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NEW CALEDONIA GAS PLANT PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT
Lowndes County, Mississippi

Prepared by:
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SUMMARY

Introduction

The entire utility industry is undergoing a transition as it faces the need to lower carbon emissions, address aging infrastructure, and meet load growth driven by development and electrification. The Tennessee Valley Authority (TVA) continues to build the energy system of the future to achieve carbon reductions, while not compromising the goal of maintaining low electric rates and the high reliability that sustains the communities we serve and is critical to achieving economy-wide decarbonization. The possible construction and operation of the approximately 500-megawatt (MW) simple cycle frame combustion turbine (CT) facility at the New Caledonia Gas (NCG) Site is one piece of the larger decarbonization effort that TVA is undergoing. The NCG Site is a former CT facility, originally constructed in 1998 and operated for several years by a private company. The company dismantled the site in 2007, removing the existing six frame CTs. TVA is a leader in clean energy, operating one of the largest, most diverse, and cleanest energy systems in the nation, with more than half its energy supply in 2022 coming from clean energy sources. TVA has reduced carbon emissions by roughly 60 percent against the 2005 benchmark and is continuing to pursue opportunities for progress incorporating clean energy generation to achieve the carbon reduction goals identified in TVA's Strategic Intent and Guiding Principles document (TVA 2021).

The transition to a clean energy economy is a generational transition requiring the development, refinement, and installation/operation of technologies and generating sources that can contribute to TVA's ability to meet system-wide generation demands. The role and contribution to system-wide generating capacity by these technologies/generating sources are likely to change over time or be replaced by newer technologies. Natural gas is one example of a generating source whose role and contributions to meeting TVA's annual generation demands will change over time. TVA is targeting 10,000 MW of solar in place by 2035 and is continuing to expand its solar and carbon-free commitments through procurement methods such as requests for proposals, while exploring opportunities at existing TVA sites and working with solar developers. Beyond targeting for 10,000 MW of solar, TVA continues to work with long-term Local Power Company (LPC) customers to deploy additional solar through the Flexibility option under TVA's Long-Term Agreement with each individual LPC customer.

Inclusion of natural gas-fired CTs and combined cycle (CC) units in the target power supply mix is driven by the demand for reliable electricity, the increased amount of solar penetration, system dispatchable capacity requirements, commodity prices, costs relative to alternative resource options, and transmission system reliability. Natural gas-fired CT or CC units can be operated year-round to meet the fluctuating demand on the power system, including overnight, during cold pre-dawn winter mornings, and during warm summer evenings as solar generation fades. The inclusion of dispatchable power generation from natural gas-fired CTs and CCs effectively enables systemwide integration of solar while providing critical transmission-related benefits to ensure reliability, resiliency, and power quality. (TVA 2019a).

TVA is proposing to construct and operate an approximately 500 MW dual fuel CT facility (NCG Plant; proposed project) at the same location as the previous generating facility, utilizing existing natural gas and transmission infrastructure. The project area for the Proposed Action includes the entire 63-acre NCG Site as well as the adjacent 82-acre Lowndes County 500-kV Substation Site and totals approximately 145 acres. TVA prepared this Environmental Impact

Statement (EIS) to evaluate the environmental and social effects of the proposed construction and operation of the CT facility and related upgrades to the transmission system and natural gas pipeline interconnection at the NCG Site in Lowndes County, Mississippi. This EIS evaluates two alternatives: the No Action Alternative and the Proposed Action Alternative. The Proposed Action aligns with TVA's strategic goals and recommendations from the 2019 Integrated Resource Plan (IRP) to enhance system flexibility.

Summary of the Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to support continued load growth within the TVA Service Territory in a way that is consistent with the recommendations in the 2019 IRP (TVA 2019a) and to meet the demand for electricity while facilitating the integration of renewables onto the electric grid, thereby advancing TVA's decarbonization goals. The 2019 IRP recommended the addition of up to 5,200 MW of CTs by 2028 and up to 8,600 MW by 2038 to accommodate load growth. CTs are needed to provide dispatchable generation capacity to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, planning reserve margin targets, and comply with the requirement under the TVA Act that power be sold at rates as low as feasible.

The Proposed Action aligns with the 2019 IRP, which guides future generation planning consistent with least-cost planning principles. The addition of CT units to the fleet was recommended to enhance system flexibility to integrate renewables and distributed resources. As the amount of solar generation in the TVA generation portfolio continues to increase, the flexibility of the remainder of the fleet becomes even more important.

No Action Alternative

Under the No Action Alternative, TVA would not construct a simple cycle frame CT facility at the New Caledonia site. TVA would not make related upgrades to the transmission system to interconnect the generation and actions related to upgrading the natural gas pipeline interconnection would not be completed. This alternative does not meet the purpose and need of TVA's Proposed Action; however, it is included in this evaluation as it represents current baseline conditions against which the action alternative will be compared.

Preferred Alternative

TVA's Preferred Alternative is the Action Alternative. Under the Action Alternative, TVA would construct an approximately 500 MW dual fuel, simple cycle frame CT facility on an approximately 63-acre previously developed parcel of TVA property in Lowndes County, Mississippi. This alternative would include upgrades to the existing gas infrastructure to connect the CT facility to an existing gas pipeline and the transmission upgrades to interconnect the generation to the power system. The Action Alternative aims to address the identified needs for additional capacity and reliability in the power generation system.

Summary of the Preferred Alternative

The following is a summary of affected resources associated with the Action Alternative. A summary level comparison of the two alternatives is provided in Section 2.2, and detailed information about the affected environment and environmental consequences associated with the two alternatives for each resource area is contained within Chapter 3.

Floodplains

Affected Environment

Based on topographic maps and the Lowndes County, Mississippi, Flood Insurance Rate Map panel number 28087C0075K, effective 2/18/2011, the proposed project would involve property that is outside identified 100-year floodplains (FEMA 2011). Additionally, the elevation tool in the TVA egis web viewer indicates that the elevation of the unnamed tributary of Howard Creek west of the project area is about 320 feet mean sea level (msl), and the elevation of Cooper Creek east of the project area is about 270 feet msl. The elevations of the substation and the former private CT facility are about 344 feet and 350 feet, respectively. The project area is, therefore, at least 24 feet higher than the tributary of Howard Creek and at least 74 feet higher than Cooper Creek, which is well outside 500-year floodplains.

Environmental Consequences

The project area is located outside of the 100-year and 500-year floodplains. Therefore, the Action Alternative would have no impacts to floodplains and would be consistent with Executive Order (EO) 11998 and EO 13690.

Air Quality

Affected Environment

The NCG Site is in Lowndes County, Mississippi, which is an area designated as in attainment / unclassifiable with the National Ambient Air Quality Standards (NAAQS) for all pollutants (United States [U.S.] Environmental Protection Agency [EPA] 2024a). Additionally, it is not classified as being in maintenance for any pollutants.

Environmental Consequences

Construction of the NCG Plant would have temporary, localized, and minor effects on air quality associated with emissions from onsite vehicles and equipment, as well as generation of fugitive dust. Operation of the NCG Plant would result in an incremental increase in emissions as measured against the current baseline. These emissions would be monitored and would comply with permit limits, and would not cause exceedance or violation of applicable NAAQS.

Climate Change, Greenhouse Gases, and Social Cost of Greenhouse Gases

Affected Environment

Climate change is a global issue that results from several factors, including, but not limited to, the release of greenhouse gases (GHGs), land use management practices, and the albedo effect, or reflectivity of various surfaces (including reflectivity of clouds). Estimates of GHG emissions are usually reported in terms of carbon dioxide equivalents (CO_2e) to account for the relative global warming potential (GWP), i.e., a given pollutant's ability to trap heat. GWP is calculated over a specific time, typically 100 years. In 2022, U.S. GHG emissions totaled 6,341.2 million metric tons of CO_2e and 5,487.0 million metric tons of CO_2e after accounting for sequestration from the land sector (EPA 2024f).

Environmental Consequences

Specific to the proposed project, GHGs are produced and emitted by various sources during the development and operational phases of power generation facilities. Construction of the NCG Plant would generate short-term, temporary GHG emissions from the combustion of gasoline and diesel fuels by vehicles, generators, and other construction equipment. Such emission levels are expected to be de minimis in comparison to the regional and worldwide volumes of GHG. Direct CO_2e emissions are calculated as the sum of the six individual GHGs, with applicable global warming potentials applied. The operation of the project would result in a maximum direct increase of 531,728 metric tons of CO_2e per year based on an assumed maximum capacity factor of 20 percent. TVA expects to operate each CT at a lower capacity factor, such that annual CO_2e tons would be less than that amount. The predicted actual direct increase is 344,077 metric tons of CO_2e per year, which is based on an average capacity factor between 2014 and 2023 of 11.2 percent for natural gas combusting gas turbines (U.S. Energy Information Administration [USEIA] 2024). The construction and operation of the NCG Plant would be consistent with the requirements of the EPA regulating Green House Gas Pollution Standards.

Emissions of CO_2 from energy consumption are being used as an operational GHG emissions geographic comparison analysis, as that data is most readily available and consistent across state, U.S., and global data sources. Based on the most recent estimates of CO_2 emissions for Mississippi by the USEIA, total emissions of CO_2 for the state in 2020 were 28.8 million metric tons (USEIA 2024). The most recent total CO_2 emissions for the U.S. due to energy consumption were 4,576.3 million metric tons from USEIA data for 2020. (USEIA 2024b). The most recent total global CO_2 emissions due to energy consumption were 31,500 million metric tons from USEIA data for 2020 (USEIA 2024).

Therefore, assuming 2020 emissions provided the above rates for GHGs, the maximum net near-term increase in emissions of approximately 531,728 metric tons of CO_2/year associated with the operation of the NCG Plant would represent a direct increase of approximately 1.8 percent of total statewide emissions, approximately 0.01 percent of the total U.S. emissions, and 0.0017 percent of the total global GHG emissions.

Similarly, the predicted actual net near-term increase in emissions of approximately 344,077 metric tons of CO_2/year associated with the operation of the NCG Plant, would represent a direct increase of approximately 1.2 percent of total statewide emissions, approximately 0.008 percent of the total U.S. emissions, and 0.0011 percent of the total global GHG emissions.

The “social cost of carbon,” “social cost of nitrous oxide,” and “social cost of methane” (together, the “social cost of greenhouse gases” [SC-GHG]) is a concept intended to indicate the economic losses that result from emitting one extra ton of GHGs into the atmosphere at a specific point in time. The SC-GHGs calculated for the proposed project’s maximum direct and predicted actual direct lifetime emissions at three different annual discount rates are presented in Section 3.2.5 of this document. However, it is noted that when the project’s direct and indirect changes are considered in combination, the project is expected to reduce TVA’s GHG emissions by facilitating the integration of renewable generation.

Climate change is driven by atmospheric concentrations of GHGs. Therefore, when calculating the impacts a project would have on climate change, the analysis is correctly based on the net change in GHG emissions brought about by the proposed project. The net effect of the Action Alternative would be to reduce TVA’s system-wide GHG emissions by providing flexible, dispatchable generation that would enable the integration of renewable generation into the system, in alignment with the 2019 IRP (TVA 2019a).

Geology, Soils, and Prime Farmland

Affected Environment

The project area is located within the East Gulf Coastal Plain Physiographic Province of Mississippi. The East Gulf Coastal Plain is characterized by sandhills and longleaf pine-dominated uplands as well as pine flatwoods and savannas, seepage bogs, bottomland hardwood forests, barrier islands/dune systems, and estuaries. The project area is underlain by the Eutaw Formation, which formed during the Late Cretaceous Epoch (100.5 to 66 million years ago). The Eutaw Formation overlies the McShan Formation and underlies the Selma Group and consists dominantly of thinly laminated glauconitic sand and clay; however, small chert gravels may be present in basal beds, not recognized in counties to the north (U.S. Fish and Wildlife [USFWS] 2015; U.S. Geological Survey [USGS] n.d.[a]). Seismic activity is low at the NCG Site, and the area has a “very low” susceptibility to liquefaction.

Nine soil types occur within the project area. Approximately 8.9 percent of the project area contains hydric soils, and 89.4 percent is classified as prime farmland or farmland of statewide importance.

Environmental Consequences

Since the NCG Plant would be constructed and operated at a previously existing generation facility, a majority of the site has already been disturbed and graded. Installation of the stormwater/process pond would have negligible impacts on geology. Therefore, it is anticipated the Action Alternative would have negligible impacts on geologic features. Additionally, it is not anticipated that the NCG Plant would be impacted by geologic hazards during operation.

Construction of the NCG Plant would include grading and site preparation that would result in minor impacts to soil resources. Construction would temporarily disturb approximately 61.8 acres of prime farmland and farmland of statewide importance soils in the project area, excluding previously converted farmland soils within existing developed portions of the project area. A stormwater pollution prevention plan (SWPPP) would be developed for the site and would identify best management practices (BMPs) that would be implemented to minimize erosion during land clearing and site preparation. Aside from minor increases in soil erosion due to increases in impervious surface for the placement of additional permanent plant equipment, additional impacts to soil resources would not occur during operation of the proposed project. Operation of the proposed project would result in minor conversion of prime farmland soils (up to 6.9 acres) in previously undeveloped areas within the NCG Plant boundary. Prime farmland soils and farmland of statewide importance soils within the NCG Plant boundary that are located within previously developed areas are considered prior converted soils. Consequently, given the small amount of farmland soils that would be converted for operation of the proposed project, implementation of the Action Alternative would result in only minor, long-term impacts to farmland soils.

Land Use

Affected Environment

Based on the Multi-Resolution Land Characteristics (MRLC) consortium National Land Cover Dataset (NLCD), as of 2021, approximately 31.6 percent (45.7 acres) of the project area consists of pasture/hay and approximately 56.9 percent (82.4 acres) consists of developed (open space, low intensity, medium intensity, and high intensity) land cover.

Environmental Consequences

During construction, areas not previously developed would be cleared and graded, including the removal of approximately 21.6 acres of forested area, to allow for the staging of construction equipment and materials. Depending on the final site layout, at full buildout there would be up to 6.3 acres of conversion of pasture/hay to developed land for placement of permanent plant equipment such as fuel and water tanks. All areas outside of the NCG Plant boundary would be revegetated with native or non-native grasses and allowed to revert back to preconstruction conditions. Everything within the property would be maintained as mowed lawn or in aggregate, which would result in conversion of approximately 0.6 acre of mixed forest to maintained open space in the northeast corner of the NCG Site; the remaining 21.0 acres of forest cleared during construction would be allowed to naturalize back over time. Because the property is mostly developed for industrial use and the site has largely been cleared of vegetation, implementation of the Action Alternative would result in minor long-term impacts to land use.

Groundwater Quantity and Quality

Affected Environment

The project area is located within the Southeastern Coastal Plain Aquifer System. The groundwater system in Lowndes County, Mississippi, consists of two major hydrogeologic units: a surficial unconfined alluvial aquifer (the Eutaw-McShan Formation/Black Warrior River Aquifer) and a deeper confined to semi-confined aquifer (the Gordo Formation Aquifer). Public water supply in Caledonia, Mississippi, is sourced from the Gordo Formation Aquifer. Results from a 2019 sampling effort indicate elevated levels of barium, copper, fluoride, and lead (Caledonia Water and Sewer Department 2020). There is one superfund site and two Toxic Release Inventory (TRI) sites within 10 miles of the project area.

Environmental Consequences

The construction of the stormwater/process pond is not anticipated to impact groundwater as the pond would be lined, and the proposed project is in an area that lacks karst features. Potable water would be obtained from the existing public supply. Therefore, no impacts to groundwater associated with the construction and operation of the NCG Plant are anticipated.

Surface Water Quantity and Quality

Affected Environment

One perennial stream, one intermittent stream, four ephemeral streams, and two ponds are present within the proposed project area. The U.S. Army Corps of Engineers (USACE) provided an Approved Jurisdictional Determination (AJD) for the project area on April 18, 2024. The AJD determined the perennial and intermittent streams (S001 and S002) to be jurisdictional Waters of the United States (WOTUS) and that all other features within the project area are not WOTUS and, therefore, not subject to USACE jurisdiction.

Environmental Consequences

The project has been designed to avoid all impacts to surface water features. Proper implementation of TVA's Stream Management Zones (SMZs) and standard construction BMPs for the Action Alternative would be expected to result in only minor temporary impacts to surface waters. In the event that jurisdictional streams cannot be avoided, applicable CWA Section 404 and 401 permits would be obtained from the USACE, and necessary mitigation credits would be purchased.

Wetlands

Affected Environment

A total of four wetlands, totaling 0.06 acres, were identified within the proposed project area. The USACE completed an AJD for the project area on April 18, 2024, and determined all wetlands within the project area are not WOTUS and, therefore, not subject to USACE jurisdiction.

Environmental Consequences

The AJD determined all wetland features in the project area are non-jurisdictional (Appendix B). Furthermore, the project has been designed to avoid all wetlands identified within the project area, and TVA would adhere to wetland BMPs for all work necessary near delineated wetland boundaries (TVA 2022b). As such, the proposed project would have no impacts to wetlands.

Vegetation

Affected Environment

Vegetation types observed during field surveys can be classified as a combination of deciduous forest, evergreen forest, and herbaceous vegetation. No forested areas in the proposed project area had structural characteristics indicative of old growth forest stands (Leverett 1996). The plant communities observed onsite are common and well represented throughout the region. Vegetation in the proposed project area is characterized by two main types: forest (35 percent) and herbaceous (65 percent).

Environmental Consequences

Construction and operation of the proposed project would result in the removal of 21.6 acres of forested habitat, of which 0.6 acre of mixed forest falls within the NCG Plant boundary and would be permanently converted to maintained open space and minimal loss of herbaceous vegetation; however, vegetation removal would result in negligible effects on the terrestrial ecology of the region. The majority of herbaceous vegetation on the NCG Site is heavily disturbed by previous land use, dominated by non-native plant species, and possesses little conservation value. The forested areas are early successional or planted forests that have a large component of invasive species. Removal of these common forested communities would not impact the terrestrial plant ecology of the region, and 21.0 acres of the forested areas cleared during construction would be allowed to naturalize back over time.

Aquatic Ecology

Affected Environment

The streams documented within the project area are first or second order tributaries that would not provide suitable habitat for sensitive aquatic species. Furthermore, because of the degraded aquatic habitat conditions due to previous activities and land use practices within the project area, only common, tolerant species would be expected to utilize these watercourses during wet periods when sufficient flow is present.

Environmental Consequences

The project has been designed to avoid all impacts to all waterbodies. Aquatic ecology would be temporarily impacted during the construction phase of the proposed project. Impacts would occur directly by the alteration of habitat conditions within streams due to modification of the riparian zone or from an increase in stormwater runoff resulting from construction and maintenance activities. Category A buffers of 50 feet were assigned to the two perennial and intermittent streams. This standard protection would be sufficient to protect all streams since there is no suitable habitat for any listed aquatic species within the project area. TVA would implement appropriate BMPs, such as erosion and sediment control measures, which would minimize the potential for surface water run-off from carrying siltation into the adjacent streams, thereby preventing indirect impacts to instream habitat for aquatic organisms.

Wildlife

Affected Environment

The deciduous forests and mixed deciduous-pine forests, pasture and agricultural fields, and retention pond onsite provide habitat for common terrestrial animal species, including a variety of common birds and mammals. Suitable habitat is present within the project area for two avian species of conservation concern identified by the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) system: the red-headed woodpecker (*Melanerpes erythrocephalus*) and wood thrush (*Hylocichla mustelina*). Field sparrows (*Spizella pusilla*) were noted in the fields during surveys. This species is often listed as a migratory bird of conservation concern by the USFWS but was not identified as potentially being in the project area during data queries.

Environmental Consequences

Under Action Alternative, minor impacts to wildlife, such as birds, reptiles, or amphibians, would be anticipated during the construction phase of the NCG CT Plant. Winter tree removal would avoid the nesting season for most migratory bird species, including two of the migratory birds of conservation concern with habitat present in the project area (red-headed woodpecker and wood thrush). Direct effects to field sparrows could occur during breeding season should they be breeding in areas during vegetation removal. However, a relatively small amount of wildlife habitat is proposed for removal. The majority of the site is heavily disturbed or covered in concrete and gravel and provides low quality or no value for wildlife.

Threatened and Endangered Species

Affected Environment

Suitable habitat is present within the project area for one state listed species of conservation concern (red salamander [*Pseudotriton rubers*]), one federal candidate species (monarch butterfly [*Danaus plexippus*]), one federally proposed threatened species (alligator snapping turtle [*Macrochelys teminckii*]), one federally proposed endangered species (tricolored bat [*Perimyotis subflavus*]), and one federally listed endangered species (northern long-eared bat [NLEB; *Myotis septentrionalis*]). One occurrence of state listed lobed tickseed (*Coreopsis auriculata*) was observed during field surveys. No suitable habitat for federal or state listed aquatic species is present within the project area.

Environmental Consequences

Direct impacts to all wetlands and waterbodies would be avoided during construction of the proposed project. Due to lack of breeding habitat/host plants, and/or marginal quality foraging habitat and low likelihood of presence, the Action Alternative would not jeopardize the continued existence of alligator snapping turtle or monarch butterfly. Implementation of SMZs and BMPs would avoid and/or minimize impacts to the lobed tickseed and red salamanders and their habitats. A number of activities associated with the proposed project 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). While impacts would be minimized due to winter tree removal and adherence to conservation measures identified in the TVA Bat Strategy Project Screening Form (Appendix D), under the terms of TVA's Programmatic Consultation, the Proposed Action may affect and is likely to adversely affect NLEB. The Proposed Action would not jeopardize the continued existence of the tricolored bat, which has been proposed to be listed as endangered under the ESA.

Natural Areas, Parks, and Recreation

Affected Environment

One managed and natural area was identified within three miles of the project area: Cooper Creek Bluffs. Cooper Creek Bluffs is a conservation site immediately adjacent to the project area and has been described as having the potential for unique or sensitive botanical and aquatic features. There are no recreational areas located within a 3-mile radius of the project area.

Environmental Consequences

The Proposed Action would result in minor temporary impacts to Cooper Creek Bluffs. Impacts during the construction phase of the proposed project would include disturbance from noise or traffic. No construction activities would occur within the Cooper Creek Bluffs site; therefore, there would be no alteration of sensitive botanical and aquatic organisms on the property.

Cultural and Historic Resources

Affected Environment

Three surveys were completed by previous owners within the project area in 1995 and 1998: all three relied on pedestrian survey only, with no shovel testing. One pre-contact archaeological site was identified in a 55-acre survey located in the proposed NCG Site. The previous reports do not meet current Mississippi Department of Archives & History guidelines or TVA requirements for phase I archaeological surveys; therefore, TVA completed a new phase I archaeological survey of the project area and a survey of above-ground historic properties in the area of potential effect (APE) in March 2023. The survey re-visited the archaeological site, confirmed that it is extant, and expanded its boundaries somewhat. The site yielded artifacts from the Woodland and Mississippian periods and indicated the possible presence of a precontact village. Based on the results of the archaeological survey, TVA found that determining the eligibility of this site for the National Register of Historic Places (NRHP) would require additional investigations. The survey did not identify any additional archaeological sites in the project area. The historic architectural survey did not identify any above-ground historic properties in the APE.

Based on these prior surveys and consultation, there are no above-ground historic properties in the APE, and one potentially significant archaeological site is present. To further clarify the potential NRHP eligibility of the site, TVA completed additional phase II archaeological investigations after consulting further with the Mississippi State Historic Preservation Officer (SHPO) and federally recognized Indian tribes with an expressed interest in Lowndes County, Mississippi, concerning a proposed research design. Based on this additional investigation, which TVA completed in May 2024, TVA has determined that the site is eligible for inclusion in the NRHP, but that a portion of the site lacks research value and does not contribute to its NRHP eligibility. TVA has prepared a report of the additional investigation and is consulting further with the SHPO and tribes regarding this determination; comments are pending completion of the consultation process.

Environmental Consequences

As there are no above-ground historic properties (buildings or structures) within the APE, the Proposed Action would not affect any such properties. TVA plans to avoid any ground-disturbing activities within the sensitive portions of the archaeological site. Should the SHPO agree with TVA that the site is eligible for the NRHP and with the proposed avoidance plan, then TVA has no further obligation to consider potential effects on the site and no further compliance obligations under Section 106 of the NHPA. If the SHPO disagrees, TVA would follow the processes outlined in §800.6-7 for resolving disagreements, which includes further seeking ways to avoid, minimize, or mitigate adverse effects, in consultation. As such, the project would have no impact on historic properties.

Visual Resources

Affected Environment

The project area is surrounded by a variety of land uses, including agricultural lands, open and undeveloped fields, densely forested areas, and scattered residences along the roadways that border the site. Adjacent to the southern border of the project area is the existing Monroe County Electric Company Substation. There are two major transmission line corridors that cross through the project area. The degree of densely forested areas surrounding the project area provides visual screening for areas north, east, and west of the immediate project area.

Environmental Consequences

Vehicles and equipment visible during construction activities would have a low visual impact over the temporary construction period with the presence of vehicles and machinery as well as the generation of fugitive dust. Removal of forested areas and vegetation within the project area would occur but would be similar to existing open areas within the project area. Due to the extent of existing industrial elements in the landscape, the visual similarity between the proposed project elements and the existing modifications in the surrounding landscape, as well as the fact that the NCG Plant would be visually similar to the former private CT facility at the same site, the overall degree of contrast of the Proposed Action is anticipated to be weak which would result in a minor impact.

Noise

Affected Environment

Primary sources of noise in the vicinity of the project area include road traffic on the rural roads. The Columbus Air Force Base is located approximately 6.5 miles to the west. Heavy equipment used for agricultural purposes on nearby properties would also result in the generation of noise. The in-service TVA Lowndes County 500-kV Substation located within the project area has active electrical equipment that generates noise. The closest residence identified is located approximately 465 feet to the southwest of the project area boundary. All potential noise sensitive receptors identified, with the exception of one commercial development located approximately 0.46 mile west of the project area, are residences; no parks, churches, or schools are located within 0.5 mile of the project area.

Environmental Consequences

Temporary and minor noise effects would occur during construction of the NCG Plant. Noise effects from construction-related traffic are expected to be temporary and minor. It is not expected for noise due to construction activities to exceed recommended noise levels at the nearest noise sensitive receptors.

A baseline noise survey and noise impact assessment for operational noise associated with the operation of the proposed NCG Plant was performed by Burns & McDonnell (2023). The noise modeling performed for the project estimated that the NCG Plant is expected to contribute a maximum sound level of approximately 63 dBA in the vicinity of the nearest residential noise sensitive receptor, which is located north of the project area. The noise impact assessment provided potential noise reduction options (such as equipment selection) that could be considered, which indicated a predicted maximum noise impact of approximately 56 dBA in the vicinity of the same nearest noise sensitive receptor. Assuming constant, continuous operation, this would result in an Ldn of 62 dBA, which is also above the EPA recommendation of 55 dBA Ldn to reduce noise impacts (Burns & McDonnell 2023).

TVA is currently evaluating modeled impacts to ambient noise levels and investigating equipment options that may be available to reduce sound propagation. Engineering and design of the NCG Plant is ongoing; however, it is expected that TVA’s final facility design and equipment selection would incorporate noise reduction measures such that noise impacts from the operation of the NCG Plant would be minor.

Transportation

Affected Environment

The transportation network surrounding the project area contains state and county roads. The eastern border of the project area is bound by Seed Tick Road, and the western and northern borders of the project area are bound by Caldwell Road. The primary roadway serving the project area is Mississippi Highway 12 (MS 12), known locally as Military Road, located approximately 0.5 miles south of the project area. The site entrance is located off of Caldwell Road, which bounds the project area to the west and north. Current activities that generate traffic near the project area include the operation of the TVA Caledonia Combined Cycle Plant approximately two miles to the east, farming in the surrounding land, and residential development scattered throughout the area. As such, existing traffic is composed of a mix of cars and light duty trucks, as well as medium duty (larger delivery trucks) to heavy duty trucks (semi-tractor trailers).

Environmental Consequences

The effects of construction traffic on MS 12 and Seed Tick Road are expected to be minor. Assuming one person per commuting vehicle, there would be a daily morning inbound traffic volume of 200 vehicles per day and a daily outbound traffic volume of 200 vehicles per day for a total of 400 trips per day. A transportation study would be conducted to determine the routes used for delivery of construction equipment and project materials. Roads used to access the project area would be surveyed to determine the existing conditions prior to construction. Transportation routes and needs would be determined by the construction contractor. A traffic impact analysis would be performed if necessary to address potential roadway impacts. Additional environmental reviews would be conducted as appropriate and mitigation measures would be implemented if warranted. Operation of the NCG Plant would require approximately 15 permanent employees and regional staff. Therefore, the operation of the proposed project would not result in long-term changes to the existing conditions on the surrounding roadways.

Solid and Hazardous Waste

Affected Environment

A Phase I Environmental Audit was conducted in 2000, two years after the former private CT facility was originally constructed by the previous owner. At the time of the audit, there were no signs of contamination or leaks. The audit observed that Resource Conservation and Recovery Act (RCRA) permitted hazardous substances were handled in accordance with the site's permit and EPA guidelines, and no environmental liabilities were discovered on the site (Neil-Schaffer, Inc. 2000). There are no known instances of contamination or environmental events in the time that TVA has owned the property.

Environmental Consequences

Construction of the proposed project would result in the generation of non-hazardous solid waste and potential generation of hazardous waste. The project would obtain a small quantity generator hazardous waste identification number from the EPA. Appropriate spill prevention, containment, and disposal requirements for hazardous wastes would be implemented and a permitted hazardous waste disposal facility would be used for the ultimate disposal of any hazardous waste generated during construction. CT plants produce very small quantities of solid waste during normal operation. Operation of the NCG Plant would require maintaining two new aboveground storage tanks for fuel oil. Solid and hazardous wastes generated during construction and operation would be managed in accordance with established procedures and applicable regulations. Therefore, impacts associated with the generation of solid and hazardous waste from the Proposed Action would be minor.

Socioeconomics and Environmental Justice

Affected Environment

The study area for the socioeconomic assessment of the project is defined as Lowndes County, Mississippi. Lowndes County contains a mix of rural and suburban areas. The county's per capita income, poverty rate, and unemployment rate generally align with the state averages for the same measures. Employment is centered in three sectors: 1) education, health care, and social assistance; 2) manufacturing; and 3) retail trade (USCB 2023j).

The Environmental Justice (EJ) assessment characterized block groups within 10 miles of the project area with respect to income and ethnicity. Of the 32 block groups comprising the EJ analysis area, 4 block groups are identified as EJ communities due to ethnicity only, 2 block groups are identified as EJ communities due to income only, and 4 block groups are identified as EJ communities due to both income and ethnicity. The project area is not within a block group identified as an EJ community. The nearest block group identified as an EJ community, block group 3 of census tract 301.01 in Lamar County, Alabama, is located approximately 2.9 miles east of the project area.

Environmental Consequences

Construction of the NCG Plant would temporarily stimulate economic activity in the socioeconomic study area. The construction-related impact of direct, indirect, and induced spending would be minor, temporary, and positive. Effort would be made to source employees for the proposed project from the surrounding area. TVA anticipates operation of the NCG Plant would require approximately 15 permanent employees and regional staff. While the impact of this job creation would not change population levels, employment, or demand for housing relative to existing conditions in the county, there would be a minor increase in tax revenues and minor indirect and induced economic activity arising from increased spending by the project's workforce and the suppliers that support them. Additionally, electricity generated by the NCG Plant would be added to the grid and sold to end users. The sale of electricity for commercial use in Mississippi may be subject to sales tax at a rate of up to 7 percent. Mississippi does not tax the sale of electricity for residential or industrial use (Mississippi Department of Revenue 2024b). Therefore, operation of the NCG Plant is expected to have a minor, positive effect on the socioeconomic conditions of Lowndes County.

For all resources, it was determined that there is no significant risk of adverse and disproportionate impacts among EJ communities. With respect to air quality, the determination of no significant risk of adverse and disproportionate impacts during operation is based on the following rationale. Generally, EJ communities may be more sensitive to operation-related emissions due to higher frequency of pre-existing health conditions, such as asthma (Louisias and Phipatanakul 2017) and/or a decreased ability to take mitigating actions; however, the increase in emission of criteria air pollutants is not expected to contribute to the exceedance of NAAQS. As required by the Clean Air Act (CAA) (40 CFR part 50), the NAAQS primary standards are developed to protect human health with an adequate margin of safety for sensitive subgroups of the population. Therefore, operation of the NCG Plant would not harm sensitive individuals in the surrounding EJ communities because emissions would not exceed the primary NAAQS standards and would not cause disproportionate and adverse impacts to EJ communities.

Public Health and Safety

Affected Environment

Public emergency services in the vicinity of the project area include hospitals, law enforcement services, and fire protection services. The closest hospital is the Baptist Memorial Hospital. Police services in the area are provided by the Lowndes County Sheriff's Department, and the nearest fire station is the Caledonia Station (Lowndes County District 1, Station 1). Lowndes County is in the Mississippi Emergency Management Agency's (2024) District 4.

Environmental Consequences

TVA's Standard Programs and Processes related to safety would be strictly adhered to during the construction and operation of the project. These safety programs and processes are designed to identify actions required for the control of hazards in all activities, operations, and programs. They also establish responsibilities for implementing Section 19 of the Occupational Safety and Health Act of 1970. TVA and its contractors are required to comply with Occupational Safety and Health Administration (OSHA) regulations and follow a Site-Specific Safety & Health Plan. With proper planning, adherence to OSHA regulations and health and safety plans, and implementation of BMPs, effects from the project in relation to public health and safety would not occur.

Utilities

Affected Environment

Due to the site's previous use as a CT generation facility and current use as an electrical substation, the required utilities, service systems, and connections are available. Current utility service areas include BellSouth Telecommunications, Inc. (telephone); the City of Caledonia (water); the Caledonia Natural Gas District (gas); and the Monroe County Electric Power Association (electric) (Mississippi Public Service Commission 2024). The site lies at the intersection of two TVA bulk power transmission lines and houses the existing TVA Lowndes County 500-kV Substation. The project area is crossed by Tennessee Gas Pipeline Company's TGP 500 System (pipeline 500-2).

Environmental Consequences

Overall, the added dispatchable generation capacity as a result of the Action Alternative would have potential long-term beneficial impacts by helping to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, and planning reserve margin targets while facilitating the integration of renewable energy onto the electric grid.

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Symbols, Acronyms, and Abbreviations

AADT	Average Annual Daily Traffic
AJD	Approved Jurisdictional Determination
APE	Area of Potential Effect
BESS	Battery Energy Storage System
BLM	Bureau of Land Management
BMP	Best Management Practice
BSER	Best System of Emission Reduction
CAA	Clean Air Act
CC	Combined Cycle
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CPP	Clean Power Plan
CT	Combustion Turbine
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibel
DCH	Designated Critical Habitat
DLN	dry-low NO_X
EA	Environmental Assessment
EIS	Environmental Impact Statement
EGU	Electric Generating Unit
EJ	Environmental Justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ESA	Endangered Species Act
FHWA	Federal Highway Administration
g	Gravity
GHG	Greenhouse Gases
gpm	Gallons Per Minute
GWP	Global Warming Potential
HAP	Hazardous Air Pollutants
HUC	Hydrologic Unit Code
HUD	U.S. Department of Housing and Urban Development
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act
IRP	Integrated Resource Plan
IWG	Interagency Working Group
kV	Kilovolt
Ldn	Day-night sound level
LPC	Local Power Companies
MAC	Mississippi Administrative Code
MDEQ	Mississippi Department of Environmental Equality
MDAH	Mississippi Department of Archives & History
MDOT	Mississippi Department of Transportation
MMBtu/hr	Million British Thermal Units Per Hour
MRLC	Multi-Resolution Land Characteristics
msl	Mean Sea Level
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NCG	New Caledonia Gas

NDC	Nationally Determined Contribution
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NLCD	National Land Cover Dataset
NLEB	Northern Long-Eared Bat
NMSZ	New Madrid Seismic Zone
NOI	Notice of Intent
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
pga	Peak Ground Acceleration
PSA	Power Service Area
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RfCs	Reference Concentrations
RICE	Reciprocating Internal Combustion Engines
ROD	Record of Decision
ROW	Rights-of-Way
SC-GHG	Social Cost of Greenhouse Gases
SHPO	State Historic Preservation Officer
SMZ	Streamside Management Zones
SWPPP	Stormwater Pollution Prevention Plan
TL	Transmission Line
tpy	Tons Per Year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
TVA	Tennessee Valley Authority
TVARAM	TVA Rapid Assessment Method
ULSD	Ultra Low Sulphur Diesel
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USCB	United States Census Bureau
USDA	U.S. Department of Agriculture
USEIA	U.S. Energy Information Administration
USFWS	U.S. Fish and Wildlife Service
VOCs	Volatile Organic Compounds
WI	Water injection
WOTUS	Waters of the United States
WWCs	Wet weather conveyances

CHAPTER 1 - PROPOSED ACTION AND PURPOSE AND NEED

1.1 Introduction

The New Caledonia Gas (NCG) Site is an existing approximately 63-acre previously developed parcel of federally owned property managed by the Tennessee Valley Authority (TVA) in Lowndes County, Mississippi, located approximately 10 miles northeast of Columbus. The NCG Site is a former combustion turbine (CT) facility, originally constructed in 1998 and operated for several years by a private company. The company dismantled the site in 2007, removing the existing six frame CTs. The adjacent TVA Lowndes County 500-kilovolt (kV) Substation is approximately 82 acres and has remained in-service.

TVA is proposing to construct and operate an approximately 500 megawatt (MW) dual fuel CT facility (NCG Plant; proposed project) at the same location as the previous generating facility, utilizing existing natural gas and transmission infrastructure. The project area for the Proposed Action includes the entire 63-acre NCG Site as well as the adjacent 82-acre Lowndes County 500-kV Substation Site and totals approximately 145 acres (see Figure 1.1-1). TVA has prepared this Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) to evaluate the environmental and social impacts of the proposed construction and operation of six dual-fuel frame CTs capable of generating approximately 500 MW at the existing NCG Site.

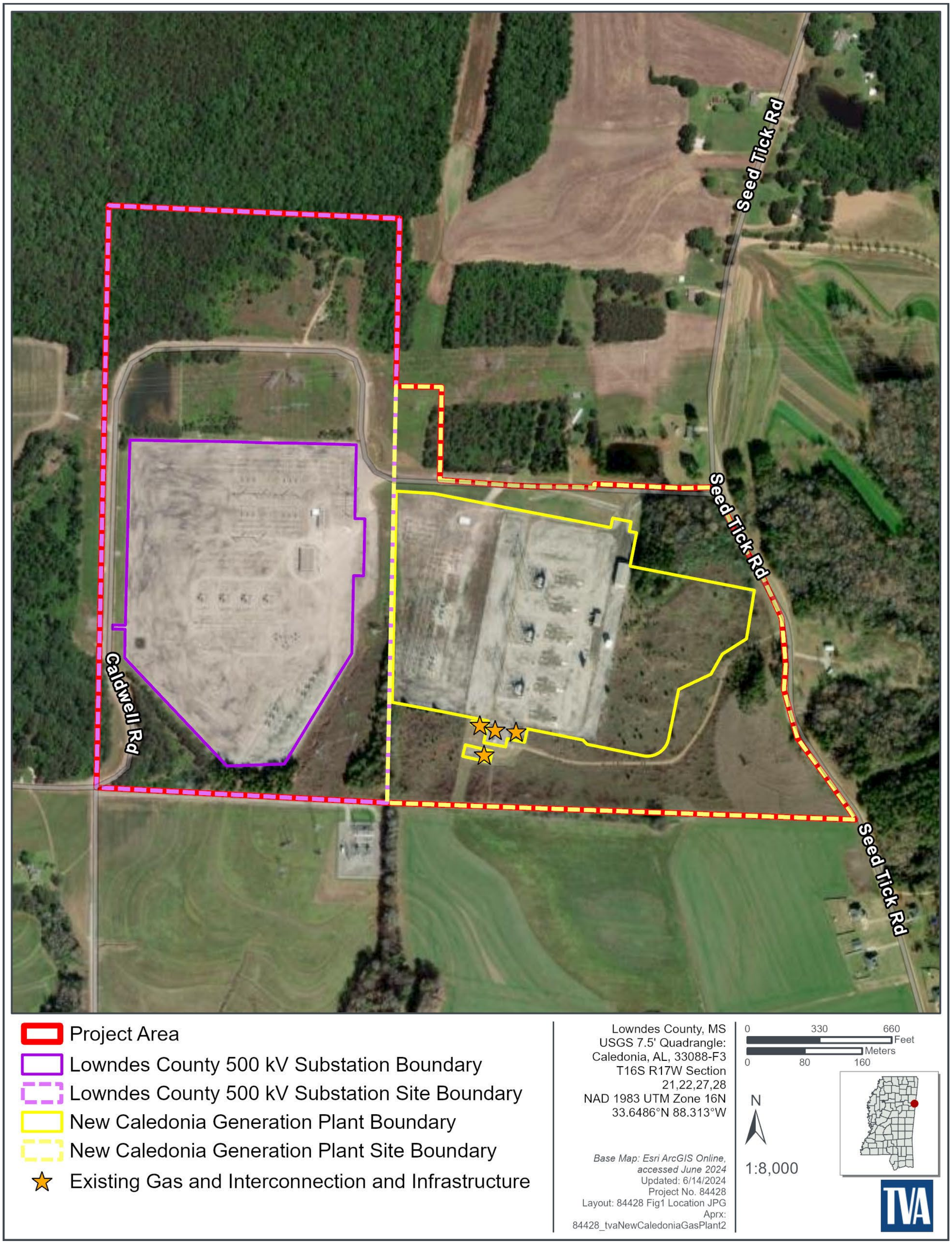

Figure 1.1-1. Map of the NCG Plant Project Area

1.2 Purpose and Need

The purpose of the Proposed Action is to support continued load growth within the Tennessee Valley in a way that is consistent with the recommendations in the 2019 Integrated Resource Plan (IRP) (TVA 2019a)[1] and to meet the demand for electricity while facilitating the integration of renewables onto the electric grid, thereby advancing TVA's decarbonization goals. The 2019 IRP recommended the addition of up to 5,200 MW of CTs by 2028 and up to 8,600 MW by 2038 to accommodate load growth. CTs are needed to provide dispatchable generation capacity to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, planning reserve margin targets, and comply with the requirement under the TVA Act that power be sold at rates as low as feasible.

The Proposed Action aligns with the 2019 IRP, which guides future generation planning consistent with least-cost planning principles. The addition of CT units to the fleet was recommended to enhance system flexibility to integrate renewables and distributed resources. As the amount of solar generation in the TVA generation portfolio continues to increase, flexibility of the remainder of the fleet becomes even more important.

Additional background information that informs the purpose and need for the Proposed Action is provided in the following sections.

1.2.1 Least Cost Planning and the TVA Act

TVA's core statutory objectives under the TVA Act are to provide the people of the Tennessee Valley with low-cost and reliable electricity, environmental stewardship, and a prosperous economy (16 United States Code [U.S.C.] §§ 831 et seq.). Consistent with, and as mandated by the Energy Policy Act of 1992, TVA engages in a long-range, "least-cost planning" process that "evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service to electric customers of [TVA] at the lowest system cost" (16 U.S.C. § 831m-1(b)(1)). TVA engages in the "least cost planning" process through development of the IRP.

1.2.2 Integrated Resource Planning

Every few years, TVA publishes an IRP, a comprehensive study of how TVA can best meet the future energy demand in its power service area, which encompasses approximately 80,000 square miles covering most of Tennessee and parts of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia. To accomplish the best blend of diverse resources for capacity to meet the Tennessee Valley's future demand for power, TVA leverages a least-cost system planning approach. TVA conducts the IRP process in a transparent, inclusive manner, using input from a diverse group of stakeholders, inclusive of the public, to help shape the IRP.

TVA typically updates its IRP every few years to ensure that its power system adapts to changing demands and regulations. Prior to the 2019 IRP (TVA 2019a), the most recent TVA IRP updates were released in 2011 and 2015. TVA's planning assumptions are regularly updated between IRPs. The comprehensive and broad long-term planning and analyses

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[1] TVA is in the process of developing the next IRP. TVA's past practice has been to evaluate its IRPs every 4 to 5 years. Accordingly, on May 19, 2023, TVA published a Notice of Intent in the Federal Register announcing its plans to prepare an EIS associated with the implementation of the updated IRP, initiating the 45-day scoping period, which concluded on July 3, 2023. TVA has reviewed the 2019 IRP and associated EIS and determined that it remains valid and guides future generation planning consistent with least-cost planning principles.

underlying TVA IRPs consistently identify the need for a diverse set of resources and load reduction measures, along with natural gas generation, solar, and battery energy storage system (BESS) resources, with the specific amounts of each driven by market conditions.

In June 2019, TVA published the 2019 IRP (TVA 2019a), which evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential energy resource additions and retirements. The 2019 IRP acknowledged that reliance on only one strategy would not ensure reliability and resilience and, therefore, considered a variety of generation resources. The strategic direction established by the 2019 IRP and results from recommended near-term actions formed the basis for TVA's asset strategy, which continues to support affordable, reliable, and cleaner energy for customers. The 2019 IRP recommended the potential addition of up to 500 MW of demand response and 2,200 MW of energy efficiency (demand-side options); 4,200 MW of wind; 5,300 MW of storage; 8,600 MW of CT; 9,800 MW of combined cycle (CC); and 14,000 MW of solar by 2038. The 2019 IRP recommendation optimizes TVA's ability to create a more flexible power-generation system that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability. Specific resource technologies included in TVA's asset strategy include:

- Maintaining the existing low-cost, carbon-free nuclear and hydro fleets;
- Retiring aging coal units as they reach the end of their useful life, expected by 2035;
- Adding 10,000 MW of solar by 2035 to meet customer demands and system needs, complemented with storage;
- Using natural gas-fueled generation to enable needed coal retirements and solar expansion as other technologies develop;
- Leveraging demand-side options in partnership with local power companies (LPCs); and
- Partnering to develop new carbon-free technologies for greater reduction in carbon emissions.

The inclusion of natural gas-fired CTs and CCs in the target power supply mix is driven by the demand for reliable electricity, the increased amount of solar capacity being added to TVA's system, system firm capacity requirements, commodity prices, costs relative to alternative resource options, and transmission system reliability (see TVA's 2019 IRP and IRP EIS [TVA 2019a and 2019b]). TVA's target power supply mix includes firm, dispatchable power, which refers to a generating resource that can adjust power output up or down on demand within the specific operating limitations of that resource, thus increasing system reliability and resiliency.

As a result of resource changes outlined in the asset strategy, TVA has a plan for 70 percent carbon reduction by 2030, a path to an approximately 80 percent carbon reduction by 2035, and aspirations of net-zero carbon emissions by 2050 (based on a 2005 baseline).

This EIS tiers from the 2019 IRP EIS (TVA 2019b). TVA issued, in May 2023, a Notice of Intent (NOI) in the Federal Register to prepare the next IRP and EIS (TVA 2023a). The NCG Plant Project was initiated in 2023 as a site-specific implementation of the current 2019 IRP, which remains valid. The decision that is analyzed in this document is consistent with the 2019 IRP (TVA 2019a) and the target power supply mix identified therein.

1.2.3 Growth in the Tennessee Valley and TVA Power Service Area

In 1950, about 2 percent of the energy used in the United States (U.S.) was delivered in the form of electricity. Today, this number has increased to approximately 22 percent and continues to grow (TVA 2023b). During the decade before the 2020 COVID pandemic, TVA's seven state region saw almost no electric load growth. In the years since the COVID pandemic, the region has experienced tremendous economic growth, driven in part by a post-pandemic increase in migration into TVA's Power Service Area (PSA) by new residents, businesses, and major industries. The full-time work-from-home culture born from the COVID pandemic triggered large waves of migration across the country, with southern states comprising the fastest growing region in the nation (Business Insider 2024).

A comparison of United States Census Bureau (USCB) population statistics (USCB 2023a) for the counties in TVA's PSA to population statistics for all US counties combined was done for 2020 through 2022 and for USCB forecasted population data for 2023. From 2020 to 2021, the population of TVA's PSA grew to over ten million people and had a 0.6 percent growth rate, which was 3.8 times the U.S. population growth rate. The rate of population growth in TVA's PSA increased over 1.0 percent in 2022, and 2023 is forecasted to hit a 1.5 percent population growth rate year over year, a rate that is 2.6 times the forecasted national growth rate for 2023 (USCB 2023a).

Until October 1, 2023, when a base rate increase was put into effect, TVA's base power rates had remained relatively flat during the past four years while significant investments were made in TVA's power system. Over the past ten years, TVA has invested $25 billion in existing and new generation. In addition, TVA is working to offset approximately 30 percent of forecasted new load growth in the next ten years through energy efficiency and demand response programs. TVA anticipates investing $1.5 billion in fiscal years 2023-2027 in energy efficiency and demand response programs to accomplish this, continuing to help lower energy bills (TVA 2023b). TVA expects to build up to 5,200 MW of CT generation by 2028 to meet increasing energy demand and is targeting the addition of 10,000 MW of solar energy by 2035 (TVA 2019a). TVA is focused on meeting growing electricity demand and achieving a net zero carbon future while maintaining energy security, reliability, and affordability.

TVA continuously monitors a variety of market signals to inform its planning, including forecasts for loads, commodities, and resource costs. Higher demand expectations for residential and support services, such as data centers, are being driven by an observed shift in interstate migration patterns into the Tennessee Valley that is expected to continue.

The 2019 IRP (TVA 2019a) indicated up to 8,600 MW of CT generation would be needed by 2038 if TVA experienced a high level of load growth. Based on the condition of TVA's aging coal fleet, a documented increase in population size within TVA's PSA, and uncertainty surrounding the annual growth rates forecast for 2023 and beyond, TVA must add capacity to the system to maintain adequate operating reserves. Operating reserves are capability above firm system demand required to provide for regulation, load forecasting error, equipment forced and scheduled outages, and local area protection. Peaking units, such as CTs, are valuable in meeting electricity demand for shorter periods of high demand on summer and winter peak days, and their flexibility also plays a key role in successfully integrating renewable resources, which have variable and unpredictable generation patterns.

1.2.4 Renewable Energy Integration

TVA's energy portfolio is expected to change over time, given the rise of renewable energy sources. TVA has existing solar capacity commitments of nearly 3,200 MW and is targeting the addition of up to 10,000 MW of solar by 2035. TVA is continuing to expand its solar and carbon-free commitments through procurement methods such as requests for proposals and opportunities at existing TVA sites. In July 2022, TVA issued a request for proposals for up to 5,000 MW for additional carbon free energy (TVA 2022a). The 2019 IRP (TVA 2019a) indicated that the near-term actions required TVA to enhance system flexibility to integrate renewable resources. TVA continues to work with long-term LPC customers as well to deploy additional solar through a flexibility option under TVA's long-term agreement with each individual LPC customer.

Solar resources are typically only available on average about 20 to 25 percent of the year, and their availability can vary significantly during daylight hours as cloud cover and precipitation events occur. As such, solar power must be paired with dispatchable power or battery storage to meet year-round capacity needs. Battery storage pairing is constrained in that batteries are energy limited (e.g., typically providing a 4-hour duration) and are net consumers of electricity. Pairing solar resources with the appropriate level of battery storage can compensate for this deficiency but adds cost and introduces transmission stability and reliability issues that then must be addressed with transmission system improvements. (TVA 2019a).

Inclusion of natural gas-fired CTs and CCs in the target power supply mix is driven by the demand for reliable electricity, the increased amount of solar penetration, system dispatchable capacity requirements, commodity prices, costs relative to alternative resource options, and transmission system reliability. Transmission-related benefits ensure reliability and stability by maintaining dynamic reactive power and inertia in the area. Dynamic reactive power is complex power produced by generation plants needed to maintain system stability and voltage under steady state and fault conditions. Inertia produced by spinning generation, such as CTs and CCs, helps maintain system stability and frequency by resisting sudden changes on the power system and adding strength to the area.

Natural gas-fired CT or CC units can be operated year-round to meet the fluctuating demand on the power system, including overnight, during cold pre-dawn winter mornings, and during warm summer evenings as solar generation fades. The inclusion of dispatchable power generation from natural gas-fired CTs and CCs effectively enables systemwide integration of solar while providing critical transmission-related benefits to ensure reliability, resiliency, and power quality. (TVA 2019a).

The addition of CT units to the fleet aligns with the direction in the IRP, which recommended enhancing system flexibility to integrate renewables and distributed resources, with substantial solar additions expected over the next two decades. As the amount of solar generation in the TVA generation portfolio continues to increase, flexibility of the remainder of the fleet becomes even more important. Cloud patterns that temporarily block the sun and reduce solar generation require other generating units to respond to continue to reliably supply power to customers. CTs provide flexible, dispatchable generation, enabling the remainder of the system to better integrate renewables.

1.3 Scope of the Environmental Impact Statement

This EIS evaluates the resource impacts of the proposed construction and operation of six gas-fired frame CTs at the New Caledonia property location and onsite transmission upgrades required to interconnect the generation to the TVA transmission system. The project area is 145 acres and encompasses the 63-acre NCG Site and the adjacent 82-acre TVA Lowndes County 500-kV Substation Site. Within the project area, impacts would include the footprint of the proposed NCG Plant as well as any construction laydown areas, any ancillary facilities, and any utility upgrades that may be necessary. Through internal scoping of the Proposed Action, TVA determined the following resources have the potential to be affected by the alternatives considered:

- Air Quality
- Climate Change, Greenhouse Gases (GHG), and Social Cost of Carbon
- Cultural and Historic Resources
- Geology, Soils, and Prime Farmland
- Land Use
- Groundwater Quality and Quantity
- Surface Water Quality and Quantity
- Wetlands
- Aquatic Ecology
- Vegetation
- Wildlife
- Threatened and Endangered Species
- Natural Areas and Parks
- Visual Resources
- Noise
- Transportation
- Solid and Hazardous Waste
- Socioeconomics and Environmental Justice
- Public Health and Safety
- Utilities

TVA's preliminary analysis identified the following resources as not being affected by the Proposed Action and are therefore eliminated from further review in this EIS.

- Recreational Areas – There are no recreational areas located within a 3-mile radius of the project area. Therefore, there would be no impacts to recreational areas and this resource is not evaluated further in this EIS.
- Floodplains – Based on topographic maps and the Lowndes County, Mississippi, Flood Insurance Rate Map panel number 28087C0075K, effective 2/18/2011, the proposed project would involve property that is outside identified 100-year floodplains (FEMA 2011). Therefore, the proposed project would be consistent with Executive Order (EO) 11988. Additionally, the elevation tool in the TVA egis web viewer indicates that the elevation of the unnamed tributary of Howard Creek west of the project area is about 320 feet mean sea level (msl), and the elevation of Cooper Creek east of the project area is about 270 feet msl. The elevations of the substation and the former private CT facility are about 344 feet and 350 feet, respectively. The project area is, therefore, at least 24 feet higher than the tributary of Howard Creek and at least 74 feet higher than Cooper Creek, which would also be well outside 500-year floodplains and consistent with EO 13690.

1.3.1 Environmental Impact Statement Overview

NEPA requires federal agencies to consider the environmental effects of their proposed actions in their decision-making. Actions, in this context, can include new and continuing activities that are conducted, financed, assisted, regulated, or approved by federal agencies, as well as new or revised plans, policies, or procedures. The NEPA review process is intended to ensure federal agencies consider the environmental effects of their actions in the decision-making process (40 Code of Federal Regulations [CFR] 1500.1). NEPA also requires that federal agencies provide opportunities for public involvement in the decision-making process.

This EIS was prepared in accordance with NEPA, as amended (42 U.S.C. §§ 4321 et seq.); the regulations implementing NEPA promulgated by the Council on Environmental Quality (CEQ; 40 CFR §§ 1500-1508, 1515- 1518, as updated April 20, 2022); and TVA NEPA regulations and procedures (18 CFR part 1318). The EIS is consistent with 2023 CEQ interim guidance on Consideration of Greenhouse Gas Emissions and Climate Change (88 FR 1196, Jan. 9, 2023); the Fiscal Responsibility Act of 2023 (Public Law 118-5 - June 3, 2023); and associated guidance from various federal and state agencies (CEQ 2023).

TVA has prepared this EIS to assess the environmental effects of the Proposed Action. TVA used the input from the public scoping period, summarized below in Section 1.6, in developing this EIS. The EIS will be distributed to interested individuals, organizations, and federal, state, and local agencies for their review and comment. Following the 45-day public comment period for this Draft EIS, TVA will review the comments received and additional available information and develop the Final EIS. The Final EIS will include TVA's responses to the comments received on the Draft EIS.

TVA has provided an estimated schedule of Final EIS availability on its website at www.tva.com/nepa. This schedule will be periodically updated as needed. When available, TVA will post the Final EIS on the TVA website; notices of its availability will be sent to those who received the Draft EIS or submitted comments on the Draft EIS. TVA will send the Final EIS to the U.S. Environmental Protection Agency (EPA), which will publish a notice of availability in the Federal Register. A Record of Decision (ROD) would be issued by TVA no sooner than 30 days after the publication of the notice of availability of the Final EIS. The ROD will include (1) the decision; (2) the rationale for the decision; (3) alternatives that were considered; (4) identification of the environmentally preferable alternative; and (5) associated mitigation measures, monitoring, and enforcement requirements.

1.4 Decision to be Made

This EIS has been prepared to inform TVA decision makers and the public about the environmental consequences of the Proposed Action. The decision TVA must make is whether to construct and operate the NCG Plant.

1.5 Related Environmental Reviews

TVA issued, in May 2023, a NOI in the Federal Register to prepare the next IRP and EIS (TVA 2023a). The NCG Plant Project was initiated in 2023 as a site-specific implementation of the current 2019 IRP, which remains valid. Therefore, this EIS tiers from the 2019 IRP EIS (TVA 2019b). The environmental documents listed below were reviewed during preparation of this EIS. The contents of these documents helped to support the Proposed Action and/or describe the affected environment and are incorporated by reference as appropriate.

- *TVA Integrated Resource Plan (TVA 2019a)* – TVA's 2019 IRP provides direction for how TVA would meet the future electricity demand of the Tennessee Valley region while fulfilling its mission of serving the Tennessee Valley by providing low-cost, reliable power, environmental stewardship, and economic development. The 2019 IRP evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential resource additions and retirements throughout the TVA power service area.

- *TVA Integrated Resource Plan, EIS (TVA 2019b)* – This EIS accompanied the 2019 IRP and assessed the natural, cultural, and socioeconomic impacts associated with the implementation of the IRP.
- *Categorical Exclusion for the Demolition of Structures and Utilities at New Caledonia, Mississippi Categorical Exclusion (TVA 2024a)* – Reroute, demolition, and removal of structures, utilities, and surfacing at the former private CT facility to reduce safety concerns and eliminate the need for upkeep at an underutilized site.
- *Categorical Exclusion for the Demolition of Two Transformers at New Caledonia Categorical Exclusion (TVA 2024b)* – Verification of polychlorinated biphenyl status, drainage of water in the containment around the tanks, and demolition of two transformers at the former private CT facility.

1.6 Public and Agency Involvement

1.6.1 Scoping and Notice of Intent

On November 28, 2023, TVA published a NOI in the Federal Register announcing plans to prepare an Environmental Assessment (EA) or an EIS to address the potential environmental effects associated with the proposed action (TVA 2023c). The NOI initiated a 53-day public scoping period from November 28, 2023, to January 19, 2024. In the NOI, TVA requested comments on data, information, and analysis relevant to the Proposed Action from the public; affected Federal, State, tribal, and local governments, agencies, and offices; the scientific community; industry; or any other interested party. The purpose of the scoping period was to present TVA's project objectives and initial alternatives for input from the public and interested stakeholders. TVA sent notification of the NOI via email to local and state government entities and federal agencies, as well as published notices in the following cities and associated newspapers:

- Columbus Commercial Dispatch.
- The Monroe Journal.
- Facebook Events ads within 10 miles of each of the following zip codes: 35461, 35576, 35586, 35592, 38848, 39701, 39702, 39705, 39740, 39746, 39766, 39773.

1.6.2 Public Scoping Meeting

In addition to the NOI published in the Federal Register, TVA invited members of the public, as well as federal, state, and local agencies and federally recognized Indian tribes, to a public meeting to discuss the scope of the NEPA document and gather input from the public and stakeholders. The public meeting was held on January 8, 2024, from 5 pm to 7 pm Central Daylight Time at the Caledonia Community Center, a facility compliant with the Americans with Disabilities Act. TVA notified the public of the meeting in the NOI, on the TVA website, in local newspaper ads, and in targeted social media ads. TVA also published notices regarding the NOI and the public meeting in the cities and associated newspapers listed above in Section 1.6.1.

The public was invited to attend this meeting and submit formal comments. At the public open house, TVA provided an interactive web browser simulating various phases of the project, and informative posters outlining the NCG Site history, a description of the Proposed Action, project schedule, and NEPA regulatory framework. A total of 34 individuals, both members of the general public and representatives of a variety of organizations, signed in for the meeting.

1.6.3 Stakeholder Engagement and Communications

In addition to the public scoping meeting, TVA met with community leaders and elected officials on November 30, 2023, to discuss the Proposed Action and request information on local initiatives that would be considered in the cumulative impact assessment and identification of communities that would be considered in the evaluation of impacts to Environmental Justice.

1.6.4 Scoping Feedback

TVA received a wide variety of comments and opinions regarding the construction and operation of the Proposed Action and considered this input in developing this Draft EIS.

TVA received 30 submissions from members of the public, federal agencies, and various organizations, totaling 1,027 unique comments. The submissions consisted of:

- Sixteen submissions from the General Public
- One submission from a federal agency, the EPA
- Thirteen submissions from the following organizations: Appalachian Voices, Center for Biological Diversity, GS Research LLC, Gulf Coast for a Sustainable Future, Hop, Legacy Village Inc, Mississippi Rising Coalition (two submissions), Robbins Properties, Sierra Club, Solar Energy Industries Association, Southern Alliance for Clean Energy, Southern Environmental Law Center

A scoping report was developed and includes information about NEPA, federal and local laws, and EOs that are relevant to this EIS. The scoping report was made available to the public on TVA's project website and presents the public comments received, as well as information on how the EIS is being developed (Appendix A).

1.7 Necessary Permits or Licenses

TVA would obtain all necessary permits, licenses, and approvals required for the alternative selected. A summary of the laws and EOs relevant to the Proposed Action is provided in Table 1.7-1. Necessary permits would be evaluated based on site-specific conditions. Permits or consultation requirements relevant to the Proposed Action are identified in Table 1.7-2.

