 3.6 ac (1.5 ha) of wetlands will be converted from forested to herbaceous or shrub/scrub (TVA 2025-TN11927). TVA would use targeted herbicide applications or mechanical means to maintain herbaceous vegetation in the 161 kV transmission corridor.

Approximately 12.7 ac (5.1 ha) of potentially affected area includes deciduous calcareous upland and wetland forest that contains the State-listed plant species, rigid sedge, and pale green orchid. Impacts will be minimized by designing the offsite transmission line to avoid these species and their habitat to the greatest extent possible.

Combined Onsite and Offsite Impacts

Based on the impact levels and conversion within the CRN Site and vicinity, as well as the scope of offsite transmission lines in Sections 3.6.1 and 3.6.2, the review team determined that the incremental impacts of CRN-1 building activities would be MODERATE and therefore, the conclusion of a combined impact of MODERATE presented in the ESP EIS remains bounding and valid.

3.6.2.4 Important Species Impacts

Section 4.3.1.3 of the ESP EIS described the construction-related impacts on important species and habitats. The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified additional new information regarding changes in the ESA-listed species and potential to be onsite. A more detailed impact analysis of the ESA-listed species is provided in Appendix F.

3.6.3 Environmental Impacts of Operation

The review team reached impact levels determinations for site, vicinity, and offsite terrestrial resource issues from operations. The impacts are discussed in Section 5.3.1 of the ESP EIS. This SEIS evaluates the potential impacts of a CP on the environment; therefore, a detailed analysis of the impacts of operations of CRN-1 will be provided during the subsequent review of the application for the OL. The analysis below provides a summary of possible operational impacts.

3.6.3.1 Onsite and Offsite

3.6.3.2 Site and Vicinity Impacts

Section 5.3.1 of the ESP EIS described the operational-related impacts of cooling towers, transmission lines, transmission line corridor maintenance, vehicle traffic, noise, and electromagnetic fields on flora and fauna and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified that the continued dewatering of the potential onsite quarry at a rate of 1,000 to 3,000 gpm (3,785–11,356 lpm) during CRN-1 operations could result in potential effects extending to nearby onsite wetlands (TVA 2025-TN11927). Regardless of the onsite quarry, wetland W017 would be permanently impacted from building activities. Any new or additional data to assess impacts during CRN-1 operations based on TVA's groundwater and surface water monitoring would be reevaluated when TVA submits an application for an OL (TVA 2025-TN12285).

Based on the review of sustainability measures and given that manufacturing labels will be followed for the addition of sulfuric acid within the cooling water, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid. A more detailed analysis of potential onsite impacts would be conducted during the environmental review for an OL, if TVA submits an OL application.

3.6.3.3 Offsite Area Impacts

Section 5.3.2 of the ESP EIS described the operational-related impacts of offsite areas to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new

information. Based on the vegetation maintenance plan for transmission corridors, the review team determined that the offsite area impacts would be SMALL.

3.6.3.4 Important Terrestrial Species and Habitats Impacts

Section 5.3.3 of the ESP EIS described the operational-related impacts on important terrestrial species and habitats and determined the impacts to be SMALL (NRC 2019-TN6136). TVA did identify new information related to the operational effects on terrestrial resources. TVA will implement conservation measures including the development of pollinator habitats and a biodiversity plan. The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. Based on the BMPs and applicable Federal and State permit conditions, the review team determined that the incremental impacts of CRN-1 operation activities would be SMALL and therefore, the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.6.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the review team evaluated TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.6.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.3 of the ESP EIS identified terrestrial ecology impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts (for example, impacts to habitats, wetland, wildlife, and important species and habitats) to terrestrial resources would be MODERATE. The ESP EIS determined that NRC-authorized activities would continue the trend of reducing, fragmenting, and degrading terrestrial and wetland resources within the 6 mi (9.7 km) GAI and therefore would be a significant contributor to the MODERATE cumulative impact; however, the existing and natural habitat protection areas would protect terrestrial resources for the reasonable future (NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own independent search for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause impacts on terrestrial and wetland resources similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact on terrestrial resources from RFAs in the GAI would be MODERATE.

The review team further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by

CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. The review team determined that CRN-1 building and operation-related incremental impacts to habitats would be the only factor that may cause cumulative effects in the GAI.

Therefore, the ESP EIS finding of MODERATE for cumulative impacts in the GAI remains bounding and valid. The NRC-authorized activities would be a significant contributor to the cumulative impact.

3.6.6 Conclusions

Based on the analysis in Section 3.6.2, the review team found the terrestrial ecology impacts from building activities to be MODERATE. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.6.3, the review team found the impacts to terrestrial ecology from operation activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.6.4, the review team found the impacts to terrestrial ecology from decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.6.5, the review team found that the cumulative impacts on terrestrial ecology from RFAs would be MODERATE and the NRC-authorized activities would be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.7 Historic and Cultural Resources

3.7.1 Affected Environment

Historic and cultural resources were described in Section 2.7 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51.92(e)(2) (TN10253), Section 2.7 of the ESP EIS is incorporated here by reference. Section 2.7 of the ESP EIS described the NRC's requirements under Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (54 U.S.C. § 306108 et seq. [National Historic Preservation Act-TN4157]).[1] Descriptions in Section 2.7 of the ESP EIS included the types of historic and cultural resources evaluated by the review team and a description of the process by which Section 106 compliance occurs, including consultation. As in the ESP EIS, the NRC staff are electing to use the NEPA (42 U.S.C.§ 4321 et seq. [National Environmental Policy Act of 1969-TN661]) process to comply

[1] Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Council a reasonable opportunity to comment on such undertakings. As defined in 36 CFR 800.16(l)(1), "Historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of Interior. This term includes artifacts, records, and remains that are related to and located within such properties." As defined in 36 CFR 800.16(l)(2), "The term eligible for inclusion in the National Register includes both properties formally determined as such in accordance with regulations of the Secretary of the Interior and all other properties that meet National Register listing criteria." National Register criteria for listing are found in 36 CFR Part 60, "National Register of Historic Places."

with this separate and distinct Section 106 undertaking. As a cooperating agency, the USACE is part of the review team. Separately, as a Federal land-managing agency, TVA also has NHPA Section 106 compliance requirements independent of the NRC and USACE. NEPA requires Federal agencies to consider the potential effects of their actions on the affected human environment, which includes aesthetic, historic, and cultural resources—as these terms are commonly understood–including such resources as sacred sites. For NEPA compliance, impacts on cultural resources that are not eligible for or listed on the National Register of Historic Places (NRHP) would also need to be considered.

The NRC's undertaking is the issuance of a CP to TVA that would allow the building of the proposed project. To operate the proposed SMR, TVA would need to request and receive an OL from the NRC. The issuance of an OL would constitute a separate NRC undertaking and would require the NRC to prepare a supplement to this CP SEIS and complete a separate NHPA Section 106 review and consultation. The review team describes the separate roles and responsibilities for each Federal agency involved in this environmental review and how they relate to the undertaking in Section 3.7.2.1, these were previously described in Section 2.7 of the ESP EIS.

Regarding historic and cultural resources, the review team used the following new and potentially significant information related to:

- In the ESP EIS, the Area of Potential Effects (APE) was the CRN Site and its immediate environs that may have been directly or indirectly affected by activities associated with the building and operation of two or more SMRs. The onsite direct-effects APE was defined as the 1,305 ac (528.1 ha) area comprising the CRN Site (1,200 ac; 485.6 ha) and the associated BTA located along Bear Creek Road and SR 58 (105 ac; 42.5 ha) as depicted in ESP EIS Figure 2-31. The indirect-effects APE was defined as the 0.5 mi (0.8 km) area around the lands then proposed to be cleared of vegetation on the CRN Site. The offsite direct APE included the Melton Hill Hydroelectric Dam (and as associated 0.5 mi [0.8 km] indirect APE). The ESP EIS indicated that an APE was not yet established for other offsite areas, including proposed transmission lines and borrow source areas, because those specific plans and details were not finalized at the ESP stage in 2019.
- As described in the CP ER (TVA 2025-TN11927), the APE for the CP undertaking has been modified since the ESP EIS in four primary ways: (1) modifications at the Melton Hill Hydroelectric Dam are no longer part of the planned project or undertaking and therefore, the dam is removed from the APE, (2) the location of the associated onsite and offsite 161 kV transmission line was defined and added to the APE, (3) the location of potential ground disturbing activities in the BTA and along Bear Creek Road and SR 58 was clarified and revised (TVA 2025-TN12285), and (4) the offsite borrow source area was confirmed to not be associated with the APE (TVA 2025-TN12285). Additionally, slight modifications to the APE are a result of TVA selecting an SMR design for the CRN Site and is also inclusive of USACE's jurisdiction within the Clinch River (Figure 3-8). The total size of the revised APE is 1,182.4 ac (478.5 ha).

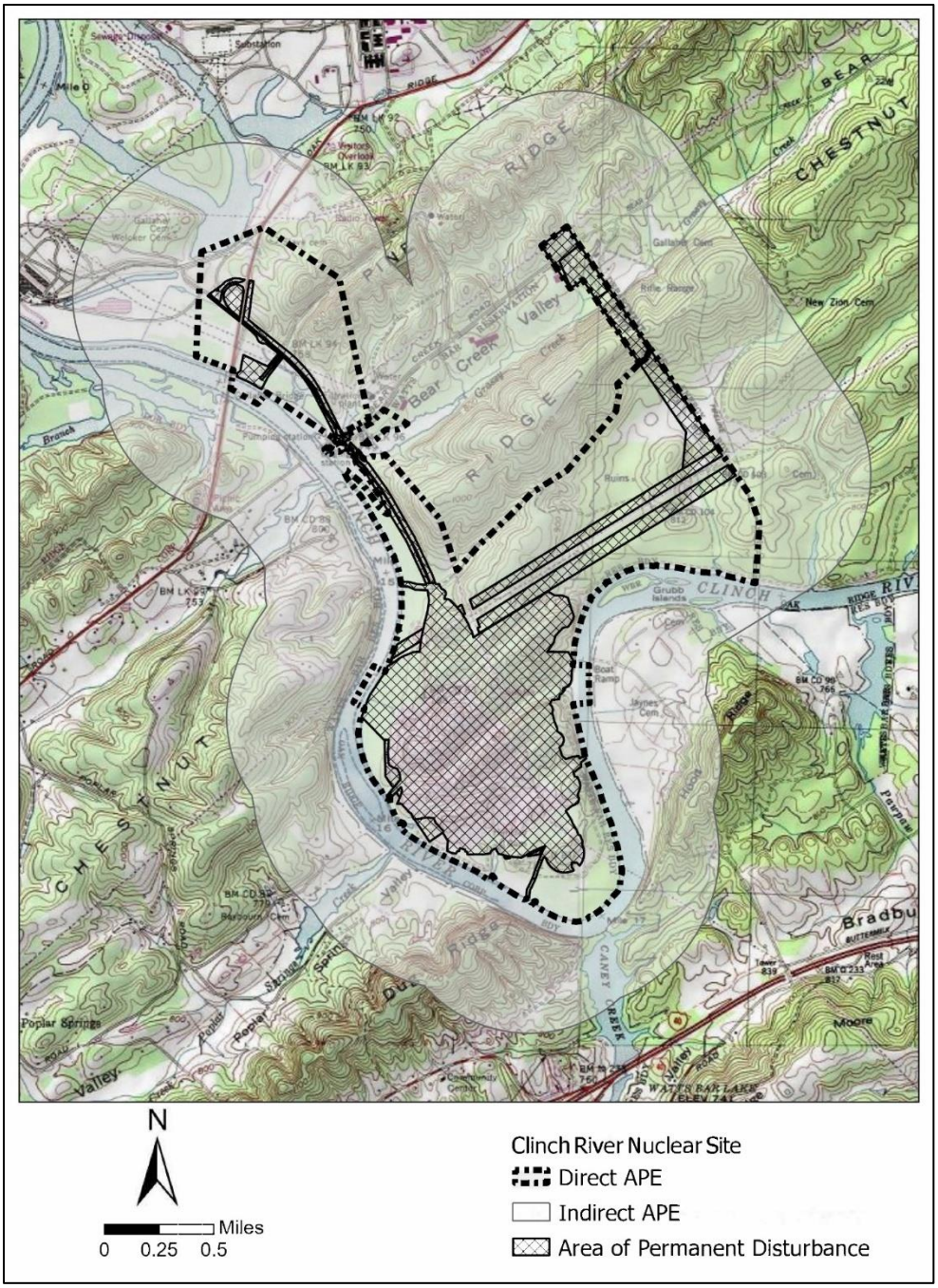

Figure 3-8 The Area of Potential Effects for Clinch River Nuclear Site

Section 2.7.1 of the ESP EIS describes the cultural background of the CRN Site and region; the review team identified no further new and significant information relevant to this section. In Section 2.7.2 of the ESP EIS, the review team presented an overview of the identified historic and cultural resources and historic properties at the CRN Site, past historic and cultural resource investigations, archaeological surveys conducted by TVA for the ESP review, a summary of traditional cultural resources, architectural resources, TVA's programmatic agreement, Federal historic and cultural resource requirements, and the documented summary of the consultation conducted for the ESP EIS. However, regarding identified historic properties,

archaeological surveys, and TVA's programmatic agreement, the review team used the following new and significant information related to:

- Identified Historic and Cultural Resources at the CRN Site. After the completion of the ESP EIS, TVA conducted two additional surveys in 2021 and 2023 (Hunter et al. 2021-TN12280; Meeks et al. 2023-TN12281) focusing on archaeological survey and testing, and an architectural viewshed survey. These surveys resulted in revised NRHP eligibility determinations for eight archaeological sites (Table 3-5). The Hunter et al. 2021 survey (Hunter et al. 2021-TN12280) also included the new 161 kV transmission line area that was added to the direct APE. The review team evaluated and confirmed the findings in both survey reports and site records from the Tennessee Division of Archaeology site files. One additional finding from the Meeks et al. 2023 archaeological survey (Meeks et al. 2023-TN12281) is that 40RE108 has two sensitive areas (referred to as Sensitive Area 1 and 2) that may contribute to the eligibility of the site, while all other portions of the site do not contribute to the overall eligibility of this historic property. The Tennessee Historical Commission concurred with these findings (TVA 2025-TN11927).

Table 3-5 Revised National Register of Historic Places Eligibility of Eight Archaeological Sites at the Clinch River Nuclear Site, 2021 and 2023. Source Data: ESP EIS and the CP ER (NRC 2019-TN6136; TVA 2025-TN11927).

Site Number	ESP EIS Site Eligibility 2019	CP ER Site Eligibility 2025	Reference Survey
40RE156	Ineligible	Ineligible	Hunter et al. 2021
40RE159	Ineligible	Ineligible/Destroyed	Hunter et al. 2021
40RE162	Ineligible	Ineligible	Hunter et al. 2021
40RE547	Ineligible	Ineligible	Hunter et al. 2021
40RE107	Potentially eligible	Ineligible	Meeks et al. 2023
40RE108	Potentially eligible	Eligible portions	Meeks et al. 2023
40RE595	Potentially eligible	Ineligible	Meeks et al. 2023
40RE600	Potentially eligible	Ineligible	Meeks et al. 2023

CP = construction permit; ER = environmental report; ESP = early site permit; EIS = environmental impact statement; NRC = U.S. Nuclear Regulatory Commission; TVA = Tennessee Valley Authority.

- Literature Review. Due to the revised project building activities, as described above, the review team also conducted an additional literature review of historic properties and other cultural resources within the direct and indirect APE on August 1, 2025, using the Tennessee Historical Commission's, Division of Archaeology, State Archaeological Site File. The review team identified 18 additional historic and cultural resources not previously reviewed during the ESP EIS because the previous APE did not intersect with these resources (Table 3-6). In November 2024, the NRC staff also published an environmental assessment and FONSI for an exemption request relating to certain preconstruction activities at the CRN Site. There were no NRHP historic properties within the narrowly defined exemption request related activities area at the CRN Site, and therefore, the NRC concluded that there were no significant impacts to historic and cultural resources and no adverse effects under NHPA Section 106 related to the exemption request action or undertaking (NRC 2024-TN12283).

Table 3-6 Historic and Cultural Resources Not Previously Reviewed Within the Onsite Direct and Indirect Area of Potential Effects for the One-Unit BWRX-300 Facility (CRN-1) at the Clinch River Nuclear Site

Site Number	Site Type	Time Period	National Register of Historic Places Status	Recommendations	Location
40RE91	Pre-contact	Late Woodland	Potentially eligible	No further work	Indirect APE
40RE92	Pre-contact	Undetermined pre-contact	Potentially eligible	No further work	Indirect APE
40RE93	Pre-contact	Undetermined pre-contact	Potentially eligible	No further work	Indirect APE
40RE126	Pre-contact	Undetermined Woodland	Potentially eligible	No further work	Indirect APE
40RE177	Pre-contact	Middle Woodland	Potentially eligible	No further work	Indirect APE
40RE178	Pre-contact	Early-to-Middle Woodland	Potentially eligible	No further work	Indirect APE
40RE219	Historic	19th and 20th Century	Not previously assessed	Site should be avoided if possible; if site disturbance is necessary, mitigation would need to be developed in accordance with the TVA PA.	Direct APE
40RE222	Historic	19th and 20th Century	Potentially eligible	No further work	Indirect APE
40RE223	Historic	19th and 20th Century	Potentially eligible	No further work	Indirect APE
40RE492	Pre-contact	Undetermined	Potentially eligible	No further work	Indirect APE
40RE493	Pre-contact	Undetermined	Potentially eligible	No further work	Indirect APE
40RE494	Pre-contact and Historic	Undetermined	Potentially eligible	No further work	Indirect APE
40RE500	Pre-contact and Historic	Undetermined	Potentially eligible	No further work	Indirect APE
40RE501	Pre-contact	Late Archaic	Potentially eligible	No further work	Indirect APE
40RE574	Historic	19th and 20th Century	Potentially eligible	No further work	Indirect APE
40RE575	Historic	19th and 20th Century	Not eligible	No further work	Indirect APE
40RE577	Historic	Mid-20th Century	Eligible	No further work	Indirect APE
40RE611	Pre-contact	Archaic to Woodland	Potentially eligible	No further work	Indirect APE

APE = area of potential effects; PA = programmatic agreement; TVA = Tennessee Valley Authority.

- Programmatic Agreements. In addition to the 2016 programmatic agreement (TVA and TSHPO 2016-TN5298) for the CRN Site, TVA also recently entered into a programmatic agreement (TVA 2019-TN12295) regarding Valleywide NHPA Section 106 undertakings and compliance with the Advisory Council on Historic Preservation, Tennessee, Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia State Historic Preservation Officers, and federally recognized Indian Tribes.

3.7.1.1 Consultation

The NRC notified the Advisory Council on Historic Preservation and initiated consultation by letters dated July 16, 2025, with the Tennessee Historical Commission and 17 Federally recognized Indian Tribes (all correspondence is contained within Appendix C).

By letter dated July 18, 2025, the Tennessee Historical Commission responded to the NRC acknowledging receipt of the Section 106 initiation letter and stated that they had no comments at this time. One additional Indian Tribe accepted the NRC's invitation to consult.

On August 7, 2025, the NRC and USACE held a non-public, virtual, Tribal information meeting. Three Federally recognized Indian Tribes participated. The purpose of this meeting was to provide an overview of the environmental and Section 106 review process. This meeting afforded Tribal representatives an opportunity to discuss and ask questions with NRC and USACE staff about the proposed project.

3.7.2 Environmental Impacts of Construction

Building (refers to both construction and preconstruction activities) one SMR may affect historic and cultural resources located within the direct and indirect APE. Sections 4.6.1 and 4.6.2 of the ESP EIS described the building-related impacts to resources at both onsite and offsite areas and determined the impacts to be MODERATE to LARGE (NRC 2019-TN6136). Preconstruction activities constituted the primary contribution to the impact determination in the ESP EIS. There were 16 identified eligible or potentially eligible historic properties that had the potential to be affected by building activities in the ESP EIS—of these 16, TVA identified a subset of six potentially eligible historic properties (40RE107, 40RE0595, 40RE0549, 40RE104, 40RE105, and 40RE138) and one eligible historic property (40RE233; and the Melton Hill Hydroelectric Dam) that may be impacted.

The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and significant information during the audit of the CP application. During its independent evaluation, the review team identified new and significant information, specifically the updated APE, the updated eligibility of historic properties, and construction design information for the project.

3.7.2.1 Impacts in the Direct and Indirect APE

For non-NRC-authorized construction activities within the direct and indirect APE (preconstruction [see Section 1.4] and other activities within USACE or DOE jurisdiction), there is the potential for impacts to historic and cultural resources at the CRN Site. As discussed in Section 4.6.1 of the ESP EIS, TVA is a Federal land-managing agency, and as such, is required to comply with NHPA Section 106 among other Federal preservation and cultural resource regulations. Since the ESP EIS, TVA has conducted additional historic and cultural resource surveys and finalized portions of their design and planned ground disturbing activities. In 2019,

TVA executed a new Valleywide programmatic agreement. The updated APE and proposed project design includes the possibility that one or more archaeological sites require additional avoidance as building activities for CRN-1 would occur within the immediate vicinity of these eligible historic properties. For example, TVA has identified measures at 40RE108 to avoid Sensitive Areas 1 and 2. The CP ER (TVA 2025-TN11927) explains that impacts to historic and cultural resources will be avoided by using brightly colored construction fencing and personnel training, along with the standards and procedures described in TVA's 2016 and 2019 programmatic agreements.

As discussed in the ESP EIS Sections 2.7 and 4.6.1, there is one historic cemetery (Hensley Cemetery) located within the direct APE. Building-related impacts on the Hensley Cemetery are expected to be negligible because building-related activities will avoid the cemetery. Indirect visual impacts are expected to be minimized because the cemetery is surrounded by vegetation and trees affording visual screening. TVA has protection procedures in place which include marking the location of cemeteries on construction drawings and fencing the perimeter of these sites to avoid impacts (TVA 2017-TN4922). TVA must also comply with the State of Tennessee's Cemetery and Burial Site laws (T.C.A. Title 46-TN5088). No impacts are expected to occur on traditional cultural properties of significance to Indian Tribes because none have been identified in the direct or indirect APE at the time of publishing this SEIS.

Historic properties may also be impacted by ground disturbing activities associated with roadway improvements at SR-58 and Bear Creek Road, and to the Bear Creek Road Ramp in the BTA on the northwestern portion of the CRN Site (TVA 2025-TN11927). TVA indicated that potential impacts would be defined once design plans are finalized with the Tennessee Department of Transportation, City of Oak Ridge, and DOE (TVA 2025-TN12285). The review team confirmed that TVA's 2016 and 2019 programmatic agreements outline a process which would occur to investigate, identify, and mitigate adverse effects, should they occur at the CRN Site, at a future date—and that if adverse effects were to occur at the CRN Site, all affiliated Indian Tribes that have historic interest to the proposed project area would be consulted with, including the State Historic Preservation Office and other necessary consulting parties, to mitigate those effects (TVA 2025-TN12285).

TVA also confirmed that at a future date they expect to site and construct the independent spent fuel storage installation within the permanently disturbed area (Figure 3-8) at the CRN Site (TVA 2025-TN12285). If any further mitigation is required under NHPA Section 106, TVA would adhere to the stipulations of their 2016 and 2019 programmatic agreements.

Furthermore, while there were no historic properties identified within the DOE portion of the Hunter et al. 2021 survey (Hunter et al. 2021-TN12280) of the planned 161 kV transmission line for the CRN Site, final design work is ongoing (TVA 2025-TN12285). If potential impacts occur to historic properties on TVA property, those would be mitigated following TVA's 2016 and 2019 programmatic agreements. DOE would be responsible for any NHPA Section 106 and other environmental regulatory requirements if potential impacts would occur to historic properties on DOE's Oak Ridge National Laboratory property adjacent to Bear Creek Road.

For the purposes of the review team's NEPA analysis, the review team concludes that the combined impacts from construction and preconstruction activities on historic and cultural resources and historic properties located within the direct and indirect APE would be MODERATE. Preconstruction activities constitute the primary contribution to this impact determination.

The NRC staff concludes that the potential impacts on historic and cultural resources and historic properties from NRC-authorized construction activities occurring within the direct and indirect APE would be SMALL.

For the purposes of NHPA Section 106 consultation pursuant to 36 CFR 800.5, the NRC staff concludes that there would be no adverse effect on historic properties from NRC-authorized construction activities because impacts on historic properties are primarily associated with preconstruction activities and would be subject to TVA's programmatic agreements prior to any construction.

3.7.2.2 Previously Documented Offsite Impacts

Section 4.6.2 of the NRC's ESP EIS also considered impacts to offsite historic and cultural resources and historic properties. The review team determined impacts would be MODERATE to LARGE because eligible and potentially eligible historic properties were located within the previously considered offsite direct APE for the project (i.e., Melton Hill Hydroelectric Dam). Since the ESP EIS, TVA has conducted additional historic and cultural resource surveys, finalized portions of their design, and planned ground disturbing activities. TVA has also implemented a new Valleywide programmatic agreement. The updated designs removed the Melton Hill Hydroelectric Dam from the APE as modifications to accommodate thermal mixing are not required. Additionally, the offsite borrow pit (or quarry) area is not part of the APE as it is already constructed and existing, and TVA's commercial use of the borrow pit does not require any new development of the quarry for those purposes (TVA 2025-TN12285).

3.7.3 Environmental Impacts of Operation

Section 5.6 of the ESP EIS described the operational-related impacts of historic and cultural resources and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team identified new information which includes TVA executing a Valleywide programmatic agreement (TVA 2019-TN12295), updated historic and cultural resource surveys, and planned avoidance strategies for potential impacts. As a result of evaluating this new information, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.7.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the review team evaluated TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.7.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project. Section 7.5 of the ESP EIS identified historic and cultural resources impacts that could occur based on projects

outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts to historic and cultural resources would be MODERATE to LARGE. The ESP EIS determined that NRC-authorized activities would not be a significant contributor to the cumulative impact ((NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own search for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause impacts on historic and cultural resources similar to those described in the ESP EIS.

The review team further evaluated whether the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. In Sections 3.7.2 and 3.7.3, the review team determined that the incremental impacts from building the proposed BWRX-300 reactor on the CRN Site would be MODERATE and determined that the incremental impacts from operations would be SMALL.

The GAI for historic and cultural resources at the CRN Site is the revised and updated direct and indirect APE as described in Section 3.7.1. This is a slightly larger area than the GAI which was originally evaluated in the ESP EIS. Various projects identified within both the CP ER Table 7-1 and Table E-1 in Appendix E of this SEIS have the potential to impact historic properties and historic and cultural resources at the CRN Site. Impacts could potentially occur through ground disturbance for future infrastructure improvements, industrial or nuclear development, or urbanization, as examples. However, NHPA Section 106 requires Federal agencies to evaluate potential impacts to historic properties on a project-by-project, or undertaking-by-undertaking, basis—unless regulated by a programmatic agreement or other agreement document. NHPA Section 106 also requires consideration of, "reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative" (36 CFR Part 800-TN513).

TVA's 2016 and 2019 programmatic agreements provide a mechanism to assess the impact of these RFAs, because while there is a potential that projects (or undertakings) identified in the CP ER Table 7-1 and Table E-1 in Appendix E of this SEIS, have the potential to impact historic properties now, or in the future, these will continue to be evaluated through NHPA Section 106 compliance and TVA's programmatic agreements. Based on the analyses described above, the review team found that the cumulative impacts on historic and cultural resources from RFAs would be MODERATE. This is primarily caused by the removal of the Melton Hill Hydroelectric Dam from the APE and avoidance of eligible archaeological sites with the APE.

Therefore, the ESP EIS finding of MODERATE to LARGE for cumulative impacts on historic and cultural resources remains bounding. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.7.6 Conclusions

Based on the analysis in Section 3.7.2, the review team found the historic and cultural resources impacts from building activities the proposed project would be MODERATE. Preconstruction activities constitute the primary contribution to this impact determination. Therefore, impacts from NRC-authorized activities are SMALL. For the purposes of NHPA Section 106 consultation pursuant to 36 CFR 800.5, the NRC staff concludes that there would be no adverse effect on historic properties from NRC-authorized construction activities.

Based on the analysis in Section 3.7.3, the review team found the historic and cultural resources impacts from operation activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.7.4, the review team found the historic and cultural resources impacts of decommissioning to be SMALL; therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.7.5, the review team found that the cumulative impacts on historic and cultural resources from RFAs would be MODERATE and the NRC-authorized activities would not be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding.

3.8 Socioeconomics

3.8.1 Affected Environment

Socioeconomic resources that could be affected by building and operating the SMR units at the CRN Site, including demographics (i.e., resident population, transient population, migrant labor), and community characteristics (i.e., economy, economic region, taxes, transportation, aesthetics and recreation, housing, public services) were described in Section 2.5 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 2.5 of the ESP EIS is incorporated here by reference. Section 2.5 of the ESP EIS noted that Anderson, Knox, Loudon, and Roane Counties in Tennessee were defined as the economic region for the socioeconomic analysis. Section 2.5.1 of the ESP EIS described the population of the economic region, focusing on residents who live in the area permanently, transients who may temporarily live in or visit the area, and migrant workers who travel into the area to work and then leave after their jobs are completed. The demographic data were derived from the U.S. Census Bureau's census in 2000 and 2010, American Community Survey (ACS) 5-Year Summary Files for 2010 and 2015, and the U.S. Department of Agriculture's 2012 Census of Agriculture. County population projections till 2060 were also provided for the four-county Economic Region. Section 2.5.2 of the ESP EIS first presented information about the labor force, employment, and income within the economic region. The State tax structure and those in the four-county economic region were then evaluated. Revenue and expenses by county governments in 2016 were also provided. Section 2.5.2 of the ESP EIS also described available transportation resources, as well as the visual environment and public recreation facilities of and near the CRN Site. Section 2.5.2 of the ESP EIS presented the information on the housing stock and vacant housing units in the economic region. Lastly, this subsection provided information about public services provided to residents of the economic region, including water and wastewater, police, fire protection, medical services, social services, and education.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Section 2.5.1 of the ESP EIS described the affected environment in relation to demographics. Regarding demographics, the review team used the following new and potentially significant information related to:

- Construction Workforce Numbers. The peak construction workforce at the proposed CRN Site was estimated to be 3,300 workers in the ESP EIS (NRC 2019-TN6136). Peak construction employment for CRN-1 is estimated to be approximately 1,300 (TVA 2025-TN11927).
- Operational Workforce Numbers. The ESP EIS identified a workforce number for operations as being 500 workers (NRC 2019-TN6136). TVA updated the workforce number for operations to 205 workers (TVA 2025-TN11927).

Regarding demographics, the review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information related to demographics during the audit of the CP application. The review team did not identify any further new information in its independent evaluation.

Section 2.5.2 of the ESP EIS described the affected environment in relation to community characteristics (NRC 2019-TN6136). Regarding community characteristics, the review team used the following new and potentially significant information related to:

- Physical Environment. A new offsite 161 kV transmission corridor was not addressed in the ESP EIS (TVA 2025-TN11927). The new transmission corridor would be approximately 29 ac (12 ha) offsite, which is partially located within the existing 500 kV corridor and partially in a new transmission corridor running north toward and across Bear Creek Road passing through the Grassy Creek HPA (TVA 2025-TN11927).
- Physical Environment for Barge Facility Improvement. TVA anticipates making improvements to the existing DOE former K-25 Barge Loading Area. CRN-1 activities will include expanding the barge facility by approximately 5 ac (2 ha) on the northwest to northeast sides of the existing facility (TVA 2025-TN11927).
- Physical Environment for Laydown Area. The ESP ER (TVA 2019-TN5854) estimated that the area required to provide space for construction-related support facilities was 151 ac (61 ha), while the CP ER estimated that the total laydown area will be 161 ac (65 ha) total, including 140 ac (57 ha) for laydown and shops, and 21 ac (8 ha) for parking needed during building activities (TVA 2025-TN11927).
- Physical Environment and Building Characteristics. The ESP EIS estimated that the building height from finished grade to the top of the tallest power-block structure, excluding cooling towers would be 160 ft (49 m) (NRC 2019-TN6136). The CP ER estimated the tallest power-block structure to be of a lower height of 103 ft (31m) (TVA 2025-TN11927).
- Electrical Output. The electrical output was estimated as 800 MWe for the CRN Site with two or more SMRs in the ESP EIS (NRC 2019-TN6136). TVA's current estimate in the CP ER is 300 MWe gross/unit (one BWRX-300 unit) (TVA 2025-TN11927).

- Recreational Facilities. The Tennessee portion of the Manhattan Project National Historical Park located in Oak Ridge, Tennessee, was established in November 2015. One of the Oak Ridge facilities is located approximately 2.6 mi (3.7 km) north of the CRN Site (TVA 2025-TN11927). This is a new recreational facility and was not addressed in the ESP EIS.
- Construction Expenditures. The ESP EIS estimated that an 800 MWe plant would cost approximately $4.1 to $5.8 billion, of which $533 to $728 million (roughly 13 percent) expected to be spent locally (NRC 2019-TN6136). TVA's current cost estimate for the manufacturing and building of CRN-1 is approximately $1.8 to $3.0 billion. Utilizing the same assumption (13 percent allocated for onsite installation of the units), approximately $234 to $390 million of the total cost is expected to be spent locally in association with site preparation and onsite installation (TVA 2025-TN11927).
- Construction Onsite Traffic. The ESP EIS estimated that up to 2,412 worker vehicles would be expected to use local roads to access or exit the CRN Site during shift changes at peak employment (NRC 2019-TN6136). TVA updated the peak onsite traffic during construction period to 1,001 vehicles reflecting a significantly smaller construction workforce (TVA 2025-TN11927).
- Operation Onsite Traffic. The ESP EIS estimated approximately 1,200–1,300 vehicles per day during the operation period (NRC 2019-TN6136). TVA updated the onsite traffic during operation to approximately 150 vehicles taking into account of the reduced operation workforce (TVA 2025-TN12284).

Regarding community characteristics, the review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information related to community characteristics during the audit of the CP application. The NRC staff did not identify any further new information in its independent evaluation.

3.8.2 Environmental Impacts of Construction

In the ESP EIS, the review team reached impact levels determinations for all issues, which included physical, demographic, economic, infrastructure and community service impacts from construction. The impacts are described in Section 4.4 of the ESP EIS.

3.8.2.1 Physical Impacts

Section 4.4.1 of the ESP EIS described the impacts of construction activities on the physical aspects of the affected environment for roadways, noise and visual aesthetics to be SMALL and MODERATE (for information on noise impacts, see Section 3.11) (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information.

Building activities would impact about five additional acres (2 ha) of shoreline habitat near the expanded barge-unloading area. Clearing vegetation in this area would affect views from the Reservoir and Tennessee State Route 58. However, much of the shoreline vegetation around the CRN Site and barge/traffic area remains unaltered, providing a visual buffer of varying width between the central construction zone and surrounding areas.

Because existing transmission lines are present within the area and on the CRN Site, building the new 161 kV transmission line would be noticeable but would not significantly alter the visual landscape or the viewshed from Bear Creek Road. Aesthetic impacts from building this transmission line are primarily limited to the presence of construction workers and associated equipment within the corridor and on nearby roadways.

Additionally, based on the slightly larger laydown area and significantly lower building height associated with building the CRN-1 as described in Section 3.8.1, the review team determined that the conclusion of SMALL to MODERATE on aesthetics presented in the ESP EIS remains bounding and valid. The overall physical impacts of building CRN-1 remains SMALL to MODERATE, which is the same as in the ESP EIS.

3.8.2.2 Demographic Impacts

Section 4.4.2 of the ESP EIS described the construction-related demographic impacts and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the reduced peak construction workforce as described in Section 3.8.1 and utilizing the same assumptions outlined in ESP EIS Section 4.4.2 regarding the division of labor by category and the in-migrating percentage of workers, the demographic impacts during the building period are likely to be smaller than those indicated in the ESP EIS. Therefore, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.8.2.3 Economic Impacts

Section 4.4.3 of the ESP EIS described the construction-related economic impacts on the community and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated TVA's ER and TVA's new and significant information review process and performed its own independent search for new and significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information.

As described in Section 3.8.1, TVA's current estimated construction workforce and construction expenditures are less than the estimates from the ESP EIS. Approximately 1,300 construction workers create an incremental increase of 1,239 indirect jobs within the region of influence (ROI) during peak building period. An average of $30.2 million annually would be spent on CRN-1 construction labor wages over the 6-year duration of building, while the estimated wages would reach an annualized total of $64.4 million at the peak employment (TVA 2025-TN11927). The indirect and induced workforce income is $45.5 million, resulting in a total labor income of $109.9 million (TVA 2025-TN12285).The economic impacts including job creation, workforce income, and spending impacts are likely to be smaller than those indicated in the ESP EIS. Therefore, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

As described in the ESP EIS, per Tennessee Code Annotated 67-9-101(a)(3), the State of Tennessee allocates 3 percent of the tax equivalent payments it receives from TVA to impacted local governing areas where TVA construction on facilities to produce electric power is taking place. Estimates of these impact-related payments were not available at the ESP and CP stage.

The allocation of impact payments will be determined by the State of Tennessee after TVA notifies the State that TVA has initiated major construction activities at the CRN Site. However, the impact payments are expected to be minimal compared to the total tax revenue collected in the ROI (TVA 2025-TN11927).

3.8.2.4 Infrastructure and Community Service Impacts

Section 4.4.4 of the ESP EIS described the construction-related impacts on infrastructure and community services, including transportation, recreation, housing, public services, and education. It determined the impacts on all infrastructure and community services would be SMALL, with the exception of impacts on (1) traffic, which was determined to be MODERATE to LARGE, and (2) recreation, which was determined to be SMALL to MODERATE in close proximity to the site as a result of the expected aesthetic impacts of adding structures to the CRN Site (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the review of information about building the new 161 kV transmission line and the expanded barge-unloading area and new recreational facilities described in Section 3.8.1, the review team determined that the conclusion of SMALL to MODERATE on recreation presented in the ESP EIS remains bounding and valid.

Although the traffic during the peak construction period is likely to be less than that indicated in the ESP EIS due to the reduced size of the construction workforce described in Section 3.8.1 and the recommended mitigation measures have been scaled accordingly, the traffic impacts (i.e., delays and degradation of LOS on roadways accessing the CRN Site) are expected to be of similar magnitude or less than those described in the ESP EIS (TVA 2025-TN12284). The review team determined that the conclusion of MODERATE to LARGE on traffic presented in the ESP EIS remains bounding and valid.

The review team also determined that the conclusion of SMALL on all other categories of infrastructure and community services (including housing, public services, and education) presented in the ESP EIS remains bounding and valid.

3.8.3 Environmental Impacts of Operation

During the ESP proceedings, the review team reached impact levels determinations for all issues, which included physical, demographic, economic, and infrastructure and community service impacts from operation. The impacts are described in Section 5.4 of the ESP EIS. This SEIS evaluated the potential impacts of building one BWRX-300 unit at the CRN Site on the environment; therefore, a detailed analysis of the impacts of operations of CRN-1 will be provided during the subsequent review of the application for the OL. The analysis below provides a summary of possible operational impacts.

3.8.3.1 Physical Impacts

Section 5.4.1 of the ESP EIS described the operational-related physical impacts and determined the impacts to be SMALL, with the exception of impacts to aesthetic and recreational resources, which were determined to be MODERATE (NRC 2019-TN6136). The review team evaluated TVA's ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP

application. During its independent evaluation, the review team did not identify additional new information. Based on the review team's evaluation of anticipated operational characteristics of the new 161 kV transmission line, expanded barge area, and new reactor facilities at the CRN Site described in Section 3.8.1, the review team determined that the conclusion of SMALL to MODERATE for physical impacts due to the operation-related activities presented in the ESP EIS remains bounding and valid.

3.8.3.2 Demographic Impacts

Section 5.4.2 of the ESP EIS described the operations-related demographic impacts and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the reduced operation workforce described in Section 3.8.1 and utilizing the same assumptions outlined in ESP EIS Section 5.4.2 regarding the in-migrating percentage of workers, the demographic impacts during the operation period are likely to be smaller than those indicated in the ESP EIS. Therefore, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.8.3.3 Economic Impacts

Section 5.4.3 of the ESP EIS described the operations-related economic impacts on the community and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information.

As described in Section 3.8.1, TVA's current estimated operation workforce number and electrical output are less than the estimates from the ESP EIS. 205 full-time operations workers create an incremental increase in 440 indirect jobs within the ROI while the plant is operating (TVA 2025-TN11927). A total income of $18.9 million would be paid annually to operation workers ($18.5 million for operations plus $0.46 million for outages) and an additional $16.6 million in labor income is expected to be generated in the ROI through the multiplier effect; for a net impact of $35.5 million in labor income annually during operation (TVA 2025-TN12285). As a result, the economic impacts during operation period including created jobs, workforce income, and spending impacts are likely to be smaller than those indicated in the ESP EIS. The review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

TVA payments in lieu of taxes during the operation period are not available in the CP stage. The review team will need to revisit the tax impacts if the NRC receives an OL application regarding the proposed project.

3.8.3.4 Infrastructure and Community Service Impacts

Section 5.4.4 of the ESP EIS described the operations-related impacts on infrastructure and community services, including transportation, recreation, housing, public services, and education, and determined the impacts on all infrastructure and community services would be

SMALL, with the exception of recreational impacts to be MODERATE, because of impacts on viewsheds from the increased industrial character of the CRN Site and the impacts on recreational experiences given the cooling-tower plumes during plant operations (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Therefore, the review team determined that the conclusion of SMALL to MODERATE (recreation) on overall infrastructure and community service impacts presented in the ESP EIS remains bounding and valid.

3.8.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the review team evaluated TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.8.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.4.1 of the ESP EIS identified socioeconomics impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts to socioeconomics would be SMALL, with the exception of noise (for information on noise impacts, see Section 3.11), roadways, and visual aesthetics, which would be SMALL to MODERATE, as well as the exception of building-related traffic impacts, which would be MODERATE to LARGE. The ESP EIS determined that the NRC-authorized portion of building-related traffic impact would be MODERATE to LARGE and a significant contributor to the cumulative impact (NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own search for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause socioeconomic impacts similar to those described in the ESP EIS.

The review team further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. In Sections 3.8.2 and 3.8.3, the review team determined the impacts from building and operating the proposed BWRX-300 reactor on the CRN Site, respectively, and determined that the socioeconomics impacts would be SMALL, except for the building-related traffic impacts, which would be MODERATE to LARGE; building-related aesthetics and recreation impacts, which would be SMALL to MODERATE; and operation-related aesthetics and recreation impacts, which would be MODERATE. Based on the review team's findings, the cumulative socioeconomic impacts of

RFAs identified in Table E-1 would be SMALL, with the exception of MODERATE to LARGE for building-related traffic impacts, and SMALL to MODERATE for aesthetics and recreation resources. The review team also determined that the incremental socioeconomic impacts of building and operating CRN-1 would have a cumulative effect in the GAI.

Therefore, the ESP EIS cumulative impacts findings of SMALL to MODERATE for physical impacts, SMALL for demography, SMALL for taxes and economy, and MODERATE to LARGE for infrastructure and community services remain bounding and valid. The NRC-authorized activities would be a significant contributor to the cumulative impact.

3.8.6 Conclusions

Based on the analysis in Section 3.8.2, the review team concluded that all physical impacts from building activities would be SMALL with the exception of SMALL to MODERATE impact on aesthetics. Demographic impacts and economic impacts from building activities would be SMALL. Infrastructure and community services impacts from building activities would be SMALL with the exception of traffic to be MODERATE to LARGE, and recreation impacts to be SMALL to MODERATE. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.8.3, the review team concluded that all physical impacts from operation activities would be SMALL with the exception of a MODERATE impact on aesthetics. Demographic impacts and economic impacts from operation activities would be SMALL. Infrastructure and community services impacts from operation activities would be SMALL with the exception of a SMALL to MODERATE impact on recreational resources (with MODERATE impacts in close proximity to the proposed site). Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.8.4, the review team found the socioeconomic impacts of decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.8.5, the review team found the socioeconomic impacts from cumulative effects of RFAs to be SMALL, with the exception of MODERATE to LARGE for building-related traffic impacts, as well as SMALL to MODERATE for aesthetics and recreation resources. The NRC-authorized activities would be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.9 Environmental Justice

The EO 14173, “Ending Illegal Discrimination and Restoring Merit-Based Opportunity,” (90 FR 8633-TN11607) issued January 21, 2025, revoked EO 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” (59 FR 7629-TN1450) issued February 11, 1994, among other things. In SRM-COMSECY-25-0007, the Commission approved the withdrawal of the NRC’s Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (Environmental Justice Policy Statement) and Environmental Justice Strategy, which reflected the NRC’s voluntary commitments on environmental justice (69 FR 52040-TN1009) that were made in response to the policies stated in EO 12898. Therefore, consistent with EO 14173, the NRC withdrew its Environmental Justice Policy Statement and Environmental Justice Strategy

(90 FR 17887-TN11684 on April 30, 2025). Based on EO 14173 and SRM-COMSECY-25-0007, this SEIS does not address environmental justice.

3.10 Radiological Health

3.10.1 Affected Environment

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. The affected radiological environment for the CRN Site were described in Section 2.11 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 2.11 of the ESP EIS is incorporated here by reference. Section 2.11 of the ESP EIS notes that sources of radiation found at the CRN Site are from legacy contamination from nearby facilities at Oak Ridge National Laboratory and natural background. Collectively, the anticipated annual dose is expected to be 62 to 106 millirem (mrem)/yr from radiation sources present at the CRN Site, which is consistent with the annual average direct radiation dose for the United States of 100 mrem/yr.

3.10.2 Environmental Impacts of Construction

In the ESP EIS, the NRC staff reached impact level determinations for all issues, which included radiological health impacts from construction. The impacts are described in Section 4.9 of the ESP EIS as if there would be an operational SMR unit at the time of construction of another SMR unit. Since this CP application is for one SMR, the construction workers would not have any radiological exposures outside of the use of byproduct material devices (e.g., moisture density gauge for measuring soil conditions), which must be controlled to avoid construction worker doses.

3.10.3 Environmental Impacts of Operation

In the ESP EIS, the NRC staff reached impact level determinations for all issues, which included radiological health impacts from operations. The impacts are described in Section 5.9 of the ESP EIS. The NRC staff's assessment of the radiological health impacts resulting from normal operation of two or more reactors at the CRN Site was provided in Section 5.9 of the ESP EIS (NRC 2019-TN6136). The discussion included the estimated radiation dose to a member of the public and to the biota in the vicinity of the CRN Site. Estimated doses to workers at the proposed units also were discussed. In this SEIS, the NRC staff evaluated the information in the CP ER for a single BWRX-300 reactor and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit. This included a review of Section 15 of the PSAR submitted with the CP application. During its independent evaluation, the NRC staff did not identify any additional new information. The NRC staff determined that the conclusion of SMALL for the radiological health analysis presented in the ESP EIS remains bounding and valid.

3.10.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the NRC staff reviewed TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the NRC staff did not identify any

additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.10.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.8 of the ESP EIS identified radiological impacts of normal operations that could occur from projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs at the CRN Site and determined that the cumulative impacts would be SMALL (NRC 2019-TN6136). The radiological health impacts on workers conducting NRC-authorized construction activities at the CRN Site were also determined to be SMALL (NRC 2019-TN6136).

The NRC staff evaluated the information in the CP ER and TVA's new and significant information review process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The NRC staff also performed its own independent search for new and potentially significant information during the audit of the CP application. The NRC staff determined that the new and updated RFAs in the GAI would cause impacts on radiological health similar to those described in the ESP EIS.

The NRC staff further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 construction and operation could cause cumulative effects in combination with the RFAs, the NRC staff used geographical proximity and concurrence in time as criteria. In Sections 3.10.2 and 3.10.3, the NRC staff determined that CRN-1 construction and operation incremental impacts would be SMALL. Because the RFAs located offsite are sufficiently separated geographically from CRN-1 and individuals are unlikely to work at more than one facility, the NRC staff determined that CRN-1 would not cause a cumulative effect in the GAI. Radiation exposure and release of radioactive effluents is expected to be managed under appropriate regulations. Based on its assessment, the NRC staff found the impacts to radiological health from the cumulative effects of RFAs to be SMALL.

Therefore, the ESP EIS cumulative impacts finding of SMALL for radiological impacts of normal operations in the GAI remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.10.6 Conclusions

Based on the analysis in Section 3.10.2, the NRC staff found the impacts to radiological health from building activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.10.3, the NRC staff found the impacts to radiological health from operation activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.10.4, the NRC staff found the impacts to radiological health from decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.10.5, the NRC staff found the impacts to radiological health from the cumulative effects of RFAs to be SMALL. The NRC-authorized activities would not be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.11 Nonradiological Health

3.11.1 Affected Environment

Public and occupational health (i.e., air quality, occupational injuries, etiological agents), noise, transportation, and electromagnetic fields were described in Section 2.10 of the ESP EIS (NRC 2019-TN6136). In accordance with 10 CFR 51. 92(e)(2) (TN10253), Section 2.10 of the ESP EIS is incorporated here by reference. Section 2.10 of the ESP EIS notes that compliance with site permits, worker health and safety regulations, and implementations of BMPs during all phases of the project would be protective of public and occupational safety. Permits would govern air and water quality. There are no known State or county noise ordinances, but the ESP EIS noted that the City of Oak Ridge has requirements that would be considered to manage noise. Figures of highway and rail transportation networks, along with modifications and improvements on roads on and around the CRN Site were noted. The section also stated that TVA would perform upgrades to existing transmission lines and noted that public and occupational health can be compromised by acute and chronic exposure to electrical sources.

The following discussion provides context and presents new and significant information not available at the time the ESP EIS was issued that is relevant to environmental concerns and bearing on the proposed action or its impact. Section 2.10.1 of the ESP EIS described the affected environment in relation to public and occupational health. Regarding public and occupational health, the review team used the following new and potentially significant information related to:

- Construction Worker Injury Rates from the U.S. Bureau of Labor Statistics (BLS). The ESP EIS identified a 2015 BLS national incident rate for nonfatal occupational illness/injuries related to utility system construction of 2.4 (i.e., number of recordable cases per 100 full-time workers). The CP ER noted new public and occupational health data. The updated 2021 BLS national incidence rate for nonfatal occupational illness/injuries related to utility system construction was 1.8 (number of recordable cases per 100 full-time workers) (NRC 2025-TN12331).
- Onsite Construction Workforce Numbers. The peak onsite construction workforce at the proposed CRN Site was 3,300 workers in the ESP EIS. Current workforce estimates are approximately 2,200 workers for peak onsite construction workforce (TVA 2025-TN11927).
- Publicly Accessible Area. The ESP EIS stated that the nearest publicly accessible area was approximately 1,900 ft (579 m) from the planned cooling-tower location. The cooling towers were expected to be the loudest operational system. The CP ER states that the location of the cooling towers has changed. The nearest publicly accessible area is now 1,860 ft (569 m) from the cooling towers location (TVA 2025-TN12285).
- Etiological Occurrences. The ESP EIS reviewed data from the U.S. Center for Disease Control and Prevention (CDC) during the years 2006–2012. The CP ER noted new

etiological studies. The CDC did not identify any outbreaks of waterborne etiological agents after 2012 (NRC 2025-TN12331). However, additional data from the Tennessee Department of Health identified three recorded cases of waterborne etiological agents after 2012 (NRC 2025-TN12331).

- Operation Worker Injury Rates. The ESP EIS identified the nonfatal occupational injury rate for nuclear power generation from 2015 as being 0.2 illness/injuries per 100 full-time workers. The CP ER noted new data for worker injury rates. BLS data from 2021 identified the nonfatal occupation illness/injury rate from 2021 for nuclear electric power generation as being 0.2 injuries per 100 full-time workers (NRC 2025-TN12331).
- Operational Workforce Numbers. The ESP EIS identified a workforce number for operations as being 500 workers, with an additional 1,000 workers during refueling and major maintenance. The CP ER noted the workforce number for operations as 205 workers, and an additional 280 workers during refueling and major maintenance activities (TVA 2025-TN11927).

Regarding public and occupational health, the review team evaluated information provided in the CP ER and performed its own independent search for new and potentially significant information during the audit of the CP application. In addition to those TVA identified, the review team noted a 2023 revision to the National Electrical Safety Code, which sets updated ground rules and guidelines for safeguarding of utility workers and members of the public (IEEE 2023-TN10132). The review team also identified the 2023 incident rate for nonfatal occupational injuries related to utility system construction as 1.6 (number of recordable cases per 100 full-time workers) and 0.2 for the rate of nuclear electric power generation (number of recordable cases per 100 full-time workers [NRC 2025-TN12331]).

Section 2.10.2 of the ESP EIS described the affected environment in relation to noise (NRC 2019-TN6136). Regarding noise, the review team used the following new and potentially significant information related to:

- Optional Onsite Quarry. In the CP application, TVA noted the new construction of an optional onsite quarry, which was not mentioned in the ESP EIS. Quarry activities would include intermittent blasting. Blasting activities are expected to be 126 A-weighted decibels (dBA) at 50 ft (15 m) (TVA 2025-TN11927). Blasting for the quarry is expected to happen over a 2-year time period, with blasting frequency being one to two times per week to establish the pit. The closest sensitive noise receptor is 1,003 ft (306 m) away (TVA 2025-TN12285).
- Nearest Sensitive Noise Receptor During Construction. TVA stated that the nearest sensitive noise receptor is now 750 ft (229 m) away, with expected noise levels attenuating to 77 dBA (TVA 2025-TN12285).
- Nearest Sensitive Noise Receptor for Operation. The ESP EIS stated that the nearest sensitive noise receptor was 1,900 ft (579 m) from the cooling-tower location. In the CP application, TVA stated that three additional residences have been constructed near the site and that the nearest sensitive noise receptor is now approximately 1,860 ft (567 m) from the cooling-tower location (TVA 2025-TN12285).

Regarding noise, the review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information related to noise during the audit of the CP application. The review team did not identify any further new information in its independent evaluation.

Section 2.10.3 of the ESP EIS described the affected environment in relation to transportation (traffic-related accidents) (NRC 2019-TN6136). Regarding transportation, the review team used the following new and potentially significant information regarding:

- Accident Statistics for the Regional Transportation Network. The ESP EIS referenced a 2015 AECOM traffic impact statement. To support the CP application, TVA commissioned another traffic impact that compared 2022 Tennessee Department of Transportation Crash Report data to 2013 data from the AECOM. TVA confirmed that the data was similar between the two time periods. (TVA 2025-TN12285).

Regarding transportation, the review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information related to transportation during the audit of the CP application. The review team did not identify any further new information in its independent evaluation.

Section 2.10.4 of the ESP EIS described the affected environment in relation to electromagnetic fields (NRC 2019-TN6136). TVA did not identify any new information related to the affected environment and acute effects of electromagnetic fields in its CP application. The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. Besides the previously mentioned 2023 revision to the National Electrical Safety Code, the review team did not identify any further new information in its independent evaluation.

3.11.2 Environmental Impacts of Construction

In the ESP EIS, the review team reached impact levels determinations for all issues, which included public and occupational health, noise, and transportation impacts. The impacts are described in Section 4.8 of the ESP EIS.

3.11.2.1 Public and Occupational Health Impacts

Section 4.8.1 of the ESP EIS described the building-related impacts to public and occupational health and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. Based on lower BLS statistics for nonfatal occupational injuries related to utility system construction, CDC statistical data changes for etiological agents, lower work force estimates for construction, and a location change in the nearest resident as described in Section 3.10.1, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.11.2.2 Noise Impacts

Section 4.8.2 of the ESP EIS described the building-related impacts on noise and determined the impacts to be SMALL to MODERATE (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the review of a change in location in the nearest noise receptor as described in Section 3.11.1 and the addition of possible blasting activities at an

optional onsite quarry, the review team determined that the conclusion of SMALL to MODERATE presented in the ESP EIS remains bounding and valid.

3.11.2.3 Transportation Impacts

Section 4.8.3 of the ESP EIS described the building-related impacts to transportation (traffic-related accidents) and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the review of the 2024 traffic study as noted in Section 3.11.1, and the fact that there are less expected construction workers, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.11.3 Environmental Impacts of Operation

The review team was not able to make a determination about transmission system impacts in the ESP EIS. The issue is addressed in the CP ER Section 3.2.6 and Chapter 2 of this SEIS. However, the review team was able to reach impact level determinations for etiological (disease-causing) agents, noise, acute effects of electromagnetic fields, chronic effects of electromagnetic fields, occupational health, and transportation impacts from operations. The impacts are discussed in Section 5.8 of the ESP EIS. This SEIS evaluates the potential impacts associated with a CP on the environment; therefore, a detailed analysis of the impacts of operations of CRN-1 will be provided during the subsequent review of the application for the OL. The analysis below provides a summary of possible operational impacts.

3.11.3.1 Etiological (Disease-Causing) Agent Impacts

Section 5.8.1 of the ESP EIS described the operational-related impacts of etiological agents and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated TVA's ER and the new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the review of etiological occurrence data from the CDC as noted in Section 3.11.1, and given that the thermal discharges resulting from CRN-1 would be smaller and likely disperse more rapidly than evaluated in the ESP EIS (see the surface-water discussion in Section 3.4), the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.11.3.2 Noise Impacts

Section 5.8.2 of the ESP EIS described the operational-related impacts of noise, and the impact was determined in Table 5-20 and Table 10-2 of the ESP EIS to be SMALL to MODERATE (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the review of noise information as noted in Section 3.11.1, the fact that no change to the expected noise levels from the cooling-tower operations were proposed, and the nearest

sensitive resident is closer to the cooling tower, the review team determined that the conclusion of SMALL to MODERATE presented in the ESP EIS remains bounding and valid.

3.11.3.3 Acute Effects of Electromagnetic Fields Impacts

Section 5.8.3 of the ESP EIS described the operational-related impacts of the acute effects of electromagnetic fields and determined the impacts to be SMALL (NRC 2019-TN6136). TVA did not identify any new information related to the operational effects on human health related to the acute effects of electromagnetic fields. The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During the independent evaluation, the review team noted the 2023 revision of the National Electrical Safety Code. Because the applicant committed to designing new transmission lines to conform to the present National Electric Safety Code, as stated in Section 5.8.3 of the ESP EIS, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.11.3.4 Chronic Effects of Electromagnetic Fields Impacts

Section 5.8.4 of the ESP EIS describes the operational-related impacts of the chronic effects of electromagnetic fields and determined the impacts to be SMALL (NRC 2019-TN6136). TVA did not identify any new information related to the operational effects on human health related to the chronic effects of electromagnetic fields. The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During the independent evaluation, the review team did not identify any additional new information. Therefore, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.11.3.5 Occupational Health Impacts

Section 5.8.5 of the ESP EIS describes operational-related impacts occupational health and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the review of BLS nonfatal occupational injury rates and lower workforce data, as presented in Section 3.11.1, and given the fact that NRC expects TVA to adhere to NRC, Occupational Safety and Health Administration, and State of Tennessee safety standards, as well as TVA's BMPs, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.11.3.6 Transportation Impacts

Section 5.8.6 of the ESP EIS describes the operational-related impacts of transportation (traffic-related accidents) and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Based on the review of the 2024 traffic study, and that fact there are less expected operational work force numbers,

as noted in Section 3.11.1, the review team determined that the conclusions of SMALL presented in the ESP EIS remains bounding and valid.

3.11.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the NRC staff reviewed TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.11.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.7 of the ESP EIS identified nonradiolgical impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts (for example, emissions, occupational injuries, waterborne disease occurrences) to nonradiological health would be SMALL, with the exception of construction-related noise, which would be SMALL to MODERATE. The ESP EIS determined that NRC-authorized activities would be a significant contributor to the cumulative impact (NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the review team stated in Section 1.4.2 is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in AppendixE of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own search for new and potentially significant information during the audit of the CP application. The review team determined that the new and updated RFAs in the GAI would cause impacts on nonradiological health similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact to nonradiological health from RFAs in the GAI would be SMALL, with the exception of construction and operation-related noise, which would be SMALL to MODERATE.

The review team further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. The review team determined that CRN-1 building and operation-related noise, which were determined to cause SMALL to MODERATE impacts, would be the only factors that may cause cumulative effects in the GAI. However, because the RFAs located offsite are sufficiently separated geographically from CRN-1, the review team determined that CRN-1 would not cause a cumulative effect in the GAI. Because there is an increase in traffic in the GAI resulting from CRN-1 construction and operation, the review team expects that traffic-related accidents might increase. Each of the other subject areas evaluated under nonradiological health have their own permit or will be managed under appropriate regulations. Because those other nonradiological human health aspects will also have their own permit or be managed under appropriate regulations, the review team determined that the incremental nonradiological impacts from CRN-1 would not have a cumulative effect in the GAI.

Therefore, the ESP EIS finding of SMALL to MODERATE for noise-related cumulative impacts in the GAI remains bounding and valid. The NRC-authorized activities would be a significant contributor to the noise-related cumulative impact.

3.11.6 Conclusions

Based on the analysis in Section 3.11.2, the review team found the impacts to nonradiological health from building activities related to public and occupational health hazards and transportation to be SMALL and the noise impacts to be SMALL to MODERATE. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.11.3, the review team found the impacts to nonradiological health from operation activities related to etiological agents, acute effects of electromagnetic fields, chronic effects of electromagnetic fields, occupational health, and transportation (traffic-related accidents) to be SMALL and the noise impacts to be SMALL to MODERATE. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.11.4, the review team found the impacts to nonradiological health from decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.11.5, the review team found that the impacts to nonradiological health from RFAs would be SMALL, with the exception of noise, which would be SMALL to MODERATE, and the NRC-authorized activities would be a significant contributor to the cumulative impact. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.12 Nonradiological Waste

3.12.1 Affected Environment

The nonradioactive waste-management systems are described in Section 3.6 of the ESP application ER and Section 3.4.4 of the ESP EIS (TVA 2019-TN5854; NRC 2019-TN6136). The ESP EIS did not identify any issues regarding nonradioactive waste-management systems that were not resolved. Potential types of nonradioactive wastes expected to be generated, handled, and disposed of include construction and demolition waste, wood, metal, paper, municipal solid waste, and debris collected on trash screens at the water-intake structure. The applicant states that nonradioactive wastes will be managed in accordance with applicable Federal, State, and local laws and regulations and permit requirements. A waste minimization program would be implemented that uses material control, process control, waste management, and recycling to reduce waste.

3.12.2 Environmental Impacts of Construction

In the ESP EIS, the review team reached impact levels determinations for all issues, which included impacts to from nonradiological waste to land, water, and air from construction. The impacts are described in Section 4.10 of the ESP EIS.

3.12.2.1 Impacts on Land

Section 4.10.1 of the ESP EIS described the construction-related impacts on land and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. The review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.12.2.2 Impacts on Water

Section 4.10.2 of the ESP EIS described the construction-related impacts on water and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. The review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.12.2.3 Impacts on Air

Section 4.10.3 of the ESP EIS described the construction-related impacts on air and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. The review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.12.3 Environmental Impacts of Operation

In the ESP EIS, the review team reached impact levels determinations for all issues, which included impacts to from nonradiological waste to land, water, and air and impacts of mixed waste from operations. The impacts are described in Section 5.10 of the ESP EIS.

3.12.3.1 Impacts on Land

Section 5.10.1 of the ESP EIS described the operation-related impacts on land and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. The review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.12.3.2 Impacts on Water

Section 5.10.2 of the ESP EIS described the operations-related impacts on water and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and

performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. The review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.12.3.3 Impacts on Air

Section 5.10.3 of the ESP EIS described the operations-related impacts on air and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. The review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.12.3.4 Impacts from Mixed Waste

Section 5.10.4 of the ESP EIS describes the operational-related impacts from mixed waste and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER and TVA's new and significant information review process and performed its own independent search for new and potentially significant information during the audit of the CP application. During the independent evaluation, the review team did not identify any additional new information. Therefore, the review team determined that the conclusion of SMALL presented in the ESP EIS remains bounding and valid.

3.12.4 Environmental Impacts of Decommissioning

As stated in Section 1.4.2, the NRC staff reviewed TVA's new and significant information review process related to decommissioning and found it to be reasonable. TVA's new and significant information review process did not find any new and significant information related to decommissioning. During its independent evaluation, the review team did not identify any additional new information. Therefore, the ESP EIS impact determination of SMALL related to decommissioning impacts remains bounding and valid.

3.12.5 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.9 of the ESP EIS identified nonradiological waste systems impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts on the environment from CRN-1 nonradiological waste would be SMALL. The ESP EIS determined that NRC-authorized activities would not be a significant contributor to the cumulative impact (NRC 2019-TN6136).

The review team evaluated the information in the CP ER and TVA's new and significant information review process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The review team also performed its own search for new and potentially significant information during the audit of the CP application. The review team determined that nonradiological waste from the

new and updated RFAs in the GAI would cause impacts on the environment similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact on the environment from nonradiological waste due to RFAs in the GAI would be SMALL.

The review team further evaluated whether or not the incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the review team used geographical proximity and concurrence in time as criteria. In Sections 3.12.3 and 3.12.4, the review team determined that the impacts caused by nonradiological waste from building and operating the proposed BWRX-300 reactor on the CRN Site on the environment would be SMALL. There are multiple NRC and DOE nuclear-related facilities in the GAI; however, it is expected that the identified projects would either not coincide with the proposed CRN-1 building and operation activities at the CRN Site or would produce waste streams of a different nature. Each of the RFAs is also expected to follow applicable nonradiological waste disposal requirements. The review team determined that the incremental impact from CRN-1 nonradiological waste would not have a cumulative effect in the GAI.

Therefore, the ESP EIS cumulative impacts finding of SMALL for nonradioactive waste in the GAI remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.12.6 Conclusions

Based on the analysis in Section 3.12.2, the review team found impacts on nonradiological waste from building activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.12.3, the review team found the impacts on nonradiological waste from operation activities to be SMALL. The conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.12.4, the review team found the impacts on nonradiological waste from decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.12.5, the review team found that the cumulative impacts of nonradiological waste from RFAs would be SMALL and the NRC-authorized activities would not be a significant contributor. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.13 Transportation of Radioactive Material

The NRC staff's assessment of the impacts to public health from transporting unirradiated fuel, spent fuel, and radioactive waste to and from the CRN Site was provided in Section 6.2 of the ESP EIS (NRC 2019-TN6136). The NRC staff compared normalized environmental impacts to those in Table S-4 of 10 CFR 51.52 (TN10253) by multiplying surrogate SMR impacts by the ratio of the total electric output of the reference reactor. The NRC staff concluded in the ESP EIS that the radiological impacts from the transportation of nuclear fuel and radioactive waste would be SMALL.

The CP ER (TVA 2025-TN11927) indicated in that there is no new and significant information regarding transportation-related impacts. During its review of the application, the NRC staff independently verified that there is no new and significant information regarding transportation-related impacts. This was performed by reviewing the applicant's CP ER, supporting documentation, and process for identifying new and significant information, examining other information available at the audit of the CP application, and considering applicable regulations and updates to reference documents cited in this SEIS.

The current application is for construction of a single reactor and the ESP EIS analyzed the impacts of multiple reactors. Furthermore, the impacts from transportation of the expected fuel type, discussed in Section 3.14.1, would be bounded by the impacts from transportation described in the ESP EIS.

The Decommissioning Generic Environmental Impact Statement (GEIS) NUREG-0586, Supplement 1, *Final Generic Environmental Impact Statement of Decommissioning of Nuclear Facilities* includes a discussion of transportation, including the transportation of spent nuclear fuel and radioactive waste. The ESP EIS determined the impacts from decommissioning would be bounded by the impacts determined in the Decommissioning GEIS, NUREG-0586 Supplement 1 (NRC 2002-TN7254).

Based on this review, the NRC staff determined that the conclusions presented in the ESP EIS regarding transportation-related impacts remain bounding and valid.

3.13.1 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.11.2 of the ESP EIS identified transportation impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts from the transportation of radioactive waste and fuel would be SMALL (NRC 2019-TN6136).

The NRC staff evaluated the information in the CP ER and TVA's new and significant information evaluation process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E lists new and updated RFAs included in CP ER Table 7-1. The NRC staff also performed its own search for new and potentially significant information during the audit of the CP application. The NRC staff determined that the transportation-related impacts from the new and updated RFAs in the GAI would be similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact of transportation of radioactive waste and fuel due to RFAs in the GAI would be SMALL.

The NRC staff further evaluated whether the transportation-related incremental impacts from CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the NRC staff used geographical proximity and concurrence in time as criteria. There are multiple NRC and DOE nuclear-related facilities in the GAI. However, each of these must remain in compliance with applicable rules and regulations related to the transportation of radioactive material. These RFAs are also likely to need transportation of fuel and radioactive waste at different, non-concurrent times. Therefore, the NRC staff determined that CRN-1 transportation-related incremental impacts would not have a cumulative effect within the GAI.

Therefore, the ESP EIS cumulative impacts finding of SMALL for transportation remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.13.2 Conclusions

Based on the analysis in Section 3.13, the NRC staff found the impacts of transportation from operation activities to be SMALL. The conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.13, the NRC staff found the impacts of transportation from decommissioning to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.13, the NRC staff found the cumulative impacts of transportation from RFAs would be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.14 Uranium Fuel Cycle and Radioactive Waste

3.14.1 Uranium Fuel Cycle

The NRC staff's assessment of impacts from the uranium fuel cycle was provided in Section 6.1 of the ESP EIS (NRC 2019-TN6136). The NRC staff compared normalized environmental impacts to those in Table S-3 of 10 CFR 51.51 (TN10253) by multiplying surrogate SMR impacts metrics by the ratio of proposed electric output to the total electric output of the reference reactor. Based on the NRC staff's analysis, environmental impacts of the uranium fuel cycle were considered to be SMALL in the ESP EIS.

TVA indicated in its CP ER (TVA 2025-TN11927) that there is no new and significant information regarding uranium fuel cycle-related impacts. During its review of the application, the NRC staff independently reviewed and found no new and potentially significant information regarding uranium fuel cycle-related impacts. The NRC staff's verification was supported by reviewing the CP ER, supporting documentation, and evaluating TVA's process for identifying new and significant information, examining other information available at the audit, and considering applicable regulations and updates to reference documents cited in this SEIS.

While CRN-1 has a new reactor design, the expected fuel type will be similar to that of current BWRs. Impacts from the use of current BWR fuels have been analyzed previously in the LR GEIS (NRC 2024-TN10161) and the ESP EIS. Furthermore, the current application is for construction of a single reactor (300 MWe) and the ESP EIS analyzed the impacts of multiple reactors (a maximum of 800 MWe). The NRC staff determined that uranium fuel cycle impacts during operation are SMALL.

Based on this review, the NRC staff determined that the conclusions presented in the ESP EIS regarding uranium fuel cycle-related impacts remain bounding and valid.

3.14.2 Radioactive Waste

The NRC staff's assessment of radiological waste impacts was provided in Section 6.1 of the ESP EIS (NRC 2019-TN6136). The NRC staff considered the impacts of currently licensed locations for disposal of low-level waste and the impacts of Table S-3 and Table S-4 of 10 CFR Part 51 (TN10253). The BWRX-300 uses a light water reactor (LWR) fuel type similar to what is used in currently operating reactors. The storage and transportation of LWR fuel after the end of the licensed life for operations of a nuclear reactor and before final disposal in a permanent repository is described in NUREG-2157*, Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC 2014-TN4117). The BWRX-300 uses an LWR fuel type that is addressed in NUREG-2157. Therefore, the impacts determined in NUREG-2157 are applicable and can be incorporated by reference (see 10 CFR 51.23(b)). Based on the NRC staff's analysis, environmental impacts of radioactive waste were determined to be SMALL.

TVA indicated in its CP ER (TVA 2025-TN11927) that there is no new and significant information regarding uranium fuel cycle-related impacts. During its review of the application, the NRC staff independently reviewed and found that there is no new and potentially significant information regarding radioactive waste-related impacts. The NRC staff's verification was supported by reviewing TVA's ER, supporting documentation, and evaluating TVA's process for identifying new and significant information, examining other information available at the audit, and considering applicable regulations and updates to reference documents cited in this SEIS. The NRC staff determined that the radioactive waste impacts during operation is SMALL.

Based on this review, the NRC staff determined that the conclusions presented in the ESP EIS regarding radioactive waste-related impacts remain valid.

3.14.3 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.11 of the ESP EIS identified uranium fuel cycle and radioactive waste impacts that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts of the uranium fuel cycle and radioactive waste would be SMALL (NRC 2019-TN6136).

The NRC staff evaluated information in the CP ER and TVA's new and significant information evaluation process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The NRC staff also performed its own search for new and potentially significant information during the audit of the CP application. The NRC staff determined that the uranium fuel cycle and radioactive waste impacts from the new and updated RFAs in the GAI would be similar to those described in the ESP EIS. The NRC staff identified new and significant information about currently known projects in the GAI that may contribute to impacts from the uranium fuel cycle and production of radioactive waste. These are new RFAs not identified in the ESP EIS, and include Kairos Hermes 1 and 2, TRISO-X Fuel Fabrication Facility, Standard Nuclear Pilot Fuel Manufacturing Facility (previously called Ultra Safe Nuclear), and Orano Project Ike (TVA 2025-TN11927). When compared to the impacts for a 1000 MWe reference reactor described in WASH1248 (AEC 1974-TN23), the combined impacts of CRN-1 and the Kairos reactors do not exceed those of the reference reactor stated in Table S-3 of 10 CFR 51.51 (TN10253). The impacts from the fuel cycle-related facilities are incorporated into the impacts of Table S-3 and are not

considered as independent additions. Therefore, based on its assessment, the NRC staff found the cumulative impacts of uranium fuel cycle due to RFAs in the GAI would be SMALL.