Table 1.7-1. Laws and Executive Orders Relevant to the Proposed Action

Environmental Resource Area	Law / Executive Order
Air Quality, Climate Change, GHG, and Social Cost of Carbon	Clean Air Act (CAA) EO 13990 – Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis EO 14008 – Tackling the Climate Crisis at Home and Abroad EO 14057 – Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability 11 Miss. Admin. Code Pt. 2 – Air Regulations EO 14082 – Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022

Environmental Resource Area	Law / Executive Order
Vegetation, Wildlife, Aquatic Ecology, Threatened and Endangered Species	40 Miss. Admin. Code Pt. 5, R. 2.4 – Endangered and Threatened Species: Designations and Regulations Bald and Golden Eagle Protection Act (BGEPA) Endangered Species Act (ESA) Section 7 (Consultation with U.S. Fish & Wildlife Service) EO 13112 – Invasive Species EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds Migratory Bird Treaty Act (MBTA) EO 14008 – Tackling the Climate Crisis at Home and Abroad
Surface Water Quality and Quantity, Groundwater Quality and Quantity, and Wetlands	11 Miss. Admin. Code Pt. 6 – Wastewater Pollution Control Regulations 11 Miss. Admin. Code Pt. 7, Ch. 1 – Surface Water Groundwater Use and Protection Regulations CWA Sections 401, 402, and 404 EO 11988 – Floodplain Management EO 11990 – Protection of Wetlands EO 13778 – Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the "Waters of the U.S." Rule EO 14008 – Tackling the Climate Crisis at Home and Abroad Safe Drinking Water Act
Cultural Resources	16 Miss. Admin. Code Pt. 3, Ch. 12 – Mississippi Standards and Guidelines for Archaeological Investigations National Historic Preservation Act (NHPA) Section 106 Native American Graves Protection and Repatriation Act
Geology, Soils, Prime Farmland, Natural Areas, and Land Use	Farmland Protection Policy Act
Solid and Hazardous Waste	11 Miss. Admin. Code, Pt. 3 – Hazardous Waste Management Regulations Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Emergency Planning and Community Right-to-Know Act (EPCRA) Resource Conservation and Recovery Act (RCRA) Solid Waste Disposal Act (SWDA) Toxic Substances Control Act (TSCA)
Public Health and Safety	Occupational Safety and Health Act (OSHA)
Socioeconomics and Environmental Justice	EO 12898 – Federal Actions to Address Environmental Justice in Minority and Low-Income Populations EO 14008 – Tackling the Climate Crisis at Home and Abroad EO 14096 – Revitalizing Our Nation's Commitment to Environmental Justice for All

Table 1.7-2. Permits and Consultation Requirements Relevant to the Proposed Action

Submittal/ Consultation	Reviewing Agency	Authorization	Applicability	Timing	Fees	Notes/ Assumptions
Clean Water Act (CWA) 404/401 Permitting	U.S. Army Corps of Engineers (USACE) Mobile District	Section 404 Nationwide Permit (NWP)	Effects to Waters of the United States (WOTUS)	60 Days. Typically, contingent on 401 Certification	N/A[1]	Applicable if project impacts WOTUS.
	Mississippi Department of Environmental Quality (MDEQ)	Section 401 Water Quality Certification	Federal permit for effects to WOTUS	60 Days	N/A[1]	Applicable if project impacts WOTUS.
CWA 402 National Pollutant Discharge Elimination System (NPDES) Permitting	MDEQ	Section 402 General Permit for Stormwater Discharges Associated with Construction Activities	Stormwater discharges from activities with 5 acres or greater of disturbance during construction.	NOI and stormwater pollution prevention plan (SWPPP) to be filed 90 days prior to construction	N/A[1]	Early coordination recommended; NOI (Form LCNOI-2022) and SWPPP for Construction Activity – Stormwater Discharges. Permit MSR10 would authorize discharges associated with construction activities that result in a total land disturbance of 5 acres or greater.
	MDEQ	Section 402 Industrial Stormwater General Permit	Stormwater discharges associated with industrial activities	NOI submittal should be filed at least 60 days prior to commencement of operations.	N/A[1]	N/A[1]
Application for New Individual On-site Wastewater Disposal System (IOWDS)	Mississippi State Department of Health (MSDH)	None	Installation of new individual on-site wastewater disposal system	Up to 2 weeks for agency processing and approval	Up to $422.50	If the system is larger than 1,500 gallons/day, permit would be processed through MDEQ instead.

Submittal/ Consultation	Reviewing Agency	Authorization	Applicability	Timing	Fees	Notes/ Assumptions
Protected Species Coordination	U.S. Fish and Wildlife (USFWS)	Endangered Species Act Section 7 Consultation	Federal Listed species	60-day period for review of agency findings	N/A[1]	Activities that could affect northern long-eared bat are covered under TVA's Bat Programmatic Biological Consultation; TVA has made no jeopardy determinations for proposed and candidate listed species; therefore, no additional USFWS consultation is warranted.
Cultural Resources	Mississippi Department of Archives & History (MDAH)	National Historic Preservation Act; Section 106 Consultation	Historic Properties	30-day period for review of agency findings	N/A[1]	Consultation has been initiated.
Air Pollution Control Construction Permit; Acid Rain Permit	MDEQ	Clean Air Act (CAA)	Construction of a new air contaminant source or the modification of an air contaminant source which may result in the discharge of air contaminants	150-day agency review period	N/A	The Project would not be subject to Prevention of Significant Deterioration (PSD) permitting, but would be subject to the requirements of Title V Operating Permits.
Title V Operating Permit	MDEQ	CAA	Operation of new air contaminant source.	Within 12 months of commencement of operations.	N/A[1]	N/A[1]

1 N/A = not applicable

CHAPTER 2 - ALTERNATIVES

2.1 Description of Alternatives

This Chapter describes the two alternatives TVA identified for this review: Alternative A - The No Action Alternative and Alternative B - Construction and Operation of a simple cycle frame CT facility. The evaluated alternatives are described below.

2.1.1 Alternative A – The No Action Alternative

The No Action Alternative provides a baseline for comparing against the Action Alternative. Under the No Action Alternative, TVA would not construct a simple cycle frame CT facility at the NCG Site. TVA would not make related upgrades to the transmission system to interconnect the generation and actions related to upgrading the natural gas pipeline interconnection would not be completed. This alternative does not meet the purpose and need of TVA's Proposed Action; however, it is included in this evaluation as it represents current baseline conditions against which the action alternative would be compared.

2.1.2 Alternative B – Construction and Operation of a simple cycle frame combustion turbine facility

2.1.2.1 *Location and Description*

The proposed project would be located on an existing approximately 63-acre parcel of TVA property located in Lowndes County, Mississippi, approximately 10 miles northeast of Columbus. The property is a decommissioned former private CT facility. The existing six turbine/generator foundations, three 500-kV generator step-up, 500-kV Transmission Line (TL) superstructure, gas metering equipment, water tanks, and office building were abandoned in their current locations, but are scheduled to be demolished and removed in the fall of 2024 as a part of a separate Strategic Real Estate Reduction effort (TVA 2024a; TVA 2024b). Much of the property is fenced and graveled, with the remaining portions undeveloped and largely composed of early succession forest, particularly in areas with steep slopes, while the flatter portions of the property are largely fallow field.

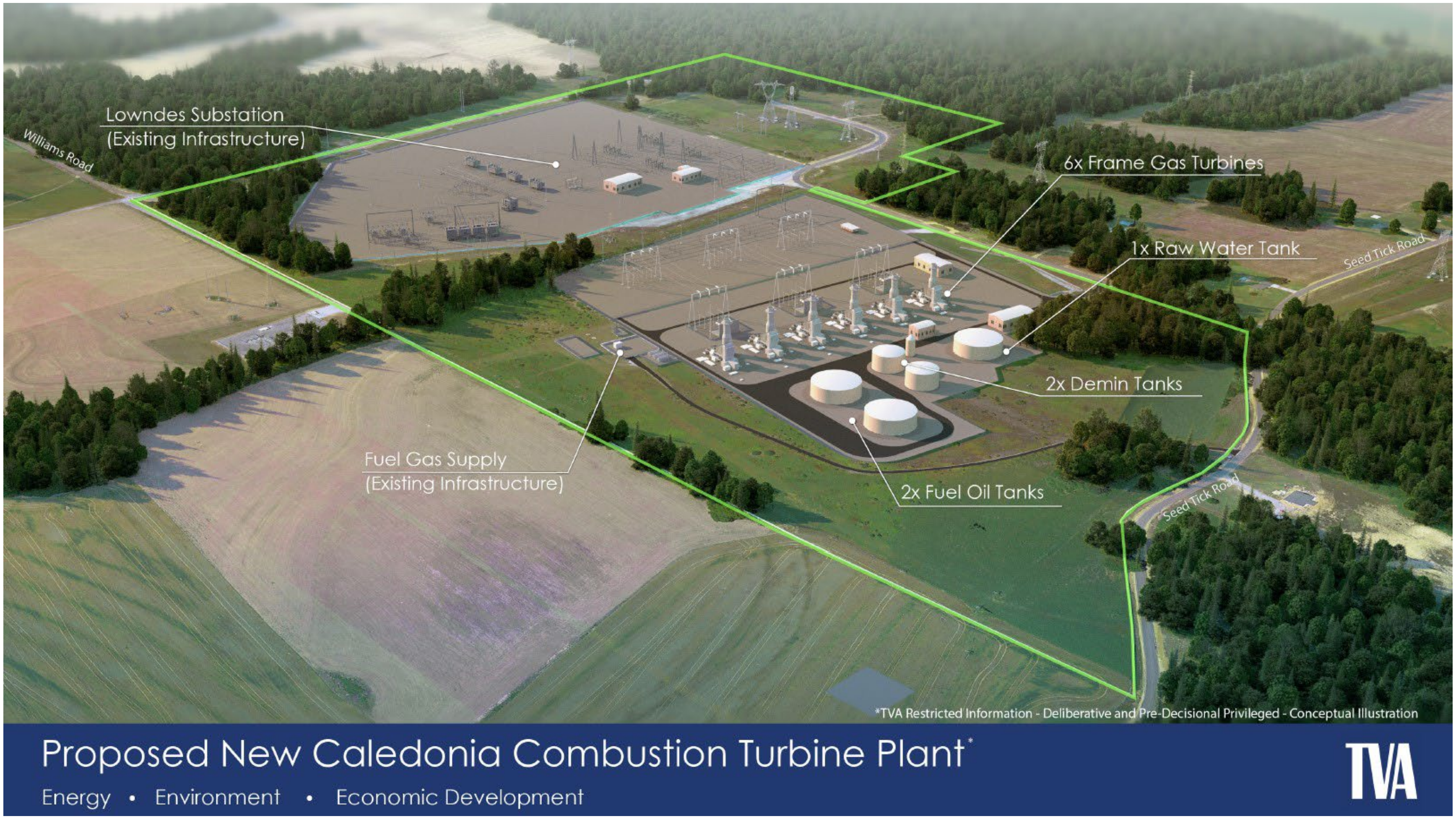

Figure 2.1-1. Digital Rendering of the NCG Plant Site.

2.1.2.2 *Components of the NCG Plant*

The NCG Plant would be located at the NCG Site (Figures 1.1-1 and 2.1-1). Alternative B would include, but would not be limited to, the following actions and components:

- Gas system upgrades to existing infrastructure to connect the plant to an existing gas pipeline;
- Construction of an onsite stormwater/process pond;
- New fuel oil storage and water storage tanks;
- New natural gas-fired dew point heaters;
- New electric and diesel emergency firewater pumps; and
- Six dual fuel frame CTs (500 MW) with inlet evaporative cooling.

In addition to the major equipment systems, the proposed NCG facilities would include plant equipment and systems, such as natural gas metering and handling systems, instrumentation and control systems, transformers, and administration and warehouse/maintenance buildings.

Some water treatment would potentially be required to support each CT. The NCG Plant would require potable water, which would be obtained from the existing public supply and stored in tanks on the site. The number of tanks and capacity required would be determined prior to completing the NEPA evaluation. Up to about 200 gallons per minute (gpm) of potable water would be used for inlet air evaporative cooling in summer ambient temperatures. Demineralized water would be used for CT injection for emission control and compressor washing. During the commissioning process, wash effluent would be collected in tanks and, after analysis, disposed of at an approved wastewater treatment facility offsite. Wash effluent would not be generated during normal operation of the NCG Plant.

2.1.2.3 *Emission Monitoring and Controls*

Operating the frame CTs would require air emissions monitoring. Reduction of emissions from the CTs would be achieved through advanced dry low-nitrogen oxide (NO_X) combustion systems and ultra-low-sulfur fuels. Emissions from the units would adhere to the requirements of state and federal regulations, and exhaust stacks would be equipped with continuous emissions monitoring systems.

2.1.2.4 *Natural Gas*

The NCG Plant would be fueled by a reliable supply of natural gas through a new or modified existing commercial agreement. Preliminary estimates indicate that approximately 165,000,000 standard cubic feet per day of natural gas would be required for the NCG CT units. Similarly, the three gas heaters, which are required to raise the supplied natural gas above its dew point, would burn as much as 233,000 standard cubic feet per day of natural gas if running at the same capacity.

The proposed NCG Plant would use an existing gas line currently located at the site. The existing interconnection and existing ancillary infrastructure (e.g., taps, meter station, pressure regulation equipment, etc.) would need to be replaced; however, construction of a new gas pipeline is not required.

Construction of a new gas pipeline is not required.

2.1.2.5 *Fuel Oil*

Consideration of 'dual fuel' at New Caledonia relates directly to issues of fuel security and resiliency. Resiliency, as applied to the power system when faced with a trigger event (e.g., natural, intentional, physical, or digital/cyberterrorism events), should include two concepts:

- Response: Flexibility of a system to respond quickly to a trigger event; and
- Recovery: Ability to recover to normal operating levels quickly and efficiently.

The combination of quick response and recovery addresses the concept of resiliency versus reliability, which reflects ongoing and continuous operations.

Natural gas-fueled electricity generation is an important source of energy for the U.S. power sector in general, as well as at TVA. The natural gas fuel supply and delivery system proposed to serve Alternative B is robust, interconnected, redundant, and geographically diversified. Most of the existing pipeline system is buried underground, offering protection against storms, natural events, and physical attacks. The redundancy of natural gas networks as well as access to the diverse sources of natural gas supply for the generation facilities they would or already serve, would provide a highly reliable and highly resilient fuel source for power generation.

Petroleum fuels also play an important role in TVA's generation mix in both CC and CT facilities as a backup/alternative option in dual-fuel units. The petroleum delivery system is robust, complex, redundant, diversified, and resilient, providing a multi-modal network that utilizes pipelines, trucks, and storage tanks. When combining the network benefits of natural gas with the network benefits of petroleum delivery, dual-fuel generation plants using Ultra Low Sulphur Diesel (ULSD) fuel as a backup fuel further strengthens TVA's resiliency and provides one of the most robust forms of generation on the system. Natural gas units with dual-fuel capability can switch to an alternative fuel and then recover rapidly after the trigger event has subsided.

Alternative B would include consideration of utilizing ULSD as an emergency backup fuel for the CTs. Approximately two million gallons of fuel oil would be delivered to the NCG Site by truck and stored in two 1-million-gallon tanks. This fuel would be permitted to be used for a limited number of hours each year.

2.1.2.6 *Transmission and Electrical System Components*

Onsite Transmission Upgrades

Under the Proposed Action, TVA would construct a new double-breaker bay in the 161-kV yard of the Lowndes County 500-kV Substation. Two 161-kV breakers would be installed along with associated metering, communication, and protective equipment.

Offsite Upgrades to Existing Transmission Lines and Substations

Offsite transmission upgrades would be required for Alternative B, which includes buswork, breaker, switch replacements at the existing Westpoint 161 kV substation, and switch replacements at the existing Okolona, MS 161 kV substation.

If future studies indicate improvements are required to the regional transmission system to maintain system stability and reliability, TVA would provide operating guides for the NCG Site and additional site-specific NEPA reviews would be completed for those additional transmission system needs.

2.1.2.7 *Support Facilities*

Other support facilities that would be constructed as part of this alternative include a new administration/control building. TVA could also construct new warehouses for supplies and/or office space. The final locations for these buildings would be within existing TVA property and near the CT units.

2.1.2.8 *Construction*

Construction equipment, materials, and craft trailers would be stored and staged within the NCG Plant and Lowndes County 500-kV Substation Sites. All construction related materials and equipment would be stored in upland areas, avoiding impacts to streams and wetlands. The appropriate state and federal permits would be acquired if equipment storage and staging requires placement of fill in jurisdictional streams or wetlands.

Borrow fill, if required, would be obtained from an existing commercial borrow pit. If an existing commercial borrow facility is not available and a new, offsite borrow pit is required, additional environmental reviews would be conducted, as appropriate.

At full buildout, the plant would occupy about 35 acres, which includes areas for equipment laydown and mobilization. Subsurface piles would be installed to support foundations for plant components, as required, based on geotechnical investigation recommendations.

TVA estimates a maximum of 200 workers would be employed onsite at the peak of the 2-year construction period. Transportation routes and needs would be determined by the construction contractor. A traffic impact analysis would be performed if necessary to address potential roadway impacts. Additional environmental reviews would be conducted as appropriate and mitigation measures would be implemented if warranted.

Site preparation work, CT plant construction, and other site upgrades would begin in 2025, and it is estimated that the plant would begin commercial operation no later than December 31, 2027. Project materials and equipment would be primarily delivered to the project site by truck and placed in designated project laydown areas until used. Equipment used during the construction phase would include, but would not be limited to, trucks, truck-mounted augers and drills, excavators, as well as tracked cranes and bulldozers. Low ground pressure-type equipment (for example, tracked vehicles) would be used in specified locations (such as areas with soft ground) to reduce the potential for environmental impacts per TVA best management practices (BMPs).

2.1.2.9 *Post Construction Staffing*

Once constructed, it is expected that staff of up to 15 employees and regional staff could operate the new CTs.

2.1.2.10 *Winter Storm Elliot*

TVA's After-Action report for Winter Storm Elliott (TVA 2023d) identifies several actions taken relating to TVA's generating assets that would harden these assets and better protect them against future events of this kind. The opportunities identified in the After-Action report, such as accurate load forecasting to utilities, improved communication across the gas fleet and TVA, and better coordination and implementation of emergency procedures and protocols, would be implemented at the proposed NCG Plant to strengthen it against future extreme weather events. The dual-fuel capability of the NCG Plant would provide further resiliency against extreme weather events.

2.1.3 Alternatives Considered but Eliminated From Further Discussion

To meet the purpose and need of the Proposed Action, generation alternatives must be capable of providing year-round peak capacity as well as serving energy needs and, therefore, must be mature, proven technologies. TVA is targeting 10,000 MW of solar generation in place by 2035 to meet customer demands and system needs. Integrating this significant number of intermittent resources requires a generation fleet that is highly flexible and capable of ramping up and down quickly to cover gaps in renewable generation.

Table 2.1-1 discusses the resource options that TVA considered.

Table 2.1-1. Alternative Resource Evaluations

Resource Option	Meet Purpose and Need for the Proposed Action	Reasoning
Utility and/or Distributed Scale PV Solar	No	Not dispatchable, and generation is intermittent; therefore, must be paired with dispatchable resources such as storage or gas. Does not meet the purpose and need of the Proposed Action; however, TVA is pursuing this option under other TVA programs.
Demand Response	No	Well-positioned to play a role in absorbing load growth resulting from increased electrification of the economy and allows TVA to offset physical capacity needs; however, they are limited in the number of calls available and would not meet the purpose and need of this project.
Energy Efficiency	No	Well-positioned to play a role in absorbing load growth resulting from increased electrification of the economy; however, energy efficiency programs take time to scale and market, increasing costs at the high penetration levels required to meet the needs of this action. This alternative is currently being studied by TVA for further evaluation and potential future deployment.
In and/or Out of Valley Wind	No	Can provide dependable capacity in both summer and winter, though not dispatchable, and generation is intermittent; therefore, it must be paired with dispatchable resources such as storage or gas. Was not selected due to low wind speeds in Tennessee Valley and higher transmission costs for out of-Valley wind, both of which increase relative costs.

Resource Option	Meet Purpose and Need for the Proposed Action	Reasoning
Small Modular Reactors	No	Potential to serve cost-effective baseload or load following needs in the future with low fuel costs, carbon-free generation, advanced passive safety systems, and anticipated cost reductions achieved by assembling components in a factory setting; however, longer timeline and first of a kind deployment risks are incompatible with purpose and need for this action. This alternative is currently being studied by TVA for further evaluation and potential future deployment.
Hydro Pumped Storage	No	Long-duration storage that is currently being studied by TVA for further evaluation and potential deployment in the 2030s. Longer timelines to meet environmental requirements and for construction are incompatible with purpose and need for this action.
BESS	No	Provides dispatchable generation if combined with solar or other generation to meet load growth. While BESS/solar combinations are being pursued under other TVA programs, they are incompatible with the purpose and need for this action.
Distributed Energy Resources	No	Does not meet the need for firm dispatchable generation identified in the purpose and need. Considered in the 2019 IRP as part of TVA's overall strategy but would not meet the needs of this project because the cost for distributed generation is generally higher than utility-scale generation for the same type of resource.

2.1.3.1 *Inflation Reduction Act of 2022*

A key beneficial result of TVA's asset strategy is the reduction in carbon emissions. As TVA implements the asset strategy, and as articulated in TVA's May 2021 Strategic Intent and Guiding Principles document (TVA 2021), TVA is executing a plan to reduce carbon emissions 70 percent from a 2005 baseline by 2030. From this strategy, TVA also envisions a path to 80 percent carbon reduction by 2035 and aspires to net-zero carbon emissions by 2050, while continuing to provide affordable and reliable power for customers. This aligns with the climate goals of the U.S. (as detailed in EO 14008 and EO 14082) to reduce greenhouse gas (GHG) emissions 50–52 percent below 2005 levels in 2030 and achieve net zero emissions by no later than 2050. TVA's plan also makes significant advancements towards meeting the current

Administration's objective of achieving a carbon-free electric sector by 2035 to the extent this objective is compatible with the mandates of least-cost planning and other provisions of the TVA Act requiring TVA to consider diversity, reliability, dispatchability, resiliency, and other related factors.

The Inflation Reduction Act (IRA) of 2022 (Public Law No.: 117-169) may improve the cost and availability of renewable and storage resources in the long-term. Short-term effects immediately following the IRA resulted in increased demand, higher prices, and a limited supply of resources needed for renewable technologies. While the IRA incentivizes the transition of the solar supply chain to the U.S., it is projected that it would take 3 to 5 years for the domestic supply chain to mature and ease the current constraints on the solar industry. Even with the incentives of the IRA, there remain a number of challenges with the development of solar facilities in the near term, mainly the availability of labor and high-voltage equipment would continue to limit buildout through 2025 (Solar Energy Industries Association [SEIA] 2024). While the provisions of the IRA provide substantial incentives for various forms of clean energy, TVA's generation decisions are driven by a number of factors and timing constraints. TVA is optimistic that the IRA will enable faster adoption of renewable resources in the long term and is continuing in its efforts to implement 10,000 MW of solar by 2035; however, enactment of the IRA does not alleviate the need for dispatchable power or alleviate the transmission-related time constraints for solar generation and energy storage facilities.

2.1.3.2 *Greenhouse Gas Standards and Guidelines for Fossil Fuel Fired Power Plants*

The EPA released the proposed rule: New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-fired Electric Generating Stations on May 23, 2023, under Section 111 of the Clean Air Act (CAA). The rule regulates GHG new carbon pollution standards for coal and gas-fired power plants.

The rule becomes effective on July 8, 2024. The construction and operation of the NCG Plant would be consistent with the requirements of any final rules promulgated by the EPA under Section 111 of the CAA. Applicability would be determined at the time of permit review, but this analysis assumes that the rule applies.

2.2 Comparison of Alternatives

Impacts evaluated may be beneficial or adverse and may apply to the full range of natural, aesthetic, historic, cultural, and socioeconomic resources within the project areas of each alternative and within the surrounding areas. Impact severity is dependent upon their relative magnitude and intensity and resource sensitivity. In this document, four descriptors are used to characterize the level of impacts in a manner that is consistent with TVA's current practice. In order of degree of impact, the descriptors are as follows:

- No Impact (or "absent") – Resource not present or, if present, not affected by project alternatives under consideration.
- Minor – Environmental effects are not detectable or are so minor that they would not 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.
- Significant – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

A comparison of the environmental consequences associated with each alternative is presented in Table 2.2-1.

Table 2.2-1. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Air quality	No change from existing conditions	Temporary minor construction impacts associated with emissions from onsite vehicles and equipment, as well as generation of fugitive dust. Operation of the NCG Plant would result in an incremental increase in emissions as measured against the current baseline. These emissions would be monitored and would comply with permit limits and would not lead to exceedance or violation of applicable National Ambient Air Quality Standards (NAAQS).
Climate Change, GHG, and Social Cost of Carbon	No change from existing conditions	Temporary, localized, minor effects during construction. Operation of the NCG Plant would result in a maximum direct increase of 531,728 metric tons of carbon dioxide equivalents per year and a predicted actual direct increase of 344,077 metric tons of carbon dioxide equivalents per year. Implementation of the Action Alternative would result in a net reduction in regional GHG emissions, given the subsequent resulting system flexibility which would allow for successful integration of renewables.
Geology, Soils, and Prime Farmland	No impact	Minor temporary increase in soil erosion, minimized with BMPs. Minor, long-term impacts of up to 6.9 acres of prime farmland soils within the NCG Plant boundary.
Land Use	No impact	Minor, long-term impacts to land use from conversion of up to 6.3 acres from pasture/hay to developed land and 0.6 acre of mixed forest to maintained open space within the NCG Plant boundary.
Groundwater Quality and Quantity	No impact	No direct or indirect project-related effects.
Surface Water Quality and Quantity	No impact	Temporary, minor impacts to jurisdictional surface waters associated with sedimentation from stormwater runoff during construction activities. Impacts would be minimized through implementation of BMPs designed to minimize erosion during construction and operation.
Wetlands	No impact	No direct or indirect project-related effects.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Aquatic Ecology	No impact	Minor, temporary impacts from stormwater runoff during construction and maintenance activities that would be minimized through the implementation of BMPs.
Vegetation	No impact	Minor impacts. Clearance of disturbed herbaceous vegetation and approximately 21.6 acres of forest. Project is expected to impact locally common vegetation with limited conservation value. Impacted forest communities are common within project vicinities, and impacts to forest resources would be negligible compared to the total amount of forest land in the region.
Wildlife	No impact	Minor impact to heavily disturbed low-quality habitat. Impact associated with the loss of forested habitat is minor due to the abundance of similarly suitable habitat in the vicinity of the project area.
Threatened and Endangered Species	No impact	This alternative would likely affect the northern long-eared bat (NLEB) and tricolored bat, and would not affect any of the federally listed plant species. Project activities are within the bounds of impacts analyzed in TVA's programmatic consultation on routine actions with potential to affect federally listed bats that was completed in April 2018 and updated in May 2023 with the U.S. Fish and Wildlife Service (USFWS). With adherence to identified conservation measures, proposed activities may affect and are likely to adversely affect NLEB and would not jeopardize the continued existence of the tricolored bat. With the use of BMPs, impacts to federal and state listed reptiles and amphibians would be minimized. TVA has made no jeopardy determinations for federally proposed or candidate animal species.
Natural Areas and Parks	No impact	Minor temporary impacts to Cooper Creek Bluffs during construction in the form of noise disturbance or traffic.
Cultural and Historic Resources	No impact	No direct or indirect project-related effects. The identified site within the project area is either ineligible for listing or would be avoided.
Visual Resources	No impact	Minor, temporary impacts due to visual contrast during construction activities. Minor long-term effects as a result of construction of a new CT plant, but adjacent to existing, similar industrial structures.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Noise	No impact	Temporary, minor adverse impact associated with increased noise during construction activities. All operational noise impacts are expected to be minor; the noise modeling performed for the project estimated the NCG Plant is expected to contribute a maximum sound level of approximately 63 dBA in the vicinity of the nearest residential noise sensitive receptor.
Transportation	No impact	Temporary, minor increases in traffic volume would occur as a result of construction and operation. Long-term impact on traffic and transportation routes would be negligible.
Solid and Hazardous Waste	No impact	No impact as solid and hazardous wastes generated during construction and operation of the NCG Plant would be managed in accordance with established procedures and applicable regulations.
Socioeconomics and Environmental Justice	No impact	Beneficial short-term impacts during construction. No adverse or disproportionate impacts to low-income or minority communities.
Public Health and Safety and Services	No impact	The operation of the proposed NCG Plant would adhere to TVA guidance and be consistent with standards established by OSHA and applicable state requirements. Therefore, worker and public health and safety during project operation would be maintained and impacts would be minimal.
Utilities	Potential adverse impacts in the form of service disruptions due to inability to meet the increasing energy demands in the Tennessee Valley.	Overall long-term beneficial impacts would occur due to improved system reliability and flexibility to integrate renewables.

2.3 Summary of Best Management Practices and Mitigation Measures

TVA would employ standard practices, routine measures, and other project-specific measures to avoid and minimize effects to resources from implementation of the Proposed Action Alternative. TVA's minimization and mitigation measures have been developed with consideration of BMPs, permit requirements, and adherence to erosion and sediment control plans. TVA would utilize standard BMPs to minimize erosion during construction, operation, and maintenance activities. BMPs are described in A Guide for Environmental Protection and BMPs for TVA Construction and Maintenance Activities – Revision 4 (TVA 2022b).TVA's analysis of potential impacts includes consideration of BMPs and mitigation measures implemented as required to reduce or avoid adverse effects. These measures are discussed in Chapter 3 and summarized below.

2.3.1 Standard and Routine Best Management Practices

2.3.1.1 *Air Quality*

- Fugitive dust produced from construction activities would be controlled by BMPs (e.g., wet suppression) as provided in TVA's fugitive dust control plans required under existing CAA Title V operating permits.

2.3.1.2 *Soils*

- Low ground-pressure-type equipment would be used in specified locations (such as areas with soft ground) to reduce the potential for environmental impacts, per TVA BMPs.
- Implement BMPs described in A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities, Revision 4 (TVA 2022b) to minimize erosion during site preparation.

2.3.1.3 *Surface Water*

- TVA would develop a project specific stormwater pollution prevention plan (SWPPP) as required under the Large Construction General Permit (MSR10) prior to the start of construction.
- Perennial, intermittent, and ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in the project SWPPP and TVA's Guide for Environmental Protection and Best Management Practices (TVA 2022b).
- Equipment washing and dust control discharges would be handled in accordance with BMPs described in the SWPPP for water-only cleaning and/or Mississippi Stormwater Pollution Prevention Plan Guidance Manual for Industrial Activities to minimize construction impacts to surface waters.
- TVA would comply with the terms of the individual National Pollutant Discharge Elimination System (NPDES) permit for industrial wastewater discharges by ensuring the proposed process water discharge meets applicable effluent limits and water quality standards, as identified in the NPDES permit.
- Use TVA BMP procedures for controlling soil erosion and sediment control, such as the use of 50-foot buffer zones, to the extent practicable, surrounding perennial and intermittent streams.

2.3.1.4 *Vegetation*

- Revegetate with native and/or non-invasive vegetation consistent with EO 13112 (Invasive Species).

2.3.1.5 *Cultural Resources*

- If the Mississippi State Historic Preservation Officer (SHPO) and/or federally recognized Indian tribes disagree with TVA's determinations regarding the archaeological findings within the project area, TVA would follow the processes outlined in §800.6-7 for resolving disagreements, which includes seeking ways to avoid, minimize, or mitigate adverse effects, in consultation.

2.3.2 Non-Routine Mitigation measures

2.3.2.1 *Threatened and Endangered Species*

- In areas requiring tree removal, clearing activities would be limited to winter periods (October 1 – March 14) to the extent practicable to minimize impacts to wildlife and protected species. Unavoidable impacts to potential suitable summer roosting habitat for the northern long-eared bat (*Myotis septentrionalis,* NLEB) would be addressed using TVA's programmatic consultation on routine actions with potential to affect federally listed bats that was completed in April 2018 and updated May 2023 with the USFWS in accordance with ESA Section 7(a)(2). For those activities with potential to affect bats, TVA committed to implementing conservation measures established through the programmatic consultation. The conservation measures required for this project are identified in the TVA Bat Strategy Project Screening Form (Appendix C), and they would be implemented as part of the proposed project. Winter tree removal and conservation measures implemented through TVA's bat programmatic consultation would also minimize unavoidable impacts to summer roosting habitat for the Proposed Endangered tricolored bat (*Perimyotis subflavus*).

2.3.3 Transportation

- A transportation study would be conducted to determine the routes used for delivery of construction equipment and project materials.
- Roads used to access the project area would be surveyed to determine the existing conditions prior to construction.
- A traffic impact analysis would be performed if necessary to address potential roadway impacts.

2.4 The Preferred Alternative

TVA has identified Alternative B as its preferred alternative. Under the preferred alternative, TVA would construct a simple cycle frame CT facility generating approximately 500 MW at the NCG Plant. This addition of CT units to the fleet aligns with the 2019 IRP recommendation to enhance system flexibility and TVA's May 2021 Strategic Intent and Guiding Principles (TVA 2021).

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the baseline environmental conditions (affected environment) of environmental resources against which the decision maker and the public can compare the potential effects of the alternatives under consideration (No Action and Action Alternative). Additionally, this chapter contains the analysis and discussion of the potential effects of implementing the alternatives as described in Chapter 2. The environmental consequences of the No Action and Action Alternatives have been evaluated in this Chapter based on a combination of publicly available information and results of TVA's field surveys.

The CEQ's regulations for implementing NEPA include definitions for the types of environmental effects. The CEQ revised the NEPA regulations in April 2022. The presently operative regulations (40 CFR § 1508.1(g)) define "effects" as follows: "Effects or impacts means changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and include the following:

(1) Direct effects, which are caused by the action and occur at the same time and place.

(2) Indirect effects, which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

(3) Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

(4) Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial."

The degree of impact descriptors (no impact, minor, moderate, significant) are defined in Section 2.2. Cumulative effects on the affected environment are addressed in Section 3.21.

3.1 Air Quality

3.1.1 Affected Environment

The CAA (as amended) is the comprehensive law that protects air quality by regulating emissions of air pollutants from stationary sources (e.g., power plants) and mobile sources (e.g., automobiles). It requires the EPA to establish National Ambient Air Quality Standards (NAAQS) and directs the states to develop State Implementation Plans to achieve these standards. This is primarily accomplished through permitting programs that establish limits for emissions of air pollutants. The CAA also requires EPA to set standards for emissions of hazardous air pollutants.

NAAQS have been established to protect the public health and welfare with respect to six criteria air pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), sulfur dioxide (SO_2), and lead (Pb). Primary standards protect public health, while secondary standards protect public welfare (e.g., visibility, crops, forests, soils, and materials) (EPA 2024b).

In accordance with the CAA Amendments of 1990, all counties are designated with respect to compliance, or degree of noncompliance, with NAAQS. These designations include:

- Attainment – any area where air quality achieves the NAAQS;
- Nonattainment – any area with air quality worse than the NAAQS;
- Maintenance – an area that was formerly in nonattainment but has monitored attainment and is currently under a maintenance plan; and
- Unclassified – not enough data to determine attainment status. Unclassifiable areas are treated the same as attainment areas.

The attainment status designations appear in 40 CFR Part 81. The attainment status of a region, in conjunction with projected emission rates or emissions increases, determines the regulatory review process for a new project. The proposed project activities would be in Lowndes County, Mississippi, which is an area designated as in attainment/unclassifiable with the NAAQS for all pollutants (EPA 2024c). Additionally, it is not classified as being in maintenance for any pollutants.

3.1.1.1 *Hazardous Air Pollutants*

Hazardous Air Pollutants (HAPs), sometimes referred to as air toxics, are pollutants that are known or suspected to cause cancer or other serious health effects or adverse environmental effects. The CAA identifies 189 pollutants as HAPs (EPA 2024e). Most HAPs are emitted by human activities, including mobile sources (motor vehicles), stationary sources (factories, refineries, and power plants), and indoor sources (building materials and activities, such as dry cleaning).

States are required to establish an air operating program under Title V of the CAA. Regulations to implement this operating program, 40 CFR Part 70, require each major source of air pollutant emissions to obtain an operating permit, typically issued by the state environmental agency, that consolidates all the air pollution control requirements into a single, comprehensive document covering all aspects of air pollution activities at a facility. In attainment / unclassifiable areas, Title V major source thresholds, the level of potential emissions that require sources to obtain a Title V permit, are 100 tons per year (tpy) for each criteria pollutant, 10 tpy for each individual HAP, and 25 tpy for total HAPs. Issuance of Title V permits falls under the jurisdiction of the Mississippi Department of Environmental Quality (MDEQ) in Mississippi.

Sources that emit less than 10 tpy of a single HAP or less than 25 tpy of a combination of HAPs are referred to as area sources, as opposed to major sources. Emissions from individual area sources are relatively small. However, if located in heavily populated areas that contain several area sources, emissions can be of concern.

3.1.1.2 *Characterization of Existing NCG Site*

Currently, there are no existing CTs at the site. In 2007, the site was dismantled, and the previously existing six frame CTs were removed. The adjacent TVA Lowndes County 500-kV Substation has remained in service and has active electrical equipment.

3.1.2 Environmental Consequences

3.1.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts to air quality.

3.1.2.2 *Alternative B*

Construction Impacts

Under Alternative B, construction activities associated with the CTs and their support systems would result in emissions from the operation of construction equipment driven on paved and unpaved roads and fugitive dust emissions from clearing, grading, and other activities on unpaved areas. Fugitive dust produced from construction activities would be temporary and controlled by BMPs (e.g., wet suppression).

Equipment used during the construction phase would include various heavy equipment, such as graders, bulldozers, backhoes, cranes, loaders, etc. Combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.) would generate local emissions of CO, CO_2, NO_X, PM, SO_2, and volatile organic compounds (VOCs). However, new emission control technologies and fuel mixtures have significantly reduced vehicle and equipment emissions, and it is expected that all vehicles and equipment would be properly maintained and employ the use of diesel emission controls and cleaner fuel, which also would reduce emissions. Air quality impacts from construction activities would depend on both man-made factors (intensity of activity, control measures, etc.) and natural factors, such as wind speed and direction, soil moisture, and other factors. Proposed construction activities would primarily occur at the location on which the previous generating facility had operated, minimizing these kinds of emissions. Overall effects to air quality from construction-associated activities would be temporary and localized. Emissions would only affect the immediate project area and would have limited effects to offsite areas. In addition, dust control actions, including application of wetting agents or soil stabilization products on exposed soils and unpaved roads/travel areas, would be implemented to reduce fugitive dust/particulate emissions. Further details regarding construction emission calculations and impacts are provided in the NCG Plant Air Quality and Greenhouse Gas Assessment, provided as Appendix B to this document.

Fugitive dust/particulate matter emissions would be generated during soil excavation and disturbance and truck traffic over paved and unpaved roads/areas. The largest fraction of fugitive dust emissions would be deposited in the immediate vicinity of the construction area. For a typical mean wind speed of 10 mph, particles larger than about 100 μm are likely to settle out within 6 to 9 meters (20 to 30 feet) from the point of emission. Smaller particles, particularly PM_{10} and $PM_{2.5}$ have much slower gravitational settling velocities and are much more likely to have their settling rate retarded by atmospheric turbulence (EPA 1995). However, those emissions are expected to be minor.

Regulatory Air Permit Requirements

Operation of the proposed six dual-fuel GE 7E.03 simple cycle CTs rated at 994 million British thermal units per hour (MMBtu/hr), three gas-fired heaters rated at 9.9 MMBtu/hr, and one emergency generator rated at 299 brake-horsepower are subject to permitting programs that regulate the construction of new stationary sources of air pollution, typically referred to as New Source Review (NSR). Major NSR is applicable to major sources under Prevention of Significant Deterioration (PSD) regulations; new major stationary sources under the PSD regulation are defined as having 250 tpy (or more) of any criteria pollutant or 100 tpy for specifically listed source categories. Based on the NCG's annual potential-to-emit, the project does not classify as a new major stationary source; therefore, PSD is not applicable.

A source is considered major under the Title V operating permit program if its annual actual or potential emissions are at or above the following thresholds:

- 100 tpy for all air pollutants in attainment areas. Lower standards apply in non-attainment regions (but only for the pollutant that is in non-attainment).
- The thresholds for major sources of HAP are 10 tons per year for a single HAP and 25 tons per year for any combination of HAP.

As the proposed project would have the potential to emit more than 100 tpy of at least one criteria pollutant, TVA would be required to obtain a Title V permit to begin operation of the facility. The Title V operating permit would incorporate limitations from applicable federal regulations, including, but not limited to, the following:

- New Source Performance Standard (NSPS): 40 CFR 60, Subpart IIII, is applicable to the diesel fired fire pump. This NSPS provides emissions standards and operational requirements under NSPS Subpart IIII. Subpart IIII specifies emission standards for non-methane hydrocarbons/ NO_x, particulate matter. Emission standards for the less than 30 liters per cylinder fire pump can be found in Table 4 to Subpart IIII. The proposed project would comply with the requirements contained in this subpart.
- NSPS: 40 CFR 60, Subpart KKKK, is applicable to all stationary gas CT units with a heat input at peak load equal to or greater than 10 million MMBtu/hr, which commenced construction, modification, or reconstruction after February 18, 2005. This subpart contains emission standards for NO_x and SO_2 emissions from CTs, as well as various operational, monitoring, testing, and reporting requirements. The proposed project would comply with the requirements contained in this subpart.
- 40 CFR 60, Subpart TTTTa, is applicable to CT electrical generating units constructed after May 23, 2023, for the control of GHG emissions. For CT units of the size and capacity considered under this alternative, the proposed CO_2 emission standard is 120 pounds of CO_2 per MMBtu to 160 pounds of CO_2 per MMBtu. Other relevant requirements include purchase records for permitted fuels and initial notifications.
- National Emission Standards for Hazardous Air Pollutants (NESHAPs): 40 CFR 63, Subpart ZZZZ is applicable to the established national emission limitations and operating limitations for HAP emissions from stationary reciprocating internal combustion engines (RICEs). Affected sources under Subpart ZZZZ are any existing, new, or reconstructed stationary RICE located at major or area sources of HAP emissions, excluding stationary RICEs being tested at a stationary RICE test cell/stand (40 CFR 63.6590[a]). Because the diesel-fired fire pump meets the criteria of 40 CFR 63.6590I(1) (a new or reconstructed stationary RICE located at an area source), the stationary RICE meet the requirements of Subpart ZZZZ by meeting those of Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, discussed in the NSPS regulatory review section above. No further requirements of Subpart ZZZZ are applicable to the proposed project.

Under the provisions of the CAA, any state can have requirements that are more stringent than those of the national program. In addition to federal air regulations, the proposed project may be subject to state air quality requirements administered by the MDEQ pursuant to 11 Mississippi Administrative Code (MAC) Part 2 (11 MAC:2). Mississippi regulations under 11 MAC:2

establish requirements applicable to stationary sources of emissions. The rules also include requirements related to construction and/or operating permits. The proposed project would be subject to all applicable state permitting requirements contained in 11 MAC:2. A demonstration of compliance with these regulations would be provided in the permit application that would be submitted to MDEQ.

Operational Impacts

Criteria pollutant, CO_2, and HAP emissions would be low and comparable to other similarly-sized CT plants. Each of the six GE 7E.03 natural gas simple-cycle CTs would be equipped with dry-low NO_X (DLN) combustors for natural gas firing and water injection (WI) for ultra-low sulfur No. 2 fuel for minimizing emissions of NO_X. Good combustion design and practices would minimize emissions of CO and VOC. The proposed units would operate during periods of peak demand when sufficient generating capacity may not be available from other TVA assets and to maintain transmission system reliability.

During combustion at 100 percent operating load, the heat input capacity of each new turbine is estimated to be 994 MMBtu/hour at 59°F. The NCG Plant potential emissions provided in Table 3.1-2 are based primarily on each CT's 40 CFR 60, Subpart TTTTa, maximum annual capacity factor (i.e., 20 percent). Predicted actual emissions provided in Table 3.1-3 are based primarily on each CT's capacity factor (i.e., 11.2 percent) being representative of the historical average for natural gas and combusting gas turbines between 2014 and 2023 (U.S. Energy Information Administration [USEIA] 2024).

Table 3.1-2. Maximum Operational Emissions on an Annual Basis Based on NSPS TTTTa Capacity Factor (20%)

	Emissions, tpy										
Emission Source	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**HAPs**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Six (6) GE 7E.03 CTs	237.8	231.6	3	24.3	24.3	64.4	3	525,430.1	10.1	1.1	525,997.9
Three (3) Dew-Point Gas-Fired Gas Heaters	3.8	0.6	0	0.4	0.4	0.8	0	5,547.3	0.1	0	5,553.0
One (1) Fire-Suppression Diesel-Engine Water Pump	0.4	0.5	0	0	0	0	0	77.4	0	0	77.7
Worker Commute	1.1	0.1	0	3.4	0.4	0	0	99.4	0	0	99.7
Total	**243.1**	**232.8**	**3.0**	**28.1**	**25.1**	**65.2**	**3**	**531,154.2**	**10.2**	**1.1**	**531,728.2**

Note: CO_2, CH_4, N_2O, and CO2e are in metric tons. All other totals are in short tons.

Table 3.1-3. Predicted Actual Operational Emissions on an Annual Basis Based on EIA Capacity Factors (11.2%)

	Emissions, tpy										
Emission Source	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**HAPs**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Six (6) GE 7E.03 CTs	183.7	161.8	1.9	16.9	16.9	60.2	5.8	337,973.1	6.6	0.7	338,352.2
Three (3) Dew-Point Gas-Fired Gas Heaters	3.8	0.6	0	0.4	0.4	0.8	0	5,547.3	0.1	0	5,553.0
One (1) Fire-Suppression Diesel-Engine Water Pump	0.4	0.5	0	0	0	0	0	77.4	0	0	77.7
Worker Commute	1.1	0.1	0	3.4	0.4	0	0	99.4	0	0	99.7
Total	**189.0**	**163.0**	**1.9**	**20.8**	**17.8**	**61.0**	**5.8**	**343,697.2**	**6.7**	**0.7**	**344,082.5**

Note: CO_2, CH_4, N_2O, and CO2e are in metric tons. All other totals are in short tons.

As emissions vary with ambient temperature and operating configuration, annual turbine potential emissions are based on a combination of routine operations with time estimated for startup and shutdown events and the capacity threshold of each turbine (as determined by Subpart TTTTa). The maximum emission rates for the six (6) GE 7E.03 simple-cycle CTs were calculated based on a 40 CFR 60, Subpart TTTTa, generation restriction, which equates to approximately 1,561 hours per CT-year. Actual anticipated emission rates are based on the average of historical data for natural gas and combusting gas turbines between 2014 and 2023 and result in 984 hours per CT-year (USEIA). The three (3) gas-fired gas heaters were calculated assuming continual operation throughout the year, equating to 8,760 hours of operation on an annual basis. The one (1) fire suppression diesel-engine water pump's emissions were calculated based on the assumption that they would operate up to a maximum of 500 hours per year. Emissions for these emission units were calculated using manufacturer specification sheets, AP-42 emission factors (where manufacturer emission factors were not provided), and/or known fuel properties.

Operation of new CT units would result in increases in local emissions; however, they would not exceed air permit limits. The Title V operating permit would incorporate permit conditions that would be protective of ambient air quality through the enforcement of permit conditions and assure that the NCG Plant does not contribute to an exceedance of the NAAQS.

3.2 Climate Change, Greenhouse Gases, and Social Cost of Greenhouse Gases

3.2.1 Affected Environment

Greenhouse gases (GHG) are gases that trap heat in the atmosphere. GHGs include methane (CH_4), carbon dioxide (CO_2), nitrous oxide (N_2O), water vapor, and fluorinated gases (e.g., hydrofluorocarbons and perfluorocarbons). GHG emissions are expressed/measured in units of carbon dioxide equivalents (CO_2e). The EPA has established reporting and major source thresholds for GHGs.

Climate change is a global issue that results from several factors, including, but not limited to, the release of GHGs, land use management practices, and the albedo effect, or reflectivity of various surfaces (including reflectivity of clouds). Specific to the proposed project, GHGs are produced and emitted by various sources during the construction and operational phases of power generation facilities.

Estimates of GHG emissions are usually reported in terms of CO_2e to account for the relative global warming potential (GWP), i.e., a given pollutant's ability to trap heat. GWP is calculated over a specific time, typically 100 years. For example, per the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (IPCC 2022), CH_4 has a GWP of 29.8 over 100 years, meaning it is 29.8 times more effective at trapping heat than CO_2. Nitrogen dioxide has a GWP of 273 over 100 years, meaning it is 273 times more effective at trapping heat than CO_2.

An analysis of regional climate impacts prepared for the IPCC Sixth Assessment Report (IPCC 2022) concludes that future climate change projections indicate that further strong warming will reduce precipitation. Analysis of past records and future projections indicates an overall increase in regional temperatures, including in the analysis area. As has been observed at many sites to date, the observed increase is largely the result of the warmer nights and, effectively, higher average daily minimum temperatures at many of the sites in the region.

In 2022, U.S. GHG emissions totaled 6,341.2 million metric tons of CO_2e and 5,487.0 million metric tons of CO_2e after accounting for sequestration from the land sector (EPA 2024f).

The CEQ released new interim guidance on January 9, 2023, regarding GHGs and climate change in the NEPA process (CEQ 2023). Overall, the guidance emphasizes quantification of direct (defined herein as emission arising directly from the construction and operation of the proposed project) and net GHG emissions (defined herein as the change in GHG emissions brought about by the proposed project considering direct emissions, indirect emissions, and any gross emissions reductions brought about by the proposed project), discussing GHGs in terms of equivalencies, calculating social cost of greenhouse gases (SC-GHG), and an explanation of how climate change impacts could impact proposed project construction and operations. There are currently no emission thresholds for GHGs that establish significance under NEPA.

As described in TVA's 2019 IRP, TVA has one of the largest, most diverse, and cleanest energy-generating systems in the nation. For example, in calendar year 2021, 56 percent of TVA's electricity was generated from carbon-free sources, such as nuclear power and renewable resources, including hydropower (TVA 2022c). TVA continues to invest in assets to reduce reliance on coal, modernize the transmission system, and add new renewable energy resources to ensure safe, reliable, and cleaner energy. As described in TVA's Strategic Intent and Guiding Principles document (TVA 2021), TVA has a plan for 70 percent TVA system-wide carbon reductions by 2030 (referenced to 2005 baseline), sees a path to approximately 80 percent carbon reductions by 2035, and aspires to net-zero carbon emissions by 2050. The entire TVA system achieved 63 percent mass carbon emission reductions from 2005 to 2020. This decrease is mainly due to the retirement of coal plants, which emit larger quantities of CO_2 relative to other types of electrical generation, and the replacement of these plants with nuclear and natural gas-fueled generation. Nuclear generation does not result in emissions of CO_2, and the CO_2 output rate from natural gas fueled electricity generation is approximately half that of coal (TVA 2021). As a power generation fleet, TVA has demonstrated a commitment to continued reduction and management of GHG emissions while also maintaining a balanced generation portfolio.

3.2.2 Regulatory Requirements

Although there have been a series of recent administrative changes, no clear GHG emission reduction requirements have been established to date at the federal level for fossil-fired power plants. The national emissions reduction requirements established in the EPA's Clean Power Plan (CPP) rule were repealed on July 8, 2019 (84 FR 32250), and the targets in the Paris Climate Accord were withdrawn in November 2020. The emission reduction requirements established by EPA in the Affordable Clean Energy rule, which replaced the CPP rule, were vacated by the D.C. Circuit Court of Appeals on January 19, 2021. On January 20, 2021, President Biden issued EO 13990 (Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis), and on January 27, 2021, President Biden issued EO 14008 (Tackling the Climate Crisis at Home and Abroad). Amongst other objectives, the EOs set an aspirational target to achieve a net-zero emission economy by 2050 and a carbon-free electricity sector by 2035. In addition, on January 20, 2021, President Biden announced that the U.S. would rejoin the Paris Climate Agreement, and the U.S. became a party to the Agreement on February 19, 2021. The Agreement is a binding international agreement to reduce GHG emissions and impacts due to climate change that was signed by 196 parties on December 12, 2015, and entered into force on November 4, 2016. The Agreement aims to limit global warming to well below 2°C, and preferably to 1.5°C, compared to pre-industrial levels. Prior to the U.S. withdrawal from the Agreement in November 2020, the U.S. had proposed a 26 to 28 percent domestic reduction in GHG emissions by 2025 compared to 2005 levels. On April 22, 2021, the U.S. submitted its nationally determined contribution (NDC) in line with Article 3 of the Paris Agreement. In the NDC, the U.S. is setting an economy-wide target of reducing GHG emissions by 50 to 52 percent below 2005 levels in 2030.

The EPA released the rule: New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-fired Electric Generating Stations on May 23, 2023, under Section 111 of the CAA. The rule regulates GHG new carbon pollution standards for coal and gas-fired power plants.

The rule, known commonly as NSPS TTTTa, became effective on July 8, 2024. The construction and operation of the NCG Plant would be consistent with the requirements of any final rules promulgated by the EPA under Section 111 of the CAA. Applicability would be determined at the time of permit review, but this analysis assumes that the rule applies.

Included in the rule are new requirements relating to GHG emissions from new and reconstructed fossil fuel-fired stationary CT electric generating units (EGUs) that are based on highly efficient generating practices in addition to CCS or co-firing low-GHG hydrogen. The EPA has created three subcategories (low load, intermediate load, and base load) based on the functions the CTs serve and defined by the capacity factor. These subcategories each have a distinct best system of emission reduction (BSER) and standard of performance. The low load subcategory BSER is the use of lower emitting fuels with standards of performance ranging from 120 pounds (lbs) CO_2/MMBtu to 160 lbs CO_2/MMBtu. The Base load subcategory BSER would be applied in phases, with Phase 1 based on highly efficient generation beginning by the date the rule is promulgated. Phase 2 requires CCS installation by 2032.

3.2.3 TVA Carbon Trajectory and Strategic Intent

At its May 6, 2021 meeting, the TVA Board adopted the TVA Strategic Intent and Guiding Principles, which focus on energy supply and decarbonization initiatives (TVA 2021h). These guiding principles commit TVA to delivering safe, low-cost, reliable power while providing responsible stewardship by caring for the region’s natural resources. The guiding principles memorialize the IRP recommendations and reiterate TVA’s plan for 70 percent carbon reduction by 2030, a path to approximately 80 percent carbon reduction by 2035, and aspirations for net-zero carbon emissions by 2050. Thus, while the 2019 IRP does not estimate the net change in GHG emissions attributable to specific resources in the TVA system, it does demonstrate that the resources are being managed in a manner that contributes to a net reduction in the amount of GHG being released while TVA meets the demand of its electricity customers.

To implement the TVA Strategic Intent and Guiding Principles and add new renewables, additional peaking units are needed to operate infrequently during short-duration, high-demand periods. These peaking units are essential for maintaining system reliability requirements, as they can startup quickly to meet sudden changes in either demand or supply resulting from short-term changes in weather that affect renewable resources.

Additional details regarding TVA’s carbon trajectory can be found in the Fiscal Year 2023 Sustainability Report (TVA 2024c).

3.2.4 Social Cost of Greenhouse Gases

The “social cost of carbon,” “social cost of nitrous oxide,” and “social cost of methane” (together, the “social cost of greenhouse gases” [SC-GHG]) is a concept intended to indicate the economic losses that result from emitting one extra ton of GHGs into the atmosphere at a specific point in time.

On January 20, 2021, President Joe Biden issued EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*. Section 2 of the EO calls for federal agencies to review existing regulations and policies issued between January 20, 2017, and January 20, 2021, for consistency with the policy articulated in the EO and to take appropriate action. Thus, the CEQ rescinded its 2019 Draft *National Environmental Policy Act Guidance on Considering Greenhouse Gas Emissions* and has begun to review (with the purpose of updating) its *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews* issued on August 5, 2016 (2016 GHG Guidance) (CEQ 2016). Although CEQ works on updated guidance, it has instructed agencies to consider and use all tools and resources available to them in assessing GHG emissions and climate change effects, including the 2016 GHG Guidance.

Section 5 of EO 13990 encouraged federal agencies to “capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account” and established an Interagency Working Group (IWG) on the SC-GHG. In February 2021, the IWG published *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under EO 13990* (IWG 2021). This is an interim report that updates previous guidance from 2016.

The CEQ released new interim guidance on January 9, 2023, regarding GHGs and climate change in the NEPA process (88 *Federal Register* 1196–1212 [January 9, 2023]). This interim guidance recommends that context for the GHG emissions and climate impacts associated with a Proposed Action be demonstrated by calculating estimated SC-GHG. However, the 2016 GHG Guidance noted that NEPA does not require monetizing costs and benefits. It also noted that “the weighing of the merits and drawbacks of the various alternatives need not be displayed using a monetary cost-benefit analysis and should not be when there are important qualitative considerations” (CEQ 2016).

This EIS calculates GHG emissions directly attributable to the proposed project’s construction and operation, evaluates the net change in GHG emission brought about by the proposed project, and discusses the SC-GHG as it applies to the proposed project.

3.2.5 Environmental Consequences

3.2.5.1 *Alternative A*

Under Alternative A, TVA would not construct the CTs or associated support systems. Therefore, there would be no short-term, temporary construction-related GHG emissions or operational changes due to GHG emissions. Benefits associated with the flexibility of operations of the new CTs would not be realized.

3.2.5.2 *Alternative B*

Construction

As described for criteria air pollutant emissions in Section 3.2 (Air Quality), heavy equipment used during the approximately two-year construction period would include trucks, truck-mounted augers and drills, excavators, tracked cranes, bulldozers, and similar equipment. Combustion of gasoline and diesel fuels by internal combustion engines (e.g., vehicles, generators, construction equipment, etc.) would generate short-term, temporary GHG emissions. Such emission levels are expected to be de minimis in comparison to the regional and worldwide volumes of GHG.

Operation

TVA has evaluated the potential for direct operational increases in GHG emissions as a result of operating the proposed CTs. Annual turbine emissions are based on a combination of routine operations with time estimated for startup and shutdown events and the capacity threshold of each turbine assuming the application of Subpart TTTTa, as well as the anticipated emissions from the gas-fired heaters and emergency generator. The operations allowed by Subpart TTTTa for each proposed CT would result in an approximate maximum of 1,723 hours per CT-yr. Actual anticipated hours are expected to be 984 hours per CT-yr. Startup/shutdown events are estimated at 162 per year for each CT unit. Anticipated operating hours would be expected to be lower based on TVA's experience at other simple-cycle CT plants.

Direct CO_2e emissions are calculated as the sum of the six individual GHGs, including CO_2, CH_4, and N_2O, with applicable global warming potentials applied pursuant to 40 CFR Part 98. The operation of the project would result in a maximum direct increase of 531,728 metric tons of CO_2e per year based on the maximum capacity factor of 20 percent provided by NSPS TTTTa. Because TVA expects to operate each CT less than the nominal hours provided in Subpart TTTTa, annual CO_2e tons would be less than the amounts presented. The predicted actual direct increase of 344,077 metric tons of CO_2e per year was based on the average of capacity factors between 2014 and 2023 for natural gas combusting gas turbines, which was 11.2 percent (USEIA 2024).

Emissions of CO_2 from energy consumption are being used as an operational GHG emissions geographic comparison analysis, as that data is most readily available and consistent across state, U.S., and global data sources. Based on the most recent estimates of CO_2 emissions for Mississippi by the USEIA, total emissions of CO_2 for the state in 2020 were 28.8 million metric tons (USEIA 2024). The most recent total CO_2 emissions for the U.S. due to energy consumption were 4,576.3 million metric tons from USEIA data for 2020 (USEIA 2024b). The most recent total global CO_2 emissions due to energy consumption were 31,500 million metric tons from USEIA data for 2020 (USEIA 2024).

Therefore, assuming 2020 emission rates for GHGs , the net near-term increase in emissions of approximately 531,728 million metric tons of CO_2/year associated with the operation of the NCG Plant, would represent a direct increase of approximately 1.8 percent of total statewide emissions, approximately 0.01 percent of the total U.S. emissions, and 0.0017 percent of the total global GHG emissions. Similarly, the predicted actual net near-term increase in emissions of approximately 344,077 metric tons of CO_2/year associated with the operation of the NCG Plant, assuming 2020 emission rates for GHGs, would represent a direct increase of approximately 1.2 percent of total statewide emissions, approximately 0.008 percent of the total U.S. emissions, and 0.0011 percent of the total global GHG emissions.

In addition to direct GHG emissions, the CEQ's January 2023 Interim NEPA GHG Emissions guidance states that agencies should quantify a Proposed Action's net GHG emissions relative to baseline (CEQ 2023). That is, agencies should consider whether the implementation of an action is likely to result in an increase or a decrease in global GHG emissions by considering direct emissions, indirect emissions, and any gross emissions reductions brought about by the Proposed Action.

TVA's 2019 IRP demonstrates that TVA's system-wide approach to transmission and generation has already brought about a decrease in GHG emission intensity and will continue to bring about an overall reduction in GHG emissions while maintaining grid reliability (TVA 2019a). One component of this plan is the construction of high efficiency "peaking capacity" such as the proposed project. The addition of these assets enables the integration of renewable generation while (a) maintaining grid stability and (b) putting downward pressure on the demand for other, more carbon intensive, peaking facilities.

Thus, while the 2019 IRP does not estimate the net change in GHG emissions attributable to specific resources in the TVA system, it does demonstrate that TVA's resources are being managed in a manner that contributes to a net reduction in the amount of GHG being released while TVA meets the demand of its electricity customers.

Social Cost of Greenhouse Gases

CEQ (2023) recommends reporting society's estimated willingness-to-pay for a small change in GHG emissions as a way of contextualizing project-related changes in greenhouse gas emissions.

The process of estimating society's willingness-to-pay is commonly called "monetization," and it relies extensively on the SC-GHG. The SC-GHG is estimated using a series of 4 relationships: (1) how will a small change in GHG emissions change atmospheric GHG concentrations, (2) how will the change in atmospheric GHG concentrations change climate, (3) how will the change in climate affect humans, and (4) how much are humans willing to pay to avoid those effects.

- When a project is expected to increase global GHG emissions, multiplying the expected increase by the SC-GHG is a measure of the cost imposed on society by the project-related increase in GHG emissions.
- When a project is expected to reduce global GHG emissions, multiplying the expected reduction by the SC-GHG is a measure of the benefit society receives because of the GHG emissions reduction.

While the EIS prepared for the 2019 IRP demonstrates that TVA's system-wide approach to transmission and generation will bring about an overall reduction in GHG emissions while maintaining grid reliability (TVA 2019b), it does not predict the change in GHG emissions associated with each element of the IRP. Because of this, and further noting that there are no established thresholds for identifying significance for NEPA purposes, this EIS notes that the proposed project would bring about a net decrease in GHG emissions as a part of TVA's overall asset strategy and, therefore, is expected to impart a benefit to society. However, the monetary value of that benefit is not estimated.

CEQ (2023) can also be interpreted as suggesting that direct changes in GHG emissions should be multiplied by the SC-GHG. While it is difficult to assign meaning to the resulting numbers because direct changes in GHG emissions are not indicative of the change in atmospheric GHG concentrations that would be brought about by a project (only net changes are indicative of that change), Table 3.2-1 reports the results obtained by multiplying the proposed project's direct emissions by the temporally relevant SC-GHG over the anticipated 30-year life of the NCG Plant assuming the maximum capacity factor for the CTs under NSPS TTTTa. Table 3.2-2 reports the results obtained by multiplying the proposed project's direct emissions by the temporally relevant SC-GHG over the anticipated 30-year life of the NCG Plant assuming the average of capacity factors between 2014 and 2023 for natural gas combusting gas turbines, which was 11.2 percent (USEIA 2024).