NUREG-2157, the Continued Storage GEIS (NRC 2014-TN4117), examines the incremental impacts of continued storage on each resource area analyzed in NUREG–2157 in combination with other past, present, and reasonably foreseeable actions. Section 6.5 of NUREG–2157 indicates ranges of potential cumulative impacts for multiple resource areas (NRC 2014-TN4117). These ranges are primarily driven by impacts from activities other than the continued storage of spent fuel at the reactor site. These additional federal and non-federal activities, when viewed over longer than short-term timeframes, can lead to the range of cumulative impacts discussed in Chapter 6 of NUREG-2157. The overall cumulative impact conclusions would not change if the impacts of continued storage were removed. When considering the impacts the NRC can predict with certainty, which are SMALL, the uncertainty reflected by the ranges in some non-storage impacts, and the relative likelihood of a short timeframe of storage, the staff finds that the impact of NUREG-2157 does not change the staff's overall findings regarding the cumulative impacts of the uranium fuel cycle.

The NRC staff further evaluated whether or not the incremental impacts from CRN-1 uranium fuel cycle and radioactive waste would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 building and operation could cause cumulative effects in combination with the RFAs, the NRC staff used geographical proximity and concurrence in time as criteria. There are multiple NRC and DOE nuclear-related facilities in the GAI (TVA 2025-TN11927). As stated in Sections 3.14.1 and 3.14.2, the NRC staff expects that the incremental impacts of CRN-1 during operations would be SMALL for uranium fuel cycle and radioactive waste.

Therefore, the ESP EIS conclusion of SMALL cumulative impacts from uranium fuel cycle and radioactive waste remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.14.4 Conclusions

Based on the analysis in Section 3.14, the NRC staff found the impacts from the uranium fuel cycle and radiological waste during operation activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.14, the NRC staff found the cumulative impacts on the uranium fuel cycle and radiological waste from RFAs to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

3.15 Postulated Accidents

The NRC staff's assessment of the environmental impacts of postulated design-basis accidents and severe accidents for advanced reactors at the CRN Site was provided in Section 5.10 of the ESP EIS (NRC 2019-TN6136). Based on the NRC staff's analysis, the environmental impacts of design-basis and severe accidents were determined to be SMALL in the ESP EIS.

The term “accident,” as used in this section, refers to any off-normal event not addressed in Section 3.10 that results in the release of radioactive materials into the environment. The focus of this review is on events that could lead to releases substantially in excess of permissible limits for normal operations. Normal release limits are specified in 10 CFR Part 20 (TN283), Appendix B, Table 2.

3.15.1 Design-Basis Accidents

The NRC staff’s review of Design-Basis Accidents (DBAs) was provided in Section 5.11.1 of the ESP EIS (NRC 2019-TN6136). The calculation approach used by TVA for its CP application is consistent with the approach described in the ESP EIS and is summarized below.

TVA evaluated the potential consequences of postulated accidents to demonstrate that a reactor could be constructed and operated at the CRN Site without undue risk to the health and safety of the public (TVA 2019-TN5854). These evaluations used a surrogate DBA representative of the reactor design and site-specific meteorological data. The evaluation examined the accident with the highest offsite consequences.

The DBA analyses in the ESP EIS assumed that the postulated releases would occur from the location on an imaginary border of an area surrounding all release points for the proposed unit that would result in the greatest doses at the exclusion area and low-population zone boundaries. The unit proposed in the CP application is situated entirely within the area assumed in the ESP application, so the previous exclusion area boundary and low-population zone distances remain valid.

Table 5-1 of the ESP EIS listed the set of DBAs considered and presented estimates of the environmental consequences of each accident in terms of total effective dose equivalent, which is the sum of the committed effective dose equivalent from inhalation and the effective dose equivalent from external exposure. The DBAs listed in the table are the same as those that were considered in the ESP review. Further, in no case is the consequence estimate significantly different than the corresponding estimate presented in the ESP EIS. Therefore, the NRC staff determined that the conclusion of SMALL in the ESP EIS related to the environmental consequences of DBAs for a reactor at the CRN Site remains bounding and valid.

3.15.2 Severe Accidents

The potential consequences of severe accidents were provided in Section 5.11.2 of the ESP EIS (NRC 2019-TN6136). In the ESP EIS, the NRC staff concluded that the probability-weighted consequences of severe accidents for the largest SMR considered for the CRN Site were SMALL and that the issue was resolved.

For the CP application, TVA conducted a search for new and significant information related to severe accidents and stated that there have been no significant changes in either the generic PPE or site-specific information used in the severe accident consequence assessment (TVA 2025-TN11927). TVA identified new information related to severe accident source term. The maximum power level in the ESP EIS for a single SMR was 800 MWt; however, the chosen design for the CP application has a maximum thermal power level of 870 MWt. While this value is 8.75 percent higher than the ESP PPE value, the resultant values of the severe accident analysis would remain a small fraction of the values of the current reactor fleet described in Tables 5-17 and 5-18 of the ESP EIS. The CP PSAR (TVA 2025-TN12293) indicated that the total reduction of CDF (as shown in PSAR Table 15.7-9) mitigates the increase of source term

and would not result in an overall increase in risk. In addition, and as stated in Section 5.10.2 of the CP ER, the probabilistic risk assessment required for the severe accident analysis is not yet complete. This information will be identified and provided by TVA as part of its OL application.

The NRC staff has reviewed the process that the applicant used to search for new information and has conducted its own search. The NRC staff concurs that there is no additional new information related to the site-specific input to the severe accident consequence assessment in Section 5.11.2 of the ESP EIS.

Section 6.2 of the ESP EIS described the operational-related impacts of postulated accidents and determined the impacts to be SMALL (NRC 2019-TN6136). The review team evaluated the information in the CP ER combined with the new information due to exceeding the thermal power level in the ESP EIS and performed its own independent search for new and potentially significant information during the audit of the CP application. During its independent evaluation, the review team did not identify any additional new information. Thus, the NRC staff determined that its conclusion set forth in Section 5.11.2 of the ESP EIS that the probability-weighted consequences of severe accidents at the CRN Site would be SMALL remains bounding and valid.

3.15.3 Severe Accident Mitigation Alternatives

A SAMA analysis was not required and completed for completion of the ESP EIS (NRC 2019-TN6136). This was noted as an unresolved issue and this issue remains unresolved.

The design of CRN-1 is ongoing at the time of the CP ER submission and as such additional features or actions that could prevent or mitigate the consequences of severe accidents from design alternatives or mitigation alternatives are not yet known. In addition, and as stated in Section 5.10.3 of the CP ER (TVA 2025-TN11927), the probabilistic safety assessment required for this analysis is not yet complete. TVA states in this ER section that the necessary Level 1 and Level 2 PRA information to support the evaluation of SAMAs would be provided at the OL application stage.

3.15.4 Environmental Impacts of Reasonably Foreseeable Actions

Table 7-1 of the ESP EIS identified past, present, and reasonably foreseeable projects that could cumulatively contribute to the environmental impacts of the project outlined by the ESP EIS. Section 7.10 of the ESP EIS identified impacts from postulated accidents that could occur based on projects outlined by Table 7-1 of the ESP EIS in combination with building and operating two or more SMRs and determined that the cumulative impacts would be SMALL (NRC 2019-TN6136).

The NRC staff evaluated the information in the CP ER and TVA's new and significant information evaluation process, which the review team stated in Section 1.4.2, is reasonable. Table 7-1 of the CP ER presents a summary of new information regarding RFAs. Table E-1 in Appendix E of this SEIS lists the new and updated RFAs included in the CP ER Table 7-1. The NRC staff also performed its own independent search for new and potentially significant information during the audit of the CP application. The NRC staff determined that postulated accidents at the new and updated RFAs in the GAI would cause impacts similar to those described in the ESP EIS. Therefore, the review team determined that the cumulative impact on surface water resources from RFAs in the GAI would be SMALL.

The NRC staff further evaluated whether or not the incremental impacts from postulated accidents at CRN-1 would have a cumulative effect on the GAI containing the RFAs. To evaluate if impacts caused by CRN-1 construction and operation could cause cumulative effects in combination with the RFAs. The review team used geographical proximity and concurrence in time as criteria. The NRC staff consider simultaneous accidents at multiple RFAs to be unlikely. Because each RFA must demonstrate that its safety features are appropriately implemented to minimize risk to the public from accidental releases of radioactive materials, the NRC staff determined that the cumulative impacts in the GAI from postulated accidents would be SMALL. The NRC staff determined that the incremental impacts from CRN-1 would not cause a cumulative effect in the GAI.

Therefore, the ESP EIS cumulative impacts finding of SMALL for postulated accidents remains bounding and valid. The NRC-authorized activities would not be a significant contributor to the cumulative impact.

3.15.5 Conclusions

Based on the analysis in Section 3.14, the NRC staff found the impacts (risks) from postulated accidents during operation activities to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

Based on the analysis in Section 3.14, the NRC staff found the cumulative impact of postulated accidents from RFAs to be SMALL. Therefore, the conclusions presented in the ESP EIS remain bounding and valid.

A complete evaluation of SAMAs would occur at the OL application stage.

4 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

The environmental impacts of alternatives to the proposed action were evaluated in Chapter 9 of the ESP EIS (NRC 2019-TN6136). This chapter discusses new and significant information, where applicable, concerning alternatives to the proposed action. Topics discussed are the no-action alternative (Section 4.1), energy alternatives (Section 4.2), alternative sites (Section 4.3), and system design alternatives (Section 4.4).

4.1 No-Action Alternative

Under the no-action alternative, the NRC would not issue a CP to build CRN-1. The applicant could not build the proposed CRN-1 and would therefore not have an opportunity to demonstrate the SMR technology. While forgoing the opportunities provided by CRN-1 may not necessarily preclude future development of reactors using BWRX-300 technology, it could slow or impede safe and efficient development of the technology. TVA could still perform preconstruction activities, such as excavating for the reactor building (NRC 2024-TN12283). There would be no environmental impacts at the CRN Site associated with not issuing the CP, except the impacts associated with any activities not within the definition of construction at 10 CFR 51.4 (TN10253) (i.e., those activities under the exemption request for excavation should TVA choose to pursue those activities). Any environmental benefits from selecting the no-action alternative instead of the proposed action would be minimal. Additionally, under the no-action alternative, the proposed site would remain available for other government development projects, and many of the environmental impacts resulting from land disturbance and building new industrial facilities on the site might still occur at some time in the future.

4.2 Energy Alternatives

Because the purpose of the project is to demonstrate and test chosen new technologies, specifically the BWRX-300 reactor, the applicant did not consider alternative technologies for CRN-1 (TVA 2025-TN11927).

4.3 Site Alternatives

In accordance with 10 CFR 51.92(e)(3) (TN10253), this SEIS does not contain a separate discussion of alternative sites. The NRC's detailed evaluation of alternative sites is documented in Chapter 9 and 10 of the ESP EIS (NRC 2019-TN6136).

4.4 System Design Alternatives

System design alternatives were addressed in Section 9.4 of the ESP EIS (NRC 2019-TN6136). The review team evaluated design alternatives for the proposed heat-dissipation system, the intake system, the discharge system, and the water supply. Cooling-water system water-treatment designs were not resolved in the ESP EIS. The ESP EIS stated that the alternative system designs evaluated by the review team were not environmentally preferable to the proposed plant system design.

Regarding the design alternatives that were addressed in the ESP EIS, the review team evaluated information provided in the CP ER and performed its own independent search for new and significant information during the audit of the CP application. The updated intake structure alternatives (as part of the Circulating Water Systems) described in the CP ER were found to

have similar impacts to those assessed in the ESP EIS (TVA 2025-TN11927). The review team did not identify any further new information in its independent evaluation.

Section 9.4 of the ESP EIS specifically stated that water treatment methods would need to be addressed as part of any application referencing the ESP EIS. TVA outlined the water treatment process in the CP ER Section 3.2.2.2. All quantities and concentrations of chemicals to be used would be in accordance with a Biocides/Corrosion Treatment Plan, which would be submitted as part of the NPDES permit application to the TDEC. The review team evaluated information provided in the CP ER and performed its own independent search for new and significant information during the audit of the CP application. The review team did not identify any further new information in its independent evaluation. The review team did not identify any design alternatives for water treatment that would be environmentally preferrable to the process proposed by the applicant.

4.5 Cost-Benefit Analysis

The benefit-cost balance was not included in the ESP EIS because such an assessment is not required for an ESP application per 10 CFR 51.50(b)(2) (TN10253). However, indirect costs (also called external costs) of a benefit-cost balance assessment, such as unavoidable adverse impacts, were addressed in the ESP EIS. The following supplemental information assesses the expected benefits and costs of the proposed action.

The intent of this section is not to identify and quantify all of the potential societal benefits of the proposed activities and compare them to the potential costs of the proposed activities. Instead, this section will focus on only those benefits and costs of such magnitude or importance that their inclusion in this analysis can inform the decision-making process. This section compiles and compares the conclusions reached in earlier chapters of this SEIS. It gathers the expected impacts from building and operation of the proposed CRN-1 and aggregates them into: (1) the expected benefits to be derived from approval of the proposed action and (2) the expected environmental and economic costs.

Although conceptually similar to a purely economic benefit-cost analysis, which determines the net present dollar value of a given project, the intent of this section is to identify all potential societal benefits of the proposed activities and compare them to the potential internal (i.e., private) as well as external (i.e., societal) costs of the proposed activities.

General issues related to TVA's financial viability are outside NRC's mission and authority and, thus, are not considered in this SEIS. Issues related to the financial qualifications of the applicant will be addressed in the NRC staff's SAR. It is not possible to quantify and assign a value to all benefits and costs associated with the proposed action. This analysis, however, attempts to identify, quantify, and provide monetary values for benefits and costs when reasonable estimates are available.

4.5.1 Benefits

The benefits of the proposed project include demonstration of technological capabilities, emission reduction, infrastructure improvements, and socioeconomic benefits. A summary of benefits is shown in Table 4-1. As discussed in Chapter 1 and the ESP EIS, the primary purpose of this project is to demonstrate the ability to license, construct, and operate a SMR at the CRN Site. TVA is utilizing the two-step licensing process established in 10 CFR Part 50 (TN249) to demonstrate that it can first obtain a permit to construct, and ultimately secure a

license to operate CRN-1. Successfully demonstrating this process would fulfill TVA's purpose and need and would also position TVA to consider broader deployment of SMRs across the TVA Power Service Area.

Construction and operation of CRN-1 provides important socioeconomic benefits such as increases in purchases of local and regional goods and services, local and regional direct and indirect employment, and tax revenues to local taxing jurisdictions(TVA 2025-TN11927). As detailed in Section 3.8, these impacts would be beneficial but minimal.

To minimize traffic impacts associated with construction of CRN-1, TVA will coordinate with the Tennessee Department of Transportation, DOE, and the City of Oak Ridge to identify and implement any necessary mitigation strategies (TVA 2025-TN11927). Roadway improvements undertaken to mitigate CRN-1 traffic impacts would also provide broader benefits to the surrounding community by reducing delays and improving traffic flow on TN 58, thereby benefiting the RFAs identified in Appendix E.

Table 4-1 Benefits Summary of the One-Unit BWRX-300 Facility (CRN-1) at the Clinch River Nuclear Site

Category of Benefit	Description of Benefit	Monetized Value of Benefit
Demonstration	Successful demonstration of the ability to license, construct, and operate CRN-1 supports TVA's technology innovation efforts aimed at evaluating and developing future electricity generation capabilities and enables TVA to consider utilizing SMRs throughout the TVA Power Service Area.	-
Generating capacity	300 Mwe (See Table 3.1-2 of the CP ER) (TVA 2025-TN11927)	-
Electricity generated	2,496,600 MWh per year	-
Fuel diversity and energy security	Nuclear generation provides diversity to coal- and natural gas-fired baseload generation.	-
Emissions Reduction	Demonstration of nuclear power generation that significantly reduces emissions of air pollutants when compared to equivalent sources of electricity.	-
Infrastructure	Roadway improvements undertaken to mitigate CRN-1 traffic impacts benefit the surrounding community by improving traffic flow and safety, thus reducing the potential for delay and accidents.	-

Category of Benefit	Description of Benefit	Monetized Value of Benefit
Socioeconomics Construction	Increased jobs would benefit the area economically and increase the economic diversity of region.	Approximately 1,300 construction workers create an incremental increase of 1,239 indirect jobs within the ROI during peak building period. An average of $30.2 million annually would be spent on CRN-1 construction labor wages over the 6-year duration of building, while the estimated wages would reach an annualized total of $64.4 million at the peak employment (TVA 2025-TN11927). The indirect and induced workforce income is $45.5 million, resulting in a total labor income of $109.9 million (TVA 2025-TN12285).
Socioeconomics Operations	Increased jobs would benefit the area economically and increase the economic diversity of region.	A total of 205 full-time operations workers create an incremental increase in 440 indirect jobs within the ROI while the plant is operating (TVA 2025-TN11927). $18.9 million income would be paid annually to operation workers ($18.5 million for operations plus $0.46 million for outages) and an additional $16.6 million in labor income is generated in the ROI through the multiplier effect; for a net impact of $35.5 million in labor income annually during operation (TVA 2025-TN12285).
Taxes and Revenue	Increased tax revenue supports improvements to public infrastructure and social services.	-
Electrical reliability	Nuclear power plants provide the most power per unit of any baseload unit and run at some of the highest capacity factors. These characteristics enhance the stability and reliability of the electricity supply.	-

CP = construction permit; CRN = Clinch River Nuclear; ER = environmental report; ROI = region of influence; TVA = Tennessee Valley Authority.
"-" denoted no data in table cell.

4.5.2 Costs

Internal costs to TVA as well as external costs to the surrounding region and the environment would be incurred during the building and operation of the proposed CRN-1. A summary of these costs is provided in Table 4-2.

Internal costs include all of those identified in a total capital cost assessment—the direct and indirect cost to physically build the power plant (capital costs) plus the annual costs of operation and maintenance. In accordance with the guidance for NRC staff in NUREG-1555 (NRC 2007-TN614), internal costs of the proposed project are presented in monetary terms. This SEIS

would focus on the capital cost for building CRN-1. Estimates of annual operating expenses for operation and maintenance will be provided at the OL application stage.

External costs include all costs imposed on the environment and the region surrounding the plant that are not internalized by the company, such as a loss of regional productivity, loss of wildlife habitat, or other environmental degradation. Table 4-2 and Table 4-3 below summarize these costs. A formal benefit-cost balance assessment was not performed for the ESP EIS, however, indirect costs from unavoidable adverse impacts were addressed in the ESP EIS.

Table 4-2 Internal Cost Summary for the One-Unit BWRX-300 Facility (CRN-1) at the Clinch River Nuclear Site

Cost Category	Summary of Cost from ESP EIS	Additional or Updated Cost for CRN-1 Relative to ESP EIS Cost
Building Costs	Not addressed in the ESP EIS.	$1.8–3.0 billion overnight capital cost ($6,000 to $10,000 per kWe)
Operation Costs (i.e., fixed operations and maintenance)	Not addressed in the ESP EIS.	Deferred to Operating License Application

EIS = environmental impact statement; ESP = early site permit.

Table 4-3 External Cost Summary for the One-Unit BWRX-300 Facility (CRN-1) at the Clinch River Nuclear Site

Cost Category	Summary of Cost from ESP EIS	Additional or Updated Cost for CRN-1 Relative to ESP EIS Cost
Land Use	Noticeable impacts including approximately 327 ac of vegetated land permanently converted to industrial use on the CRN Site. Approximately 167 ac temporarily disturbed and revegetated once building activities are complete. Approximately 30 ac in the BTA would be permanently affected by roadway improvements, including the conversion of naturally vegetated land to developed.	Up to approximately 29 ac of land impacted within the associated offsite 161 kV transmission corridor. Building activities associated with the development of an onsite quarry within an approximately 40 ac footprint on the CRN Site.
Air Quality	Building activities result in minor emissions and fugitive dust. Impact during operations of diesel equipment and cooling tower will be minor.	Quarry operations and associated heavy traffic will cause temporary emissions and fugitive dust.
Surface Water	Building activities result in minor impacts to surface waterbodies on and near the CRN Site, including the Reservoir, Grassy Creek, and small streams and ponds on the CRN Site, in the BTA, and in the transmission line right-of-way.	Similar impacts to the Reservoir. Permanent impacts to: • 3 ponds (0.65 ac) • 11 perennial/intermittent streams (3,586 linear ft) WWCs (2,694 linear ft) Temporary impacts to:

Cost Category	Summary of Cost from ESP EIS	Additional or Updated Cost for CRN-1 Relative to ESP EIS Cost
		• 3 perennial/intermittent streams (101 linear ft) • 3 WWC's (64 linear ft)
Consumptive Use	Consumptive use of water from the Reservoir associated with evaporation and drift from cooling towers results in a minor water loss. Additional minor water loss in potable and sanitary water supplied by the City of Oak Ridge public water supply system.	Similar impacts on water resources because of lower consumptive use.
Groundwater	No groundwater used for building or operations. Dewatering during building will be required for excavations, and surface modifications are expected to affect the rate and spatial distribution of groundwater recharge. Impacts are expected to be minor with mitigating actions such as grouting of fractures in excavations and monitoring of groundwater levels.	Dewatering for the potential onsite quarry that was not assessed in the ESP EIS will be required during building and operation. Impacts are expected to be minor and local with mitigating actions such as grouting of fractures in excavations and monitoring of groundwater levels.
Water Quality	Minor effects to surface water and groundwater quality after implementation of the SWPPP and IPPP, and controls associated with compliance with TDEC NPDES permit conditions.	Similar effects on surface water and groundwater quality. Implementation of similar pollution prevention plans and adherence with TDEC NPDES permit conditions.
Aquatic Resources	Minor losses of aquatic biota due to habitat alteration during construction and entrainment and impingement during operation; minor localized impact to aquatic biota from thermal plume during operation.	Similar area of impact on aquatic species in the Reservoir. Permanent impacts to: • 3 ponds (0.65 ac) • 11 perennial/intermittent streams (3,586 linear ft) Temporary impacts to: • 3 perennial/intermittent streams (101 linear ft)
Terrestrial and Wetland Resources	Noticeable habitat loss due to clearing and grading resulting in approximately 357 ac of permanent habitat loss and 182 ac of temporary loss of on the CRN Site and BTA. This habitat loss could result in the mortality or displacement of wildlife, including federally listed species. Noise and collision from construction equipment could disturb wildlife. Filling approximately 1.8 ac of wetlands on the CRN Site and BTA	Approximately 466.7 ac of terrestrial habitats on the CRN Site and 21.8 ac on the BTA will be permanently lost as the areas are converted to developed areas. Approximately 29 ac of impact to various habitats within associated offsite 161 kV transmission corridor. The 69 kV underground transmission line has been removed from the scope.

Cost Category	Summary of Cost from ESP EIS	Additional or Updated Cost for CRN-1 Relative to ESP EIS Cost
	and temporary disturbance of wetlands during building. Approximately 210 ac of right-of way lands would be disturbed to install the offsite portion of the 69 kV underground transmission line. Approximately 210 ac of right-of way lands would be disturbed to install the offsite portion of the 69 kV underground transmission line.	Approximately 12.7 ac of important deciduous calcareous upland and wetland forest could be affected in the 161 kV transmission corridor that contains State-listed plant species (rigid sedge and pale green orchid). Building activities affect 0.8 ac of calcareous deciduous forest on the CRN Site, which contain the State-listed spreading false foxglove. In addition, the 5 ac cedar glade habitat that was found in the 2021 vegetation survey will be filled. Wetland impacts from building activities include approximately 9.2 ac on the CRN Site, 3.6 ac in the associated offsite 161 kV transmission corridor, and 1.7 ac in the BTA.
Historic and Cultural Resources	Potential noticeable adverse effects on 16 potentially NRHP-eligible archaeological resources, one NRHP--eligible archaeological resource (40RE233), deeply buried archaeological deposits, and one NRHP-eligible Melton Hill Dam District.	Historic and cultural resources either determined ineligible for NRHP or are avoided by building and operations activities or minimized in accordance with PAs. Disturbance of the NRHP-eligible Melton Hill Dam District is no longer proposed.
Infrastructure and Community Services	MODERATE TO LARGE traffic impacts on local roadways near the site during peak building period; minimal and localized during operations. Minimal impacts on recreational activities in the vicinity, except for a noticeable, but not destabilizing, reduction in recreational enjoyment due to aesthetic impacts. Minimal impacts on housing; water supply and wastewater treatment; police, fire protection, and healthcare services; and education.	Additional visual intrusion as a result of building the associated offsite 161 kV transmission line from the CRN Site boundary, passing through the Grassy Creek HPA and across Bear Creek Road onto DOE-managed land to the intersect with the Kingston FP-Bethel Valley HP #2 transmission line.
Health Impacts (Nonradiological)	Nonradiological health hazards to the public and occupational workers would be monitored and controlled in accordance with regulatory limits.	Similar nonradiological health hazards to the public and occupational workers. Similar monitoring and controls in accordance with applicable regulations.

Cost Category	Summary of Cost from ESP EIS	Additional or Updated Cost for CRN-1 Relative to ESP EIS Cost
Health Impacts (Radiological)	Doses to members of the public would be below NRC and U.S. Environmental Protection Agency standards, and there would be no observable health impacts. Occupational doses to plant workers at the site would be below NRC standards and program to maintain doses as low as reasonably achievable would be implemented. Accident dose associated with the PPE meets the site acceptance criteria of 10 CFR 50.34 (TN249) and 10 CFR Part 100 (TN282).	Similar radiological health impacts to the public and occupational workers. Similar adherence to applicable regulations.
Nonradioactive Waste	Minor consumption of local or regional landfill space, offset by payment of tipping fees for waste disposal. Minor consumption of regional hazardous waste treatment or disposal capacity, offset by treatment and disposal costs.	The quantities have changed because TVA is no longer building two or more units. Disposal would still follow the same regulations.
Uranium Fuel Cycle	Minor impacts distributed across multiple locations throughout the United States from the mining, milling, and enrichment of uranium, from fuel fabrication, from transportation of radioactive material, and from management of radioactive wastes.	Similar impacts from uranium fuel cycle and management of radioactive waste.
Materials, Energy, and Uranium	Irreversible and irretrievable commitments of materials and energy, including depletion of uranium. Construction materials include concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Equipment needs include cranes, cement trucks, excavation equipment, dump trucks, and graders.	Similar commitment of resources.
Hazardous and Radioactive Waste	Mixed waste stored, transported, treated, and disposed in compliance with both NRC and EPA regulations would consume some regional or national waste treatment or disposal capacity, offset by treatment and disposal costs.	Similar storage, transport, treatment, and disposal of hazardous and radioactive waste in compliance with applicable regulations.

BTA = barge traffic area; CFR = *Code of Federal Regulations*; CRN = Clinch River Nuclear; DOE = U.S. Department of Energy; EIS = environmental impact statement; EPA = U.S. Environmental Protection Agency; ESP = early site permit; HPA= Habitat Protection Area; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; WWC = wet-weather conveyances.

4.5.3 Summary of Benefits and Costs

The primary benefit of the proposed action (i.e., building and operation of the CRN-1) is to support TVA's goal of demonstrating the feasibility to license, construct, and operate SMR technology at the CRN Site. Table 4-1 and Table 4-2 include summaries of both internal and external costs of the proposed activities at the CRN Site, as well as the identified benefits.

The internal costs to construct the CRN-1 appears to be substantial; however, TVA's decision to pursue this activity implies that TVA has already concluded that the private, or internal, benefits of the proposed facility outweigh the internal costs. In addition, while the economic benefits of increases in purchases of local and regional goods and services, local and regional direct and indirect employment, and tax revenues to local taxing jurisdictions appear to be minor, the external socio-environmental costs imposed on the region also appear to be relatively minor. Demonstrating the deployment of an SMR enables TVA to use SMRs more broadly in its service area and meet regional power demands. Although no specific monetary values have been assigned to the identified societal benefits, the review team determined it is not unreasonable to assume that the potential societal benefits of the proposed action outweigh the potential social and private costs.

On the basis of the assessments summarized in this SEIS, the review team concludes that building and operating the proposed CRN-1 at the Clinch River Site, with the anticipated mitigation measure identified by the review team, would have accrued benefits that most likely would outweigh the economic, environmental, and social costs.

5 NEED FOR POWER

Both the ESP EIS (NRC 2019-TN6136) and the CP ER (TVA 2025-TN11927) indicated that the primary purpose and need of the proposed action (i.e., building and operation of CRN-1) is to support TVA's goal of demonstrating the feasibility to license, construct, and operate SMR technology at the CRN Site. Further, successful demonstration of the SMR technology would enable TVA to consider utilizing SMRs throughout the TVA Power Service Area.

TVA's draft 2025 IRP (TVA 2024-TN12296) identified the various generating resources that TVA intends to pursue to meet the energy needs of the TVA Power Service Area by 2050. The 2025 IRP recommended that TVA continue to evaluate emerging nuclear technologies, including SMRs, as part of technology innovation efforts aimed at developing future electricity generation capabilities. TVA's pursuit and acquisition of an ESP for the CRN Site in 2019 supported the recommendation in both the Final 2019 IRP (TVA 2019-TN11046) and draft 2025 IRP. In February 2022, TVA's Board of Directors announced a New Nuclear Program to explore advanced reactor options (NRC 2025-TN12331).

Pursuit of a construction permit enables TVA to evaluate a specific SMR technology and determine whether SMRs could be used to help advance the recommendations of TVA's New Nuclear Program and TVA's draft 2025 IRP (TVA 2024-TN12296).

Apart from the main purpose and need for this project, any power generated from the operation of CRN-1 would be made available for regional electricity needs, thereby supporting recommended technology innovation efforts outlined in TVA's draft 2025 IRP (TVA 2024-TN12296). The need for power analysis explains how the power generated by the deployment of CRN-1 could be used to satisfy future power needs within the TVA Power Service Area.

5.1 Description of Power System

This section characterizes the institutional and physical characteristics of the TVA's power system. Section 5.1.1 describes the current power system, including geographic considerations, and regional characteristics. Section 5.1.2 provides an assessment of the TVA's analytical process in the context of the NRC's four acceptability criteria.

5.1.1 Description of TVA's Power System

TVA supplies electricity to 153 local power companies and 60 direct served customers. The TVA power system serves approximately 10 million people in a seven-State, 80,000 square mile (mi^2) (square kilometer [207,200 km^2]) region. Figure 5-1 shows TVA's service area. In fiscal year 2023, TVA delivered more than 157 billion kilowatt-hours of electricity to customers from a power supply that was 42 percent nuclear, 31 percent natural gas, 14 percent coal-fired, 9 percent hydroelectric, and 4 percent wind- and solar-based. Additionally, TVA programmatic energy efficiency efforts reduced power demand by over 1 percent (TVA 2024-TN12296).

TVA maintains 41,261 MW of generating capability (fiscal year 2023). TVA operates a generating asset portfolio of 32,139 MW, maintains long-term agreements with third-party power producers totaling 7,421 MW, and offers demand response programs that provide 1,701 MW of capacity. TVA also operates one of the Nation's largest transmission systems (TVA 2024-TN12296).

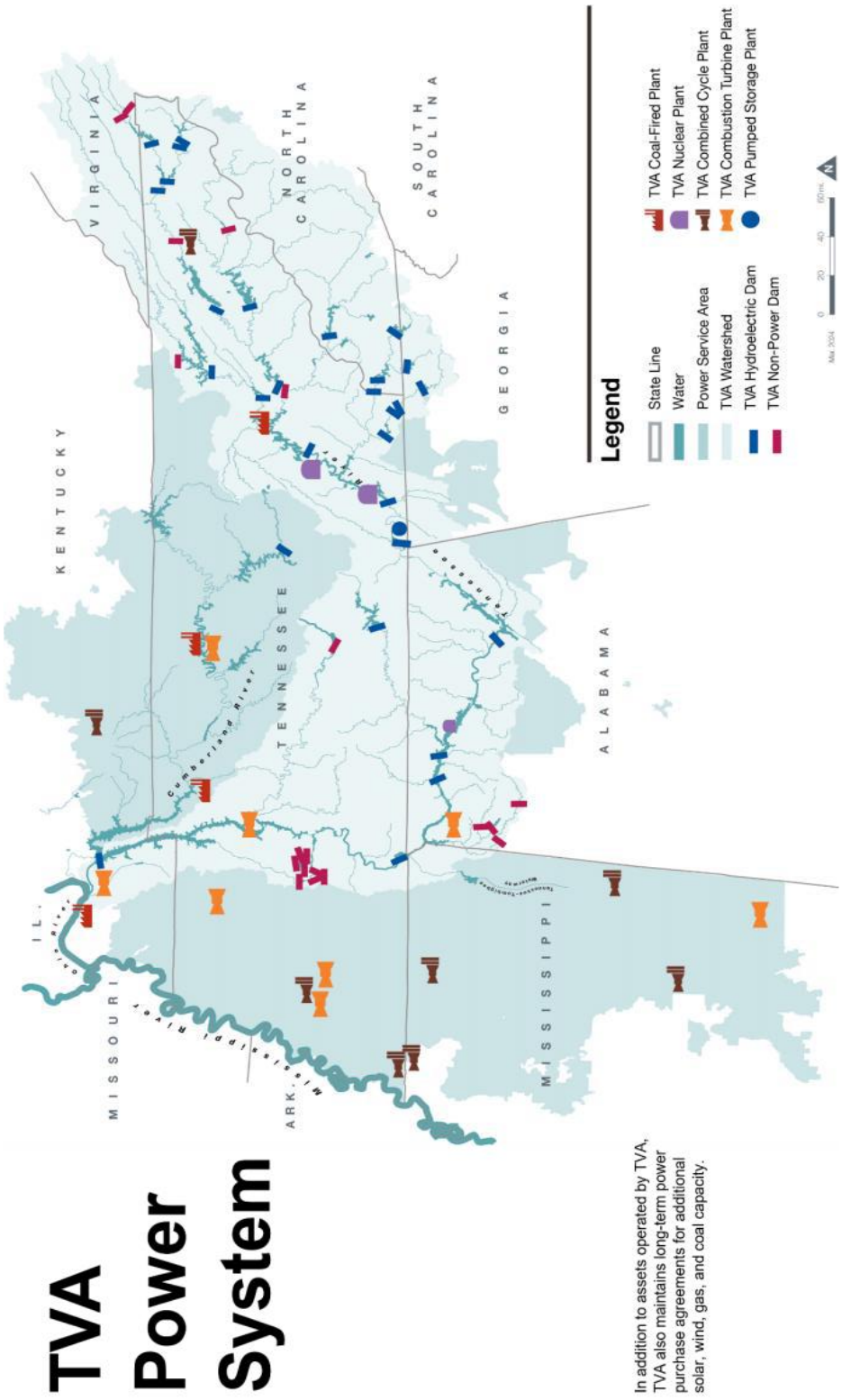

Figure 5-1 Map Showing Tennessee Valley Authority's Service Area as of September 2024. Source: TVA 2024-TN12296.

5.1.2 Evaluation of TVA's Need-for-Power Assessment

In the foregoing sections of this chapter, the NRC staff addressed the TVA processes for demand and supply forecasts. Both demand and supply forecasts are crucial to the NRC staff's consideration of need for power from CRN-1. The NRC staff determined whether the analytical process performed by TVA meets the four NRC criteria for being (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty (see NUREG-1555 [NRC 2000-TN1160; NRC 2007-TN614]). The following describes how the TVA IRP need-for-power analysis addresses the four NRC criteria.

Systematic

TVA has a systematic iterative process for load forecasting that is updated on a multi-year cycle with the latest IRP released in 2025 and the previous one in 2019. Both TVA's 2019 IRP and draft 2025 IRP utilized an integrated, least-cost framework that considered multiple views of the future to determine how potential power-generation resource portfolios could perform in different market and external conditions. The NRC staff finds that the TVA need-for-power assessment is systematic.

Comprehensive

TVA power demand estimates and forecasts, as noted in Section 5.2, incorporate key factors such as regional economic outlook, energy market prices, environmental policy and regulations, and technology advancement. TVA generates different forecasts of long-term demand around a variety of scenarios. Power supply forecasts include a comprehensive evaluation of present and planned generating capabilities in the TVA service area, as well as present and planned power purchases and sales. TVA also considers the potential of demand-side management strategies and distributed generation in the analysis. TVA performed all analyses with forecasting and statistical modeling and methodological approaches appropriate for the utility industry. The NRC staff finds that power demand estimates and forecasts are, thus, comprehensive.

Subject to Confirmation

The NRC staff determined that the processes, models, and estimates presented in TVA's 2019 IRP and draft 2025 IRP were subject to a thorough an extensive public-input process. The IRP was developed through an open and extensive public review process, with input from a diverse group of stakeholders including the general public, the IRP Working Group, and the Regional Energy Resource Council. Stakeholders and the public provided input that helped shape the IRP. The NRC staff finds that the TVA need-for-power assessment is subject to confirmation.