However, it is noted that when the project's direct and indirect changes are considered in combination, the project is expected to reduce TVA's GHG emissions by facilitating the integration of renewable generation. Fast-acting peaking capacity balances the intermittency of solar and enables the system to contain more of it, if all other external variables are held constant. Therefore, the meaning of the numbers in Table 3.2-1 is unclear, as they are not representative of the full and actual impacts of the project.

Table 3.2-1. Results Obtained by Multiplying the Proposed Project's Maximum Direct Lifetime Emissions by the SC-GHG

Social Cost Metric	Average Value, 5% Discount Rate	Average Value, 3% Discount Rate	Average Value, 2.5% Discount Rate
SC-CO_2	$177,733,589	$707,612,544	$1,081,331,821
SC-CH_4	$172,216	$464,362	$632,961
SC-N_2O	$150,392	$555,636	$844,819
Total	**$178,056,197**	**$708,632,541**	**$1,082,809,601**

Note:

The SC-GHG represents an estimated present value of future market and nonmarket costs associated with CO2, CH4, and N2O emissions. Values recommended for SC-GHG have fluctuated over time and varied from Administration to Administration, demonstrating the uncertainty in this area. In 2021, the IWG published interim estimates of the SC-CO_2, SC-CH_4, and SC-N_2O. Select estimates are published in the *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990* (IWG on Social Cost of Greenhouse Gases 2021), and the complete set of annual estimates are available on the U.S. Office of Management and Budget's website.

The IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these biophysical changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the calculation is the discount rate, which is used to estimate the present value of the costs and benefits associated with a stream of future events. A higher discount rate implies that future benefits or costs are relatively less valuable than benefits or costs occurring In the present (i.e., future benefits or costs are a less important factor in present-day decisions). The current set of interim estimates of SC-GHG have been developed using three different annual discount rates: 2.5%, 3%, and 5% (IWG on Social Cost of Greenhouse Gases 2021).

As expected with such a complex model, multiple sources of uncertainty are inherent in the SC-GHG estimates. Sources of uncertainty include the biophysical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG on Social Cost of Greenhouse Gases 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

The IWG currently recommends reporting four SC-GHG estimates. Three of the estimates correspond to the differing discount rates (2.5%, 3%, and 5%). The estimates in this table follow the IWG recommendations.

The numbers in Table 3.2-1 assume development would start in 2025 and end-use emissions would be complete after an operational phase of 30 years. Totals may not sum exactly due to rounding.

Table 3.2-2. Results Obtained by Multiplying the Proposed Project's Predicted Actual Direct Lifetime Emissions by the SC-GHG

Social Cost Metric	Average Value, 5% Discount Rate	Average Value, 3% Discount Rate	Average Value, 2.5% Discount Rate
SC-CO_2	$131,811,558	$533,239,659	$817,844,208
SC-CH_4	$130,078	$357,581	$489,494
SC-N_2O	$114,266	$428,965	$654,666
Total	**$132,055,902**	**$534,026,205**	**$818,988,368**

Note:

The SC-GHG represents an estimated present value of future market and nonmarket costs associated with CO2, CH4, and N2O emissions. Values recommended for SC-GHG have fluctuated over time and varied from Administration to Administration, demonstrating the uncertainty in this area. In 2021, the IWG published interim estimates of the SC-CO_2, SC-CH_4, and SC-N_2O. Select estimates are published in the *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990* (IWG on Social Cost of Greenhouse Gases 2021), and the complete set of annual estimates are available on the U.S. Office of Management and Budget's website.

The IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these biophysical changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the calculation is the discount rate, which is used to estimate the present value of the costs and benefits associated with a stream of future events. A higher discount rate implies that future benefits or costs are relatively less valuable than benefits or costs occurring In the present (i.e., future benefits or costs are a less important factor in present-day decisions). The current set of interim estimates of SC-GHG have been developed using three different annual discount rates: 2.5%, 3%, and 5% (IWG on Social Cost of Greenhouse Gases 2021).

As expected with such a complex model, multiple sources of uncertainty are inherent in the SC-GHG estimates. Sources of uncertainty include the biophysical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG on Social Cost of Greenhouse Gases 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

The IWG currently recommends reporting four SC-GHG estimates. Three of the estimates correspond to the differing discount rates (2.5%, 3%, and 5%). The estimates in this table follow the IWG recommendations.

The numbers in Table 3.2-2 assume development would start in 2025 and end-use emissions would be complete after an operational phase of 30 years. Totals may not sum exactly due to rounding.

Climate change is driven by atmospheric concentrations of GHGs. Therefore, when calculating the impacts a project would have on climate change, the analysis is correctly based on the net change in GHG emissions brought about by the proposed project.

The net effect of the proposed project would be to reduce TVA's system-wide GHG emissions by providing flexible, dispatchable generation that would enable the integration of renewable generation into their system, in alignment with the 2019 IRP (TVA 2019a). The net reduction in GHG emissions would put downward pressure on the rate of climate change.

3.3 Geology, Soils, and Prime Farmland

3.3.1 Affected Environment

3.3.1.1 *Site Geology*

The project area is located within the East Gulf Coastal Plain Physiographic Province of Mississippi. The East Gulf Coastal Plain is characterized by sandhills and longleaf pine-dominated uplands as well as pine flatwoods and savannas, seepage bogs, bottomland hardwood forests, barrier islands/dune systems, and estuaries. The project area is underlain by the Eutaw Formation, which formed during the Late Cretaceous Epoch (100.5 to 66 million years ago). The Eutaw Formation overlies the McShan Formation and underlies the Selma Group and consists dominantly of thinly laminated glauconitic sand and clay; however, small chert gravels may be present in basal beds, not recognized in counties to the north (U.S. Fish and Wildlife [USFWS] 2015; U.S. Geological Survey [USGS] n.d.[a]).

3.3.1.2 *Geologic Hazards*

Karst Topography
"Karst" refers to a type of topography that is formed when rocks with a high carbonate content, such as limestone and dolomite, are dissolved by groundwater to form sinkholes, caves, springs, and underground drainage systems. Karst topography forms in areas where soluble rock types, such as limestone and dolomite, are near the surface. The project area does not have underlying carbonate rock and is not susceptible to karst development (National Park Service 2022).

Seismic Events
A review of seismic hazards for the project area included a review of two percent and 10 percent probability of exceedance in fifty (50) years for the project area and recorded earthquakes. To make such estimations of the probability of exceedance, the USGS considers the past seismic history of an area and the expected decrease in intensity relative to the distance from the epicenter. These maps are used to create and update design provisions in building codes in the U.S. The codes provide design standards for buildings, bridges, highways, and utilities, including natural gas pipelines. Values on these seismic hazard maps are called peak ground acceleration (pga) values, which is a common measurement of ground motion. They are expressed as a percentage of gravitational acceleration (acceleration of a falling object due to gravity [g]); the higher the value, the greater the potential hazard. Typical bedrock pga values with a 2 percent probability of being exceeded during a 50-year period are between 0.010 g and 0.100 g for areas that are not seismically active. Seismically active areas, such as the West Coast, typically have corresponding bedrock pga values between 0.40 g and 1.00 g. The probability of exceedance at the project area is low: the 10 percent probability of exceedance of the pga value for the project area in fifty (50) years is 0.05 g (10 percent probability of exceedance in 50 years), and the 2 percent probability of exceedance in 50 years is 0.25 g (USGS 2023).

Furthermore, there are only five recorded earthquakes within 25 miles of the project area between 1975 and 2020. The magnitude of these earthquakes ranged from 2.6 to 3.2, and all occurred to the east, between Bluff, Alabama, and Palmetto, Alabama. The closest earthquake recorded in Mississippi occurred approximately 56 miles to the northwest near Reid, Mississippi (USGS 2024a). Due to the distance from recorded earthquakes, the chance of significant disruption at the ground surface (landslides, fissures, sand boils, lateral spreads, subsidence, submergence, and uplift) as a result of seismic activity is low at the project area.

Faulting and Liquefaction Potential
A fault is a fracture in the bedrock where movement has occurred relative to each side of the fracture. Movement can range from just a few inches to tens of feet, depending on the earthquake's magnitude. Generally, faults occur in various sizes and ages and can extend to

the ground surface or be buried deep within the Earth's crust and have no surface expression (USGS n.d.[b]).

Most faults in the central and eastern U.S. are buried and do not have a fault line or do not extend to the surface and, therefore, are not typically mapped on geologic maps. East of the Rocky Mountains, faults are usually not visible to a person standing on the ground because thick soil at the surface obscures most fault lines. Faults are commonly considered active if they have moved one or more times in the last 10,000 years (USGS n.d.[c]). However, faults with activity recorded within the Quaternary (the past 1.6 million years) are the most relevant for studies of active earthquake-related faults (USGS n.d.[b]). Existing, active, Quaternary faults have the highest potential for future large earthquakes and could be used to estimate earthquake hazards since most hazards occur on pre-existing faults. However, actual displacement of the Earth's surface along a fault during an earthquake is extremely rare in the eastern U.S. There are very few mapped Quaternary faults in the eastern U.S., making them less reliable as a hazard indicator than historical earthquake occurrences (USGS 2004).

A review of the USGS Quaternary Faults and Folds database, which contains information on faults and associated folds in the U.S. that are believed to be sources of more than six earthquakes having a magnitude greater than six during the Quaternary Period (the most recent geologic period), shows there are no known faults of this age located within the vicinity of the project area. The closest fault areas to the project area are the Gulf-margin normal fault (Class B) and the New Madrid Seismic Zone (NMSZ) (historic), located approximately 110 miles to the southwest and 160 miles to the northwest, respectively. The Gulf-margin fault is classified as a Class B fault due to its low seismicity and because they may be decoupled from underlying crust, making it unclear if they can generate significant seismic ruptures that could cause damaging ground motion (USGS 2022). The NMSZ is considered historic, with the most recent earthquakes occurring over several months in the winter of 1811 and 1812 and the three largest earthquakes ranging between magnitudes of 7 and 8 (USGS n.d.[e]). The geologic record of pre-1811 earthquakes indicates that the New Madrid seismic zone has repeatedly produced sequences of major earthquakes, including several of magnitude 7 to 8, over the past 4,500 years (USGS 2019). Although the NMSZ is considered historic, hundreds of small earthquakes occur each year but are too small to be felt by humans and can only be detected by sensitive instruments (Missouri Department of Natural Resources n.d.).

Soil liquefaction is a physical process that takes place during some earthquakes that may lead to ground failure. Ground failure can be due to the presence of Pleistocene sands and silts with very low or no clay content, natural deposits, or human-made land, the presence of saturated soils where the space between individual particles is completely filled with water, or from severe shaking, which may be caused by an earthquake (USGS n.d.[c]).

Young sediments are not present within the project area, as the Eutaw formation was formed during the Late Cretaceous (USGS n.d.[d]). Also, according to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) (2024) Web Soil Survey, approximately 88 percent of the project area soils are classified as non-hydric. Therefore, the potential for seismic activity related ground motion at the project area is low.

Because the potential for seismic ground shaking in the vicinity of the project area is low, the probability of soil liquefaction is also low. Due to the older age and stability of geologic formations, the low percent of project area containing hydric soils, and low potential of both seismic activity and potential of ground motion, the project area has "very low" susceptibility to liquefaction.

3.3.1.3 *Soils*

Soil types and descriptions were obtained from the USDA NRCS Web Soil Survey for the project area (USDA NRCS 2024). The project area is within the South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region and encompasses nine distinct soil map units (Table 3.3-1) (USDA NRCS 2024). Of those, three soil map units are listed as a hydric soil or include hydric components (see Table 3.3-1) (USDA NRCS 2024). See Figure 3.3-1 for the location of each USDA NRCS soil map unit within the project area. Figure 3.3-1 also indicates which soil map units are classified as prime farmland soils. Land use and prime farmland are discussed further in Section 3.4.

Table 3.3-1. NRCS-mapped Soils Within the Project Area, NCG Plant Project, Lowndes County, Mississippi

Map Unit Symbol	Map Unit Name	Hydric Criteria	Drainage Class	Farmland Classification	Acreage Within Project Area[1]	Percentage of Project Area[1]	Acreage Within Project Area (Excluding Developed Areas)[1,2]	Percentage of Project Area Excluding Developed Areas[1,2]
CoA	Caledonia silt loam, 0 to 2 percent slopes	No	Well drained	All areas are prime farmland	33.3	23.0%	19.1	13.2%
SaB	Savannah silt loam, 2 to 5 percent slopes	No	Moderately well drained	All areas are prime farmland	25.5	17.7%	12.3	8.5%
Pa	Paden silt loam	No	Moderately well drained	All areas are prime farmland	24.2	16.7%	9.6	6.6%
CoB	Caledonia silt loam, 2 to 5 percent slopes	No	Well drained	All areas are prime farmland	20.6	14.2%	15.3	10.6%
SaC2	Savannah silt loam, 5 to 8 percent slopes, eroded	No	Moderately well drained	Farmland of statewide importance	18.4	12.7%	2.8	1.9%
Gu	Guyton silt loam	Yes	Poorly drained	Prime farmland, if drained and either protected from flooding or not frequently flooded during the growing season	10.1	7.0%	10.1	7.0%
SnF	Smithdale-Saffell complex, 15 to 35 percent slopes	No	Well drained	Not prime farmland	5.2	3.6%	5.2	3.6%
SaA	Savannah silt loam, 0 to 2 percent slopes	Yes	Moderately well drained	All areas are prime farmland	4.9	3.4%	0.1	0.1%

Map Unit Symbol	Map Unit Name	Hydric Criteria	Drainage Class	Farmland Classification	Acreage Within Project Area[1]	Percentage of Project Area[1]	Acreage Within Project Area (Excluding Developed Areas)[1,2]	Percentage of Project Area Excluding Developed Areas[1,2]
Ma	Mantachie loam, 0 to 2 percent slopes, occasionally flooded	Yes	Moderately well drained	All areas are prime farmland	2.6	1.8%	2.6	1.8%
				Total[2]	**144.7**	**100.0%**	**77.1**	**53.3%**

Source: Google Maps 2024; USDA NRCS 2024.

1 Acreages and percentages are rounded to 0.1.

2 Developed areas estimated using aerial imagery.

2 Total values may differ slightly from total expected values due to rounding.

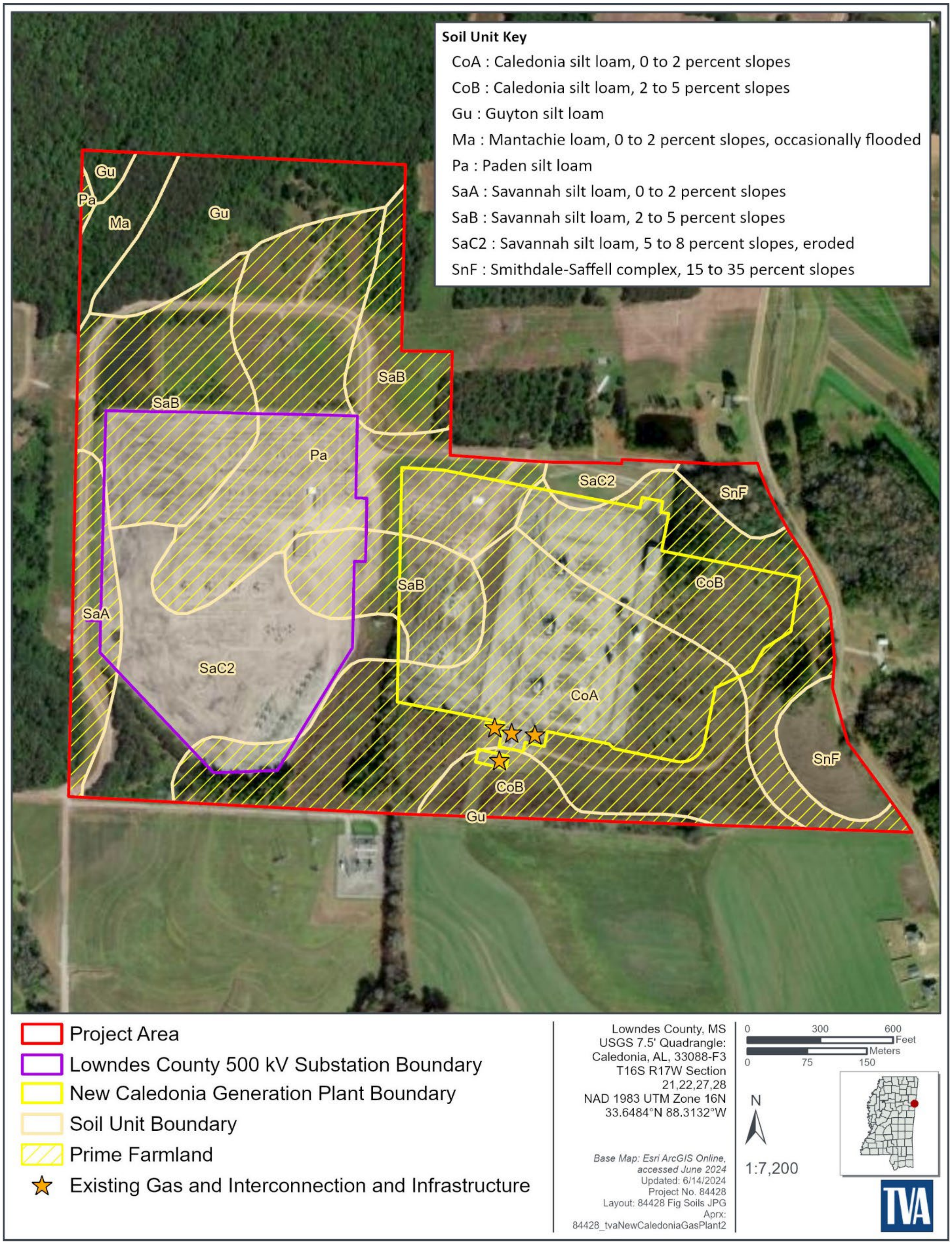

Figure 3.3-1. Soil Map Units within the Project Area

According to the USDA NRCS Web Soil Survey (USDA NRCS 2024), a variety of soil map units are present within the project area. Caledonia silt loam, 0 to 2 percent slopes (CoA), Paden silt loam (Pa), and Savannah silt loam, 2 to 5 percent slopes (SaB), are the dominant soil map units in the project area and account for approximately 57.4 percent of the area. None of these soil map units are classified as a hydric soil, and the drainage class of the three dominant soil map units range from moderately well drained to well drained (USDA NRCS 2024). Guyton silt loam (Gu), Mantachie loam, 0 to 2 percent slopes, occasionally flooded (Ma), and Savannah silt loam, 0 to 2 percent slopes (SaA) are the only hydric soils within the project area and account for approximately 12.2 percent of the area, which are mainly located at the northern and western portions of the project area (see Figure 3.3-1) (USDA NRCS 2024).

A former private CT facility, existing Lowndes County 500-kV Substation, and associated access roads encompass approximately 67.6 acres (46.7 percent) of the project area. As a result of these developments, the soils within more than half of the project area have been previously disturbed or replaced by anthropogenic fill. Soils outside the developed areas are composed of the same soil map units as the overall project area; however, to a lesser extent. Dominant soil map units within the project area, excluding the existing developed sites, include Caledonia silt loam, 0 to 2 percent slopes (CoA), Caledonia silt loam, 2 to 5 percent slopes (CoB), and Savannah silt loam, 2 to 5 percent slopes (SaB), and account for approximately 32.3 percent of the area (USDA NRCS 2024). Excluding the developed sites, hydric soils within the project area account for approximately 8.8 percent of the area (see Figure 3.3-1) (USDA NRCS 2024).

3.3.1.4 *Prime Farmland*

As required by the 1981 Farmland Protection Policy Act, all federal agencies are to assess impacts to prime farmland prior to permanently converting to land use incompatible with agriculture. Prime farmland is defined by the USDA NRCS as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Of the nine soil map units identified in Section 3.3.1.3 (summarized in Table 3.3-1 and depicted in Figure 3.3-1) for the project area, six are considered prime farmland and account for approximately 76.8 percent of the project area (USDA NRCS 2024). Additionally, Guyton silt loam (Gu) accounts for approximately 7.0 percent of the project area and is classified as prime farmland if drained and either protected from flooding or not frequently flooded during the growing season, while Savannah silt loam, 5 to 8 percent slopes, eroded (SaC2) accounts for approximately 12.7 percent of the project area and is classified as farmland of statewide importance (USDA NRCS 2024).

Table 3.3-1 identifies the farmland soil classification associated with each soil map unit mapped within the project area. Based on aerial imagery, the former private CT facility and Lowndes County 500-kV Substation encompass approximately 67.6 acres (46.7 percent) of the project area. As a result, more than half the project area has been previously disturbed or replaced by anthropogenic fill and soils classified as prime farmland or farmland of statewide importance within these areas have been previously converted. The prime farmland and farmland of statewide importance soils outside of these developed areas are composed of the same soil map units as the overall project area, but to a lesser extent. Prime farmland and farmland of statewide importance soils within the project area, excluding the existing developed sites, account for approximately 42.7 percent (61.8 acres) of the area (USDA NRCS 2024). However, all soils onsite were converted when the land was acquired by the federal government for TVA power projects.

3.3.2 Environmental Consequences

3.3.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts to the geologic or soil resources in the project area.

3.3.2.2 *Alternative B*

Under Alternative B, TVA would construct and operate a simple cycle frame CT facility at the NCG Site. Since the proposed project would be constructed and operated at a former facility site, a majority of the site has already been disturbed and graded. Installation of the stormwater/process pond would have negligible impacts on geology, and construction of a new gas pipeline is not anticipated. Therefore, negligible impacts on geologic features would be anticipated from construction and operation of the proposed project.

Due to the low probabilities of exceedance, low occurrences of earthquakes in the vicinity of the project area, and the low susceptibility to soil liquefaction at the project area, seismic or liquefaction hazards are not anticipated at the project area. Therefore, it is not anticipated that the NCG Plant would be impacted by geologic hazards during operation.

Construction of the NCG Plant would include grading and site preparation that would result in minor impacts to soil resources. Construction would temporarily disturb approximately 61.8 acres of prime farmland and farmland of statewide importance soils in the project area. However, all soils onsite were converted when the land was acquired by the federal government for TVA power projects. Therefore, there are no new anticipated impacts to prime farmland, and consultation on prime farmlands (through completion of Form AD 1006) is not required. A SWPPP would be developed for the site and would identify BMPs that would be implemented to minimize erosion during land clearing and site preparation. The BMPs identified in the SWPPP would be consistent with the *Mississippi Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas - Volume 1 Erosion and Sediment Control Practices* (Mississippi Handbook; MDEQ 2011a). Implementation of the Action Alternative would result in near-surface soil compaction due to heavy construction vehicles and soil erosion caused by ground-disturbing activities such as tree clearing and site grading. Subsequent impacts to groundwater and surface water impacts are discussed further in Sections 3.5 and 3.6, but impacts are expected to be minor and temporary. BMPs, as described in the SWPPP and consistent with the Mississippi Handbook (MDEQ 2011b), would be used during site development to avoid contamination of surface water from soil erosion in the project area. Borrow fill, if required, would be obtained from an existing commercial borrow pit. If an existing commercial borrow facility is not available and a new, offsite borrow pit is required, additional environmental reviews would be conducted, as appropriate. With implementation of BMPs, construction impacts to soil resources, including soils classified as prime farmland and farmland of statewide importance, would be minor and temporary.

Following construction and during operation of the NCG Plant, all areas outside of the plant boundary would be revegetated with native or non-native grasses and allowed to revert back to preconstruction conditions. All areas within the NCG Plant boundary would be maintained for operation of the NCG Plant. The creation of a new impervious surface for the placement of additional permanent plant equipment would result in a minor increase in stormwater runoff from the NCG Plant and could potentially contribute to minor increases in soil erosion during operation, which would be controlled by implementation of BMPs and appropriate stormwater management. Additional impacts to soil resources would not occur during operation of the proposed project.

Depending on the final site layout, operation of the proposed project would result in minor impacts to prime farmland soils (up to 6.9 acres) in previously undeveloped areas within the NCG Plant boundary. However, prime farmland soils and farmland of statewide importance soils within the plant boundary are likely no longer present and, if present, have been previously converted; therefore, there would be no additional impact to these soils. Currently, these areas are not used as farmland and are unlikely to be farmed in the future, given that they are located within the TVA Lowndes County 500-kV Substation and NCG Plant boundaries. Consequently, given the small amount of farmland soils that would be affected by operation of the proposed project, implementation of the Action Alternative would result in only minor, long-term impacts to farmland soils.

3.4 Land Use

3.4.1 Affected Environment

The project area is located between Caledonia and Woodlawn, Mississippi, and is accessible by Caldwell Road just north of the site (see Figure 1.1-1). The project area is situated within approximately 145 acres of the previously developed NCG Site and Lowndes County 500-kV Substation sites. There are only six incorporated cities, towns, and census-designated places within Lowndes County: Artesia, Caledonia, Columbus, Columbus Airforce Base, Crawford, and New Hope. The proposed project area does not fall within the boundaries of any of them (HomeTownLocator 2024). According to the Building Inspection Department/Planning and Development for Lowndes County, there are no zoning ordinances for unincorporated areas of the county (Larry Collums, Lowndes County, personal communication, April 2024); therefore, this parcel is not identified by a particular zone type.

Historically, the land within the project area was used for agriculture, and much of the area has previously been cleared. Currently, a large portion, approximately 46.7 percent (67.6 acres), of the project area has been developed. Based on the Multi-Resolution Land Characteristics (MRLC) consortium National Land Cover Dataset (NLCD), as of 2021, approximately 31.6 percent (45.7 acres) of the project area consists of pasture/hay and approximately 56.9 percent (82.4 acres) consists of developed (open space, low intensity, medium intensity, and high intensity) land cover (Table 3.4-1, Figure 3.4-1).

The surrounding 5-mile area is dominated by undeveloped woodlands (woody wetlands, mixed forest, deciduous forest, evergreen forest) (54.6 percent [30,134.0 acres]) and agricultural fields (pasture/hay, cultivated crops) (32.4 percent [17,855.5 acres]) (Table 3.4-2, Figure 3.4-2) (MRLC 2024). Developed areas account for approximately 7.6 percent (4,205.8 acres) of the surrounding area and are mainly located within cities/towns, residential areas, and along roadways (Table 3.4-2, Figure 3.4-2) (MRLC 2024). Several residences are adjacent to the project area; however, the majority of the residential developments do not occur within the direct vicinity (less than 0.5-mile) of the project area and mainly occur along roadways, including along Caldwell Road (east-west) and Seed Tick Road (north-south), which border the site. The nearest single-family residential areas are further discussed in Sections 3.14 and 3.15. There are not any commercial or industrial developments adjacent to the project area.

Table 3.4-1. NLCD-mapped Cover Types Within the Project Area

Cover Type	Acreage Within Project Area[1]	Percentage of Project Area[1]
Pasture/Hay	45.7	31.6%
Developed, High Intensity	39.8	27.5%
Developed, Medium Intensity	27.7	19.1%
Woody Wetlands	12.6	8.7%

Cover Type	Acreage Within Project Area[1]	Percentage of Project Area[1]
Developed, Low Intensity	11.9	8.2%
Mixed Forest	3.7	2.6%
Developed, Open Space	3.0	2.1%
Grassland/Herbaceous	0.2	0.2%
Shrub/Scrub	<0.1	<0.1%
Total[2]	**144.7**	**100.0%**

Source: MRLC 2024.

[1] Acreages and percentages are rounded to 0.1.

[2] Total values may differ slightly from total expected values due to rounding.

Table 3.4-2. NLCD-mapped Cover Types Within Five Miles of the Project Area

Cover Type	Acreage Within Five Miles of the Project Area[1]	Percentage Within Five Miles of the Project Area[1]
Woody Wetlands	16,618.7	30.1%
Pasture/Hay	12,422.4	22.5%
Mixed Forest	5,777.6	10.5%
Cultivated Crops	5,433.1	9.8%
Evergreen Forest	3,882.7	7.0%
Deciduous Forest	3,855.0	7.0%
Developed, Open Space	2,375.3	4.3%
Developed, Low Intensity	1,362.1	2.5%
Emergent Herbaceous Wetlands	1,031.0	1.9%
Grassland/Herbaceous	863.3	1.6%
Shrub/Scrub	747.9	1.4%
Developed, Medium Intensity	345.7	0.6%
Open Water	295.3	0.5%
Developed, High Intensity	122.8	0.2%
Barren Land (Rock/Sand/Clay)	53.4	0.1%
Total[2]	**55,186.2**	**100.0%**

Source: MRLC 2024.

[1] Acreages and percentages are rounded to 0.1.

[2] Total values may differ slightly from total expected values due to rounding.

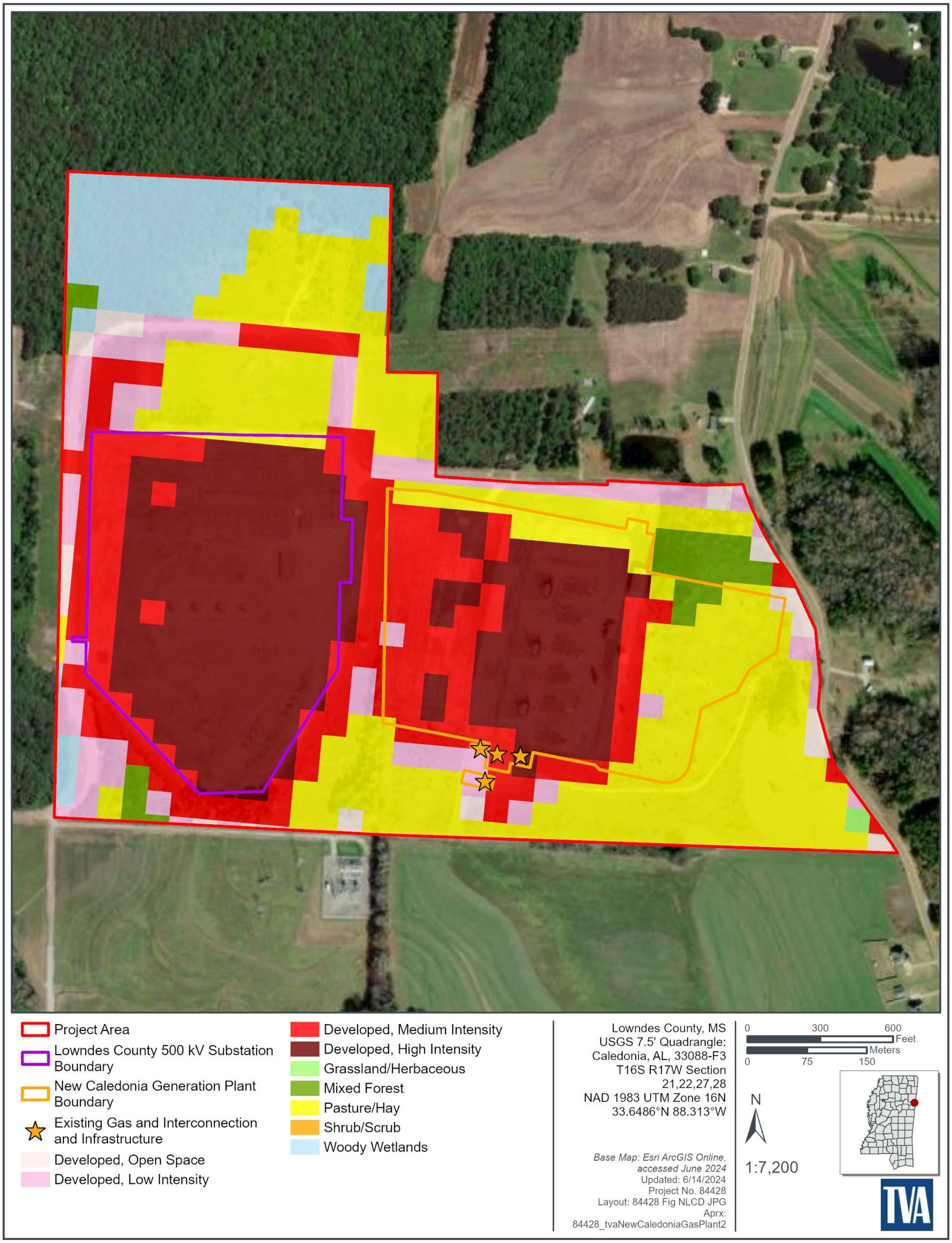

Figure 3.4-1. NLCD Map of Project Area

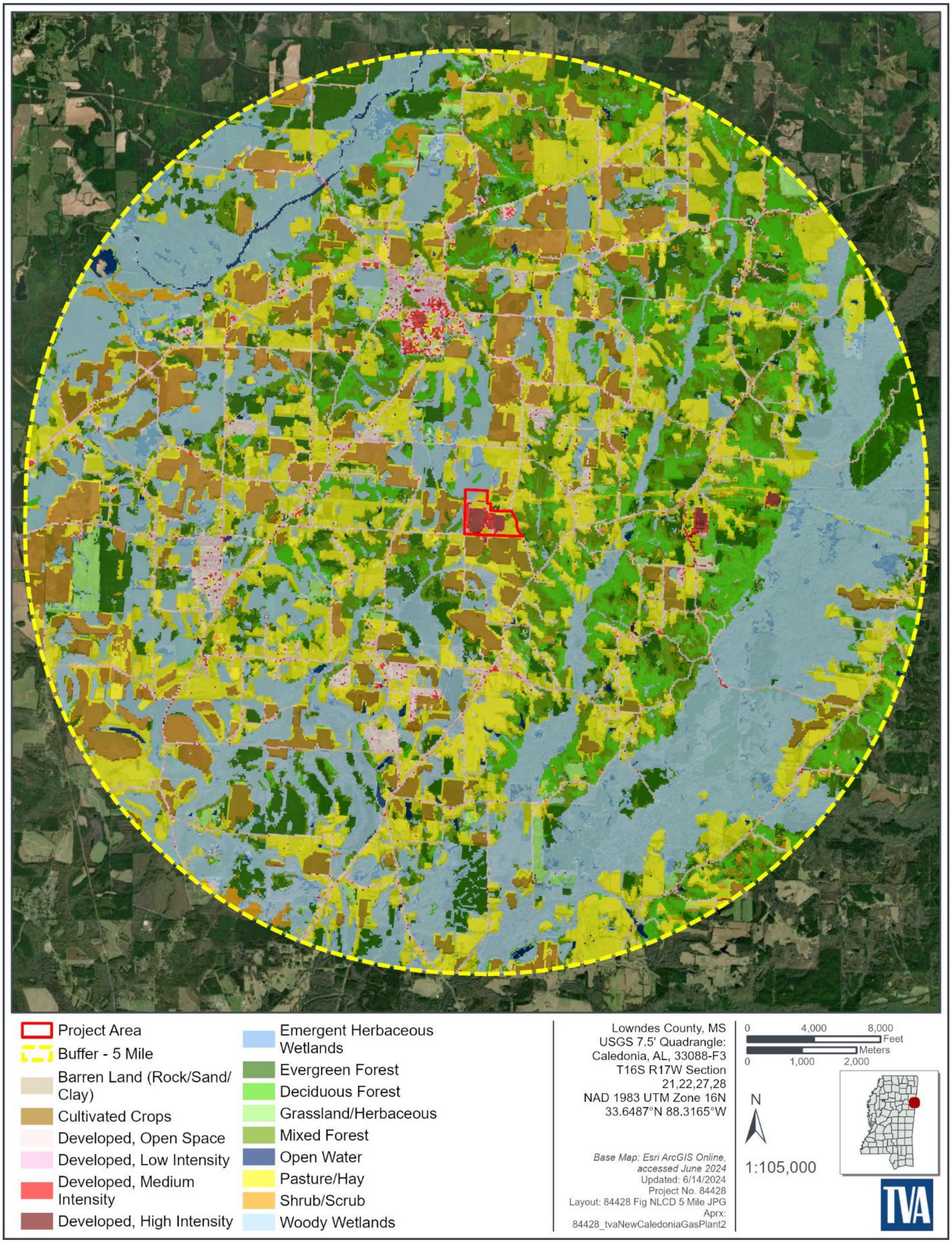

Figure 3.4-2. NLCD Map of 5-miles Surrounding the Project Boundary

3.4.2 Environmental Consequences

3.4.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no change in land use within the project area.

3.4.2.2 *Alternative B*

Under Alternative B, TVA would construct the proposed project, and areas not previously developed would be cleared and graded, including the removal of approximately 21.6 acres of forested area, to allow for the staging of construction equipment and materials. Depending on the final site layout, at full buildout there would be up to 6.3 acres of conversion of pasture/hay to developed land for placement of permanent plant equipment such as fuel and water tanks. All areas outside of the NCG Plant boundary would be revegetated with native or non-native grasses and allowed to revert back to preconstruction conditions. Everything within the property would be maintained as mowed lawn or in aggregate, which would result in conversion of approximately 0.6 acre of mixed forest to maintained open space in the northeast corner of the NCG Site; the remaining 21.0 acres of forest cleared during construction would be allowed to naturalize back over time. Because the property is mostly developed for industrial use and the site has largely been cleared of vegetation, implementation of the Action Alternative would result in minor long-term impacts to land use.

3.5 Groundwater Quality and Quantity

3.5.1 Affected Environment

3.5.1.1 *Regional Aquifers*

The project area is located within the Southeastern Coastal Plain Aquifer System. The groundwater system in Lowndes County, Mississippi, consists of two major hydrogeologic units: a surficial unconfined alluvial aquifer (the Eutaw-McShan Formation/Black Warrior River Aquifer) and a deeper confined to semi-confined aquifer (the Gordo Formation Aquifer). The deeper aquifer is overlaid by the Black Warrior River confining unit, and water bearing material exists within the Black Warrior River Aquifer. The Black Warrior River Aquifer consists of the Eutaw and McShan Formations, underlain by the Gordo Formation, underlain by the Coker Formation (USGS 1996). The largest sources of groundwater in the region are within the Eutaw-McShan Formation (Black Warrior River Aquifer) and the Gordo Formation Aquifer.

The Eutaw-McShan Formation consists of light greenish-gray well-sorted micaceous cross bedded fine to medium sand that is fossiliferous and glauconitic in part and contains greenish-gray micaceous silty clay and medium-dark-gray carbonaceous clay. The depth to water in the Eutaw Formation (Black Warrior River Aquifer) is 15 to 36 feet below ground surface. The Gordo Formation consists of massive beds of cross bedded sand, gravelly sand, and lenticular beds of locally carbonaceous clay, partly mottled moderate-red and pale-red-purple (USGS 1996). The depth to water in the Gordo Formation Aquifer is 43 to 150 feet below ground surface. The confined Gordo Formation Aquifer receives most of its recharge north of the project area at the formation outcrop. The regional groundwater flow within the Eutaw Formation (Black Warrior River Aquifer) in the vicinity of the project area is west-southwest, coinciding with a dip in the formation (Parsons Engineering Sciences 1997).

3.5.1.2 *Groundwater Use and Quality*

Public water supply in Caledonia, Mississippi, is sourced from the Gordo Formation Aquifer. Results from a 2019 sampling effort indicate elevated levels of barium, copper, fluoride, and lead (Caledonia Water and Sewer Department 2020). There are two groundwater wells within a 2-mile radius of the project area; both wells are registered with the Town of Caledonia (MDEQ n.d).

The Gordo Formation Aquifer was not drilled extensively until approximately 1960. The shallower Eutaw-McShan Formation (Black Warrior River Aquifer) supplied enough water for the local population without requiring additional treatment until approximately 1960, when demands from population growth and development of heavy industry drove higher demands for water. The Gordo Formation Aquifer is capable of yielding greater quantities of water than the Eutaw-McShan Formation (Black Warrior River Aquifer), but water from the Gordo Formation Aquifer requires treatment for some uses due to high iron concentrations (Phillips and Hoffman 1994).

Regional topography (USGS 2024b) indicates the land surface regionally slopes from north to south. Generally speaking, the regional groundwater flow direction would be expected to mimic surface topography from the north to the south. There are five Superfund sites in Lowndes County, Mississippi; however, none are located within two miles of the project area. All of the Superfund sites are located in Columbus, Mississippi, which is approximately 10 miles southwest of the project area, and therefore, should not have an impact on the project. In addition to Superfund sites, Toxic Release Inventory (TRI) sites were also assessed within the vicinity of the project area. There are no TRI sites within two miles of the project, and therefore, should not have an impact on the project. Due to the lack of Superfund Sites and TRI sites within a 2-mile radius of the project, potential groundwater contamination is not expected to impact the project area.

3.5.2 Environmental Consequences

3.5.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no change in groundwater conditions at the NCG Site.

3.5.2.2 *Alternative B*

Under Alternative B, TVA would construct and operate a simple cycle frame CT facility. Alternative B would include construction of an onsite stormwater/process pond as well as water treatment, as needed, to support each CT.

The construction of the stormwater/process pond is not anticipated to impact groundwater as the pond would be lined, and the proposed project is in an area that lacks karst features. Potable water would be obtained from the existing public supply. Therefore, no impacts to groundwater associated with the construction and operation of the NCG Plant are anticipated. During the commissioning process, all wash effluent would be collected in tanks and disposed of at an approved offsite wastewater treatment facility. Wash effluent would not be generated during normal operation of the CT facility. BMPs, such as those described in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (TVA 2022b) and a spill prevention, control, and countermeasure plan would be used to avoid contamination of groundwater from project activities. The use of such BMPs would reduce the possibility of any onsite spills or hazardous materials from reaching the groundwater during construction and operation. Therefore, there would be no impacts to groundwater associated with construction or operation of the NCG Plant.

3.6 Surface Water Quality and Quantity

3.6.1 Affected Environment

The proposed NCG Site is located in Lowndes County, Mississippi, approximately 2.1 miles south of Caledonia, Mississippi. The site was formerly a private CT site, but much of the energy infrastructure was removed in 2007, with the remaining structures scheduled to be demolished prior to construction of the project (TVA 2024a; TVA 2024b). The project area is still comprised of developed land and is primarily surrounded by agricultural fields and upland forests. Precipitation in the vicinity of the project area averages approximately 57 inches per year, and the monthly average air temperature ranges from 31 degrees Fahrenheit to 92 degrees Fahrenheit (BestPlaces 2024).

The project area spans two different 10-digit Hydrologic Unit Code (HUC) watersheds, Lower Yellow Creek (0316010504) and Lower Luxapallila Creek (0316010505) (USGS 2024c). The nearest receiving surface waters for the proposed project include two perennial waterbodies, Howard Creek and Cooper Creek (Figure 3.6-1). Of the two waterbodies, only Howard Creek is located within the project area. Cooper Creek is approximately 0.2 mile east of the project area.

The MDEQ provides the primary designations of surface waters within the state of Mississippi. MDEQ takes into consideration the use and value of water for public water supplies, protection and propagation of aquatic life, recreation in and on the water (such as swimming and boating), and protection of consumers of fish and shellfish. MDEQ classifies each water of the state to ensure the proper criteria is protecting the waterbody (MEDQ 2024a). The project is within the Tombigbee river basin, and all waters in the Tombigbee Basin that do not have specific designations are classified as fish and wildlife waters (MDEQ 2024a).

TVA performed a field visit with U.S. Army Corps of Engineers (USACE) personnel in February 2024 and identified one perennial stream, one intermittent stream, four ephemeral streams, and two ponds within the project area (Table 3.6-1, Figure 3.6-2). One intermittent stream (S002; Howard Creek), three ephemeral streams (E002-004), and two ponds (P001-002) were identified on the western side of the project area and ultimately drain into the Lower Luxapallila Creek watershed. One perennial stream (S001) and one ephemeral stream (E001) located on the eastern side of the project area ultimately drain into Cooper Creek, approximately 0.2 miles east of the project area, which is part of the Yellow Creek watershed. The aquatic resources identified in the project area were found to be consistent with those described in the Flatwoods/Blackland Prairie Margins sub-ecoregion. The streams observed had relatively low gradient, sluggish flow, and sandy substrate. The same features that are regulated by the USACE are regulated by the state of Mississippi. The USACE provided an Approved Jurisdictional Determination (AJD) for the project area on April 18, 2024. The AJD determined the perennial and intermittent streams (S001and S002) to be jurisdictional Waters of the United States (WOTUS) and that all other features within the project area are not WOTUS and, therefore, not subject to USACE jurisdiction (Appendix C).

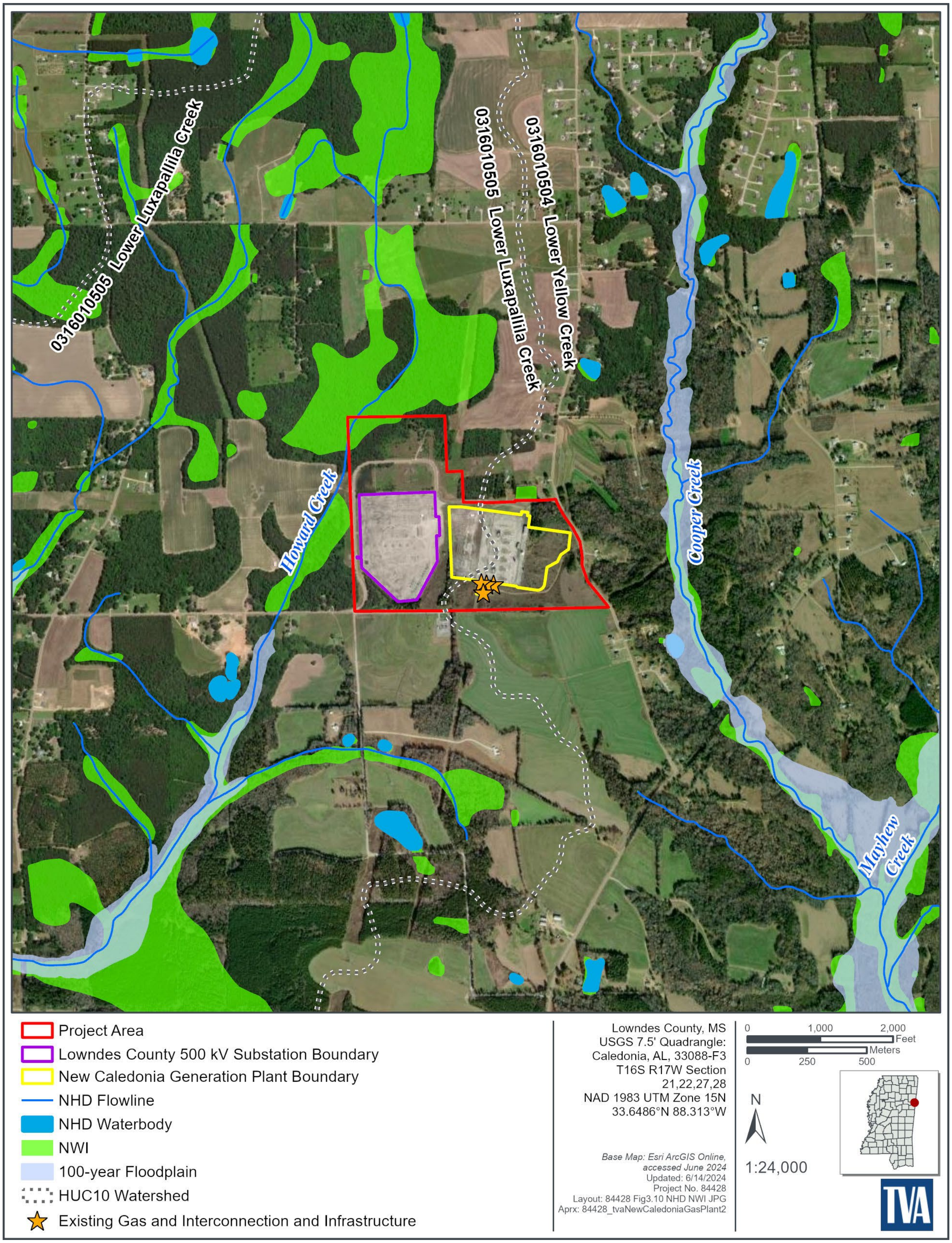

Figure 3.6-1. USFWS NWI and USGS NHD Map

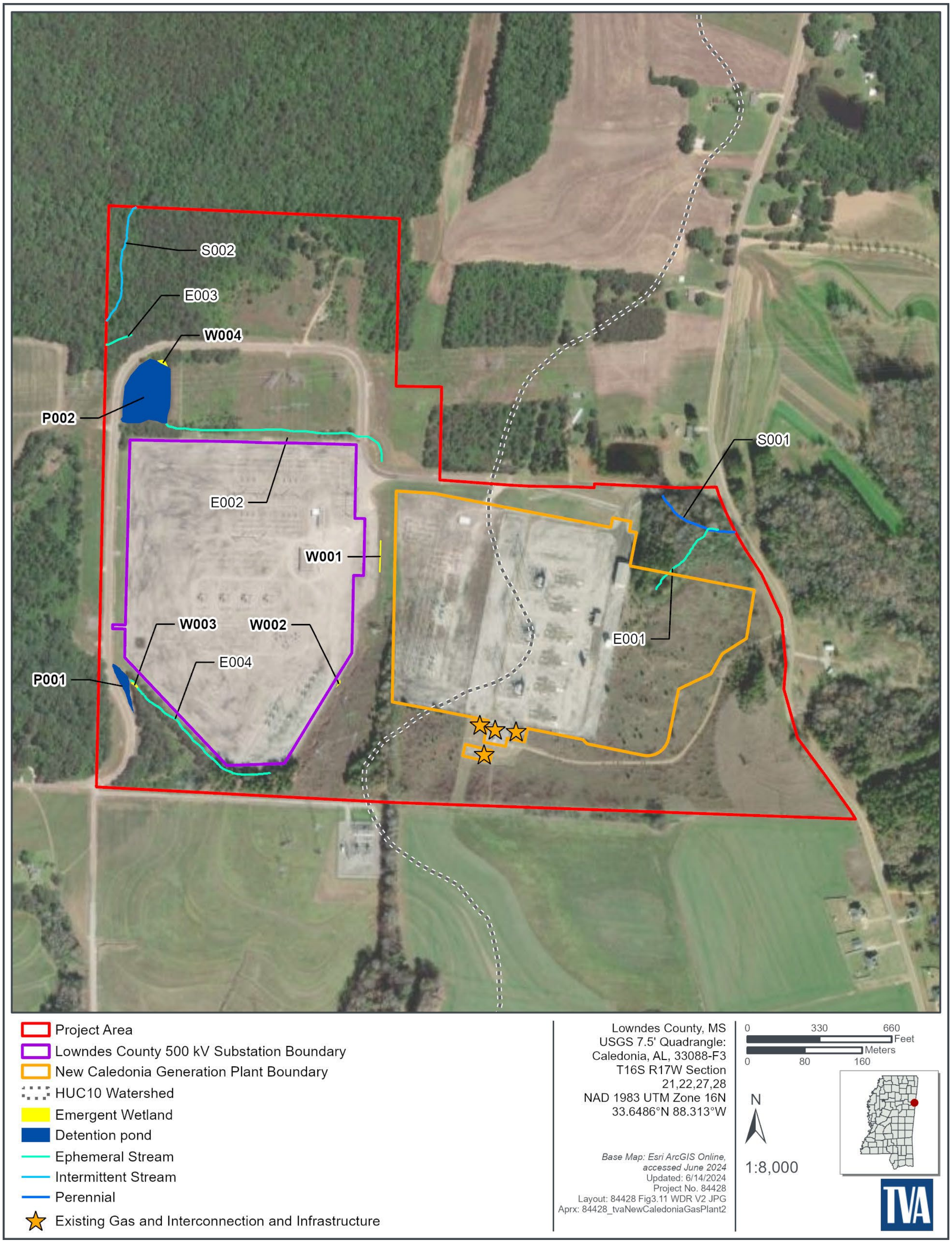

Figure 3.6-2. Wetlands and Waterbodies Map

Table 3.6-1. Waterbodies Crossed by the Project Area

Waterbody ID	Resource Type	Length (feet) or Acres	Cowardin Code[1]	Receiving Water	Jurisdictional[2]
E001	Ephemeral	540 LF	R6	UT to Cooper Creek	N
E002	Ephemeral	1600 LF	R6	UT to P002	N
E003	Ephemeral	193 LF	R6	UT to Howard Creek	N
E004	Ephemeral	936 LF	R6	UT to P001	N
P001	Pond	0.25 ac	PUBHx	Isolated	N
P002	Pond	1.87 ac	PUBHx	Isolated	N
S001	Perennial	532 LF	R3	UT to Cooper Creek	Y
S002	Intermittent	1119 LF	R4	Howard Creek	Y

Notes:
LF = linear feet
UT = unnamed tributary
[1] Cowardin Code Designations
R3 = Upper perennial, riverine
R4 = Intermittent, riverine
R6 = A wetland spring, stream, river, pond or lake that only exists for a short period.
PUBHx = freshwater pond
[2] Jurisdictional status of waterbody was determined by the USACE.

The federal Clean Water Act (CWA) requires all states to identify waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to the EPA. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. The 2023 field study did not identify any waterbodies within the project area that are on the Mississippi 303(d) List of Impaired Waterbodies (MDEQ 2022a). However, a segment of Howard Creek, located approximately 3.1 miles southwest and downstream of the project area, is listed as impaired due to aquatic life support, with the pollutant listed as biological impairment (Figure 3.6-3) (MDEQ 2022b).

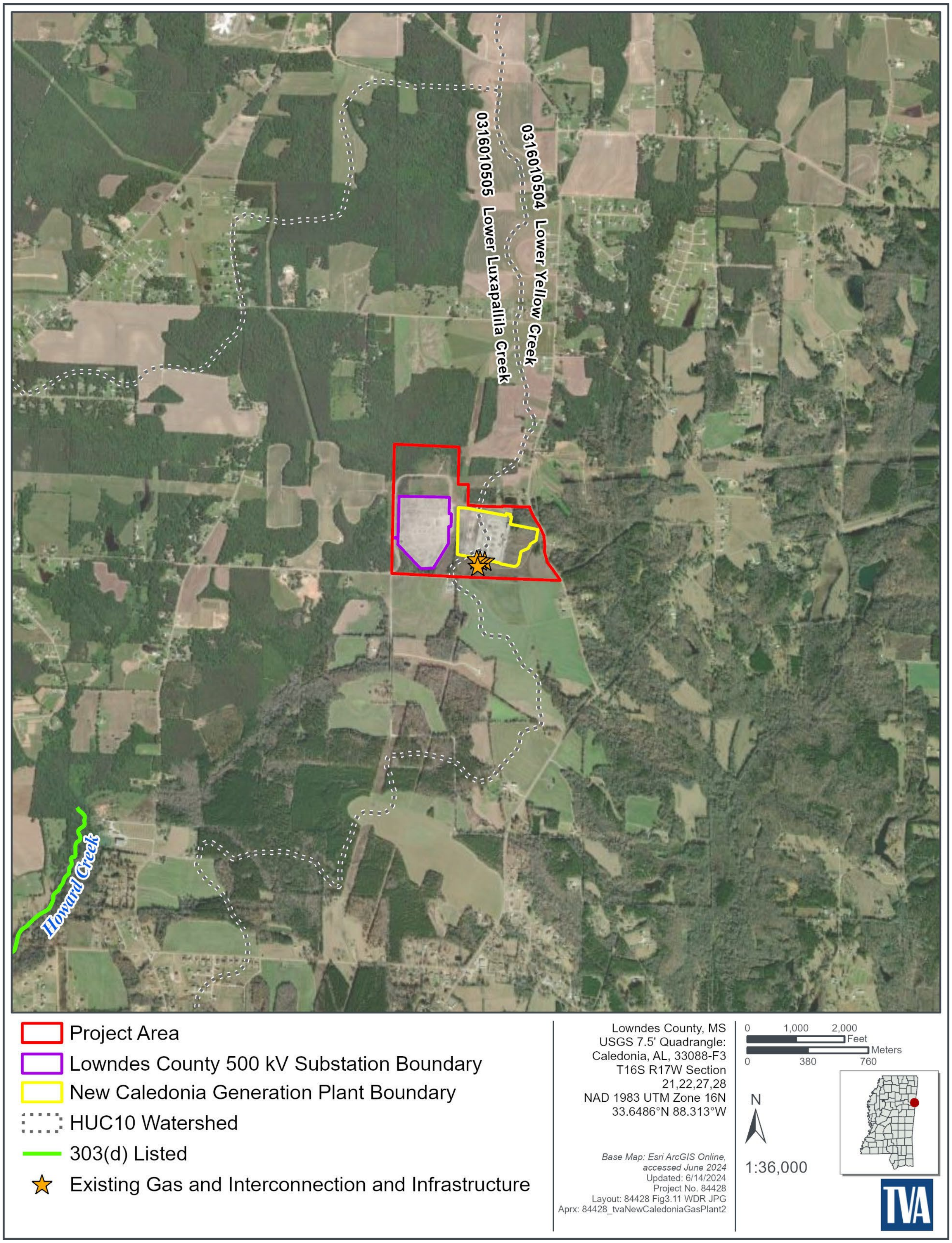

Figure 3.6-3. Mississippi 303(d) Listed Impaired Waterbodies Map

3.6.2 Environmental Consequences

3.6.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts to surface waters within the project area.

3.6.2.2 *Alternative B*

Construction Impacts

Soil disturbances associated with the construction of the NCG Plant could potentially result in adverse water quality impacts. Sedimentation and soil erosion resulting from construction-related disturbance would have the potential to accumulate in the aquatic features identified onsite and threaten aquatic life. Implementation of the Action Alternative would include construction activities that have the potential to affect surface water temporarily via stormwater runoff and introduction of pollutants. Construction activities would result in temporary soil disturbance and soil compaction. Soil compaction reduces the ability for rain to percolate through the soil and results in additional runoff of water and pollutants into storm drains, ditches, and streams. Soil erosion and sedimentation from construction activities can clog small streams, threaten aquatic life, and contribute to degraded water quality.

To minimize construction stormwater runoff to surface water resources, TVA would comply with all appropriate federal, state, and local permit requirements. Appropriate BMPs would be implemented, and all construction activities would be conducted in a manner to ensure that waste materials are contained, and controls are implemented to adequately protect receiving waters from sedimentation or introduction of pollutants. A Large Construction General Permit (MSR10) would be required due to the total acreage of disturbance (greater than 5 acres) that would occur during construction activities. The MSR10 permit requires the development and implementation of a SWPPP, which identifies specific BMPs to address construction-related activities that would be adopted to minimize stormwater impacts. BMPs, as described in the Mississippi Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas Handbook (MDEQ 2011b), would be implemented during construction to minimize stormwater runoff from the project area and avoid contamination of surface waters. Additionally, BMPs and discharge drainage systems would be designed to ensure adequate sediment retention and capacity to handle increased flows prior to construction.

Sanitary Wastewater

Portable/temporary toilets would be provided onsite for the construction workforce as needed. These toilets would be pumped out regularly, and the sewage would be transported by tanker truck to a publicly owned wastewater treatment works that accepts pump-out. There would be no discharge to adjacent surface waters, and therefore, no impacts to surface water quality are expected.

Equipment Washing and Dust Control

To minimize construction impacts to surface water resources, discharges from equipment washing and dust control would be handled in accordance with BMPs contained within the SWPPP and described in the Mississippi Stormwater Pollution Prevention Plan Guidance Manual for Industrial Activities (MDEQ 2020).

Hydrostatic Testing

An individual Mississippi NPDES Hydrostatic Test General Permit (MSG13) would be required for onsite hydrostatic testing of new fuel oil storage and water storage tanks. Hydrostatic test water would be sourced from municipal sources or water storage tanks. Hydrostatic test water would be discharged to well-vegetated and stabilized upland areas where practicable and in accordance with applicable permit conditions.

Surface Water Features
As described in Section 3.6.1, an AJD was received from the USACE Mobile District. The AJD determined the perennial and intermittent streams (S001 and S002) to be jurisdictional WOTUS, and all other features are non-jurisdictional (Appendix C). The proposed project has been designed to avoid direct impacts to all aquatic features. Proper implementation of BMPs and other controls for the Action Alternative would be anticipated to result in only minor temporary impacts to surface waters. In the event that jurisdictional streams cannot be avoided, applicable CWA Section 404 and 401 permits would be obtained from the USACE, and necessary mitigation credits would be purchased. Refer to Table 3.6-1 for information pertaining to waterbodies crossed by the proposed project.

Due to the distance of the 303(d) listed waterbody, construction of the proposed project would not be anticipated to impact impaired surface waters. Therefore, MSR10 requirements specific to 303(d) listed waters would not be applicable to the proposed project (MDEQ 2022b). Additionally, TVA assigns appropriate Streamside Management Zones (SMZs) following field surveys. Stream categorization, potential presence of listed species, and other factors are included in this analysis. Category A buffers of 50 feet were assigned to two streams (one perennial, one intermittent) within the project area. Appropriate application and installation of the SMZs and BMPs, including erosion and sediment control measures, would minimize the potential for impacts to water quality for the surface waters identified within the project area.

Operational Impacts Stormwater
Operational activities for the NCG Plant, including general grounds maintenance, would not be anticipated to affect surface water via stormwater runoff. The proposed project would either require coverage under an Industrial Storm Water General Permit for Industrial Activities (MSR00; MDEQ 2020), or would divert all stormwater discharges to the stormwater/process pond. The MSR00 permit would require the development and implementation of a SWPPP, which would identify specific BMPs that would be adopted to minimize stormwater impacts during operation activities. BMPs, as described in the Mississippi Stormwater Pollution Prevention Plan Guidance Manual for Industrial Activities (MDEQ 2020), would be implemented during operation to minimize stormwater runoff from the project area and avoid contamination of surface waters. Under the required permits, all process flows would be routed for adequate treatment, and effluent waste streams would be authorized to be discharged through permitted outfalls under an individual NPDES permit. Additionally, the NCG Plant would require secondary containment devices for the storage of fuel oil onsite. For coverage under the MSR00 permit, TVA or its contractors would provide secondary containment around any onsite single fuel or chemical container with a capacity greater than 660 gallons or any combination of containers that has an above ground bulk storage capacity of more than 1,320 gallons and provide secondary containment for raw material stockpiles (MDEQ 2020).

Sanitary Wastewater
During operation of the NCG Plant, there would be an onsite workforce. Restroom facilities and showers would require potable water, which would be obtained from the existing public supply, and installation of a septic system would likely be needed. If determined necessary, sewer treatment would be accomplished through the use of a pump-out septic collection and holding tanks. If installed, the septic holding tank would be appropriately constructed and permitted in accordance with local, state, and federal regulatory requirements.

Process Wastewater

The proposed project would require up to 200 gpm of water used for inlet air evaporative cooling in the summer ambient temperatures. All water needs, including eye wash stations and fire protection, would be obtained from the existing public supply. Demineralized water would be made and stored onsite and used for CT injection for emission control and compressor washing. All process wastewater would be routed for adequate treatment, and effluent waste streams would be authorized to discharge through permitted outfalls under an individual NPDES permit. During the commissioning process, wash effluent would be collected in tanks and, after analysis, disposed of at an approved wastewater treatment facility offsite. Wash effluent would not be generated during normal operation of the NCG Plant.

3.7 Wetlands

3.7.1 Affected Environment

Wetlands are those areas inundated or saturated by surface or groundwater such that vegetation adapted to saturated soil conditions are prevalent. Examples include bottomland forests, swamps, wet meadows, isolated depressions, shallow embayments, and shoreline fringe wetlands along the edges of watercourses, impoundments, or lake systems. Wetlands provide many societal benefits, such as toxin absorption and sediment retention for improved downstream water quality, stormwater impediment and attenuation for flood control, shoreline buffering for erosion protection, and provision of fish and wildlife habitat for commercial, recreational, and conservation purposes. A wetland assessment was performed to ascertain wetland presence, condition, and the extent to which wetland functions are provided within the project area.

Wetlands are protected under Sections 404 and 401 of the CWA and by EO 11990 - Protection of Wetlands. To conduct specific activities in wetlands, authorization under a Section 404 Permit from the USACE may be required depending on the wetland's size and hydrologic connectivity to a navigable waterway. Section 401 gives states the authority to certify whether activities permitted under Section 404 are in accordance with state water quality standards. In Mississippi, the MDEQ is responsible for the issuance of water quality certifications to ensure federally permitted projects comport with state water quality mandates. EO 11990 requires all federal agencies to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. Wetland determinations were performed according to the USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; USACE 2010; USACE 2020).

Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (TVA Rapid Assessment Method or "TVARAM"), wetlands were evaluated by their functions and classified into three categories: low quality, moderate quality, and superior quality. Low quality wetlands are degraded aquatic resources which may exhibit low species diversity, minimal hydrologic input and connectivity, recent or ongoing disturbance regimes, and/or predominance of non-native species. These wetlands provide low functionality and are considered of low value. Moderate quality wetlands provide functions at a greater value due to a lesser degree of degradation and/or due to their habitat, landscape position, or hydrologic input. Moderate quality wetlands are considered healthy water resources of value. Disturbance to hydrology, substrate and/or vegetation may be present to a degree at which valuable functional capacity is sustained and there is reasonable potential for restoration. High quality wetlands include those wetlands offering superior functions and values within a watershed or are of regional/statewide concern. High quality wetlands may exhibit little, if any, recent disturbance, provide essential and/or large-scale stormwater storage, sediment retention, and toxin absorption, contain mature vegetation communities, and/or offer habitat to rare species. Conditions found in high quality wetlands often represent restoration goals for wetlands functioning at a lower capacity.

The project area consists primarily of the heavily developed former private CT facility and TVA Lowndes County 500-kV Substation, mostly consisting of pre-existing aggregate with surrounding mowed field and some bordering upland forests. As described in Section 3.6.1, the project area is located in both the Lower Luxapallia Creek and Lower Yellow Creek watersheds; however, all wetland resources mapped within the project area are located within the Lower Luxapallia watershed. TVA conducted a field visit with USACE personnel in February 2024 to identify the actual wetland extent and quality. A total of four wetlands, totaling 0.06 acres, were identified within the proposed project area (Table 3.7-1). The combination of land-use practices and landscape position dictates the wetland habitat type, wetland functional capacity, and wetland value. The identified wetlands consisted of emergent habitat, all exhibiting low conditions, thus providing poor wetland value to the surrounding landscape (Tables 3.7-2 and 3.7-3). The USACE completed an AJD for the project area on April 18, 2024, and determined all wetlands within the project area are not WOTUS and, therefore, not subject to USACE jurisdiction (Appendix C).

Table 3.7-1 Wetlands Located Within the Project Area

Wetland Identifier	Wetland Type[1]	TVARAM[2] Category (Score)	Total Wetland Acreage on Site	Jurisdictional[3]
W001	PEM1E	Low (13)	0.02	N
W002	PEM1E	Low (13)	<0.01	N
W003	PEM1F	Low (23)	<0.01	N
W004	PEM1H	Low (29)	0.02	N
Total			**0.06**	

[1] Classification codes as defined in Cowardin et al. (1979): P=Palustrine; EM1=Emergent, persistent vegetation; E = Seasonally flooded/saturated; F=Semipermanently Flooded; H= Permanently Flooded.

[2] TVARAM = Tennessee Valley Authority Rapid Assessment Method that categorizes wetland quality by their functional capacity

[3] Jurisdictional status based on the AJD from the USACE (Appendix C).

Table 3.7-2. Acreage of Wetlands Representing Low, Moderate, or Exceptional Resource Value Within the Project Area and Relative to Total Mapped Wetland Occurrence Within the Watershed

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Wetland Acreage in Project Area			
		Low Value	Moderate Value	Exceptional Resource Value	TOTAL
Lower Luxapallia Creek (0316010505)	**16,948**	0.06	0	0	**0.06**
Lower Yellow Creek (0316010504)	**25,399**	0	0	0	**0**

*National Wetland Inventory (USFWS 2021)

Table 3.7-3. Acreage of Wetlands by Habitat Type Within the Project Area and Relative to Total Mapped Wetland Occurrence Within the Watershed

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Total Wetland Acreage in Proposed Project			
		Emergent	Scrub-Shrub	Forested	TOTAL
Lower Luxapallia Creek (0316010505)	**16,948**	0.06	0	0	**0.06**
Lower Yellow Creek (0316010504)	**25,399**	0	0	0	**0**

*National Wetland Inventory (USFWS 2021)

Emergent wetlands within the project area totaled 0.06 acres across four delineated wetland areas. Emergent wetlands are generally devoid of woody vegetation with predominant cover by non-woody species across areas periodically saturated and/or inundated. Emergent wetlands in this general vicinity are often found where land-use practices or inundation deter the growth of woody species. All wetland habitats encountered within the project area were emergent vegetated swales. All of these wetland areas contained indicators of wetland hydrology influencing soil physiology such that coloration indicative of wetland conditions were evident in the soil profile. Emergent wetlands were dominated by common emergent wetland vegetation, including bushy bluestem (*Andropogon glomeratus*), shallow sedge (*Carex lurida*), and soft rush (*Juncus effusus*). All emergent wetland habitat encountered scored as low quality using TVARAM, indicating poor wetland quality due to small size, surrounding land use, and evidence of disturbance (e.g., mowing, past construction, etc.) (see Table 3.7-1).

3.7.2 Environmental Consequences

3.7.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts to wetlands within the project area.

3.7.2.2 *Alternative B*

The project area falls within the USACE Mobile regulatory district and the State of Mississippi's regulatory oversight wherever regulated activities may intersect with jurisdictional features. As discussed in Section 3.7.1, an AJD was received from the USACE Mobile District, which provided a definitive, official determination of the jurisdictional status of wetland resources in the project area. The AJD determined all wetland features in the project area are non-jurisdictional (Appendix C). Additionally, the project has been designed to avoid impacts to all wetlands identified within the project area, and TVA would further avoid wetland disturbance through adherence to wetland BMPs for all work necessary near delineated wetland boundaries (TVA 2022b). As such, the proposed project would have no impacts to wetlands and would be in compliance with EO 11990.

3.8 Vegetation

3.8.1 Affected Environment

The project area lies within the Flatwoods/Blackland Prairie Margins IV sub-ecoregion of the greater Southeastern Plains III ecoregion. This sub-ecoregion is characterized by smooth to undulating lowland plains and some low hills, mixed oak, and pine forests. The sub-ecoregion is a transitional region that combines Flatwoods, which are comprised of a mostly forested lowland area of little relief, with soils that are very deep, clayey, poorly or somewhat poorly drained, and acidic, and Blackland Prairie Margins comprised of undulating, irregular plains, with slightly more relief than the Flatwoods, but also tend to have clayey soils that are sticky when wet, hard and cracked when dry, with generally poor drainage. Pine plantations, pasture, hay, some cropland, and cattle production comprise the majority of land use in this region. (Chapman et al. 2004). Field surveys were conducted in April and September of 2023 to document plant communities, infestations of invasive plants, and to search for possible threatened and endangered plant species within the project area. Using the National Vegetation Classification System (Grossman et al. 1998), vegetation types observed during field surveys can be classified as a combination of deciduous forest, evergreen forest, and herbaceous vegetation. No forested areas in the proposed project area had structural characteristics indicative of old growth forest stands (Leverett 1996). The plant communities observed onsite are common and well represented throughout the region. Vegetation in the proposed project area is characterized by two main types: forest (35 percent) and herbaceous (65 percent).

Herbaceous vegetation is characterized by greater than 75 percent cover of forbs and grasses and less than 25 percent cover of other types of vegetation. The majority of this habitat contains a mix of early successional native and non-native species such as broomsedge (*Andropogon virginicus*), sawtooth blackberry (*Rubus argutus*), beaked corn salad (*Valerianella radiata*), large yellow vetch (*Vicia grandiflora*), tall goldenrod (*Solidago altissima*), sericea lespedeza (*Lezpedeza cuneata*), and clover (*Trifolium* spp.). These areas also contain scattered small woody vegetation, including Chinese privet (*Ligustrum sinense*), callery pear (*Pyrus calleryana*), autumn olive (*Eleaegnus umbellata*), and red cedar (*Juniperus virginiana*). The remaining herbaceous area contains an agriculture field with ryegrass (*Lolium* sp.) and kudzu (*Pueraria montana*). Areas of emergent wetlands were present in the project area. See Section 3.7.1 for species indicative of wetland areas.

Deciduous forest, which is characterized by trees with overlapping crowns where deciduous species account for more than 75 percent of the canopy cover, occurs on approximately 20 percent of the vegetated project area. The species composition and age of stand in these areas is indicative of highly disturbed early successional forests. Common overstory species include water oak (*Quercus nigra*), hackberry (*Celtis occidentalis*), sweetgum (*Liquidambar styraciflua*), white oak (*Quercus alba*), chinaberry (*Melia azedarach*), and American elm (*Ulmus americana*). The midstory was dominated by Chinese privet with lesser amounts of winged elm (*Ulmus alata*), box elder (*Acer negundo*), black cherry (*Prunus serotina*), and sassafras (*Sassafras albidum*). The herbaceous layer in these areas included Japanese honeysuckle (*Lonicera japonica*), poison ivy (*Toxicodendron radicans*), sticky willy (*Galium aparine*), Christmas fern (*Polystichum acrostichoides*), and beaked corn salad (*Valerianella radiata*).

Evergreen forests occur as remnants of planted loblolly pine intermixed with deciduous forests and occur on approximately 15 percent of the vegetated project area. Evergreen forests comprised of planted loblolly pine have low species diversity and bear little resemblance to a natural plant community. Midstory species included winged elm, sweetgum, and Chinese privet. Understory species included Japanese honeysuckle, beautyberry (*Callicarpa americana*), and poison ivy.

EO 13112 directed TVA and other federal agencies to prevent the introduction of invasive species (both plants and animals), control their populations, restore invaded ecosystems, and take other related actions. EO 13751 amends EO 13112 and directs actions by federal agencies to continue coordinated federal prevention and control efforts related to invasive species. This order incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into federal efforts to address invasive species. Some invasive plants have been introduced accidentally, but most were brought here as ornamentals or for livestock forage. Because these robust plants arrived without their natural predators (insects and diseases), their populations spread quickly across the landscape, displacing native species and degrading ecological communities and ecosystem processes (Miller 2010). Large portions of the project area were extensively altered in the past, resulting in the introduction and spread of invasive non-native plants. One federal-noxious weed, cogon grass (*Imperata cylindrica),* was observed during field surveys, and many non-native invasive plant species were observed throughout the project area. Common invasive plant species occurring in the project area include autumn olive, Chinese privet, Japanese honeysuckle, Johnson grass (*Sorghum halepense*), callery pear, mimosa (*Albizia julibrissin*), sericea lespedeza, and chinaberry. All these species occur widely across the landscape and have the potential to adversely impact native plant communities because of their potential to spread rapidly and displace native vegetation.

3.8.2 Environmental Consequences

3.8.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts to vegetation within the project area. All invasive species found in the project area are common throughout the region and implementation of the No Action Alternative would not change this situation.

3.8.2.2 *Alternative B*

Under Alternative B, TVA would construct and operate a simple cycle frame CT facility at the NCG Site. Construction and operation of the proposed project would result in the removal of 21.6 acres of forested habitat, of which 0.6 acre of mixed forest falls within the NCG Plant boundary and would be permanently converted to maintained open space and minimal loss of herbaceous vegetation; however, vegetation removal would result in negligible effects on the terrestrial ecology of the region. The majority of herbaceous vegetation on the NCG Site is heavily disturbed by previous land use, dominated by non-native plant species, and possesses little conservation value. The forested areas are early successional or planted forests that have a large component of invasive species. Removal of these common forested communities would not impact the terrestrial plant ecology of the region, and 21.0 acres of the forested areas cleared during construction would be allowed to naturalize back over time.

The majority of project area currently has a substantial component of invasive terrestrial plants, construction and operation of the proposed project would have no more than minor effects on the extent or abundance of these species at the county, regional, or state level. The use of TVA standard operating procedure of revegetating with noninvasive species (TVA 2022b) would serve to minimize the potential introduction and spread of invasive species in the project area.

3.9 Aquatic Ecology

3.9.1 Affected Environment

As described in Sections 3.6.1 and 3.8.1, the proposed project area lies within the Lower Yellow Creek and Lower Luxapallila Creek watersheds in the Flatwoods/Blackland Prairie Margins IV sub-ecoregion. Field surveys conducted in April 2023 identified one perennial stream, one intermittent stream, four ephemeral streams/wet-weather conveyances (WWCs), and two ponds within the project area (Section 3.6.1 and Table 3.6-1). Streams in the project area were typical of the Flatwoods/Blackland Prairie Margins ecoregion, with relatively low gradient, sluggish flow, and sandy substrates. This location was a former private CT facility, and the majority of the site is still covered in pre-existing aggregate and surrounded by maintained fields.

The project area falls in the upper reaches of both the Lower Yellow Creek and Lower Luxapallila Creek watersheds. The streams documented within the project area are first or second order tributaries that would not provide suitable habitat for sensitive aquatic species. Furthermore, because of the degraded aquatic habitat conditions due to previous activities and land use practices within the project area, only common, tolerant species would be expected to utilize these watercourses during wet periods when sufficient flow is present.

3.9.2 Environmental Consequences

3.9.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts to aquatic ecology.

3.9.2.2 *Alternative B*

Aquatic ecology would be temporarily impacted during the construction phase of the proposed project. Impacts would occur directly by the alteration of habitat conditions within streams due to modification of the riparian zone. An increase in stormwater runoff could also result from construction and maintenance activities. Potential impacts due to removal of streamside vegetation within the riparian zone include increased erosion and siltation, loss of instream habitat, increased stream temperatures, and reduction in dissolved oxygen. Other potential effects resulting from construction and operational activities include herbicide runoff into streams and alteration of stream banks and stream bottoms by heavy equipment. Siltation has a detrimental effect on many aquatic animals adapted to riverine environments. Turbidity caused by suspended sediment can negatively impact the spawning and feeding success of fish and mussel species (Brim Box and Mossa 1999; Sutherland et al. 2002).

Ephemeral streams/WWCs convey only surface water during storm events and, therefore, do not sustain sufficient flow throughout the year to sustain suitable habitat for aquatic species. The proposed project has been designed to avoid impacts to all surface water features, and category A buffers of 50 feet were assigned to two streams (one perennial, one intermittent). Additionally, TVA would implement appropriate BMPs, such as erosion and sediment control measures, which would minimize the potential for surface water run-off from carrying siltation into the adjacent streams, thereby preventing indirect impacts to instream habitat for aquatic organisms. In the event that jurisdictional streams cannot be avoided, applicable CWA Section 404 and 401 permits would be obtained from the USACE and necessary mitigation credits purchased.

The aquatic community within streams and ponds documented within the project area could potentially be negatively impacted by increased overland flow, changes in water temperatures, and temporary destabilization of the stream banks due to removal of forest canopy and streamside vegetation. However, implementation of SMZs and BMPs during construction activities would reduce those impacts to the greatest extent possible; therefore, impacts to aquatic ecology would be temporary and insignificant as a result of implementing the Proposed Action.

3.10 Wildlife

3.10.1 Affected Environment

Terrestrial plant communities are described and quantified in Section 3.8, and aquatic habitat is described and quantified in Section 3.9. Field surveys to assess habitat for terrestrial species were conducted on April 18, 2023, and September 26, 2023. Deciduous forests and mixed deciduous pine forests provide habitat for an array of terrestrial animal species. Avian species found in this habitat are chuck-will's-widow (*Antrostomus carolinensis*), downy woodpecker (*Picoides pubescens*), eastern screech-owl (*Megascops asio*), red-tailed hawk (*Buteo jamaicensis*), white-breasted nuthatch (*Sitta carolinensis*), and yellow-billed cuckoo (*Coccyzus americanus*) (National Geographic 2002). Pine warbler (*Setophaga pinus*) and white-eyed vireo (*Vireo griseus*) were observed in this habitat during field surveys. This area also provides foraging and roosting habitat for several species of bat, particularly in areas where the forest understory is more open. Some examples of bat species likely found within this habitat are big brown (*Eptesicus fuscus*), eastern red (*Lasiurus borealis*), and evening bat (*Nycticeius humeralis*) (Harvey 1992). Coyote (*Canis latrans*), eastern chipmunk (*Tamias striatus*), eastern woodrat (*Neotoma floridana*), North American deermouse (*Peromyscus maniculatus*), and woodland vole (*Microtus pinetorum*) are also likely mammalian species present within this habitat (Whitaker 1996). Gray rat snake (*Pantherophis spiloides*), Dekay's brownsnake (*Storeria dekayi*), and scarlet kingsnake (*Lampropeltis elapsoides*) are all common reptilian residents of this habitat (Powell et al. 2016). In forest sections with aquatic features, amphibians likely found in the area include the spotted dusky salamander (*Desmognathus fuscus*), marbled salamander (*Ambystoma opacum*), mole salamander (*Ambystoma talpoideum*), and spotted salamanders (A*mbystoma maculatum*) as well as Cope's gray treefrogs (*Hyla chrysoscelis*) (Powell et al. 2016).

Pasture and agricultural fields offer habitat to a multitude of common species such as blue grosbeak (*Passerina caerulea*), brown-headed cowbird (*Molothrus ater*), brown thrasher (*Toxostoma rufum*), common grackle (*Quiscalus quiscula*), common yellowthroat (*Geothlypis trichas*), eastern bluebird (*Sialia sialis*), eastern meadowlark (*Sturnella magna*), eastern towhee (*Pipilo erythrophthalmus*), grasshopper sparrow (*Ammodramus savannarum*), house finch (*Haemorhous mexicanus*), and northern mockingbird (*Mimus polyglottos*), among others (National Geographic 2002). Eastern kingbird (*Tyrannus tyrannus*), killdeer (*Charadrius vociferus*), red-tailed hawk, and tree swallow (*Tachycineta bicolor*) were observed onsite in this habitat during field reviews. Mammalian species likely present in this habitat include eastern cottontail (*Sylvilagus floridanus*), eastern harvest mouse (*Reithrodontomys humulis*), eastern woodrat, hispid cotton rat (*Sigmodon hispidus*), red fox (*Vulpes vulpes*) and striped skunk (*Mephitis mephitis*) (Whitaker 1996). Reptilian species with the potential to occur in the project area are the eastern milk snake (*Lampropeltis triangulum triangulum*), gray rat snake, smooth earth snake (*Virginia valeriae*), and southern black racer snake (*Coluber constrictor priapus*), as well as the slender glass lizard (*Ophisaurus attenuates*) (Powell et al. 2016).

The retention pond onsite provides some habitat for common reptiles and amphibians, as well as migrating shorebirds when there is water present. During field surveys, a solitary sandpiper (*Scolopacidae* spp.) was observed foraging along the edges of the pond, and a watersnake was observed in the drainage culvert leading from the pond. Common amphibians, such as southern cricket frog (*Acris gryllus*), spring peeper (*Pseudacris crucifer*), and upland chorus frog (*Pseudacris feriarum*), may take advantage of this ephemeral habitat (Powell et al. 2016).

Review of the TVA Regional Natural Heritage database on April 17, 2023, and September 7, 2023, indicated that no caves or other unique or important terrestrial habitats have been identified within three miles of the project area. No caves were observed in the project area during field surveys. Records reviews resulted in no known colonial wading bird colonies or osprey (*Pandion haliaetus*) within three miles of the project area. One solitary sandpiper was observed in the retention pond on the western edge of the action area during field surveys. Field sparrows (*Spizella pusilla*) were also noted in the fields during field surveys. This species is often listed as a migratory bird of conservation concern by the USFWS but was not identified as potentially being in the project area during data queries.

Review of the USFWS Information for Planning and Consultation (IPac) (USFWS 2023a) online project planning tool resulted in five avian species of conservation concern with the potential to occur in the project area: bald eagle (*Haliaeetus leucocephalus*), chimney swift (*Chaetura pelagica*), red-headed woodpecker (*Melanerpes erythrocephalus*), rusty blackbird (*Euphagus carolinus*), and wood thrush (*Hylocichla mustelina*). As mentioned above, the field sparrow, a bird of conservation concern, was observed onsite during field studies.

See Section 3.11.1 for discussion on bald eagles.

Chimney swifts are found in this region during summer breeding months and use chimneys, barns, and hollow trees for nesting sites and communal roosts, especially in urban areas (Steeves et al. 2020). No chimney-like structures exist within the project area.

Red-headed woodpeckers are found in this region year-round and use a variety of treed habitats but show preference for forested areas exhibiting more openness and a high number of tree snags available (Frei et al. 2020). Some red-headed woodpecker habitat is present in forested areas and edge habitats in the project area.

Rusty blackbirds are found in this region in winter and use wet areas such as swamps, pond edges, or hardwood bottomlands woodlands; the species does not breed in this region (Avery 2020). Significant quantity of quality habitat for rusty blackbirds does not exist in the project area.

Wood thrushes are found in this region during their summer breeding season and are associated with larger tracts of mature mixed-deciduous forests with open forest floors (Evans et al. 2020). A small amount of wood thrush habitat is present in the project area.

3.10.2 Environmental Consequences

3.10.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the onsite transmission system or natural gas pipeline interconnection. As such, there would be no impacts to wildlife within the project area.

3.10.2.2 *Alternative B*

Under Alternative B, TVA would construct a CT facility at the NCG Site. TVA would make related upgrades to the onsite transmission system to interconnect the generation. Up to 21.6 acres of forest would be removed within the project area. Tree removal would occur in winter (October 1 – March 14). Impacts to jurisdictional streams would be avoided.

Any wildlife (primarily common, habituated species) currently using these previously disturbed areas may be displaced by increased levels of disturbance during construction actions. Direct effects to some individuals who have limited mobility during the time of vegetation removal may occur, particularly if construction activities transpire during breeding/nesting seasons. Removal of this vegetation also would remove foraging and future nesting sites for individuals utilizing the area. When feasible, tree removal would occur during winter months when most migratory bird species are absent from the area, and many species of animals would not be nesting/breeding. Winter tree removal would avoid the nesting season for the two migratory birds of conservation concern that were identified by the USFWS IPaC system and have habitat present in the project area (red-headed woodpecker and wood thrush). However, direct effects to field sparrows, which were observed in fields during field reviews, could occur during breeding season should they be breeding in areas during vegetation removal. Many species of migratory birds, including the solitary sandpiper observed at the retention pond, are only found in the region during migration events and would only be able to use the retention pond if it held the appropriate amount of water at the time of migration. Given the short timeframe these species could be onsite and the ephemeral nature of the habitat, these species are not likely to be directly impacted by the Proposed Action. A relatively small amount of wildlife habitat is proposed for removal. The majority of the site is heavily disturbed or covered in concrete and gravel and provides low quality or no value for wildlife. In addition, habitat of similarly low or higher quality exists in the surrounding landscape. Actions are not likely to affect populations of species common to the area or populations of migratory birds.

3.11 Threatened and Endangered Species

3.11.1 Affected Environment

3.11.1.1 *Terrestrial Species*

A review of the terrestrial animal species in the TVA Regional Natural Heritage database on April 17, 2023, and September 07, 2023, returned one record of a species of conservation concern for the red salamander (*Pseudotriton rubers*) within three miles of the project area. One federally protected species, the bald eagle, is known from Lowndes County, Mississippi. Review of the USFWS IPaC project planning tool resulted in the identification of one candidate species for federal listing (monarch butterfly [*Danaus plexippus*]), one federally listed endangered species (NLEB), and one proposed threatened species (alligator snapping turtle [*Macrochelys teminckii*]) that may occur in the project area. In addition, the project area overlaps the range of the federally proposed endangered tricolored bat; therefore, potential for impacts to this species is also reviewed (Table 3.11-1). Field surveys to assess habitat for terrestrial threatened and endangered species were conducted on April 18, 2023, and September 26, 2023.

Table 3.11-1. Federally Listed Terrestrial Animal Species Reported from Lowndes County, Mississippi, and Other Species of Conservation Concern Documented Within Three Miles of the Project Area[1]

		Status[2]	
Common Name	**Scientific Name**	**Federal**	**State (Rank[3])**
Amphibians			
Alligator snapping turtle[4]	*Macrochelys teminckii*	PT	-(S3)
Red salamander	*Pseudotriton rubers*	-	-(S3)
Birds			
Bald eagle [5]	*Haliaeetus leucocephalus*	DL	-(S3B, S2N)
Insects			
Monarch butterfly [6]	*Danaus plexippus*	C	--(S5)
Mammals			
Northern long-eared bat [4]	*Myotis septentrionalis*	E	T(S1S2)
Tricolored bat[4]	*Perimyotis subflavus*	PE	-(S3S4)

[1] Sources: TVA Regional Natural Heritage Database, extracted 09/07/2023; USFWS 2023a.

[2] Status Codes: C = Candidate for Listing; DL = Delisted but Monitored; PE = Proposed endangered; PT = Proposed Threatened; T = Listed Threatened.

[3] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S5 = Secure. S_B = Status of Breeding Population; S_N = Status of Nonbreeding Population.

[4] Federally proposed species whose known range includes Lowndes County, Mississippi, but that has no known documented presence from Lowndes Co. to date.

[5] Species known from Lowndes County, MS, but not within three miles of the action area.

[6] Candidate species for listing under the Endangered Species Act. Historically, this species has not been tracked by state or federal heritage programs.

The alligator snapping turtle is proposed for listing as a federally threatened species. They are a highly aquatic reptile that emerges from water only for nesting in the summer, rarely for basking. These turtles are confined to river systems that flow into the Gulf of Mexico. This species is typically associated with deep water of large rivers where they feed on fish and other small invertebrates and vertebrates that they can scavenge. To date, no known records of this species have been documented in Lowndes County. One small retention pond could provide marginal quality foraging habitat for alligator snapping turtles if they manage to venture that far up the watershed. This pond was shallow and partially dry during the second field survey conducted on September 26, 2023. This pond does not offer quality breeding habitat for this species.

Red salamanders are stout-bodied salamanders most often associated with clear rocky streams, creeks, or springs. Adults spend most of their life under leaf litter or rocks, occasionally dispersing into upland forests. In the fall, females would lay eggs on the underside of rocks or logs in water and remain with the eggs until hatching in late fall/early winter (Jensen et al. 2008; Powell et al. 2016). One record of a red salamander exists approximately 2.53 miles from the project area. Suitable habitat for this species exists in the one perennial stream (S001) present in the project area.

Bald eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d). This species is associated with large mature trees capable of supporting their nests that can weigh several hundred pounds and are typically built near larger waterways where they forage primarily for fish (USFWS 2007). There are no known records of bald eagle nests from Lowndes County, Mississippi. No bald eagles were observed in or around the project area during field surveys. Suitable foraging habitat for bald eagles does not exist within the project area.

The monarch butterfly is currently listed under the Endangered Species Act (ESA) as a candidate species but is not yet listed or proposed for listing. The monarch butterfly is a highly migratory species, with eastern U.S. populations overwintering in Mexico. Monarch populations typically return to the eastern U.S. in April (Davis and Howard 2005). Summer breeding habitat requires milkweed plant species, on which adults exclusively lay eggs for larvae to develop and feed on. Adults will drink nectar from other blooming wildflowers when milkweeds are not in bloom (NatureServe 2023). Approximately 46 acres of the project area consists of early successional grasslands or mowed fields. No milkweed was observed growing in these areas during field reviews.

NLEB predominantly overwinters in large hibernacula, such as caves and abandoned mines, with high humidity and no air flow. During fall and occasionally in spring, they utilize entrances of caves and the surrounding forested areas for swarming (mating). In summer, NLEB roost singly or in colonies beneath exfoliating bark or in crevices of both live trees and snags. They switch roosts roughly every two days and have a high site fidelity to summer roosting areas and winter hibernacula. Roost selection by NLEB is similar to Indiana bat; however, it is thought that NLEB are more opportunistic in their roost site selection. This species is known to roost in abandoned buildings and under bridges, though their primary summer roosting site is trees. NLEBs emerge at dusk to forage below the canopy of mature forests on hillsides and ridges and occasionally over forest clearings and along riparian areas (USFWS 2023b). While the USFWS has determined NLEB have the potential to occur within the project area, there are no known records of NLEB from Lowndes County to date. No caves or structures providing suitable winter roosting habitat were documented in the project area. Approximately 4.8 acres of the forested areas within the project area are suitable for use by NLEB. Aquatic features within the project area, as well as some of the forested habitat provide suitable foraging habitat for this species.

Tricolored bats are generally solitary or found in small groups. They are associated with forested landscapes where they forage along forest edges and along waterways. Summer roosts are primarily in live and dead leaf clusters of live or recently dead deciduous hardwood trees. However, this species has also been documented roosting in artificial structures such as barns, bridges, bunkers, and residential roofs during summer months. In winter, this species is most commonly found in caves and mines but may also use culverts, abandoned wells, tree cavities, and rock shelters (USFWS 2023b). There are no known records of tricolored bats within three miles of the action area or within Lowndes County, Mississippi. There are no known caves within three miles of the action area. No caves or structures providing suitable winter roosting habitat were documented in the project area. Approximately 7.1 acres of the forested areas within the project area are suitable for use by tricolored bats. Aquatic features within the project area, as well as some of the forested habitat provide suitable foraging habitat for this species.

3.11.1.2 *Aquatic Species*

A query of the TVA Regional Natural Heritage database and the USFWS IPaC (USFWS 2023a) indicated five federally listed species of freshwater mussels, two species of freshwater mussels that are currently under review for federal listing, and four species that are tracked by the state of Mississippi but not currently state listed (one fish, three mussels) within the Lower Yellow Creek (0316010504) and Lower Luxapallila Creek (0316010505) 10-digit HUC watersheds encompassing the proposed project area (Table 3.11-2). Federally designated critical habitat (DCH) for the following federally listed mussels occurs in Luxapallila and Yellow creeks: Alabama moccasinshell (*Medionidus acutissimu*), Orangenacre mucket (*Lampsilis perovalis*), and Southern clubshell (*Obovaria arkansasensis*).

Table 3.11-2. Records of Federal and State listed Aquatic Animal Species Within the Lower Yellow Creek (0316010504) and Lower Luxapallia Creek (0316010505) 10-digit HUC watersheds.[1]

Common Name	Scientific Name	[2]State Rank	[3]State Status	[5]Federal Status
Fishes				
Alabama Shiner	*Cyprinella callistia*	S2	-	-
Mussels				
Alabama Spike	*Elliptio arca*	S1S2	-	UR
Orangenacre Mucket	*Lampsilis perovalis*	S1	LE	T
Alabama Moccasinshell	*Medionidus acutissimus*	S1	LE	T
Southern Hickorynut	*Obovaria arkansasensis*	S1	-	-
Alabama Hickorynut	*Obovaria unicolor*	S1S2	-	UR
Southern Clubshell	*Pleurobema decisum*	S1	-	E
Ovate Clubshell	*Pleurobema perovatum*	S1	LE	E
Heavy Pigtoe	*Pleurobema taitanum*	SX	LE	E
Alabama Creekmussel	*Strophitus connasaugaensis*	S1	-	-
Southern Creekmussel	*Strophitus subvexus*	S2	-	-

[1] Source: TVA Natural Heritage Database, queried on 5/24/2023
[2] State Ranks: S1 = Critically Imperiled; S2 = Imperiled; SX = Extirpated
[3] State Status Codes: LE = Listed Endangered
[4] Element Rank (=population) Rank; E = Extant record ≤25 years old; H = Historical record >25 years old; ? = Uncertain status
[5] Federal Status Code: T = Listed Threatened; E = Listed Endangered; UR = Under Review

3.11.1.3 *Plant Species*

A review of the TVA Regional Natural Heritage database indicates that no federally or state listed plants have been previously reported from within five miles of the project area. Two federally listed plants, the white fringeless orchid (*Plantathera integrilabia*) and Price's potato bean (*Apios priceana*), have been previously reported from Lowndes County, Mississippi. DCH for plants does not occur in the project area. Price's potato bean and white fringeless orchid have very specific requirements and elements constituting suitable habitat that do not occur on the site.

One occurrence of state listed lobed tickseed (*Coreopsis auriculata*) was observed during field surveys in the northwest portion of the project area along Howard Creek. The population occurred in a six square meter area of stoloniferous individuals.

3.11.2 Environmental Consequences

3.11.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts to federally or state listed endangered or threatened species or critical habitats.

3.11.2.2 *Alternative B*

Terrestrial Species

Under Alternative B, TVA would construct a CT facility at the NCG Site. TVA would make related upgrades to the onsite transmission system to interconnect the generation. Up to 21.6 acres of forest would be removed within the project area. Tree removal would occur in winter (October 1 – March 14). Impacts to jurisdictional wetlands and streams would be avoided.

Direct impacts to streams would be avoided during construction of the proposed project. BMPs would be used surrounding these features. Due to the marginal quality of the small retention pond, lack of quality nesting habitat, the use of BMPs, and lack of records of this species in the county, adverse impacts are not anticipated for alligator snapping turtles. Construction of the proposed project would not jeopardize the continued existence of alligator snapping turtles. With the implementation of these same avoidance measures and BMPs, impacts to red salamanders and their habitats would also be avoided and/or minimized. Populations of red salamanders would not be impacted by the proposed project.

Due to the lack of significant quantities of the host plant and overall impacts/degradation that has occurred on site, the project area does not provide a substantial amount of habitat for the monarch butterfly. The Proposed Action would not jeopardize the continued existence of the monarch butterfly.

Due to the lack of known bald eagle nesting records and lack of suitable foraging habitat, bald eagles would not be impacted by the proposed project. The proposed project actions are in compliance with the National Bald Eagle Management Guidelines.

As previously discussed, no caves or structures providing suitable bat winter roosting habitat were documented in the project area. Approximately 21.6 acres of trees are proposed for removal during construction. Approximately 4.8 acres of the forested areas within the project area are suitable for use by NLEB. Approximately 7.1 acres of trees are suitable for tricolored bat. Trees are proposed for removal in the winter when these species would not be expected to be present on the landscape.

A number of activities associated with the proposed project 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) and completed in April 2018 and updated in May 2023. For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. These activities and associated conservation measures are identified in the TVA Bat Strategy Project Screening Form (Appendix D) and need to be reviewed/implemented as part of the proposed project. With winter tree removal and adherence to identified Conservation Measures and BMPs, the Proposed Action would be minimized but still may affect and are likely to adversely affect NLEB, but would not jeopardize the continued existence of the tricolored bat.

Aquatic Species

The following five species of federally listed mussels are considered extant within the aforementioned 10-digit HUC watersheds encompassing the project area: orangenacre mucket, Alabama moccasinshell, southern clubshell, ovate clubshell (*Pleurobema perovatum*), and heavy pigtoe (*Pleurobema taitianum*). In addition, the Alabama spike (*Elliptio arca*) and Alabama hickorynut (*Obovaria arkansasensis*) are currently under review for federal listing and have been documented within the aforementioned watersheds. However, all seven mussel species are inhabitants of larger streams and would not be supported by any of the aquatic resources identified within the project area. Therefore, no effects to federally threatened and endangered aquatic species are anticipated to occur as a result of the proposed project.

Federally DCH for the following federally listed mussels occurs in Luxapallila and Yellow creeks: Alabama moccasinshell, orangenacre mucket, and southern clubshell. Although the watercourses documented within the project area ultimately drain to these streams, the DCH units are over seven river miles downstream from the project area; therefore, with implementation of SMZs and standard BMPs for construction and maintenance (TVA 2022b), DCH would not be impacted by activities on the NCG Site. Therefore, no adverse modifications to DCH would result from the proposed project.

Furthermore, because no suitable habitat for federal or state listed aquatic species is present within the project area, and given the appropriate implementation of BMPs during construction of the proposed project, no impacts to federally or state listed aquatic species are anticipated to occur as a result of the Proposed Action Alternative.

Plant Species

Adoption of the Action Alternative would not affect federally listed plant species or DCH because neither occurs in the proposed project area. Category A buffer of 50 feet was assigned to Howard Creek, which would avoid impacts to the state listed lobed tickseed population located in the northwest portion of the project area. Therefore, no impacts to federally or state listed plant species are anticipated to occur as a result of the Proposed Action Alternative.

3.12 Natural Areas and Parks

3.12.1 Affected Environment

Managed areas include lands held in public ownership that are managed by an entity (e.g., TVA, USDA, U.S. Forest Service, State of Tennessee) to protect and maintain certain ecological and/or recreational features. Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; wildlife management areas; recreational areas; greenways; trails; Nationwide Rivers Inventory streams; and wild and scenic rivers. Ecologically significant sites are either tracts of privately owned land that are recognized by resource biologists as having significant environmental resources or identified tracts on TVA lands that are ecologically significant but not specifically managed by TVA's Natural Areas program.

A review of the TVA Regional Natural Heritage database identified one managed and natural area within three miles of the project area: Cooper Creek Bluffs. Cooper Creek Bluffs is a conservation site immediately adjacent to the project area and has been described as having the potential for unique or sensitive botanical and aquatic organisms.

3.12.2 Environmental Consequences

3.12.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts to managed or natural areas.

3.12.2.2 *Alternative B*

Impacts during the construction phase of the proposed project would include disturbance from noise or traffic. No construction activities would occur within the Cooper Creek Bluffs site; therefore, there would be no alteration of sensitive botanical and aquatic features on the property. Furthermore, potential impacts to the sensitive botanical and aquatic features within the site would be avoided using standard BMP measures described in the surface waters, vegetation, and aquatics sections (Sections 3.6.2, 3.8.2, and 3.9.2). As such, the Action Alternative would only result in minor temporary impacts to Cooper Creek Bluffs.

3.13 Cultural and Historic Resources

3.13.1 Affected Environment

The Proposed Action requires compliance with Section 106 of the National Historic Preservation Act (NHPA). This law requires Federal agencies to formally consider the potential effects of their actions on historic properties (significant archaeological sites, objects, historic sites, historic buildings, monuments, and traditional cultural places) prior to making a decision to move forward on a proposed action. The Advisory Council on Historic Preservation established the overall process that agencies follow in complying with the implementing regulations at 36 CFR Part 800. A first step in the process is to determine the undertaking's area of potential effect (APE). The APE is defined at §800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." TVA has defined the APE for this undertaking as the project area plus areas within 0.5 mile that would have unobstructed lines of sight to the completed project.

As a first step in the Section 106 review process, TVA completed a desktop review of the project area. Three archaeological surveys were completed previously within the project area: Johnson 1998a and 1998b for the NCG Site, and Thorne 1995 for the adjacent Lowndes County 500-kV Substation Site. All three relied on pedestrian survey only, with no shovel testing. Thorne (1995) identified a pre-contact isolate and two scatters of historic artifacts related to non-extant structures possibly occupied between 1880 and 1920. Johnson (1998a) identified pre-contact archaeological site 22LO0954 in a 55-acre survey located in the proposed NCG Site. Johnson (1998b) identified no artifacts in an 18-acre portion of the NCG Site north of Caldwell Road. Both authors recommended no further archaeological survey.

The previous reports do not meet current Mississippi Department of Archives & History (MDAH) guidelines or TVA requirements for phase I archaeological surveys. Moreover, given the amount of time that has passed since the previous surveys, the potential for additional ground disturbance, and the lack of up-to-date information on historic architectural resources in the APE, TVA completed a new archaeological survey. TVA also completed a survey of above-ground historic properties in the APE. The archaeological survey included areas within the project area outside the existing paved pads. The survey re-visited site 22LO0954, confirmed that it is extant, and expanded its boundaries somewhat. The site yielded artifacts from the Woodland and Mississippian periods and indicates the possible presence of a precontact village. Based on the results of the archaeological survey, TVA found that additional investigations would be necessary to determine the eligibility of this site for the National Register of Historic Places (NRHP). The survey did not identify any additional archaeological sites in the project area. The historic architectural survey did not identify any above-ground historic properties in the APE. Moreover, thick stands of mature vegetation surrounding the project area would limit views of the facility from outside. TVA consulted with the SHPO and federally recognized Indian tribes with an expressed interest in Lowndes County, Mississippi. The SHPO agreed with the findings and recommendations. None of the consulted tribes objected or identified resources of concern in the APE.

Based on these prior surveys and consultation, there are no above-ground historic properties in the APE, and one potentially significant archaeological site is present. To further clarify the potential NRHP eligibility of the site, TVA completed additional investigations following further consultation with the SHPO and tribes concerning the proposed research design. Based on this additional investigation, TVA has determined that the site lacks research value and is ineligible for inclusion in the NRHP. TVA has prepared a report of the additional investigation and is consulting further with the SHPO and tribes regarding this determination; comments are pending completion of the consultation process.

3.13.2 Environmental Consequences

3.13.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no impacts on historic properties.

3.13.2.2 *Alternative B*

As there are no above-ground historic properties (buildings or structures) within the APE, the Proposed Action would not affect any such properties. The potentially significant archaeological site is located outside of the proposed NCG Plant boundary and construction activity areas. Should the SHPO agree with TVA that the site is ineligible for the NRHP, and provided any further concerns on the part of the consulted tribes are resolved in consultation, then TVA has no further obligation to consider potential effects on the site and no further compliance obligations under Section 106 of the NHPA. If the SHPO disagrees, TVA will follow the processes outlined in §800.6-7 for resolving disagreements, which includes seeking ways to avoid, minimize, or mitigate adverse effects, in consultation. As such, the Action Alternative would have no impact on historic properties.

3.14 Visual Resources

3.14.1 Affected Environment

The project area includes a 63-acre former private CT facility site and the 82-acre TVA Lowndes County 500-kV Substation still in service. Both the decommissioned CT and substation sites have an industrial appearance associated with energy development and include the presence of electrical equipment and other structures. On the 63-acre parcel, there is existing equipment, including six turbine/generator foundations, three 500-kV GSU, 500-kV transmission line superstructure, gas metering equipment, water tanks, and an office building that were abandoned in their current locations. All structures and equipment are scheduled to be demolished and removed in the fall of 2024 as a part of a separate Strategic Real Estate Reduction effort (TVA 2024a, TVA 2024b), which would leave an empty site prepped for the construction of new industrial structures and equipment. Directly adjacent to this parcel is the TVA Lowndes County 500-kV Substation, which is in service and consists of a 161-kV and 500-kV substation. A majority of the project area is fenced and graveled, with the remaining portions undeveloped and composed primarily of early succession forest. The project area is surrounded by a variety of land uses, including agricultural lands, open and undeveloped fields as well as densely forested areas, and scattered residences along the roadways that border the site, including Caldwell Road (which primarily runs east-west) and Seed Tick Road (which runs north-south). Adjacent to the southern border of the project area is the existing Monroe County Electric Company Substation. There are two major transmission line corridors that cross through the project area, one running east-west through the northwest portion and the other running north-south through the center of the project area. The degree of densely forested areas surrounding the project area provides visual screening for areas north, east, and west of the immediate project area.

Residential development immediately surrounding the project area consists of two residences to the north off Caldwell Road (0.01 mile and 0.05 mile from the project boundary) and several residences to the north off Seed Tick Road. Another residence is located east of Seed Tick Road, approximately 0.03 mile from the project boundary. A small residential subdivision is located southeast of the project area along Seed Tick Road (between 0.08 and 0.27 mile from the project boundary). Additionally, there are a few residences to the west/southwest of the project area (between 0.07 and 0.17 mile from the project boundary). There is one commercial development, a boutique and gift shop, located approximately 0.46 mile west of the southwest corner of the project area, and no industrial developments located within 0.5 mile of the project boundary (Figure 3.14-1).

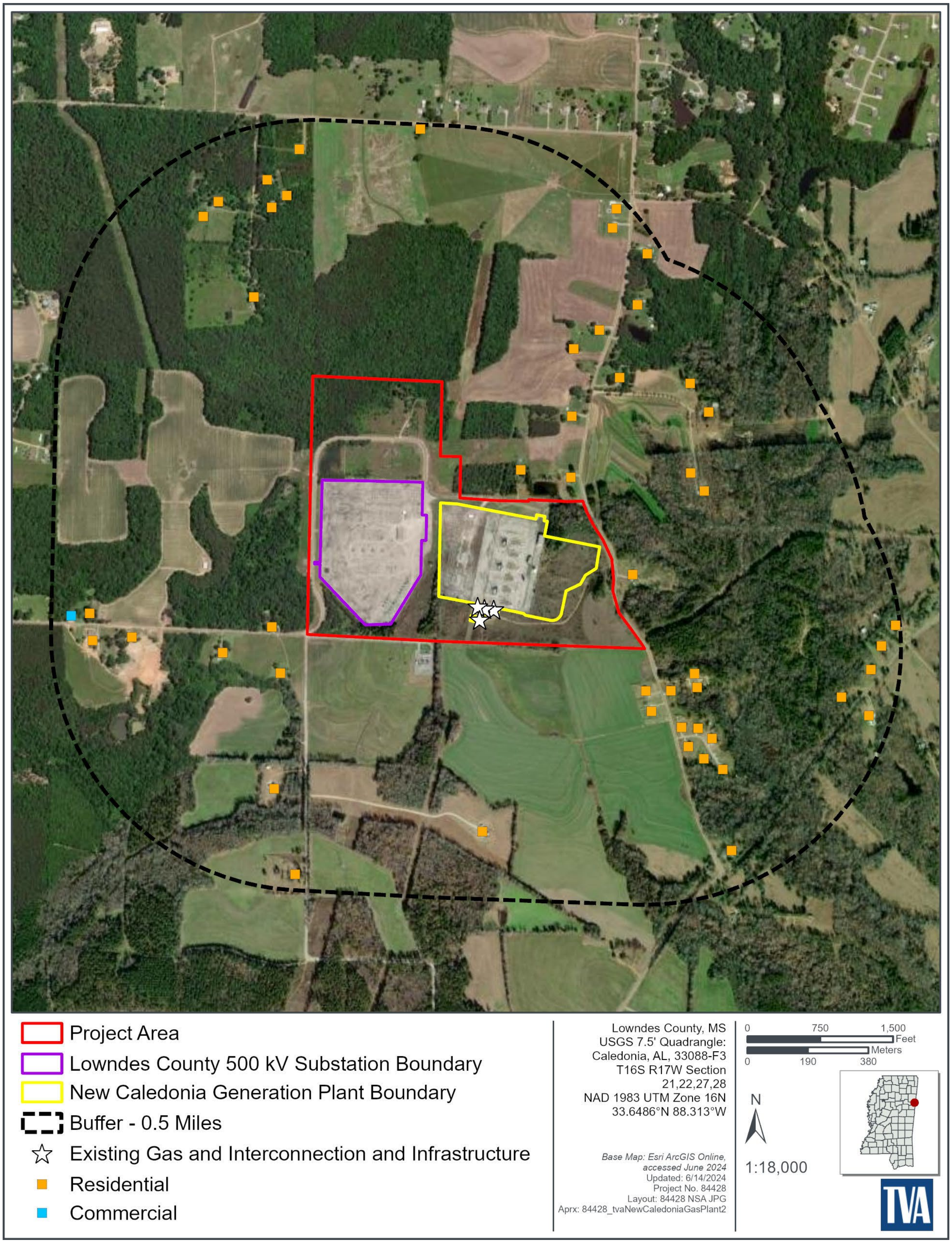

Figure 3.14-1. Sensitive Receptors Within 0.5-mile of the Project Area

3.14.2 Environmental Consequences

3.14.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, no new visual impacts would be introduced into the landscape.

3.14.2.2 *Alternative B*

Impacts to the visual resources resulting from the proposed project were determined by analyzing the existing conditions at the project area, the proposed project components, and the degree of visual contrast created by the change experienced in the landscape. The degree of contrast was evaluated as none, weak, moderate, and strong using the criteria outlined in Table 3.14-1 below. The degree of contrast in Table 3.14-1 was derived from Bureau of Land Management (BLM) Manual H-8431 (1986) to provide a systematic basis for evaluating contrast to visual resources and was adapted to fit project needs.

Table 3.14-1. Criteria for Degree of Visual Contrast

Degree of Contrast	Criteria
None	The landscape, when viewed, appears unaltered, and project elements would not attract attention or project elements would repeat the form, line, color, texture or scale common in the landscape.
Weak	The landscape, when viewed, appears slightly altered, and project elements would begin to introduce form, line, color, texture or scale in the landscape that would be visually subordinate.
Moderate	The landscape, when viewed, appears moderately altered, and project elements would introduce form, line, color, texture or scale not common in the landscape and would be visually prominent in the landscape.
Strong	The landscape, when viewed, appears heavily altered, and project elements would be out of scale or contain detail that is out of character with the existing landscape as viewed.

Source: BLM 1986.

The degrees of contrast relate to the degrees of impact as defined in Chapter 2. A degree of contrast of none would equate to no impact, a degree of weak contrast would equate to a minor impact, a degree of moderate contrast would equate to a moderate impact, and a degree of strong contrast would equate to a significant impact.

Vehicles and equipment visible during construction activities would have a low visual impact over the temporary construction period with the presence of vehicles and machinery as well as generation of fugitive dust. Removal of forested areas and vegetation within the project area would occur during construction but would be similar to existing open areas within the project area. Visual contrast during construction would be reduced by minimizing surface disturbance and controlling erosion and fugitive dust during construction of the project. Vehicular travelers along Caldwell Road and Seed Tick Road would have a brief duration of exposure to visual contrast from construction. They may also observe an increased number of vehicles traveling on the roadways to, from and around the project area. Due to the temporary nature of disturbance and limited exposure while traveling, contrast to vehicular travelers would be weak. Although views from residences would experience an extended duration of overall exposure compared to vehicular travelers, construction-related contrast to these residences are similarly anticipated to be weak, which would result in a minor level of impact.

Vehicular travelers along Caldwell Road and Seed Tick Road would have direct and indirect views of the NCG Plant once developed through occasional patches of dense forest or scattered trees. Many of the new components from the Proposed Action occur on the eastern side of the property (e.g., two 1-million-gallon fuel oil storage tanks, stormwater/process pond, water storage tanks, pumps, etc.). Resulting removal of forested areas and vegetation would result in views of linear forested edges onsite; however, these linear and geometrical forest lines are not unusual within the area due to road, agricultural, and other developments. Removal of forested areas is anticipated to have a weak degree of contrast to vehicular travelers. Vehicular travelers along Caldwell Road and Seed Tick Road would have a brief duration of exposure to visual contrast introduced by the developed NCG Plant. Due to the short duration of exposure to the built project and occasional screening from trees, visual contrasts would be weak to vehicular travelers.

Views from residences would experience an extended duration of exposure to the project compared to vehicular travelers and are anticipated to be more sensitive to changes in the landscape, like the removal of forested areas. Any impacts from removal of forested areas within the project area would be weak due to the existing disturbance of the adjacent forested areas. A majority of the project development would happen near existing residential development and a small residential community. The proposed industrial components for the proposed project would be similar in form, line, color, and texture to those currently present within the project area. During operation, the proposed project would have a weak degree of contrast, which would result in a minor impact to residential viewers, with the landscape appearing slightly altered, as the project would merge with the existing plant infrastructure, becoming visually subordinate to the overall landscape character.

Current views of the project area are dominated by existing energy development with in-service electrical equipment and decommissioned equipment. The project area would become further modified through the introduction of additional electrical infrastructure; however, the proposed project would be visually similar to the former private CT facility previously operating at the same location. Existing development and disturbance within this area have already heavily altered the landscape through the introduction of elements that are out of character with the natural landscape. The overall degree of contrast of the Action Alternative is anticipated to be weak, which would result in a minor impact. This is based on the amount of additional development, type, and location of proposed project elements, the extent of existing industrial elements in the landscape, and visual similarity between the proposed project elements and the existing modifications in the surrounding landscape. The overall size of the built-out facility would increase, adding to the cumulative visual impact. However, the proposed project would be visually similar to the previous former private CT facility located at the same site; therefore, effects of the project on visual resources are expected to be negligible.

3.15 Noise

3.15.1 Affected Environment

Noise is an unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses, and the time of day the noise occurs. For instance, higher sensitivities to noise would be expected during the quieter overnight periods at noise sensitive receptors such as residences. Other sensitive receptors include developed sites where frequent human use occurs, such as churches and schools.

Sound is measured in logarithmic units called decibels (dB). Given that the human ear cannot perceive all pitches or frequencies of sound, noise measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel (dBA), which filters out sound in frequencies above and below human hearing. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. The noise level associated with a 10 dBA change is perceived as being twice as loud, whereas the noise level associated with a 20 dBA change is considered to be four times as loud and would, therefore, represent a “dramatic change” in loudness.

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level. The equivalent sound level is the constant noise level that conveys the same noise energy as the actual varying instantaneous sounds over a given period. Fluctuating levels of continuous, background, and/or intermittent noise heard over a specific period are averaged as if they had been a steady sound. The day-night sound level (Ldn), expressed in dBA, is the 24-hour average noise level with a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for the increased sensitivity of people to noises that occur at night. Typical background day-night noise levels for rural areas are anticipated to range between an Ldn of 35 and 50 dB, whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (EPA 1974). Common noise levels and how they are perceived in terms of loudness by a human observer are provided in Table 3.15-1.

Table 3.15-1. Sound Levels of Representative Sounds and Noises

Common Outdoor Noises	Sound Pressure Levels (dB)			Common Indoor Noises
-	-	-	110	Rock Band at 5 m (16.4 ft)
-	-	-	-	-
Jet Flyover at 300 m (984.3 ft)	-	-	-	-
-	-	-	100	-
-	-	-	-	Inside Subway Train (New York)
Gas Lawn Mower at 1 m (3.3 ft)	-	-	-	-
-	-	-	90	-
-	-	-	-	Food Blender at 1 m (3.3 ft)
Diesel Truck at 15 m (49.2 ft)	-	-	-	Garbage Disposal at 1 m (3.3 ft)
-	-	-	80	-
-	-	-	-	Shouting at 1 m (3.3 ft)
-	-	-	-	-
Gas Lawn Mower at 30 m (98.4 ft)	-	-	70	Vacuum Cleaner at 3 m (9.8 ft)
-	-	-	-	-
Commercial Area	-	-	-	Normal Speech at 1 m (3.3 ft)
-	-	-	60	-
-	-	-	-	Large Business Office
-	-	-	-	-
-	-	-	50	Dishwasher Next Room
Quiet Urban Daytime	-	-	-	-
-	-	-	-	-

Common Outdoor Noises		Sound Pressure Levels (dB)		Common Indoor Noises
-	-	-	40	Small Theater, Large Conference Room
Quiet Urban Nighttime	-	-	-	Library
Quiet Suburban Nighttime	-	-	-	-
-	-	-	30	-
-	-	-	-	Bedroom at Night
Quiet Rural Nighttime	-	-	-	Concert Hall (Background)
-	-	-	20	-
-	-	-	-	Broadcast and Recording Studio
-	-	-	-	-
-	-	-	10	-
-	-	-	-	-
-	-	-	-	Threshold of Hearing
-	-	-	0	-
-	-	-	-	-

Source: FHWA (2018)

The perceived loudness or intensity between a noise source and a receptor may change because of distance, topography, vegetation, water bodies, and structures. The closer a receptor is to a noise source, the louder the noise seems, and for every doubling of distance from a source, the intensity drops by about 6 dBA over land and about 5 dBA over water. Topography, vegetation, and structures can change noise intensity through reflection, absorption, or deflection. Reflection tends to increase the intensity, while absorption and deflection tend to decrease the intensity.

There are no federal, state, or locally established quantitative noise-level regulations specifying environmental noise limits for the NCG Plant or the surrounding area. However, the EPA noise guideline recommends that outdoor noise levels not exceed a Ldn of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are "intentionally conservative to protect the most sensitive portion of the American population" with "an additional margin of safety" (EPA 1974). The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 2009).

3.15.2 Sources of Noise

Primary sources of noise in the vicinity of the project area include road traffic on the rural roads. The Columbus Air Force Base is located approximately 6.5 miles to the west. Heavy equipment used for agricultural purposes on nearby properties would also result in the generation of noise.

Currently, there are no existing CTs that are operational at the site. In 2007, TVA dismantled the site, removing the previously existing six-frame CTs. However, the adjacent TVA Lowndes County 500-kV Substation has remained in-service and has active electrical equipment that generates noise.

3.15.3 Noise Receptors

Sensitive noise receptors include residences or other developed sites where frequent human use occurs, such as churches, parks, and schools. The area is rural, mostly dominated by agricultural fields and woodlands with scattered rural residences. The closest residence identified is located approximately 465 feet to the southwest of the project area boundary, though the distance from the actual noise sources associated with the NCG Plant would be greater. There is one commercial development, a boutique and gift shop, located approximately 0.46 mile west of the southwest corner of the project area. All other potential noise sensitive receptors identified were residences; no parks, churches, or schools are located within 0.5-mile of the project area (Figure 3.14-1).

3.15.4 Environmental Consequences

3.15.4.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no noise-related impacts.

3.15.4.2 *Alternative B*

Under Alternative B, onsite construction activities for the proposed project would result in temporary increased noise levels adjacent to the construction site due to operation of construction equipment onsite and along roadways used by construction-related vehicles. Construction activities would last approximately 30 months, with work primarily occurring on weekdays during daytime hours, though weekend and night shift construction may occur should the schedule necessitate. During the construction phase, noise would be generated by a variety of construction equipment, including trucks, truck-mounted augers and drills, excavators, tracked cranes, and bulldozers. Typical noise levels from this construction equipment are expected to be 85 dBA or less at a distance of 50 feet from the construction site (Federal Highway Administration [FHWA] 2016).

The closest sensitive noise receptor to the project area is a residence located approximately 465 feet southwest of the project area. Based on straight line noise attenuation, it is estimated that maximum noise levels from construction equipment operated within the primary project area would attenuate to 55.3 dBA at the closest residence. However, this is assuming that the loudest single piece of construction equipment would operate at the boundary of the project area in the corner closest to the residence. Due to the size and layout of the project area, this is unlikely to be a location at which any substantial construction activities would occur. Thus, typical construction noise at residences would typically fall below the recommended EPA outdoor noise guideline of 55 dBA.

It is not expected for noise due to construction activities to exceed recommended noise levels at the nearest noise sensitive receptors. The noise due to construction would be temporary and transient, with no persisting impacts on nearby noise sensitive areas. Therefore, noise impacts from construction of the proposed project would be temporary and minor.

There is also a potential for noise impacts associated with an increase in traffic related to workforce vehicle traffic and deliveries during construction. Roadway traffic is typically not a major contributor of noise for people who live more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA 2011). Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic volume would result in an approximately 3 dBA increase in noise level, which would not normally be a perceptible noise increase (FHWA 2011). TVA estimates that the peak workforce needed during the estimated 30-month construction period would consist of approximately 200 personnel per day. Assuming one person per commuting vehicle, there would be a maximum daily morning inbound traffic volume of approximately 200 vehicles and a daily outbound traffic volume of approximately 200 vehicles each working day. Due to the rural nature of the location, it is likely that the increase in traffic would result in higher short-term noise levels. These impacts would be temporary and minor.

A baseline noise survey and noise impact assessment for operational noise associated with the operation of the proposed NCG Plant was performed by Burns & McDonnell (2023). The noise modeling performed for the project estimated that the NCG Plant is expected to contribute a maximum sound level of approximately 63 dBA in the vicinity of the nearest residential noise sensitive receptor, which is located north of the project area. Assuming constant, continuous operation, this would result in an Ldn of approximately 69 dBA, which is above the EPA recommendation of 55 dBA Ldn to reduce noise impacts. The noise impact assessment provided potential noise reduction options (such as equipment selection) that could be considered, which indicated a predicted maximum noise impact of approximately 56 dBA in the vicinity of the same nearest noise sensitive receptor. Assuming constant, continuous operation, this would result in an Ldn of 62 dBA, which is also above the EPA recommendation of 55 dBA Ldn to reduce noise impacts (Burns & McDonnell 2023).

TVA is currently evaluating modeled impacts to ambient noise levels and investigating equipment options that may be available to reduce sound propagation. Engineering and design of the NCG Plant is ongoing; however, it is expected that TVA's final facility design and equipment selection would incorporate noise reduction measures such that noise impacts from the operation of the NCG Plant would be minor.

3.16 Transportation

3.16.1 Affected Environment

The transportation network surrounding the project area contains state and county roads. The eastern border of the project area is bound by Seed Tick Road, and the western and northern borders of the project area are bound by Caldwell Road. The primary roadway serving the project area is Mississippi Highway 12 (MS 12), known locally as Military Road, located approximately 0.5 miles to the south of the project area. MS 12 is a two-lane divided road for all its reach and is classified as a minor arterial roadway. Current activities that generate traffic near the project area include the operation of the TVA Caledonia Combined Cycle Plant approximately two miles to the east, farming in the surrounding land, and residential development scattered throughout the area. As such, existing traffic is composed of a mix of cars and light duty trucks, as well as medium duty (larger delivery trucks) to heavy duty trucks (semi-tractor trailers).

Locations of surrounding roadways and those that provide access to the project area are shown on Figure 3.16-1. There are two existing primary points of access into the project area from MS 12, Caldwell Road and Seed Tick Road. Seed Tick Road intersects at an at-grade T-intersection with MS 12 approximately 0.46 miles to the south-southeast of the project area. Seed Tick Road is a paved, two-lane road with no center markings. Workers would travel 0.8 miles on Seed Tick Road before turning left onto Caldwell Road, a gravel road, where the site entrance is located 400 feet away on the left. Alternatively, work traffic could turn off MS 12 at an at-grade T-intersection onto Caldwell Road due south of the project area. Vehicles would travel 2.3 miles down the gravel road before turning right into the site entrance. Utilizing this route increases the distance construction vehicles would travel once off MS 12; however, there are currently less residential properties along this route, which reduces residential impacts due to construction traffic when compared to the Seed Tick Road route.