Responsive to Forecasting Uncertainty

The analysis performed in the IRP study relied on industry-standard models and incorporated best practices while using an innovative methodology to evaluate the role of distributed energy resources. Resource cost and performance input data were independently validated. TVA designed scenarios that are outside of TVA's control but represent possible futures in which TVA may find itself operating. TVA created a list of uncertainties that could alter the future operating environment and affect the cost of electricity and/or mix of optimal resources. In addition, TVA utilized varying strategies, alternate business approaches within TVA's control, that differ in the type and amount of resources that are promoted in the future. The NRC staff finds that the TVA forecasts and estimates are responsive to forecasting uncertainty.

Based on the above evaluation, the review team determined that the analytical process and need-for-power evaluation performed by TVA meets the four NRC criteria for being (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty (see NUREG-1555) (NRC 2007-TN614). No independent assessment of the relevant service area's need for power is necessary for the review team to meet its responsibility under NEPA (TN661), as amended.

5.2 Determination of Demand

TVA developed six scenarios for forecasting future energy demand. The six scenarios evaluated were (TVA 2024-TN12296):

- Reference (Without GHG Rule). Reflects moderate economic growth and adoption of electric vehicles that drives steady load growth.
- Higher Growth Economy. Projects more robust technology and productivity driven economic growth, resulting in a higher load forecast.
- Stagnant Economy. Projects inflationary pressures that dampen economic growth, causing load to remain essentially flat over the study period.
- Net-Zero Regulation. Foresees future carbon regulations that drive higher energy prices than Scenario 1, causing slightly lower energy demand in the long run.
- Net-Zero Regulation Plus Growth. Envisions carbon regulations, rapid technology advancement, and electrification of transportation and industry, driving the highest load forecast across the scenarios.
- Reference (With GHG Rule). Reflects the GHG Rule which drives increased energy prices that dampen growth in electricity demand relative to Scenario 1.

Based on the above scenario narratives, forecasts were then developed considering key drivers such as economic outlook, energy market prices, environmental policy and regulations, and technology advancement, The load forecast represents the future energy needs for the region under normal weather conditions for each of the modeled scenarios. Figure 5-2 shows energy demand forecasts for each scenario, along with their associated compound annual growth rates over the study window. TVA projected energy demand to increase 9 percent by 2035 in Reference without GHG Rule scenario, and nearly 50 percent in Net-Zero Regulation Plus Growth scenario by 2050 (TVA 2024-TN12296). Figure 5-3 shows the peak demand forecast in TVA's service area.

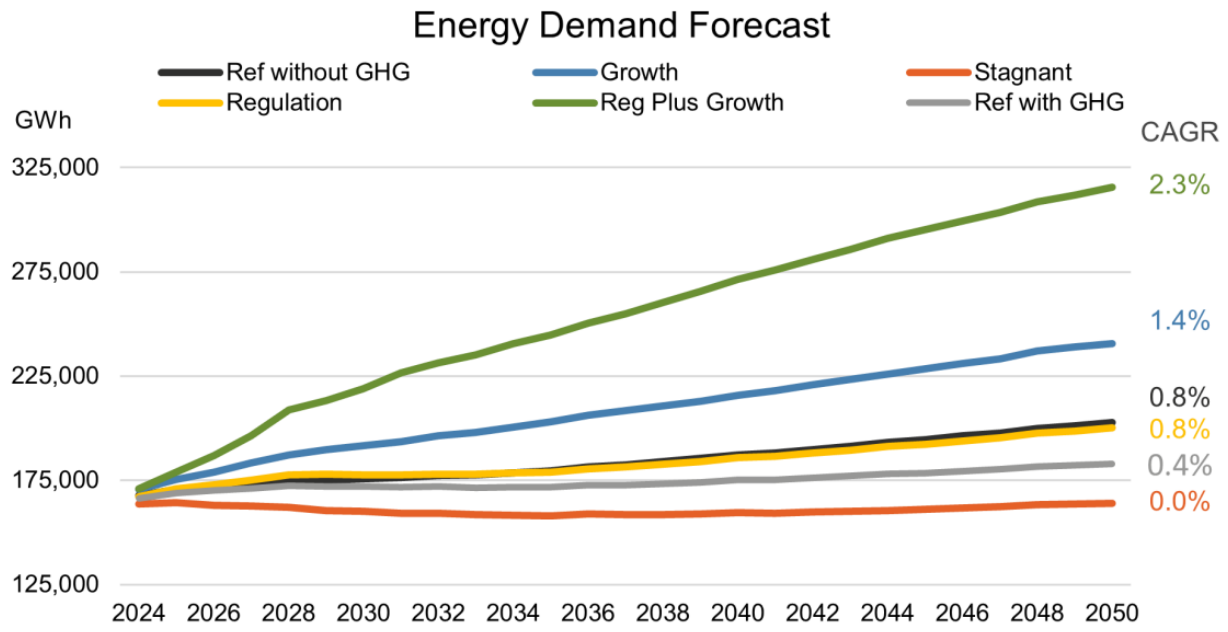

Figure 5-2 Energy Demand Forecast in Tennessee Valley Authority's Service Area. Source: TVA 2024-TN12296.

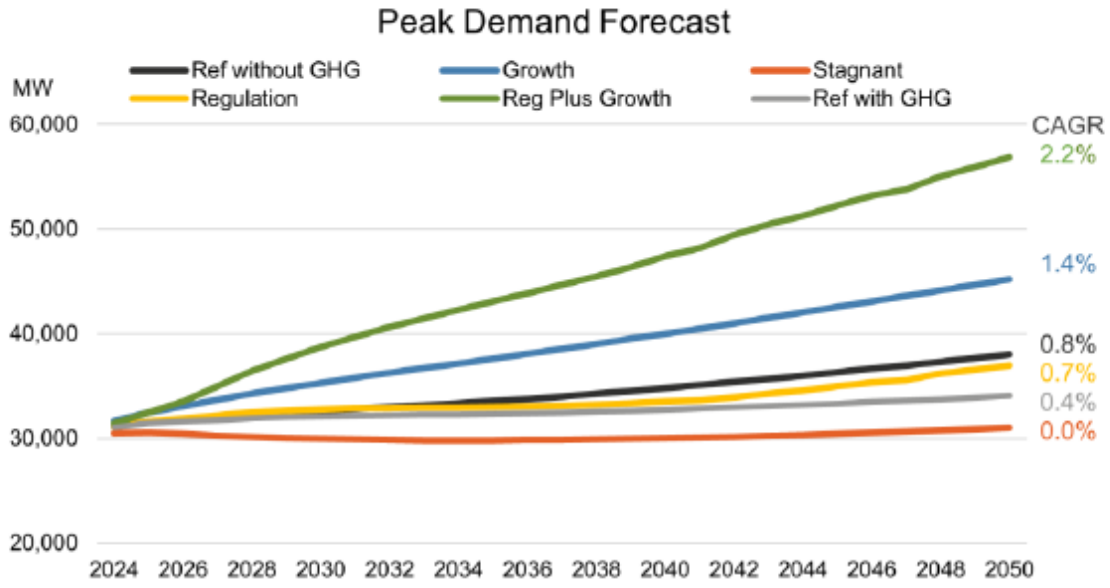

Figure 5-3 Peak Demand Forecast in Tennessee Valley Authority's Service Area. Source: TVA 2024-TN12296.

5.3 Determination of Supply

Capacity requirements refer to the megawatts (MW) needed to meet projected demand plus planning reserves, which account for uncertainties like weather, consumer behavior, and generator availability. These needs are compared against forecasted firm supply, which declines over time due to retirements of generation facilities and contract expirations. Over

10,000 gigawatts (GW) and 13,000 GW of TVA's existing capacity is expected to retire or expire by 2035 and 2050, respectively. The difference, known as the capacity gap, represents the minimum new resources needed to meet demand in each scenario.

TVA's planning reserve margins have changed over time as the power system and the load it serves have evolved. Based on the last reserve margin study, TVA established planning reserve margins for summer and winter at 18 and 25 percent above peak demand requirements, respectively (TVA 2024-TN12296).

As Figure 5-4 shows, the firm capacity requirements for each scenario for both summer and winter as identified by TVA, based on projected electricity demand and required reserves in each season. Firm requirements were highest in the Net-Zero Regulation Plus Growth Scenario and lowest in the Stagnant Economy Scenario, and the remaining scenarios fell within this range (TVA 2024-TN12296).

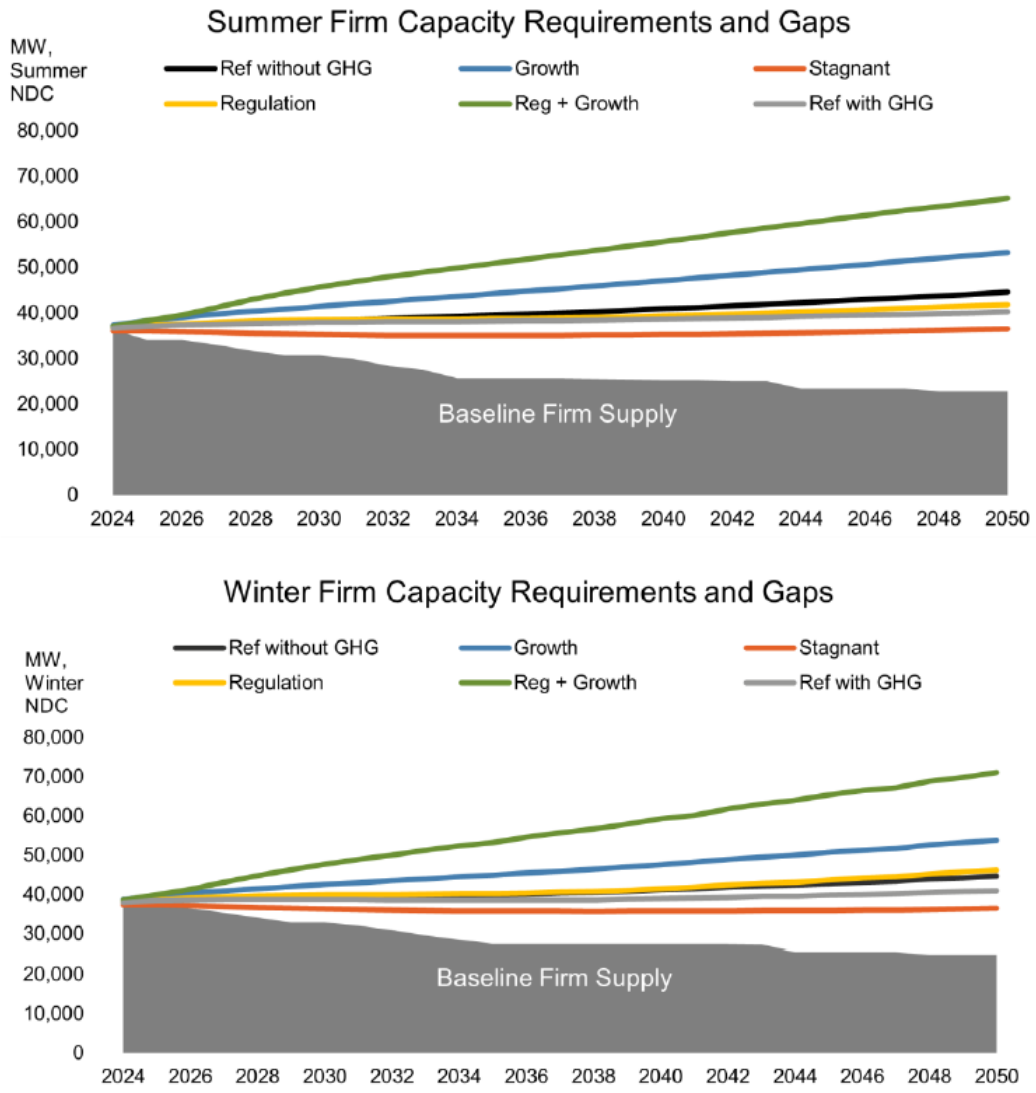

Figure 5-4 Summer and Winter Firm Capacity Requirements in Tennessee Valley Authority's Service Area. Source: TVA 2024-TN12296.

The difference between firm capacity requirements and baseline firm supply from existing resources represents the capacity gap, or the need for incremental resources, in each scenario. As Figure 5-5 shows, the capacity gap was highest in the Net-Zero Regulation Plus Growth Scenario and lowest in the Stagnant Economy Scenario and the remaining scenarios fell within this range. The capacity gap impacts the magnitude and timing of incremental resource additions.

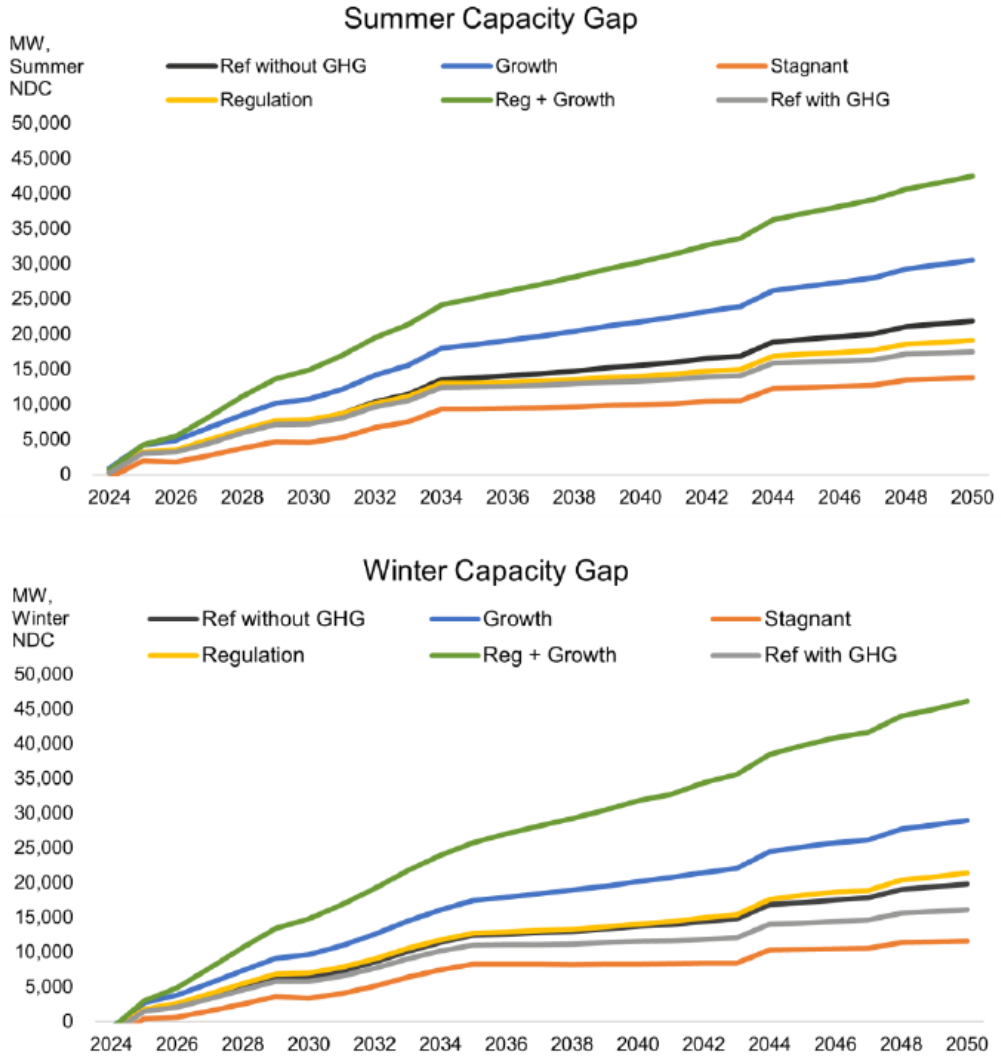

Figure 5-5 Summer and Winter Capacity Gaps for Tennessee Valley Authority's Service Area. Source: TVA 2024-TN12296.

In all scenarios, the IRP analyzes potential ways the resource portfolio might evolve between now and 2050 to respond to changes in the key drivers mentioned above. Specifically, looking across all portfolios through 2035, TVA's draft IRP suggests up to 1 GW nuclear additions, including the emerging technologies from the CRN Site (TVA 2024-TN12296).

5.4 Conclusions

TVA's IRP analysis shows that new capacity is needed in all six scenarios to replace retiring and expiring capacity, support economic growth, and enable further electrification of the economy. New nuclear technologies, with continued advancements, can support load growth and deeper decarbonization. The draft 2025 IRP (TVA 2024-TN12296) preferred portfolio includes SMRs at the CRN Site and anticipates operation by summer 2033. By the end of 2035, the preferred portfolio includes up to 1 GW nuclear additions. While using power generated by CRN-1 is not TVA's primary purpose and need, the NRC staff determined that successfully deploying SMRs would make this technology available for meeting future power demands.

6 CONCLUSIONS AND RECOMMENDATIONS

This SEIS describes the environmental review in response to an application submitted by TVA, for a construction permit under 10 CFR Part 50 (TN249) that would allow the construction of a BWRX-300 SMR on the CRN Site in Roane County, Tennessee, approximately 10 mi (16 km) south of the Oak Ridge, Tennessee urban center. This SEIS follows the requirements in 10 CFR Part 51 (TN10253), which are the NRC's regulations that implement NEPA (TN661) and tiers off NUREG-2226 (NRC 2019-TN6136). This section presents conclusions and recommendations based on the environmental review of the CP application. Section 6.1 summarizes the environmental impacts of the proposed action. Section 6.2 compares the environmental impacts of the proposed action to the no-action alternative and to a range of reasonable alternatives that are technically and economically feasible and meet the purpose and need of the proposal. Section 6.3 discusses the unavoidable impacts of the proposed action and identifies resource commitments.

6.1 Environmental Impacts of the Proposed Action

A summary of the impacts associated with the issuance of an ESP was given in Section 10.1 of the ESP EIS (NRC 2019-TN6136). This information, as supplemented by this SEIS, provides the basis for an informed decision concerning the environmental impacts of issuance of a CP by the NRC. A cost benefit and need-for-power review was performed for this SEIS, as it was not done at the time of the ESP EIS. As indicated in Section 1.1, the proposed action is for the NRC to decide whether to issue a CP to TVA that would allow the construction of a BWRX-300 SMR at the CRN Site. Section 1.2 presents the purpose and need for the proposed action, which is to allow TVA to demonstrate the BWRX-300 reactor while ultimately replacing electricity generation capacity in the TVA service area. Chapter 3 summarizes the potential direct, indirect, and RFAs of the proposed action and provides an impact level of SMALL, MODERATE, or LARGE for each potentially affected environmental resource area. These conclusions are based on the review team's independent environmental review, the CP ER, and the review team's consultation with Federal, State, and Tribal agencies. Table 6-1 summarizes the changes in environmental impacts since the ESP EIS was issued.

Table 6-1 Summary of the Changes in Environmental Impacts of the Proposed Project at the Clinch River Nuclear Site Compared to the Early Site Permit Environmental Impact Statement

Resource Area	EIS Section	Summary of Impact	Impact Level
Land Use	3.1	Impacts remain bounding and valid to that of the ESP EIS.	MODERATE for building; SMALL for operation and decommissioning; MODERATE for RFAs.
Meteorology and Air Quality	3.2	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for building, operation, and decommissioning; SMALL for criteria pollutants and MODERATE for GHG RFAs.
Water Resources	3.4	Impacts remain bounding and valid to that of the ESP EIS.	Surface Water—SMALL for building, operation, and decommissioning; MODERATE for RFAs. Groundwater—SMALL for building, operation, and decommissioning; SMALL for groundwater use and

Resource Area	EIS Section	Summary of Impact	Impact Level
			MODERATE for groundwater quality for RFAs.
Aquatic Ecology	3.5	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for building, operation, and decommissioning; LARGE for RFAs.
Terrestrial Ecology	3.6	Impacts remain bounding and valid to that of the ESP EIS.	MODERATE for building; SMALL for operation and decommissioning; MODERATE for RFAs.
Historic and Cultural Resources	3.7	The impact conclusion for building as stated in the ESP EIS was MODERATE to LARGE. The revised finding is described in Section 3.7.2. Preconstruction activities constitute the primary contribution to this impact determination. The impact conclusion for RFAs as stated in the ESP EIS was MODERATE to LARGE. The revised finding is described in Section 3.7.5.	MODERATE for preconstruction; SMALL for construction; SMALL for operation and decommissioning; MODERATE for RFAs.
Socioeconomics	3.8	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for building, with the exception of SMALL to MODERATE for aesthetics and MODERATE to LARGE for traffic and SMALL to MODERATE for recreation impacts; SMALL for operation, with the exception of MODERATE for aesthetics, and SMALL to MODERATE for recreational resources, and MODERATE for resources in close proximity to the CRN Site; SMALL for decommissioning; SMALL for RFAs with the exception of MODERATE to LARGE for building-related traffic impacts and SMALL to MODERATE for aesthetics and recreation resources.
Environmental Justice	3.9	Reviewed in the ESP EIS.	Not reviewed in the CP SEIS, per 90 FR 17887
Radiological Health	3.10	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for building, operation, decommissioning and RFAs.
Nonradiological Health	3.11	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for building, with the exception of SMALL to MODERATE for noise; SMALL for operation, with the exception of SMALL to MODERATE for noise; SMALL for decommissioning; SMALL for RFAs,

Resource Area	EIS Section	Summary of Impact	Impact Level
			with the exception of SMALL to MODERATE for noise.
Nonradiological Waste	3.12	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for building, operation, decommissioning and RFAs.
Transportation of Radioactive Material	3.13	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for operation, decommissioning, and RFAs (there would be no transportation of radioactive material for construction, hence no impact conclusion).
Uranium Fuel Cycle and Radiological Waste	3.14	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for operation, decommissioning, and RFAs (there would be no use of the uranium fuel cycle for construction, hence no impact conclusion).
Postulated Accidents	3.15	Impacts remain bounding and valid to that of the ESP EIS.	SMALL for operations and RFAs (there would be no postulated accidents during construction or decommissioning because the reactors are not operating yet, hence no impact conclusion).

CFR = *Code of Federal Regulations*; CP = construction permit; EIS = environmental impact statement; ESP = early site permit; FR = *Federal Register*; RFA = reasonably foreseeable action; SEIS = supplemental environmental impact statement.

6.2 Comparison of Alternatives

In Chapter 4, the no-action alternative to the construction of a BWRX-300 reactor at the CRN Site was considered. The no-action alternative would not meet the purpose and need for the proposed action. Additionally, under the no-action alternative, the benefits (demonstrating feasibility to license, construct and operate the BWRX-300 reactors technology) associated with the proposed action would not occur. Alternative sites were addressed in the ESP EIS and not discussed further in this SEIS, per 10 CFR 52.1(a) and 10 CFR 51.92(e)(3) (TN251; TN10253).

6.3 Resource Commitments

6.3.1 Unavoidable Adverse Environmental Impacts

The NRC staff's assessment of unavoidable adverse environmental impacts during construction, preconstruction, and operation of two or more SMRs was provided in Section 10.1 of the ESP EIS (NRC 2019-TN6136). That assessment explained whether adverse impacts had been identified, listed actions anticipated to mitigate impacts, and noted which impacts would be unavoidable. In its CP ER for CRN-1 (TVA 2025-TN11927), TVA stated that updated unavoidable adverse environmental impacts during preconstruction and construction are land use impacts associated with the quarry, land disturbances from building the offsite 161 kV transmission line, building activities within streams, wetlands and floodplains, and visual intrusion from the 161 kV transmission line. TVA provided Table 10.2-1 in its CP ER that showed updated information regarding unavoidable adverse environmental impacts during construction and preconstruction. TVA provided Table 10.2-2 in its CP ER that showed updated information regarding unavoidable adverse environmental impacts during operation.

In the NRC staff's review of new and significant information for the CP review, no additional information was identified that would change the conclusions in the ESP EIS, for the proposed action identified in Section 1.2, regarding unavoidable adverse impacts.

6.3.2 Relationship Between Local Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity

The NRC staff's review of the relationship between local short-term uses of the environment and the long-term productivity of the environment for the ESP was provided in Section 10.2 of the ESP EIS (NRC 2019-TN6136). The evaluation of the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity for the construction and operation of proposed units can be performed by discussing the benefits of operating the unit. The principal benefit is the production of electricity. The analysis of the benefit-cost balance is presented in Chapter 4. If a SMR were constructed on the CRN Site, power production would continue until the OL expires or the licensee chooses to cease operation. Once the SMR is shut down, it would be decommissioned according to NRC regulations. Once decommissioning is complete and the NRC license is terminated, the site would be available for other uses.

In its CP ER (TVA 2025-TN11927), TVA indicated that because the generating capacity of CRN-1 is 300 MWe, as compared to the 800 MWe capacity for the CRN Site evaluated in the ESP EIS, therefore, the short-term benefit of the production of electrical energy and its secondary economic benefits is reduced. The long-term impact on productivity at the CRN Site would result if CRN-1 was not immediately decommissioned at the end of its operating period. The land for the plant structures would be unavailable for any other use.

In the NRC staff's review of new and significant information for the CP review, no information was identified that would change the conclusions in the ESP EIS, for the proposed action identified in Section 1.2, regarding short-term uses and long-term productivity.

6.3.3 Irreversible and Irretrievable Commitments of Resources

The NRC staff's review of the irreversible and irretrievable commitments of resources associated with the proposed action at the ESP stage was provided in Section 10.3 of the ESP EIS (NRC 2019-TN6136).

Irreversible commitment of resources were discussed for land use, water use and quality, terrestrial and aquatic biota, socioeconomic resources, historic and cultural resources, and air quality. In its CP ER (TVA 2025-TN11927), TVA indicated that there is new information related to irreversible commitment of resources associated with historic and cultural resources. New information regarding a phase II archeological investigation on the CRN Site and changes to the disturbance area compared to that of what was assessed for the ESP EIS have reduced potential for permanent damage to those resources. In the NRC staff's independent review of the CP ER and TVA's process for identifying new and significant information, and additional information provided by TVA (TVA 2025-TN12285), no new and significant information was identified that would change the conclusions identified in the ESP EIS regarding irreversible commitments of resources.

Irretrievable commitment of resources were identified as those similar to any major construction project in the ESP EIS. The ESP EIS listed the upper limit on the electrical generating capacity of reactor units under consideration in the ESP review as 800 MWe and scaled the quantities of

construction materials required to be about 62 percent of a typical new 1,300 MWe reactor. The ESP EIS also identified the main irretrievable resource as uranium. However, the availability of uranium ore and existing stockpiles of highly enriched uranium in the United States and Russia that could be processed into fuel is sufficient, so the irreversible and irretrievable commitment would be of small consequence. In its CP ER, TVA stated that the quantities of construction material required for CRN-1 with an electrical output of 300 MWe, could be scaled to 38 percent of a typical new 1,300 MWe reactor. The CP ER also stated that rock to produce backfill material would be obtained from either an onsite quarry developed by TVA or an existing licensed offsite quarry. The use of construction materials, while irretrievable unless recycled at decommissioning, would be of small consequence to the availability of the resource. Regarding uranium resources, the amount of uranium irretrievably used in the operation of CRN-1 is less than that identified in the ESP EIS. In the NRC staff's independent evaluation and review of the CP ER and TVA's process for identifying new and significant information, and additional information provided by TVA (TVA 2025-TN12285), no new and significant information was identified that would change the conclusions identified in the ESP EIS regarding irretrievable commitments of resources.

6.3.4 Unresolved Conflicts

NEPA requires that the review team study, develop, and describe appropriate alternatives to recommended courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources. In reviewing the potential impacts associated with the proposed action, the review team did not identify any unresolved conflicts concerning alternative uses of available resources.

6.3.5 Recommendations

The NRC staff's preliminary recommendation to the Commission related to the environmental aspects of the proposed action is that the CP be issued. The NRC staff's evaluation of the safety and security aspects of the proposed action will be addressed in the staff's SER. This recommendation is based on (1) the CP ER (TVA 2025-TN11927) and responses to NRC staff requests for additional information; (2) the NRC staff's review conducted for the ESP application and the assessment documented in the ESP EIS (NRC 2019-TN6136); (3) consultation with Federal, State, and Tribal agencies; (4) the NRC staff's own independent review of potential new and significant information available since preparation and publication of the ESP EIS; and (5) the assessments summarized in this SEIS, including the potential mitigation measures identified.

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10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.” TN10253.

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APPENDIX A

CONTRIBUTORS TO THE SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Members of the U.S. Army Corp of Engineers, Nashville District, Regulatory Division; U.S. Nuclear Regulatory Commission (NRC or the Commission), Office of Nuclear Material Safety and Safeguards, Division of Rulemaking, Environmental, and Financial Support; and Environmental New Reactor Branch prepared this environmental impact statement. Staff from other NRC branches and from Pacific Northwest National Laboratory provided supplemental technical support and technical editing. Table A-1 identifies each contributor's name and affiliation, summary of education and experience, and indication of function or expertise contributed to the document.

Table A-1 List of Preparers

Name and Affiliation	Education/Experience
Cara Beverly, USACE	BS Biology 16 years of experience with environmental permitting, NEPA compliance, wetland and stream identification, and ecology.
Timothy Dodson, USACE	Register of Professional Archaeologists MA Maritime Archaeology BA Biology 16 years of terrestrial and underwater archaeology, NEPA and Tribal consultations and scholarly research.
Jennifer Davis, NRC	BA, Historic Preservation and Classical Civilization (Archaeology) 5 years of archaeological fieldwork; 23 years of experience in NEPA compliance, project management, cultural resources impact analysis, and National Historic Preservation Act Section 106 consultations.
Mitchell Dehmer, NRC	PSM Environmental Science Graduate Certificate Environmental Management Graduate Certificate Energy Policy BS Biology 11 years of combined academic and professional experience in environmental science and ecological consultations under ESA, MSA, and NMSA.
Lloyd Desotell, NRC	MS Civil Engineering MS Water Resource Management BA Environmental Studies Over 20 years of experience conducting surface and subsurface hydrologic analyses.
Peyton Doub, NRC	MS Plant Physiology (Botany) BS Plant Sciences (Botany) Duke NEPA Certificate; Professional Wetland Scientist; Certified Environmental Professional 38 years of experience in terrestrial and wetland ecology and NEPA.
Nancy Martinez, NRC	AM Earth and Planetary Science BS Earth and Environmental Science 13 years of experience in environmental impact analysis.
Madelyn Nagel, NRC	BA Environmental Science and Policy BA Political Science 3 years of experience in NEPA and project management.

Name and Affiliation	Education/Experience
Donald Palmrose, NRC	PhD Nuclear Engineering MS Nuclear Engineering BS Nuclear Engineering Duke NEPA Certificate 39 years of experience including operations on U.S. Navy nuclear powered surface ships, technical and NEPA analyses, nuclear authorization basis support for DOE, and NRC project management.
Caroline Hsu, NRC	BS Molecular Biology BA English Literature 13 years of government experience.
Gerry Stirewalt, NRC	PhD Structural Geology with two post-doctoral appointments BA Geology/Mathematics Registered PG and CEG; Over 50 years relevant experience in Environmental and Engineering Geology, including 3-D geospatial modeling of subsurface stratigraphy, tectonic faults, and groundwater contaminant plumes.
Bradley Werling, NRC	BA Engineering Physics BS Chemistry MS Environmental Science Duke NEPA Certificate 25+ years of experience as an analytical chemist including air monitoring analyses and radionuclide transport studies with 20 years of experience preparing and reviewing NEPA documents.
Teresa Carlon, PNNL	BS Information Technology 30 years of experience as SharePoint administrator, project coordinator, and databases
Cyler Conrad, PNNL	PhD in Anthropology (Archaeology) MA in Anthropology (Archaeology) BA Anthropology 13 years of relevant experience; Over 10 years of experience in archaeology, cultural resource management, National Historic Preservation Act Section 106, NEPA, and project management.
Katherine Cort, PNNL	MA in Economics BS in Economics 25+ years of relevant experience including NEPA compliance, socioeconomics, land use, alternatives, and project management.
Saikat Ghosh, PNNL	PhD Chemical Engineering MS Environmental Engineering BE Environmental Engineering 15 years of relevant experience in air quality assessments, meteorological data analyses and dispersion modeling.
Josh Hargraves, PNNL	PhD Radiation Health Physics BS Physics 2 years of relevant experience in Health Physics.
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Name and Affiliation	Education/Experience
Kimberly Leigh, PNNL	BS Environmental Science 25 years of experience in NEPA compliance and project management.
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Ann Miracle, PNNL	PhD Molecular Immunology MS Molecular Genetics BA Biology Over 18 years of experience in NEPA document preparation, ecological impact analysis, Endangered Species Act Section 7 consultations, and Essential Fish Habitat consultations.
Jonathan Napier, PNNL	PhD Radiation Health Physics MS Health Physics BS Environmental Science Certified Health Physicist with 9 years of experience in health physics, nuclear materials inspections and licensing, and radiation safety.
Michelle Niemeyer, PNNL	MS Agricultural Economics BS Agricultural Economics 15+ years of experience including NEPA environmental impact assessments, project management, economics, and stakeholder engagement.
Tara O'Neil, PNNL	MBA BA Anthropology emphasis on archaeology Over 30 years of experience in NEPA, NHPA Section 106, Tribal engagement.
Mike Parker, PNNL	BA English Literature 25 years of experience copyediting, document design, and formatting and 20 years of experience in technical editing.
Rajiv Prasad, PNNL	PhD Civil and Environmental Engineering MTech Civil Engineering BE Civil Engineering 25 years of experience in applying hydrologic principles to water resources engineering, hydrologic design, flooding assessments, environmental engineering, and impact assessment including 15 years of experience in NEPA environmental assessments of surface-water resources.
Lindsey Renaud, PNNL	MA Anthropology BA Anthropology 12 years in cultural resource management, NEPA environmental impact assessments and Section 106 and 110 compliance. Secretary of the Interior-qualified registered professional archaeologist. Experience in Tribal engagement and Native American Graves Protection and Repatriation Act compliance.
Kacoli Sen, PNNL	PhD Cancer Biology MS Zoology (Specialization: Ecology) BS Zoology Diploma in Environmental Law Over 6 years of document editing and production experience.

Name and Affiliation	Education/Experience
Susan Tackett, PNNL	20 years document formatting/copyediting experience at PNNL 7 years of experience word processing, formatting, and proof-reading, 4 years technical editing of safety analysis reports and engineering as-built reports.
Kazi Tamaddun, PNNL	PhD Civil and Environmental Engineering MS Civil Engineering 8 years of experience in hydrologic, hydraulic, ecosystem, and water systems modeling; hydro-climatology; climate change modeling and analysis.
Dana Vesty, PNNL	BS, Environmental Scientist Professional Wetland Scientist 9 years of experience in environmental assessments, permitting, environmental resource monitoring, and data analysis.
Caitlin Wessel, PNNL	PhD Marine Science MS Coastal, Marine, and Wetland Science BS Biology BS Math 11 years of relevant experience in environmental impact assessment and aquatic ecology.
Lin Zeng, PNNL	PhD Environmental Science and Engineering BE Civil Engineering 10 years of experience in socioeconomic analysis and environmental impact assessment.

AM or MA = Master of Arts; BA = Bachelor of Arts; BS = Bachelor of Science; DoD = U.S. Department of Defense; DOE = U.S. Department of Energy; DOI = U.S. Department of Interior; CEG = Certified Engineering Geologist; EA = environmental assessment; ESA = Endangered Species Act; GIS = Geographic Information System; GradCert = Graduate Certificate; MBA = Master of Business Administration; MRP = Master of Regional Planning; MS = Master of Science; MSA = Magnuson–Stevens Fishery Conservation and Management Act; NEPA = National Environmental Policy Act of 1969; NMSA = National Marine Sanctuary Act; NNSA = National Nuclear Security Administration; NRC = U.S. Nuclear Regulatory Commission; PG = Professional Geologist; PhD = Doctor of Philosophy; PNNL = Pacific Northwest National Laboratory; PSM = Professional Science Masters; USACE = U.S. Army Corps of Engineers.

APPENDIX B

AGENCIES, ORGANIZATIONS, TRIBES, AND INDIVIDUALS CONTACTED

The U.S. Nuclear Regulatory Commission (NRC or the Commission) is providing electronic copies of the Clinch River Nuclear Site Construction Permit Draft Supplemental Environmental Impact Statement to the Federal and State agencies, organizations, Tribes, and individuals listed in Table B-1 below. The NRC will provide copies to other interested organizations and individuals upon request.