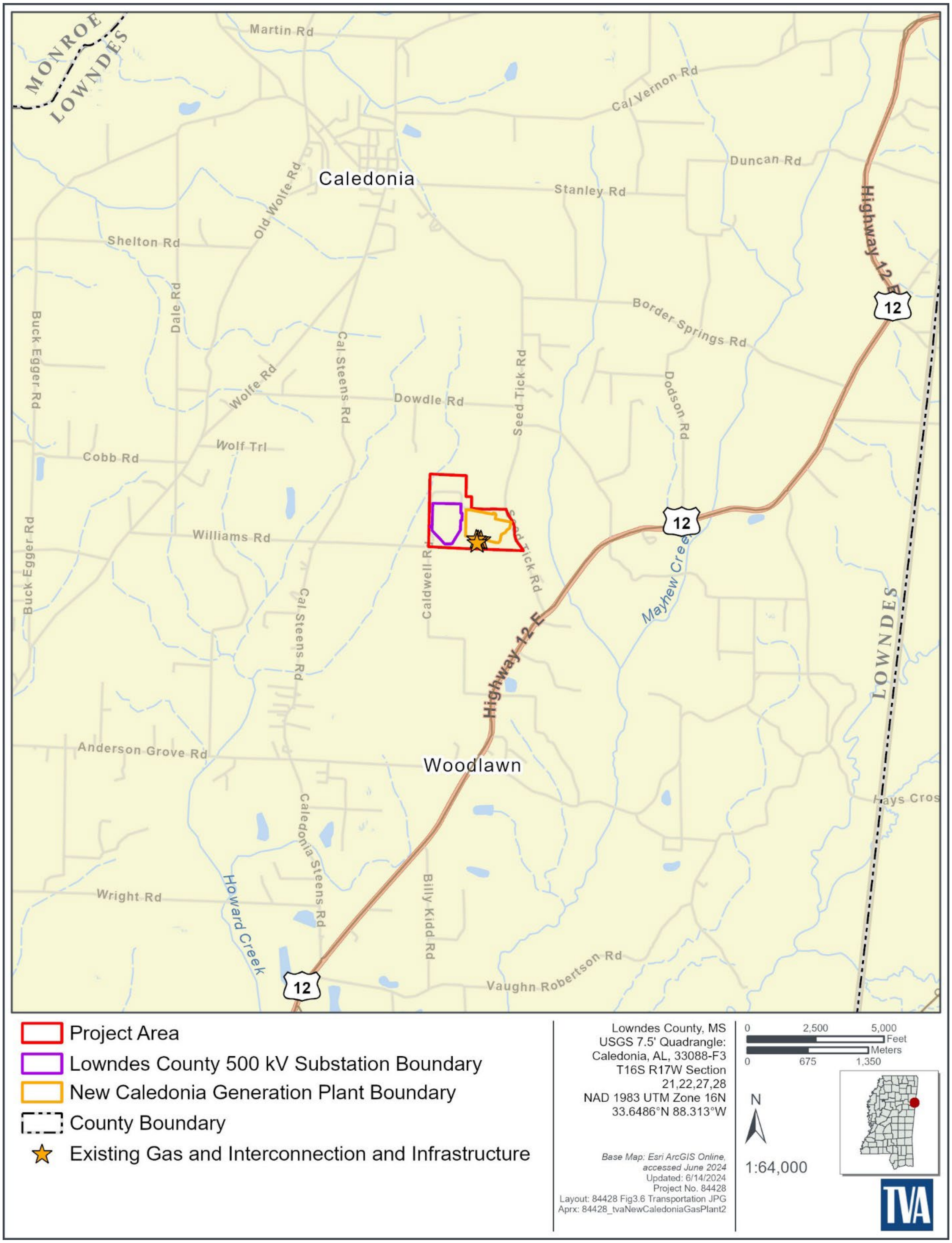

Figure 3.16-1. Roadways in the Vicinity of the Project Area

Average Annual Daily Traffic (AADT) for key roadways near the project area are presented in Table 3.16-1. There is no traffic counter for Seed Tick Road in the vicinity of the project area; however, a traffic counter exists on Seed Tick Road approximately 2.71 miles north of the project area in Caledonia, Mississippi. This counter is likely to experience heavier traffic volumes than the road directly adjacent to the project area due to its presence in a more populated and developed location. In general, during the period between 2018 and 2022, traffic has decreased slightly on both MS 12 and Seed Tick Road.

Table 3.16-1. Average Annual Daily Traffic Volume on Roadways in Proximity to the NCG Plant

Roadway	Year	AADT
MS 12 (Location ID 440310) Southwest of the project area	2022	5,300
	2021	5,400
	2020	N/A*
	2019	6,200
	2018	6,100
Seed Tick Road near the populated area of Caledonia, MS (Location ID 440995) North of the project area	2022	1,900
	2021	2,300
	2020	N/A*
	2019	2,500
	2018	3,100

*N/A – Not available
Source: MDOT 2024a

3.16.2 Environmental Consequences

3.16.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no change in transportation conditions in the project area.

3.16.2.2 *Alternative B*

Under Alternative B, vehicular traffic on public roads near the project area would temporarily increase due to the commuting of construction workers and delivery of materials and equipment. A transportation study would be conducted to determine the routes used for delivery of construction equipment and project materials. Roads used to access the project area would be surveyed to determine the existing conditions prior to construction. Transportation routes and needs would be determined by the construction contractor. A traffic impact analysis would be performed if necessary to address potential roadway impacts. Additional environmental reviews would be conducted as appropriate and mitigation measures would be implemented if warranted.

Construction activities would last for approximately 30 months, beginning in 2025 and ending at the end of 2027, with work primarily occurring during daytime hours, typically on weekdays, but potentially up to seven days a week, and limited nighttime hours if warranted to meet construction schedules. The daily workforce during the construction phase is expected to be 200 workers per day. Traffic is expected to be distributed during a peak morning period (to the project area) and a peak evening period (away from the project area). Assuming one person per commuting vehicle, there would be a daily morning inbound traffic volume of 200 vehicles per day and a daily outbound traffic volume of 200 vehicles per day for a total of 400 trips per day. Construction traffic would access the site via the Caldwell Road site entrance. Construction would primarily route down Seed Tick Road before turning onto Caldwell Road to minimize impacts to the residences along Caldwell Road.

The effects of construction traffic on MS 12 and Seed Tick Road are expected to be minor. During the peak construction period, the additional daily commuters would result in minor increases in traffic volumes along this roadway (approximately 7.5 percent on MS 12 and 12.9 percent on Seed Tick Road). As a result, morning and evening commuters on public roadways near the project area may experience congestion; however, disruptions to local traffic circulation would mostly occur in 15- or 20-minute periods around the major shift changes and would be short-term in duration.

Additional truck traffic would also occur in the area during the construction phase due to material and equipment deliveries to the project area. However, as this increase would primarily occur during the mobilization and demobilization phases, impacts to the surrounding transportation network are not anticipated. Construction materials and equipment are anticipated to be delivered by truck. Borrow fill, if required, would be obtained from an existing commercial borrow pit. If an existing commercial borrow facility is not available and a new, offsite borrow pit is required, additional environmental reviews would be conducted, as appropriate. Although exact borrow needs are not known at this time, the demand for borrow would vary over the course of construction; thus, it is expected to be intermittent and dependent upon specific construction needs. Based on the intermittent nature of borrow transport, impacts to traffic operations are expected to be minor and short-term, if borrow is required.

Operation of the NCG Plant would require approximately 15 permanent employees and regional staff. Therefore, the operation of the proposed project would not result in long-term changes to the existing conditions on the surrounding roadways.

3.17 Solid and Hazardous Waste

3.17.1 Affected Environment

Hazardous waste is a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. Hazardous waste is generated from many sources, ranging from industrial manufacturing process wastes to batteries, and may come in many forms, including liquids, solids gases, and sludges. Hazardous materials are regulated under a variety of federal laws, including Occupational Safety and Health Administration (OSHA) standards, Emergency Planning and Community Right to Know Act (EPCRA), the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act of 1980, and the Toxic Substances Control Act (TSCA) (EPA 2023a).

RCRA regulations define what constitutes a hazardous waste and establishes a “cradle to grave” system for the management and disposal of hazardous wastes. Universal wastes are a subset of hazardous wastes that are widely generated. Universal wastes include batteries, lamps, high intensity lights, and mercury thermostats. Universal wastes may be managed in accordance with the RCRA requirements for hazardous wastes or by special, less stringent provisions (EPA 2023a).

Solid waste consists of a broad range of materials that include refuse, sanitary wastes, contaminated environmental media, scrap metals, non-hazardous wastewater treatment plant sludge, non-hazardous air pollution control wastes, various non-hazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances). Solid waste is regulated by the EPA and RCRA Subtitle D. Each state is required to ensure the federal regulations for solid waste are met and may implement more stringent requirements (EPA 2024f).

Special waste is a solid waste, other than a hazardous waste, that requires special handling and management to protect public health or the environment. In some states, special wastes may include sludges, bulky wastes, pesticide wastes, industrial wastes, combustion wastes, friable asbestos, and certain hazardous wastes exempted from RCRA Subtitle C requirements. Any of these wastes, if generated, would be disposed of as required by state and federal regulations (EPA 2023b).

A Phase I Environmental Audit was conducted in 2000, two years after the original gas plant was constructed by the previous owner. At the time of the audit, there were no signs of contamination or leaks. Hazardous substances noted onsite during the audit included RCRA permitted substances, such as the oil from operating the CTs and the water from cleaning the turbines. Hazardous substance containers and unidentified substance containers observed during the audit included 55-gallon drums and skid mounted horizontal tanks, but there was no soil contamination from these tanks. Demineralized water storage tanks were also observed onsite but there were no leaks or hazards associated with them. There were no polychlorinated biphenyls (PCBs) containing materials or solid waste disposals on the site. The audit observed that RCRA permitted hazardous substances were handled in accordance with the site's permit and EPA guidelines, and no environmental liabilities were discovered on the site (Neil-Schaffer, Inc. 2000). There are no known instances of contamination or environmental events in the time that TVA has owned the property.

3.17.2 Environmental Consequences

3.17.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no solid waste and hazardous waste generation.

3.17.2.2 *Alternative B*

Construction of the proposed project would generate non-hazardous solid waste, including concrete, stabilizing debris, metals, plastic, wood, packing materials, scrap metals, and non-hazardous used oil and lubricants. The project would obtain a small quantity generator hazardous waste identification number from the EPA. All non-hazardous waste from construction activities would be disposed of in accordance with applicable regulations and TVA procedures, which includes recycling where possible.

Construction activities would result in the potential for the generation of hazardous waste. Various hazardous wastes, such as waste paints, coating, and adhesive wastes, and spent solvents, could be produced during construction. Appropriate spill prevention, containment, and disposal requirements for hazardous wastes would be implemented to protect construction workers, the public, and the environment. A permitted hazardous waste disposal facility would be used for the ultimate disposal of any hazardous waste generated during construction.

CT plants produce very small quantities of solid waste during normal operation. Operation of the NCG Plant would require maintaining two new aboveground storage tanks for fuel oil and would be in compliance with measures identified in TVA's Spill Prevention and Response Procedures to prevent and contain accidental spills of any material and to ensure that inadvertent spills of fuels, lubricants, coolants, or solvents are contained, cleaned up, and disposed of in an appropriate manner. Therefore, operation of the NCG Plant would produce very small quantities of solid and hazardous waste.

Solid and hazardous wastes generated during construction and operation would be managed in accordance with established procedures and applicable regulations. Therefore, impacts associated with the generation of solid and hazardous waste from the Proposed Action would be minor.

3.18 Socioeconomics and Environmental Justice

3.18.1 Affected Environment

3.18.1.1 *Socioeconomic Conditions*

The study area for the socioeconomic assessment of the project is defined as Lowndes County, Mississippi, as project-related changes to socioeconomic indicators, such as population level and demographics, employment, housing, tourism, and demand for public services, are likely to be distributed across the entire county. Existing conditions in Lowndes County are characterized primarily from information collected by the USCB. Information for the State of Mississippi is provided for context.

Table 3.18-1 characterizes the population, labor force, and income levels for Lowndes County. Table 3.18-1 also reports housing and public service statistics for the county. Similar information is provided at the state level for comparison purposes.

Table 3.18-1. Population, Labor Force, Housing, and Public Services

	Lowndes County	Mississippi
Population (Five-Year Estimates Ending in Designated Year)[a,b]		
Total Population (2012)	59,584	2,967,620
Total Population (2022)	58,547	2,958,846
Population Change (2012 to 2022)	-1.7%	-0.3%
Persons per Square Mile (2022)	115.8	63.1
Labor Force (2018-2022 Five-Year Estimates)[c]		
Civilian Labor Force	25,412	1,331,419
Employed	23,827	1,245,900
Unemployed	1,585	85,519
Average Annual Unemployment Rate	6.2%	6.4%
Income (2018-2022 Five-Year Estimates)		
Per Capita Income[d]	$29,750	$29.209
Median Household Income[e]	$53,687	$52,985
Percent of Persons Below Poverty Level[f]	18.1%	19.2%
Housing (2018-2022 Five-Year Estimates)[g,h,i]		
Total Housing Units	26,973	1,324,992
Total Occupied Housing Units	22,651	1,121,269
Total Vacant Units	4,322	203,723
Homeowner Vacancy Rate	3.8%	1.3%
Rental Vacancy Rate	6.5%	9.0%
Number of Hotels/Motels[j]	18	NR
Number of RV Parks/Campgrounds[j]	12	NR

Public Services and Facilities		
Police Departments[k]	2	NR
Fire Departments[j]	12	NR
Hospitals[j]	1	NR
Public Schools[l]	18	NR

NR: Not Reported

Sources: [a] USCB 2012; [b] USCB 2023b; [c] USCB 2023c; [d] USCB 2023d; [e] USCB 2023e; [f] USCB 2023f; [g] USCB 2023g; [h] USCB 2023h; [i] USCB 2023i; [j] Google Maps 2024; [k] USACOPS 2024; [l] EJScreen 2024

With a population density of almost twice the state average, Lowndes County contains a mix of rural and suburban areas. The county's per capita income, poverty rate, and unemployment rate generally align with the state averages for the same measures. Employment is centered in three sectors: 1) education, health care, and social assistance; 2) manufacturing; and 3) retail trade (USCB 2023j). The rental vacancy rate is below the state average, despite having a population that is decreasing at a greater rate than that of the state. Although there are 12 RV parks/campgrounds in the county, no tourist attractions have been identified within one mile of the project area.

Community facilities and services include public or publicly funded facilities, such as police protection and other emergency services (ambulance/fire protection), schools, hospitals, and other health care facilities, libraries, daycare centers, churches, and community centers. The socioeconomic study area for the proposed project has fire and public safety departments commensurate with the population and industrial activity in the county. The Baptist Memorial Hospital is the closest emergency room to the project area, located approximately 14 miles (driving distance) to the southwest. Caledonia Elementary School and High School lie approximately two miles north of the project area.

3.18.1.2 *Environmental Justice*

An Environmental Justice (EJ) assessment was completed for the proposed project to identify minority and low-income communities and determine if these populations would likely be adversely and disproportionately affected by construction or operation of the proposed project. The EJ assessment characterized block groups within 10 miles of the project area with respect to income and ethnicity, consistent with the CEQ guidance (CEQ 1997), using the following criteria.

- Low-income block groups are defined as those in which the percentage of low-income households exceeds 50 percent OR the proportion of low-income households exceeds the same measure for the county within which the block group is located.
- Minority block groups are defined as those in which the percentage of the block group's population self-identifying as a minority exceeds 50 percent OR the percentage of the block group's population self-identifying as a minority exceeds 110 percent of (i.e., is 10 percent higher than) the same measure for the county in which the block group is located.

As summarized in Table 3.18-2, reported in Table 3.18-3, and illustrated in Figure 3.18-1[2], the EJ analysis area comprised 32 block groups. Of these 32 block groups, 4 block groups are identified as EJ communities due to ethnicity only, 2 block groups are identified as EJ communities due to income only, and 4 block groups are identified as EJ communities due to both income and ethnicity. The project area is not within a block group identified as an EJ community. The nearest block group

[2] Block groups in Figure 3.18-1 are labeled with reference numbers that correspond to Table 3.18-3 and Appendix A of the NCG EJ Assessment.

identified as an EJ community, block group 3 of census tract 301.01 in Lamar County, Alabama, is located approximately 2.9 miles east of the project area.

Refer to the NCG EJ Assessment (Appendix E) for a detailed discussion of the EJ assessment completed for the proposed project, including details on existing EJ conditions, English language proficiency, an overview of federal guidance, and more information about the identification of EJ communities.

Table 3.18-2. Summary of Environmental Justice Among Block Groups in the Environmental Justice Analysis Area Within 10-miles of the Project Area

Characteristic	Number of Block Groups	Proportion of Block Groups (%)
Total	32	100%
Identified as an EJ Community due to Minority Criteria only	4	12.5%
Identified as an EJ Community due to Low-Income Criteria only	2	6.3%
Identified as an EJ Community due to Minority and Low-Income Criteria	4	12.5%
Total Block Groups Identified as EJ Communities	10	31.3%

Sources: USCB 2023k; USCB 2023l

Table 3.18-3. Race, Ethnicity, and Poverty Statistics in the Environmental Justice Analysis Area Within 10-miles of the Project Area

Block Group Reference Number[a]	Location	Total Population	White Alone (not Hispanic or Latino)	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races	Hispanic or Latino	Total Racial Minority[b,c]	% Low-Income[c]
N/A	Alabama	5,028,092	64.6%	26.2%	0.3%	1.4%	0.0%	0.3%	2.6%	4.6%	35.4%	34.8%
N/A	Lamar County	13,885	85.7%	11.0%	0.4%	0.2%	0.0%	0.3%	2.0%	0.5%	14.3%	37.2%
1	Block Group 1, Census Tract 301.01	810	77.2%	21.2%	0.0%	0.9%	0.0%	0.0%	0.0%	0.7%	22.8%	19.8%
2	Block Group 3, Census Tract 301.01	511	81.6%	18.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	18.4%	23.7%
3	Block Group 4, Census Tract 301.01	1,191	95.0%	3.9%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	5.0%	28.6%
4	Block Group 3, Census Tract 302	1,220	68.4%	29.7%	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%	31.6%	29.9%
5	Block Group 4, Census Tract 302	885	96.4%	0.0%	0.0%	1.6%	0.0%	0.0%	2.0%	0.0%	3.6%	28.0%
N/A	Pickens County	18,925	53.6%	39.2%	0.2%	0.1%	0.0%	0.1%	1.7%	5.2%	46.4%	44.4%
6	Block Group 1, Census Tract 502	1,536	76.5%	23.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	23.5%	28.0%
N/A	Mississippi	2,958,846	55.9%	37.1%	0.4%	1.0%	0.0%	0.3%	2.1%	3.3%	44.1%	40.7%
N/A	Clay County	18,598	38.0%	60.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.2%	62.0%	52.2%
7	Block Group 3, Census Tract 9505	1,799	50.8%	46.2%	0.2%	0.0%	0.0%	0.0%	2.7%	0.0%	49.2%	51.8%
N/A	Lowndes County	58,547	50.0%	44.5%	0.1%	1.1%	0.0%	0.4%	1.5%	2.4%	50.0%	39.7%
8	Block Group 1, Census Tract 1.02	1,222	75.5%	13.0%	0.0%	0.6%	0.0%	0.0%	3.1%	7.8%	24.5%	22.3%
9	Block Group 2, Census Tract 1.02	815	75.1%	24.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	24.9%	36.6%
10	Block Group 1, Census Tract 1.03	1,508	69.8%	25.1%	0.0%	0.0%	0.0%	0.0%	4.4%	0.8%	30.2%	11.7%
11	Block Group 2, Census Tract 1.03	1,066	81.9%	15.9%	0.0%	0.4%	0.0%	0.0%	0.8%	1.0%	18.1%	14.1%
12	Block Group 3, Census Tract 1.03	1,881	94.2%	0.0%	2.1%	2.0%	0.0%	0.0%	0.6%	1.1%	5.8%	24.0%
13	Block Group 4, Census Tract 1.03	925	65.8%	11.2%	0.0%	0.0%	0.0%	8.9%	2.5%	11.6%	34.2%	27.0%
14	Block Group 1, Census Tract 1.04	1,725	80.7%	8.3%	0.3%	0.0%	0.0%	0.0%	10.7%	0.0%	19.3%	36.0%
15	Block Group 1, Census Tract 3.01	1,351	53.1%	42.8%	0.1%	0.7%	0.0%	0.0%	0.3%	3.1%	46.9%	25.5%

Block Group Reference Number[a]	Location	Total Population	White Alone (not Hispanic or Latino)	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races	Hispanic or Latino	Total Racial Minority[b,c]	% Low-Income[c]
16	Block Group 2, Census Tract 3.01	398	93.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	7.0%	0.0%
17	Block Group 3, Census Tract 3.01	1,462	47.9%	51.4%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	52.1%	20.9%
18	Block Group 1, Census Tract 3.02	1,178	74.8%	14.9%	0.0%	5.4%	0.0%	0.0%	2.0%	2.8%	25.2%	18.8%
19	Block Group 2, Census Tract 3.02	1,769	73.6%	18.3%	0.0%	0.0%	0.0%	0.0%	0.0%	8.1%	26.4%	22.3%
20	Block Group 3, Census Tract 3.02	881	64.5%	24.5%	0.0%	1.9%	0.0%	0.0%	0.0%	9.1%	35.5%	30.1%
21	Block Group 1, Census Tract 4.05	856	50.5%	41.1%	0.0%	0.0%	0.0%	0.0%	5.7%	2.7%	49.5%	38.1%
22	Block Group 2, Census Tract 4.05	1,911	57.7%	39.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	42.3%	36.9%
23	Block Group 3, Census Tract 4.05	775	69.8%	28.0%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	30.2%	37.8%
24	Block Group 4, Census Tract 4.05	2,398	28.3%	69.8%	0.0%	0.0%	0.0%	0.0%	0.6%	1.3%	71.7%	66.6%
25	Block Group 1, Census Tract 5	1,194	56.3%	33.6%	0.0%	5.3%	0.0%	0.0%	3.0%	1.8%	43.7%	27.7%
26	Block Group 2, Census Tract 5	1,336	12.1%	86.8%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	87.9%	47.8%
27	Block Group 1, Census Tract 8	1,074	11.8%	88.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	88.2%	70.5%
28	Block Group 1, Census Tract 9800	1,428	61.4%	3.9%	0.0%	5.3%	0.0%	0.4%	6.0%	23.1%	38.6%	25.7%
N/A	Monroe County	34,168	66.7%	30.2%	0.0%	0.3%	0.0%	0.0%	1.3%	1.5%	33.3%	38.8%
29	Block Group 1, Census Tract 9505.01	2,102	95.9%	1.4%	0.0%	0.0%	0.0%	0.0%	0.2%	2.5%	4.1%	22.8%
30	Block Group 2, Census Tract 9505.01	920	44.7%	46.5%	0.0%	8.8%	0.0%	0.0%	0.0%	0.0%	55.3%	65.2%
31	Block Group 1, Census Tract 9505.02	2,306	97.4%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%	50.5%
32	Block Group 3, Census Tract 9506	602	83.1%	16.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.9%	27.9%

Sources: U.S. Census Bureau 2023k and 2023l

[a] A reference number is assigned to each block group within the environmental justice assessment area for reporting purposes. These numbers link to Figure 3.18-1.

[b] “Minority” refers to people who self-identify as something other than White Alone, not Hispanic or Latino.

[c] Low-income and minority populations exceeding the established thresholds are indicated by blue shading.

Due to rounding differences in the dataset, the totals may not reflect the sum of the addends.

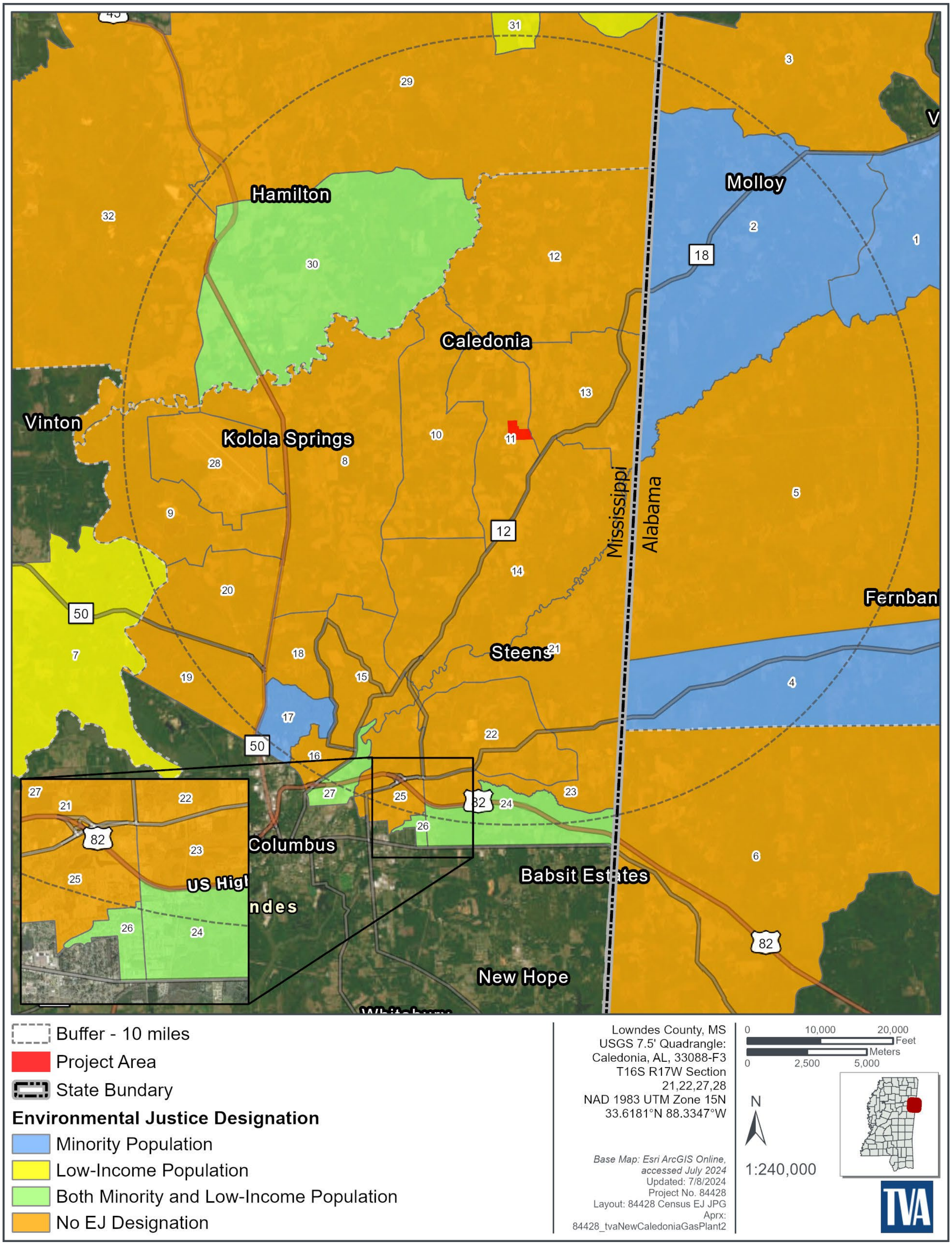

Figure 3.18-1. Minority and Low-Income Communities in the Environmental Justice Analysis Area Within 10-miles of the Project Area

3.18.2 Environmental Consequences

3.18.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, any taxes associated with the proposed project would not be distributed to Lowndes County, and any indirect and induced economic activity associated with the construction and operation workforces would be forgone. There would be no potential for disproportionate and adverse impacts to EJ communities under Alternative A.

3.18.2.2 *Alternative B*

Socioeconomic Conditions

Construction of the proposed project would last for 30 months and require a peak workforce of 200 workers. While most of the workers would likely already be employed in the construction industry, it is possible the project could generate a small number of new jobs in the county, resulting in a minor beneficial impact.

Workers could be drawn from the labor force within the socioeconomic study area or nearby population centers where available. As such, it is likely that construction workers would commute daily to and from the project area and that construction of the NCG Plant would not impact population levels, cause a shortfall in the supply of short-term housing accommodations, or materially increase the demand for public services. Further, when local or regional contracting companies are hired for construction projects similar to the proposed project, worker pay typically aligns with local prevailing wages; therefore, construction of the NCG Plant is not expected to materially affect average income levels in the socioeconomic study area.

If the construction workforce is not drawn from the surrounding area, workers may seek short-term accommodations in Lowndes County. The temporary presence of up to 200 additional workers would increase the population of the county by no more than 0.4 percent. There are 18 hotels and motels in Lowndes County, which indicates that the local economy is prepared for and anticipates temporary population increases greater than 0.4 percent[3]. Although a temporary population increase of less than 0.4 percent may, to a limited degree, increase demand for public services, this increase is unlikely to strain public service providers or prevent current residents from accessing services due to the magnitude of the increase.

Lowndes County does not levy income or sales tax additional to those levied by the state of Mississippi (Avalara 2024). Due to the immaterial changes to employment and income associated with the project, construction activities associated with the NCG Plant would not materially change income tax revenues at the state level. Purchases made by TVA are not subject to sales tax. If the construction contractor acquires materials and equipment for the proposed project within the state of Mississippi, these purchases would generate sales tax at the state rate of 7 percent. Materials and equipment purchased out of state and imported to Mississippi may be subject to a 7 percent use tax (Mississippi Department of Revenue 2024a). Therefore, if the contractor acquires materials and equipment for the proposed project, construction of the NCG Plant may result in a measurable increase in Mississippi's tax revenue proportionate to the magnitude of acquisition.

Construction of the NCG Plant would temporarily stimulate economic activity in the socioeconomic study area in the form of direct payments to local businesses as well as indirect and induced economic activity associated with increased spending by the project's contractors and the suppliers

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[3] Economy scale hotels have an average of approximately 75 rooms (Statista 2023). Therefore, there are an estimated 1,350 rooms for the 18 hotels/motels in the socioeconomic study area.

that support them. The construction-related impact of direct, indirect, and induced spending would be minor, temporary, and positive.

Operation of the NCG Plant would have a minor, positive effect on the socioeconomic conditions of Lowndes County in two ways. First, TVA anticipates operation of the NCG Plant would require approximately 15 permanent employees and regional staff. While the impact of this job creation would not change population levels, employment, or demand for housing relative to existing conditions in the county, there would be a minor increase in tax revenues and minor indirect and induced economic activity arising from increased spending by the project's workforce and the suppliers that support them. Second, electricity generated by the NCG Plant would be added to the grid and sold to end users. The sale of electricity for commercial use in Mississippi may be subject to sales tax at a rate of up to 7 percent. Mississippi does not tax the sale of electricity for residential or industrial use (Mississippi Department of Revenue 2024b).

Environmental Justice

The EJ assessment completed for the proposed project considered the full range of project-related changes that could affect humans (e.g., construction and or operations-related changes in air quality, changes in water quality, degradation of cultural resources, socioeconomic alterations, etc.). For each project-related change, the analysis posed three specific questions, considering both direct and indirect project impacts:

1. Are residents of EJ communities likely to be disproportionality and adversely affected because they are more sensitive to a given level of exposure due to pre-existing medical conditions and/or reduced access to health care and/or because they are exposed to higher baseline concentrations of health stressors such as particulate matter (PM) 2.5?
2. Are residents of EJ communities likely to be disproportionally and adversely affected due to lifestyle approaches such as subsistence fishing and/or because they have different cultural, community, or religious practices?
3. Are residents of EJ communities likely to be disproportionally and adversely affected because of their economic status, or do language barriers prevent them from taking mitigating actions that general members of the public might readily adopt, such as closing doors and windows to limit dust exposure?

For all resources[4], it was determined that there is no significant risk of adverse and disproportionate impacts among EJ communities. The determination is based on two factors. First, most resources at issue are not expected to be materially altered. Second, there is no reasonable expectation that EJ communities would be disproportionately and adversely impacted even if the resources were materially altered.

With respect to air quality, the determination of no significant risk of adverse and disproportionate impacts during operation is based on the following rationale. Generally, EJ communities may be more sensitive to operation-related emissions due to a higher frequency of pre-existing health conditions, such as asthma (Louisias and Phipatanakul 2017) and/or a decreased ability to take mitigating actions; however, the increase in emission of criteria air pollutants is not expected to contribute to the exceedance of NAAQS. As required by the CAA (40 CFR part 50), the NAAQS primary standards are developed to protect human health with an adequate margin of safety for sensitive subgroups of the population. These sensitive subgroups include: children, older adults, people with heart or lung conditions, communities of color, and low economic status populations.

[4] Refer to the NCG EJ Assessment (Appendix E) for details about the determination of no risk of adverse and disproportionate impacts associated with potential changes to surface water, wetlands and floodplains; wildlife, vegetation, aquatic ecology, and threatened and endangered species; cultural resources; socioeconomics; geology and soils; groundwater; land use; climate change; utilities, service systems, and safety; and solid and hazardous waste.

NAAQS primary standards are based on reference concentrations (RfCs) that represent continuous inhalation that is likely to be without appreciable risk of deleterious effects during a lifetime of exposure for these sensitive subgroups. RfCs also include a 10-fold safety factor to address uncertainty. The NAAQS standards specifically protect the sensitive subgroups of the surrounding minority and low-income overburdened communities during lifetime exposures. Therefore, operation of the NCG Plant would not harm sensitive individuals in the surrounding EJ communities because emissions would not be expected to contribute to an exceedance the primary NAAQS standards, which were developed specifically to protect those individuals.

Potential changes to visual resources, transportation, and noise associated with construction and/or operation of the proposed project would be localized, and impacts are not expected to reach the nearest EJ community (block group 3, census tract 301.01 of Lamar County). Refer to the NCG EJ Assessment (Appendix E) for a comprehensive evaluation of the environmental consequences of the Action Alternative and a detailed discussion supporting the determination that the proposed project would not cause disproportionate and adverse impacts to EJ communities.

3.19 Public Health and Safety

3.19.1 Affected Environment

The project area includes the NCG Site, which has had the CTs removed and is not currently in operation, and the existing TVA Lowndes County 500-kV Substation, which has remained in-service. No residential properties are located within the project area.

Public emergency services in the vicinity of the project area include hospitals, law enforcement services, and fire protection services. The closest hospital is the Baptist Memorial Hospital – Golden Triangle in Columbus, Mississippi, which is approximately 14 miles southwest of the project area (Baptist Golden Triangle 2024). Police services in the area are provided by the Lowndes County Sheriff’s Department based in Columbus, Mississippi (Lowndes County Sherriff’s Office 2024). Additional nearby police departments include the Caledonia Police Department, the Columbus Police Department, and the Mississippi Highway Patrol. The project area falls within the Lowndes County District 1 Volunteer Fire and Rescue Department, and the nearest fire station is the Caledonia Station (Lowndes County District 1, Station 1), approximately four miles north of the project area (Lowndes County 2024a; USA Fire Departments 2024). Lowndes County is in the Mississippi Emergency Management Agency’s (2024) District 4.

Workplace health and safety regulations are designed to eliminate personal injuries and illnesses from occurring in the workplace. These laws may comprise both federal and state statutes. The Occupational Safety and Health Act of 1970 is the main statute protecting the health and safety of workers in the workplace. 29 CFR 1926 contains health and safety regulations specific to the construction industry. TVA has a robust safety-conscious culture that is focused on awareness and understanding of workplace hazards, prevention, intervention, and active integration of BMPs to avoid and minimize hazards. Activities performed at TVA facilities, on TVA-owned land, or within TVA transmission rights-of-way (ROWs) are consistent with OSHA regulations, state standards and requirements, and specific TVA guidance. TVA personnel (including TVA authorized contractors) are conscientious about health and safety, having addressed and managed operations to reduce or eliminate occupational hazards through implementation of safety practices, training, and control measures.

TVA has a safety program in place to prevent worker injuries and accidents. The various prevention programs include but are not limited to the following:

- Operations and Maintenance Plans
- Hazard Communication
- Housekeeping
- Project Safety Plans
- Competent Person
- Ground Disturbance
- Lifting Operations
- Energy Isolation (Lockout/Tag out)
- Cutting, Burning, Welding and other "Hot Work"
- Incident Reporting and Investigations
- Personal Protective Equipment
- Hearing Conservation
- Employee Training
- Contractor Evaluation and Acceptance
- Emergency Spill/Release Plans
- Emergency Response Plan

The implementation of proper engineering and equipment design and administrative controls, such as employee training and compliance with regulatory requirements related to Health and Safety, help ensure that the risks associated with work at TVA facilities remain low.

3.19.2 Environmental Consequences

3.19.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no change in public health and safety conditions in the project area.

3.19.2.2 *Alternative B*

Under Alternative B, safety hazards would be present during construction of the project. However, because construction work has known hazards, it is TVA's policy that contractors establish and maintain site-specific health and safety plans in compliance with OSHA regulations. The contractor site-specific health and safety plans would address the hazards and controls, as well as contractor coordination for various construction tasks. Health and safety plans emphasize BMPs for site safety management to minimize potential risks to workers. Examples of BMPs include employee safety orientations; establishment of work procedures and programs for site activities; use of equipment guards, emergency shutdown procedures, lockout procedures, site housekeeping, and personal protective equipment; regular safety inspections; and plans and procedures to identify and resolve hazards.

Potential safety hazards could result from increased traffic on roadways during construction. Residential and other human-use areas along roadways used by construction traffic to access the project area would experience increased traffic. Awareness of these residences and establishment of traffic procedures to minimize potential safety concerns would be addressed in the health and safety plans followed by construction contractor(s).

Health hazards are also associated with waste generation; these wastes include solid wastes, hazardous waste, liquid wastes, discharges, and air emissions. Wastes that would potentially be generated during construction or operation of the proposed project are further described in Section 3.17 and would be managed in accordance with federal, state, and local requirements.

During operation of the NCG Plant, the CT units would be fueled on a day-to-day basis by a reliable supply of natural gas through an existing gas pipeline located at the site. TVA would also include consideration of utilizing ULSD as an emergency backup fuel for the CTs. General public health and safety would not be at risk in the event of an accidental spill onsite because an emergency response plan that addresses potential releases would be developed in coordination with local emergency management agencies and implemented during construction and operation of the project. Emergency response for the NCG Plant would be provided by the local, regional, and state law enforcement, fire, and emergency responders, as described above. These mitigative measures would ensure protection of human health during operation, which includes the workplace, the public, and the environment.

The existing pipeline and transmission line infrastructure at the site would minimize the need for any additional pipelines or electrical interconnection, and therefore, any changes in public health and safety associated with the construction or operation of that infrastructure would be minimal.

The operation of the proposed project would adhere to TVA guidance and be consistent with standards established by OSHA and applicable state requirements. Occupational and public health hazards would be reduced or eliminated through TVA's implementation of health and safety practices. Through its safety programs, TVA fosters a culture of safety minded employees, and, as such, impacts would be minimal.

TVA's Standard Programs and Processes related to safety would be strictly adhered to during the construction and operation of the project. These safety programs and processes are designed to identify actions required for the control of hazards in all activities, operations, and programs. They also establish responsibilities for implementing Section 19 of the Occupational Safety and Health Act of 1970. Therefore, impacts to public health and safety from the Proposed Action are not anticipated.

3.20 Utilities

3.20.1 Affected Environment

Due to the site's previous use as a CT generation facility and current use as an electrical substation, the required utilities, service systems, and connections are available. Current utility service areas include BellSouth Telecommunications, Inc. (telephone); the City of Caledonia (water); the Caledonia Natural Gas District (gas); and the Monroe County Electric Power Association (electric) (Mississippi Public Service Commission 2024). The site lies at the intersection of two TVA bulk power transmission lines and houses the existing TVA Lowndes County 500-kV Substation. The Tennessee Gas Pipeline Company's TGP 500 System (pipeline 500-2) crosses the site and was previously connected to the former private CT facility.

3.20.2 Environmental Consequences

3.20.2.1 *Alternative A*

Under Alternative A, TVA would not construct a simple cycle frame CT facility at the NCG Site and would not make the related upgrades to the transmission system or natural gas pipeline interconnection. As such, there would be no added dispatchable generation capacity to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, and planning reserve margin targets while facilitating the integration of renewable energy onto the electric grid and complying with the requirement under the TVA ACT that power be sold at rates as low as feasible. Without the added capacity, TVA may need to acquire power from other power producers that would potentially include more GHG intense generation sources than the proposed CT facility, particularly when combined with the renewable energy sources that would be enabled by the CT facility.

3.20.2.2 *Alternative B*

Under Alternative B, TVA would construct a simple cycle frame CT facility at the NCG Site. Utilities and service systems that would potentially be accessed or used at the site would include natural gas, alternative fuels, drinking water, process wastewater, sanitary wastewater, electrical, fiber optics, and a fire pump house with one electric and one diesel-driven emergency fire protection pump.

Preliminary estimates indicate that a maximum of 165 million standard cubic feet per day of natural gas would be required for the CT units. The CT units would be fueled on a day-to-day basis by a reliable supply of natural gas through an existing connection with the Tennessee Gas Pipeline Company's system. TVA would need to replace or upgrade the existing interconnection and existing ancillary infrastructure (e.g., taps, meter station, pressure regulation equipment, etc.); however, construction of a new gas pipeline is not anticipated.

Under Alternative B, ULSD would be considered as an emergency backup fuel for the CTs. Approximately two million gallons of fuel oil would be delivered to the NCG Site by truck and stored in two 1-million-gallon tanks. A storage system for the reserve amounts of ULSD would be constructed onsite.

The CT facility would connect to the electric grid via the existing adjacent TVA Lowndes County 500-kV Substation located within the project area. TVA would construct a new double-breaker bay in the 161-kV yard of the Lowndes County 500-kV Substation. Two 161-kV breakers would be installed along with associated metering, communication, and protective equipment. If future studies indicate improvements are required to the regional transmission system to maintain system stability and reliability, additional site-specific NEPA reviews would be completed for those additional transmission system needs at that time. Potential offsite upgrades to existing transmission lines and substations are discussed in Section 2.1.2.6. Overall, the added dispatchable generation capacity would have potential long-term beneficial impacts by helping to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, and planning reserve margin targets while facilitating the integration of renewable energy onto the electric grid.

3.21 Cumulative Impacts

The CEQ regulations (40 CFR §§ 1500-1508) implementing the procedural provisions of NEPA (42 USC § 4321 et seq.), define cumulative impact as:

> "…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7)."

This definition of "cumulative impacts" was incorporated in TVA's amended NEPA regulations that became effective on April 27, 2020. A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of a project when added to other past, present, and reasonably foreseeable future actions (40 CFR § 1508.7). Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in the preceding sections are based on baseline conditions and, therefore, incorporate the cumulative impacts of past and present actions.

3.21.1 Geographic Area of Analysis

The appropriate geographic area over which past, present, and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. The cumulative impact analysis is based on the resources of potential concern and the geographic area in which potential adverse effects from site-specific activities have the potential to alter (degrade) the quality of the regional environmental resources.

The geographic area of analysis is limited to the immediate NCG project area and the respective vicinities (5-mile radius for many resources) surrounding them. The NCG and its components are within Lowndes County, Mississippi. Therefore, Lowndes County was used to define the geographic area of analysis for cumulative effects on air quality, socioeconomics, and environmental justice.

3.21.2 Identification of "Other Actions"

Past, present, and reasonably foreseeable future actions that are appropriate for consideration in this cumulative analysis are listed in Table 3.20-1. These actions were identified within the geographic areas of analysis as having the potential to, in aggregate, result in larger and potentially adverse impacts to the resources of concern.

Table 3.20-1. Summary of Past, Present, and Reasonably Foreseeable Future Actions in the Vicinity of the NCG Plant Project Area

Action	Description	Timing and Reasonable Foreseeability
Golden Triangle I	Orgis is constructing a solar-plus-storage site in Lowndes County, Mississippi. TVA is purchasing the power. The site will generate up to 200 megawatts (MW) of alternating current (AC) capacity with a 50 MW AC – 200-Megawatt hour (MWh) Battery Energy Storage System (BESS). The site is expected to begin operations in January 2025.	Present
Golden Triangle II	Orgis has completed work on the first of three planned solar-plus-storage projects in Mississippi. The energy provided by the 150-MW alternating current project with 50 MW of battery storage will be purchased by TVA and began operations in May 2024.	Present
Optimist Solar	Orgis is constructing a solar-plus-storage site in Clay County, Mississippi, and is expected to generate up to 200 MW of AC output with a 50 MW AC – 200 - MWh BESS. TVA would purchase the power under a power purchase agreement. The project is expected to begin construction in August 2024 and begin operations in late 2025 or early 2026.	Present
Safety Enhancements to U.S. 82	Mississippi Department of Transportation (MDOT) safety enhancements and overlay project has started in Lowndes County and is anticipated to be completed in Summer 2024.	Present
SR 182 over Relief Bridge	MDOT to repair bridge on SR 182 in 2024.	Present
MS12 and MS 69 Rumble Strips	MDOT to install rumble strips MS 12 from MS 50 to the Alabama State Line and MS 69 from Fabritek Road (Columbus Airport) to Alabama State Line in 2024.	Present
Mill and Overlay SR 69	MDOT to mill and overlay SR 69 from Granderson Creek to Junction SR 182 in 2024.	Reasonably Foreseeable
Mill and Overlay US 45A	MDOT to mill and overlay US 45A from Noxubee Circle to Clay Circle in 2025.	Reasonably Foreseeable
Construction and Operation of Aluminum Dynamics, LLC Aluminum Manufacturing Plant	Steel Dynamics to construct and operate an aluminum manufacturing company in Lowndes County; construction began in 2023 and is anticipated to be complete in Summer 2025.	Present and Reasonably Foreseeable

Action	Description	Timing and Reasonable Foreseeability
TVA Transmission and Local Power Company Distribution System Upgrades	Potential future upgrades to the TVA transmission system may include moving features that interfere with clearance, replacement or modification of existing transmission line structures, installation of immediate transmission line structures, conductor modification and/or replacement, adding surcharge, modification of local power company distribution lines, and fiber optic ground wire installation.	Reasonably Foreseeable

Sources:

FERC 2024a; FERC 2024b; Lowndes County 2024b; Metal Center News 2023; MDEQ 2024b; MDEQ 2024c; MDOT 2024b; Orgis Energy 2024; Super Talk 2023; TVA 2023e; USACE 2024.

3.21.2.1 *Past, Present, and Reasonably Foreseeable Actions*

Construction and Operation of Golden Triangle I, Golden Triangle II, and Optimist Solar Projects

Golden Triangle I is located approximately 22 miles southwest of the project area. Golden Triangle II is located approximately 23 miles southwest of the project area. Although outside of the Lowndes County geographic area of analysis for cumulative effects, Optimist is located approximately 16 miles west of the project area in Clay County and was therefore included in this analysis. Collectively, these three solar projects are part of a portfolio of projects in Mississippi, with a total capacity of 550 MW plus 150 MW of battery storage. Construction of Golden Triangle II is complete, and commercial operations began in May 2024. Golden Triangle I is currently under construction and expected to begin commercial operations in January 2025. Optimist is expected to begin construction in August 2024 and begin operations in late 2025/early 2026 (Orgis Energy 2024).

Transportation Projects (MDOT)

The Mississippi Department of Transportation (MDOT) plans several road improvement projects throughout Lowndes County, including safety enhancements to U.S. 82, bridge replacement at SR 182, rumble strip installs at MS 12 and MS 69, and mill and overlay work along SR 69 and U.S. 45A (MDOT 2024b). The mill and overlay projects are currently planned for 2024 and 2025. All other projects are either ongoing or preparing to start in the year 2024.

Construction and Operation of Aluminum Dynamics, LLC

Steel Dynamics is a metal manufacturing company with locations in the U.S. and Mexico that has seven other steel/metal making facilities. Steel Dynamics' new joint venture, Aluminum Dynamics, announced plans in June 2023 to build and operate a 650,000 metric ton aluminum flat rolled mill and two supporting satellite recycled aluminum slab centers with the goal of producing low-carbon aluminum from recycled material (Metal Center News 2023). Aluminum Dynamics, LLC currently has a group of 50-plus employees at the Columbus, Mississippi location and could eventually hire up to 750 employees for the mill, which is anticipated to begin operations in the summer of 2025 (Super Talk 2023; TVA 2023e). Aluminum Dynamics, LLC is located approximately 22 miles southwest of the proposed project.

TVA Transmission System and Local Power Company (LPC) Distribution Upgrades
The addition of renewable generation may warrant potential upgrades to the transmission system to increase the electrical capacity of the existing transmission lines. Additionally, upgrades to LPC distribution systems may be required. These upgrades may include activities such as:

- moving features that interfere with clearance;
- replacement or modification of existing transmission line structures;
- installation of intermediate transmission line structures;
- conductor modification and/or replacement;
- adding surcharge;
- modification of local power company distribution lines; and
- fiber optic ground wire installation.

3.21.3 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the project area was considered in conjunction with the environmental impacts presented in Chapter 3 and the potential resource impacts from the past, present, and reasonably foreseeable future actions. These combined impacts are defined by the CEQ as “cumulative” in 40 CFR Section 1508.7 and may include individually minor, but collectively significant actions taking place over a period of time.

TVA evaluated a full range of environmental resource issues associated with Alternative B for inclusion in the cumulative impacts analysis. The Proposed Action identified under Alternative B would occur primarily on land that was previously disturbed and is used for industrial purposes. The landscapes surrounding the NCG Site are already subject to environmental stressors associated with industrial operations and previous disturbances of the sites. Consequently, as has been described in prior subsections of this EIS, the existing quality of environmental resources potentially directly or indirectly affected by proposed project activities is generally low.

The cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of a project when added to other past, present, and reasonably foreseeable future actions. This cumulative impact analysis is limited to those resource issues potentially adversely affected by project activities. Accordingly, floodplains; geology and soils; groundwater; natural areas parks, and recreation; cultural resources; solid and hazardous waste; socioeconomics and environmental justice; public health and safety; and utilities are not included in this analysis as these resources are either not adversely affected, or the effects are considered to be temporary, negligible or beneficial. In addition, the analyses summarized in preceding sections showed that the Proposed Action would result in only minor adverse impacts to undisturbed or sensitive resources, including prime farmland, land use, surface water, wetlands, aquatic ecology, wildlife, vegetation, and visual resources. Therefore, impacts from the proposed project, in combination with the “other actions” described above, would not result in incrementally greater cumulative effects to these resources.

Overall, cumulative impacts associated with Alternative B would be negligible. The potential for cumulative effects associated with the implementation of Alternative B are analyzed below.

3.21.3.1 *Air Quality*

The geographic reference area for air quality for the proposed project is Lowndes County, Mississippi. It is expected that emissions would continue from local vehicles in these areas, and air emissions associated with other reasonably foreseeable future actions in Lowndes County. All MDOT transportation projects and transmission system and LPC distribution upgrades would involve temporary maintenance or repair work; no roadway expansions or new transmission line structures that would result in ongoing operational emissions are currently proposed. The cumulative impact of these construction activity emissions, when combined with the ongoing emissions from local vehicles, would incrementally increase emissions within the reference area for the NCG Plant under the Proposed Action, but such increases would not be notable on a regional scale. If the reasonably foreseeable future actions occur at the same time as the proposed project, there would be potential for short-term and minor cumulative impacts to air quality. However, exceedances of applicable ambient air quality standards are not expected.

Construction and operation of the Aluminum Dynamics LLC aluminum mill would also result in a potential temporary increase in regulated pollutants, such as PM emissions and VOCs. The Golden Triangle I, Golden Triangle II, Optimist Solar, and the Aluminum Dynamics LLC aluminum mill would be operated in compliance with applicable regulations and permits and as such, operation of the NCG Plant concurrent with operation of other actions would not be expected to result in a cumulative impact to air quality. Therefore, the cumulative impacts of the Proposed Action on air quality, either from the construction or operation of the proposed project, are not expected to have significant adverse effects on regional air quality.

3.21.3.2 *Greenhouse Gas Emissions*

GHG emissions associated with the operation of the proposed NCG Plant are identified in Section 3.2 of the EIS. Though cumulative impacts from projects presented in Table 3.20-1 are expected, the impacts of GHGs are experienced on a global scale and are typically not considered to be regional impacts. As a result, cumulative impacts would be driven more by global changes in GHG emission rates, rather than the projects analyzed due to their proximity to the proposed project.

The Proposed Action is part of the Target Power Supply Mix strategy identified in the 2019 IRP. The 2019 IRP programmatically evaluated future decisions related to the IRP and determined that the implementation of the 2019 IRP would result in an incremental reduction in TVA's annual GHG emissions by facilitating the integration of renewable generation. The IRP also notes that the reduction in CO_2 emissions would have small but beneficial impacts on the potential for associated climate change. Similar to project impacts, the potential for the proposed NCG Plant to enable renewable energy generation results in the potential for cumulative impacts from the Proposed Action to be beneficial.

3.21.3.3 *Threatened and Endangered Species*

Although the project may impact potentially suitable habitats for several listed species, there is an abundance of suitable habitat in the surrounding areas. The Action Alternative is not expected to result in long-term significant effects to listed species populations. Overall, the Action Alternative would likely adversely affect the NLEB, but implementation of BMPs and timing of tree removal to occur during winter months would help to ensure that impacts would not be significant and would not affect any of the other animal or plant species. The Golden Triangle I, Golden Triangle II, Optimist Solar, and aluminum manufacturing plant are both located primarily in agricultural fields, and the planned MDOT actions and transmission system and LPC distribution upgrades are all within existing ROWs, with no expansions currently proposed. Tree clearing for these projects is expected to be minimal. Furthermore, of the 11.9 acres of suitable bat roosting habitat to be cleared during construction of the NCG Plant, only 0.6 acre would be permanently converted to open space; the remaining 11.3 acres would be allowed to naturalize back over time. Therefore, there would be no cumulative effects anticipated to threatened and endangered species.

3.21.3.4 *Noise*

The two nearest projects evaluated for cumulative noise impacts were Optimist Solar, located approximately 16 miles west of the project area, and Aluminum Dynamics, located approximately 22.25 southwest of project area. At these distances, it is not expected for cumulative noise impacts to occur at NSAs. Noise from these projects would be expected to attenuate to well below ambient noise levels at NSAs predicted to be impacted by the NCG Plant, and, as a result, would not result in a perceptible cumulation of noise impacts.

3.21.3.5 *Transportation*

The potential for cumulative effects to transportation from the Proposed Action and other identified actions would be related to the construction phase of these actions. Traffic generated by these actions would consist of construction workforce and goods and equipment transport to construction sites. The only action identified near the proposed project location (within a 5-mile radius) is the MDOT action to install rumble strips at MS12 and MS69. This MDOT action is anticipated to begin in 2024 and would include work on a highway (MS12) which is 0.4 mile east of the proposed project area. This MDOT action is minor in scope and only anticipated to cause short-term influxes in traffic due to the presence of construction crews and equipment to complete the rumble strip install.

Transportation routes and needs would be determined by the construction contractor, and a traffic impact analysis would be performed if necessary to address potential roadway impacts. Additional environmental reviews would be conducted as appropriate, and mitigation measures would be implemented if warranted. As such, cumulative impacts of the Proposed Action and all other past, present, and reasonably foreseeable actions to transportation are expected to be minor.

3.22 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are the effects of the Proposed Action on natural and human resources that would remain after mitigation measures or BMPs have been applied.

Mitigation measures and BMPs are typically implemented to reduce a potential impact to a level that would be below the threshold of significance as defined by the CEQ and the courts. Impacts associated with the construction and operation of the proposed NCG Plant and the associated natural gas and facility upgrades have the potential to cause unavoidable adverse effects to several natural and human environmental resources. TVA has reduced the potential for adverse effects during the planning process. In addition, TVA would implement mitigation measures (Section 2.3) to further reduce potential adverse effects to certain environmental resources.

Depending on the final site layout, construction of the proposed project would require the permanent conversion of up to 6.3 acres of pasture/hay to developed land. A total of 21.6

acres of forested area is proposed for removal, of which 0.6 acre of mixed forest falls within the NCG Plant boundary and would result in a permanent conversion to maintained open space. The remaining forested area would be allowed to return to preconstruction conditions over time. These habitat alterations would result in impacts to localized species composition and wildlife habitat for the lands immediately affected. However, due to the abundant habitat of similar quality within the vicinity of the project area, the overall impact to vegetation and wildlife is considered minor.

Approximately 21.6 acres of forested habitat is anticipated to be removed for construction of the proposed project. Winter tree removal would avoid the nesting season for the two migratory birds of conservation concern that were identified by the USFWS IPaC system and have habitat present in the project area (red-headed woodpecker and wood thrush). However, direct impacts to field sparrow could occur if vegetation removal occurs while these birds are nesting in fields. Cumulative effects of the project on common wildlife species are expected to be negligible. The Proposed Action may remove existing forested habitat for common, habituated wildlife; however, similarly suitable habitat is abundant throughout the surrounding landscape. Furthermore, only 0.6 acre would be permanently converted to open space for the operation of the NCG Plant; the remaining 21.0 acres of forested habitat would be allowed to naturalize back over time. Thus, the effects to terrestrial wildlife would be minor.

The construction of the proposed NCG Plant would avoid placing fill material into surface waters and wetland resources. The construction of the proposed project would result in potential minor effects to surface water and wetland resources. These impacts would be mitigated through adherence to permit requirements and the provision of appropriate compensatory mitigative measures, if needed. Temporary impacts to water quality from runoff during construction, as well as ongoing vegetation maintenance, could impact nearby receiving waters but would be reduced with the application of appropriate BMPs.

Of the 21.6 acres of forested habitat proposed for removal, approximately 4.8 acres are suitable summer roosting habitat for NLEB, and approximately 7.1 acres are suitable for tricolored bat. These activities 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) and completed in April 2018 and updated in May 2023. For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. Due to the application of identified conservation measures, TVA has determined that proposed project impacts would be minimized, but still may affect and would likely adversely affect NLEB, but would not jeopardize the continued existence of the tricolored bat.

If the application for construction is approved, MDEQ would issue a construction permit listing all the applicable federal and state air quality applicable requirements, which allows initial unit operations for approximately one year. As the NCG Plant would operate within the parameters of the Title V permit to be issued, the overall unavoidable emissions adverse impacts to air quality would be minor. Unavoidable localized increases in air and noise emissions would also occur during construction activities. Activities associated with the use of construction equipment may result in varying amounts of dust, air emissions, and noise that may potentially impact onsite workers and residents located near the project area. Emissions from construction activities and equipment are minimized through implementation of BMPs, including proper maintenance of construction equipment and vehicles. Low income and minority communities would not suffer any disproportionate air, dust, noise, transportation, or waste impacts.

In the context of the availability of regional resources that are similar to those unavoidably adversely affected by the project, coupled with the application of appropriate BMPs and adherence to permit requirements, unavoidable adverse effects would be minor.

3.23 Relationship of Short-Term Uses and Long-Term Productivity

NEPA requires a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. This EIS focuses on the analyses of environmental impacts associated with the construction and operation of the proposed NCG Plant. These activities are considered short-term uses of the environment for the purposes of this section. In contrast, long-term productivity is considered to be that which occurs beyond the conclusion of decommissioning the NCG Plant. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of the project area.

Construction of the NCG Plant would cause a minor, short-term deterioration in existing air quality during construction. These impacts would be mitigated through implementation of BMPs to reduce emissions from construction phase equipment and minimize emissions of fugitive dust. Operational impacts to air quality would be minor because appropriate emission controls are included within the NCG Plant infrastructure to allow the plant to operate under its Title V permit conditions. Similarly, operational impacts to climate change would be minor; however, the net effect of the proposed project would be to reduce TVA's system-wide GHG emissions by enabling the integration of renewable generation into the system and by reducing the frequency with which other, more carbon intense, peaking units are dispatched. Therefore, implementation of the Action Alternative is expected to result in a long-term net reduction in regional GHG emissions.

The acreage disturbed during construction of the NCG Plant is larger than that required for the actual permanent structures and other ancillary facilities necessary once the site is operational because of the need for laydown and temporary use areas. Preparation of these onsite areas coupled with noise from construction activities, may displace some wildlife and alter existing vegetation. Once the new facility is completed, the areas outside of the NCG Plant boundary would be revegetated with native or non-native grasses and allowed to revert back to preconstruction conditions. Additionally, following decommissioning of the NCG Plant, lands would be available for redevelopment, thereby maintaining long-term productivity of the site.

The principal change in short-term use of the project area would be the loss of vegetation within the areas impacted by operation of the NCG Plant facilities. Much of the project area has been previously developed for heavy industrial use; it is not currently used for agriculture and only supports fragmented areas of woody vegetation. Therefore, there would be no losses to agricultural activities or large-scale forested habitat. Additionally, because the vicinity of the project area includes similar vegetation and habitat types, the short-term disturbance to support NCG plant operations is not expected to significantly alter long-term productivity of wildlife, agriculture, or other natural resources.

Construction of the NCG Plant would reduce the long-term productivity of the land for other purposes while these facilities are in operation. However, after decommissioning, the land could be reused and made available for other uses.

3.24 Irreversible and Irretrievable Commitments of Resources

The term “irreversible commitments of resources” describes environmental resources that are potentially changed by the construction or operation of the proposed projects that could not be restored to their prior state by practical means at some later time. Irreversible commitments generally occur to nonrenewable resources, such as minerals or cultural resources, and to those resources that are renewable only over long timespans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption is neither renewable nor recoverable for use until reclamation is successfully applied. Irretrievable commitments generally apply to the loss of production, harvest, or other natural resources and are not necessarily irreversible. For example, the construction of a road through a forest would be an irretrievable commitment of the productivity of timber within the road ROW as long as the road remains. Mining of ore is an irreversible commitment of a resource; once the ore is removed and used, it cannot be restored.

The land used for the proposed NCG Plant is not irreversibly committed because once the plants cease operations and the facilities are decommissioned, the land supporting the facilities could be returned to other industrial or nonindustrial uses. Thus, the loss of vegetation until the area is successfully revegetated would be an irretrievable commitment, but not irreversible.

Resources required by construction activities, including labor, fossil fuels, and construction materials, would be irretrievably lost through the use of gasoline and diesel-powered equipment during construction. In addition, operation of the NCG Plant would result in the irretrievable loss of natural gas, which would be used to fuel the CTs. In addition, the materials used for the construction of the proposed project would be committed for the life of the facilities. However, these fossil fuels and building materials are not in short supply, and their use would not have an adverse effect on the continued availability of these resources.

CHAPTER 4 - LITERATURE CITED

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Appendix A – Scoping Report

Document Type:	EIS – Administrative Record
Index Field:	Scoping Report
Project Name:	New Caledonia Gas Plant Project
Project Number:	2023-15

NEW CALEDONIA GAS PLANT PROJECT
ENVIRONMENTAL IMPACT STATEMENT
SCOPING REPORT

Prepared by:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

May 2024

To request further information, contact:
Erica McLamb
NEPA Compliance
Tennessee Valley Authority
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Chattanooga, TN 37402
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Abbreviations and Acronyms

CC	Combined Cycle
CT	Combustion Turbine
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
IRP	Integrated Resource Plan
MW	megawatts
NCG	New Caledonia Gas Plant
NEPA	National Environmental Policy Act
TVA	Tennessee Valley Authority

1.0 Introduction

The Tennessee Valley Authority (TVA) intends to prepare an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) to assess the potential environmental and social impacts associated with the construction and operation of a combustion turbine (CT) facility, consisting of six dual-fuel frame CTs capable of generating approximately 500 megawatts (MW), at the TVA New Caledonia Simple Cycle Facility site (New Caledonia Gas Plant [NCG] project or Proposed Action). TVA's project goal is to support continued load growth within the Tennessee Valley in a way that is consistent with the recommendations in the TVA 2019 Integrated Resource Plan (IRP) (TVA 2019)[1] and to facilitate the integration of renewables onto the electric grid, thereby advancing TVA's decarbonization goals while complying with the requirement under the TVA Act that power be sold at rates as low as feasible.

This NCG Project Scoping Report (herein Scoping Report) describes the internal and public scoping for relevant issues relating to the NCG project and outreach conducted by TVA to notify the public. The Scoping Report also documents the input submitted to TVA by the public, organizations, and intergovernmental entities during the public scoping period.

1.1 Background

In June 2019, TVA published the 2019 IRP (TVA 2019), which evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential energy resource additions and retirements. The 2019 IRP acknowledged that reliance on only one strategy would not ensure reliability and resilience and, therefore, considered a variety of generation resources. The 2019 IRP identified the potential addition of up to 500 MW of demand response and 2,200 MW of energy efficiency (demand-side options); 4,200 MW of wind; 5,300 MW of storage; 8,600 MW of CTs; 9,800 MW of combined cycle (CC); and 14,000 MW of solar by 2038. The 2019 IRP recommendation optimizes TVA's ability to create a more flexible power-generation system that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability. Additionally, the 2019 IRP recommended a series of near-term actions, including evaluating engineering end-of-life dates for aging fossil units, to determine whether retirements greater than 2,200 MW would be appropriate to inform long-term planning. The strategic direction established by the 2019 IRP and results from recommended near-term actions formed the basis for TVA's asset strategy, which continues to support affordable, reliable, and cleaner energy for customers.