Table B-1 List of Agencies, Organizations, Tribes and Persons to Whom Copies of this Supplemental Environmental Impact Statement Are Sent

Name	Affiliation
Federal and State Agencies	-
Jaime Loichinger	Advisory Council on Historic Preservation
Jill Fortney	Department of Energy, Oak Ridge Office of Environmental Management
Jayashree Jayaraj	Department of Energy, Oak Ridge Office of Environmental Management
Steve Cooke	Department of Energy, Oak Ridge Office of Environmental Management
Ntale Kajumba	Environmental Protection Agency, Region 4
Amanetta Somerville	Environmental Protection Agency, Region 4
Kristina Bowen	Environmental Protection Agency, Region 4
John Ackermann	Federal Emergency Management Agency, Region IV
Mathew Bradley	Federal Emergency Management Agency, Region IV
E. Patrick McIntyre	Tennessee Historical Commission
Steven Alexander	Fish and Wildlife Service
Daniel Elbert	Fish and Wildlife Service
David Giddens	Fish and Wildlife Service
Nicole Sikula	Fish and Wildlife Service
Beth Shelton	Tennessee Division of Radiological Health
Steve Seeger	Tennessee Division of Radiological Health
Andrew Holcomb	Tennessee Division of Radiological Health
Patrick Sheehan	Tennessee Emergency Management Agency
Kevin Petty	Tennessee Emergency Management Agency
Indian Tribes	-
John Raymond Johnson, Governor	Absentee Shawnee Tribe
Donnis Battise, Chairman	Alabama-Coushatta Tribe of Texas
Wilson Yargee, Chief	Alabama-Quassarte Tribal Town
Chuck Hoskin, Jr., Principal Chief	Cherokee Nation
Deborah Dotson, President	Delaware Nation
Michell Hicks, Principal Chief	Eastern Band of Cherokee Indians
Glenna J. Wallace, Chief	Eastern Shawnee Tribe of Oklahoma

Name	Affiliation
Stephanie Yahola, Town King	Kialegee Tribal Town
David Hill, Principal Chief	Muscogee (Creek) Nation
Lewis J. Johnson, Chief	Seminole Nation of Oklahoma
Marcellus W. Osceola, Jr., Chairman	Seminole Tribe of Florida
Benjamin Barnes, Chief	Shawnee Tribe
Ryan K. Morrow, Town King	Thlopthlocco Tribal Town
Joe Bunch, Chief	United Keetoowah Band of Cherokee Indians in Oklahoma
Jonathan Cernek, Chairman	Coushatta Tribe of Louisiana
Libby Rogers, Principal Chief	Jena Band of Choctaw Indians
Stephanie A. Bryan, Chairwoman	Poarch Band of Creek Indians
Other Organizations and Individuals	-
Anthony Allen	Anderson County
Ebony Capshaw	Anderson County
Sabra Beauchamp	Anderson County
Stephen Verran	Anderson County
Phil Yager	Anderson County
Robert Smallridge	Anderson County
Brice Kidwell	Anderson County
Karen Ooten	Anderson County
Randy Hemann	City of Oak Ridge
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Beth Hickman	City of Oak Ridge
Sean Gleason	City of Oak Ridge
Warren Gooch	City of Oak Ridge
Derrick Hammond	City of Oak Ridge
Charles Hensley	City of Oak Ridge
Chuck Hope	City of Oak Ridge
Ellen Smith	City of Oak Ridge
Amy Fitzgerald	City of Oak Ridge
Charlotte Bowers	Clinch River Habitat for Humanity
Tim Suter	Roane County
Chuck Hiatt	Roane County
Amanda Daugherty	Roane County
Lance Duff	Roane County

"-" denotes no entry in table cell.

APPENDIX C

CHRONOLOGY OF ENVIRONMENTAL REVIEW CORRESPONDENCE

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC or the Commission), U.S. Army Corps of Engineers (USACE), and external parties as part of its environmental review for the Clinch River Nuclear Unit 1 (CRN-1) reactor construction permit. All documents, with the exception of those containing proprietary information, have been placed in the NRC's Public Document Reading Room at One White Flint North, 11555 Rockville Pike (First Floor), Rockville, Maryland, and are available electronically from the NRC's Agencywide Document Access and Management Systems (ADAMS). The ADAMS accession numbers for each document are included below. Some of the ADAMS accession numbers below lead to a folder containing several documents. If you need assistance in accessing or searching in ADAMS, contact the Public Document Room staff at 1-800-397-4209. Table C-1 lists the environmental review correspondence by date.

Table C-1 List of Correspondence Between the U.S. Nuclear Regulatory Commission and External Parties

Date	Correspondence Description	ADAMS Accession No. or *Federal Register* Citation
September 9, 2022	NRC Public Meeting Summary from July 25, 2022	ML22227A196
September 12, 2022	NRC Public Meeting Summary from August 22, 2022	ML22255A221
October 3, 2022	NRC Public Meeting Summary from October 3, 2022	ML22298A271
October 27, 2022	Letter from NRC to B. McDermott, TVA, Regarding Pre-Application Readiness Assessment Activities and Audit Plan for the Clinch River Nuclear Site Draft Application	ML22285A027
December 20, 2022	NRC Clinch River Nuclear Site Environmental Preapplication Audit Summary Report from November 9, 2022	Package # ML22353A544
July 7, 2023	NRC Memorandum: Trip Report - Clinch River Nuclear Site Visit	Package # ML23178A034
August 5, 2024	Letter from NRC to S. Hunnewell, TVA, Regarding Clinch River Nuclear Site Construction Permit Preapplication Readiness Assessment Report for the Draft Environmental Report	Package # ML24218A168
April 17, 2025	Letter from S. Hunnewell, TVA, to NRC, Regarding Notification of Intent to Submit Clinch River Nuclear Site Construction Permit Application	ML25107A017
April 28, 2025	Letter from S. Hunnewell, TVA, Regarding Submittal of the Environmental Report in Support of the Clinch River Nuclear Site Construction Permit Application	ML25118A209

Date	Correspondence Description	ADAMS Accession No. or *Federal Register* Citation
May 1, 2025	Meeting Notice for the Afternoon Public Outreach Meeting on the NRC's Review Process of TVA's Construction Permit Application, Clinch River Nuclear Site, Oak Ridge, Tennessee	ML25121A153
May 1, 2025	Meeting Notice for the Evening Public Outreach Meeting on the NRC's Review Process of TVA's Construction Permit Application, Clinch River Nuclear Site, Oak Ridge, Tennessee	ML25121A154
June 5, 2025	Letter from NRC to S. Hunnewell, TVA, Regarding Acceptance for Docketing of Part One of the Application for a Construction Permit at the Clinch River Nuclear Site	Package # ML25164A048
June 10, 2025	*Federal Register Notice*—Notice of Availability, Tennessee Valley Authority's Construction Permit Application (Clinch River Nuclear Site)	90 FR 24425
June 12, 2025	Email from D. Daigle, TVA, to NRC, Regarding Permission to Use GIS Data Shapefiles	ML25191A310
June 12, 2025	Letter from NRC to S. Hunnewell, TVA, Regarding Acceptance for Docketing of Part One of the Application for a Construction Permit at the Clinch River Nuclear Site	Package # ML25164A048
June 25, 2025	Letter from NRC to J. Frost, U.S. Army Corps of Engineers, Inviting to Participate as a Cooperating Agency	ML25174A015
July 9, 2025	Letter from NRC to S. Hunnewell, TVA, Regarding Acceptance for Docketing of Part Two of the Application for a Construction Permit at the Clinch River Nuclear Site	ML25182A151
July 10, 2025	Clinch River Nuclear Site Construction Permit Environmental Audit Plan	ML25189A385
July 15, 2025	*Federal Register Notice*—Acceptance for docketing of the complete application and opportunity to request a hearing	90 FR 31709
July 18, 2025	Letter from NRC to S. Hunnewell, TVA, Regarding Notice of Intent to Prepare a Supplement to the Environmental Impact Statement in Relation to the Construction Permit Application for the Clinch River Nuclear Site	Package # ML25175A065
July 16, 2025	Letter from NRC to E. Patrick McIntyre, Jr., Tennessee Historical Commission (TN SHPO), Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25182A122
July 16, 2025	Letter from NRC to J. Loichinger, Advisory Council on Historic Preservation, Notifying of Section 106 Consultation for the Clinch River Construction Permit	ML25182A123
July 16, 2025	Letter from NRC to B. Barnes, Chief of the Shawnee Tribe, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A023

Date	Correspondence Description	ADAMS Accession No. or *Federal Register* Citation
July 16, 2025	Letter from NRC to J. Raymond Johnson, Governor of the Absentee Shawnee Tribe, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25182A155
July 16, 2025	Letter from NRC to W. Yargee, Chief of Alabama-Quassarte Tribal Town, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A039
July 16, 2025	Letter from NRC to D. Dotson, President of the Delaware Nation, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A026
July 16, 2025	Letter from NRC to D. Hill, Principal Chief of the Muscogee Nation, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A027
July 16, 2025	Letter from NRC to C. Hoskin, Jr., Principal Chief of the Cherokee Nation, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A024
July 16, 2025	Letter from NRC to L.J. Johnson, Chief of the Seminole Nation of Oklahoma, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A031
July 16, 2025	Letter from NRC to J. Cernek, Chairman of the Coushatta Tribe of Louisiana, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A030
July 16, 2025	Letter from NRC to G.J. Wallace, Chief of the Eastern Shawnee Tribe of Oklahoma, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A028
July 16, 2025	Letter from NRC to J. Bunch, Chief of the United Keetoowah Band of Cherokee Indians, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A029
July 16, 2025	Letter from NRC to S.A. Bryan, Chairwoman of the Poarch Band of Creek Indians, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A037
July 16, 2025	Letter from NRC to R.K. Morrow, Town King of the Thlopthlocco Tribal Town, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A036
July 16, 2025	Letter from NRC to L. Rogers, Principal Chief of the Jena Band of Choctaw Indians, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A032

Date	Correspondence Description	ADAMS Accession No. or *Federal Register* Citation
July 16, 2025	Letter from NRC to M.W. Osceola, Jr., Chairman of the Seminole Tribe of Florida, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A034
July 16, 2025	Letter from NRC to M.l Hicks, Chief of the Eastern Band of Cherokee Indians, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A033
July 16, 2025	Letter from NRC to S. Yahola, Town King of the Kialegee Tribal Town, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A038
July 16, 2025	Letter from NRC to D. Battise, Chairman of the Alabama-Coushatta Tribe of Texas, Initiating Section 106 Consultation for the Clinch River Construction Permit	ML25198A025
July 18, 2025	Email from E. Patrick McIntyre, Jr., Tennessee State Historic Preservation Office, to NRC, Regarding Response to Section 106 Initiation Letter	ML25202A005
July 18, 2025	Letter from NRC to S. Hunnewell, TVA, Regarding Notice of Intent to Prepare a Supplement to the Environmental Impact Statement in Relation to the Construction Permit Application for the Clinch River Nuclear Site	Package # ML25175A065
July 24, 2025	Letter from S. Hunnewell, TVA, to NRC, Regarding Submittal of Audit Responses in Support of the Clinch River Nuclear Site Construction Permit Application Environmental Report	ML25205A137
July 25, 2025	Letter from NRC to S. Hunnewell, TVA, Regarding Construction Permit Application Review Schedule and Resource Estimate	ML25205A005
July 25, 2025	Letter from NRC to S. Hunnewell, TVA, Regarding Requests for Additional Information Regarding the Clinch River Nuclear Site Construction Permit Application (Docket Number: 50-0615)	ML25204A049
July 30, 2025	Email from NRC to S. Hunnewell, TVA, Regarding Transmittal of Request for Confirmatory Information	ML25211A357
August 4, 2025	Letter from ACHP to M. Rome, NRC, Regarding Response to Section 106 Notification Letter	ML25216A159
August 7, 2025	Email from NRC to S. Hunnewell, TVA, Regarding Transmittal of Request for Confirmatory Information	ML25219A273
August 7, 2025	Letter from J. Frost, USACE, to NRC, Regarding CRN Site Construction Permit Cooperating Invitation Response	ML25226A140

Date	Correspondence Description	ADAMS Accession No. or *Federal Register* Citation
August 12, 2025	Letter from S. Hunnewell, TVA, to NRC, Regarding Response to NRC Requests for Confirmatory Information regarding the Clinch River Nuclear Site Construction Permit Application Environmental Report	ML25224A191
August 12, 2025	Letter from S. Hunnewell, TVA, to NRC, Regarding Response to Requests for Additional Information Regarding the Clinch River Nuclear Site Construction Permit Application	ML25224A161
September 2, 2025	Meeting Summary from NRC's May 6, 2025 Public Outreach in Oak Ridge, TN	ML25245A131
September 15, 2025	Email from NRC to S. Hunnewell to Notifying of Environmental Audit Closeout	ML25258A162
September 22, 2025	Email from D. Elbert, FWS, to NRC, Regarding TVA Clinch River Redacted BiOp Availability	ML25273A090
October 6, 2025	Letter from NRC to S. Hunnewell, TVA, Regarding Environmental Audit Summary Report	Package #ML25272A187

ADAMS = Agencywide Documents Access and Management System; NRC = U.S. Nuclear Regulatory Commission; SHPO = State Historic Preservation Officer; SLR = subsequent license renewal; TN = Tennessee; TVA = Tennessee Valley Authority.

APPENDIX D

COMMENTS RECEIVED ON THE ENVIRONMENTAL REVIEW

Reserved for comments received on the draft supplemental environmental impact statement

APPENDIX E

REASONABLY FORESEEABLE ACTIONS AND SUMMARY OF CLIMATE CHANGE

E.1 Reasonably Foreseeable Actions

Reasonably foreseeable actions in the vicinity of the Clinch River Nuclear (CRN) Site were described in NUREG-2226, *Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site* (hereafter referred to as the ESP EIS) Chapter 7 (NRC 2019-TN6136). The review team incorporates ESP EIS Table 7-1 by reference here. The applicant provided Table 7-1, titled "Summary of New Information Regarding Reasonably Foreseeable Future Actions," in the construction permit (CP) environmental report (ER) (TVA 2025-TN11927). Table E-1 is adapted from Table 7-1 of the CP ER.

Table E-1 Summary of New Information Regarding Reasonably Foreseeable Actions Near the Clinch River Nuclear Site

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
TVA's Future Development of CRN Site (CP/OL)	Construction and operation of a 300 MW electric BWRX-300.	Not applicable	NRC issued ESP-006 on December 19, 2019. CP permit application received April 2025. An OL will need to be addressed in a future licensing proceeding.	N
TVA's CRN Site Advanced Nuclear Reactor Technology Park PEIS	Construction and operation of an advanced nuclear reactor technology park, to demonstrate the feasibility of emerging nuclear technologies as part of TVA's technology innovation efforts aimed at evaluating and developing future electricity generation capabilities. Technologies may include SMRs and/or Advanced Non-Light Water Reactors at Area 1 and/or Area 2 on the CRN Site.	Not applicable	TVA issued a ROD on September 29, 2022. At present, TVA has not identified any projects suitable for Area 2, therefore, development of Area 2 is not currently considered a RFA.	N

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
TVA's CRN Site Grassy Creek Bridge Replacement	Replacement of a damaged culverted crossing and temporary bridge with new culvert and permanent bridge to access the CRN Site.	Not applicable	Completed in 2023 by TVA.	N
TVA's CRN Site NRIC Project	The CRN Site has been identified as a candidate host location for a construction demonstration project.	Not applicable	TVA is currently engaged in final site selection, design, and planning.	N
TVA's CRN Site Culvert Replacement Project	Replacement of two culverts on CRN Site River Road.	Not applicable	Completed in 2023.	N
TVA's Watts Bar Nuclear Generating Station Units 1 and 2	Revise Watts Bar Nuclear Plant Units 1 and 2 technical specifications to change the number of tritium producing burnable absorber rods and revision to reactor vessel surveillance capsule removal schedule for Units 1 and 2.	31 mi southwest	TVA published a Determination of NEPA Adequacy regarding production of tritium at Watts Bar Nuclear Plant. EA and FONSI issued by NRC and published in *Federal Register* on February 23, 2024.	U
Retirement and Replacement of the KIF	TVA will demolish the nine existing KIF coal units, construct a new 1,500 MW natural gas dual-fuel capable combined cycle aeroderivative combustion turbine plant, a 3 to 4 MW solar array, a 100 MW battery energy storage system, and a new transmission line infrastructure on the Kingston Reservation. Offsite transmission system upgrades are proposed along six	8 mi west	TVA released a EIS on February 16, 2024 that evaluates the potential impacts of retirement and replacement. The April 2024 ROD reflects TVA's final decision regarding the KIF retirement and replacement project.	U

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
	existing transmission lines located in east Tennessee.			
Fusion Facility at Former Bull Run Fossil Plant	Pilot demonstration project to research, build, and operate a prototype fusion device. Project would utilize the former Bull Run Fossil Plant turbine building and construct some additional structures such as tanks within the Bull Run Reservation.	15.5 mi northeast	TVA is in review of the project proposal, in discussions with the project proponent, and in planning for anticipated NEPA review.	N
Retirement of the Bull Run Fossil Plant	Decontaminatio n and deconstruction of the 865 MW net-capacity coal-fired plant.	15.5 mi northeast	In December 2023, TVA retired the Plant. TVA released the Final EA for the Bull Run Fossil Decontamination and Deconstruction project in June 2023.	U
Melton Hill Hydro-electric Dam Turbine and Rotor Replacement	TVA replaced the current variable blade Kaplan turbine with a fixed blade propeller turbine on Unit 1. Work included installation of discharge ring, turbine shaft, turbine guide bearing, generator shaft, wicket gate mechanisms, servo motors, shift ring, head cover, and other components.	4 mi east	TVA completed a categorical exclusion checklist to satisfy NEPA requirements that was signed on May 4, 2021. The unit returned to service in May 2023.	N
Kairos Power, LLC Hermes Low Power Demonstration Reactor CP	Construct and operate Hermes to demonstrate key elements of the Kairos Power Fluoride Salt-Cooled, High Temperature Reactor technology for possible future	3.5 mi northwest	NRC's EIS was released August 17, 2023. Construction Permit was issued on December 12, 2023. Construction started in July 2024.	N

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
	commercial deployment.			
Kairos Power, LLC Hermes 2 Reactor CP	Construct and operate Hermes 2, consisting of two 35-MW reactors adjacent to the Hermes Test Reactor at ETTP in Oak Ridge, Tennessee.	3.5 mi northwest	CPA under review by NRC.	N
TRISO-X Fuel Fabrication Facility	Construction of fuel fabrication facility at Horizon Center Industrial Park for production of TRISO-X fuel for use in Xe-100 reactors.	3 mi north-northeast	Facility is set to be commissioned and operational by 2025. NRC's Environmental Impact Statement for the issuance of a license for the possession and use of special nuclear material is underway. The public scoping period closed February 14, 2023.	N
ETTP Property Transfer/ Development of Heritage Center Industrial Park	Transfer of DOE property to private companies/ Community Reuse Organization of East Tennessee and development of the 1,200 ac Heritage Center. Both new and renovated industrial buildings are available for sale or lease, as well as approximately 555 ac served by a robust, redundant utility system.	2 mi north	In 2020, core clean up was completed at the ETTP site which included demolishing more than 500 structures, addressing major areas of soil contamination, and final cleanup decisions for the majority of ETTP. An additional 600 ac is slated for transfer for economic development in the years ahead. Numerous parcels within the Heritage Center industrial park have recently sold or are pending sale. DOE released its updated 10-year Program Plan in November 2022, which includes	U

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
			completion of soil and groundwater cleanup and all land transfers at ETTP within that period.	
Coqui Pharma Medical Isotope Production Facility	Planned 250,000 ft^2 medical isotope production facility on Duct Island within the Heritage Center Industrial Park.	3 mi north-northwest	Construction has not yet begun. The facility is expected to be fully operational in 2026.	N
ORNL	Remediation of radiologically and chemically contaminated facilities.	Within ORR	DOE released its updated 10-year Program Plan in November 2022. The plan includes removal of all uranium-233 inventory and debris, all transuranic waste at ORNL, as well as remediating numerous former reactors, associated infrastructure, and shuttered laboratories within the central campus.	U
Y-12 National Security Complex	Remediation of contaminated facilities and mercury contamination.	Within ORR	DOE and National Nuclear Security Administration released an updated 10-year Program Plan in November 2022. The plan includes the demolition of high-risk buildings at Y-12 and remediation of underlying contaminated soil and groundwater.	U

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
UPF at Y-12	Construction of a multi-facility complex to replace aging infrastructure at Y-12; will have processing capabilities for enriched uranium casting, oxide production, and salvage and accountability operations to support the United States' nuclear weapons stockpile, defense nuclear non-proliferation, and naval reactors program.	Within ORR	UPF is currently under construction. Construction of four of the seven project components is complete. Construction advertised to be complete by the end of 2025.	U
Outfall 200 Mercury Treatment Facility at Y-12	Construction of headworks, treatment facility, and interconnecting pipeline for mercury treatment facilities.	Within ORR	Construction was scheduled to be complete in December 2022 with commissioning and start up activities through mid-2023; however, construction delays have occurred. Construction crews installed the initial equipment to the project's treatment plant site and placed micro-piles to help lay the foundation for the headworks facility site in March 2023.	N
Sludge Processing Mock Test Facility at ORNL	The facility will play a vital role in maturing technologies needed to continue processing Oak Ridge's inventory of transuranic sludge waste. DOE's OREM contractor will test six critical technology elements to gather the data necessary to	Within ORR	Site preparation for the Sludge Processing Mock Test Facility was completed in 2022. DOE's OREM anticipates approximately two years of testing to gather the data needed to confirm the best designs and	U

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
	complete the final design and construction of the Sludge Processing Facility later this decade. Two of those technologies will be tested at the mock test facility.		approaches for the Sludge Processing Facility's final design.	
Oak Ridge Enhanced Technology and Training Center	Operation of a facility to train first responders and other experts in nuclear operations, safeguards, and emergency response. Facilities consist of a Simulated Nuclear and Radiological Activities Facility and a Technical Rescue Training Area; an Emergency Response Training Facility; a maintenance building; and utilities, roads, and supporting infrastructure.	5.5 mi north	Construction has been completed. Facility opened on January 9, 2023.	N
USNC Pilot Fuel Manufacturing Facility	A Pilot Fuel Manufacturing operation at the ETTP, site of Manhattan Project's former K-25 gaseous diffusion plant. USNC commissioned and operates production-scale modules involved in manufacturing of TRISO coated fuel particles and its proprietary Fully Ceramic Micro-encapsulated® fuel.	3 mi north	USNC held a ribbon cutting on August 18, 2022.	N

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
Environmental Management Waste Management Facility	Landfill for low-level radiological and hazardous wastes generated from ORNL/ORR's cleanup projects comprised of 6 disposal areas, or cells, that have a total disposal capacity of 2.3 million y^3.	2 mi north within ETTP	The existing disposal area has only 18 percent capacity remaining. As a result, the Environmental Management Disposal Facility is being constructed.	U
Environmental Management Disposal Facility (called Environmental Management Waste Management Facility in the ESP EIS)	DOE OREM's contractor will build a new hazardous and radioactive waste disposal facility to manage radioactive, hazardous, and toxic wastes generated by the remediation of Y-12, ETTP, and ORNL.	Within ORR	On September 30, 2022, the DOE, the EPA, and the TDEC signed a ROD completing the Comprehensive Environmental Response, Compensation, and Liability Act process. A ground-breaking was conducted in 2023.	U
Orano Project Ike	Orano would develop the "Project Ike" uranium enrichment facility consisting of 750,000 ft^2, resulting in 305 full-time jobs.	5 mi north	Planning and licensing application in development.	N
Future Transmission Uprates and Reconductoring	Various uprate and reconductoring projects beyond the first transmission interconnect with the CRN Site. These are subject to recurring TVA maintenance activities, new TVA projects, and would largely be conducted within existing transmission corridors. Actions may include transmission upgrades to address potential thermal overloads,	Various	Subject to future TVA transmission and project planning.	U

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
	transmission loops, fiber lines, and new or upgraded breakers.			
Rugby-Sunbright Transmission System	Improve the existing power supply in the Sunbright, Tennessee area by constructing, operating, and maintaining a 7.5 mi 69 kV transmission line consisting of steel pole structures on 100 ft right-of-way and new Rugby 161 kV substation.	30 to 37 mi northwest	On February 16, 2017, TVA issued a Final EA and signed FONSI. On January 24, 2019, a ribbon cutting was held to open the new Rugby Substation.	U
Plateau 500 kV Substation	Improve the existing power supply system in Cumberland and Putnam Counties, Tennessee, and surrounding areas by constructing and operating a new 500 kV substation. The proposed substation would be connected to the adjacent existing Roane-Wilson 500 kV and Monterey-Peavine 161 kV transmission lines.	44 mi west	On November 13, 2013, TVA issued an EA and signed FONSI approving the project. Construction began in June 2016. Construction is complete and the substation is operational.	U
Oak Ridge General Aviation Airport	Development of a general aviation airport to support projected growth in the region. The proposed airport includes a 5,000 ft runway and would support general aviation in the vicinity of Oak Ridge.	3 mi north	The State of Tennessee's 2023 budget included $11 M which was used towards the purchase of property. A Draft EA (April 2023) was issued by the Federal Aviation Administration. A public hearing was conducted in August 2023. The goal is to have the airport completed	U

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
			and operational in 2026. Airport plan paused due to proposed Orano facility. Airport location is uncertain.	
West End Corridor Intersection Improvements	Intersection improvements along Oak Ridge Turnpike (Tennessee State Route 95 [TN 95]/Tennessee State Route 58 [TN 58]) at Renovare Boulevard, Novus Drive, Heritage Center Boulevard, and Broadberry Avenue at Gallaher Road.	2 mi west to 5 mi north	Estimated completion by 2030. Included in Mobility Plan 2045 approved in 2021.	N
Future Planned TDOT or Local Roadway Improvement Projects within Project Vicinity	Roadway improvement projects in Roane County including bridge repair/replacement, resurfacing, maintenance, and repair.	Various	As of January 23, 2023, TDOT lists 317 projects that are underway or planned within Roane County. An additional 1,317 projects are identified within the surrounding counties of Loudon (212), Knox (820), and Anderson (285).	U
City of Oak Ridge Water Treatment Plant	The City of Oak Ridge has designed and is constructing a new ultrafiltration membrane drinking water treatment plant to replace the existing 80-year old conventional treatment plant, which is currently at capacity and beyond its useful life. The project also includes construction of raw water-intake pumps, traveling screens, a finished water pump station, and water pipelines as well as	11 mi northeast	Groundbreaking occurred on October 19, 2022. The plant is expected to be operating by spring 2025.	N

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
	the rehabilitation of the existing finished water tanks. The new plant will have a capacity of 12 MGD and will be located at the existing raw water intake off Pump House Road.			
Tellico West Industrial Park	Industrial Park with sites for development.	20 mi south-southeast	Approximately 225 ac development site. Facilities and parcels in the Park are available for development.	U
Roane Regional Business and Technology Park	Business and Industrial Park (655 ac) with sites for development.	1 mi east	Currently 24 sites are available for development. On June 17, 2022, the Jones Road Site, the largest site in the park (40 ac) was sold to The TPA Group, a developer from Atlanta, Georgia, for $1.3 M, with plans to build a 250,000 ft^2 speculative building, a total planned investment of $32M. Site preparation and construction is underway. The Roane Regional Business and Technology Park Master Plan has identified approximately 317 ac available for development.	N

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
Roane County Industrial Park Cardiff Valley Road Site	Roane Specialized Services, LLC (made up of Roane Transportation and Roane Metals) purchased the 45 ac site. Plans included the addition of a new corporate office and warehouse facility, truck fleet parking, and storage space for their existing customers.	15 mi west	Roane County Industrial Development Board accepted formal offer in February 2021. Construction of a 50,000 ft^2 warehouse and corporate office completed in 2023.	N
Horizon Center Industrial Park	1,000 ac business park that can accommodate 4 million ft^2 of space for research and development, light manufacturing, and office facilities. 500 ac have been set aside for environmental preservation and protection.	4 mi north	Development sites available ranging in size from 11 to 148 ac.	N
Helium Test Facility	Test facility to support small modular reactor design validation.	5 mi north	15 ac project site in Horizon Center Industrial Park currently in planning stage for facility development.	N
Rockwood Iron and Metal Cleanup Project	Clean up of former ironworks and metals operations.	18 mi west	EPA has designated the site as a non-National Priorities List Superfund (Brownfields) site. An Eligible Response Site Exclusion decision has been made at this site. Clean up is dependent on State-led action.	U
Smokey Mountain Smelters	Clean up of former fertilizer and smelting operations.	25 mi east	EPA placed the site on the Superfund National Priorities List in 2010 because of	U

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
			contaminated soils, sediment, and surface water resulting from past industrial operations at the site. The EPA has performed short-term cleanup actions to stop immediate threats. The Remedial Action began in February 2023 and was completed by September 2023.	
Downtown Oak Ridge Development Project	Downtown Oak Ridge development project along the Wilson Street corridor creating an intimate, walkable and urban place with buildings addressing the street, flanked by generous sidewalks and streetscapes. Restaurants, shops, offices, apartments, condominiums, and green spaces combine to make a vibrant new district.	11 mi northeast	On January 13, 2020, Oak Ridge City Council unanimously approved a resolution endorsing the Vision for the Wilson Street Corridor. A request for proposals was issued to develop the now mostly vacant land. In March 2022, two firms were selected and the two proposals were blended into a single master plan.	N
The Preserve at Clinch River	The Preserve is a 1,400 ac, master planned community, currently separated into eight neighborhoods.	2–3.5 mi west	Located west of TN 58, construction began in 2002 and new homes continue to be constructed. Additional areas are planned for development, and lots continue to be released for sale. Three of the neighborhoods have sold all available lots.	N

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
Roane County School Construction	Proposed plan would retire Kingston, Harriman, and Rockwood high schools, combining them in a new 1,600 student facility near Roane State Community College. It would also include moving Oliver Springs High to the Oliver Springs Middle school, adding a new gym and technical education space, sewer upgrades for the Midway area schools, moving Ridge View Elementary to Rockwood High School and moving Harriman Middle School to Harriman High School.	13 mi west	On July 9, 2018, the Roane County Commission voted unanimously against a property tax increase that would help fund the entire project. However, the County Commission did fund the Oliver Springs and Midway portions of the project. On April 27, 2021, the Roane County School Board approved a motion to study building a new Roane County High School and another new high school that would combine Harriman and Rockwood. The study would also provide information on moving Ridge View Elementary School to Rockwood High School and moving Harriman Middle School to Harriman High School.	N
American Nuclear Corporation	Producer of radioactive sources and detectors, active from 1962 to 1970. License revoked in 1970 after discovery of contamination leaking into the Clinch River.	15 mi northeast	Remediation of the site began in spring 2024. Activities include stabilizing building contamination for safe dismantling and demolition; dismantling and demolishing the former facility and hot cell, excavating contaminated soils and buried debris, and transporting and disposing of contaminated materials to an	U

Project Name	Description	Approximate Distance from CRN Site	Status	New (N), Updated (U), or Discontinued (D)
			approved offsite disposal facility. Work could be completed in late 2024.	
Roane-Pineville 500 kV Transmission Line	70 mi long transmission line	Not applicable	Proposed in-service date of 2018. Project has not been progressed and is presumed to be discontinued.	D

ac = acre(s); CP = Construction Permit; CPA = CP Application; CRN = Clinch River Nuclear; DOE = U.S. Department of Energy; EA = environmental assessment; EA = environmental assessment; EPA = U.S. Environmental Protection Agency; ESP = early site permit; ETTP = East Tennessee Technology Park; FONSI = finding of no significant impact; KIF = Kingston Fossil Plant; LLC = Limited Liability Company; NEPA = National Environmental Policy Act of 1969; NRC = U.S. Nuclear Regulatory Commission; NRIC = National Reactor Innovation Center; OREM = Oak Ridge Office of Environmental Management; ORNL = Oak Ridge National Laboratory; ORR = Oak Ridge Reservation; PEIS = programmatic environmental impact statement; RFA = reasonably foreseeable future action; ROD = Record of Decision; SMR = small modular reactor; TDEC = Tennessee Department of Environment and Conservation; TDOT = Tennessee Department of Transportation; TVA = Tennessee Valley Authority; UPF = Uranium Processing Facility; USNC = Ultra Safe Nuclear Corporation; Y-12 = Y-12 National Security Complex.

E.2 Climate Change Impacts on Environmental Resources

Appendix L of the ESP EIS (NRC 2019-TN6136) documents the review team's assessment of the potential effects of climate changes on its evaluation of the environmental impacts of the proposed action. In accordance with 10 CFR 51. 92(e)(2) (TN10253), Appendix L of the ESP EIS is incorporated here by reference. Appendix L of the ESP EIS describes the process by which the potential effects of climate change are considered for environmental recourse areas that are affected by the proposed action. The appendix summarizes the projected changes in climate for eastern Tennessee and references comprehensive evaluations completed by the U.S. Global Change Research Program (USGCRP 2014-TN3472, USGCRP 2017-TN5848, USGCRP 2018-TN5847). Appendix L of the ESP EIS makes qualitative determinations of the likely shifts in the impacts of the proposed action on environmental resources as a result of altering the environment in accordance with the predictions in climate change literature (NRC 2019-TN6136).

With respect to climate change, the review team evaluated information provided in the CP ER and performed its own independent search for new and significant information during the audit of the CP application. As part of this review, the team examined the publication of the Fifth National Climate Assessment (NCA5) by the U.S. Global Change Research Program (USGCRP 2023-TN9762) which was published after the ESP EIS and builds upon findings from the Fourth National Climate Assessment (NCA4). NCA5 states that, "[w]ith virtually no exceptions, climate change in the southeast continues to exhibit the trends that were reported in the Fourth NCA."

A direct comparison of the projections between NCA4 and NCA5 is complicated by differences in temporal baseline and emission scenarios applied between the two assessments. NCA4 (USGCRP 2017-TN5848) primarily relied on representative concentration pathways (RCPs) to describe future climate scenarios. RCPs outline future climate trajectories based on greenhouse

gas (GHG) emissions. Appendix L of the ESP EIS (NRC 2019-TN6136) presented projections under RCP 8.5, which reflects a continued increase in global emissions (assumes high emissions with minimal mitigation efforts) resulting in increased warming by 2100. In contrast, NCA5 (USGCRP 2023-TN9762) uses shared socioeconomic pathways (SSP) and global warming levels (GWLs) as its primary framework for assessing potential climate impacts. The five socioeconomic pathway scenarios (SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5) cover a range of GHG pathways and climate change mitigation. GWLs quantify changes based on specific global temperature increases relative to preindustrial conditions (e.g., 2.7°F or 1.5°C), providing a more direct measure of the effects of global temperature shifts (USGCRP 2023-TN9762). If and when a GWL is reached, depends on future GHG emissions. Despite the differences between NCA4 and NCA5, the review team considered updated information in NCA5. To facilitate a comparison of climate projections and potential impacts for eastern Tennessee between NCA5 and NCA4, relevant data from NCA5, where available, are presented in Table E-2. Unless otherwise noted, comparisons between NCA4 and NCA5 are made using impacts projected under the continued increasing emissions scenario (RCP8.5) and a GWL of 7.2°F (4°C).

Table E-2 Climate Variable and Projected Change for Tennessee and the Southeast

Climate Variable	Projected Change (USGCRP 2014-TN3472, USGCRP 2017-TN5848, USGCRP 2018-TN5847) Under Continued Increasing Emission Scenario	Updated Projected Change (USGCRP 2023-TN9762) Under the Very High Scenario or Global Warming of 7.2°F (4°C)
Average surface air temperature	Increase 6−8°F by the late 21st century (2070−2099) relative to 1986−2015 (USGCRP 2017-TN5848).	Increase by 7°F degrees relative to 1991–2020. (USGCRP 2023-TN9762).
Hottest and coldest days expected in a 30-year period	6–12°F warmer during the 2036–2065 period than those experienced during the 1976−2005 period (USGCRP 2017-TN5848).	The highest temperature of the year is projected to increase by 8°F relative to 1991–2020 (USGCRP 2023-TN9762).
Days with temperatures above 90°F	Increase by 40 to 60 days during the 2036−2065 period relative to 1976−2005 (USGCRP 2017-TN5848).	Days above 95°F are projected increase by 55 days relative to 1991–2020 (USGCRP 2023-TN9762).
Days with temperatures below 32°F	Decrease by 10 to 30 days during the 2036−2065 period relative to 1976−2005 (USGCRP 2017-TN5848).	Decrease by 37 days relative to 1991–2020 (USGCRP 2023-TN9762).
Frost-free season	Increase by 30 to 40 days in the 2070–2099 period relative to 1971−2000 (USGCRP 2014-TN3472).	No comparison data available in NCA5.
Projected changes in precipitation	Stay within the range of natural variability during summer and fall. Precipitation during winter and spring projected to increase 5–15% by the late 21st century (2070−2099) relative to 1986−2015 (USGCRP 2018-TN5847).	Relative to the 1991–2020 time period: • The annual total precipitation is projected to increase by 7%. • The annual number of days with extreme precipitation (top 1% of historical rainfall events) will increase by 48%. (USGCRP 2023-TN9762)
Water availability and yield	Reduced due to increased evaporative losses resulting from rising temperatures alone. Water yield	Reduced due to increased evaporative losses resulting from rising temperatures (2026–2065

Climate Variable	Projected Change (USGCRP 2014-TN3472, USGCRP 2017-TN5848, USGCRP 2018-TN5847) Under Continued Increasing Emission Scenario	Updated Projected Change (USGCRP 2023-TN9762) Under the Very High Scenario or Global Warming of 7.2°F (4°C)
	expected to decrease 2.5–5% per decade for the period 2010–2060, relative to 2010 (USGCRP 2014-TN3472).	relative to 1991–2020) (USGCRP 2023-TN9762).
Water demand	Increase by 10–25% without climate change considerations. Increase by 25–50% with climate change considerations by 2060, relative to 2005 (USGCRP 2014-TN3472).	No available comparison in NCA5. Other resources indicate public water supply use is expected to increase by 21% to meet internal demand from 2010 to 2030 (USGCRP 2023-TN9762; Robinson and Gain 2023-TN12313) based on population growth.
Regional Energy Demand	Projected increase	Projected increase in air-conditioning demand as the climate warms (USGCRP 2023-TN9762).
General/Other	Increase in the frequency and intensity of extreme rainfall events. Effects on fisheries and fishery habitats due to wetland loss. Spread of non-native plants. Decreased crop production and livestock yield. Increased formation of allergens and air pollutants, including ozone. Increases in harmful algal blooms and other surface-waterborne disease-causing agents.	Increase in wet-bulb globe temperature through the end of this century under all scenarios. Medium confidence that climate change is projected to worsen air quality in many U.S. regions. 10–30 more premature deaths per 10,000 people aged 65 and older due to $PM_{2.5}$ (2°C warming). Lengthening of the thunderstorm season with each degree of warming, especially during the cool-season months. Projected increase (0.1–0.5 in.) in annual runoff by midcentury (2036–2065 relative to 1991–2020) (USGCRP 2023-TN9762).