As a result of resource changes outlined in the asset strategy, TVA has a plan for 70% carbon reductions by 2030, a path to approximately 80% carbon reductions by 2035, and aspires to net-zero carbon emissions by 2050 (based on a 2005 baseline).

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[1] TVA is in the process of developing the 2024 IRP. TVA's past practice has been to evaluate its IRPs every 4 to 5 years. Accordingly, on May 19, 2023, TVA published a Notice of Intent in the Federal Register announcing its plans to prepare an EIS associated with the implementation of the updated IRP, initiating the 45-day scoping period, which concluded on July 3, 2023. The 2019 IRP remains valid and guides future generation planning consistent with least-cost planning principles.

The combination of resource technologies in the overall asset strategy includes:

- Maintaining the existing low-cost, carbon-free nuclear and hydro fleets;
- Retiring aging coal units as they reach the end of their useful lives, expected by 2035;
- Adding up to 10,000 MW of solar by 2035 to meet customer demands and system needs, complemented with storage;
- Using natural-gas-fueled generation to enable needed coal retirements and solar expansion as other technologies develop;
- Leveraging demand-side options, in partnership with local power companies; and
- Partnering to develop new carbon-free technologies for greater reduction in carbon emissions.

Since the pandemic, TVA has seen an increase in electric demand. The population in the TVA service region has grown 1.5%, and that pace is expected to continue in 2024. TVA expects continued growth in annual electric demand through the middle of this decade. Forecasted electric demand is expected to grow more than one percent per year on average between 2023 and 2026.

With increased residential migration and commercial development in the Tennessee Valley, TVA must add capacity to the system to maintain adequate operating reserves. Operating reserves are defined as the capability above firm system demand required to provide for regulation, load forecasting error, equipment, -forced and scheduled outages, and local area protection. Peaking units, such as CTs, are valuable in meeting electricity demand for shorter periods of high demand on summer and winter peak days. Their flexibility also plays a key role in successfully integrating renewable resources, which have variable and unpredictable generation patterns.

TVA's energy portfolio is expected to change over time given the rise of renewable energy sources. TVA is working to expand its nearly 3,200 MW of solar capacity commitments to 10,000 MW of solar by 2035. TVA is continuing to expand its solar and carbon-free commitments through procurement methods such as requests for proposals and opportunities at existing TVA sites. In July 2022 TVA issued a request for proposals for up to 5,000 MW for additional carbon free energy.

The 2019 IRP indicated that the near-term actions required TVA to enhance system flexibility to integrate increasing amounts of renewable resources. Solar resources are typically only available on average about 20 to 25% of the year, and their availability can vary significantly during daylight hours as cloud cover and precipitation events occur. As such, solar power must be paired with dispatchable power or battery storage to meet year-round capacity needs. Battery storage pairing is constrained in that batteries are energy limited (e.g., typically providing a 4-hour duration) and are net consumers of electricity. Pairing solar resources with the appropriate level battery storage can compensate for this deficiency but adds cost and introduces transmission stability and reliability issues that then must be addressed with transmission system improvements (TVA 2019).

The need for inclusion of natural-gas-fired CTs and CCs in the target power supply mix is driven by the demand for reliable electricity, the increased amount of solar penetration, system dispatchable capacity requirements, commodity prices, costs relative to alternative resource options, and transmission system reliability. Natural-gas-fired CT or CC units can be operated year-round to meet the fluctuating demand on the power system, including overnight, during cold pre-dawn winter mornings, and during warm summer evenings as solar generation fades. The inclusion of dispatchable power generation from natural-gas-fired CTs and CCs effectively enables systemwide integration of solar while providing critical transmission-related benefits to ensure reliability and power quality (TVA 2019).

The NCG site is a decommissioned former CT. By constructing and operating an approximately 500-MW CT facility at the same location as the previous generating facility, TVA would be able to utilize existing natural gas and transmission infrastructure, allowing the facility to operate without needing new pipeline construction.

1.2 Purpose and Need

The purpose of the Proposed Action is to support continued load growth within the Tennessee Valley in a way that is consistent with the recommendations in the 2019 IRP to meet demand for electricity and to facilitate the integration of renewables onto the electric grid, thereby advancing TVA's decarbonization goals. The 2019 IRP included the addition of up to 5,200 MW of CTs by 2028 and up to 8,600 MW by 2038 to accommodate load growth. CTs are needed to provide dispatchable generation capacity to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, planning reserve margin targets, and comply with the requirement under the TVA Act that power be sold at rates as low as feasible.

The Proposed Action aligns with the 2019 IRP, which remains current and valid to guide future generation planning consistent with least system cost principles. The addition of CT units to the fleet was recommended to enhance system flexibility to integrate renewables and distributed resources, with substantial solar additions expected over the next two decades. As the amount of solar generation in the TVA generation portfolio continues to increase, flexibility of the remainder of the fleet becomes even more important.

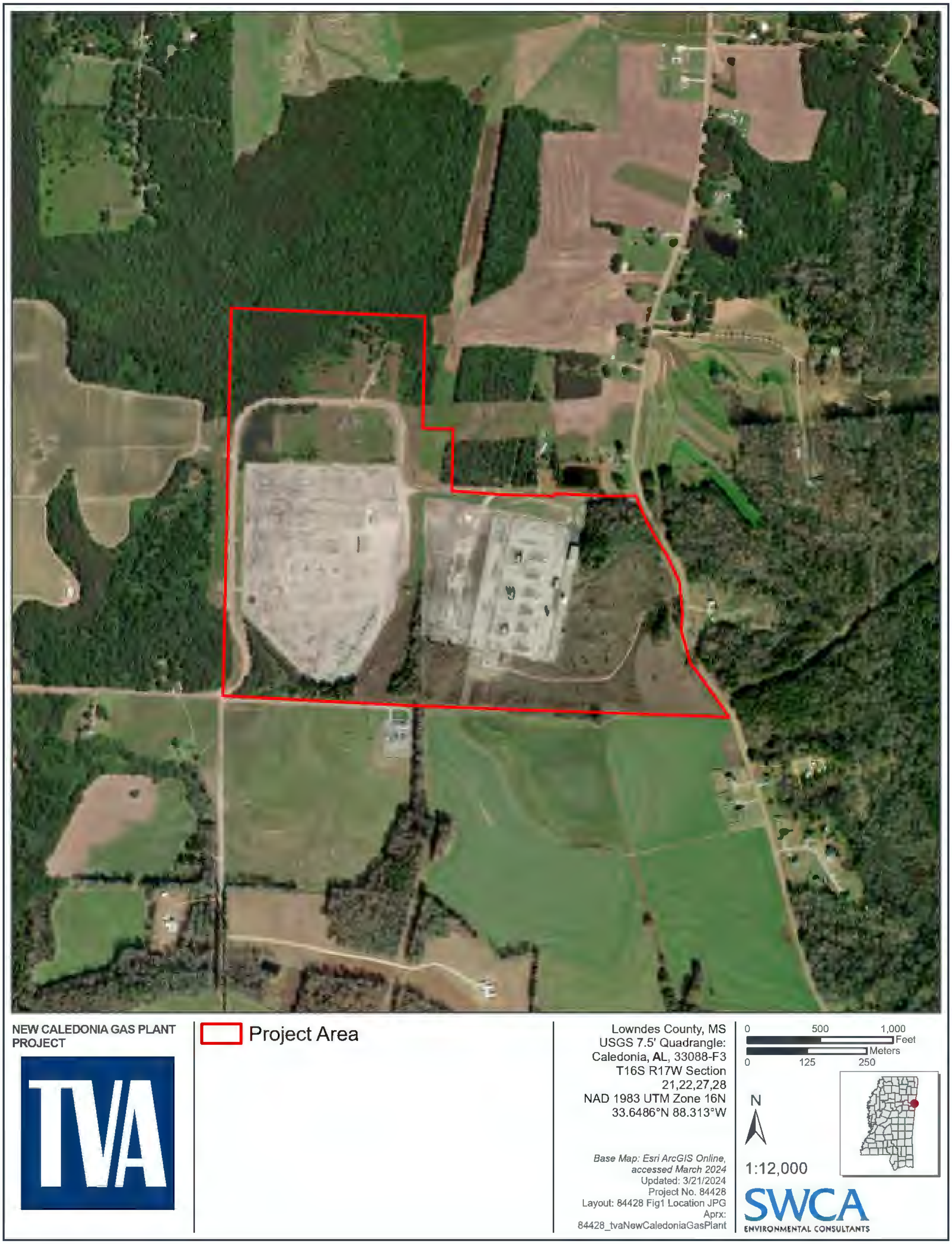

Figure 1. Proposed NCG Project Location.

1.3 Related Documents and Environmental Reviews

The following environmental reviews were prepared for actions related to the NCG project:

- *TVA 2019 IRP and Programmatic EIS* (TVA 2019). The 2019 IRP and Programmatic EIS provides direction for how TVA will meet the future electricity demand of the Tennessee Valley region while fulfilling its mission of providing the Tennessee Valley with low-cost reliable power, environmental stewardship, and economic development. The 2019 IRP evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential resource additions and retirements throughout the TVA power service area.
- *TVA 2024a. Demolition of Structures and Utilities at New Caledonia, Mississippi Categorical Exclusion.* Reroute, demolition and removal of structures, utilities and surfacing at the former New Caledonia site to reduce safety concerns and eliminate the need for upkeep at an underutilized site.
- *TVA 2024b. Demolition of Two Transformers at New Caledonia Categorical Exclusion.* Verification of polychlorinated biphenyl status, drainage of water in the containment around the tanks, and demolition of two transformers at the former New Caledonia site.

2.0 Alternatives

2.1 Alternatives Carried Forward for Analysis

TVA anticipates that the NCG EIS will address two alternatives: the Proposed Action and a No Action Alternative. Whether these or other alternatives are reasonable, warranting further consideration under NEPA, would be determined while preparing the EIS. Connected actions will also be considered in this assessment.

2.1.1 Alternative A – No Action Alternative

The No Action Alternative provides a baseline for comparing against the Action Alternative. Under the No Action Alternative, TVA would not construct a simple cycle frame CT facility at the NCG site. TVA would not make related upgrades to the transmission system to interconnect the generation and actions related to upgrades of the existing natural gas pipeline interconnection would not be completed. This alternative does not meet the purpose and need of TVA's Proposed Action; however, it is included in this evaluation as it represents current conditions against which the Proposed Action will be compared.

2.1.2 Alternative B – Action Alternative (Proposed Action)

Location and Description

The NCG project is proposed to be located on an existing approximately 63 acre parcel of TVA property and an adjacent 82-acre substation parcel, located in Lowndes County, Mississippi, approximately 10 miles northeast of Columbus (see Figure 1). The property is a decommissioned former CT site. Much of the property is fenced and graveled with the remaining portions undeveloped and largely composed of early successional forest, particularly in areas with steep slopes, while the flatter portions of the property are largely fallow field. The Action Alternative would evaluate the development of the NCG site for construction and operation of six gas-fired frame CTs (500 MW). The CTs would use existing natural gas and transmission infrastructure.

3.0 Environmental Review Process

The NEPA review process helps federal agencies make decisions based on an understanding of a proposed action's potential impacts. NEPA also requires that federal agencies provide opportunities for public involvement in the agency decision-making process. Finally, federal agencies conduct scoping under NEPA to engage important stakeholders in the early identification of concerns, potential impacts, relevant effects of past actions, and possible alternative actions.

TVA will consider input obtained from the public, stakeholders, resource and permitting agencies, and other interested parties during the public scoping period when developing the Draft EIS. Publication of the Draft EIS will include a public review and comment period, during which TVA will conduct a public meeting. TVA will consider all substantive comments and edits submitted on the Draft EIS, make appropriate revisions in response, and publish a Final EIS. TVA's final decision on which alternative will be implemented will be documented in a Record of Decision, to be published in the Federal Register.

In addition to agency and public input, the EIS will also address specific requirements associated with a number of federal laws such as the National Historic Preservation Act, Endangered Species Act, Clean Water Act, and Clean Air Act, and relevant executive actions, including Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), EO 12898 (Environmental Justice), EO 13112 as amended by 13751 (Invasive Species), EO 13990 (Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis), EO 14008 (Tackling the Climate Crisis at Home and Abroad), and other relevant EOs.

At the time of publication of this report, TVA estimates that the Draft EIS will be published in the summer of 2024 and the Final EIS will be published by winter of 2024. TVA will issue a decision document, a Record of Decision, by Spring 2025.

3.1 Scoping Period Public Outreach

The public scoping process was initiated with the publication of a Notice of Intent to prepare an EA or EIS in the Federal Register on November 28, 2023 (Appendix A). Additionally, TVA posted a public notice about the scoping period and information regarding the EA or EIS on the TVA website (www.tva.com/nepa). The public scoping period occurred between November 28, 2023, and January 19, 2024. To facilitate awareness of this opportunity, in addition to posting the Notice of Intent in the Federal Register and TVA website, TVA contacted local, state, and federal government agencies, local power companies, and direct serve customers and sent a media advisory to news outlets across the TVA service area(Columbus Commercial Dispatch and the Monrow Journal), TVA also posted Facebook Events ads within 10 miles of the following zip codes: 35461, 35576, 35586, 35592, 38848, 39701, 39702, 39705, 39740, 39746, 39766, 39773.

TVA encouraged the public to comment on the scope of the EA or EIS, the alternatives under consideration, and environmental issues that should be addressed. TVA invited the public as well as Federal, state, and local agencies and federally recognized Indian tribes to submit formal comments via email (nepa@tva.gov), the TVA webpage (www.tva.com/nepa), or by mail. TVA's webpage also provided a link for virtual submission of comments.

As part of public scoping, TVA hosted an in-person public open house on January 8, 2024, to gather input from the public and stakeholders. The public was invited to attend this meeting and submit formal comments. At the public open house, TVA provided an interactive web-browser simulating various phases of the project, and informative posters outlining the NCG site history, a description of the Proposed Action, project schedule, and NEPA regulatory framework. A total of 43 individuals, both members of the general public and representatives of a variety of organizations, signed in for the meeting.

3.2 Summary of Scoping Feedback

TVA received a wide variety of comments and opinions regarding the construction and operation of a CT plant at the NCG site. Based on TVA's internal scoping and input gathered from the public scoping process, TVA determined that an EIS would be the appropriate level of review for the Proposed Action. TVA will consider this input in developing its Draft EIS.

TVA received 30 submissions from members of the public, federal agencies, and various organizations totaling 1,027 unique comments. The submissions consisted of:

- Sixteen submissions from the General Public.
- One submission from a federal agency, the U.S. Environmental Protection Agency.
- Thirteen submissions from the following organizations: Appalachian Voices, Center for Biological Diversity, GS Research LLC, Gulf Coast for a Sustainable Future, Hop, Legacy Village Inc, Mississippi Rising Coalition (2 submissions), Robbins Properties, Sierra Club, Solar Energy Industries Association, Southern Alliance for Clean Energy, Southern Environmental Law Center.

All comments submitted are included in Appendix B.

The 30 submissions were reviewed to identify specific issues of concern by each commenter and were grouped in general categories for identification and review. In total, 1,027 unique comments were identified. In order of number of comments received, the general categories raised by commenters included the following:

1. *Preference for renewable energy options:* Concerns regarding using non-renewable energy instead of expanding on existing renewable energy options or building new renewable energy facilities (201 comments)

2. *Cost effectiveness:* Concerns regarding project cost as well as other forms of energy being more affordable (171 comments)

3. *EIS requested*: Requests for further analysis of environmental impact of building a gas plant and fossil fuel use (146 comments)

4. *Job creation/economic development:* Concerns that gas plants will not provide the jobs that residential solar and energy efficiency programs could (125 comments)

5. *Renewable options more reliable*: Concerns pertaining to renewable energy providing supply needs in inclement weather when non-renewable sources have failed (125 comments)

6. *Lacking information*: Requests for more information on one or more parts of the process and/or documentation (45 comments)

7. *Policy/regulation*: Concerns that the 2019 IRP does not conform to current policies and regulations (43 comments)

8. *IRP information*: Questions and concerns over the use of information from the 2019 IRP (42 comments)

9. *Climate change*: Concerns regarding the use of fossil fuels and impacts on global warming (40 comments)

10. *Environmental justice*: Concerns regarding potential impacts to the human environment, particularly vulnerable communities adjacent to the gas plant (39 comments)

11. *Air quality*: Concerns over adequate representation of greenhouse gas emissions and lack of measures to prevent impact to air quality (13 comments)

12. *Pollution (general)*: Concerns over pollution to the environment specifically related to impact to environmental justice communities (13 comments)

13. *Electric resources needed*: Comments acknowledging the need for more utility support in the area (7 comments)

14. *Mitigation*: Concerns with whether cost measurements associated with the project include appropriate mitigation (6 comments)

15. *Reliability of energy source*: Commentors discussed rolling blackouts associated with cold climates and stated support for renewable energy that provided back-up to gas plants (6 comments)

16. *Alternatives analysis*: While alternatives are discussed in many comments, these specifically highlighted concerns with a lack of alternatives for a thorough alternatives analysis (5 comments)

3.3 Issues to be Addressed

Based on TVA's internal scoping and input gathered from the public scoping process, the anticipated major issues to be addressed in this EIS include:

- *Air Quality and Climate Change/Greenhouse Gases:* Air quality considerations including attainment status and regional air quality information will be presented. Impacts to air quality from activities associated with each of the alternatives will be evaluated. The impact of greenhouse gas emissions from each of the alternatives on climate change will be addressed.
- *Geology and Soils*: Regional geology and soils at the NCG site will be identified and any limitations related to construction and operation will be evaluated. Impacts to prime farmland soils will be quantified. The seismic history of the region will be identified and evaluated.

- *Land Use/Prime Farmlands*: Land uses within the NCG site and within the vicinity (5-mile radius) will be identified. Permanent and temporary direct and indirect impacts to land use associated with each of the alternatives will be evaluated.
- *Groundwater Quality and Quantity:* Existing groundwater conditions in the vicinity of the site will be described and analyzed to the extent to which each alternative would affect groundwater quality.
- *Surface Water Quality and Quantity:* The quality of surface water resources will be described and the extent to which each alternative would affect water quality directly or indirectly will be analyzed.
- *Floodplains and Wetlands*: Wetlands, waterbodies, and floodplains within the NCG site will be identified and impacts will be quantified. The effects of each of the alternatives on jurisdictional wetlands, waterbodies, and floodplains will be evaluated.
- *Biological Resources* (vegetation, wildlife, and aquatic life): Vegetation community types within the NCG site will be described. Significant natural features, including rare species habitat, important wildlife habitat, and locally uncommon natural community types, will be identified. The effects of each alternative on terrestrial and aquatic ecosystems will be evaluated.
- *Threatened and Endangered Species*: Federally or state-listed as threatened or endangered plants and animals known to exist in the vicinity of the NCG site will be identified. The effects of each alternative on endangered, threatened, and rare species in need of management will be evaluated.
- *Recreational and Managed Areas*: Natural areas, parks, and other managed areas within the vicinity of the alternatives will be identified and potential impacts associated with the proposed alternatives will be addressed.
- *Cultural and Historic Resources:* Archaeological and historic resources within the Area of Potential Effect of the NCG site will be characterized. Any known sites listed on or eligible for the National Register of Historic Places will be discussed. The potential effects of each alternative on historic and archaeological resources will be evaluated. The cultural resources analysis and recommendations will be reviewed through formal consultation with the Mississippi State Historic Preservation Office and interested Tribes, the results of which will also be provided.
- *Visual Resources:* The aesthetic setting of the NCG site will be described and an analysis of changes to scenic attractiveness and scenic integrity associated with each of the alternatives will be completed.
- *Noise:* Noise emissions and impacts associated with the construction phase equipment use and plant operations will be assessed to determine the potential noise effects of each alternative on sensitive receptors.
- *Transportation*: The existing roadway network in the vicinity of the NCG site, including physical road characteristics (number of lanes, shoulders, and posted speed limit) and existing traffic characteristics will be identified. The effect of construction and operational traffic to the NCG site will be evaluated, including the potential for improvements to site access from local highways.
- *Solid and Hazardous Waste:* Current practices regarding hazardous materials/waste management near the NCG site will be identified. Any impacts from waste generation

during construction and operation will be identified. Operational measures (waste management practices) will be incorporated into the assessment of impacts.

- *Socioeconomics and Environmental Justice:* Demographic and community characteristics within the vicinity (10-mile radius) of the NCG site will be evaluated. Potential low-income and minority populations will be identified to evaluate the potential for disproportionate adverse impacts in accordance with EO 12898 and EO 13990. Economic effects associated with the construction and operational workforce for each alternative will also be evaluated. The existing local services, including emergency, water, and wastewater, will be evaluated to determine adequate resources and effects associated with each alternative.
- *Public Health and Safety, Services, and Utilities:* The public emergency services and utilities in the vicinity of the project will be described. Any safety concerns in the vicinity resulting from project activities will be identified.

The potential direct and indirect impacts to each resource will be assessed in the EIS. Avoidance, minimization, and mitigation measures will be identified as appropriate. In addition, the EIS will include an analysis of the cumulative impacts associated with each alternative. A cumulative impact analysis considers the potential impact to the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions (40 Code of Federal Regulations 1508.7). These past, present, and reasonably foreseeable future actions will include, but are not limited to, the other potential development actions that are connected to the development of a simple cycle facility at the NCG Site. The methodology for performing such analysis is set forth in the Council on Environmental Quality's *Considering Cumulative Effects under NEPA*.

4.0 References

Tennessee Valley Authority (TVA). 2019. 2019 Integrated Resource Plan. Retrieved from https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan/2019-integrated-resource-plan (accessed January 2024).

______. 2024a. Categorical Exclusion Record for Demolition of Structures and Utilities at New Caledonia, MS. March 2024.

______. 2024b. Categorical Exclusion Record for Demolition of Two Transformers at New Caledonia. March 2024.

APPENDIX A

Federal Register Notice

blocked pursuant to a determination by the Secretary of State pursuant to E.O. 13224.

Consistent with the determination in section 10 of E.O. 13224 that prior notice to persons determined to be subject to the Order who might have a constitutional presence in the United States would render ineffectual the blocking and other measures authorized in the Order because of the ability to transfer funds instantaneously, I determine that no prior notice needs to be provided to any person subject to this determination who might have a constitutional presence in the United States, because to do so would render ineffectual the measures authorized in the Order.

This notice shall be published in the **Federal Register**.

Dated: November 16, 2023.

Antony J. Blinken,

Secretary of State.

[FR Doc. 2023–26103 Filed 11–27–23; 8:45 am]

BILLING CODE 4710–AD–P

TENNESSEE VALLEY AUTHORITY

New Caledonia Generation Site Project

AGENCY: Tennessee Valley Authority.

ACTION: Notice of intent.

SUMMARY: The Tennessee Valley Authority (TVA) intends to prepare an environmental assessment (EA) or an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA) to address the potential environmental impacts associated with the proposed construction and operation of a Combustion Turbine (CT) Plant on a parcel of TVA-owned brownfield property in Lowndes County, Mississippi. The proposed New Caledonia Generation Site (NCG) would provide approximately 500 Megawatts (MW) of new generation capacity. The NCG CTs would be composed of six (6) natural gas-fired frame CTs. NCG would provide flexible and dispatchable transmission grid support and facilitate the integration of renewable generation onto the TVA bulk transmission system, consistent with the 2019 Integrated Resource Plan (IRP). Public comment is invited concerning the scope of the environmental review, alternatives being considered, and environmental issues that should be addressed. TVA is also requesting data, information, and analysis relevant to the proposed action from the public; affected Federal, State, Tribal, and local governments, agencies, and offices; the scientific community; industry; or any other interested party.

DATES: The public scoping period begins with the publication of this Notice of Intent in the **Federal Register**. To ensure consideration, comments must be postmarked, submitted online, or emailed no later than January 19, 2024. To facilitate the scoping process, TVA will hold an in-person public open house from 5 p.m. to 7 p.m. on January 8, 2024, at the Caledonia Community Center; see *https://www.tva.com/nepa* for more information on the meeting.

ADDRESSES: Written comments should be sent to Erica McLamb, NEPA Compliance Specialist, 1101 Market Street, BR 2C–C, Chattanooga, Tennessee 37402. Comments may also be submitted online at: *https://www.tva.com/nepa* or by email at *nepa@tva.gov.* The public meeting will be held at the Caledonia Community Center, located at 205 South St., Caledonia, Mississippi 39740.

FOR FURTHER INFORMATION CONTACT: Erica McLamb by email to *nepa@tva.gov,* by phone at (423) 751–8022, or by mail at the address above.

SUPPLEMENTARY INFORMATION: This notice is provided in accordance with the Council on Environmental Quality's regulations (40 CFR parts 1500 to 1508) and TVA's procedures for implementing NEPA. TVA is an agency and instrumentality of the United States, established by an act of Congress in 1933, to foster the social and economic welfare of the people of the Tennessee Valley region and to promote the proper use and conservation of the region's natural resources. One component of this mission is the generation, transmission, and sale of reliable and affordable electric energy.

Background

TVA provides electricity for local power companies serving 10 million people in Tennessee and parts of six surrounding States, as well as directly to large industrial customers and Federal installations. TVA is fully self-financed without Federal appropriations and funds virtually all operations through electricity sales and power system bond financing. The dependable electrical capacity on the TVA power system is approximately 38,000 MW. TVA transmits electricity from generating facilities over 16,000 miles of transmission lines.

In June 2019, TVA published an IRP, which was developed with input from stakeholder groups and the public. The 2019 IRP evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those plausible futures) and identified a range of potential resource additions and retirements throughout the TVA power service area, which encompasses approximately 80,000 square miles. The 2019 IRP identified the potential addition of up to 500 MW of demand response and 2,200 MW of energy efficiency (demand-side options); 4,200 MW of wind; 5,300 MW of storage; 8,600 MW of CT; 9,800 MW of combined cycle (CC); and 14,000 MW of solar by 2038. The 2019 IRP recommendation optimizes TVA's ability to create a more flexible power-generation system that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability. Additionally, the 2019 IRP recommended a series of near-term actions, including evaluating engineering end-of-life dates for aging fossil units, to determine whether retirements greater than 2,200 MW would be appropriate to inform long-term planning. The strategic direction established by the 2019 IRP and results from recommended near-term actions formed the basis for TVA's asset strategy, which continues to support affordable, reliable, and cleaner energy for customers. As a result of resource changes outlined in the asset strategy, TVA has a plan for 70% carbon reductions by 2030, a path to an approximately 80% carbon reductions by 2035 and aspires to net-zero carbon emissions by 2050 (based on a 2005 baseline).

Since the pandemic, TVA has seen a strong increase in electric demand. Population in the TVA service region has grown 1.5%. TVA expects continued strong growth in annual electric demand through the middle of this decade. Forecasted electric demand is expected to grow more than one percent per year on average between 2023–2026. Current system modeling shows that with increased In-Valley residential migration and commercial development, TVA must add generation capacity to the system to maintain adequate operating reserves.

The NCG Site is an approximately 63-acre federally owned brownfield property managed by TVA in Lowndes, Mississippi, located approximately 10 miles northeast of Columbus. The NCG site was the location of a former CT facility, originally constructed in 1998 and operated for several years by a private company. The company decommissioned the facility in 2007, removing the existing six frame CTs from the site. The adjacent TVA Lowndes County 161 kV and 500-kV Substation is approximately 82 acres and has remained in-service. The study area for the proposed action is 145 acres and includes the entire combustion turbine property as well as the adjacent substation property.

TVA is considering constructing and operating a combustion turbine facility (with generation capacity of approximately 500 MW) at the same brownfield location as the previously operated generating facility, which would allow TVA to utilize existing natural gas and transmission infrastructure.

Project Purpose and Need

The purpose of the proposed action is to help provide generation to support continued load growth in the TVA power service area and TVA's decarbonization goals. TVA needs flexible, dispatchable power that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability. The need for the Proposed Action is to ensure that TVA can meet required year-round generation and maximum capacity system demands and planning reserve margin targets.

Preliminary Proposed Action and Alternatives

TVA anticipates that the scope of the EA or EIS will evaluate a No Action Alternative and an Action Alternative. The No Action Alternative provides a baseline for comparing against the Action Alternative. Under the No Action Alternative, TVA would not redevelop the TVA-owned brownfield property in Lowndes County for energy generation. The Action Alternative would evaluate the development of the NCG site for construction and operation of a CT. Whether these or other alternatives are reasonable warranting further consideration under NEPA would be determined in the course of preparing the EA or EIS.

Anticipated Environmental Impacts

The EA or EIS will include a detailed evaluation of the environmental, social, and economic impacts associated with implementation of the proposed action. Resource areas to be addressed in the EA or EIS include but are not limited to air quality; aquatics; botany; climate change; cultural resources; emergency planning; floodplains; geology and groundwater; land use; noise and vibration; health and safety; soil erosion and surface water; socioeconomics and environmental justice; threatened and endangered species; transportation; visual resources; waste; wetlands; and wildlife. Measures to avoid, minimize, and mitigate adverse effects will be identified and evaluated in the EA or EIS.

Anticipated Permits and Other Authorizations

TVA anticipates seeking required permits or authorizations, as appropriate. TVA's proposed action to construct a CT may also require issuance of an air permit under the Clean Air Act, an Individual or Nationwide Permit under section 404 of the Clean Water Act; section 401 Water Quality Certification; a Mississippi Large Construction Stormwater Permit; conformance with Executive Orders on Environmental Justice (12898), Wetlands (11990), Floodplain Management (11988), Migratory Birds (13186), and Invasive Species (13112); and compliance with Section 106 of the National Historic Preservation Act, section 7 of the Endangered Species Act, and other applicable local, Federal, and State regulations.

Public Participation and Scoping Process

Scoping, which is integral to the process for implementing NEPA, provides an early and open process to ensure that issues are identified early and properly studied; issues of little significance do not consume substantial time and effort; the draft EA or EIS is thorough and balanced; and delays caused by an inadequate EA or EIS are avoided. TVA seeks comment and participation from all interested parties for identification of potential alternatives, information, and analyses relevant to the proposed action in this EA or EIS. Public comments received during the scoping period will assist TVA in determining the appropriate level of NEPA review.

Information about this project is available at *https://www.tva.com/nepa,* which includes a link to an online public comment page. Comments must be received or postmarked no later than January 19, 2024. Federal, State, local agencies, and Native American Tribes are also invited to provide comments. Please note that any comments received, including names and addresses, will become part of the project administrative record and will be available for public inspection. To facilitate the scoping process, TVA will hold an in-person public open house from 5 p.m. to 7 p.m. on January 8, 2024, at the New Caledonia Community Center located at 205 South St., Caledonia, MS 39740; see the project website for more information on the meeting.

EA or EIS Preparation and Schedule

TVA will consider comments received during the scoping period and develop a scoping report which will be published online. The scoping report will summarize public and agency comments that were received and identify the projected schedule for completing the environmental review process. TVA will post a draft EA or EIS for public review and comment on the project website. TVA anticipates holding a public open house after releasing the draft EA or EIS. TVA expects to release the draft EA or EIS in Spring or Summer 2024 and a final EA or EIS in late 2024. If an EIS is prepared, TVA would publish a Record of Decision at least 30 days after the release of the final EIS.

Authority: 40 CFR 1501.9.

Susan Jacks,

General Manager, Environmental Resource Compliance.

[FR Doc. 2023–26178 Filed 11–27–23; 8:45 am]

BILLING CODE 8120–08–P

DEPARTMENT OF THE TREASURY

Internal Revenue Service

Proposed Collection; Requesting Comments on Qualification and Transfer of Credit Under Sections 30D and 25E From the Taxpayer to an Eligible Entity

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Notice and request for comments.

SUMMARY: The Internal Revenue Service, as part of its continuing effort to reduce paperwork and respondent burden, invites the general public and other federal agencies to take this opportunity to comment on proposed and/or continuing information collections, as required by the Paperwork Reduction Act of 1995. The IRS is soliciting comments concerning Revenue Procedure 2023–33 and subsequent procedures for making a transfer election under Internal Revenue Code (IRC) sections 30D and 25E, and qualifying vehicles under IRC section 30D.

DATES: Written comments should be received on or before January 29, 2024 to be assured of consideration.

ADDRESSES: Direct all written comments to Andres Garcia, Internal Revenue Service, Room 6526, 1111 Constitution Avenue NW, Washington, DC 20224, or by email to *pra.comments@irs.gov.* Include OMB Control No. 1545–2311 in the subject line of the message.

FOR FURTHER INFORMATION CONTACT: Requests for additional information or

APPENDIX B

Public and Agency Comments Submitted During the Scoping Period

(November 28, 2023, through January 19, 2024)

Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/environmental-stewardship/nepa-environmental-reviews/ncg-scoping-report.pdf?sfvrsn=bccab970_3

Appendix B – Air Quality and Greenhouse Assessment Report

New Caledonia Gas Plant Air Quality and Greenhouse Gas Assessment

JULY 2024

PREPARED FOR

Tennessee Valley Authority

PREPARED BY

SWCA Environmental Consultants

CONTENTS

Appendices

Figures

Tables

Acronyms and Abbreviations

°F	degrees Fahrenheit
µg/m3	micrograms per cubic meter
AQCR	Air Quality Control Region
AQRV	Air Quality Related Value
bhp	brake horsepower
BSER	best system of emission reduction
CAA	Clean Air Act
CCS	carbon capture and sequestration/storage
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CT	combustion turbine
EGU	Electric utility generating unit
EIS	Environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
GWP	global warming potential
HAP	hazardous air pollutant
HHV	higher heat value
IPCC	Intergovernmental Panel on Climate Change
IRP	Integrated Resource Plan
IWG	Interagency Working Group
Km	kilometer
Lb	pound
MAC	Mississippi Administrative Code
MACT	Maximum Achievable Control Technology
MDEQ	Mississippi Department of Environmental Quality
MMBtu	Million British thermal units
MOVES3	Motor Vehicle Emission Simulator

MW	megawatt
MWh	megawatt hours
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NSPS	New Source Performance Standards
NSR	New Source Review
O&M	operations and maintenance
ppb	parts per billion
$PM_{2.5}$	particulate matter less than 2.5 microns
PM_{10}	particulate matter less than 10 microns
PM NAAQS	National Ambient Air Quality Standards for Particulate Matter
Project	New Caledonia Gas Plant
PSD	prevention of significant deterioration
PTE	potential to emit
RICE	reciprocating internal combustion engine
SC-GHG	social cost of GHG emissions
SER	significant emission rate
SO_2	sulfur dioxide
SO_x	oxides of sulfur
Tpy	tons per year
VOC	volatile organic compound
TVA	Tennessee Valley Authority
WRAP	Western Regional Air Partnership

1. INTRODUCTION

Air quality conditions are a valuable resource from an aesthetic and human health perspective, and they are subject to specific regulations that aim to protect that resource. Local and regional aspects of air quality may be affected during construction, operations, as well as closure and reclamation phases of a project. The purpose of this air quality and greenhouse gas (GHG) desktop assessment is to provide a description of air quality in the analysis area and identify potential impacts from the construction and operation of the proposed Project for use in developing the required National Environmental Policy Act (NEPA) documentation.

The analysis includes a qualitative/quantitative assessment of air quality and GHG impacts from construction activities (e.g., air emissions from construction equipment exhaust, and fugitive dust emissions) and from operation activities (e.g., stationary emission sources and fugitive dust emissions). This document also provides a background of the Project area with respect to the existing air quality in the region and a summary of identified air quality regulations that would apply to the Project.

2. PROJECT BACKGROUND

The purpose of the proposed New Caledonia Gas Plant (Project) is to support continued load growth within the Tennessee Valley in a way that is consistent with the recommendations in the Tennessee Valley Authority (TVA)'s 2019 Integrated Resource Plan (IRP) and to facilitate the integration of renewables onto the electric grid, thereby advancing TVA's decarbonization goals. The 2019 IRP included the addition of up to 5,200 megawatts (MWs) of combustion turbines (CTs) by 2028 and up to 8,600 MW by 2038 to accommodate load growth. Natural gas-fired CTs are needed to provide dispatchable generation capacity to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, and planning reserve margin targets while facilitating the integration of renewable energy onto the electric grid and complying with its mandate under Section 113 of the Energy Policy Act of 1992 to satisfy the requirement of least-cost planning.

The proposed Project would include:

- Gas system upgrades to existing infrastructure to connect the plant to an existing gas pipeline;
- Construction of an onsite stormwater pond;
- New fuel oil storage and water storage tanks;
- Existing and new natural gas-fired dew point heaters;
- New electric and diesel emergency firewater pumps; and
- Six gas-fired Frame CTs (500 MW) with inlet evaporative cooling.

Site preparation work, plant construction, and other site upgrades would begin in early 2025, and the plant would begin commercial operation no later than December 2027. It is expected that the lifespan of the facility, once operational, would be 30 years.

2.1. Existing Ambient Air Quality

A useful way to characterize existing air quality is to identify the attainment status of the Air Quality Control Region (AQCR) in which it is located. An AQCR, as defined in Section 107 of the Clean Air Act (CAA), is a federally designated area in which National Ambient Air Quality Standards (NAAQS) are assessed on a regional basis. An implementation plan is developed for each AQCR describing how ambient air quality standards will be achieved and maintained.

The U.S. Environmental Protection Agency (EPA) designates the attainment status of an area on a pollutant-specific basis based on whether an area meets the NAAQS. Areas that meet the NAAQS are termed "attainment areas."

Areas that do not meet the NAAQS are termed "nonattainment areas." Areas for which insufficient data are available to determine attainment status are termed "unclassifiable areas" and are treated the same as attainment areas. Areas formerly designated as nonattainment areas that have subsequently reached attainment are termed "maintenance areas."

The attainment status designations appear in 40 Code of Federal Regulations (CFR) Part 81. The attainment status of a region, in conjunction with projected emission rates or emissions increases, determines the regulatory review process for a new project. All Project activities would be in Lowndes County, Mississippi, which is an area designated as in attainment / unclassifiable with the NAAQS for all pollutants (EPA 2024). Air quality impacts in this analysis are assessed on a county basis.

The Project would involve construction and operational activities in Lowndes County, Mississippi. Summary data from the EPA AirData database was reviewed to characterize maximum or near-maximum existing concentrations in representative counties in which Project facilities would be constructed. To characterize the existing ambient air quality for the proposed Project, data were gathered from active monitoring stations closest to the proposed Project site.

While states can promulgate more stringent standards than the NAAQS, the Mississippi Department of Environmental Quality (MDEQ) has adopted all the NAAQS as promulgated by the EPA. Table 1 shows monitoring data for criteria pollutants between 2021 and 2023 from the monitoring sites, along with the appropriate primary NAAQS standard. All monitored values were below the NAAQS (EPA 2024A).

Table 1: National Ambient Air Quality Standards and Background Concentrations Near Project Area

Pollutant	Averaging Time	Background Concentration (ppb)	Background Concentration (μg/m^3)	Primary NAAQS	Data Source
CO	8-hour	2,600	2,990	9,000 ppb	North Birmingham Monitor (01-073-2059) 2021-2023 (highest 2nd high)
	1-hour	2,600	2,990	35,000 ppb	North Birmingham Monitor (01-073-2059) 2021-2023 (highest 2nd high)
NO_2	Annual	8.4	15.8	53 ppb	North Birmingham Monitor (01-073-2059) 2021-2023 (annual mean)
	1-hour	29.3	55.1	100 ppb	North Birmingham Monitor (01-073-2059) 2021-2023 (3-year average 98th percentile)
PM_{10}	24-hour	-	40	150 μg/m^3	Wylam Monitor (01-073-2003) 2021-2023 (3-year average 98th percentile)
$PM_{2.5}$	Annual	-	8.5	9 μg/m^3	McAdory Monitor (01-073-1005) 2021-2023 (annual mean)
	24-hour	-	22.4	35 μg/m^3	McAdory Monitor (01-073-1005) 2021-2023 (3-year average 98th percentile)

Pollutant	Averaging Time	Background Concentration (ppb)	Background Concentration (μg/m^3)	Primary NAAQS	Data Source
SO_2	1-hour	12.1	31.7	75 ppb	North Birmingham Monitor (01-073-2059) 2021-2023 (average 99th percentile)
Ozone	8-hour	67	131.32	70 ppb	Tupelo Airport Near Old NWS Office Monitor (28-081-0005) 2021-2023 (highest 4th high)

Notes: ppb = parts per billion
μg/m^3 = micrograms per cubic meter
CO = carbon monoxide
NO_2 = nitrogen dioxide
PM_{10} = particulate matter less than 10 microns
$PM_{2.5}$ = particulate matter less than 2.5 microns
SO_2 = sulfur dioxide

It is worth noting that on February 7, 2024, the EPA strengthened the National Ambient Air Quality Standards for Particulate Matter (PM NAAQS). As a result of the changes, the EPA has set the level of the primary (health-based) annual $PM_{2.5}$ standard at 9.0 micrograms per cubic meter to provide increased public health protection, consistent with the available health science (EPA 2024B).

The National Emissions Inventory (NEI) is a detailed annual estimate of criterial pollutants and hazardous air pollutants (HAPs) from air emission sources maintained by the EPA. Emission inventories provide an overview of the types of pollution sources in the area, as well as the amount of pollution being emitted on an annual basis. Emission inventories are useful in comparing projected emissions due to a planned project against the county and state level emission rates to provide context to the magnitude of the emissions associated with a project. Table 2 summarizes the emission inventory data for Lowndes County, as well as the state of Mississippi as a whole, from the most recent NEI, which was conducted in 2020.

Table 2. 2020 National Emissions Inventory Emission Rates for Lowndes County and State of Mississippi

Location	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOCs	HAPs	CO_2	CH_4	N_2O	CO_2e
Lowndes County	17,273	8,140	1,007	10,037	2,599	21,736	2,619	4,700,831	1,904	28	4,756,816
State of Mississippi	737,431	138,760	11,370	412,475	90,986	1,555,400	133,241	68,351,856	73,774	5,233	71,755,536

Source: EPA 2024C
Notes: CO_2, CH_4, N_2O and CO_2e are in unit of metric tons. All other totals are in units of short tons.
CO = carbon monoxide
NO_x = oxides of nitrogen
SO_x = oxides of sulfur
PM_{10} = particulate matter less than 10 microns
$PM_{2.5}$ = particulate matter less than 2.5 microns
CO_2e = carbon dioxide equivalent
VOCs = volatile organic compounds
CO_2 = carbon dioxide
CH_4 = methane
N_2O = nitrous oxide
HAPs = hazardous air pollutants
CO_2e was calculated by summing the emissions for CO_2, N_2O, and CH_4. N_2O and CH_4 were both multiplied by their relative global warming potential factor first. N_2O has a global warming potential factor equivalent to 298 times that of CO_2, while CH_4 has a global warming potential equivalent to 25 times CO_2 (Intergovernmental Panel on Climate Change [IPCC] Fifth Assessment Report, 2014 (AR5) 100-year Global Warming Potential Values).

2.2. Greenhouse Gases and Climate Change

GHGs are gases that trap heat in the atmosphere. GHGs include methane (CH_4), carbon dioxide (CO_2), nitrous oxide (N_2O), water vapor, and fluorinated gases (e.g., hydrofluorocarbons and perfluorocarbons). GHG emissions are expressed/measured in units of carbon dioxide equivalents (CO_2e). There are no NAAQS established for GHGs; however, the EPA has established reporting and major source thresholds for GHGs.

Climate change is a global issue that results from several factors, including, but not limited to, the release of GHGs, land use management practices, and the albedo effect, or reflectivity of various surfaces (including reflectivity of clouds). Specific to the Project, GHGs are produced and emitted by various sources during the development and operational phases of power generation facilities.

Estimates of GHG emissions are usually reported in terms of CO_2e to account for the relative global warming potential (GWP), i.e., a given pollutant's ability to trap heat. GWP is calculated over a specific time, typically 100 years. For example, per the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (IPCC 2022), CH_4 has a GWP of 29.8 over 100 years, meaning it is 29.8 times more effective at trapping heat than CO_2. Nitrogen dioxide has a GWP of 273 over 100 years, meaning it is 273 times more effective at trapping heat than CO_2.

An analysis of regional climate impacts prepared for the IPCC Sixth Assessment Report (IPCC 2022) concludes that future climate change projections indicate that further strong warming will reduce precipitation. Analysis of past records and future projections indicates an overall increase in regional temperatures, including in the analysis area. As has been observed at many sites to date, the observed increase is largely the result of the warmer nights and effectively higher average daily minimum temperatures at many of the sites in the region.

In 2022, U.S. GHG emissions totaled 6,341.2 million metric tons of CO_2e, and 5,487.0 million metric tons of CO_2e after accounting for sequestration from the land sector (EPA 2024D).

The Council on Environmental Quality (CEQ) released new interim guidance on January 9, 2023, regarding GHGs and climate change in the NEPA process (CEQ 2023). Overall, the guidance emphasizes quantification of direct (defined herein as emission arising directly from the construction and operation of the Project) and net GHG emissions (defined herein as the change in GHG emissions brought about by the Project considering direct emissions, indirect emissions, and any gross emissions reductions brought about by the proposed action), discussing GHGs in terms of equivalencies, calculating social cost of greenhouse gases (SC-GHG), and an explanation of how climate change impacts could impact Project construction and operations. There are currently no emission thresholds for GHGs that establish significance under NEPA.

2.3. Climate in Project Area

The Project Site is located in Lowndes County, Mississippi, approximately 2.5 miles south of Caledonia and approximately 10 miles north-northeast of Columbus, Mississippi. This region has a humid subtropical climate with hot, humid summers and mild winters. Precipitation is evenly spread throughout the year in this region. A summary of weather conditions from Columbus, Mississippi, near the Project Area can be found in Table 3.

Table 3. Columbus, Mississippi Weather Conditions

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high (ºF)	54	60	68	76	84	90	93	93	87	77	67	57
Average low (ºF)	33	37	43	50	59	67	70	70	63	51	42	35
Av. precipitation (inches)	5.4	5.5	4.9	4.8	4.2	4.9	4.2	4.0	3.7	4.0	4.9	5.2

Source: U.S. Climate Data (2024)
ºF = degrees Fahrenheit

Winds predominantly flow from the south to the north and from the northwest to the southeast. Figure 1 shows the distribution of wind direction and wind speed at the Project area during 2023.

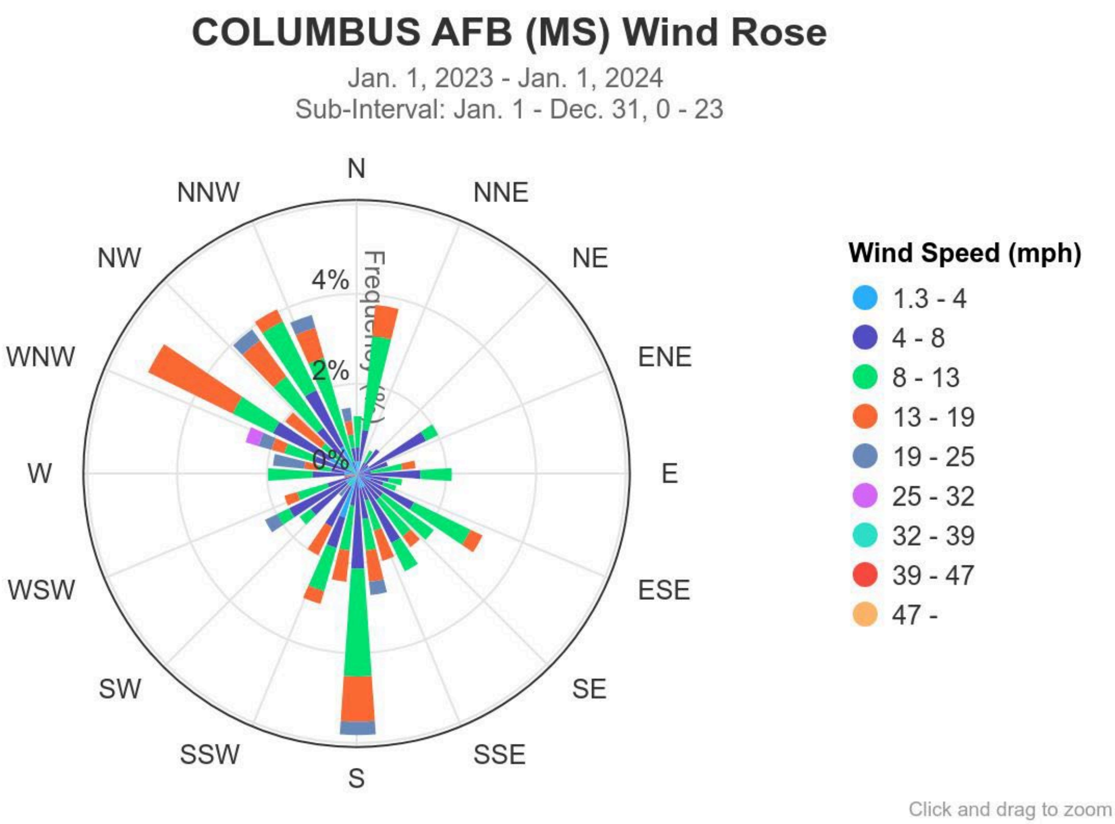

Figure 1. Columbus, Mississippi 2023 Wind Rose (Purdue 2024).

3. REGULATORY CONSIDERATIONS

The following sections provide an overview of federal and state regulatory requirements that would be applicable to the Project.

3.1. Federal Air Quality Programs

Construction and operation of the Project would emit air pollutants regulated under the CAA. During construction of the Project, activities such as clearing, grading, trenching, equipment delivery, and operation of construction equipment and on- and off-road vehicles would generate emissions. In addition, the operation of the completed Project would result in emissions from natural gas and diesel combustion, fugitive leaks from piping components, and various maintenance activities. The provisions of the CAA that are potentially relevant to the Proposed Project are summarized in the following sections.

3.1.1. New Source Review

New Source Review (NSR) is a preconstruction permitting program designed to protect air quality when air pollutant emissions are increased either through the modification of existing sources or through the construction of a new source of air pollution. For areas in attainment or unclassifiable with NAAQS, NSR ensures that the new emissions do not degrade the air quality, which is achieved through the implementation of the prevention of significant deterioration (PSD) permitting program or state minor permit programs. In addition, NSR ensures that any large, new, or modified industrial source uses air pollution control technology. Air permitting of stationary sources has been delegated to each state.

A source is classified as PSD major if it has the Potential to Emit (PTE) more than 100 tons per year (tpy) of regulated pollutant that is not a GHG under the CAA and it is listed in one of the 28 named source categories in Section 169 of the CAA, or if it has the PTE more than 250 tpy and is not listed in one of the 28 named source categories in Section 169 of the CAA. The proposed project would not fall under a listed source category and would not be subject to PSD permitting due to emissions of regulated pollutants not being in excess of 250 tpy.

3.1.2. Title V Operating Permit

MDEQ issues air permits to stationary sources, including all sources subject to NSR permitting. The permitting procedure provides sources with an operating permit after they have completed construction or modifications to document all emission limitations, monitoring, recordkeeping, and reporting requirements for the continued operation of the new or modified emission units at a major source. These permits are known as "Title V" permits since they are required by Title V of the 1990 CAA. A source is considered major under the Title V operating permit program if its annual actual or potential emissions are at or above the following thresholds:

- 100 tpy for all air pollutants in attainment areas. Lower standards apply in non-attainment regions (but only for the pollutant that is in non-attainment).
- The thresholds for major sources of HAP are 10 tpy for a single HAP and 25 tpy for any combination of HAP.

The Project would have the potential to emit more than 100 tpy of at least one criteria pollutant, making it subject to the requirements of Title V Operating Permits.

3.1.3. New Source Performance Standards

Section 111 of the CAA authorized the EPA to develop technology-based standards that apply to specific categories of stationary sources. These standards are referred to as New Source Performance Standards (NSPS) and are found at 40 CFR 60. The NSPSs apply to new, modified, and reconstructed affected facilities in specific source categories.

Subpart A – General Provisions

Subpart A contains general requirements for notification, testing, and reporting for the NSPS program. The subpart applies to each project that has an affected source as defined under another subpart. As the Project would have units subject to one or more standards under 40 CFR 60 as discussed below, Subpart A applies to the Project.

Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Subpart IIII was published as a final rule on July 11, 2006 (*Federal Register* 71:39172). The one (1) diesel-fired fire pump associated with the proposed Project would utilize a stationary, compression ignition internal combustion engine subject to emissions standards and operational requirements under NSPS Subpart IIII. Subpart IIII specifies emission standards for non-methane hydrocarbons/oxides of nitrogen (NO_x) and particulate matter depending on the rated engine capacity and date of manufacture in 40 CFR 60.4205.

To comply with the primary equipment requirements of NSPS Subpart IIII, the Project would purchase engines certified by the manufacturer to meet emission standards provided in Table 4 to Subpart IIII.

In accordance with this regulation, operation of this emergency engine for the purposes of maintenance checks and readiness testing would be limited to 100 hours per year per engine; there is no time limit on the use in emergency situations to comply with the NSPS. The Project would use ultra-low sulfur diesel.

Subpart KKKK – Standards of Performance for Stationary Combustion Turbines

This subpart establishes standards for stationary CTs with a heat input at peak load equal to or greater than 10 million British Thermal Units (MMBtu) per hour, which commenced construction, modification, or reconstruction after February 18, 2005.

The Project would operate six (6) GE 7E.03 simple-cycle stationary CTs with a rated heat input of 994 MMBtu per hour at 59 degrees Fahrenheit (°F) based on the higher heat value (HHV) of the fuel. As a result, the Project would be subject to Subpart KKKK.

This subpart contains emission standards for NO_x and sulfur dioxide (SO_2) emissions from CTs, as well as various operational, monitoring, testing and reporting requirements. The Project would comply with the requirements contained in this subpart.

Subpart TTTT – Standards of Performance for Greenhous Gas Emissions for Electric Generating Units

On August 3, 2015, EPA signed the final rule for regulating GHG emissions from new, modified, and reconstructed electric utility generating units (EGUs). The rule applies to fossil fuel–fired electric generating units and stationary CTs that generate electricity for sale and are larger than 25 MW that commenced construction after January 8, 2014, or commenced modification or reconstruction after June 18, 2014. Implementation of the final rule occurred on October 23, 2015. The final performance standards are summarized in Table 4.

Table 4. Summary of Subpart TTTT Performance Standards for Affected Stationary Combustion Turbines

Type of Source	Description	Final Standard (lb CO_2/MWh)
	Newly constructed or reconstructed stationary combustion turbine that supplies more than its design efficiency or 50 percent, whichever is less, times its potential electric output as net-electric sales on both a 12-operating month and a 3-year rolling average basis and combusts more than 90% natural gas on a heat input basis on a 12-operating-month rolling average basis	1,000
New or Reconstructed	Newly constructed or reconstructed stationary combustion turbine that supplies its design efficiency or 50 percent, whichever is less, times its potential electric output or less as net-electric sales on either a 12-operating month or a 3-year rolling average basis and combusts more than 90% natural gas on a heat input basis on a 12-operating-month rolling average basis	120 lb CO_2/MMBtu
	Newly constructed and reconstructed stationary combustion turbine that combusts 90% or less natural gas on a heat input basis on a 12-operating-month rolling average basis.	120 lb CO_2/MMBtu to 160 lb CO_2/MMBtu

Lb = pound; MWh = megawatt hours

Compliance with the standard would be assured by establishing a rolling 12-operating-month generation restriction. Regardless of the location of the proposed EGU, all stationary gas turbines that meet the applicability of subpart TTTT must comply with the emission standards as well as the compliance, testing, and reporting requirements.

Visibility Impacts

Protection for large pristine areas of the U.S., such as national parks, forests, and wildlife refuges, referred to as Class I areas are evaluated using screening and modeling methods. The nearest Class I area is the Sipsey Wilderness, located approximately 65 miles to the northeast in Alabama.

According to the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised (2010), the initial annual emissions over distance (Q/D) screening method can be used to determine whether further visibility impact analyses must be performed, where Q is the sum of SO2, NOx, PM10 and H2SO4 multiplied by the ratio of hours in a year to hours of operation in a year and D is the distance (in km) to the Class I area. If Q/D is 10 or less, further analysis for visibility impacts on Class I areas is not required. If Q/D is greater than 10, then additional analysis is required. Based on the maximum operational emission rates presented in Table 3.1-2, this Q/D analysis results in a value of approximately 2.4, indicating that no significant visibility impacts on Class I areas are expected, and no further analysis is required.

Subpart TTTTa – Greenhouse Gas Standards for New Stationary Combustion Turbines

The EPA released the rule: New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-fired Electric Generating Stations on May 23, 2023, under Section 111 of the CAA. The rule regulates GHG new carbon pollution standards for coal and gas-fired power plants.

The rule, known commonly as NSPS TTTTa, will become effective on July 8, 2024. The construction and operation of the NCG Plant would be consistent with the requirements of any final rules promulgated by the EPA under

Section 111 of the CAA. Applicability would be determined at the time of permit review, but this analysis assumes that the rule applies.

Included in the rule are new requirements relating to GHG emissions from new and reconstructed fossil fuel-fired stationary CT electric generating units (EGUs) that are based on highly efficient generating practices in addition to CCS . The rule creates three subcategories (low load, intermediate load, and base load) based on the functions the CTs serve and defined by the capacity factor. These subcategories each have a distinct proposed best system of emission reduction (BSER) and standard of performance. The low load subcategory proposed BSER is the use of lower emitting fuels with standards of performance ranging from 120 pounds (lbs) CO2/MMBtu to 160 lbs CO2/MMBtu. Based on the assumed applicability of this regulation, a maximum capacity factor will be applied that results in a reduction in the maximum allowable hours of operation of the CTs. As a result, the maximum capacity factor for the project is 20 percent.

3.1.4. National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAPs) are stationary source standards for HAPs. HAPs are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. NESHAPs can apply to major and/or area (minor) sources of HAPs. A major source of HAPs emits 10 tpy or more of an individual HAP or 25 tpy or more of any combination of HAPs. To be classified as an area source, HAP emissions must be less than these thresholds. Based on calculated emissions rates, the Project would not be a major source for HAPs. The NESHAPs promulgated after the 1990 CAA Amendments are found in 40 CFR Part 63. These standards require the application of technology-based emissions standards referred to as Maximum Achievable Control Technology (MACT). Because of this, these post-1990 NESHAPs are also referred to as MACT standards.

Subpart A – General Provisions

Subpart A contains general requirements for notification, testing, and reporting for the NESHAPs program. The subpart applies to each project that has an affected source as defined under another subpart. As the facility would have units subject to one or more standards under 40 CFR Part 63, Subpart A applies to the Project.

Subpart YYYY – National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines

Subpart YYYY applies to new stationary CTs located at a major source of HAPs. The Project would not be a major source of HAPs, and as a result of this, would not be subject to Subpart YYYY.

Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Subpart ZZZZ established national emission limitations and operating limitations for HAP emissions from stationary reciprocating internal combustion engines (RICEs). Affected sources under Subpart ZZZZ are any existing, new, or reconstructed stationary RICE located at major or area sources of HAP emissions, excluding stationary RICEs being tested at a stationary RICE test cell/stand (40 CFR 63.6590[a]). Because the diesel-fired fire pump meets the criteria of 40 CFR 63.6590(c)(1) (a new or reconstructed stationary RICE located at an area source), the stationary RICEs meet the requirements of Subpart ZZZZ by meeting those of Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, discussed in the NSPS regulatory review section above. No further requirements of Subpart ZZZZ are applicable to the proposed Project.

3.1.5. Greenhouse Gas Reporting

40 CFR Part 98 Subpart D requires electrical generation facilities with annual GHG emissions equal to or greater than 25,000 metric tons of CO_2e to report GHGs from various processes within the facility. These emissions are reported directly to the EPA for all covered facilities. The Project would be subject to mandatory GHG reporting requirements due to overall CO_2e emissions from the site exceeding 25,000 metric tpy. The Project would comply with applicable 40 CFR Part 98 requirements after operation begins.

3.1.6. General Conformity

According to the EPA, the goal of General Conformity is to ensure that actions conducted or sponsored by federal agencies are consistent with state air quality goals. The purpose of General Conformity is to ensure that:

- federal activities do not cause or contribute to new violations of the NAAQS;
- actions do not worsen existing violations of the NAAQS; and
- attainment of the NAAQS is not delayed.

Under 40 CFR Part 93, a General Conformity determination is required for any project that requires federal action where: (1) the total direct and indirect emissions of a criteria pollutant or its precursors would equal or exceed specific thresholds set forth at 40 CFR Part 93.153(b)(1) in nonattainment or maintenance areas, and (2) such emissions are not already covered by an air permit.

Emissions from construction activities, for example, are not typically subject to air permitting and are often subject to General Conformity. Construction of all project facilities would occur in a county that is in attainment with the NAAQS. Therefore, the project would not be subject to General Conformity.

3.2. State Air Quality Regulations

Under the provisions of the CAA, any state can have requirements that are more stringent than those of the national program. In addition to federal air regulations, the Project may be subject to state air quality requirements administered by the MDEQ pursuant to 11 Mississippi Administrative Code (MAC) Part 2 (11 MAC:2). Mississippi regulations under 11 MAC:2 establish requirements applicable to stationary sources of emissions. The rules also include requirements related to construction and/or operating permits. The Project would be subject to all applicable state permitting requirements contained in 11 MAC:2. A demonstration of compliance with these regulations would be provided in the PSD permit application that would be submitted to MDEQ.

4. AIR QUALITY IMPACT ASSESSMENTS

The following sections provide the methodology and results for the construction, operation and GHG impact assessments for the Project.

4.1. Construction Impact Assessment

4.1.1. Construction Impact Assessment Methodology

Air emissions associated with construction of the Project would include emissions from fossil-fueled vehicles and equipment and fugitive emissions such as dust. Earth moving equipment and other mobile sources may be powered by diesel or gasoline engines and are sources of combustion-related emissions, including NO_x, CO, volatile organic compounds (VOCs), SO_2, PM_{10}, $PM_{2.5}$, GHGs, and small quantities of HAPs. Air emissions from construction equipment would be limited to the immediate vicinity of the construction area and would be temporary and expected to last for a total of 30 months, though actual duration could extend further. General construction activities would be expected to typically occur approximately 10 hours a day, 6 days a week, though construction hours and days could deviate from this anticipated schedule if needed.

The following assumptions were used to complete the construction impact assessment for the Project:

- Emissions from off-road construction equipment and vehicles; heavy-duty, on-road construction equipment; construction worker commuting; on-road construction equipment; and equipment delivery were estimated using EPA's Motor Vehicle Emission Simulator (MOVES3) emission factors for 2022.
- An estimated maximum number of 200 construction worker commuters are assumed to commute from Columbus, Mississippi (approximately 20 miles away, on average).
- Heavy-hauling trucks would be used to deliver materials and equipment from Columbus, Mississippi.
- Construction and operational emissions were estimated using published and agency-accepted emission factors, such as AP-42 emission factors (EPA 2023a) when appropriate, to estimate GHG emissions.
- It was assumed that construction activities would typically occur approximately 10 hours a day, 6 days a week, 52 weeks a year, for a duration of approximately 900 days. If the duration of construction would need to be extended for any reason, it is expected that any additional air impacts would be proportional to what is presented in this analysis.

A roster of construction equipment based on similar projects has been developed to represent the magnitude of emissions that may be associated with the construction of the Project. This roster is anticipated to include: cranes, diesel generators, bulldozers, grader, backhoe, front-end loaders, pickup trucks, dump trucks, mixer trucks, drill rigs, welders, water pumps, and air compressors. Fugitive dust would result from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. Fugitive dust emissions were conservatively estimated to be those emissions generated from unpaved roads and from general construction activities. The quantity of dust generated from unpaved roads is a function of soil type, soil moisture content, humidity, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions from general construction activities are a function of the size of the area being disturbed by construction activities.

There would be emissions attributable to on-road vehicles used for commuting and other support vehicles at the construction site (e.g., pickup trucks, etc.). Emission factors in grams per vehicle mile traveled for on-road vehicles were obtained from the EPA MOVES3 model. Emissions from off-road construction equipment engines used during Project construction were estimated based on the anticipated types of off-road equipment and their associated levels of use. Emission factors in grams per hour of use were obtained using the most recent version of the EPA MOVES3 model. Fugitive particulate matter emissions resulting from general construction activities were based on emission factors from the Western Regional Air Partnership's *WRAP Fugitive Dust Handbook* (Western Governors' Association 2006). The emission factors used were Level 1 values, which are used when only the area of disturbances and duration of construction activities are known. The emission factor assumes worst-case conditions, which accounts for construction sites with active large-scale earth moving operations. Though the Project would be unlikely to produce these levels of emissions, the emission factor was used to produce conservative emission estimates that could cover all general construction activities, including but not limited to debris removal, site preparation (earth moving), and general construction.

4.1.2. Construction Impact Assessment Results

Construction-related emissions of criteria pollutants and GHG have been estimated for the Project. Table 5 provides a summary of estimated emissions from construction activities for the duration of construction. To provide context to the magnitude of emissions expected from the construction of the Project on an annual basis, the construction emissions have been compared to the Lowndes County and State of Mississippi 2020 Annual Emission Inventory in Table 6. Detailed construction emissions calculations, along with the methodology and emissions factors, are provided in Appendix A.

Table 5. Construction Emissions Over Entire 30-Month Construction Period

	Emissions (Tons)										
Construction Emission Source	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**HAPs**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Construction Equipment (Off-Road)	97.42	36.82	0.03	2.44	2.36	5.32	2.21	8,576.31	0.38	0.17	8,638.15
Worker Commute & Equipment/ Material Delivery (On-Road)	34.84	3.16	0.03	0.10	0.09	0.13	0.02	3,643.07	0.05	0.01	3,647.79
Fugitive Dust From Construction	-	-	-	67.57	6.76	-	-	-	-	-	-
Fugitive Dust from Paved and Unpaved Roads	-	-	-	9.54	0.91			-	-	-	-
Total:	**132.26**	**39.98**	**0.06**	**79.64**	**10.11**	**5.46**	**2.23**	**12,219.38**	**0.44**	**0.19**	**12,286.22**

Note: CO_2, CH_4, N_2O and CO_2e are in units of metric tons. All other totals are in units of short tons.

Table 6. Construction Emissions on Annual Basis and Comparison to County and State 2020 Annual Emission Inventories

	Emissions (tpy)										
Emission Source	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**HAPs**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Construction Equipment (Off-Road)	39.51	14.93	0.01	0.99	0.96	2.16	0.90	3,478.17	0.15	0.07	3,502.22
Worker Commute & Equipment/ Material Delivery (On-Road)	14.13	1.28	0.01	0.04	0.04	0.05	0.01	1,477.47	0.02	0.01	1,479.49
Fugitive Dust From Construction	-	-	-	27.40	2.74	-	-	-	-	-	-
Fugitive Dust from Paved and Unpaved Roads	-	-	-	3.87	0.37	-	-	-	-	-	-
Total Annual Construction Emissions	**53.64**	**16.21**	**0.02**	**28.43**	**3.73**	**2.21**	**0.91**	**4,955.64**	**0.17**	**0.07**	**4,981.72**

Emission Source	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	VOC	HAPs	CO_2	CH_4	N_2O	CO_2e
Lowndes County 2020 Annual Emission Inventory	17,273	8,140	1,007	10,037	2,599	21,736	2,619	4,700,831	1,904	28	4,756,816
State of Mississippi 2020 Annual Emission Inventory	737,431	138,760	11,370	412,475	90,986	1,555,400	133,241	68,351,856	73,774	5,233	71,755,536
Project Annual Construction Emissions Percent of Lowndes County	0.31%	0.20%	<0.01%	0.28%	0.14%	0.01%	0.03%	0.11%	0.01%	0.27%	0.10%
Project Annual Construction Emissions Percent of Mississippi State	0.01%	0.01%	<0.01%	0.01%	<0.01%	<0.01%	<0.01%	0.01%	<0.01%	<0.01%	0.01%

Note: CO_2, CH_4, N_2O and CO_2e are in units of metric tons. All other totals are in units of short tons.

As demonstrated in Table 6, construction emissions would be expected to be a very small fraction of both the Lowndes County's and the State of Mississippi's annual emissions, with emissions from the Project being less than 1% for all pollutants.

As previously discussed, General Conformity is not applicable to the Project due to Lowndes being in attainment for all pollutants for which there are NAAQS. As no regulatory thresholds exist at which construction emissions would be considered significant, these emissions would not be significant. All air quality impacts from Project construction would generally be temporary and localized.

4.2. Operational Impact Assessment

4.2.1. Operational Impact Assessment Methodology

Operational emissions would result from the use of the following sources:

- Six (6) nominally rated 994 MMBtu per hour dual-fuel GE 7E.03 simple cycle CTs;
- Three (3) 9.9 MMBtu per hour gas-fired gas heaters; and,
- One (1) 299 bhp fire suppression diesel-engine water pump.

The maximum emission rates for the six (6) GE 7E.03 simple-cycle CTs were calculated based on a 40 CFR 60, Subpart TTTT, generation restriction, which equates to approximately 1,561 hours per CT-year. Actual anticipated emission rates are based on the average of historical data for natural gas combusting gas turbines between 2014 and 2023 and result in 984 hours per CT-year (USEIA). The three (3) gas-fired gas heaters were calculated assuming continual operation throughout the year, equating to 8,760 hours of operation on an annual basis. The one (1) fire suppression diesel-engine water pump's emissions were calculated based on the assumption that they would operate up to a maximum of 500 hours per year. Emissions for these emission units were calculated using manufacturer specification sheets, AP-42 emission factors (where manufacturer emission factors were not provided), and/or known fuel properties. To assess ambient air quality impacts, air emissions have been quantified. Detailed emission calculations for operational emission sources can be found in Appendix B.

4.2.2. Operational Impact Assessment Results

A summary of the operational emissions from stationary sources that are being permitted as part of the air permit application submittal to MDEQ is provided in Table 7, and actual operational emissions are provided in Table 8.

Table 7. Construction Emissions on Annual Basis and Comparison to County and State 2020 Annual Emission Inventories

Emission Source	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	VOC	HAPs	CO_2	CH_4	N_2O	CO_2e
Six (6) GE 7E.03 CTs	237.8	231.6	3	12.2	12.2	64.4	5.8	579,177.8	11.1	1.2	579,803.7
Three (3) Dew-Point Gas-Fired Gas Heaters	3.8	0.6	0	0.1	0.1	0.8	0	6,114.70	0.1	0	6,121.00
One (1) Fire-Suppression Diesel-Engine Water Pump	0.4	0.5	0	0	0	0	0	85.3	0	0	85.6
Worker Commute	1.1	0.1	0	3.4	0.4	0	0	109.6	0	0	109.85
Total	**243.1**	**232.8**	**3.0**	**15.7**	**12.7**	**65.2**	**5.8**	**585,487.4**	**11.2**	**1.2**	**586,120.2**
Lowndes County	17,273	8,140	1,007	10,037	2,599	21,736.00	2,619	4,700,831	1,904	28	4,756,816
State of Mississippi	737,431	138,760	11,370	412,475	90,986	1,555,400	133,240	68,351,856	73,774	5,233	71,755,536
Project Annual Operation Emissions Percent of Lowndes County	1.41%	2.86%	0.3%	0.16%	0.49%	0.3%	0.22%	12.45%	0.59%	4.29%	12.32%
Project Annual Operation Emissions Percent of Mississippi	0.03%	0.17%	0.03%	0%	0.01%	0%	0%	0.86%	0.02%	0.02%	0.82%

Table 8. Predicted Actual Operational Emissions on an Annual Basis Based on EIA Capacity Factors (11.2%)

	Emissions, tpy										
Emission Source	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**HAPs**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Six (6) GE 7E.03 CTs	183.7	161.8	1.9	8.5	8.5	60.2	5.8	372,545.30	7.3	0.8	372,963.20
Three (3) Dew-Point Gas-Fired Gas Heaters	3.8	0.6	0	0.1	0.1	0.8	0	6,114.70	0.1	0	6,121.00
One (1) Fire-Suppression Diesel-Engine Water Pump	0.4	0.5	0	0	0	0	0	85.3	0	0	85.6
Worker Commute	1.1	0.1	0	3.4	0.4	0	0	109.6	0	0	109.85
Total	**189.0**	**163.0**	**1.9**	**12.0**	**9.0**	**61.0**	**5.8**	**378,854.9**	**7.4**	**0.8**	**379,279.7**
Lowndes County	17,273	8,140	1,007	10,037	2,599	21,736.00	2,619	4,700,831	1,904	28	4,756,816
State of Mississippi	737,431	138,760	11,370	412,475	90,986	1,555,400	133,240	68,351,856	73,774	5,233	71,755,536
Project Annual Operation Emissions Percent of Lowndes County	1.09%	2.00%	0.19%	0.12%	0.35%	0.28%	0.22%	8.06%	0.39%	2.86%	7.97%
Project Annual Operation Emissions Percent of Mississippi	0.03%	0.12%	0.02%	0.00%	0.01%	0.00%	0.00%	0.55%	0.01%	0.02%	0.53%

Note: CO_2, CH_4, N_2O, and CO2e are in metric tons. All other totals are in short tons.

As demonstrated in Tables 7 and 8, operational emissions would be expected to be a larger fraction of both the Lowndes County's and the State of Mississippi's annual emissions than construction emissions. Despite composing larger fractions of the county and state's emission totals, emissions from the operation of the Project would be minimized through regulatory compliance. By obtaining an air permit, the Project would be compliant with the Clean Air Act, which ensures that emissions from the Project would be regulated to protect public health and the environment, thereby ensuring air quality is not adversely affected.

Each combustion source is subject to a specific NSPS and would be required to meet emission limitations contained within the applicable subparts. Due to the applicability of NSPS Subpart IIII to the fire-suppression diesel-engine water pump, a pump with an engine that meets the NO_x emission limitations provided in this subpart would be selected. The engine would meet the EPAs Tier 3 Standards for Non-Road Engines and would use only ultra-low sulfur diesel. The simple-cycle dual-fuel CTs would be compliant with NSPS KKKK, which imposes limitations on NO_x and SO_2 emissions. Similarly, the simple-cycle compression turbines would be compliant with NSPS TTTT, which imposes limitations on emissions of CO_2 from the CTs.

All operational emission sources would be subject to a Best Available Control Technology (BACT) for these pollutants as a result, which would require for emissions of these pollutants to be controlled based on a review of control technologies that are currently available and that are technologically feasible. This would ensure that equipment is selected that is best able to mitigate the emissions of these pollutants when compared to older, higher emitting technologies, assuring that any air quality impacts are minimized. Each dual-fuel CT's NO_x emissions would be reduced through a dry low-NO_x combustion system while firing natural gas, which would be the primary fuel source, and water injection while firing ultra-low sulfur diesel. CO and VOC emissions would be controlled via good combustion practices. The exhaust stacks would be equipped with continuous emission monitoring systems. Pipeline quality natural gas with a maximum sulfur content of 2,000 grains per million standard cubic feet of gas would be used in the simple-cycle CTs and gas heaters, and ultra-low sulfur diesel fuel would be used in fire-suppression diesel-engine water pump during maintenance and during emergency use and in the CTs when the need for a quick response to a trigger vent is required, or if the need to recover to normal operating levels quickly and efficiently is required.

Because the increase in emissions associated with the Project would not contribute to an exceedance of NAAQS and because no AQRV impacts are expected, it is anticipated that the air quality impacts from the operation of the Project would be minor. In conjunction with construction emissions, it is expected that the project would have an overall minor level of impact to air quality.

4.3. Climate Change and Greenhouse Gases Impact Assessment

The climate change and GHG impact assessment calculates GHG emissions directly attributable to the Project's construction and operation, evaluates the net change in GHG emission brought about by the Project, and discusses the SC-GHG as it applies to the Project.

4.3.1. Direct Greenhouse Gas Emissions

Direct emissions calculations for the Project were divided into construction-related (those direct emissions that are expected to be temporary in nature) and operational-related (those direct emissions that are expected to occur throughout the operational lifetime of the Project). Direct, construction-related emissions include the following:

- Exhaust from on- and off-road construction vehicles and equipment;
- Exhaust from on-road construction worker commuter vehicles; and,
- Exhaust from on-road construction material and equipment delivery vehicles.

Similar to the impact assessment evaluated for non-GHG pollutants, the following assumptions were used to complete the GHG and climate impact analysis for the Project:

- Emissions from off-road construction equipment and vehicles; heavy-duty, on-road construction equipment; construction worker commuting; on-road construction equipment; and equipment delivery were estimated using EPA's MOVES3 emission factors for 2022.
- An estimated maximum number of 200 construction worker commuters are assumed to commute from Columbus, Mississippi (approximately 20 miles away, on average).
- Heavy-hauling trucks would be used to deliver materials and equipment from Columbus, Mississippi.
- Construction and operational emissions were estimated using published and agency-accepted emission factors, such as AP-42 emission factors (EPA 2023a) when appropriate, to estimate GHG emissions.
- It was assumed that construction activities would typically occur approximately 10 hours a day, 6 days a week, 52 weeks a year, for a total duration of 900 days.

Direct Emissions Associated with Project Construction

Construction activities would result in direct GHG emissions from equipment exhaust during construction and vehicle exhaust caused by travel to and from the Project area. Construction would take approximately 900 days (30 months). Table 9 presents the estimated total direct GHG emissions that would occur from construction (all 900 days). Construction of the Project would generate approximately 12,286 mt of CO_2e.

Table 9. Total Project Construction Emissions Summary (Metric Tons)

Emission Source	CO_2	CH_4	N_2O	CO_2e
Construction Equipment (Off-Road)	8,576.31	0.38	0.18	8,638
Worker Commute & Equipment/ Material Delivery (On-Road)	3,643.07	0.05	0.01	3,648
Total	**12,219.38**	**0.43**	**0.19**	**12,286**

Direct Emissions Associated with Project Operation and Maintenance

In addition to the stationary sources of air emissions described in Section 4.2.1, other Operation and Maintenance (O&M) activities would occur after completion of construction activities and throughout the life of the Project. These activities would include workers commuting to the location during operation, as well as the inspections by passenger truck for routine maintenance. It is expected that the site would be staffed by up to 15 employees.

GHG emissions would be generated from vehicles used for worker commuting and for maintenance activities, which would be much less compared to construction. The information provided in Tables 9 and 10 show the estimated maximum and predicted actual potential GHG emissions per year from typical O&M activities, as well as the GHG emissions from stationary operational sources described in Section 4.2.1. These emissions took into consideration the commute for workers and any potential routine maintenance emissions, such as emissions from maintenance vehicles.

Table 10. Project Maximum Operational Emissions (Metric Tons/Year)

Emission Source	CO_2	CH_4	N_2O	CO_2e
Six (6) GE 7E.03 CTs	579,177.80	11.1	1.2	579,803.70
Three (3) Dew-Point Gas-Fired Gas Heaters	6,114.70	0.1	0	6,121.00
One (1) Fire-Suppression Diesel-Engine Water Pump	85.3	0	0	85.6
Worker Commute	109.6	0	0	109.85
Total	**585,487.4**	**11.2**	**1.2**	**586,120.2**

Table 11. Project Predicted Actual Operational Emissions (Metric Tons/Year)

Emission Source	CO_2	CH_4	N_2O	CO_2e
Six (6) GE 7E.03 CTs	372,545.30	7.3	0.8	372,963.20
Three (3) Dew-Point Gas-Fired Gas Heaters	6,114.70	0.1	0	6,121.00
One (1) Fire-Suppression Diesel-Engine Water Pump	85.3	0	0	85.6
Worker Commute	109.6	0	0	109.85
Total	**378,854.9**	**7.4**	**0.8**	**379,279.7**

Direct Emissions Associated with Project Decommissioning

During decommissioning, direct GHG emissions would be less than or equal to emissions that are emitted during construction; therefore, impacts to GHGs and climate change from decommissioning would be less than or equal to the impacts to GHGs and climate change due to construction.

4.3.2. Net Greenhouse Gas Emissions

In addition to direct GHG emissions, the CEQ's January 2023 Interim NEPA GHG Emissions guidance states that agencies should quantify a proposed action's net GHG emissions relative to baseline (CEQ 2023). That is, agencies should consider whether the implementation of an action is likely to result in an increase or a decrease in global GHG emissions by considering direct emissions, indirect emissions, and any gross emissions reductions brought about by the proposed action.

TVA's 2019 IRP demonstrates that TVA's system-wide approach to transmission and generation has already brought about a decrease in GHG emission intensity and will continue to bring about an overall reduction in GHG emissions while maintaining grid reliability (TVA 2019a). One component of this plan is the construction of high efficiency "peaking capacity" such as the proposed Project. The addition of these assets enables the integration of renewable generation while (a) maintaining grid stability and (b) putting downward pressure on the demand for other, less efficient, peaking facilities. Thus, while Project construction and operation are associated with direct GHG emissions, the net effect of the Project will be to reduce TVA's system-wide GHG emissions by enabling the integration of renewable generation and by reducing the frequency with which other, more carbon intense, peaking units are dispatched.

As described in TVA's 2019 IRP, TVA has one of the largest, most diverse, and cleanest energy-generating systems in the nation. For example, in fiscal year 2022 52 percent of TVA's electricity was generated from carbon-free sources, such as nuclear power and renewable resources including hydropower (TVA 2022). TVA continues to invest in assets to reduce reliance on coal, modernize the transmission system, and add new renewable energy resources to ensure safe, reliable, and cleaner energy. With the implementation of the IRP Recommendations, as well as the TVA Strategic Intent and Guiding Principles (TVA 2021), TVA envisions an average of 70 percent reduction in carbon emissions by 2030, and up to 80 percent by 2035, from 2005 levels. Thus, while the 2019 IRP does not estimate the net change in GHG emissions attributable to specific resources in the TVA system, it does demonstrate that the resources are being managed in a manner that, from a system-wide perspective, contributes to a net reduction in the amount of GHG being released while TVA meets the demand of its electricity customers.

4.3.3. Monetizing the Project-Related Change in Greenhouse Gas Emissions

On January 20, 2021, President Joe Biden issued Executive Order (EO) 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis (*Federal Register* 86(14):7037–7043)) and established the Interagency Working Group (IWG) on the Social Cost of Greenhouse Gases.

Consistent with EO 13990, the CEQ rescinded its draft 2019 *National Environmental Policy Act Guidance on Considering Greenhouse Gas Emissions* (CEQ 2021) and has begun to review (with the purpose of updating) its *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews* issued on August 5, 2016 (2016 GHG Guidance) (CEQ 2016). On January 9, 2023, the CEQ issued updated interim guidance to assist agencies in analyzing GHG and climate change impacts (CEQ 2023) to include recommending that NEPA documents (a) consider both direct and net and net changes in GHG emission brought about by a Project and (b) report societies' estimated willingness-to-pay for a Project-related change in GHG emissions as a way of contextualizing those changes.

Monetization Methods and Assumptions

The process of estimating societies' willingness-to-pay is commonly called "monetization" and it relies extensively on the SC-GHG concept, which is intended to indicate the economic losses that result from emitting one extra ton of GHGs into the atmosphere at a specific point in time. The SC-GHG is estimated using a series of 4 relationships: (1) how will a small change in GHG emissions change atmospheric GHG concentrations, (2) how will the change in atmospheric GHG concentrations change climate, (3) how will the change in climate affect humans, and (4) how much are humans willing to pay to avoid those effects.

- When a project is expected to increase global GHG emissions, multiplying the expected increase by the SC-GHG is a measure of the cost imposed on society by the project-related increase in GHG emissions.
- When a project is expected to reduce global GHG emissions, multiplying the expected reduction by the SC-GHG is a measure of the benefit society receives because of the GHG emissions reduction.

In February 2021, the IWG on the Social Cost of Greenhouse Gases published *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990* (IWG on Social Cost of Greenhouse Gases 2021) which reports current estimates of the economic losses or gains that result from changing, by one ton, the amount of GHGs in the atmosphere at a specific points in time. Thus, IWG on Social Cost of Greenhouse Gases (2021) is used as the source of SC-GHG estimates.

Because climate change is driven by the atmospheric concentrations of GHGs, the social cost or benefit of any Project-related change in GHG emissions should be calculated as the product of (a) the net change in GHG emissions brought about by a Project and (b) SC-GHG.

Monetization Results

The environmental impact statement (EIS) prepared for the 2019 IRP demonstrates that TVA's system-wide approach to transmission and generation will bring about an overall reduction in GHG emissions while maintaining grid reliability (TVA 2019b). However, it does not predict the change in GHG emissions associated with each element of the IRP.

Given the robust analysis embedded in TVA (TVA 2019a) and further noting that there is no established threshold for identifying social benefits as significant for NEPA purposes, this review notes that the Project would bring about a net decrease in TVA's GHG emissions by facilitating the integration of renewable generation, and so impart a GHG-related benefit to society. However, the monetary value of that benefit is not estimated.

Tables 12 and 13 report the results obtained by multiplying the Project's direct emissions by the temporally relevant SC-GHG. However, it is noted that when the Project's direct and indirect changes are considered in combination, the Project is expected to reduce global GHG emissions. Therefore, the numbers in Tables 12 and 13 are not representative of the full and actual impacts of the project.

Table 12. Results Obtained by Multiplying the Proposed Project's Maximum Direct Lifetime Emissions by the SC-GHG

Social Cost Metric	Average Value, 5% Discount Rate	Average Value, 3% Discount Rate	Average Value, 2.5% Discount Rate
SC-CO_2	$177,733,589	$707,612,544	$1,081,331,821
SC-CH_4	$172,216	$464,362	$632,961
SC-N_2O	$150,392	$555,636	$844,819
Total	**$178,056,197**	**$708,632,541**	**$1,082,809,601**

Note:

The SC-GHG represents an estimated present value of future market and nonmarket costs associated with CO2, CH4, and N2O emissions. Values recommended for SC-GHG have fluctuated over time and varied from Administration to Administration, demonstrating the uncertainty in this area. In 2021, the IWG published interim estimates of the SC-CO_2, SC-CH_4, and SC-N_2O. Select estimates are published in the *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990* (IWG on Social Cost of Greenhouse Gases 2021), and the complete set of annual estimates are available on the U.S. Office of Management and Budget's website.

The IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these biophysical changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the calculation is the discount rate, which is used to estimate the present value of the costs and benefits associated with a stream of future events. A higher discount rate implies that future benefits or costs are relatively less valuable than benefits or costs occurring In the present (i.e., future benefits or costs are a less important factor in present-day decisions). The current set of interim estimates of SC-GHG have been developed using three different annual discount rates: 2.5%, 3%, and 5% (IWG on Social Cost of Greenhouse Gases 2021).

As expected with such a complex model, multiple sources of uncertainty are inherent in the SC-GHG estimates. Sources of uncertainty include the biophysical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG on Social Cost of Greenhouse Gases 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

The IWG currently recommends reporting four SC-GHG estimates. Three of the estimates correspond to the differing discount rates (2.5%, 3%, and 5%). The estimates in this table follow the IWG recommendations.

The numbers in Table 3.2-1 assume development would start in 2025 and end-use emissions would be complete after an operational phase of 30 years. Totals may not sum exactly due to rounding.

Table 13. Results Obtained by Multiplying the Proposed Project's Predicted Actual Direct Lifetime Emissions by the SC-GHG

Social Cost Metric	Average Value, 5% Discount Rate	Average Value, 3% Discount Rate	Average Value, 2.5% Discount Rate
SC-CO_2	$131,811,558	$533,239,659	$817,844,208
SC-CH_4	$130,078	$357,581	$489,494
SC-N_2O	$114,266	$428,965	$654,666
Total	**$132,055,902**	**$534,026,205**	**$818,988,368**

Note:

The SC-GHG represents an estimated present value of future market and nonmarket costs associated with CO2, CH4, and N2O emissions. Values recommended for SC-GHG have fluctuated over time and varied from Administration to Administration, demonstrating the uncertainty in this area. In 2021, the IWG published interim estimates of the SC-CO_2, SC-CH_4, and SC-N_2O. Select estimates are published in the *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990* (IWG on Social Cost of Greenhouse Gases 2021), and the complete set of annual estimates are available on the U.S. Office of Management and Budget's website.

The IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these biophysical changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the calculation is the discount rate, which is used to estimate the present value of the costs and benefits associated with a stream of future events. A higher discount rate implies that future benefits or costs are relatively less valuable than benefits or costs occurring In the present (i.e., future benefits or costs are a less important factor in present-day decisions). The current set of interim estimates of SC-GHG have been developed using three different annual discount rates: 2.5%, 3%, and 5% (IWG on Social Cost of Greenhouse Gases 2021).

As expected with such a complex model, multiple sources of uncertainty are inherent in the SC-GHG estimates. Sources of uncertainty include the biophysical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG on Social Cost of Greenhouse Gases 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

The IWG currently recommends reporting four SC-GHG estimates. Three of the estimates correspond to the differing discount rates (2.5%, 3%, and 5%). The estimates in this table follow the IWG recommendations.

The numbers in Table 3.2-2 assume development would start in 2025 and end-use emissions would be complete after an operational phase of 30 years. Totals may not sum exactly due to rounding.

4.3.4. Climate Change and Greenhouse Gases Impact Assessment: Summary

Climate change is driven by atmospheric concentrations of GHGs. Therefore, when calculating the impacts a project will have on climate change, the analysis is correctly based on the net change in GHG emissions brought about by the Project. The net effect of the Project will be to reduce TVA's system-wide GHG emissions by enabling the integration of renewable generation into the system and by reducing the frequency with which other, more carbon intense, peaking units are dispatched.

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Appendix A

Construction Emission Calculation

New Caledonia Gas Plant

Table 1: Construction Emissions Summary

Total Project Construction Emissions Summary	Emissions, tpy										Emissions, mtpy
Construction Emission Source	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**HAPs**	**CH4**	**N20**	**CO2**	**CO_2e**
Construction Equipment (Off-Road)	97.42	36.82	0.03	2.42	2.73	5.63	2.21	0.42	0.19	9,453.75	9,521.94
Worker Commute & Equipment/ Material Delivery (On-Road)	34.84	3.16	0.03	0.10	0.09	0.13	0.02	0.05	0.01	4,015.80	4,021
Fugitive Dust From Construction Operations	-	-	-	67.57	6.76	-	-	-	-	-	-
Fugitive Dust from Paved and Unpaved Roads	-	-	-	15.65	1.56			-	-	-	
Total:	**132.26**	**39.98**	**0.06**	**85.73**	**11.14**	**5.76**	**2.23**	**0.48**	**0.21**	**13,469.55**	**13,543.25**

Annual Construction Emissions Summary	Emissions, tpy										Emissions, mtpy
Construction Emission Source	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**HAPs**	**CH4**	**N20**	**CO2**	**CO_2e**
Construction Equipment (Off-Road)	51.16	19.34	0.02	1.27	1.43	2.96	1.16	0.22	0.10	4,964.92	5,000.73
Worker Commute & Equipment/ Material Delivery (On-Road)	18.30	1.66	0.01	0.05	0.05	0.07	0.01	0.03	0.01	2,109.02	2,111.91
Fugitive Dust From Construction Operations	-	-	-	35.49	3.55	-	-	-	-	-	-
Fugitive Dust from Paved and Unpaved Roads	-	-	-	8.22	0.82	-	-	-	-	-	-
Total:	**69.46**	**21.00**	**0.03**	**36.80**	**5.03**	**3.03**	**1.17**	**0.25**	**0.11**	**7,073.94**	**7,112.64**

Table 2: Construction Equipment Emission Factors

Diesel Equipment

Equipment	CO	NO_X	SO2	PM / PM_{10}	$PM_{2.5}$	ROG / VOC	CH_4	N_2O	CO_2	HAP's:
Pavers	0.0476	0.1635	0.0002	0.0083	0.0081	0.0075	0.0007	7.51E-07	89.0506	
Tampers/Rammers	0.0104	0.0171	0.0000	0.0011	0.0010	0.0033	0.0003	2.77E-07	2.3411	
Plate Compactors	0.0161	0.0294	0.0000	0.0017	0.0017	0.0048	0.0004	4.11E-07	4.2016	
Rollers	0.0507	0.1534	0.0002	0.0084	0.0081	0.0077	0.0007	7.28E-07	67.1494	
Paving Equipment	0.0478	0.1340	0.0001	0.0080	0.0077	0.0091	0.0008	7.72E-07	50.3476	
Surfacing Equipment	0.1296	0.3401	0.0002	0.0179	0.0173	0.0199	0.0012	1.18E-06	79.5533	
Trenchers	0.0647	0.2120	0.0002	0.0092	0.0089	0.0104	0.0009	9.32E-07	56.9926	
Bore/Drill Rigs	0.1391	0.5137	0.0003	0.0256	0.0249	0.0353	0.0014	1.37E-06	89.8302	
Concrete/Industrial Saws	0.0451	0.1422	0.0001	0.0063	0.0061	0.0076	0.0007	7.07E-07	36.5809	
Cement & Mortar Mixers	0.0447	0.1078	0.0001	0.0072	0.0069	0.0112	0.0005	4.86E-07	16.5579	
Cranes	0.0529	0.2149	0.0003	0.0095	0.0092	0.0118	0.0009	9.03E-07	116.7109	
Rough Terrain Forklift	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.0000	
Rubber Tire Loaders	0.1125	0.3613	0.0005	0.0188	0.0182	0.0182	0.0013	1.34E-06	170.3300	
Tractors/Loaders/Backhoes	0.0912	0.1193	0.0001	0.0149	0.0145	0.0195	0.0009	8.77E-07	28.7623	
Skid Steer Loaders	0.0879	0.1021	0.0001	0.0138	0.0134	0.0186	0.0006	6.02E-07	17.5865	
Dumpers/Tenders	0.0546	0.0630	0.0000	0.0083	0.0081	0.0127	0.0004	4.27E-07	10.4492	
Other Construction Equipment	0.2955	0.7306	0.0007	0.0410	0.0398	0.0417	0.0024	2.40E-06	229.7011	
Forklifts	0.0149	0.1326	0.0002	0.0023	0.0022	0.0028	0.0004	3.81E-07	70.0867	
Other General Industrial Eqp	0.0386	0.1395	0.0002	0.0074	0.0071	0.0076	0.0006	6.41E-07	60.3414	
Other Material Handling Eqp	0.1050	0.1794	0.0001	0.0178	0.0173	0.0273	0.0012	1.16E-06	37.2862	
Terminal Tractors	0.0214	0.0883	0.0003	0.0045	0.0043	0.0040	0.0003	3.41E-07	115.9384	
Excavators	0.0378	0.1289	0.0003	0.0074	0.0072	0.0064	0.0006	5.72E-07	120.6487	
Graders	0.0436	0.1258	0.0004	0.0090	0.0088	0.0075	0.0006	6.39E-07	142.9567	
Off-highway Trucks	0.1717	1.5658	0.0015	0.0322	0.0312	0.0407	0.0035	3.51E-06	546.5568	
Rough Terrain Forklifts	0.0736	0.1840	0.0002	0.0123	0.0119	0.0090	0.0007	7.31E-07	71.7104	
Crawler Tractor/Dozers	0.0945	0.3135	0.0005	0.0158	0.0153	0.0143	0.0012	1.17E-06	182.4246	
Pumps	0.0628	0.1612	0.0001	0.0107	0.0104	0.0148	0.0008	7.86E-07	28.3976	
Air Compressors	0.0459	0.1564	0.0001	0.0074	0.0072	0.0079	0.0007	6.85E-07	45.0877	
Other Construction Equipment	0.2955	0.7306	0.0007	0.0410	0.0398	0.0417	0.0024	2.40E-06	229.7011	
Off-Highway Tractors	0.4094	1.6546	0.0015	0.0581	0.0563	0.0663	0.0046	4.59E-06	506.0295	
Welders	0.0634	0.0803	0.0000	0.0092	0.0090	0.0132	0.0006	6.24E-07	14.1511	
Generator Sets	0.0573	0.1520	0.0001	0.0096	0.0093	0.0137	0.0007	0.0269	26.7107	

Equipment	3-Butadier	Trimethylp	cetaldehyd	Acrolein	nic Compo	Benzene	hromium 6	thyl Benzer	rmaldehyd	Hexane	nese Com	ury Compo	phthalene	thalene pa	kel Compo	pionaldehy	Styrene	Toluene	Xylene
Pavers	0.0000	0.0001	0.0007	0.0001	0.0000	0.0004	0.0000	0.0000	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001
Tampers/Rammers	0.0000	0.0000	0.0003	0.0001	0.0000	0.0002	0.0000	0.0000	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000
Plate Compactors	0.0000	0.0000	0.0005	0.0001	0.0000	0.0003	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0002	0.0001
Rollers	0.0000	0.0001	0.0008	0.0001	0.0000	0.0004	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001
Paving Equipment	0.0000	0.0001	0.0009	0.0002	0.0000	0.0004	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001
Surfacing Equipment	0.0000	0.0002	0.0018	0.0004	0.0000	0.0008	0.0000	0.0001	0.0051	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0005	0.0000	0.0006	0.0003
Trenchers	0.0000	0.0001	0.0010	0.0002	0.0000	0.0005	0.0000	0.0000	0.0028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0003	0.0001
Bore/Drill Rigs	0.0001	0.0003	0.0030	0.0008	0.0000	0.0011	0.0000	0.0002	0.0084	0.0001	0.0000	0.0000	0.0001	0.0000	0.0000	0.0009	0.0000	0.0008	0.0006
Concrete/Industrial Saws	0.0000	0.0001	0.0007	0.0001	0.0000	0.0004	0.0000	0.0000	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001
Cement & Mortar Mixers	0.0000	0.0001	0.0010	0.0002	0.0000	0.0004	0.0000	0.0001	0.0028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0003	0.0002
Cranes	0.0000	0.0001	0.0011	0.0002	0.0000	0.0005	0.0000	0.0001	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0004	0.0002
Rough Terrain Forklift	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Rubber Tire Loaders	0.0000	0.0001	0.0017	0.0003	0.0000	0.0008	0.0000	0.0001	0.0047	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0004	0.0000	0.0006	0.0003
Tractors/Loaders/Backhoes	0.0000	0.0001	0.0017	0.0004	0.0000	0.0007	0.0000	0.0001	0.0048	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0005	0.0000	0.0005	0.0003
Skid Steer Loaders	0.0000	0.0001	0.0015	0.0004	0.0000	0.0005	0.0000	0.0001	0.0043	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0005	0.0000	0.0004	0.0003
Dumpers/Tenders	0.0000	0.0001	0.0011	0.0003	0.0000	0.0004	0.0000	0.0001	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0003	0.0002
Other Construction Equipment	0.0001	0.0003	0.0038	0.0008	0.0000	0.0016	0.0000	0.0002	0.0105	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0009	0.0000	0.0012	0.0007
Forklifts	0.0000	0.0000	0.0003	0.0000	0.0000	0.0001	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001
Other General Industrial Eqp	0.0000	0.0001	0.0007	0.0001	0.0000	0.0004	0.0000	0.0000	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001
Other Material Handling Eqp	0.0001	0.0002	0.0024	0.0006	0.0000	0.0009	0.0000	0.0002	0.0066	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0006	0.0000	0.0007	0.0005
Terminal Tractors	0.0000	0.0000	0.0004	0.0001	0.0000	0.0002	0.0000	0.0000	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001
Excavators	0.0000	0.0000	0.0006	0.0001	0.0000	0.0003	0.0000	0.0000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0002	0.0001
Graders	0.0000	0.0001	0.0007	0.0001	0.0000	0.0003	0.0000	0.0000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0003	0.0002
Off-highway Trucks	0.0001	0.0003	0.0041	0.0007	0.0000	0.0021	0.0000	0.0002	0.0113	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0009	0.0000	0.0015	0.0006
Rough Terrain Forklifts	0.0000	0.0001	0.0009	0.0002	0.0000	0.0004	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001
Crawler Tractor/Dozers	0.0000	0.0001	0.0014	0.0002	0.0000	0.0007	0.0000	0.0001	0.0038	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0003	0.0000	0.0005	0.0003
Pumps	0.0000	0.0001	0.0013	0.0003	0.0000	0.0006	0.0000	0.0001	0.0037	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0003	0.0000	0.0004	0.0002
Air Compressors	0.0000	0.0001	0.0008	0.0001	0.0000	0.0004	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001
Other Construction Equipment	0.0001	0.0003	0.0038	0.0008	0.0000	0.0016	0.0000	0.0002	0.0105	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0009	0.0000	0.0012	0.0007
Off-Highway Tractors	0.0001	0.0005	0.0063	0.0012	0.0000	0.0029	0.0000	0.0003	0.0175	0.0001	0.0000	0.0000	0.0003	0.0000	0.0000	0.0016	0.0000	0.0021	0.0010
Welders	0.0000	0.0001	0.0012	0.0003	0.0000	0.0005	0.0000	0.0001	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0003	0.0002
Generator Sets	0.0000	0.0001	0.0012	0.0003	0.0000	0.0005	0.0000	0.0001	0.0035	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0003	0.0000	0.0004	0.0002

Note: Original data in g/mi converted to lb/mi

Gasoline Equipment

Equipment	CO	NO_X	SO_X	PM / PM_{10}	$PM_{2.5}$	ROG / VOC	CH_4	N_2O	CO_2	HAP's:
Pavers	4.0160	0.0499	0.0001	0.0025	0.0023	0.0965	0.0125	1.25E-05	20.3623	
Tampers/Rammers	1.1593	0.0070	0.0000	0.0421	0.0387	0.2783	0.0051	5.17E-06	3.1759	
Plate Compactors	1.3239	0.0172	0.0000	0.0033	0.0031	0.0563	0.0056	5.65E-06	7.1032	
Rollers	4.0895	0.0488	0.0001	0.0024	0.0022	0.0959	0.0128	1.29E-05	20.0522	
Paving Equipment	2.5925	0.0291	0.0001	0.0038	0.0035	0.0824	0.0088	8.86E-06	12.0312	
Surfacing Equipment	2.4074	0.0270	0.0001	0.0017	0.0015	0.0641	0.0081	8.12E-06	10.9446	
Trenchers	3.2368	0.0433	0.0001	0.0026	0.0024	0.0858	0.0111	1.12E-05	17.4581	
Bore/Drill Rigs	1.0176	0.0250	0.0000	0.0014	0.0013	0.0413	0.0049	4.89E-06	6.7719	
Concrete/Industrial Saws	2.7835	0.0250	0.0001	0.0438	0.0403	0.3152	0.0109	1.09E-05	10.2925	
Cement & Mortar Mixers	2.2739	0.0257	0.0001	0.0015	0.0014	0.0727	0.0074	7.45E-06	10.6137	
Cranes	2.4194	0.1408	0.0002	0.0037	0.0034	0.0886	0.0104	1.05E-05	38.0847	
Rough Terrain Forklift	1.5107	0.1643	0.0004	0.0062	0.0057	0.0749	0.0073	7.30E-06	63.2452	
Rubber Tire Loaders	1.1828	0.1650	0.0004	0.0077	0.0071	0.0690	0.0057	5.69E-06	77.7576	
Tractors/Loaders/Backhoes	4.9115	0.0514	0.0001	0.0025	0.0023	0.1084	0.0148	1.49E-05	21.1726	
Skid Steer Loaders	4.2447	0.1014	0.0002	0.0033	0.0030	0.1103	0.0138	1.39E-05	32.3712	
Dumpers/Tenders	2.0943	0.0243	0.0001	0.0011	0.0010	0.0640	0.0064	6.43E-06	9.1725	
Other Construction Equipment	3.7372	0.4260	0.0005	0.0088	0.0081	0.1927	0.0226	2.28E-05	92.8651	
Forklifts	0.5121	0.0717	0.0002	0.0033	0.0031	0.0300	0.0024	2.45E-06	33.9340	
Other General Industrial Eqp	1.7012	0.0243	0.0001	0.0022	0.0020	0.0605	0.0074	7.42E-06	9.4205	
Other Material Handling Eqp	3.7095	0.0946	0.0002	0.0034	0.0031	0.0978	0.0120	1.21E-05	33.4725	
Terminal Tractors	1.7548	0.2437	0.0006	0.0115	0.0105	0.1001	0.0085	8.51E-06	114.5545	
Excavators	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.0000	
Graders	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.0000	
Off-highway Trucks	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.0000	
Rough Terrain Forklifts	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.0000	
Pumps	1.5932	0.0221	0.0000	0.0093	0.0086	0.1099	0.0072	7.21E-06	8.6293	
Air Compressors	2.3539	0.0352	0.0001	0.0023	0.0021	0.0732	0.0086	8.67E-06	14.3117	
Other Construction Equipment	3.7372	0.4260	0.0005	0.0088	0.0081	0.1927	0.0226	2.28E-05	92.8651	
Crawler Tractor/Dozers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.0000	
Welders	5.3693	0.0623	0.0001	0.0030	0.0028	0.1393	0.0166	1.67E-05	25.4992	
Off-Highway Tractors	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.0000	

Equipment	3-Butadien	rimethylpe	cetaldehyd	Acrolein	nic Compo	Benzene	hromium 6	thyl Benzen	rmaldehyd	Hexane	nese Comp	ury Compo	phthalene	thalene pa	el Compou	pionaldehy	Styrene	Toluene	Xylene
Pavers	0.0009	0.0050	0.0007	0.0000	0.0000	0.0041	0.0000	0.0016	0.0013	0.0010	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0005	0.0090	0.0066
Tampers/Rammers	0.0007	0.0349	0.0009	0.0001	0.0000	0.0037	0.0000	0.0061	0.0013	0.0022	0.0000	0.0000	0.0006	0.0000	0.0000	0.0001	0.0005	0.0224	0.0201
Plate Compactors	0.0004	0.0035	0.0003	0.0000	0.0000	0.0021	0.0000	0.0010	0.0006	0.0006	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0002	0.0053	0.0038
Rollers	0.0009	0.0050	0.0007	0.0000	0.0000	0.0041	0.0000	0.0016	0.0013	0.0009	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0005	0.0087	0.0066
Paving Equipment	0.0007	0.0049	0.0005	0.0000	0.0000	0.0031	0.0000	0.0014	0.0009	0.0009	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0004	0.0078	0.0056
Surfacing Equipment	0.0006	0.0033	0.0004	0.0000	0.0000	0.0027	0.0000	0.0011	0.0008	0.0007	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0003	0.0060	0.0044
Trenchers	0.0008	0.0044	0.0006	0.0000	0.0000	0.0037	0.0000	0.0014	0.0012	0.0009	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0005	0.0080	0.0059
Bore/Drill Rigs	0.0004	0.0021	0.0003	0.0000	0.0000	0.0017	0.0000	0.0007	0.0005	0.0005	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0002	0.0040	0.0028
Concrete/Industrial Saws	0.0011	0.0371	0.0012	0.0001	0.0000	0.0054	0.0000	0.0068	0.0019	0.0025	0.0000	0.0000	0.0006	0.0000	0.0000	0.0002	0.0007	0.0255	0.0226
Cement & Mortar Mixers	0.0005	0.0034	0.0004	0.0000	0.0000	0.0029	0.0000	0.0012	0.0008	0.0011	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0003	0.0074	0.0048
Cranes	0.0008	0.0044	0.0006	0.0000	0.0000	0.0037	0.0000	0.0015	0.0011	0.0010	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0004	0.0087	0.0060
Rough Terrain Forklift	0.0005	0.0035	0.0004	0.0000	0.0000	0.0030	0.0000	0.0013	0.0008	0.0010	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0003	0.0079	0.0051
Rubber Tire Loaders	0.0004	0.0031	0.0003	0.0000	0.0000	0.0027	0.0000	0.0012	0.0006	0.0011	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0002	0.0077	0.0046
Tractors/Loaders/Backhoes	0.0011	0.0057	0.0008	0.0000	0.0000	0.0047	0.0000	0.0018	0.0015	0.0010	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0006	0.0098	0.0074
Skid Steer Loaders	0.0010	0.0056	0.0007	0.0000	0.0000	0.0047	0.0000	0.0018	0.0014	0.0012	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0006	0.0104	0.0075
Dumpers/Tenders	0.0005	0.0030	0.0003	0.0000	0.0000	0.0025	0.0000	0.0010	0.0007	0.0010	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0003	0.0066	0.0042
Other Construction Equipment	0.0017	0.0096	0.0012	0.0001	0.0000	0.0080	0.0000	0.0032	0.0024	0.0022	0.0000	0.0000	0.0003	0.0000	0.0000	0.0001	0.0010	0.0188	0.0131
Forklifts	0.0002	0.0013	0.0001	0.0000	0.0000	0.0012	0.0000	0.0005	0.0003	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0033	0.0020
Other General Industrial Eqp	0.0005	0.0031	0.0004	0.0000	0.0000	0.0025	0.0000	0.0010	0.0008	0.0007	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0003	0.0058	0.0041
Other Material Handling Eqp	0.0009	0.0050	0.0006	0.0000	0.0000	0.0041	0.0000	0.0016	0.0012	0.0011	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0005	0.0093	0.0066
Terminal Tractors	0.0006	0.0045	0.0004	0.0000	0.0000	0.0039	0.0000	0.0017	0.0009	0.0015	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0004	0.0111	0.0067
Excavators	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Graders	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-highway Trucks	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Rough Terrain Forklifts	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pumps	0.0006	0.0083	0.0005	0.0000	0.0000	0.0033	0.0000	0.0021	0.0009	0.0013	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0003	0.0107	0.0076
Air Compressors	0.0006	0.0037	0.0005	0.0000	0.0000	0.0030	0.0000	0.0012	0.0009	0.0008	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0004	0.0071	0.0050
Other Construction Equipment	0.0017	0.0096	0.0012	0.0001	0.0000	0.0080	0.0000	0.0032	0.0024	0.0022	0.0000	0.0000	0.0003	0.0000	0.0000	0.0001	0.0010	0.0188	0.0131
Crawler Tractor/Dozers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Welders	0.0012	0.0070	0.0009	0.0000	0.0000	0.0058	0.0000	0.0023	0.0017	0.0016	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0007	0.0135	0.0095
Off-Highway Tractors	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: Original data in g/mi converted to lb/mi

New Caledonia Gas Plant

Table 3: Construction Equipment Emissions (Off-Road)

Equipment							Emissions (tons)										
Equipment Type	**Mapped MOVES Equipment Category**	**Fuel Type**	**Quantity**	**Hours per Day**	**Days of Use**	**Total Cumulative Hours of Use**	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**HAPs**	**CH_4**	**N_2O**	**CO_2**	**CO_2e**
Cranes	Cranes	Diesel	1	10	900	9,000	0.2381	0.9669	0.0015	0.0426	0.4130	0.0533	0.0274	0.0040	0.0018	525.1900	525.85
Diesel Generators	Generator Sets	Diesel	3	10	900	27,000	0.7734	2.0516	0.0012	0.1296	0.1257	0.1852	0.0916	0.0100	0.0046	360.59	362.21
Bulldozers	Crawler Tractor/Dozers	Diesel	2	10	900	18,000	0.8504	2.8212	0.0046	0.1423	0.1380	0.1287	0.0673	0.0105	0.0048	1641.82	1,643.51
Grader	Graders	Diesel	1	10	900	9,000	0.1962	0.5662	0.0018	0.0406	0.0394	0.3380	0.0173	0.0029	0.0013	643.31	643.77
Backhoe	Tractors/Loaders/Backhoes	Diesel	4	10	900	36,000	1.6424	2.1481	0.0016	0.2682	0.2602	0.3504	0.1687	0.0157	0.0072	517.72	520.25
Front-End Loader	Tractors/Loaders/Backhoes	Diesel	4	10	900	36,000	1.6424	2.1481	0.0016	0.2682	0.2602	0.3504	0.1687	0.0157	0.0072	517.72	520.25
Pickup Trucks	Other Material Handling Eqp	Gasoline	5	10	900	45,000	83.4644	2.1280	0.0042	0.0766	0.0705	2.2004	0.7026	0.2703	0.1233	753.13	796.63
Dump Trucks	Dumpers/Tenders	Diesel	4	10	900	36,000	0.9827	1.1340	0.0006	0.1502	0.1457	0.2294	0.1057	0.0077	0.0035	188.09	189.32
Mixer Trucks	Cement & Mortar Mixers	Diesel	2	10	900	18,000	0.4022	0.9705	0.0005	0.0644	0.0624	0.1012	0.0484	0.0043	0.0020	149.02	149.72
Drill Rigs	Bore/Drill Rigs	Diesel	2	24	900	43,200	3.0054	11.0959	0.0061	0.5534	0.5368	0.7633	0.3569	0.0295	0.0135	1940.33	1,945.07
Welders	Welders	Diesel	2	10	900	18,000	0.5706	0.7226	0.0004	0.0832	0.0807	0.1191	0.0570	0.0056	0.0026	127.36	128.26
Water Pump	Pumps	Diesel	10	10	900	90,000	2.8242	7.2550	0.0041	0.4823	0.4678	0.6653	0.3249	0.0352	0.0161	1277.89	1,283.55
Air Compressors	Air Compressors	Diesel	4	10	900	36,000	0.8265	2.8151	0.0024	0.1134	0.1294	0.1427	0.0753	0.0123	0.0056	811.58	813.55
						Total	***97.4189***	***36.8232***	***0.0306***	***2.4150***	***2.7298***	***5.6274***	***2.2118***	***0.4237***	***0.1933***	***9453.7500***	***9521.9400***

[1] Equipment list and quantity for each equipment type based on roster of equipment expected to be used for this project.

[2] Total hours for each piece of equipment = sumproduct (number of pieces of equipment for each month x hours per day x number of days used).

[3] Emissions were calculated based on emission factors derived from USEPA MOVES3 Model.

[4] N2O was not calculated using the MOVES 2014b NONROAD Model. In order to estimate N2O emissions, the g/hp hr factor for CH4 was multiplied by a ratio of 0.26 (g N2O/gal fuel) / 0.57 (g CH4/gal fuel). The g/gallon of fuel factors were sourced from diesel construction/mining equipment in the Greenhouse Gas Inventory Guidance document titled "Direct Emissions from Mobile Combustion Sources", January 2016.

[5] CO2e was calculated by summing the emissions for CO2, N2O, and CH4. N2O and CH4 were both multiplied by their relative global warming potential factor first. N2O has a global warming potential factor equivalent to 298 times that of CO 2, while CH4 has a global warming potential equivalent to 25 times CO2.

New Caledonia Gas Plant
Table 4: Construction Equipment Emissions (On-Road)

Total Project On-Road Emissions - Construction							Emission Factors (lb/mile)[2]										Emissions (tons)[3]										
Equipment Type	Fuel	Source Category	Total Mileage/ Round Trip	Number of Vehicles	Number of Round Trips/	Total Miles/ Year	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2	NO_X	HAPs	CO_2	N_2O	CH_4	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2	NO_X	HAPs	CO_2	N_2O	CH_4	CO_2e[4]
Commuter Passenger Truck	Gasoline	Passenger Truck	40	30	Vehicle[1]	7,200,000	1.09E-05	9.63E-06	1.75E-05	9.11E-03	5.76E-06	4.62E-04	5.08E-06	0.87	3.48E-06	1.07E-05	3.92E-02	3.47E-02	6.30E-02	3.28E+01	2.07E-02	1.66E+00	1.83E-02	3.13E+03	1.25E-02	3.85E-02	3.14E+03
Light Duty Construction	Gasoline	Passenger Truck	40	10	900	360,000	1.09E-05	9.63E-06	1.75E-05	9.11E-03	5.76E-06	4.62E-04	5.08E-06	0.87	3.48E-06	1.07E-05	1.96E-03	1.73E-03	3.15E-03	1.64E+00	1.04E-03	8.32E-02	9.14E-04	1.57E+02	6.26E-04	1.93E-03	1.57E+02
Heavy Duty Construction	Diesel	Combination Long Haul Truck	40	10	900	360,000	3.05E-04	2.81E-04	3.74E-04	2.25E-03	3.42E-05	7.83E-03	8.32E-06	4.04	4.01E-06	8.08E-05	5.49E-02	5.06E-02	6.73E-02	4.05E-01	6.16E-03	1.41E+00	1.50E-03	7.27E+02	7.22E-04	1.45E-02	7.28E+02
																Total:	**0.10**	**0.09**	**0.13**	**34.84**	**0.03**	**3.16**	**0.02**	**4015.80**	**0.01**	**0.05**	**4021.31**

Notes:
[1] This assumes that each vehicle makes one round trip to the site once each day. It is assumed workers will originate from the vicinity of the construction sites, no further than 20 miles.
[2] Emissions were calculated based on emission factors derived from national averages from USEPA MOVES3 Model.
[3] Emissions (ton/yr) = (Total Miles/Year x Emission Factor (lb/mile) / 2,000 (lb/ton)
[4] CO_2e was calculated by summing the emissions for CO_2, N_2O, and CH_4. N_2O and CH_4 were both multiplied by their relative global warming potential factor first. N_2O has a global warming potential factor equivalent to 298 times that of CO_2, while CH_4 has a global warming potential equivalent to 25 times CO_2 (IPCC AR5 100-year Golbal Warming Potential Values).

Total Project On-Road Emissions - Operaton							Emission Factors (lb/mile)[2]										Emissions (tons)[3]										
Equipment Type	Fuel	Source Category	Total Mileage/ Round Trip	Number of Vehicles	Number of Round Trips/	Total Miles/ Year	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2	NO_X	HAPs	CO_2	N_2O	CH_4	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2	NO_X	HAPs	CO_2	N_2O	CH_4	CO_2e[4]
Commuter Passenger Truck	Gasoline	Passenger Truck	40	20	900	720,000	1.09E-05	9.63E-06	1.75E-05	9.11E-03	5.76E-06	4.62E-04	5.08E-06	0.87	3.48E-06	1.07E-05	3.92E-03	3.47E-03	6.30E-03	3.28E+00	2.07E-03	1.66E-01	1.83E-03	3.13E+02	1.25E-03	3.85E-03	3.14E+02
																Total:	**0.00**	**0.00**	**0.01**	**3.28**	**0.00**	**0.17**	**0.00**	**313.20**	**0.00**	**0.00**	**313.67**

Notes:
[1] This assumes that each vehicle makes one round trip to the site once each day. It is assumed workers will originate from the vicinity of the construction sites, no further than 20 miles.
[2] Emissions were calculated based on emission factors derived from national averages from USEPA MOVES3 Model.
[3] Emissions (ton/yr) = (Total Miles/Year x Emission Factor (lb/mile) / 2,000 (lb/ton)
[4] CO_2e was calculated by summing the emissions for CO_2, N_2O, and CH_4. N_2O and CH_4 were both multiplied by their relative global warming potential factor first. N_2O has a global warming potential factor equivalent to 298 times that of CO_2, while CH_4 has a global warming potential equivalent to 25 times CO_2 (IPCC AR5 100-year Golbal Warming Potential Values).

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Table 5: Construction Fugitive Dust Emissions

Fugitive Dust From Construction Operations: General Construction and Cut/Fill Assumptions and Emission Factors

Parameter	Value	Source / Notes
Total Acres Affected During Construction	21.00	*Estimates that 1/3 of 63 acre site may be disturbed at any point during construction.*
General Construction PM_{10} Emission Factor, ton/acre-month	0.11	*WRAP Fugitive Dust Handbook, Table 3-2, "Level 1"*
Project Duration in Days	900	*Anticpated construction schedule*
Assumed Control Efficiency, %	61%	*WRAP Fugitive Dust Handbook, Table 3-7, for applying water at various intervals (3.2hr watering interval).*

Source: Based on WRAP Fugitive Dust Handbook, Table 3-2, "Recommended PM_{10} Emission Factors for Construction Operations," Level 1. http://www.wrapair.org/forums/dejf/fdh/content/final-handbook.pdf

Fugitive Dust Emissions From Construction Operations, in Tons - Full Project

Source	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	VOC	HAPs	CH_4	CO_2	CO_2e
General Construction	-	-	-	67.57	6.76	-	-	-	-	-
Total Fugitive Dust Emissions, tons	-	-	-	**67.57**	**6.76**	-	-	-	-	-

Fugitive Dust Emissions From Construction Operations, in Tons - Average Annual

Source	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	VOC	HAPs	CH_4	CO_2	CO_2e
General Construction	-	-	-	35.49	3.55	-	-	-	-	-
Total Fugitive Dust Emissions, tons	-	-	-	**35.49**	**3.55**	-	-	-	-	-

Note: $PM_{2.5}/PM_{10}$ ratio of 0.10 used from the WRAP Fugitive Dust Handbook, Section 3.3.1..

Example Calculation, General Construction: [Emission Factor, ton/acre-month] * [# of acres affected] * [# of months of construction/project] * [1 - Control Efficiency] = Tons of pollutant for duration of project

New Caledonia Gas Plant
Table 6: Fugitive Dust Emissions from Paved and Unpaved Roads Construction

Constants for Vehicles Traveling on Unpaved Surfaces at Industrial Sites

Constant	PM10	PM2.5
k (lb/VMT)	1.50	0.15
a	0.90	0.90
b	0.45	0.45

* Assumed equivalent to total suspended particulate.

Variables for Vehicles Traveling on Unpaved Surfaces at Industrial Sites

Parameter	Amount	Notes
Surface Material Silt Content (s), %	8.5	*Mean silt content for construction site; Table 13.2.2-1*
Average Vehicle Weight (W), tons:		
Pickup Truck	2	*Conservative estimate; light duty truck is ≤ 3,750 lbs*
Delivery Trucks	10	*Vehicle weights from www.epa.gov/otaq/standards/weights.htm*
Heavy-Heavy Duty Vehicles	20	*Vehicle weights from www.epa.gov/otaq/standards/weights.htm.*
Number of Days with Greater than 0.01" Precipitation (P)	30	*From AP-42, Section 13.2.2, Figure 13.2.2-1.*
Control Efficiency (CE)	55%	*From WRAP Fugitive Dust Handbook, Table 6-7 for watering twice a day*

Emission Factor for Fugitive Dust from Unpaved Roads, lb/VMT

Source	PM10	PM2.5
Unpaved Roads Emission Factors for Pickup Trucks	0.38	0.04
Unpaved Roads Emission Factors for Delivery Trucks	0.78	0.08
Unpaved Roads Emission Factors for Heavy-Heavy Duty Vehicles	1.07	0.11

Note: Emission factors determined using AP-42, Section 13.2.2, Unpaved Roads.

$$E = k\left(\frac{s}{12}\right)^a\left(\frac{W}{3}\right)^b\left(\frac{365-P}{365}\right)(1-C)$$

where k, a and b are empirical constants and:

E = size-specific emission factor (lb/VMT)

s = surface material silt content (%); Table 13.2.2-1

W = mean vehicle weight (tons)

P = number of days with at least 0.01 in of precipitation

C = control efficiency

VMT = vehicle mile traveled

Constants for Vehicles Traveling on Paved Surfaces

Constant	PM10	PM2.5
k (lb/VMT)	0.00220	0.00054

* Assumed equivalent to total suspended particulate.
Source: AP-42 Section 13.2.1 Table 13.2.1-1

Variables for Vehicles Traveling on Paved Surfaces

Parameter	Amount	Notes
Road Surface Silt Loading (sL) (g/m^2)	0.2	*The surface silt content was obtained from Table 13.2.1-3: Ubiquitous Silt Loading Default Values with Hot Spot Contributions from Anti-Skid*
Average Vehicle Weight (W), tons:		
Pickup Truck	2	*Conservative estimate; light duty truck is ≤ 3,750 lbs*
Delivery Trucks	10	*Vehicle weights from www.epa.gov/otaq/standards/weights.htm*
Heavy-Heavy Duty Vehicles	20	*Vehicle weights from www.epa.gov/otaq/standards/weights.htm.*
Number of Days with Greater than 0.01" Precipitation (P)	30	*From AP-42, Section 13.2.1, Figure 13.2.1-2.*
Number of Days in the Averaging Period (N)	365	*Annual averaging period*

Emission Factor for Fugitive Dust from Paved Roads, lb/VMT

Source	PM10	PM2.5
Paved Roads Emission Factors for Passenger Vehicles	1.01E-03	2.48E-04
Paved Roads Emission Factors for Delivery Vehicles	5.22E-03	2.48E-04
Paved Roads Emission Factors for Heavy-Heavy Duty Vehicles	1.06E-02	2.48E-04

Note: Emission factors determined using AP-42, Section 13.2.1, Paved Roads.

$$E_{ext} = [k(sL)^{0.91}\ x\ (W)^{1.02}]\ x\ \left(1 - \frac{P}{4N}\right)$$

E_{ext} = annual or other long-term average emission factor (lb/VMT)

k = particle size multiplier for particle size range and units of interest; Table 13.2.1-1

sL = road surface silt loading (g/m^2); Table 13.2.1-3

W = average weight (tons) of the vehicles traveling the road

P = number of days with at least 0.01 in of precipitation; Figure 13.2.1-2

N = number of days in the averaging period

Emission Calculations for Expansion Project Unpaved Roads

Type of Vehicle	Quantity Used Daily	Construction Duration	VMT/day Unpaved	VMT/day Paved	Emissions Unpaved (tons/year) PM10	Emissions Unpaved (tons/year) PM2.5	Emissions Unpaved (tons/year) PM10	Emissions Unpaved (tons/year) PM2.5	Emissions Total (tons/year) PM10	Emissions Total (tons/year) PM2.5
Passenger Vehicles	30	695	1.5	40	5.92	0.59	0.02	3.88E-03	5.93	0.60
Delivery Vehicles	10	695	1.5	40	4.07	0.41	0.03	1.29E-03	4.10	0.41
Heavy-Heavy Duty Vehicles	10	695	1.5	40	5.56	0.56	0.06	1.29E-03	5.62	0.56
Total	**-**	**-**	**-**		**15.55**	**1.55**	**0.10**	**0.01**	**15.65**	**1.56**

New Caledonia Gas Plant
Table 6: Fugitive Dust Emissions from Paved and Unpaved Roads Operation

Constants for Vehicles Traveling on Unpaved Surfaces at Industrial Sites

Constant	PM10	PM2.5
k (lb/VMT)	1.50	0.15
a	0.90	0.90
b	0.45	0.45

* Assumed equivalent to total suspended particulate.