E.3 Assessment Summary

Appendix L of the ESP EIS (NRC 2019-TN6136) described the affected environment in relation to climate change and summarized the review team's assessment of the effects of climate change on relevant resource areas. Regarding potential effects of climate change in eastern Tennessee, the review team determined there is no new and significant information as part of its independent evaluation. As shown in Table E-1 above, when comparing climate change parameter projections presented in NCA4 to that in NCA5, the new information in NCA5 does not significantly differ from what was considered in Appendix L of the ESP EIS (NRC 2019-TN6136) with respect to climate change. Therefore, the review team has not identified new information that would change the findings of climate change effects on the impact determinations for the resources areas that were assessed in Appendix L of the ESP EIS. These include land use, hydrology, terrestrial and wetland ecology, aquatic ecology,

socioeconomics, environmental justice, historic and cultural resources, meteorology and air quality, nonradiological health, radiological health, nonradioactive waste, accidents, and transportation of radiological materials.

E.4 Conclusions

Based on the discussion in Section E.3, the review team found the conclusions presented in the ESP EIS remain bounding and valid.

E.5 References

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." TN10253.

NRC (U.S. Nuclear Regulatory Commission). 2019. *Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site*. NUREG-2226, Washington, D.C. ADAMS Package Accession No. ML19087A266. TN6136.

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TVA (Tennessee Valley Authority). 2025. Letter from S.W. Hunnewell, Vice President, New Nuclear Program, to NRC Document Control Desk, dated April 28, 2025, regarding "Clinch River Project NRC Docket No. 99902056, Submittal of the Environmental Report in Support of the Clinch River Nuclear Site Construction Permit Application." Chattanooga, Tennessee. ADAMS Accession No. ML25118A209. TN11927.

USGCRP (U.S. Global Change Research Program). 2014. *Climate Change Impacts in the United States: The Third National Climate Assessment*. J.M. Melillo, T.C. Richmond, and G.W. Yohe (eds.). U.S. Government Printing Office, Washington, D.C. ADAMS Accession No. ML14129A233. TN3472.

USGCRP (U.S. Global Change Research Program). 2017. *Climate Science Special Report: Fourth National Climate Assessment*. Volume I. Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.). Washington, D.C. ADAMS Accession No. ML19008A410. doi: 10.7930/J0J964J6. TN5848.

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USGCRP (U.S. Global Change Research Program).2023. *The Fifth National Climate Assessment*. A.R. Crimmins, C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. Washington, D.C. Available at https://repository.library.noaa.gov/view/noaa/61592. TN9762.

APPENDIX F

BIOLOGICAL ASSESSMENT

F.1 Biological Assessment

The U.S. Nuclear Regulatory Commission (NRC or the Commission) staff structured its biological assessment (BA) in accordance with the Services suggested BA contents described in Title 50 of the *Code of Federal Regulations* (50 CFR) 402.12(f) (TN4312). Appendix Section F.1.1 describes the Federal action area, Section F.1.2 summarizes consultation with the Services, and Section F.1.3 contains the NRC staff's analysis of Endangered Species Act of 1973 (ESA)-listed species baseline, action area occurrence, and project impacts. The results of the NRC staff's analysis for the proposed action for these species are summarized in Table F-1, and Table F-4. Table F-2 describes the species discussed previously in correspondence between NRC and FWS that have been determined to not occur within the action area. No federally listed species or critical habitats under National Marine Fisheries Service (NMFS) jurisdiction occur within the action area.

For this BA, the NRC staff reviewed its 2019 early site permit (ESP) (TVA 2019-TN5854), Tennessee Valley Authority's (TVA's) environmental report (ER) (TVA 2025-TN11927), TVA's BA (NRC 2025-TN12378), and correspondence with U.S. Fish and Wildlife Service (FWS) (FWS 2017-TN5090, FWS 2025-TN12289). These documents are incorporated by reference.

Table F-1 Effect Determinations for Federally Listed Species Under U.S. Fish and Wildlife Service Jurisdiction for Clinch River Nuclear Site

Common Name[a]	Federal Status[b]	Potentially Present in Action Area	2025 TVA BA Effect Determination[c]	2025 NRC Staff Effect Determination[d]	FWS Concurrence Date
gray bat[a]	FE	Yes	LAA	LAA	TBD
Indiana bat[a]	FE	Yes	LAA	LAA	TBD
northern long-eared bat[a]	FE	Yes	LAA	NLAA	TBD
tricolored bat[a]	FPE	Yes	NLAA (No jeopardy)	NLAA	N/A
little brown bat	NL	Yes	NLAA (No jeopardy)	NLAA	N/A
whooping crane[a]	EXPN	Yes	NE	NE	N/A
monarch butterfly[a]	FPT	Yes	NLAA (No jeopardy)	NLAA	N/A
Virginia spiraea[a]	FT	No	NE	NE	N/A
white fringeless orchid[a]	FT	No	NE	NE	N/A
slender chub[a]	FT	No	NE	NE	N/A
spotfin chub[a]	FT	No	NE	NE	N/A
yellowfin madtom[a]	FT	No	NE	NE	N/A
Anthony's riversnail[a]	FE	No	NE	NE	N/A

Common Name[a]	Federal Status[b]	Potentially Present in Action Area	2025 TVA BA Effect Determination[c]	2025 NRC Staff Effect Determination[d]	FWS Concurrence Date
Alabama lampmussel[a]	FE	No	NE	NE	N/A
pink mucket[a]	FE	No	NE	NE	N/A
spectaclecase[a]	FE	No	NE	NE	N/A

BA = Biological Assessment; DER = delisted due to recovery; EIS = environmental impact statement; EXPN = experimental population, nonessential; FE = federally endangered; FPE = proposed for Federal listing as endangered; FPT = proposed for Federal listing as threatened; FT = federally threatened; FWS = U.S. Fish and Wildlife Service; IPaC = Information for Planning and Consultation; LAA = likely to adversely affect; N/A = not applicable; NE = no effect; NL= not listed; NLAA = may affect but is not likely to adversely affect; NRC = U.S. Nuclear Regulatory Commission; TBD = to be determined; TVA = Tennessee Valley Authority.

(a) Species identified as occurring within the NRC action area, based on the most recent FWS IPaC report (FWS 2025-TN12289).

(b) TVA's BA can be found in Appendix M of TVA 2025 EIS (NRC 2025-TN12378). FWS issued a Biological Opinion/Conference Opinion (BO/CO) to TVA on July 11, 2025 (FWS 2025-TN12330, FWS 2025-TN12329), addressing the project impacts. FWS agreed that TVA's BA was sufficient and that formal consultation for the Action was appropriate. In its BA, TVA determined the Federal action "may affect and was likely to adversely affect" the Indiana bat, northern long-eared bat, gray bat, and tricolored bat. FWS issued an Incidental Take Statement in the BO/CO, which identified reasonable and prudent measures necessary or appropriate to minimize the impacts of anticipated taking of listed species. Incidental taking of Federally listed species that are in compliance with the terms and conditions of this statement are exempted from the prohibitions against taking under the Endangered Species Act.

(c) The effect determinations for federally listed species are made in accordance with the language and definitions specified in the FWS and National Marine Fisheries Service Endangered Species Consultation Handbook (FWS and NMFS 1998-TN1031).

(d) The ESA does not require Federal agencies to seek FWS concurrence for "no effect" determinations or for "may affect, not likely to adversely affect" determinations for candidate and proposed species. For species with a FWS concurrence date of TBD, the NRC will seek the FWS's concurrence following the issuance of this draft SEIS.

(e) Indicates protection status under the Endangered Species Act (TN1010).

Table F-2 Federally Listed Species that the NRC Staff Have Determined Are Not Present Within the Action Area

Common Name[a,b]	Scientific Name	Federal Status[c]
American hart's-tongue fern	*Asplenium scolopendrium* var. *americanum*	FT
Cumberland rosemary	*Conradina verticillata*	FT
Cumberland sandwort	*Arenaria cumberlandensis*	DER
large-flowered skullcap	*Scutellaria montana*	FT
Morefield's leather-flower	*Clematis morefieldii*	FE
Price's potato-bean	*Apios priceana*	FT
small whorled pogonia	*Isotria medeoloides*	FT
blackside dace	*Phoxinus cumberlandensis*	-
bluemask (Jewel) darter	*Etheostoma akatulo*	FE
chucky madtom	*Noturus crypticus*	FE
dusky darter	*Etheostoma percnurum*	FE
Laurel dace	*Chrosomus saylori*	FE
palezone shiner	*Notropis albizonatus*	FE
snail darter	Percina tanasi	DER
appalachian elktoe	*Alasmidonta raveneliana*	FE
birdwing pearlymussel	*Lemiox rimosus*	FE

Common Name[a,b]	Scientific Name	Federal Status[c]
catspaw	*Epioblasma obliquata*	FE
clubshell	*Pleurobema clava*	FE
cracking pearlymussel	*Hemistena lata*	FE
Cumberland bean	*Villosa trabalis*	FE
Cumberland elktoe	*Alasmidonta atropurpurea*	FE
Cumberland monkeyface	*Theliderma intermedia*	FE
Cumberland pigtoe	*Pleuronaia gibber*	FE
Cumberlandian combshell	*Epioblasma brevidens*	FE
Dromedary pearlymussel	*Dromus dromas*	FE
fanshell	*Cyprogenia stegaria*	FE
Finerayed pigtoe	*Fusconaia cuneolus*	FE
fluted kidneyshell	*Ptychobranchus subtentus*	FE
littlewing pearlymussel	*Pegias fabula*	FE
orangefoot pimpleback	*Plethobasus cooperianus*	FE
oyster mussel	*Epioblasma capsaeformis*	FE
pale lilliput	*Toxolasma cylindrellus*	FE
purple bean	*Villosa perpurpurea*	FE
rabbitsfoot	*Quadrula cylindrica cylindrica*	FT
ring pink	*Obovaria retusa*	FE
rough pigtoe	*Pleurobema plenum*	FE
rough rabbitsfoot	*Quadrula cylindrica strigillata*	FE
sheepnose mussel	*Plethobasus cyphyus*	FE
shiny pigtoe	*Fusconaia cor*	FE
slabside pearlymussel	*Pleuronaia dolabelloides*	FE
snuffbox	*Epioblasma triquetra*	FE
tan riffleshell	*Pioblasma florentina walkeri*	FE
turgid blossom	*Epioblasma turgidula*	DEX
white wartyback	*Plethobasus cicatricosus*	FE

DEX = delisted due to extinction; DER = delisted due to recovery; FE = federally endangered; FT = federally threatened.
"-" denotes no entry in table cell.

(a) Species not identified as potentially occurring within the action area in recent IPAC reports (TVA 2025-TN11927 Appendix M or FWS 2025-TN12289) but described as potentially occurring in previous correspondence between NRC and FWS (FWS 2017-TN5090; FWS 2017-TN5091). The NRC staff interpret the change in species lists as resulting from two sources: (1) from the smaller action area in the NRC EA for TVA's exemption request compared to the ESP EIS, and (2) from an updated understanding of the distribution of federally listed species.
(b) Species delisted due to extinction (88 FR 71644-TN11423) or recovery (87 FR 60298-TN12320; 86 FR 45685-TN12321)
(c) Indicates protection status under the Endangered Species Act (TN1010).

TVA submitted an exemption request in November 2023 (TVA 2023-TN10326), which requested exemption from portions of 10 CFR 50.10(c) (TN249) to allow TVA to conduct certain excavation support activities at the CRN Site prior to issuance of a CP. The exemption request was granted on December 10, 2024 (NRC 2024-TN11016). The NRC's environmental assessment and finding of no significant impact (FONSI) for that request was published in the *Federal Register* (FR) on December 16, 2024 (89 FR 101643-TN12274). Sections 3.5 and 3.6 of the environmental assessment (EA) describe the aquatic and terrestrial systems and project

impacts. Ecological resources were described in Sections 2.4.1 and 2.4.2 of the ESP, and potential impacts were described in Sections 4.3, 5.3, 6.3, and Appendix M. Alternative actions were described in Chapter 9 of the ESP EIS and Chapter 4 of this supplemental environmental impact statement (NRC 2019-TN6136). The current EIS utilizes the alternatives examined in the ESP.

F.1.1 Endangered Species Act: Action Area

For the purpose of assessing the potential impacts of the Federal action on federally listed species, the NRC staff considers the action area to consist of the following: the Clinch River Nuclear (CRN) Site, barge traffic area, and offsite 161 kV transmission line right-of-way (ROW) plus a surrounding area extending approximately 1 mi (1.6 km) out from the perimeters of each component. The 1 mi (km) buffer ensures that the action area includes terrestrial habitats potentially affected by offsite effects such as noise and light as well as landscape-level effects such as habitat fragmentation and changes to patterns of localized movement. The action area includes over 1 mi (km) of river channel downstream from the proposed intake and discharge, which covers the potential sedimentation and thermal discharges into the river and the potential impacted area. The CRN Site is transitional in character between lacustrine habitats associated with Watts Bar Lake and a short reach of riverine habitat extending up to the Melton Hill Dam. The action area takes in downstream waters substantially influenced by river flow but excludes the predominantly lacustrine habitats in the main part of Watts Bar Lake.

This action area is inclusive of the action area described in TVA's biological assessment (TVA 2025-TN12304) as it covers the CRN Site, barge traffic area, and the 29 ac (ha) offsite 161 kV transmission line ROW. The action area does not include the 69 kV underground transmission line ROW that connected the CRN Site to the Bethel Valley substation and the 439 mi (km) of offsite transmission line ROW throughout eastern Tennessee and extending into Kentucky and Georgia previously described in the ESP. The development of the 69 kV transmission line is not necessary to support operation of CRN-1 and is no longer being considered by TVA as part of CRN-1 (TVA 2025-TN11927). For the offsite transmission line ROW throughout eastern Tennessee and extending into Kentucky and Georgia, TVA has determined that the offsite transmission lines recircuiting, reconductoring, or other improvements would be dependent on future activities with TVA's other power generation assets and not as a direct result of CRN-1 (TVA 2025-TN11927).

The NRC staff recognizes that, although the action area is stationary, federally listed species can move in and out of the action area. For instance, a migratory bird could occur in the action area seasonally as it forages or breeds within the action area. Thus, in its analysis, the NRC staff considers not only those species known to occur directly within the action area but those species that may passively or actively move into the action area. The NRC staff then considers if the life history and habitat requirements of each species make it likely to occur in the action area where it could be affected by the proposed action. The following sections discuss listed species and critical habitats under FWS.

F.1.2 Chronology of Endangered Species Action Section 7 Consultation

Following issuance of this DSEIS, the NRC staff will seek review of and concurrence with impact determinations for species for which the NRC has determined that proposed action may affect and is likely to adversely affect the species or may affect and is not likely to adversely affect the species (Table F-1), in accordance with 50 CFR 402.13(c) (TN4312). The final SEIS will list correspondence between the NRC and the FWS pursuant to

ESA Section 7. Table F-3 lists the correspondence between the NRC and FWS pursuant to ESA Section 7 that has transpired to date.

TVA, a Federal agency, consulted with FWS on this project in January 2025, where TVA completed a BA (TVA 2025-TN12304) and received a Biological Opinion/Conference Opinion (FWS 2025-TN12329) from FWS on July 11, 2025. FWS concurred with TVA determination of "may affect, likely to adversely affect" for effects of the proposed action on the gray bat, Indiana bat, northern long-eared bat, and tricolored bat. FWS issued an incidental take statement for these species and detailed reasonable and prudent measures to avoid or limit take. TVA correspondence with FWS is detailed in FWS' Biological Opinion (FWS 2025-TN12329).

Table F-3 Endangered Species Act Section 7 Consultation Correspondence for Clinch River Nuclear Site Between the U.S. Nuclear Regulatory Commission and the U.S. Fish and Wildlife Service

Date	Description	ADAMS Accession No.[(a)]
04/21/2017	Tennessee Ecological Services Office to NRC, Comments on Clinch River SMR Scoping	ML17145A505
10/9/2018	U.S. Department of Interior to NRC, suggesting that NRC contact FWS to determine applicability of Section 7 to Clinch River ESP	ML18191B354
10/28/2019	Email from Dustin Bowles (FWS) to Tamsen Dozier (NRC), stating that Section 7 consultation not required for the Clinch River ESP	ML19028A275
08/19/2025	Tennessee Ecological Services Field Office (FWS) to Mitchell Dehmer (NRC), List of threatened and endangered species for proposed Clinch River	ML25231A112

ADAMS = Agencywide Documents Access and Management System; ESA = Endangered Species Act; FWS = U.S. Fish and Wildlife Service; LR = license renewal; NRC = U.S. Nuclear Regulatory Commission; SMR = small modular reactor.
(a) Access these documents through the NRC's ADAMS at https://adams-search.nrc.gov/home.

F.1.3 Endangered Species Act: Federally Listed Species Considered and Analyzed

The NRC staff identified 15 federally listed, proposed and candidate species with the potential to occur in the action area (Table F-1), and included the little brown bat at the request of FWS. No designated or proposed critical habitat under FWS jurisdiction occurs within the action area. No federally listed species or habitats under NMFS jurisdiction occur within the action area.

In making this identification, the NRC staff reviewed its 2019 ESP EIS (TVA 2019-TN5854), the CP ER (TVA 2025-TN11927), TVA's BA (NRC 2025-TN12378), correspondence with FWS (FWS 2017-TN5090, FWS 2025-TN12289), available ecological surveys within the action area, and other records to determine whether the species or its habitat may occur within the action area. Table F-4 analyzes the relevant federally protected species under FWS jurisdiction with the potential to occur within the action area and summarizes the NRC staff's effect determinations, including background information, site occurrence, and the NRC staff's determination of potential impacts of the proposed action.

The NRC staff have determined 31 federally listed species from previous analyses would not occur within the action area based on the results of the most recent IPaC (FWS 2025-TN12289) and its independent review of species specific information (Table F-2). The NRC therefore determines that the proposed action would have no effect on these species and does not discuss them further in this BA.

FWS requested that NRC analyze the little brown bat in the ESP BA (PNNL 2017-TN5384). As a result, TVA included the little brown bat in their 2025 BA (NRC 2025-TN12378) and NRC includes it in this analysis, though it is not federally listed at this time.

Table F-4 The U.S. Nuclear Regulatory Commission's Staff Evaluation of Species Protected Under U.S. Fish and Wildlife Service Jurisdiction with Likelihood to Occur within the Action Area of the Clinch River Nuclear Site

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
gray bat (*Myotis grisescens*)	**Background Information:** The gray bat is an insectivorous, migratory bat that roosts colonially in caves and mines year round (FWS 2009-TN11465; MDC 2019-TN11493). They are also known to use quarries, bridges, and culverts as summer roosts. Hibernacula typically support thousands of overwintering individuals, have multiple entrances, good air flow, and temperatures between 41°–48°F (5°–9°C). Females form summer maternity colonies consisting of a few hundred to thousands of individuals. Bachelor males segregate to separate summer roosts. Gray bat foraging typically occurs nocturnally along rivers, streams, lakes, and reservoirs. They forage specifically on aquatic insects (e.g., mayflies, caddisflies, and stoneflies) but opportunistically forage upon moths and beetles. Human disturbance is the main reason for the continued decline of gray bats in caves that are not protected by gates or fences (FWS 2009-TN11465). Climate change impacts resulting in changes in ambient temperature and shortages in food supply is another significant threat to this species (FWS 2009-TN11465). **Action Area Occurrence:** Gray bats have been detected within the action area via mist nest and acoustic surveys over the last 13 years (TVA 2025-TN12304). They are also known from the Oak Ridge Reservation to forage along a pond approximately 2 mi from the project area. A large gray bat maternity cave (approximately 10,000 bats) was recently documented approximately 3.32 mi from the site. Nine caves are known within 3 mi of the CRN Site, including the traditional roosting cave. Winter cave surveys in 2021 documented five gray bats roosting inside a cave. Subsequent surveys in 2023 and 2024 documented a number of bats roosting in the cave from spring through fall. Acoustic results during that same timeframe indicated a large enough quantity of bats was present to capture chatter sporadically from early June through early November 2023 (TVA 2025-TN12304).	LAA

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
	Potential Impacts: The gray bats will be impacted by tree removal near the caves, noise from construction, potential collision hazards, and potential reduction in onsite foraging areas due to hydraulic alterations(TVA 2025-TN12304, FWS 2025-TN12329). Proposed activities would result in tree removal within 0.25 mi from the caves. The tree removal would result in possible bat relocation or abandonment of caves, reduced winter habitat, and potential reduction of the gray-bat maternity colony numbers. Drilling, excavation, and blasting within 0.5 mi of known caves will be avoided from November 15 through March 31 while bats are in torpor. The proposed activities will increase the risk of collision; however, the majority of traffic will occur during daylight hours (FWS 2025-TN12329). As mentioned in Section 3.4.2.2 and 3.4.2.3, the continued dewatering of the potential onsite quarry during construction and operation at a rate of 1,000 to 3,000 gpm has the potential to affect nearby onsite waterways and wetlands. **Reasonable and Prudent Measures:** TVA will conduct a baseline study and continually monitor the caves during the proposed action to allow adaptive management, as needed. This monitoring includes seismically and acoustically monitoring affected caves during blasting and drilling activities to ensure no impacts will occur to the bats within these caves due to the proposed activities (FWS 2025-TN12329). As part of the reasonable and prudent measures detailed in the BO issued to TVA, any excessively loud blasting above 120 dBA at 50 ft must be reported to FWS. In addition, TVA will delineate and report the acreage of tree removal near these caves (FWS 2025-TN12329). TVA has committed to contributing to local and regional bat research and monitoring efforts, as well as continuing to monitor caves within the area to document seasonal use and monitor populations (FWS 2025-TN12329). TVA will monitor groundwater prior to and during the construction of the potential quarry and implement stormwater controls and discharge under the site NPDES program (TVA 2025-TN11927, TVA 2025-TN12285). TVA will develop a post-construction monitoring plan to determine any changes to local bat populations within the action area, report results to the FWS, and upload the data to North American Bat Monitoring Program.	

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
Indiana bat (*Myotis sodalist*)	**Background Information:** According to the recovery plan (FWS 2007-TN934), the Indiana bat is a flying, insectivorous mammal that hibernates in caves and mines and forms maternity roosts in mature trees over 5 in. diameter at breast height, especially trees with exfoliating bark. It roosts and forages in forested or semi-forested areas. Threats include disturbance to the hibernacula, loss and fragmentation of forested swarming and roosting habitat, chemical contaminants, collision with wind turbines, and white-nose syndrome. **Action Area Occurrence:** In 2013, an Indiana bat was captured approximately 9.9 mi from the CRN Site (TVA 2025-TN12304). The closest summer roost recorded for Indiana bats is 27–29 mi to the southeast in Cherokee National Forest. Nine caves are known to be present within 3 mi of the CRN Site (TVA 2025-TN12304). Suitable summer roosting habitat exists in the project area within the mature forests of the CRN Site, BTA, and offsite 161 kV transmission corridor. Suitable foraging habitat occurs over streams, wetlands, and ponds across the site as well as the Reservoir. Acoustic surveys were performed at the CRN Site (2011, 2013, 2021) and at the BTA (2015). Indiana Bats were detected acoustically in 2013 on the CRN Site (TVA 2025-TN12304). Although final critical habitat is designated for this species, it does not overlap the action area (FWS 2025-TN12289). **Potential Impact**s: The Indiana bats will be impacted by tree removal, reduction in drinking water and potential food source, noise and lighting from construction, and potential collision hazards (TVA 2025-TN12304). Proposed activities would result in approximately 250 ac of tree removal onsite over 4.5 years, while approximately 446 ac of forested habitat is expected to remain onsite. Impacts from tree removal would be minimal due to the large amount of suitable roosting habitat onsite and on immediately vicinity that may provide alternative habitat. Approximately 0.65 ac of wetlands will be filled, and 3,600 ft of 11 perennial/intermittent streams will be filled, which would reduce drinking water and food. Overall, the wetlands and streams within the vicinity of the action area would not be significantly impacted. Noise from the construction equipment may impact the species and startle individuals out of hibernation, torpor or rest; however, the impact will be minimal unless it occurs in adjacent areas to known hibernaculum. Similarly, lighting could impact bats; but the impact can be minimized by utilizing cut-off lightning. The proposed activities will increase the risk of collision; however, the majority of traffic will occur during daylight hours (FWS 2025-TN12329). **Reasonable and Prudent Measures:** Tree removal will be conducted in the winter, November 16–March 31, to avoid roosting Indiana Bats. Artificial bat roosting	LAA

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
	structures, selected to attract federally protected bats, would be installed at the CRN Site to provide habitat for imperiled tree roosting bats and will be monitored annually (FWS 2025-TN12329). TVA will comply with the conditions of their NPDES permit and implement BMPs to reduce sedimentation, restrict vegetation removal near sensitive resources, and manage stormwater (FWS 2025-TN12329). As a condition of the BO, TVA will sample selenium concentration within the holding ponds and report to FWS if an onsite quarry was constructed. In addition, TVA has committed to contributing to local and regional bat research and monitoring efforts (FWS 2025-TN12329). A condition of BO is that TVA will develop a post-construction monitoring plan to determine any changes to local bat populations within the action area and report results to the FWS and upload the data to North American Bat Monitoring Program.	
northern long-eared bat (*Myotis septentrionalis*)	**Background Information:** According to the final rule (80 FR 17974-TN4216), the northern long-eared bat is a flying, insectivorous mammal found across much of the eastern and north-central United States and all Canadian provinces. It predominantly overwinters in hibernacula including underground caves and mines. In spring, summer, and fall it uses forest habitats and roosts individually or in colonies underneath tree bark or in cavities or crevices of live trees and snags greater than 3 in. in diameter at breast height. Threats include white-nose syndrome, human disturbances of hibernacula and roosts, collision with wind turbines, chemical contaminants, and loss of summer habitat from forest management and conversion. **Action Area Occurrence**: Mist net surveys captured northern long-eared bat on the CRN Site during 2011 and approximately 9.9 mi away on Oak Ridge Reservation in 2013 (TVA 2025-TN12304). Acoustic surveys on the CRN Site and the BTA detected NLEB during 2011, 2013, and 2015 (TVA 2025-TN12304). As mentioned, nine caves are known to be present within 3 mi of the CRN Site; however, internal surveys of these caves conducted in 2021 determined northern long-eared bats are not currently using them (TVA 2025-TN12304). Suitable summer roosting habitat occurs in forested areas across the project area. Suitable foraging habitat for northern long-eared bats are present over and along streams, wetlands and the Clinch River arm of Watts Bar Reservoir. **Potential Impacts:** The proposed action will have similar impacts on the northern long-eared bat as the Indiana bat, though FWS is not reasonably certain that northern long-eared bat are present within the action area (FWS 2025-TN12329). Reasonable and prudent measures for other federally listed bat species would be protective for this species and reduce adverse impacts.	NLAA

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
tricolored bat (*Perimyotis subflavus*)	**Background Information**: According to a status assessment (FWS 2021-TN8589), the tricolored bat is a flying insectivorous mammal found across much of the eastern and north central United States in parts of southern Canada, Mexico, and Central America. It overwinters in caves and abandoned mines, but also in road culverts. In the spring, summer, and fall it occupies forest habitats and roosts in foliage of live and dead trees. Threats include white-nose syndrome, human disturbances of hibernacula and roosts, collision with wind turbines, loss of summer habitat from forest management and conversion, and climate change. **Action Area Occurrence:** Nine caves are known to be present within 3 mi of the CRN Site. During internal winter cave surveys conducted in March 2021, five tricolored bats were found roosting in a cave across the Clinch River arm of Watts Bar Reservoir from the project area (TVA 2025-TN12304). In addition, one to three individual tricolored bats were found in the caves within Grassy Creek HPA, adjacent to the project area (TVA 2025-TN12304). Previously, three tricolored bats were captured during 2011 mist net surveys on the CRN Site, but no tricolored bats were captured onsite during 2021 mist net surveys. In the same 2021 study, a post-lactating female tricolored bat was captured approximately 1.7 mi from the CRN Site on nearby DOE land (TVA 2025-TN12304). Suitable foraging habitat exists in the wetlands, streams, and Clinch River onsite. Suitable summer roosting habitat occurs throughout the project area. **Potential Impacts:** Impacts for the tricolored bat are similar to those for the Indiana bat and gray bat. The proposed activities would result in tree removal onsite and near caves, which will be conducted in the winter to avoid impacts to tricolored bats during spring staging, summer roosting, and fall swarming. The tree removal would result in a reduced foraging habitat and swarming/staging habitat, possible relocation, potential reduced fitness of returning pregnant females, and increased noise levels in the caves. Impacts from tree removal would be minimal due to the large amount of suitable roosting habitat onsite and on the immediate vicinity that may provide alternative habitat. Tree removal in wetlands and near streams would be restricted to those that would interfere with transmission lines. The proposed activities will increase the risk of collision; however, the majority of traffic will occur during daylight hours (FWS 2025-TN12329). **Reasonable and Prudent Measures:** TVA will seismically and acoustically monitor the caves and will report any excessively loud blasting above 120 dBA at 50 ft to FWS (FWS 2025-TN12329). TVA will develop a post-construction monitoring plan to determine any changes to local bat populations within the action area and report	NLAA

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
	results to the FWS and upload the data to North American Bat Monitoring Program.	
little brown bat (*Myotis lucifugus*)	**Background Information**: The little brown is a flying insectivorous mammal that has a wide range in North America, stretching from Alaska and Canada boreal forests through most of the contiguous United States and into central Mexico (NRC 2025-TN12331). Little brown bats typically hibernate in caves or mines in the winter and utilize trees, artificial structures, and rocks in the summer. Maternity colonies are primarily warm sites in human structures and less frequently in hollow trees. Foraging habitat is primarily stream and wetland margins. Threats include white-nose syndrome, collision with wind turbines, and climate change, which have greatly reduced the population (NRC 2025-TN12331). **Action Area Occurrence:** Nine caves are known to be present within 3 mi of the CRN Site. During internal winter cave surveys conducted in March 2021, no little brown bats were observed. Previously, a little brown bat was caught in the 2011 mist net surveys on the Oak Ridge Reservation, approximately 2.5 mi from the proposed site (NRC 2025-TN12378). Little brown bats were not captured on the CRN Site during the TVA 2011 or 2021 mist net surveys. Acoustically, the little brown bat was detected at one location during the 2021 acoustic surveys. Potential habitat exists in the forested areas across the CRN Site, BTA, and offsite transmission corridor, and foraging habitat is present over and along the streams and wetlands within those areas. **Potential Impacts:** As previously requested, NRC included an impact analysis for the little brown bat. Impacts for the little brown bat are similar to those for the Indiana bat and gray bat. Reasonable and prudent measures for federally listed bat species would be protective for this species and reduce adverse impacts.	N/A
whooping crane (*Grus americana*)	**Background Information:** The eastern migratory population of whooping cranes migrate over Tennessee and occasionally a portion overwinters near the Cumberland River, as well as the Hiawassee Wildlife Refuge, Wheeler National Wildlife Refuge, and ACE Basin (NRC 2025-TN12331; FWS 2012-TN12290). Whooping cranes are not known to breed within Tennessee (FWS 2012-TN12290). Threats include alteration and destruction of whooping crane habitat, occurrence and severity of drought conditions, and decrease in river flows (FWS 2012-TN12290). **Site Occurrence:** The closest record of whooping cranes is approximately 25 mi away (NRC 2025-TN12331) from the CRN site. Foraging habitat for the whooping crane was not found during site surveys conducted in 2011, 2013, 2015, and 2021 (TVA 2025-TN12304).	NE

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
	Potential Impacts: Although whooping cranes may fly over the site, there is no foraging habitat onsite. Therefore,the proposed project construction, operations, or decommissioning activities will not affect this species.	
monarch butterfly (*Danaus plexippus*)	**Background Information:** The monarch butterfly is dependent on milkweeds (primarily *Asclepias* spp.) for egg-laying and larval food (NRC 2025-TN12331). North America populations migrate to Mexico or California in the fall and return in early spring. Adult monarchs feed on nectar from milkweeds and from a variety of plant species. Threats include habitat loss and degradation of habitat from conversion of grasslands to agriculture, widespread use of herbicides, logging/thinning at overwintering sites in Mexico, senescence and incompatible management of overwintering sites in California, urban development, drought, insecticides, and climate change effects. **Action Area Occurrence:** Monarch butterflies have not been observed during TVA's site surveys in 2011, 2013, 2015, and 2021. Milkweed was observed during botanical surveys, and suitable habitat is present onsite in shrub/scrub and herbaceous areas in the existing ROWs, open areas, and unmowed pockets such as roadside ditches (TVA 2025-TN12304). Monarch butterflies have been recorded within 1 mi of the CRN Site boundaries (NRC 2025-TN12331). Although proposed critical habitat is designated for this species, it does not overlap the action area (FWS 2025-TN12289). **Potential Impacts:** Proposed project construction, operation, and decommissioning activities will occur within potential monarch habitat. This includes the small population near the intake location. TVA is working on restoring 11 ac to support pollinator species, including the monarch butterfly (TVA 2025-TN12304). Herbicide would be used onsite through targeted or mechanical applications following the "Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities" (TVA 2025-TN12304).	NLAA
Virginia spiraea (*Spiraea virginiana*)	**Background Information:** Virginia spiraea has approximately 17 occurrences within Tennessee within the Tennessee River basin (FWS 2021-TN12291). Virginia spiraea prefer floodplains on creek edges with exposed rocks, gravel bars, and boulders (NRC 2025-TN12331). Threats include competition by both native and non-native species, habitat loss due to land disturbances, and changes in hydrologic flow regime (FWS 2021-TN12291). **Action Area Occurrence:** While Virginia spiraea is known within the Tennessee River basin, there are no documented populations within HUC-8 sub-basin lower Clinch River (FWS 2021-TN12291). Vegetation surveys in 2021 did not find this species or its habitat on site.	NE

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
	Potential Impacts: No proposed project construction, operations, or decommissioning activities would take place in or adjacent to habitat for the Virginia spiraea which is not known to or believed to occur in the lower Clinch River.	
white fringeless orchid (*Platanthera integrilabia*)	**Background Information:** White fringeless orchid has been historically present in Roane County, Tennessee. This species typically prefers partially shaded areas with sandy acidic soil in non-alluvial wetlands (FWS 2022-TN12292). Threats include habitat modifications caused by development, encroachment by invasive and native plant species, disturbances by feral hogs, and altered hydrology (FWS 2022-TN12292). **Action Area Occurrence:** Though no occurrences have been recently recorded in Roane County, there are known populations in the nearby counties Cumberland and McMinn (FWS 2022-TN12292). Vegetation surveys in 2021 did not find this species or its habitat on site (TVA 2025-TN11927). **Potential Impacts:** Proposed project construction, operation, or decommissioning activities would not take place in or adjacent to habitat for white fringeless orchid.	NE
Alabama lampmussel (*Lampsilis virescens*)	**Background Information:** Alabama lampmussel occurred in small creeks to large rivers; however, at present, it seems to only persist in small to moderate sized streams in areas of slow to moderate current within sand and gravel substrates. Habitat destruction or modification is presently the greatest threat to this species (FWS 2020-TN12297). **Action Area Occurrence:** Historically found in two tributaries of the lower reach of Clinch River, Emory River and Coal Creek. There are no recorded observations of it in the lower reach of the Clinch River (FWS 2020-TN12297). **Potential Impacts:** No proposed project construction, operations, or decommissioning activities would take place in or adjacent to habitat for the Alabama lampmussel, which is not known to or believed to occur in the lower Clinch River.	NE
spectaclecase (*Cumberlandia monodonta*)	**Background Information:**. The spectaclecase inhabits larger stream systems and is generally found in microhabitats sheltered from both high and low extremes in flow (FWS 2022-TN11462). Threats to the conservation of the spectaclecase include changes to hydrology or water quality from anthropogenic sources, municipal or industrial pollutions, runoff, or sedimentation, loss of riparian vegetation within the watershed and further development and conversion of bottomlands, habitat loss from bank degradation or destruction, erosion, and in-water structures such as bridges and dams, and presence of invasive species, especially zebra mussel.	NE

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
	Action Area Occurrence: Spectaclecase has known populations within the Mississippi, Ohio, Cumberland, and Tennessee River systems, in areas where they are sheltered from the main force of the river current (NRC 2025-TN12331). Relic shells have been found during the 2011 mollusk survey. **Potential Impacts:** No proposed project construction, operations, or decommissioning activities would take place in or adjacent to habitat for the spectaclecase, which is not known to or believed to occur in the lower Clinch River.	
pink mucket (*Lampsilis abrupta*)	**Background Information:** Medium to large rivers with range of substrates (silt to boulders, rubble, gravel, and sand) (FWS 1985-TN11490). Most often associated with moderate to fast-flowing water but appears to have adapted to impounded rivers. Primary threats include habitat degradation from impoundments, sedimentation, and pollution (FWS 2024-TN11469). **Action Area Occurrence:** Considered extirpated in the lower reach of the Clinch River below Norris Dam, the last documented single relic shell was in 2008 at RM 1.3, and the last live siting was in 1982 in Melton Hill Reservoir, (FWS 2024-TN11469). **Potential Impacts:** No proposed project construction, operations, or decommissioning activities would take place in or adjacent to habitat for the pink mucket, which is extirpated in the lower Clinch River.	NE
Anthony's riversnail (*Athearnia anthonyi*)	**Background Information:** Anthony's riversnail, endemic to the Tennessee River system, inhabits medium to large rivers with cobble or boulder substrates but currently is only known to occupy 4 streams in Marion Co., Tennessee and Limestone and Jackson Co., Alabama. It remains vulnerable to increased urbanization and pollution events, such as toxic chemical spills (FWS 2023-TN11551). **Action Area Occurrence:** While historically found in the Clinch River there are no known populations north of the Tennessee/Alabama line (Marion Co. TN) FWS 2023-TN11551). **Potential Impacts:** No proposed project construction, operations, or decommissioning activities would take place in or adjacent to habitat for the Anthony's riversnail, which is not known to or believed to occur in the lower Clinch River.	NE
slender chub (*Erimystax cahni*)	**Background Information:** The slender chub inhabit medium to large rivers with moderate to high flow and clean gravel shoals or riffles (FWS 2020-TN12300). The primary threat is habitat degradation from coal runoff. **Action Area Occurrence:** There are no known existing populations in the Clinch River and no specimens have been collected during surveys since 1996 (FWS 2020-TN12300, FWS 2014-TN12301). Although final critical	NE

Common Name (*Scientific Name*)	Staff Evaluation	2025 NRC Staff Conclusions
	habitat is designated for this species, it does not overlap the action area (FWS 2025-TN12289). **Potential Impacts:** No proposed project construction, operation, or decommissioning activities would take place in or adjacent to habitat for the slender chub, which is not known to or believed to occur in the lower Clinch River.	
spotfin chub (*Erimonax monachus*)	**Background Information:** Spotfin chubs primarily inhabit clear, moderate to large streams and rivers with moderate to swift currents and gravel, cobble, boulder, or bedrock substrates (FWS 2024-TN12302). Primary threats are the effects of erosion from upland disturbance and water withdrawals. **Action Area Occurrence:** Not known to occur in the Clinch River, although it has been found in other nearby tributaries of the Tennessee River including Emory River and North Fork Holston River. (FWS 2024-TN12302). Although final critical habitat is designated for this species, it does not overlap the action area (FWS 2025-TN12289). **Potential Impacts:** No proposed project construction, operations, or decommissioning activities would take place in or adjacent to habitat for the spotfin chub, which is not known to or believed to occur in the lower Clinch River.	NE
yellowfin madtom (*Noturus flavipinnis*)	**Background Information:** The yellowfin madtom is a small catfish that inhabits clear creeks and small rivers with pools and backwaters. They prefer areas with slab rocks, bedrock ledges, and tree roots. Primary threat is habitat degradation (FWS 2020-TN12303). **Action Area Occurrence:** Only known populations in the Clinch River occur in the upper Clinch River in Virginia (FWS 2020-TN12303). Although final critical habitat is designated for this species, it does not overlap the action area (FWS 2025-TN12289). **Potential Impacts:** No proposed project construction, operation, or decommissioning activities would take place in or adjacent to habitat for the yellowfin madtom, which is not known to or believed to occur in the lower Clinch River.	NE

BMP = best management practice; DPS = Distinct Population Segment; EA = environmental assessment; FWS = U.S. Fish and Wildlife Service; IPaC = Information for Planning and Consultation; LAA = likely to adversely affect; N/A = not applicable; NE = no effect; NLEB = northern long-eared bat; NRC = U.S. Nuclear Regulatory Commission.

(a) All species in this table identified as potentially occurring within the action area via FWS IPAC reports (FWS 2025-TN12289).

(b) Applicable generic impacts considered, along with species specific factors: (1) habitat loss, degradation, disturbance, or fragmentation; and associated effects; (2) behavioral changes resulting from preparation, refurbishment or other site activities; (3) mortality or injury from collisions with nuclear power plant structures and vehicles; (4) vegetation management and pesticide application; and (5) other landscape maintenance activities, stormwater management, other ongoing operations and maintenance activities.

(c) The NRC staff makes its effect determinations for federally listed species in accordance with the language and definitions specified in the FWS and National Marine Fisheries Service (NMFS) Endangered Species Consultation Handbook (FWS and NMFS 1998-TN1031). LAA = likely to adversely affect. NLAA = may affect, not likely to adversely affect. NE = No effect.

F.1.4 Endangered Species Act Cumulative Effects Analysis

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02) (TN4312). When formulating biological opinions during formal ESA Section 7 consultation, the Services consider cumulative effects when determining the likelihood of jeopardy or adverse modification. During informal consultation, a Federal agency need only consider cumulative effects under the ESA in the biological assessment if listed species would be adversely affected by the proposed action and formal Section 7 consultation is necessary. Since the NRC staff concluded earlier that the proposed action is likely to adversely affect the gray bat and Indiana bat, consideration of cumulative effects is required.

Current activities in the action area, such as recreational boating and fishing, camping, hiking, hunting, research conducted by Oak Ridge National Laboratory, and other energy-related or development projects are expected to continue at present levels of intensity (AECOM 2014-TN5067).

These ongoing non-federal activities may contribute to cumulative effects on listed species; however, most of these activities (i.e., fishing, hunting, research, and development) are regulated under state and local guidelines intended to minimize harm to protected species. The research activities by Oak Ridge National Laboratory are conducted under appropriate permits and are designed to minimize disturbance to listed species.

Although these activities are not federally authorized, they may contribute incrementally to the overall risk profile for listed species in the action area. When considered in combination with the proposed federal action, these cumulative effects do not rise to a level that would be expected to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat.

F.2 References

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87 FR 60298. October 5, 2022. "Endangered and Threatened Wildlife and Plants; Removing the Snail Darter From the List of Endangered and Threatened Wildlife." *Federal Register*, Fish and Wildlife Service, Interior. TN12320.

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FWS (U.S. Fish and Wildlife Service). 2020. *Alabama Lampmussel (Lampsilis virescens) 5-Year Review: Summary and Evaluation.* U.S. Fish and Wildlife Service South Atlantic-Gulf Region Alabama Ecological Services Field Office Daphne, Alabama. TN12297.

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APPENDIX G

REGULATORY COMPLIANCE AND LIST OF FEDERAL, STATE, AND LOCAL PERMITS AND APPROVALS

Table G-1 contains a list of the environmental-related authorizations, permits, and certifications potentially required by Federal, State, Tribal, regional, and local agencies related to site preparation and construction a nuclear power plant with one GE Hitachi (GEH; also known as GE-Vernova Hitachi [GVH]) Nuclear Energy BWRX-300 small modular reactor at the Clinch River Nuclear Site in Oak Ridge, Roane County, Tennessee. Table G-1 was adapted from Table 1.5-2 of the environmental report to the U.S. Nuclear Regulatory Commission (NRC or the Commission) by the applicant (TVA 2025-TN11927). Table G-2 contains a list of environmental related authorizations required for operation. Table G-2 was adapted from Table 1.5-3 of the environmental report.

Table G-1 Authorizations Required for Preconstruction and Construction Activities at the Clinch River Nuclear Site

Agency	Authority	Requirement	Activity Covered
NRC	Atomic Energy and Energy Reorganization Acts (TN663) 10 CFR Part 52 Subpart A (TN251)	ESP	Site licensing, including safety-related construction activities and operation of a nuclear power facility (including the Source Material, Special By-Product Material, and Special Nuclear Material Licenses issued pursuant to 10 CFR Parts 30, 40, and 70 and addressed in the operating license application). ESP-006 was issued December 2019.
NRC	10 CFR 50.23	Construction Permit	Construction Permit
NRC	10 CFR 50.57 (TN249)	Operating License	Operating License
Federal Aviation Administration	Federal Aviation Act 49 U.S.C. 1501; 14 CFR 77 (TN4315)	Construction Notice	Erection of structures greater than 200 ft high that potentially may affect air navigation.
TDOT	TCA 54-5-302 (TN12427)	Entrance Permits	Construction of entrances including ramps, driveways, and other access points. Requires traffic studies and engineering designs to show design and potential impacts of proposed changes.
TDOT	TCA 54-5-302 Tennessee Code Annotated (TCA) 54-5-302 (TN12427)	Right-of-way permit	Installation of utilities in highway rights-of-way.

Agency	Authority	Requirement	Activity Covered
USACE	Clean Water Act 33 CFR Part 323 (TN4827) and Part 330 (TN4318)	Section 404 Permit	Filling in of waters of the U.S.
USACE	Rivers and Harbors Act 33 U.S.C. 403 (TN4768)	Section 10 Permit	Dredge and fill activities for intake, discharge and barge structures in navigable waters of the U.S.
U.S. Coast Guard	Ports and Waterways Safety Act 33 U.S.C. 1221, et seq. (TN4314)	Private Aids to Navigation Permit	Construction of intake structure and discharge pipeline in navigable waters.
EPA and TDEC	Resource Conservation and Recovery Act, Section 3010 (TN1281)	Acknowledgement of Notification of Hazardous Waste Activity	Hazardous waste generation.
EPA and TDEC	EPA Facility Response Plan (40 CFR Part 9 [TN5322] and 112 [TN1041]), and the EPA Hazardous Waste Contingency Plan (40 CFR Part 265-TN12442)	Facility Response Plan Approval	Spill/Discharge Response Program
EPA and TDEC	SPCC rule (40 CFR Part 112 [TN1041]), Appendix F, Sections 1.2.1 and 1.2.2	SPCC/IPPP	Spill/Discharge Prevention Plan
FWS	Endangered Species Act Section 7 (16 U.S.C. 1536) (TN1010)	Consultation/Biological Assessment	Evaluation of effects on listed species.
FWS	Migratory Bird Treaty Act/ Executive Order 13186 (TN3331)	Responsibility of Federal Agencies to Protect Migratory Birds	TVA is exempt from the Act requirements but complies voluntarily. TVA is subject to the Executive Order.

Agency	Authority	Requirement	Activity Covered
City of Oak Ridge	Migratory Bird Treaty Act/ Executive Order 13186	Sanitary Sewer connection	Connection to the city wastewater treatment system.
City of Oak Ridge	Migratory Bird Treaty Act/ Executive Order 13186	Potable Water	Extension of existing potable waterline.
TDEC	Federal Clean Water Act (33 U.S.C. 1251 et seq.) (TN662)	State water quality certification (Clean Water Act Section 401 Certification)	Discharges to waters of the U.S. and waters of the State to be compliant with State mandated water quality requirements. TVA would need to obtain the certification before the NRC can issue the construction permit.
TDEC	Federal Clean Water Act (33 U.S.C. 1251 et seq.) (TN662) and TCA §69-3-108: Tennessee Water Quality Control Act of 1977 (TN12428)	NOI for coverage under an Individual NPDES Permit for stormwater discharges	Associated with construction activities. Discharges to waters of the state due to • support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) • dewatering of work areas of collected stormwater and groundwater • water used to wash vehicles • water used to control dust • routine building washdown • uncontaminated groundwater Unpolluted foundation or footing drains Appropriate dewatering controls include, but are not limited to: weir tank, dewatering tank, gravity bag filter, sand media particulate filter, pressurized bag filter, cartridge filter or other control units providing the level of treatment necessary to comply with permit requirements. Applied for in October 2025.

Agency	Authority	Requirement	Activity Covered
TDEC	Federal Clean Water Act (33 U.S.C. 1251 et seq.) and TCA §69-3-108: Tennessee Water Quality Control Act of 1977	Stormwater Pollution Prevention Plan, to include Common Plan of Development, Soil Erosion and Sediment Control Plan (structural control measures, engineering design of sediment basin/controls for projects 10 ac or greater), etc.	Discharges to waters of the state due to construction of the new plant, switchyards, and transmission lines. Submitted in October 2025.
TDEC	Federal Clean Water Act (33 U.S.C. 1251 et seq.) and TCA §69-3-108: Tennessee Water Quality Control Act of 1977	Aquatic Resource Alteration Permit required for alterations of a stream or wetland, including diversion of surface waters of the state.	Withdrawal of water from the Reservoir for cooling purposes. Project construction within freshwater streams, wetlands, and transitional areas.
TDEC	Federal Clean Water Act (33 U.S.C. 1251 et seq.) and TCA §69-3-108: Tennessee Water Quality Control Act of 1977	NOI for NPDES General Permit of Discharges from the Application of Pesticides (TNP100000)	Discharges of pesticides used for mosquito and other flying insect pest control, weed and algae control, animal pest control, and forest canopy pest control to waters of the state.
TDEC	Federal Clean Water Act (33 U.S.C. 1251 et seq.) and TCA §69-3-108: Tennessee Water Quality Control Act of 1977	Sanitary Wastewater - Use of licensed wastewater hauler	Portable facilities
TNSHPO/TPO	Section 106 of the National Historic Preservation Act (TN4157)	As a Federal agency, TVA is required to comply with Section 106, which includes TNSHPO/TPO, and identification of potentially affected resources (i.e., a site survey).	Protection of archaeological and historical resources.

CFR = *Code of Federal Regulations*; EPA = U.S. Environmental Protection Agency; ESP = early site permit; FWS = U.S. Fish and Wildlife Service; IPPP = Integrated Pollution Prevention Plan; NOI = Notice of Intent; NPDES = National Pollution Discharge Elimination System; NRC = U.S. Nuclear Regulatory Commission; SPCC = Spill Prevention, Control and Countermeasures; TCA = Tennessee Code Annotated; TDEC = Tennessee Department of Environment and Conservation; TDOT = Tennessee Department of Transportation; TNSHPO = Tennessee State Historic Preservation Officer; TPO = Tribal Preservation Officer; TVA = Tennessee Valley Authority; USACE = U.S. Army Corps of Engineers; U.S.C. = *United States Code*.

Table G-2 Authorization Required for Operation Activities

Agency	Authority	Requirement	Activity Covered
DOT	Hazardous Material Transportation Act 49 CFR Part 107 Subpart G (TN6605)	Certificate of Registration	Transportation of hazardous materials
EPA and TDEC	Resource Conservation and Recovery Act, Section 3010 (TN1281)	Acknowledgement of Notification of Hazardous Waste Activity	Hazardous Waste Generation
EPA and TDEC	EPA Facility Response Plan (40 CFR Part 9 [TN5322] and Part 112 [TN1041]), and the EPA Hazardous Waste Contingency Plan (40 CFR Part 265-TN12442)	Facility Response Plan Approval	Spill/Discharge Response Program
EPA and TDEC	SPCC rule (40 CFR Part 112 [TN1041]), Appendix F, Sections 1.2.1 and 1.2.2	SPCC/IPPP	Spill/Discharge Prevention Plan
City of Oak Ridge	-	Sanitary Sewer connection	Connection to the City Wastewater Treatment System
City of Oak Ridge	-	Potable Water	Extension of existing potable waterline
TDEC	Federal Clean Water Act (33 U.S.C. 1251 et seq.) and TCA §69-3-108 (TN12428): Tennessee Water Quality Control Act of 1977 (TN12428)	NPDES Industrial Stormwater General Permit for plant operation activities; EPA Application Forms 2D (Application for Permit to Discharge Process Wastewater) and 2F (Application for Permit to Discharge Stormwater Discharges Associated with Industrial Activity)	Discharge of cooling-water, service water, and stormwater runoff from plant operations
TDEC	Federal Clean Water Act (33 U.S.C. 1251 et seq.) and TCA §69-3-108: Tennessee Water Quality Control Act of 1977	Permanent Sanitary Wastewater	Connection to Wastewater Treatment Plant
TDEC	TCA §§69-7-301, et seq (Justia 2024-TN12453).	Water Resources Notification; Water Withdrawal Registration	Surface-water withdrawal of an average of 10,000 gallons or more per day

Agency	Authority	Requirement	Activity Covered
TDEC	Federal Clean Air Act, 42 U.S.C. 7401 (TN4539)	Title V Operating Permit; Prevention of Significant Deterioration Preconstruction Permit	Discharge of air pollutants from cooling tower(s), emergency generators, auxiliary boiler(s), and ancillary equipment
Texas Department of State Health Services, Radiation Control Program, Radiation Safety Licensing Branch	25 TAC §289.252 "Licensing of Radioactive Material" (TN12443)	Emergency Plan for the response to an accident or incident involving shipments of radioactive waste	Transportation of LLRW to the Texas Disposal Facility
Texas Department of State Health Services, Radiation Control Program, Radiation Safety Licensing Branch	25 TAC §289.252 "Licensing of Radioactive Material"	Proof of financial responsibility such as insurance that the carrier has in order to comply with DOT requirements	
Texas Department of State Health Services, Radiation Control Program, Radiation Safety Licensing Branch	25 TAC §289.257 "Packaging and Transportation of Radioactive Material" (TN12444)	Provide list of approved shipping containers along with their certificates of compliance or other certifying documentation. For a shipper that manufactures their own containers they must submit their quality assurance procedures.	Shipping of LLRW to the Texas Disposal Facility
TDEC DRH	TCA §68-202-2 (Justia 2024-TN12452); TDEC Rule 0400-20-10-.32 (TNCRR 2012-TN12451)	Obtain a License-for-Delivery from the DRH (Form RHS 8-30). Persons whose activities result in the generation of radioactive waste have the primary responsibility to verify that a License-for-Delivery is obtained.	Transportation of radioactive waste within the State of Tennessee to a disposal/ processing facility

CFR = *Code of Federal Register*; DOT = Department of Transportation; DRH = Division of Radiological Health; EPA = U.S. Environmental Protection Agency; IPPP = Integrated Pollution Prevention Plan; LLRW = low-level radioactive waste; NPDES = National Pollution Discharge Elimination System; SPCC = Spill Prevention, Control and Countermeasures; TAC = Texas Administrative Code; TCA = Tennessee Code Annotated; TDEC = Tennessee Department of Environment and Conservation; U.S.C. = United States Code.

G.1 References

10 CFR Part 50. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities." TN249.

10 CFR Part 52. *Code of Federal Regulations*, Title 10, *Energy*, Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." TN251.

33 CFR Part 323. *Code of Federal Regulations*, Title 33, *Navigation and Navigable Waters,* Part 323, "Permits for Discharge of Dredged or Fill Material into Waters of the United States." TN4827.

33 CFR Part 330. *Code of Federal Regulations*, Title 33, *Navigation and Navigable Waters*, Part 330, "Nationwide Permit Program." TN4318.

40 CFR Part 9. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 9, "OMB Approvals Under the Paperwork Reduction Act." TN5322.

40 CFR Part 112. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 112, "Oil Pollution Prevention." TN1041.

40 CFR Part 265. *Code of Federal Regulations*, Title 40, *Projection of the Environment*, Part 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities." TN12442.

33 U.S.C. § 403. U.S. Code Title 33, *Navigation and Navigable Waters*, Section 403 "Obstruction of Navigable Waters Generally; Wharves; Piers, etc.; Excavations and Filing in." TN4768.

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Clean Air Act Amendments of 1990. 42 U.S.C. § 7401 et seq. Public Law 101-549, as amended. TN4539.

Endangered Species Act of 1973. 16 U.S.C. § 1531 et seq. TN1010.

Federal Aviation Act of 1958. 49 U.S.C. § 1301 et seq. TN4315.

Federal Water Pollution Control Act of 1972 (commonly referred to as the Clean Water Act). 33 U.S.C. § 1251 et seq. TN662.

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Migratory Bird Treaty Act of 1918. 16 U.S.C. § 703 et seq. TN3331.

National Historic Preservation Act. 54 U.S.C. § 300101 et seq. TN4157.

Ports and Waterways Safety Act of 1972. 33 U.S.C. § 1221 et seq. TN4314.

Resource Conservation and Recovery Act of 1976. 42 U.S.C § 6901 et seq. Public Law 94-580, 90 Stat. 2795. TN1281.

TN Code Ann. 54-5-302. “Title 54, Highways, Bridges and Ferries, Chapter 5 State Highways, Part 3 Entrances onto Highways.” *Tennessee Code Unannotated*, Nashville, Tennessee. TN12427.

TN Code Ann. 69-3-108. “Title 69, Waters, Waterways, Drains and Levees, Chapter 3 Water Pollution Control, Part 1 Water Quality Control Act.” *Tennessee Code Unannotated*, Nashville, Tennessee. TN12428.

TNCRR (TN Compilation of Rules and Regulations). 2012 “Tenn. Comp. R. & Regs. 0400-20-10-.32, Licensing of Shippers of Radioactive Material into or Withing Tennessee.” Ithaca, New York. Accessed on September 16, 2025, at https://www.law.cornell.edu/regulations/tennessee/Tenn-Comp-R-Regs-0400-20-10-.32. TN12451.

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TX Admin. Code 25 § 289.252. October 29, 2024. Title 25, “Licensing of Radioactive Material, Texas Regulation for Control of Radiation.” *Texas Administrative Code*, Austin, Texas. TN12443.

TX Admin. Code 25 § 289.257. October 23, 2024. Title 25, “Packaging and Transportation of Radioactive Material, Texas Regulation for Control of Radiation.” *Texas Administrative Code*, Austin, Texas. TN12444.

APPENDIX H

RESOLUTION OF ISSUES

There were issues that were not resolved in the early site permit proceedings, as documented in NUREG-2226, *Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site* (NRC 2019-TN6136) and issues that will still need to be addressed in the operating license proceeding. The proposed Federal action by NRC is the issuance of a construction permit (CP), under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, for one BWRX-300 SMR at the CRN Site TVA's CP application references an ESP; therefore, in accordance with 10 CFR 52.39 (TN251), issues resolved as part of the ESP proceeding remain resolved except under conditions set forth in 10 CFR 52.39(a)(2).

Table H-1 shows the representations and assumptions for building and operation of a nuclear power plant with one GE Hitachi (GEH; also known as GE-Vernova Hitachi [GVH]) Nuclear Energy BWRX-300 small modular reactor at the Clinch River Nuclear Site in Oak Ridge, Roane County, Tennessee. Table H-2 lists the issues that will need to be addressed in a future operation license proceeding.

Table H-1 Representations and Assumptions and Their Resolution for Construction and Operations at the Clinch River Nuclear Site

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Site Layout, Project Description	The majority of module and component deliveries would be over road and rail.	The TVA is no longer considering rail as an option for deliveries to the CRN Site.
Site Layout, Project Description	Shoreline excavation would be required for construction of the intake structure, along a length of shoreline approximately 50 ft wide. The diffuser pipe for the discharge would be partially buried, which would also require underwater excavation. No dredging would be required for construction in the BTA.	TVA is evaluating two alternatives for the intake design: Alternative 1—Recessed shoreline intake structure; Rectangular concrete structure that extends roughly 50 ft inland and is approximately 28 ft high. The intake would connect to the Clinch River arm of the Watts Barr Reservoir (Reservoir) via an 80 ft long channel. Shoreline excavation is required for this design. Building a temporary cofferdam of approximately 55 ft by 20 ft is required for installation of the intake screens. Alternative 2—Submerged offshore intake structure; Consists of a subsurface conduit extending between a submerged intake in the reservoir and a vertical shaft wet well on the bank. The shoreline wet well is roughly 20 ft in diameter and 50 ft deep. At this location, the bottom of the reservoir is 718 ft, so the intake conduits to the screens must be buried 3 ft below elevation 718. Building a temporary cofferdam with similar parameters to Alternative 1.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
		Discharge Structure: The diffuser pipe for the discharge would be partially buried, which would also require underwater excavation. No dredging required for construction.
Site Layout, Project Description	The volume of equipment delivered by barge during operation is expected to be similar to the volume delivered during construction.	No new information.
Land Use	The CRN Site construction footprint is shown in Figure 3.1-2 in the ER.	Figure 3-1 presents the construction footprint for CRN Unit 1 (CRN-1).
Land Use	The CRN Site would total 935 ac. The BTA would total 203 ac.	No new information. Updates to the NLCD Land Cover/Land Use Categories for the CRN Site and Surrounding Areas result in changes to habitat areas, however the CRN Site and BTA totals remain the same.
Land Use	An estimated 494 ac of the existing 935-ac CRN Site would be affected by the construction of a new nuclear power plant.	An estimated 481.4 ac of the existing 935 ac CRN Site would be affected by building of the CRN Site.
Land Use	Permanent facilities and structures (primarily the power-block area, cooling-tower area, and intake structures and their associated pipelines) for new SMR units would occupy approximately 327 ac and temporary facilities would occupy approximately 167 ac.	New information is updated from that previously included in the ESP EIS.
Land Use	In the BTA, 30 ac would be permanently disturbed with new roadways and barge- landing improvements and 15 ac would be temporarily disturbed for the installation of the new roadways.	New information is updated from that previously included in the ESP EIS.
Land Use	Building activities, including barge slip reconditioning activities, would not require dredging.	New information is updated from that previously included in the ESP EIS.
Land Use	No prime farmland impacts exceeding U.S. Department of Agriculture thresholds would result from the proposed project.	No new information.
Land Use	Heritage Rail Offload Area would be refurbished and stabilized for deliveries. The U.S. Department of Energy former K-25 Barge- Loading Area between SR 58 and the CRN Site entrance would also be refurbished for deliveries. Alternatively, a new barge slip may be constructed.	New information is updated from that previously included in the ESP EIS.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Land Use	Salt drift from any cooling-tower design would be localized with some areas of drift during summer exceeding NRC guidance thresholds (EIS Figure 5-2). Exceedance areas would be located in early successional habitat within the CRBRP footprint that mostly would be occupied by facilities and to a lesser extent in forested habitat that would be cleared during preconstruction. No fogging or icing impacts are expected on transportation areas around the CRN Site.	New information is updated from that previously included in the ESP EIS.
Land Use	A new switchyard would be constructed for use with new SMR units at the CRN Site.	A new switchyard would be constructed for use by CRN-1 at the CRN Site.
Land Use	The extent of land required for borrow pits would not exceed designated capacities.	New information is updated from that previously included in the ESP EIS.
Land Use	Potential areas for the temporary storage of earthwork and excavation spoils have been identified on the site. The total amount of spoils and the extent of land required have not been determined but are assumed to not extend beyond the construction footprint identified in Figure 4.3-1 in the ER. The excavated material would be managed with the appropriate erosion and sediment control measures, and BMPs would be used as necessary for these storage areas.	New information is updated from that previously included in the ESP EIS.
Land Use	A minor intrusion to the Clinch River 100-year floodplain would be disturbed by clearing and grading activities necessary to building the proposed intake and blowdown structures, and installing makeup and blowdown lines. Most impacts would be temporary, except for building and operating the CRN plant intake and discharge structures.	Building activities associated with CRN-1 occur in 27.7 ac of floodplain within the permanent disturbance area and 3.4 ac of floodplain within the temporary disturbance area. Much of the impact to floodplain is permanent conversion of land cover rather than filling in the floodplain. Building activities within the floodplain along the Reservoir are associated with intake construction, discharge pipeline installation, transmission line construction and maintenance, and expansion of the offsite barge facility within the BTA.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Land Use	The hypothesized offsite transmission lines with assumed modifications to affected rights-of-way are based on injecting 800 MW(e) to the grid at the CRN Site.	The power transmission system for CRN-1 differs from that presented ESP EIS both as a result of TVA system changes since the development of these documents and because of the smaller power output of CRN-1 (nominal 300 MWe), compared to the total power output of 800 MWe assumed in the ESP EIS. Improvements beyond the first transmission line interconnect are considered system maintenance activities.
Land Use	Hypothesized offsite transmission corridor impacts included a 12.7 mi segment where lines will be rebuilt, including potential excavation work. These impacts would be confined to established right-of- ways.	The associated offsite 161 kV corridor extending from the 500 kV line to the interconnect with the Kingston Fossil Plant–Bethel Valley Substation transmission line at Bear Creek Road, also shown in Figure 2.2 is established with a width of 280 ft to accommodate a 120 ft wide corridor for the 161 kV loop-in.
Land Use	Hypothesized transmission line upgrades would affect currently unspecified areas within existing rights-of-way of a total of 439 mi or 5,327 ac of offsite transmission line corridors.	It is not currently possible to determine whether uprating, reconductoring, or other activities beyond the first transmission line interconnect are part of routine maintenance and upgrade activities for the regional power transmission system or a direct downstream effect resulting from the construction and operation of CRN-1.
Water Use and Quality	Stormwater runoff from the CRN Site would be controlled via engineered structures, collected in engineered retention ponds, and infiltrated to the ground, or released to the Clinch River in a controlled manner according to the terms of the NPDES permit. This permit would be obtained prior to any building activities at the site.	Stormwater runoff from the CRN Site is controlled via engineered structures, collected in engineered stormwater retention ponds, and infiltrated to the ground, or released to the Reservoir in a controlled manner. Two additional stormwater retention ponds would be constructed.
Water Use and Quality	No dredging during building would occur.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	Underwater excavation for construction of the intake and discharge structures would use BMPs to limit disturbance of sediments according to applicable regulations, including procedures of the Watts Bar Interagency Agreement Working Group.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	Underwater excavation material would be sampled and characterized for contamination, and disposed of according to applicable regulations.	New information is updated from that previously included in the ESP EIS.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Water Use and Quality	Engineering control measures (e.g., grouting of fractures) would be used during construction to limit the rate of excavation dewatering required.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	Excavation dewatering required would be similar to the CRBRP experience: the rate would be low. Monitoring would be carried out to evaluate the effect of dewatering on the surrounding groundwater and any nearby surface waterbodies, including wetlands.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	Dewatering flows would be routed to one of the stormwater retention ponds.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	Construction of a Melton Hill Dam bypass capable of providing 400 cfs of continuous discharge from the dam would be constructed at the site. Construction of the bypass would be conducted with appropriate engineering controls to avoid water quality impacts.	There are no building activities associated with the Melton Hill Dam.
Water Use and Quality	Installation of the underground 69 kV transmission line would be conducted with minor localized and temporary effects on streams traversed.	The proposed underground 69 kV transmission development project is not necessary to support operation of CRN-1 and is not included as part of the building of CRN-1.
Water Use and Quality	Construction water would be obtained from the City of Oak Ridge and would not exceed 231,660 gpd. Any upgrades to existing infrastructure would conform to applicable local, State, and Federal permits.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	Surface water would be obtained directly from the Clinch River for dust suppression and other building purposes and would not exceed 5,000 gpd.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	No groundwater would be used during construction.	No new information.
Water Use and Quality	Makeup water for a new plant's circulating- water system would be obtained from the Clinch River arm of the Watts Bar Reservoir.	Makeup water for the system is drawn from the Reservoir through an intake structure and pumped into the cooling-tower basin.
Water Use and Quality	Net water demand in the Clinch River basin, including consumptive water use of a plant at the CRN Site would not exceed the demand projections used in the development of the current reservoir operations policy.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	No groundwater would be used during operations.	No new information.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Water Use and Quality	No dredging during operation would occur	No new information.
Water Use and Quality	The Melton Hill Dam bypass would operate continuously during plant operations	There are no building activities associated with the Melton Hill Dam.
Water Use and Quality	Plant discharge would be in compliance with terms and conditions of the NPDES permit.	New information is updated from that previously included in the ESP EIS.
Water Use and Quality	Design and construction of the holding pond would preclude groundwater contamination during site operations.	No new information.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	The CRN Site would total 935 ac. The BTA would total 203 ac.	No new information. Table 2.4-1 identifies the CRN Site total as 935.3 ac and the BTA as 202.5 ac. Updates to the NLCD Land Cover/Land Use Categories for the CRN Site and Surrounding Areas result in changes to habitat areas.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	An estimated 494 ac of the existing 935 ac CRN Site and an estimated 45 ac of the existing 203 ac BTA would be affected by the construction of two or more SMRs.	An estimated 481.4 ac of the existing CRN Site and an estimated 24.6 ac of the existing BTA would be affected by construction of CRN-1.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	The CRN Site and BTA construction footprint would generally be as shown in Figure 4.3.1 in the ER.	The CRN Site, BTA, and associated 161 kV transmission corridor are shown in Figure 2-2.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	Permanent disturbance would occur on approximately 327 ac, and temporary disturbance would occur on approximately 167 ac on the CRN Site.	Permanent disturbance will occur on approximately 466.7 ac, and temporary disturbance will occur on approximately 14.6 ac on the CRN Site.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	Permanent disturbance would occur on approximately 30 ac, and temporary disturbance would occur on approximately 15 ac on the BTA.	Permanent disturbance will occur on approximately 21.8 ac, and temporary disturbance will occur on approximately 2.9 ac on the BTA.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	Disturbance for the buried 69 kV transmission line, extending from the CRN Site to the Bethel Valley Substation would occur only within the corridor of an existing 500 kV transmission line.	The proposed underground 69 kV transmission development project is not necessary to support operation of CRN-1 and is not included as part of the building of CRN-1.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	Disturbance of wetland habitat would total an estimated 1.8 ac on the CRN Site and BTA.	Table 4.3-2, the total area of impact from building activities on Wetlands in the CRN Site is 9.2 ac, 1.7 ac in the BTA, and approx. 3.6 ac within the 161 kV TL corridor.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	Mechanical draft cooling towers approximately 65 ft in height or less would be used to cool the SMRs.	The vertical height above finished grade of mechanical draft cooling towers associated with the cooling-water systems is approximately 64 ft.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	TVA would propose use only of those borrow pits (without expansion) that were presented in the ESP application.	New information is updated from that previously included in the ESP EIS.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	TVA would comply with all required wetland mitigation measures determined for jurisdictional wetlands that could be affected by the building and operating at the CRN Site.	TVA will implement a wetland and stream mitigation plan in accordance with USACE and TDEC requirements. To compensate for unavoidable impacts to WOTUS and/or TDEC regulated waters, including wetlands, TVA will provide compensatory mitigation in accordance with USACE and TDEC requirements.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	TVA would follow the State of Tennessee BMPs and TVA BMPs and when working in wetlands.	TVA would follow the State of Tennessee BMPs and TVA BMPs when working in wetlands.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	Temporarily affected areas would be revegetated or otherwise restored after construction using native or noninvasive plant species.	TVA will implement sustainability measures during building of CRN-1 to include development of pollinator habitats and other sustainable development and land management policies in association with a site biodiversity plan in accordance with TVA's Biodiversity Policy.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	The potential impacts on federally listed threatened and endangered terrestrial species and designated critical habitats are documented in the NRC's BA in Appendix M. However, the FWS concluded that this ESP does not require further ESA Section 7 consultation. The NRC would update its BA as part of consultation conducted in connection with the NRC's review of any future COL or CP application that references a CRN Site ESP.	Conservation measures, including removal of up to 250 ac of trees in winter (November 15–March 31) to avoid nesting and roosting wildlife and installation of artificial bat roosting structures, would be implemented to minimize adverse impacts to bats. Additional avoidance and minimization measures would reduce or eliminate the potential for drilling and blasting to impact bats roosting in caves. Consultation under Section 7(a)(2) of the ESA is underway regarding potential impacts to federally listed bats for construction and operation activities. Potential impacts to federally listed tree-roosting bats alongside existing corridors were addressed in TVA's programmatic consultation with the USFWS on routine actions and federally listed bats in accordance with ESA Section 7(a)(2), originally completed in April 2018 and updated in May 2023. For those activities with potential to affect federally listed bats, TVA committed to implementing specific conservation measures.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	Any offsite transmission line upgrades proposed by TVA would be limited to the existing rights-of-way of the transmission lines presented in the ESP application.	It is not currently possible to determine whether uprating, reconductoring, or other activities beyond the first transmission line interconnect are part of routine maintenance and upgrade activities for the regional power transmission system or a direct downstream effect resulting from the construction and operation of CRN-1.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	Any ground disturbance from the offsite transmission line upgrades would not encroach into land outside of the existing rights-of-way.	It is not currently possible to determine whether uprating, reconductoring, or other activities beyond the first transmission line interconnect are part of routine maintenance and upgrade activities for the regional power transmission system or a direct downstream effect resulting from the construction and operation of CRN-1.
Terrestrial Ecology—Clinch River Site, Barge/Traffic Area, 69 kV Buried Transmission Line	TVA would prevent or minimize to the extent practicable impacts to forests, wetlands, or sensitive biota due to ground disturbance resulting from the offsite transmission line upgrades by using established BMPs.	It is not currently possible to determine whether uprating, reconductoring, or other activities beyond the first transmission line interconnect are part of routine maintenance and upgrade activities for the regional power transmission system or a direct downstream effect resulting from the construction and operation of CRN-1.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Aquatic Ecology	Onsite and offsite descriptions of aquatic resources for the CRN Site, consistent with NUREG-1555, would be as provided in ER Sections 2.4.2.1 and 2.4.2.2.	Onsite and offsite descriptions of aquatic resources have been updated.
Aquatic Ecology	Important aquatic species would be the ones discussed in Section 2.4.2.3 of the ER.	Important and other aquatic species are discussed.
Aquatic Ecology	The potential impacts on federally listed threatened and endangered aquatic species and designated critical habitats are documented in the NRC's BA in Appendix M. However, the FWS concluded that this ESP does not require further ESA Section 7 consultation. The NRC would update its BA as part of consultation conducted in connection with the NRC's review of any future COL or CP application that references a CRN Site ESP.	New information is updated from that previously included in the ESP EIS.
Aquatic Ecology	Building activities that could directly affect onsite and offsite aquatic ecosystems would include site preparation for installation of plant structures and the barge-unloading facility in the barge transport area; and installing the cooling-water system intake and discharge structures. This includes the use of BMPs including silt-curtains and cofferdams as appropriate. Shoreline installation and site preparation activities would require a stormwater pollution prevention plan, developed as part of the TDEC stormwater permit, which would describe BMPs to control sedimentation and erosion and provide stormwater management. In-water building activities would comply with the terms and conditions included in the Department of the Army permit issued by the USACE and the TDEC Aquatic Resource Alteration Permit and the NPDES Construction Stormwater Permit requirements.	Mitigative measures required by TDEC and USACE guidelines will be used to minimize impacts to streams and ponds onsite and in associated offsite areas.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Aquatic Ecology	TVA would comply with all required mitigation measures determined for jurisdictional streams that could be affected by building and operating at the CRN Site. TVA has committed to restoring any disturbance to streams immediately after work is completed. It is expected that the USACE would require TVA to restore surface disturbances to jurisdictional streams as part of any Department of the Army permit issued under the Clean Water Act.	New information is updated from that previously included in the ESP EIS.
Aquatic Ecology	One perennial stream (S01), six ephemeral streams/WWCs; C01, C02, C03, C13, C14, C15), and two freshwater ponds (P04 and P06) lie within the TVA's estimated construction footprint. Building activities in the vicinity of the intake would result in the loss of these waterbodies including the entire 925 ft channel composing Stream S01. Five additional ephemeral streams located in the northeast section of the CRN Site (C04, C05, C06, C07, and C08) may be temporarily disturbed and then restored. Within the BTA, two intermittent streams (S09 and S10) and six ephemeral streams (C26, C27, C28, C29, C30, and C31) would be affected by building improvements related to Bear Creek Road, the CRN Site entrances, and development of a new intersection and access ramps on SR 58. Stream S10 and the six ephemeral streams would be permanently altered through grading and filling as part of the road development.	The proposed action results in permanent impacts to: • 0.65 ac of three ponds (P01, P02, and P04) • 3,586 linear ft of 11 perennial/intermittent streams (STR03, STR04, STR05, STR06, STR07, STR08, STR09, STR10, STR11, STR12, and STR17) • 2,694 linear ft of eight WWCs (EPH02, EPH03, EPH04, EPH08, EPH09, EPH10, EPH18, and EPH19) Construction of CRN-1 results in temporary impacts to: • Three perennial/intermittent streams (STR01, STR03, STR04) totaling 101 linear ft, and three WWCs (EPH02, EPH04, EPH10) totaling 64 linear ft.
Aquatic Ecology	Building activities include burying a 69 kV underground transmission line in the existing 500 kV transmission line corridor where it crosses streams or creeks. TVA has indicated that preliminary plans include tunneling under the streams where practicable.	The proposed underground 69 kV transmission development project is not necessary to support operation of CRN-1 and is not included as part of the building of CRN-1.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Aquatic Ecology	A buffer of undisturbed riparian forest vegetation would be left between disturbed lands and the river to assist in prevention of erosion and sedimentation, and would provide shaded aquatic habitats.	No new information
Aquatic Ecology	BMPs would be used during uprating, reconductoring, and rebuilding of offsite overhead transmission line segments to prevent or minimize impacts on aquatic habitats.	No new information
Aquatic Ecology	The location, design, construction, and capacity of the cooling-water intake structure would reflect the best technology available for minimizing environmental impacts and would be compliant with U.S. Environmental Protection Agency 316(b) Phase I requirements (40 CFR Part 125-TN254).	CRN-1 intake structure designs comply with the CWA 316(b) regulations. The maximum through-screen velocity is maintained at less than 0.5 ft per second per the requirements of the CWA.
Aquatic Ecology	Thermal discharge would be regulated as part of an NPDES permit administered by TDEC.	TVA will work with TDEC throughout the NPDES permitting process to establish appropriate permit conditions to support operation of CRN-1 to minimize impacts of the thermal discharge on the Reservoir.
Aquatic Ecology	The planned 400 cfs Melton Hill Dam bypass would be functioning during plant operations.	There are no building activities associated with the Melton Hill Dam.
Aquatic Ecology	Maintenance of upgraded overhead transmission lines would be in accordance with TVA guidance for environmental protection and BMPs.	New information is updated from that previously included in the ESP EIS.
Socioeconomics	Construction materials would be shipped to the CRN Site and construction debris and associated waste not placed in the onsite disposal pit would be removed from the site via road, rail, and/or barge. A portion of Bear Creek Road and access to the Rail Offload Area would be modified to handle heavy-haul traffic. The CRN Site Access Road would also be modified to handle heavy-haul traffic into the CRN Site. River Road would be improved to handle regular patrol traffic.	TVA anticipates making improvements to the existing Department of Energy former K-25 Barge Loading Area, near Bear Creek Road between Tennessee SR 58 and the CRN Site entrance, for deliveries of equipment and materials. CRN-1 activities will include expanding the barge facility by approximately 5 ac on the northwest to northeast sides of the existing facility. Refurbishment of the K-25 barge facility may include improvements such as reducing the height of the sheet pile wall; vegetation clearing; grubbing and grading; replacement of a culvert; limited placement of fill, widening, and resurfacing of the haul path; addition of tie off points for the barge; and installation of temporary support of overhead lines. Tree removal may be required. No in-water work is anticipated.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Socioeconomics	Definition of the affected demographic and economic regions would be those suggested in the ER. The review team relied upon American Community Survey 2011–2015 5-year data for most demographic statistics and for the analyses of potential impacts. Populations projections would be based on information from the State of Tennessee.	New information is updated from that previously included in the ESP EIS.
Socioeconomics	Site preparation and construction activities would continue for approximately 6 years and would employ as many as 3,300 construction workers. During concurrent building of a unit and operation of another, the total workers would be 3,666 people. TVA would employ up to 500 operations and 1,000 outage workers. Of the maximum workforce employed across all shifts, the maximum number of workers onsite at one time would be 2,200, as indicated in the plant parameter envelope.	New information is updated from that previously included in the ESP EIS.
Socioeconomics	The in-migrating building and operations workforce would be distributed geographically in a manner similar to the existing Oak Ridge Reservation workforce.	New information is updated from that previously included in the ESP EIS.
Socioeconomics	Traffic impacts would be based on the AECOM Technical Services Inc. traffic impact analysis (AECOM 2015-TN5000).	New information is updated from that previously included in the ESP EIS.
Socioeconomics	The household size for in-migrating workers would be 2.53 persons	New information is updated from that previously included in the ESP EIS.
Socioeconomics	TVA would construct two or more SMRs with the combined capacity listed in the PPE (800 MW(e)). The cost of reactors would be $5,183–7,256 per kW(e) in 2016 dollars (used the Bureau of Economic Analysis' Regional Input-Output Modeling System II multipliers for indirect workforce).	TVA's current cost estimates for the manufacturing and building of CRN-1 are based on the results of a DOE report which concludes that as of 2023, overnight capital costs for first of a kind advanced nuclear power plants are estimated to range from approximately $6,000 to $10,000 per kWe. Applying this range of potential costs per kWe to CRN-1, which has a nominal power output of 300 MWe, results in an estimated cost of approximately $1.8 to $3.0 billion.
Socioeconomics	Construction worker annual income would be $40,920 and operations worker income would be $65,520.	New information is updated from that previously included in the ESP EIS.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Socioeconomics	Aesthetic impacts would include 160-ft-tall SMR buildings and mechanical draft cooling towers and associated plumes.	New information is updated from that previously included in the ESP EIS. Updated aesthetic impacts from associated offsite 161 kV transmission line.
Socioeconomics	Water and wastewater services would be 145 and 75 gpd, respectively.	Parameter not considered in the analysis for CRN-1.
Socioeconomics	All construction and operations noise would be sufficiently attenuated by TVA's identified mitigation and the physical properties (i.e., topography, foliage, etc.) of the area to reduce the overall noise levels to below the NRC threshold for minor impacts (65 dBA).	New information is updated from that previously included in the ESP EIS.
Socioeconomics	American Community Survey 2011–2015 5-year data were used as the baseline for the analyses of potential impacts. Minority and low- income populations would continue to exist in the same proportions and locations as populations increase.	New information is updated from that previously included in the ESP EIS.
Socioeconomics	Field reconnaissance did not reveal evidence of any special populations or subsistence activities in close proximity to the CRN Site.	No new information
Historic and Cultural Resources	TVA has executed a PA in accordance with 36 CFR Part 800 (TN513) that outlines how TVA would avoid, minimize, or mitigate impacts on historic and cultural resources from preconstruction and construction activities within the onsite and offsite direct- and indirect-effects APE. The PA also outlines a process for TVA to amend the APE as project plans are finalized for the COL application. Included in this process are the steps TVA would take to identify, evaluate, and mitigate newly identified significant historic and cultural resources as well as inadvertent discoveries. Notification and consultation with THC and Indian Tribes are also stipulated for these steps. TVA has committed to keeping the NRC informed of updates concerning its NHPA Section 106 consultation (TVA 2017-TN4922). It is expected that as part of its COL application, TVA would have implemented its PA which commits	No new information

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
	them to following the NHPA Section 106 compliance process in consultation with the Tennessee Historical Commission and Tribes for building-related activities within the direct and indirect APEs at the CRN Site (NRC 2018-TN5844).	
Historic and Cultural Resources	During the course of the NRC's NHPA Section 106 consultation for the ESP, Indian Tribes provided comments on TVA's undertaking, cultural resource survey reports, and its PA. These comments were captured at a high level in Section 2.7.4 for the purposes of documenting the results of NRC's NHPA Section 106 consultation for the ESP as part of the administrative record. Most comments provided by Tribes and the THC are pertinent to TVA's undertaking and do not apply to NRC's current undertaking associated with the ESP. The NRC provided these comments to TVA because they are pertinent to TVA's undertaking and its ongoing NHPA Section 106 consultation considerations. It is expected that prior to its COL application, TVA will have resolved and addressed any ongoing concerns raised by consulting parties including American Indian Tribes (NRC 2018-TN5844).	In addition to the 2016 Clinch River SMR PA governing construction activities, TVA executed a Programmatic Agreement in 2019 Among the Tennessee Valley Authority, the Advisory Council on Historic Preservation, and the State Historic Preservation Officers of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia, and federally recognized Indian Tribes, Regarding Undertakings Subject to Section 106 of the National Historic Preservation Act of 1966. Under the 2019 Valleywide Section 106 PA TVA will avoid, minimize, or mitigate potential operation-related impacts. Additionally, the NRC staff performed its own consultation with the Tennessee Historical Commission and federally recognized Indian Tribes.
Historic and Cultural Resources	It is expected that the USACE would be a cooperating agency on the COL EIS. The USACE will defer its Section 106 NHPA consultation until the COL stage of the application process and will define its permit area at that time.	No new information
Historic and Cultural Resources	To avoid and minimize unintentional impacts on historic and cultural resources from operation and maintenance activities, TVA would follow appropriate Federal historic and cultural resource protection requirements (i.e., NHPA; 54 U.S.C. § 300101 et seq. [TN4157]), Archaeological Resources Protection Act (16 U.S.C. § 470aa et seq. [TN1687]), Native American Graves Protection and Repatriation Act (25 U.S.C. § 3001 et seq. [TN1686]), and Archeological and Historic Preservation Act (54 U.S.C. § 312501 et seq. [TN4844]), American Indian Religious	As project plans are finalized, the number of historic and cultural resources impacted by construction could change and would be addressed in accordance with the 2016 Clinch River SMR PA. For any potentially eligible or undetermined sites that would be physically affected by building CRN-1, TVA will follow the stipulations of the 2016 Clinch River SMR PA and the 2019 Valleywide Section 106 PA with the Tennessee Historical Commission and would consult with all affiliated Indian Tribes that have historic interest to the proposed project area (TVA 2025-TN12285). Additionally, the 2016 Clinch River SMR PA stipulates the steps that

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
	Freedom Act (42 U.S.C. § 1996 et seq. [TN5281]), EO 13007 “Indian Sacred Sites” (TN5250), and EO 13175 “Consultation and Coordination with Indian Tribal Governments” (TN4846). These laws also require TVA to notify the THC and American Indian Tribes in the event of inadvertent discovery of human remains or historic and cultural resources. These requirements would also apply to the COL application.	TVA will take to make any needed changes to the APE as project plans develop; identify historic properties in the APE; evaluate the project’s potential effects on historic properties; and seek ways to avoid, minimize, or mitigate adverse effects on historic properties.
Meteorology and Air Quality	Temporary emissions, including fugitive dust and construction equipment engine exhaust, would be minimized with a preconstruction and construction-related mitigation plan. These mitigation measures could include any or all of the measures identified in Section 4.5.2.	New information is updated from that previously included in the ESP EIS.
Meteorology and Air Quality	Meteorological data for the CRN Site are presented in the ER. The data from 2011 to 2013 are assumed to be representative.	New information is updated from that previously included in the ESP EIS.
Meteorology and Air Quality	Air emissions from the CRN Site would be bounded by those listed in EIS Sections 4.7, 5.7, 6.1.3, 6.3, and 7.6. Greenhouse gas emissions would be bounded by those in Appendix K over the life cycle of the facility	New information is updated from that previously included in the ESP EIS.
Meteorology and Air Quality	Auxiliary boilers and diesel generators and/or gas turbines are assumed to be required for a new nuclear power plant, and these devices would release permitted pollutants to the air. The ER describes the annual estimated emissions, and these emissions have been considered in EIS Table 5-3.	New information is updated from that previously included in the ESP EIS.
Meteorology and Air Quality	The normal heat sink that would be used to dissipate heat from the turbine cycle for a new nuclear power plant would use cooling towers to reject that heat directly into the atmosphere.	The CWS for CRN-1 provides cooling water to the main condenser and transfers heat from the condenser to the environment through the NHS. The CWS has two subsystems: the main condenser supply (CW) and the SW supply. The main condenser CW supply provides cooling water to the Main Condenser and Auxiliaries System during all modes of condenser heat removal. SW supplies cooling water to reject the heat loads from the PCW heat exchangers through the NHS. The SW supply provides cooling water to the PCW heat exchangers for all normal and off-normal operating modes.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Meteorology and Air Quality	Cooling towers would have drift eliminators comparable in effectiveness to the drift eliminators in current-generation cooling towers.	New information is updated from that previously included in the ESP EIS.
Meteorology and Air Quality	The maximum salt deposition rate from the two linear mechanical draft cooling towers was estimated to be 6,276 kg/km^2 per month and would occur at a distance of 100 m west of the towers.	New information is updated from that previously included in the ESP EIS.
Meteorology and Air Quality	A meteorological monitoring program would be re-established for the operational phase of the project. The monitoring program would be a similar to the meteorological monitoring program for the site preparation monitoring.	New information is updated from that previously included in the ESP EIS.
Nonradiological Human Health—CRN Site	The nearest sensitive receptor (residence) would be approximately 0.36 mi from the planned cooling-tower location.	New information is updated from that previously included in the ESP EIS.
Nonradiological Human Health—CRN Site	Nighttime construction activities would not exceed 65 dBA at the site boundary.	New information is updated from that previously included in the ESP EIS.
Nonradiological Human Health—CRN Site	The peak noise level would be 102 dBA measured from 50 ft from the source during construction. Peak noise levels during operations would be 70 dBA 1,000 ft from the source, and would be primarily from cooling- tower operation.	The peak noise level would be 101 dBA measured from 50 ft from the source during construction. Peak noise levels during operations would be 70 dBA 1,000 ft from the source, and would be primarily from cooling-tower operation.
Nonradiological Human Health—CRN Site	All construction and operations noise would be sufficiently attenuated by TVA's identified mitigation and the physical properties (i.e., topography, foliage, etc.) to levels below the NRC threshold for minor impacts (65 dBA) at the site boundary.	New information is updated from that previously included in the ESP EIS.
Nonradiological Human Health—CRN Site	Noise levels associated with blasting activities during construction are infrequent, temporary, and limited to daytime hours. Although this noise-producing activity is discussed in the Terrestrial Ecology sections, it is not appropriate for analysis with respect to human health.	New information is updated from that previously included in the ESP EIS.
Nonradioactive Waste	Water and wastewater services would be 100 gpm and 75 gpd, respectively.	Parameter not considered in the analysis for CRN-1.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Radiological Human Health	Radioactive waste-management systems would be designed to minimize releases from reactor operations to values as low as is reasonably achievable. These systems would be designed and maintained to meet the requirements of 10 CFR Part 20 (TN283) and Appendix I in 10 CFR Part 50 (TN249).	The radioactive waste-management systems are designed to restrict releases of radioactive materials in effluents to ALARA levels to meet the requirements of 10 CFR Parts 20 and 50, including the design objectives of 10 CFR Part 50 Appendix I.
Radiological Human Health	The expected single unit annual activities by isotope contained in the airborne effluent, liquid effluent, and solid radioactive waste streams generated during routine plant operations are based on the PPE approach, where bounding direct radiation and liquid and gaseous radiological effluents were used in the evaluation.	Table 3.2-3 provides the average normal liquid radioactive effluent activities for CRN-1. Values are given for both the ESP-006 PPE bounding analysis and CRN-1. The total projected annual release activity in liquid effluents for CRN-1 is 0.0995 Ci per year, which is less than 887 Ci/ year total activity in the ESP-006 PPE (Item 10.3.1). However, some isotopes are not bounded by the ESP-006 PPE analysis.
Radiological Human Health	The exposure pathways considered and the analytical methods used to estimate doses to the maximally exposed individual and to the population surrounding a new nuclear power plant are based on NRC Regulatory Guide 1.109, *Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I* (Rev.1, October 1977 [TN249]) (RG 1.109, NRC 1977-TN90), and NRC Regulatory Guide 1.111, Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors (Revision 1, July 1977) (RG 1.111, NRC 1977- TN91).	New information is updated from that previously included in the ESP EIS.
Radiological Human Health	ER Table 5.4-15 estimates the total body and organ doses to the maximally exposed individual from liquid effluents and gaseous releases per unit based on the PPE approach for analytical endpoints prescribed in 10 CFR Part 50, Appendix I (TN249).	New information is updated from that previously included in the ESP EIS.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Radiological Human Health	The estimated annual doses from all pathways for the CRN Site are summarized in ER Table 5.4-16. ER Table 5.4-16 compares these doses to the public dose criteria in 40 CFR Part 190 (TN739). TVA states that by demonstrating compliance with the requirements of 40 CFR Part 190 (TN739), it in turn demonstrates compliance with the requirements of 10 CFR 20.1301 (TN283).	New information is updated from that previously included in the ESP EIS.
Radiological Human Health	Because a specific reactor design has not been selected, the calculated construction worker direct doses are based on data available for the Westinghouse AP1000 PWR. Although thought to be bounding, it is possible that these dose rates would increase in the future as site conditions change. However, the site would be monitored continually during the construction period, and appropriate actions would be taken as necessary to ensure that the construction workers are protected from radiation.	During building of this single unit, there are no operating plants on or adjacent to the project site. Thus, construction workers are not exposed to radioactive materials or effluent from operating reactors at the site. At certain times during building, TVA would receive, possess, and use specific radioactive material in support of building. These sources of low- level radiation have very specific uses under controlled conditions. Therefore, these sources are expected to result in a negligible contribution to construction worker doses. Workers can be considered members of the public and are not subject to monitoring.
Radiological Human Health	The new nuclear power plant would release liquid effluents to the Clinch River arm of the Watts Bar Reservoir via the cooling-water discharge stream.	During normal operation, it is expected that processed water from the LWMS can be reused in the plant with no discharges to the environment. However, if the plant's overall water inventory does not allow for the water to be recycled (when the tank is full and there is no demand from systems using condensate storage tank), the filtered water can be discharged to the Reservoir through the diffuser.
Transportation of Radioactive Materials	Overall, the generating output of the SMRs at the CRN Site or alternative sites would be 800 MW(e) and the station capacity factor would be 90%.	New information is updated from that previously included in the ESP EIS.
Transportation of Radioactive Materials	Unirradiated fuel assemblies would be shipped to the CRN Site by truck only shortly before they would be needed.	New information is updated from that previously included in the ESP EIS.
Transportation of Radioactive Materials	Radioactive waste and spent fuel would be shipped from the CRN Site by truck only. The number of radioactive waste shipments was based on 2.34 m^3/shipment. The number of spent fuel shipments was based on 0.5 MTU/shipment.	New information is updated from that previously included in the ESP EIS.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Transportation of Radioactive Materials	The radionuclide inventory used in the transportation accident analysis was based on AP1000 reactor fuel.	New information is updated from that previously included in the ESP EIS.
Transportation of Radioactive Materials	The new nuclear power plant would have storage capacity exceeding that needed to accommodate 5-year cooling of irradiated fuel before transport offsite.	The fuel pool has sufficient capacity to store eight years of spent fuel and an additional full core offload. When necessary, spent fuel will be stored onsite in dry casks on an independent spent fuel storage installation.
Transportation of Radioactive Materials	The transportation impact analysis for the surrogate SMR spent fuel shipments assumed the radiation dose rate emitted from the shipments would be the maximum allowed by Federal Regulations.	New information is updated from that previously included in the ESP EIS.
Transportation of Radioactive Materials	It was assumed that shipping casks for the surrogate SMR spent fuel would provide equivalent mechanical and thermal protection of the spent fuel cargo (relative to the current LWR spent fuel shipping cask designs).	New information is updated from that previously included in the ESP EIS.
Transportation of Radioactive Materials	For this assessment, release fractions for current-generation LWR fuels were used to approximate the impacts from advanced reactor spent fuel shipments. This essentially assumes that the behavior of fuel materials and containment systems (e.g., cladding and fuel coatings) is similar to that of the current-generation LWR fuel under applied mechanical and thermal conditions.	New information is updated from that previously included in the ESP EIS.
Transportation of Radioactive Materials	The proposed geologic repository at Yucca Mountain was used as a surrogate destination for spent fuel shipments.	New information is updated from that previously included in the ESP EIS.
Transportation of Radioactive Materials	It was assumed that no shipments of unirradiated fuel, irradiated fuel, or radioactive waste would be made by barge or rail.	New information is updated from that previously included in the ESP EIS.
Transportation of Radioactive Materials	It was assumed that shipments of spent nuclear fuel would be shipped directly to a geologic repository. Shipment of spent nuclear fuel to an interim storage facility followed by shipment to a geologic repository was not analyzed.	New information is updated from that previously included in the ESP EIS.
Decommissioning	Impacts from decommissioning new reactor unit(s) designs are considered to be bounded by those in NUREG-0586, Supplement 1 (NRC 2002-TN665).	New information is updated from that previously included in the ESP EIS.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Nuclear Fuel Cycle and Fuel Storage	All of the SMR technologies considered have a design storage capacity for spent fuel pools of a minimum of 6 years, a period sufficient to accommodate a 5-year cooling period, as required in 10 CFR Part 961, Appendix E (TN300).	The fuel pool has sufficient capacity to store eight years of spent fuel and an additional full core offload. When necessary, spent fuel will be stored onsite in dry casks on an independent spent fuel storage installation.
Nuclear Fuel Cycle and Fuel Storage	After a sufficient decay period of at least 5 years, the fuel would be removed from the pool and packaged in spent fuel shipping/storage casks either for storage onsite at an ISFSI or for transportation offsite. Onsite storage would be licensed in accordance with 10 CFR Part 72 (TN4884), "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Waste, and Reactor-Related Greater than Class C Waste," and transferred either to an ISFSI facility onsite or an offsite disposal facility. Offsite transportation would be conducted in accordance with 49 CFR Part 173 (TN298), 49 CFR Part 178 (TN5160), and 10 CFR Part 71 (TN301).	The fuel pool has sufficient capacity to store eight years of spent fuel and an additional full core offload. When necessary, spent fuel will be stored onsite in dry casks on an independent spent fuel storage installation.
Accidents	The EAB is 0.21 mi in all directions from the effluent release boundary and encloses potential release points from the nuclear island. No major roads, public buildings, or residences are located within the exclusion area.	No new information
Accidents	Because TVA's ESP application does not rely on information based on an approved SMR design certification, the DBA analysis is based on a surrogate SMR and only applying a LOCA source term as a bounding calculation.	New information is updated from that previously included in the ESP EIS.
Accidents	The LOCA source term is based on the vendor design of the four SMR designs under consideration that resulted in the highest doses at both the EAB and the low-population zone boundary. The source term is based on uranium fuel enriched to no more than 5%, which is representative of the SMR designs under consideration, a maximum single unit power level of 800 MW(t), and a maximum average burnup of 51 GWD/MTU, while the maximum average burnup for the remaining SMR designs is less than 41 GWD/MTU.	New information is updated from that previously included in the ESP EIS.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Accidents	In accordance with RG 1.183 (NRC 2000-TN517), the DBA dose for the EAB is from the 2-hour period that yields the maximum dose.	New information is updated from that previously included in the ESP EIS.
Accidents	Population growth in the vicinity of the CRN Site would not alter the population distribution in the region.	New information is updated from that previously included in the ESP EIS.
Accidents	The severe accident source term was based on a ratio of the maximum PPE thermal power rating of 800 MW(t) to that of a large PWR previously analyzed.	CRN-1 has a maximum thermal power level of approximately 870 MWt, approximately 8.75% higher than the reactor considered in the previous severe accident analysis. New information is updated from that previously included ESP EIS. Severe accident analysis event sequences are selected based upon the Level 2 Probabilistic Risk Assessment. Results from the Level 2 Probabilistic Risk Assessment being developed will be submitted in a future OLA, which will include an update to this ER. The OLA ER will identify and evaluate severe accidents and their impacts.
Accidents	The severe accident risks are based on the assumption that 99.5% of the population evacuates within the 2 mi and 10 mi EPZs and the other 0.5% of the population does not evacuate. No evacuation is assumed to occur for the site boundary EPZ analysis.	Severe accident analysis event sequences are selected based upon the Level 2 Probabilistic Risk Assessment. Results from the Level 2 Probabilistic Risk Assessment being developed will be submitted in a future OLA, which will include an update to this ER. The OLA ER will identify and evaluate severe accidents and their impacts.
Accidents	The core damage frequencies are based on the largest SMR considered for the CRN Site based on proprietary vendor information provided to TVA.	Severe accident analysis event sequences are selected based upon the Level 2 Probabilistic Risk Assessment. Results from the Level 2 Probabilistic Risk Assessment being developed will be submitted in a future OLA, which will include an update to this ER. The OLA ER will identify and evaluate severe accidents and their impacts.
Accidents	To assess health risks from a severe accident, the projected population that resides within a 50 mi radius of the CRN Site in 2067 was assumed.	Severe accident analysis event sequences are selected based upon the Level 2 Probabilistic Risk Assessment. Results from the Level 2 Probabilistic Risk Assessment being developed will be submitted in a future OLA, which will include an update to this ER. The OLA ER will identify and evaluate severe accidents and their impacts.

Technical Area	ESP EIS Appendix Table J-2 Representations/ Assumptions	CP SEIS CRN-1 Representations/ Assumptions*,†
Accidents	The spent fuel pool would be constructed at or below grade level. The spent fuel pools have a design storage capacity of 1,800 spent fuel assemblies. This allows for a period sufficient to accommodate a 5-year radioactive decay time and cooling period, as required in 10 CFR Part 961, Appendix E (TN300). After a sufficient decay period of at least 5 years, the fuel would be removed from the pool and packaged in spent fuel shipping/storage casks either for storage onsite at an ISFSI or for transportation offsite.	The CRN-1 spent fuel pool is located in the reactor building. The reactor building is a Seismic Category 1 structure. The reactor building is designed as a vertical right cylinder shaft that mitigates the effects of external events including aircraft impact, adverse weather, flooding, fires, and earthquakes. The bottom of the BWRX-300 cask pit in the spent fuel pool is at grade; the top of the cask pit/bottom of the spent fuel pool is located 4.9 m above grade; and the top of the spent fuel pool is located 13 m above grade. While the location of the spent fuel pool is different from that of the four technologies reviewed in the ESP EIS, the BWRX-300 meets 10 CFR 50.150 and the seismic requirements for a safety-related Seismic Category I structure. In addition, requirements of 10 CFR 50.155(e) related to monitoring wide-range water level of the spent fuel pool are met. The fuel pool has sufficient capacity to store eight years of spent fuel and an additional full core offload. When necessary, spent fuel will be stored onsite in dry casks at an independent spent fuel storage installation.
Accidents	An appropriately sized ISFSI would be constructed and operational within 22 years from the commencement of operations. After a sufficient decay period of at least 5 years, the fuel would be removed from the pool and packaged in spent fuel shipping/storage casks either for storage onsite at an ISFSI or for transportation offsite.	No new information
System Design Alternatives	Water treatment alternatives for the circulating- water system were not described in the ER and not evaluated in the ESP EIS. Therefore, this issue is not resolved.	Water treatment is described.
Cumulative Impacts	The proposed nearby projects and activities that could have a cumulative effect on the construction or operation of a new nuclear power plant at the CRN Site are those identified in EIS Sections 2.12 and 7.0.	New information regarding reasonably foreseeable actions that could have impacts on the construction or operation of a new nuclear power plant at the CRN Site were updated.

ALARA = as low as is reasonably achievable; AP1000 = Advanced Passive 1000; APE = areas of potential effect; BA = biological assessment; BMP = best management practices; BTA = barge/traffic area; CFR = *Code of Federal Register*; COL = combined license; CP = construction permit; CPA = Construction Permit Application;

CRBRP = Clinch River Breeder Reactor Project; CRN = Clinch River Nuclear; CW = circulating water; CWA = Clean Water Act; CWS = cooling-water system; dBA = A-rated decibels; DBA = design-basis accident; DOE = U.S. Department of Energy; EAB = exclusion area boundary; EIS = environmental impact statement; EO = Executive Order; EPZ = emergency planning zones; ER = environmental report; ESP = early site permit; ESPA = Early Site Permit Application; FWS = U.S. Fish and Wildlife Service; HPA = Habitat Protection Area; ISFSI = independent spent fuel storage installation; LOCA = loss-of-coolant accident; LWMS = Liquid Waste-Management System; LWR = light water reactor; NHPA = National Historic Preservation Act; NHS = normal heat sink; NLCD = National Land Cover Database; NPDES = National Pollutant Discharge Elimination System; NRC = U.S. Nuclear Regulatory Commission; OLA = Operating License Application; PA = Programmatic Agreement; PCW = plant cooling water; PPE = Plant Parameter Envelope; PWR = pressurized water reactor; RFA = reasonably foreseeable future actions; SEIS = supplemental environmental impact statement; SMR = small modular reactor; SR = State Route; SW = service water; TDEC = Tennessee Department of Environment and Conservation; THC = Tennessee Historical Commission; TNSHPO = Tennessee State Historic Preservation Office; TVA = Tennessee Valley Authority; USACE = U.S. Army Corps of Engineers; U.S.C. = *U.S. Code*; WWC = wet-weather conveyances.
* Source: CP ER (TVA 2025-TN11927).
† New information is described in Chapter 3 of this SEIS.

Table H-2 Issues Not Resolved in the Early Site Permit or Construction Permit Proceeding for the Clinch Nuclear River Site That Will Need to be Addressed in the Operating License Application Stage

Issue	Description of Issue
Severe Accident Mitigation Alternatives	Not required to be addressed in an ESP application per 10 CFR 51.50(b)(2) because this is a benefit-cost evaluation. Not addressed in the CP SEIS.
Decommissioning Financial Requirements	At the time of application submittal, NRC regulations (10 CFR 70.75) require certification that financial assurance for radiological decommissioning would be provided. Not addressed in the CP SEIS.
Benefits and Costs (including Need for Power-Operational Costs)	Not required to be addressed in an ESP application per 10 CFR 51.50(b)(2). Not addressed in the CP SEIS.
Water and Wastewater Services	Not addressed in the CP SEIS.

CFR = *Code of Federal Regulations*; EIS = environmental impact statement; ER = environmental report; ESP = early site permit; ESPA = early site permit application; EIS = environmental impact statement; NRC = U.S. Nuclear Regulatory Commission; OL = operating license.

H.1 References

10 CFR Part 20. *Code of Federal Regulations*, Title 10, *Energy*, Part 20, “Standards for Protection Against Radiation.” TN283.

10 CFR Part 50. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, “Domestic Licensing of Production and Utilization Facilities.” TN249.

10 CFR Part 71. *Code of Federal Regulations*, Title 10, *Energy*, Part 71, “Packaging and Transportation of Radioactive Material.” TN301.

10 CFR Part 72. *Code of Federal Regulations*, Title 10, *Energy*, Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste.” TN4884.

10 CFR Part 961. *Code of Federal Regulations*, Title 10, *Energy*, Part 961, “Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste.” TN300.

36 CFR Part 800. *Code of Federal Regulations*, Title 36, *Parks, Forests, and Public Property*, Part 800, “Protection of Historic Properties.” TN513.

40 CFR Part 125. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 125, “Criteria and Standards for the National Pollutant Discharge Elimination System.” TN254.

40 CFR Part 190. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 190, “Environmental Radiation Protection Standards for Nuclear Power Operations.” TN739.

49 CFR Part 173. *Code of Federal Regulations*, Title 49, *Transportation*, Part 173, “Shippers—General Requirements for Shipments and Packagings.” TN298.

49 CFR Part 178. *Code of Federal Regulations*, Title 49, *Transportation*, Part 178, “Specifications for Packagings.” TN5160.

61 FR 26771. May 24, 1996. “Executive Order 13007 of May 24, 1996: Indian Sacred Sites.” *Federal Register*, Office of the President. TN5250.

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Archaeological Resources Protection Act of 1979, as amended. 54 U.S.C. § 302101 et seq. TN1687.

Archeological and Historic Preservation Act of 1974, as amended. 54 U.S.C. § 312501 et seq. TN4844.

National Historic Preservation Act. 54 U.S.C. § 300101 et seq. TN4157.

Native American Graves Protection and Repatriation Act. 25 U.S.C. § 3001 et seq. TN1686.

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NRC (U.S. Nuclear Regulatory Commission). 1977. *Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors.* Regulatory Guide 1.111*,* Revision 1, Washington, D.C. ADAMS Accession No. ML003740354. TN91.

NRC (U.S. Nuclear Regulatory Commission). 2000. *Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors.* Regulatory Guide 1.183, Washington, D.C. ADAMS Accession No. ML003716792. TN517.

NRC (U.S. Nuclear Regulatory Commission). 2002. "Final Generic Environmental Impact Statement of Decommissioning of Nuclear Facilities (NUREG-0586)." NUREG–0586, Supplement 1, Volumes 1 and 2, Washington, D.C. ADAMS Accession Nos. ML023470327, ML023500228. TN665.

NRC (U.S. Nuclear Regulatory Commission). 2000, 2007. *Environmental Standard Review Plan—Standard Review Plans for Environmental Reviews for Nuclear Power Plants*. NUREG–1555, Main Report and 2007 Revisions, Washington, D.C. Available at https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1555/toc/index.html and https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1555/updates.html. TN614.

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TVA (Tennessee Valley Authority). 2017. Letter from J.W. Shea to NRC, dated August 1, 2017, regarding "Submittal of Supplemental Information Related to the Environmental Audit in Support of Early Site Permit Application for Clinch River Nuclear Site." CNL-17-097, Chattanooga, Tennessee. ADAMS Accession No. ML17234A003. TN4922.

TVA (Tennessee Valley Authority). 2025. Letter from S.W. Hunnewell, Vice President, New Nuclear Program, to NRC Document Control Desk, dated April 28, 2025, regarding "Clinch River Project NRC Docket No. 99902056, Submittal of the Environmental Report in Support of the Clinch River Nuclear Site Construction Permit Application." Chattanooga, Tennessee. ADAMS Accession No. ML25118A209. TN11927.