Variables for Vehicles Traveling on Unpaved Surfaces at Industrial Sites

Parameter	Amount	Notes
Surface Material Silt Content (s), %	8.5	*Mean silt content for construction site; Table 13.2.2-1*
Average Vehicle Weight (W), tons:		
Pickup Truck	2	*Conservative estimate; light duty truck is ≤ 3,750 lbs*
Delivery Trucks	10	*Vehicle weights from www.epa.gov/otaq/standards/weights.htm*
Heavy-Heavy Duty Vehicles	20	*Vehicle weights from www.epa.gov/otaq/standards/weights.htm.*
Number of Days with Greater than 0.01" Precipitation (P)	30	*From AP-42, Section 13.2.2, Figure 13.2.2-1.*
Control Efficiency (CE)	55%	*From WRAP Fugitive Dust Handbook, Table 6-7 for watering twice a day*

Emission Factor for Fugitive Dust from Unpaved Roads, lb/VMT

Source	PM10	PM2.5
Unpaved Roads Emission Factors for Pickup Trucks	0.38	0.04
Unpaved Roads Emission Factors for Delivery Trucks	0.78	0.08
Unpaved Roads Emission Factors for Heavy-Heavy Duty Vehicles	1.07	0.11

Note: Emission factors determined using AP-42, Section 13.2.2, Unpaved Roads.

$$E = k\left(\frac{s}{12}\right)^a\left(\frac{W}{3}\right)^b\left(\frac{365-P}{365}\right)(1-C)$$

where k, a and b are empirical constants and:

E = size-specific emission factor (lb/VMT)

s = surface material silt content (%); Table 13.2.2-1

W = mean vehicle weight (tons)

P = number of days with at least 0.01 in of precipitation

C = control efficiency

VMT = vehicle mile traveled

Constants for Vehicles Traveling on Paved Surfaces

Constant	PM10	PM2.5
k (lb/VMT)	0.00220	0.00054

* Assumed equivalent to total suspended particulate.
Source: AP-42 Section 13.2.1 Table 13.2.1-1

Variables for Vehicles Traveling on Paved Surfaces

Parameter	Amount	Notes
Road Surface Silt Loading (sL) (g/m^2)	0.2	*The surface silt content was obtained from Table 13.2.1-3: Ubiquitous Silt Loading Default Values with Hot Spot Contributions from Anti-Skid*
Average Vehicle Weight (W), tons:		
Pickup Truck	2	*Conservative estimate; light duty truck is ≤ 3,750 lbs*
Delivery Trucks	10	*Vehicle weights from www.epa.gov/otaq/standards/weights.htm*
Heavy-Heavy Duty Vehicles	20	*Vehicle weights from www.epa.gov/otaq/standards/weights.htm.*
Number of Days with Greater than 0.01" Precipitation (P)	30	*From AP-42, Section 13.2.1, Figure 13.2.1-2.*
Number of Days in the Averaging Period (N)	365	*Annual averaging period*

Emission Factor for Fugitive Dust from Paved Roads, lb/VMT

Source	PM10	PM2.5
Paved Roads Emission Factors for Passenger Vehicles	1.01E-03	2.48E-04
Paved Roads Emission Factors for Delivery Vehicles	5.22E-03	2.48E-04
Paved Roads Emission Factors for Heavy-Heavy Duty Vehicles	1.06E-02	2.48E-04

Note: Emission factors determined using AP-42, Section 13.2.1, Paved Roads.

$$E_{ext} = [k(sL)^{0.91}\ x\ (W)^{1.02}]\ x\ \left(1 - \frac{P}{4N}\right)$$

E_{ext} = annual or other long-term average emission factor (lb/VMT)

k = particle size multiplier for particle size range and units of interest; Table 13.2.1-1

sL = road surface silt loading (g/m^2); Table 13.2.1-3

W = average weight (tons) of the vehicles traveling the road

P = number of days with at least 0.01 in of precipitation; Figure 13.2.1-2

N = number of days in the averaging period

Emission Calculations for Expansion Project Unpaved Roads

					Emissions Unpaved (tons/year)		Emissions Unpaved (tons/year)		Emissions Total (tons/year)	
Type of Vehicle	**Quantity Used Daily**	**Operation Days per Year**	**VMT/day Unpaved**	**VMT/day Paved**	**PM10**	**PM2.5**	**PM10**	**PM2.5**	**PM10**	**PM2.5**
Passenger Vehicles	20	365	0	40	0.00	0.00	0.15	3.62E-02	0.15	0.04
Delivery Vehicles	0	0	0	40	0.00	0.00	0.00	0.00E+00	0.00	0.00
Heavy-Heavy Duty Vehicles	0	0	0	40	0.00	0.00	0.00	0.00E+00	0.00	0.00
Total					**0.00**	**0.00**	**0.15**	**0.04**	**0.15**	**0.04**

Appendix B

Operational Emission Calculations

Average Capacity Factor Scenario

NEW CALEDONIA GENERATION: GE 7E.03 COMBUSTION TURBINE (CT)

Table 1. Natural Gas-Fired Inputs

EP&C APS - Date: 18-Jun-24

Parameter	-	Value	Units	Comment	Note
Number of Units:	-	6		each with #REF! ft stk ID and 131 ft stack height	A
Annual Operation:	-	952	hr/CT-yr	Steady-state hrs sans 163 CT-hrs for startups/shutdowns	1
Max-Modeled Heat Input at -10 deg F:	-	1,166	*10^6 Btu/hr	per CT; M. 19 F-Factor: 8,710 dscf/10^6 Btu	2
Annual-Avg. Heat Input at 59 deg F:	-	994	*10^6 Btu/hr	per CT; M. 19 F-Factor: 8,710 dscf/10^6 Btu	2
Annual Avg. Fuel Heat Content:	-	1,020	Btu/scf	scf = standard ft^3; nominal, higher heating value (HHV)	3
Fuel Sulfur Content:	-	2,000	gr/10^6 scf	gr = grains; equivalent to 6.32E-04 % S (0.04524 lb/scf at 60 deg F)	3,4
Total PM (as TPM10/2.5)	TPM10	4.29E-03	lb/10^6 Btu	Manufacture guarantee: 5 lb/hr; emissions < given rate – GE	2
Sulfur Dioxide:	SO2	6.00E-04	lb/10^6 Btu	AP-42 states 100% fuel S conversion: 0.94* %S (lb/10^6 Btu)	3
Nitrogen Oxides:	NOX	11.0	ppmvd	Manufacturer's data at 15% O2	5
Carbon Monoxide:	CO	14.0	ppmvd	Manufacturer's data at 15% O2	5
Volatile Organic Compounds:	VOC	1.4	ppmvw	Manufacturer's data at 15% O2 (wet)	2
Fuel-Sulfur Oxidation:	-	5.0	%	Estimated portion of fuel-sulfur that is oxidized to SO3 / H2SO4	7

Notes:

A Stack (Stk) internal diameter (ID) and height from GE Tech spec "1640722-G1N1-Rev 3.pdf

1 Equivalent annual hours via the generation restriction determined by 40 CFR Part 60, Subpart TTTTa, potential electric output (PEO) at base load HHV ISO (equiv.) rating times 20% capacity factor for the low load combustion turbine category: 153,000 MWh/CT-yr

2 GE Tech spec "1640722-G1N1-Rev 3_ChangeOrder1.pdf

3 EPA AP-42, Vol. I, 5th Edition, Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

4 AP-42 conversion factor assumes all fuel sulfur is converted to SO2. Emission factor used is the 40 CFR Part 75 App. D, 2.3.1.1.1, default SO2 emission rate for firing pipeline natural gas, which will be subsumed into the operating permit. Part 75 emission rate approximates to 2,000 gr/10^6 scf at 60 deg F.

5 Manufacture's guarantee: L. Kaufman [GE] 6-07-24 email to Mike Hoy, et. al.

6 Manufacture assumes VOC is 20% of the predicted UHC.

7 J.P. Lobene [GE] 3-2-01 email to S.C. Strunk

Table 2. No. 2 Distillate Oil-Fired Inputs

Parameter	-	Value	Units	Comment	Note
Number of Units:	-	6			
Annual Operation:	-	32	hr/CT-yr	2*10^6 gal. of storage sans 13.0 CT-hrs for startups/shutdowns	
Max-Modeled Heat Input at -10 deg F:	-	1,196	*10^6 Btu/hr	per CT; M. 19 F-Factor 9,190 dscf/10^6 Btu	
Annual-Avg. Heat Input at 59 deg F:	-	1,047	*10^6 Btu/hr	per CT; M. 19 F-Factor: 9,190 dscf/10^6 Btu	
Heat Content:	-	140,000	Btu/gal	Nominal, higher heating value (HHV) heat content; approx. AP-42 ref.'s value	1
Fuel Sulfur Content:	-	0.0015	%	Ultra-low-sulfur distillate oil	
Total PM2.5:	TPM2.5	1.88E-02	lb/10^6 Btu	Manufacturer data: 22.5 lb/hr; emissions < given rate - GE	2
Sulfur Dioxide:	SO2	1.52E-03	lb/10^6 Btu	AP-42 states 100% fuel S conversion: 1.01 * %S (lb/10^6 Btu)	1
Nitrogen Oxides:	NOX	42.0	ppmvd	Manufacturer's data at 15 % O2	2
Carbon Monoxide:	CO	20.0	ppmvd	Manufacturer's data at 15 % O2	2
Volatile Organic Compounds:	VOC	3.5	ppmvw	Manufacturer's data at 15 % O2 (wet_	2,3
Fuel-Sulfur Oxidation:	-	5.0	%	Estimated portion of fuel-sulfur that is oxidized to SO3 / H2SO4	5

Notes:

1 EPA AP-42, Vol. I, 5th Edition, Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

2 GE Tech spec "1640722-G1N1-Rev 3_ChangeOrder1.pdf"

3 Manufacture assumes VOC is 50% of the predicted UHC.

4 [Reserved]

5 J.P. Lobene [GE] 3-2-01 email to S.C. Strunk

Table 2. Annual Fuel Burned (per CT)

Fuel	Units	NCG01	NCG02	NCG03	NCG04	NCG05	NCG06
Natrl Gas	10^3 scf/yr	928,360	928,360	928,360	928,360	928,360	928,360
Dist. Oil	10^3 gal/yr	236	236	236	236	236	236
Total	10^6 Btu/yr	979,978	979,978	979,978	979,978	979,978	979,978

Table 3. Criteria/Non-HAP Pollutant Average-Annual Emissions at 59 deg F and Max Short-Term Emissions

-	-	-	Emssn Fctr, lb/10^6 Btu	-	Max Hrly,	Avg. Hourly, lb/CT-hr	-	Avg. Annual, tons/CT-yr	-	Total
Pollutant	**(Abbrev.)**	**Note**	**Natrl Gas**	**No. 2 Oil**	**lb/CT-hr**	**Natrl Gas**	**No. 2 Oil**	**Natrl Gas**	**No. 2 Oil**	**tons/yr**
Filterable Particulate Matter	FPM	-	2.14E-03	9.40E-03	1.13E+01	2.13E+00	9.85E+00	1.01E+00	1.55E-01	7.02E+00
FPM < 10-micrometer aero. dia.	FPM10	-	2.14E-03	9.40E-03	1.13E+01	2.13E+00	9.85E+00	1.01E+00	1.55E-01	7.02E+00
FPM < 2.5-micrometer aero. dia.	FPM2.5	1	2.14E-03	9.40E-03	1.13E+01	2.13E+00	9.85E+00	1.01E+00	1.55E-01	7.02E+00
Condensable Particulate Matter	CPM	2	2.14E-03	9.40E-03	1.13E+01	2.13E+00	9.85E+00	1.01E+00	1.55E-01	7.02E+00
Sulfur Dioxide	SO2	-	6.00E-04	1.52E-03	1.81E+00	5.97E-01	1.59E+00	2.84E-01	2.50E-02	1.85E+00
Nitrogen Oxides	NOX	3	4.05E-02	1.63E-01	1.95E+02	4.03E+01	1.71E+02	1.92E+01	2.70E+00	1.31E+02
Carbon Monoxide	CO	3	3.14E-02	4.73E-02	5.66E+01	3.12E+01	4.96E+01	1.49E+01	7.82E-01	9.39E+01
Volatile Organic Compounds	VOC	3	2.43E-03	6.84E-03	8.00E+00	2.42E+00	7.16E+00	1.15E+00	1.13E-01	7.59E+00
Sulfuric Acid (SO3/H2SO4) as H2SO4	H2SO4	-	9.66E-07	2.29E-06	2.74E-03	9.61E-04	2.40E-03	4.57E-04	3.79E-05	2.97E-03
Carbon Dioxide	CO2	5	120.0	163.1	195,059	119,336	170,784	56,816	2,694	357,061
Methane	CH4	6	2.20E-03	6.61E-03	7.91E+00	2.19E+00	6.93E+00	1.04E+00	1.09E-01	6.92E+00
Nitrous Oxide	N2O	6	2.20E-04	1.32E-03	1.58E+00	2.19E-01	1.39E+00	1.04E-01	2.19E-02	7.57E-01
Grnhouse Gas (GHG) as CO2 equiv.	CO2e	-	120.1	163.6	195,729	119,456	171,370	56,873	2,704	357,459

Notes:

1 EPA AP-42, Vol. I, 5th Ed., Sec. 3.1 - Stationary Gas Turbines - 1/95, Table 3.1-2: all FPM may be considered equal to, or less than, 2.5 micron.

2 EPA AP-42, Vol. I, 5th Edition, Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00, states all CPM is less than one micron.

3 Assumed ideal gas - conversion from concentration value utilizing a molar volume of 385.3 ft^3/lbmole at 68 deg F and 1 atmosphere (atm).

4 [Reserve]

5 "Low load" CT units in 40 CFR 60 Subpart TTTTa, Table 2, limit natrl gas-fired ops to 120 lb CO2 per 10^6 Btu.

6 US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart A, Table A-1 and Subpart C, Tables C-1 & C-2, as amended 11-29-13 (78 FR 71904)

7 Full load (sans startup/shutdown) CO2 rate for natural gas: 1,344 lb/MWh; oil: 1,856 lb/MWh.

Table 4. Trace Elements Average-Annual Emissions at 59 deg F and Max Short-Term Emissions at -10 deg F [1]

-	-	-	Emssn Fctr, lb/10^6 Btu		Max Hrly,	Avg. Hourly, lb/CT-hr		Avg. Annual, tons/CT-yr		Total
Pollutant	(Symbol)	Note	Natrl Gas	No. 2 Oil	lb/CT-hr	Natrl Gas	No. 2 Oil	Natrl Gas	No. 2 Oil	tons/yr
Antimony	Sb	2, HAP	1.80E-07	-	2.10E-04	1.79E-04	-	9.98E-05	-	5.99E-04
Arsenic	As	HAP	2.30E-07	1.10E-05	2.68E-04	2.29E-04	1.15E-02	1.27E-04	1.82E-04	6.50E-03
Barium	Ba	3	4.00E-06	-	4.67E-03	3.98E-03		2.22E-03		1.33E-02
Beryllium	Be	HAP	1.00E-08	3.10E-07	1.17E-05	9.94E-06	3.25E-04	5.54E-06	5.12E-06	1.95E-04
Cadmium	Cd	HAP	4.00E-08	4.80E-06	4.67E-05	3.98E-05	5.03E-03	2.22E-05	7.93E-05	2.64E-03
Chlorine as HCl	HCl	HAP	-	3.11E-04	-	-	3.25E-01	-	5.13E-03	1.62E-01
Chromium	Cr	HAP	1.10E-06	1.10E-05	1.28E-03	1.09E-03	1.15E-02	6.10E-04	1.82E-04	9.39E-03
Cobalt	Co	HAP	8.00E-08	-	9.33E-05	7.96E-05	-	4.43E-05	-	2.66E-04
Copper	Cu	3	7.00E-07	1.01E-05	8.17E-04	6.96E-04	1.06E-02	3.88E-04	1.67E-04	7.59E-03
Lead	Pb	HAP	4.00E-07	1.40E-05	4.67E-04	3.98E-04	1.47E-02	2.22E-04	2.31E-04	8.63E-03
Manganese	Mn	HAP	4.00E-07	1.01E-04	4.67E-04	3.98E-04	1.05E-01	2.22E-04	1.66E-03	5.38E-02
Mercury	Hg	HAP	8.00E-10	1.20E-06	9.33E-07	7.96E-07	1.26E-03	4.43E-07	1.98E-05	6.28E-04
Nickel	Ni	HAP	2.40E-06	4.60E-06	2.80E-03	2.39E-03	4.82E-03	1.33E-03	7.60E-05	1.04E-02
Selenium	Se	HAP	2.00E-08	2.50E-05	2.33E-05	1.99E-05	2.62E-02	1.11E-05	4.13E-04	1.31E-02
Vanadium	V	-	1.80E-06	-	2.10E-03	1.79E-03	-	9.98E-04	-	5.99E-03
Zinc	Zn	5	2.84E-05	8.90E-06	3.32E-02	2.83E-02	9.32E-03	1.58E-02	1.47E-04	9.92E-02

Notes:

1 Unless noted, emission factors are from Emission Factors Handbook [EFH] - Guidelines for Estimating Trace Substance Emissions from Fossil Fuel Steam Electric Plants, Electric Power Research Institute (EPRI), Report No. EPRI TR-105611, 11-95, Table 4-1 (Uncontrolled Gas-Fired Boiler Emission Factors)[*]
[*]While EPRI cautioned against using the data in Table 4-1 for gas-fired turbines, TVA believes that the trace-element emission factors should be reasonably applicable to CT units. Fuel composition determines trace-element emissions (mass-per-unit-energy basis) whether burned in a boiler or a CT unit.

2 Unless noted, emission factors are from EPA AP-42, Vol. I, 5th Ed., Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

3 Natrl Gas: US EPA, Air Emissions from Scrap Tire Combustion, EPA-600/R-97-115, October 1997 (natural gas-fired rotary-kiln incinerator simulator emission data)

4 [Reserved]

5 Natrl Gas: Emission Factors Handbook [EFH] Addendum, EPRI, 9-98, Table 4-1. Table 3-1 in April 2002 EFH Revision is the current version of this table.

6 No. 2 Oil: HCl and Mn emission factors are derived from TVA Combustion-Turbine (CT) Fuel-Oil Specifications (#2 Distillate) Revision 5.0, 17-Jan-2001:
Cl -6 ppmw; Mn -2 ppmw Density -7.05 lb/gal [AP-42, Vol. 1, 5th Ed., App. A, 9/85 (reformatted 1/95)]

7 No. 2 Oil: Trace Element Emission Factors from Distillate Oil Combustion, Paul Chu, EPRI, 5-13-99 (Source: PISCES database 4-6-99)

8 Natrl Gas: Emission Factors Handbook [EFH] Addendum 2, EPRI, 2-01, Table 4-1. Table 3-1 in April 2002 EFH Revision is the current version of this table.

9 Natrl Gas: EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - Supplement D, 7/98

HAP This abbreviation denotes "Hazardous Air Pollutant.

Table 5. Organic HAP Average-Annual Emissions at 59 deg F and and Max Short-Term Emissions at -10 deg F [1]

-	-	-	Emssn Fctr, lb/10^6 Btu		Max Hrly,	Avg. Hourly, lb/CT-hr		Avg. Annual, tons/CT-yr		Total
Pollutant	**(CASRN)**	**Note**	**Natrl Gas**	**No. 2 Oil**	**lb/CT-hr**	**Natrl Gas**	**No. 2 Oil**	**Natrl Gas**	**No. 2 Oil**	**tons/yr**
1,3-Butadiene	106-99-0	HAP	4.30E-07	1.60E-05	5.02E-04	4.28E-04	1.68E-02	2.38E-04	2.64E-04	1.43E-03
2-Methylnaphthalene	91-57-6	2, POM	1.62E-07	-	1.89E-04	1.61E-04	-	8.98E-05	-	5.39E-04
Acetaldehyde	75-07-0	HAP	4.00E-05	-	4.67E-02	3.98E-02	-	2.22E-02	-	1.33E-01
Acrolein	107-02-8	HAP	6.40E-06	-	7.47E-03	6.36E-03	-	3.55E-03	-	2.13E-02
Benzene	71-43-2	HAP	1.20E-05	5.50E-05	1.40E-02	1.19E-02	5.76E-02	6.65E-03	9.09E-04	3.99E-02
Ethylbenzene	100-41-4	HAP	3.20E-05	-	3.73E-02	3.18E-02	-	1.77E-02	-	1.06E-01
Formaldehyde	50-00-0	3, HAP	2.20E-04	2.30E-04	2.57E-01	2.19E-01	2.41E-01	1.22E-01	3.80E-03	7.32E-01
Naphthalene	91-20-3	HAP	1.30E-06	3.50E-05	1.52E-03	1.29E-03	3.67E-02	7.21E-04	5.78E-04	4.32E-03
Phenanthrene	85-01-8	2, POM	1.11E-07	-	1.29E-04	1.10E-04	-	6.15E-05	-	3.69E-04
Propylene Oxide	75-56-9	HAP	2.90E-05	-	3.38E-02	2.88E-02	-	1.61E-02	-	9.64E-02
Toluene	108-88-3	HAP	1.30E-04	-	1.52E-01	1.29E-01	-	7.21E-02	-	4.32E-01
Xylenes	1330-20-7	HAP	6.40E-05	-	7.47E-02	6.36E-02	-	3.55E-02	-	2.13E-01
Polycyclic Aromatic Hydrocarbons	PAH	POM	2.20E-06	4.00E-05	2.57E-03	2.19E-03	4.19E-02	1.22E-03	6.61E-04	7.32E-03
Polycyclic Organic Matter	POM	HAP	2.47E-06	4.00E-05	2.88E-03	2.46E-03	4.19E-02	1.37E-03	6.61E-04	8.22E-03
Organic HAP Total	-	-	5.38E-04	3.76E-04	6.27E-01	5.35E-01	3.94E-01	2.98E-01	6.21E-03	1.79E+00
Total HAP	-	-	5.38E-04	8.59E-04	6.27E-01	5.35E-01	9.00E-01	2.98E-01	1.42E-02	1.79E+00

Notes:

1 EPA AP-42, Vol. I, 5th Edition, Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

2 Gas-Fired Boiler and Turbine Air Toxics Summary Report, EPRI, Report No. EPRI TR-105646, Table S-2, 10-96

3 Table 1 to Subpart YYYY of Part 63 provides a formaldehyde emission limit of 91 ppbvd at 15 % O2. For natural gas firing, this equates to 2.20E-04 lb/10^6 Btu; for oil-firing, this equates to 2.30E-04 lb/10^6 Btu.

HAP This abbreviation denotes "Hazardous Air Pollutant."

POM This abbreviation denotes "Polycyclic Organic Matter" (POM), which is broad class of organic compounds that includes PAH and PAC. The POM group is defined as a HAP.

Table A. Baseload Gross Performance vs. Ambient Temperature [1]

Amb. Temp. deg F	kW/CT Natrl Gas	Btu/kW-hr HHV [2]	LHV	10^6 Btu/CT-hr HHV	LHV	Estimated Eff., %
-10	106,383	10,965	9,896	1,166	-	-
59	88,777	11,202	10,110	994	-	30.0
110 [a]	79,403	11,575	10,447	919	-	-

Note [a]: Performance reflects evap. cooler in service.

Table B. Baseload Flue-Gas Concentrations (%-Volume) vs. Ambient Temperature [1]

Species			Natrl Gas, Amb. Temp. (F)		
-	-	(Mole Wt.)	-10	59	110
Oxygen	O2	32.00	13.64	13.61	13.04
Carbon Dioxide	CO2	44.01	3.41	3.33	3.3
Water	H2O	18.02	6.58	7.36	10.39

Table C. Baseload Flue-Gas Parameters vs. Ambient Temperature [1]

		Natrl Gas, Amb. Temp. (F)		
Parameter	-	-10	59	110
Exhaust Mass Flow Rate per Unit [1]	lb/hr	2,634,000	2,292,000	-
Exhaust Temperature [1]	deg F	970	1,018	-
Average Molecular Weight	lb/lbmole	28.55	28.46	-
Stack-Exit Ambient Pressure	psia	14.519	14.519	-
Stk-Exit Volumetric Flow Rate (Actual)	acfm	1,624,795	1,465,920	-
Stk-Exit Vol. Flow (Dry): 68 deg F | 1 atm	dscfm	553,481	479,106	-
F-Factor at 68 deg F | 1 atm | 0% O2	dscf/10^6 Btu	8,581	8,587	-
[TDEC APC 3] Stack H2O	gr/dscf	23.3	26.3	-
[TDEC APC 3] Stack Velocity	ft/s	-	#REF!	-
[TDEC APC 5] CT Heat Rate	kJ/W-hr	-	10.7	-
Stk-Exit Oxygen (O2)	%-dry	-	14.7	-

Note [1]: GE Tech spec "1640722-G1N1-Rev 3_ChangeOrder1.pdf"
Note [2]: HHV to LHV ratio assumed to equal 1.108
Ref.: GE 7F.05 Tech. Specs., June 2020

Table D. Baseload Gross Performance vs. Ambient Temperature [1]

Amb. Temp. deg F	kW/CT Dist. Oil	Btu/kW-hr HHV [3]	LHV	10^6 Btu/CT-hr HHV	LHV	Estimated Eff., %
-10	105,146	11,377	10,683	1,196	-	-
59	92,009	11,384	10,689	1,047	983	-
110 [a]	80,881	11,640	10,930	941	-	-

Note [a]: Performance reflects evap. cooler in service.

Table E. Baseload Flue-Gas Concentrations (%-Volume) vs. Ambient Temperature [1]

Species			Dist. Oil, Amb. Temp. (F)		
-	-	(Mole Wt.)	-10	59	110
Oxygen	O2	32.00	12.55	12.66	12.42
Carbon Dioxide	CO2	44.01	5.1	4.95	4.81
Water	H2O	18.02	8.21	8.64	10.65

Table F. Baseload Flue-Gas Parameters vs. Ambient Temperature [1]

Parameter		Dist. Oil, Amb. Temp. (F)		
-	--	-10	59	110
Exhaust Mass Flow Rate per Unit [1]	lb/hr	2,618,000	2,355,000	-
Exhaust Temperature [1]	deg F	974	1,010	-
Average Molecular Weight	lb/lbmole	28.620	28.550	-
Stack-Exit Ambient Pressure	psia	14.519	14.519	-
Stk-Exit Volumetric Flow Rate (Actual)	acfm	1,615,482	1,493,336	-
Stk-Exit Vol. Flow (Dry): 68 deg F | 1 atm	dscfm	539,198	483,943	-
F-Factor at 68 deg F | 1 atm | 0% O2	dscf/10^6 Btu	9,352	9,342	-

Note [3]: HHV to LHV ratio assumed to equal 1.065

Ref.: Typical Dual Fuel LM6000PF Plus Emission Envelope.xlsx

NEW CALEDONIA GENERATION: GE 7E COMBUSTION-TURBINE (CT) STARTUP (SU) AND SHUTDOWN (SD) EMISSION ESTIMATES

[1] Startup and shutdown CT performance based on GE proprietary data. EP&C APS - Date: 18-Jun-24

Table 1. Nominal Number of Startup Types and Shutdowns per CT-Year [1]

Event Type		Downtime		GE 7E.03		
-	(Abbrev.)	Hours	No. Units	Gas [1]	Oil [2]	Total
Starts	SU	-	6	150	12	162
Shutdown	SD	-	6	150	12	162

Tbl 1 [1]: Number of starts per CT-year assumed equivalent to the GE simple-cycle frame units installed at CCT and are provided by that project's technical specifications report.
Tbl 1 [2]: Number captures one start per CT-year for unit readiness testing.

Table 2. Natural Gas Inputs at 59 deg F

Parameter		Value	Units	Comment
Heat Input at 59 deg F:	-	994	*10^6 Btu/hr	per CT; M. 19 F-Factor: 8,710 dscf/10^6 Btu at 68 F, 1 atm, & 0% O2 ref.: Appendix A-7 to Part 60
Fuel Sulfur Content:	-	2,000	gr/10^6 scf	gr = grains; equivalent to 6.32E-04 % S (0.04524 lb/scf at 60 deg F) ref.: AP-42, Vol. I, 5th Ed., Sec. 3.1, Sup. F, 4/00
Sulfur Dioxide:	SO2	6.00E-04	lb/10^6 Btu	AP-42 states 100% fuel S conversion: 0.94 * %S (lb/10^6 Btu) ref.: AP-42, Vol. I, 5th Ed., Sec. 3.1, Sup. F, 4/00
Sufuric Acid:	H2SO4	9.66E-07	lb/10^6 Btu	SO3/H2SO4 est. based on mass-balance conversn of SO2 to SO3/H2SO4
Ammonia:	NH3	0.00E+00	lb/10^6 Btu	-
Carbon Dioxide	-	120	lb/10^6 Btu	-
Methane	-	2.20E-03	lb/10^6 Btu	-
Nitrous Oxide	-	2.20E-04	lb/10^6 Btu	-
Grnhouse Gas (GHG) as CO2 equiv.		120.1	lb/10^6 Btu	-

					Natural Gas Startup and Subsequent Shutdown, lb/CT-hr											
Event	**No. of Units**	**Duration hour**	**Avg. Exh. Temp, deg F**	**Avg. Flow acfm**	**NOX**	**CO**	**VOC**	**SO2**	**H2SO4**	**FPM**	**FPM2.5**	**CPM**	**CO2**	**CH4**	**N2O**	**CO2e**
Startup	6	5.00E-01	859	702,221	5.13E+01	2.04E+02	1.40E+02	1.75E-01	2.81E-04	2.14E+00	2.14E+00	2.14E+00	3.50E+04	6.42E-01	6.42E-02	3.50E+04
Shutdown	6	5.83E-01	835	680,008	5.35E+01	1.39E+02	6.39E+01	1.17E-01	1.88E-04	1.09E+00	1.09E+00	1.09E+00	2.34E+04	7.88E-01	7.88E-02	2.34E+04

-	**NOX**	**CO**	**VOC**	**SO2**	**H2SO4**	**FPM**	**FPM2.5**	**CPM**	**CO2**	**CH4**	**N2O**	**CO2e**
Startup and Shutdown, tons/CT-yr:	4.26E+00	1.37E+01	8.04E+00	1.17E-02	1.88E-05	1.28E-01	1.28E-01	1.28E-01	2.33E+03	5.86E-02	5.86E-03	2.34E+03

-	**NOX**	**CO**	**VOC**	**SO2**	**H2SO4**	**FPM**	**FPM2.5**	**CPM**	**CO2**	**CH4**	**N2O**	**CO2e**
Total Startup and Shutdown, tons/yr:	2.56E+01	8.25E+01	4.83E+01	7.00E-02	1.13E-04	7.69E-01	7.69E-01	7.69E-01	1.40E+04	3.51E-01	3.51E-02	1.40E+04

Table 3. No. 2 Distillate Oil Inputs at 59 deg F

Parameter	-	Value	Units	Comment
Heat Input at 59 deg F:	-	1,047	*10^6 Btu/hr	per CT; M. 19 F-Factor: 9,190 dscf/10^6 Btu at 68 F, 1 atm, & 0% O2 ref.: Appendix A-7 to Part 60
Fuel Sulfur Content:	-	0.0015	%	Ultra-low-sulfur distillate oil
Sulfur Dioxide:	SO2	1.52E-03	lb/10^6 Btu	AP-42 states 100% fuel S conversion: 1.01 * %S (lb/10^6 Btu) ref.: AP-42, Vol. I, 5th Ed., Sec. 3.1, Sup. F, 4/00
Sufuric Acid:	H2SO4	2.29E-06	lb/10^6 Btu	SO3/H2SO4 est. based on mass-balance conversn of SO2 to SO3/H2SO4 ref.: AP-42, Vol. I, 5th Ed., Sec. 3.1, Sup. F, 4/00
Ammonia:	NH3	0.00E+00	lb/10^6 Btu	-
Carbon Dioxide	-	163.1	lb/10^6 Btu	-
Methane	-	6.61E-03	lb/10^6 Btu	-
Nitrous Oxide	-	1.32E-03	lb/10^6 Btu	-
Grnhouse Gas (GHG) as CO2 equiv.	-	163.6	lb/10^6 Btu	-

Event	No. of Units	Duration hour	Avg. Exh. Temp, deg F	Avg. Flow acfm	NOX	CO	VOC	SO2	H2SO4	FPM	FPM2.5	CPM	CO2	CH4	N2O	CO2e
Startup	6	5.00E-01	-	-	2.28E+02	2.38E+02	1.43E+02	4.49E-01	6.81E-04	1.13E+01	1.13E+01	1.13E+01	4.84E+04	1.96E+00	3.92E-01	4.85E+04
Shutdown	6	5.83E-01	-	-	3.86E+01	1.46E+02	8.74E+01	2.70E-01	4.09E-04	2.25E+01	2.25E+01	2.25E+01	2.91E+04	1.18E+00	2.36E-01	2.92E+04

-	NOX	CO	VOC	SO2	H2SO4	FPM	FPM2.5	CPM	CO2	CH4	N2O	CO2e
Startup and Shutdown, tons/CT-yr:	8.19E-01	1.22E+00	7.34E-01	2.29E-03	3.47E-06	1.13E-01	1.13E-01	1.13E-01	2.47E+02	1.00E-02	2.00E-03	2.48E+02

-	NOX	CO	VOC	SO2	H2SO4	FPM	FPM2.5	CPM	CO2	CH4	N2O	CO2e
Total Startup and Shutdown, tons/yr:	4.91E+00	7.34E+00	4.40E+00	1.38E-02	2.08E-05	6.75E-01	6.75E-01	6.75E-01	1.48E+03	6.01E-02	1.20E-02	1.49E+03

NEW CALEDONIA GENERATION: DEWPOINT GAS HEATER (GH) EMISSION ESTIMATES

Table 1. Natural Gas-Fired Gas Heater Inputs

EP&C APS - Date: 18-Jun-24

Parameter	-	Value	Units	Comment	Note
Number of Units:	-	3		each with 2.0 ft stk ID and 30 ft stack height	1,A
Annual Operation:	-	3,500	hr/htr-yr	stack flows: 1,366 dscf/min; 3,956 acf/min and 21. ft/s	A
Heat Input:	-	9.9	*10^6 Btu/hr	stk paramtrs: 780 deg F.; 17.9 % H2O and 3% dry O2	1,A
Heat Content:	-	1,020	Btu/scf	Nominal, higher heating value (HHV) NG heat content (volumetric basis)	2
Fuel Sulfur Content:	-	6.32E-04	%S	Fuel sulfur content analogous with the CT units	-
Filterable Particulate Matter:	FPM10	1.9	lb/10^6 scf	AP-42 ref. states all PM to be less than 1.0 micrometer in diameter	2
Condensable Particulate Matter:	CPM	5.7	lb/10^6 scf	AP-42 ref. states all PM to be less than 1.0 micrometer in diameter	2
Sulfur Dioxide:	SO2	0.6	lb/10^6 scf	Assumed 100% fuel S convrsn; ref. fuel S basis is 2,000 gr/10^6 scf	2
Nitrogen Oxides:	NOX	0.011	lb/10^6 Btu	Manufacturer's data; equivalent to 9 ppmvd at 3% O2	3
Carbon Monoxide	CO	0.074	lb/10^6 Btu	Manufacturer's data; equivalent to 100 ppmvd at 3% O2	4
Volatile Organic Compounds:	VOC	0.015	lb/10^6 Btu	Manufacturer's data; equivalent to 35 ppmvd at 3% O2	4
Fuel-Sulfur Oxidation:	-	5.0	%	Est. portion of fuel-S that is oxidized to SO3 / H2SO4 (analogous w/ CT units)	

Notes:

A Stack internal dia. (ID), stack height, and stack velocity mirrors CCT GH units (221014-WB Heat Spec Sheet.pdf). Stack temperature from JCC GH info (TJS03d.xls) [12*10^6 Btu/hr]

1 Only two gas heaters are necessary to operate. The additional gas heater serves as redundant capacity. Each gas heater is expected to actually run simultaneously at 50% capacity. However, estimates reflect

2 EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - Supplement D, 4/98

3 CCT gas heater emissions performance

4 Similarly sized gas heater (PCC) manufacturer's performance.

Table 2. Theoretical Annual Fuel Burn

Units	GH1	GH2	GH3
10^3 scf/yr	33,971	33,971	33,971
10^6 Btu/yr	34,650	34,650	34,650

Table 3. Criteria / Non-HAP Pollutant Emission Estimates

Pollutant	-	Note	Emission Factor lb/10^6 scf	Emission Factor lb/10^6 Btu	Hourly lb/htr-hr	Annual tons/htr-yr	Total tons/yr
Filterable Particulate Matter	FPM	-	-	1.86E-03	1.84E-02	3.23E-02	9.68E-02
FPM < 10-micrometer aero. dia.	FPM10	-	-	1.86E-03	1.84E-02	3.23E-02	9.68E-02
FPM < 2.5-micrometer aero. dia.	FPM2.5	-	-	1.86E-03	1.84E-02	3.23E-02	9.68E-02
Condensable Particulate Matter	CPM	-	-	5.59E-03	5.53E-02	9.68E-02	2.90E-01
Sulfur Dioxide	SO2	1	-	5.88E-04	5.82E-03	1.02E-02	3.06E-02
Nitrogen Oxides	NOX	-	11.2	1.10E-02	1.09E-01	1.91E-01	5.72E-01
Carbon Monoxide	CO	-	75.5	7.40E-02	7.33E-01	1.28E+00	3.85E+00
Volatile Organic Compounds	VOC	-	15.3	1.50E-02	1.49E-01	2.60E-01	7.80E-01
Sulfuric Acid (SO3/H2SO4) as H2SO4	H2SO4	1	-	9.66E-07	9.56E-06	1.67E-05	5.02E-05
Carbon Dioxide	CO2	2	120,000	117.6	1,165	2,038	6,115
Methane	CH4	3	-	2.20E-03	2.18E-02	3.82E-02	1.15E-01
Nitrous Oxide	N2O	3	-	2.20E-04	2.18E-03	3.82E-03	1.15E-02
Greenhouse Gas (GHG), as CO2 Equiv.	CO2e	3	-	117.8	1,166	2,040	6,121

Notes:

1 SO2 and SO3/H2SO4 emission estimates are based on fuel sulfur mass-bal. calculation for conversion of fuel sulfur to SO2 or SO3/H2SO4.

2 EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - Supplement D, 4/98

3 US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart A, Table A-1 and Subpart C, Tables C-1 & C-2, as amended 11-29-13 (78 FR 71904)

Table 4. Trace Elements Emission Estimates

Pollutant	(Symbol)	Note	Emission Factor [1] lb/10^6 scf	Emission Factor [1] lb/10^6 Btu	Hourly lb/htr-hr	Annual tons/htr-yr	Total tons/yr
Antimony	Sb	2, HAP		1.80E-07	1.78E-06	3.12E-06	9.36E-06
Arsenic	As	HAP	2.0E-04	-	1.94E-06	3.40E-06	1.02E-05
Barium	Ba	-	4.4E-03	-	4.27E-05	7.47E-05	2.24E-04
Beryllium	Be	HAP	1.2E-05	-	1.16E-07	2.04E-07	6.11E-07
Cadmium	Cd	HAP	1.1E-03	-	1.07E-05	1.87E-05	5.61E-05
Chromium	Cr	HAP	1.4E-03	-	1.36E-05	2.38E-05	7.13E-05
Cobalt	Co	HAP	8.4E-05	-	8.15E-07	1.43E-06	4.28E-06
Copper	Cu	-	8.5E-04	-	8.25E-06	1.44E-05	4.33E-05
Lead	Pb	HAP	5.0E-04	4.90E-07	4.85E-06	8.49E-06	2.55E-05
Manganese	Mn	HAP	3.8E-04	-	3.69E-06	6.45E-06	1.94E-05
Mercury	Hg	HAP	2.6E-04	-	2.52E-06	4.42E-06	1.32E-05
Nickel	Ni	HAP	2.1E-03	-	2.04E-05	3.57E-05	1.07E-04
Selenium	Se	HAP	2.4E-05	-	2.33E-07	4.08E-07	1.22E-06
Vanadium	V	-	2.3E-03	-	2.23E-05	3.91E-05	1.17E-04
Zinc	Zn	-	2.9E-02	-	2.81E-04	4.93E-04	1.48E-03

Notes:

1 Unless noted, all emission factors are from EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - Supplement D, 4/98.

2 US EPA, Air Emissions from Scrap Tire Combustion, EPA-600/R-97-115, Oct 1997 (natrl gas-fired rotary-kiln incinerator simulator emssn data)

HAP This abbreviation denotes "Hazardous Air Pollutant."

Table 5. Organic HAP / Compounds Emission Estimates

Pollutant	(CASRN)	Note	Emission Factor, [1] lb/10^6 scf	Emission Factor, [1] lb/10^6 Btu	Hourly lb/htr-hr	Annual tons/htr-yr	Total tons/yr
2-Methylnaphthalene	91-57-6	POM	2.4E-05	-	2.33E-07	4.08E-07	1.22E-06
3-Methylcholanthrene	56-49-5	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
7,12-Dimethylbenz(a)anthracene	57-97-6	PAC	1.6E-05	-	1.55E-07	2.72E-07	8.15E-07
Acenaphthene	83-32-9	POM	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Acenaphthylene	208-96-8	POM	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Anthracene	120-12-7	POM	2.4E-06	-	2.33E-08	4.08E-08	1.22E-07
Benzene	71-43-2	HAP	2.1E-03	-	2.04E-05	3.57E-05	1.07E-04
Benzo(a)anthracene	56-55-3	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Benzo(a)pyrene	50-32-8	PAC	1.2E-06	-	1.16E-08	2.04E-08	6.11E-08
Benzo(b)fluoranthene	205-99-2	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Benzo(g,h,i)perylene	191-24-2	POM	1.2E-06	-	1.16E-08	2.04E-08	6.11E-08
Benzo(k)fluoranthene	207-08-9	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Chrysene	218-01-9	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Dibenzo(a,h)anthracene	53-70-3	PAC	1.2E-06	-	1.16E-08	2.04E-08	6.11E-08
Dichlorobenzene [mixed isomers]	25321-22-6	HAP	1.2E-03	-	1.16E-05	2.04E-05	6.11E-05
Fluoranthene	206-44-0	PAC	3.0E-06	-	2.91E-08	5.10E-08	1.53E-07
Fluorene	86-73-7	POM	2.8E-06	-	2.72E-08	4.76E-08	1.43E-07
Formaldehyde	50-00-0	HAP	7.5E-02	-	7.28E-04	1.27E-03	3.82E-03
Indeno(1,2,3-c,d)pyrene	193-39-5	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Naphthalene	91-20-3	HAP	6.1E-04	-	5.92E-06	1.04E-05	3.11E-05
n-Hexane	110-54-3	2, HAP	4.3E-04	-	4.17E-06	7.30E-06	2.19E-05
Phenanthrene	85-01-8	POM	1.7E-05	-	1.65E-07	2.89E-07	8.66E-07
Pyrene	129-00-0	POM	5.0E-06	-	4.85E-08	8.49E-08	2.55E-07
Toluene	108-88-3	HAP	3.4E-03	-	3.30E-05	5.78E-05	1.73E-04
Polycyclic Aromatic Compounds	PAC	POM	3.22E-05	-	3.13E-07	5.47E-07	1.64E-06
Polycyclic Organic Matter	POM	HAP	8.82E-05	-	8.56E-07	1.50E-06	4.49E-06
Organic HAP Total	-	-	8.28E-02	-	8.04E-04	1.41E-03	4.22E-03
Total HAP	-	-	8.91E-02	8.73E-05	8.65E-04	1.51E-03	4.54E-03

Notes:

1 Unless noted, all emission factors are from EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - 7-98.

2 B.T. O'Neil & D.A. Orr, "Hexane and Other Alkane Emission Estimates for Natural Gas-Fired Boilers", Electric Power Research Institute (EPRI), 5-5-00

HAP This abbreviation denotes "Hazardous Air Pollutant."

PAC This abbreviation denotes "Polycyclic Aromatic Compounds". This group does not have an associated CASRN.

POM This abbreviation denotes "Polycyclic Organic Matter" (POM), which is broad class of organic compounds that includes PAH and PAC. The POM group is defined as a HAP.

NEW CALEDONIA GENERATION: FIRE-SUPPRESSION DIESEL-ENGINE WATER PUMP (FP)

Table 1. Diesel Engine Inputs

Parameter	-	Value	Units	Comment	Note
Number of Engines:	-	1	-	each with 0.5 ft stk ID and 12 ft stack height	-
Annual Operation:	-	500	hr/yr	stk paramtrs: 832 deg F.; 1,351 acf/min and 115 ft/s	1
Rated Horsepower:	-	299	bhp/eng	Heat input equivalent is 2.1 *10^6 Btu/hr.	2
Fuel Consumption:	-	15.0	gal/eng-hr	Approx. fuel consumption per engine based on 7,000 Btu/hp-hr	3
Fuel Heat Content	-	140,000	Btu/gal	Nominal distillate-oil heat content (HHV)	4
No. 2 Fuel Oil Density:	-	7.05	lb/gal	Nominal distillate-oil density	5
No. 2 Fuel Oil Sulfur Content:	-	0.0015	weight %	Ultra-low-sulfur distillate oil	-
Filterable Particulate Matter:	FPM	0.15	g/hp-hr	40 CFR 60, Subpart IIII, standard for a 175 hp to 300 hp (Tier 3) engine	-
Nitrogen Oxides:	NOX	2.85	g/hp-hr	40 CFR 60, Subpart IIII, standard for a 175 hp to 300 hp (Tier 3) engine	6
Carbon Monoxide:	CO	2.60	g/hp-hr	40 CFR 60, Subpart IIII, standard for a 175 hp to 300 hp (Tier 3) engine	-
Volatile Organic Compounds:	VOC	0.15	g/hp-hr	40 CFR 60, Subpart IIII, standard for a 175 hp to 300 hp (Tier 3) engine	6
Fuel-Sulfur Oxidation:	-	5.0	%	Engine-outlet fuel-S conversion to SO3/H2SO4 (by analogy with CT units)	-

Notes:

1 Potential emergency-use operating hours

2 Estimated to be the approximately the same as Paradise CC (D. Tibbs in 1-12-15 conf. call w/ Strunk, Myers, Byars, Hoy, Wylie, Crooks)

3 EPA AP-42, Vol. 1, 5th Ed., Sec. 3.3 - Gasoline and Diesel Industrial Engines - Supp. B, 10/96; ref. states all PM to be less than 1.0 microns in diameter.

4 EPA AP-42, Vol. I, 5th Edition, Section 1.3 - Fuel Oil Combustion - Supplement E, 9/99 (corrected 5/10)

5 EPA AP-42, Vol. 1, 5th Edition, Appendix A, 9/85 (reformatted 1/95)

6 "CARB Emission Factors for CI Diesel Engines - Percent HC in Relation to NMHC+NOX," June 28, 2004: "When the [NMHC] and [NOX] emission factor is combined, assume a breakdown of 5% and 95%, respectively."

Table 2. Annual Diesel Burned

Units	FP01
gal/yr	7,475
10^6 Btu/yr	1,047

Table 3. Criteria / Non-HAP Pollutant Emission Estimates

Pollutant	-	Note	Emission Factor, g/hp-hr	Emission Factor, lb/10^6 Btu	Hourly, lb/eng-hr	Annual, tons/yr
Filterable Particulate Matter	FPM	-	0.15	4.72E-02	9.89E-02	2.47E-02
FPM < 10-micrometer aero. dia.	FPM10	-	-	4.72E-02	9.89E-02	2.47E-02
FPM < 2.5-micrometer aero. dia.	FPM2.5	-	-	4.72E-02	9.89E-02	2.47E-02
Condensable Particulate Matter	CPM	-	-	4.72E-02	9.89E-02	2.47E-02
Sulfur Dioxide	SO2	2	-	1.43E-03	3.00E-03	7.50E-04
Nitrogen Oxides	NOX	-	2.85	8.98E-01	1.88E+00	4.70E-01
Carbon Monoxide	CO	-	2.60	8.19E-01	1.71E+00	4.28E-01
Volatile Organic Compounds	VOC	-	0.15	4.72E-02	9.89E-02	2.47E-02
Sulfuric Acid (SO3/H2SO4) as H2SO4	H2SO4	2	-	1.16E-04	2.42E-04	6.04E-05
Carbon Dioxide	CO2	3	-	163.1	341	85
Methane	CH4	3	-	6.61E-03	1.38E-02	3.46E-03
Nitrous Oxide	N2O	3	-	1.32E-03	2.77E-03	6.92E-04
Greenhouse Gas (GHG) as CO2 equiv.	CO2e	-	-	163.6	342	86

Notes:

1 [Reserved]

2 SO2 and SO3/H2SO4 emission estimates are based on mass-balance calculation for conversion of fuel sulfur to SO2 or SO3/H2SO4.

3 US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart A, Table A-1 and Subpart C, Tables C-1 & C-2, as amended 11-29-13 (78 FR 71904)

Table 4. Trace Elements Emission Estimates

Pollutant	(Symbol)	Note	Emission Factor, [1] lb/10^3 gal	Emission Factor, [1] lb/10^6 Btu	Hourly, lb/eng-hr	Annual, tons/yr
Arsenic	As	HAP	-	1.10E-05	2.30E-05	5.76E-06
Beryllium	Be	HAP	-	3.10E-07	6.49E-07	1.62E-07
Cadmium	Cd	HAP	-	4.80E-06	1.00E-05	2.51E-06
Chlorine as Hydrogen Chloride	HCl	2,HAP	-	3.11E-04	6.50E-04	1.63E-04
Chromium	Cr	HAP	-	1.10E-05	2.30E-05	5.76E-06
Copper	Cu	3	-	1.01E-05	2.11E-05	5.28E-06
Lead	Pb	HAP	-	1.40E-05	2.93E-05	7.33E-06
Manganese	Mn	2,HAP	-	1.01E-04	2.11E-04	5.27E-05
Mercury	Hg	HAP	-	1.20E-06	2.51E-06	6.28E-07
Nickel	Ni	HAP	-	4.60E-06	9.63E-06	2.41E-06
Selenium	Se	HAP	-	2.50E-05	5.23E-05	1.31E-05
Zinc	Zn	3	-	8.90E-06	1.86E-05	4.66E-06

Notes:

1 Unless noted, emission factors are from EPA AP-42, Vol. I, 5th Ed., Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

2 No. 2 Oil: HCl and Mn emission factors are derived from TVA Combustion-Turbine (CT) Fuel-Oil Specifications (#2 Distillate) Revision 5.0, 17-Jan-2001: Nominal heat content for distillate fuel oil = 140000 Btu [HHV]/gallon

3 Trace Element Emission Factors from Distillate Oil Combustion, Paul Chu, EPRI, 5-13-99 (Source: PISCES database 4-6-99)

HAP This abbreviation denotes "Hazardous Air Pollutant."

Table 5. Organic HAP Emission Estimates

Pollutant	(CASRN)	Note	Emission Factor, [1] lb/10^3 gal	Emission Factor, [1] lb/10^6 Btu	Hourly, lb/eng-hr	Annual, tons/yr
1,3-Butadiene	106-99-0	HAP	-	3.91E-05	8.18E-05	2.05E-05
Acenaphthene	83-32-9	POM	-	1.42E-06	2.97E-06	7.43E-07
Acenaphthylene	208-96-8	POM	-	5.06E-06	1.06E-05	2.65E-06
Acetaldehyde	75-07-0	HAP	-	7.67E-04	1.61E-03	4.01E-04
Acrolein	107-02-8	HAP	-	9.25E-05	1.94E-04	4.84E-05
Anthracene	120-12-7	POM	-	1.87E-06	3.91E-06	9.78E-07
Benzene	71-43-2	HAP	-	9.33E-04	1.95E-03	4.88E-04
Benzo(a)anthracene	56-55-3	PAC	-	1.68E-06	3.52E-06	8.79E-07
Benzo(a)pyrene	50-32-8	PAC	-	1.88E-07	3.93E-07	9.84E-08
Benzo(b)fluoranthene	205-99-2	PAC	-	9.91E-08	2.07E-07	5.19E-08
Benzo(g,h,i)perylene	191-24-2	POM	-	4.89E-07	1.02E-06	2.56E-07
Benzo(k)fluoranthene	207-08-9	PAC	-	1.55E-07	3.24E-07	8.11E-08
Chrysene	218-01-9	PAC	-	3.53E-07	7.39E-07	1.85E-07
Dibenzo(a,h)anthracene	53-70-3	PAC	-	5.83E-07	1.22E-06	3.05E-07
Fluoranthene	206-44-0	PAC	-	7.61E-06	1.59E-05	3.98E-06
Fluorene	86-73-7	POM	-	2.92E-05	6.11E-05	1.53E-05
Formaldehyde	50-00-0	HAP	-	1.18E-03	2.47E-03	6.17E-04
Indeno(1,2,3-c,d)pyrene	193-39-5	PAC	-	3.75E-07	7.85E-07	1.96E-07
Naphthalene	91-20-3	HAP	-	8.48E-05	1.77E-04	4.44E-05
Phenanthrene	85-01-8	POM	-	2.94E-05	6.15E-05	1.54E-05
Pyrene	129-00-0	POM	-	4.78E-06	1.00E-05	2.50E-06
Toluene	108-88-3	HAP	-	4.09E-04	8.56E-04	2.14E-04
Xylenes	1330-20-7	HAP	-	2.85E-04	5.97E-04	1.49E-04
Polycyclic Aromatic Compounds	PAC	-	-	1.10E-05	2.31E-05	5.78E-06
Polycyclic Organic Matter	POM	HAP	-	8.33E-05	1.74E-04	4.36E-05
Organic HAP Total	-	-	-	3.87E-03	8.11E-03	2.03E-03
Total HAP	-	-	-	4.36E-03	9.12E-03	2.28E-03

Notes:

1 EPA AP-42, Vol. 1, 5th Ed., Chapter 3.3 - Gasoline and Diesel Industrial Engines - Supplement B, 10/96

HAP This abbreviation denotes "Hazardous Air Pollutant."

PAC This abbreviation denotes "Polycyclic Aromatic Compounds". This group does not have an associated CASRN.

POM This abbreviation denotes "Polycyclic Organic Matter" (POM), which is broad class of organic compounds that includes PAH and PAC. The POM group is defined as a HAP.

NEW CALEDONIA GENERATION

Project Potential to Emit (tons/yr)

Table 1. General Operations

Parameter	Note	GE 7E.03 CT Units: Routine	Startup/SD	Total	% SU/SD	Gas Heaters	Fire Pump	Project Total
Natural Gas Annual Operating Hours	per Unit	1,529	163	-	-	3,500	-	-
Startup / Shutdown Events	per Unit	-	150	-	-	-	-	-
No. 2 Fuel Oil Annual Operating Hours	per Unit	32	13	-	-	-	500	-
Startup / Shutdown Events	per Unit	-	12	-	-	-	-	-
Miscellaneous Annual Operating Hours	per Unit	-	-	-	-	-	-	-

Table 2. Criteria / Non-HAP Pollutants

Pollutant	(Abbrev.)	Note	GE 7E.03 CT Units: Routine	Startup/SD	Total	% SU/SD	3 Gas Heaters	1 Fire Pump	Project Total	Pollutant	Project Totals	NSR Limits tons/yr
Filterable Particulate Matter	FPM	-	7.02E+00	1.44E+00	8.46E+00	17.1	9.68E-02	2.47E-02	8.59E+00	FPM	9	25
FPM < 10-micrometer aero. dia.	FPM10	-	7.02E+00	1.44E+00	8.46E+00	17.1	9.68E-02	2.47E-02	8.59E+00	TPM10	17	15
FPM < 2.5-micrometer aero. dia.	FPM2.5	-	7.02E+00	1.44E+00	8.46E+00	17.1	9.68E-02	2.47E-02	8.59E+00	TPM2.5	17	10
Condensable Particulate Matter	CPM	-	7.02E+00	1.44E+00	8.46E+00	17.1	2.90E-01	2.47E-02	8.78E+00	-	-	-
Sulfur Dioxide	SO2	-	1.85E+00	8.38E-02	1.94E+00	4.32	3.06E-02	7.50E-04	1.97E+00	SO2	2	40
Nitrogen Oxides	NOX	-	1.31E+02	3.05E+01	1.62E+02	18.8	5.72E-01	4.70E-01	1.63E+02	NOX	163	40
Carbon Monoxide	CO	-	9.39E+01	8.98E+01	1.84E+02	48.9	3.85E+00	4.28E-01	1.88E+02	CO	188	100
Volatile Organic Compounds	VOC	-	7.59E+00	5.27E+01	6.02E+01	87.4	7.80E-01	2.47E-02	6.11E+01	VOC	61	40
Sulfuric Acid	H2SO4	-	2.97E-03	1.34E-04	3.10E-03	4.30	5.02E-05	6.04E-05	3.22E-03	H2SO4	0.0	7
Ammonia	NH3	-	-	-	-	-	-	-	-	-	-	-
Carbon Dioxide	CO2	-	357,061	15,485	372,545	4.16	6,115	85	378,745	-	-	-
Methane	CH4	-	6.92E+00	4.11E-01	7.33E+00	5.61	1.15E-01	3.46E-03	7.45E+00	-	-	-
Nitrous Oxide	N2O	-	7.57E-01	4.72E-02	8.05E-01	5.86	1.15E-02	6.92E-04	8.17E-01	-	-	-
CO2 equivalent (GHGs)	CO2e	-	357,459	15,504	372,963	4.16	6,121	86	379,170	CO2e	379,170	75,000

Table 3. Trace-Element Pollutants

			GE 7E.03 CT Units									
Pollutant	**(Symbol)**	**Note**	**Routine**	**Startup/SD**	**Total**	**% SU/SD**	**3 Gas Heaters**	**1 Fire Pump**	**Project Total**	**Pollutant**	**Project Totals**	**NSR Limits tons/yr**
Antimony	Sb	HAP	-	-	5.99E-04	-	9.36E-06	-	6.08E-04	-	-	-
Arsenic	As	HAP	-	-	6.50E-03	-	1.02E-05	5.76E-06	6.52E-03	-	-	-
Barium	Ba	-	-	-	1.33E-02	-	2.24E-04	-	1.35E-02	-	-	-
Beryllium	Be	HAP	-	-	1.95E-04	-	6.11E-07	1.62E-07	1.96E-04	-	-	-
Cadmium	Cd	HAP	-	-	2.64E-03	-	5.61E-05	2.51E-06	2.69E-03	-	-	-
Hydrogen Chloride	HCl	HAP	-	-	1.62E-01	-		1.63E-04	1.62E-01	-	-	-
Chromium	Cr	HAP	-	-	9.39E-03	-	7.13E-05	5.76E-06	9.47E-03	-	-	-
Cobalt	Co	HAP	-	-	2.66E-04	-	4.28E-06	-	2.70E-04	-	-	-
Copper	Cu	-	-	-	7.59E-03	-	4.33E-05	5.28E-06	7.64E-03	-	-	-
Hydrogen Fluoride	HF	HAP	-	-		-	-	-	-	HF	0	3
Lead	Pb	HAP	-	-	8.63E-03	-	2.55E-05	7.33E-06	8.66E-03	Pb	0.01	0.60
Manganese	Mn	HAP	-	-	5.38E-02	-	1.94E-05	5.27E-05	5.39E-02	-	-	-
Mercury	Hg	HAP	-	-	6.28E-04	-	1.32E-05	6.28E-07	6.42E-04	-	-	-
Nickel	Ni	HAP	-	-	1.04E-02	-	1.07E-04	2.41E-06	1.05E-02	-	-	-
Selenium	Se	HAP	-	-	1.31E-02	-	1.22E-06	1.31E-05	1.31E-02	-	-	-
Vanadium	V	-	-	-	5.99E-03	-	1.17E-04	-	6.10E-03	-	-	-
Zinc	Zn	-	-	-	9.92E-02	-	1.48E-03	4.66E-06	1.01E-01	-	-	-

Note:
HAP This abbreviation denotes "Hazardous Air Pollutant."

Table 4. Organic HAP / Compounds

Pollutant	(CASRN)	Note	Routine	Startup /SD	Total	% SU/SD	3 Gas Heaters	1 Fire Pump	Project Total
			GE 7E.03 CT Units						
1,1,2,2-Tetrachloroethane	79-34-5	HAP	-	-	-	-	-	-	0.00E+00
1,1,2-Trichloroethane	79-00-5	HAP	-	-	-	-	-	-	0.00E+00
1,3-Butadiene	106-99-0	HAP	-	-	1.43E-03	-	-	2.05E-05	1.45E-03
1,3-Dichloropropene	542-75-6	HAP	-	-	-	-	-	-	0.00E+00
2,2,4-Trimethylpentane	540-84-1	HAP	-	-	-	-	-	-	0.00E+00
2-Methylnaphthalene	91-57-6	POM	-	-	5.39E-04	-	1.22E-06	-	5.40E-04
3-Methylcholanthrene	56-49-5	PAC	-	-	-	-	9.17E-08	-	9.17E-08
7,12-Dimethylbenz(a)anthracene	57-97-6	PAC	-	-	-	-	8.15E-07	-	8.15E-07
Acenaphthene	83-32-9	POM	-	-	-	-	9.17E-08	7.43E-07	8.35E-07
Acenaphthylene	208-96-8	HAP	-	-	-	-	9.17E-08	2.65E-06	2.74E-06
Acetaldehyde	75-07-0	HAP	-	-	1.33E-01	-	-	4.01E-04	1.33E-01
Acrolein	107-02-8	HAP	-	-	2.13E-02	-	-	4.84E-05	2.13E-02
Anthracene	120-12-7	POM	-	-	-	-	1.22E-07	9.78E-07	1.10E-06
Benzene	71-43-2	HAP	-	-	3.99E-02	-	1.07E-04	4.88E-04	4.05E-02
Benzo(a)anthracene	56-55-3	PAC	-	-	-	-	9.17E-08	8.79E-07	9.71E-07
Benzo(b)fluoranthene	205-99-2	PAC	-	-	-	-	9.17E-08	5.19E-08	1.44E-07
Benzo(a)pyrene	50-32-8	PAC	-	-	-	-	6.11E-08	9.84E-08	1.60E-07
Benzo(e)pyrene	192-97-2	POM	-	-	-	-	-	-	0.00E+00
Benzo(g,h,i)perylene	191-24-2	POM	-	-	-	-	6.11E-08	2.56E-07	3.17E-07
Benzo(k)fluoranthene	207-08-9	PAC	-	-	-	-	9.17E-08	8.11E-08	1.73E-07
Biphenyl	92-52-4	HAP	-	-	-	-	-	-	0.00E+00
Carbon Tetrachloride	56-23-5	HAP	-	-	-	-	-	-	0.00E+00
Chlorobenzene	108-90-7	HAP	-	-	-	-	-	-	0.00E+00
Chloroform	67-66-3	HAP	-	-	-	-	-	-	0.00E+00
Chrysene	218-01-9	PAC	-	-	-	-	9.17E-08	1.85E-07	2.76E-07
Dibenzo(a,h)anthracene	53-70-3	PAC	-	-	-	-	6.11E-08	3.05E-07	3.66E-07
Dichlorobenzene [mixed isomers]	25321-22-6	HAP	-	-	-	-	6.11E-05	-	6.11E-05
Ethylbenzene	100-41-4	HAP	-	-	1.06E-01	-	-	-	1.06E-01
Ethylene Dibromide	106-93-4	HAP	-	-	-	-	-	-	0.00E+00
Fluoranthene	206-44-0	PAC	-	-	-	-	1.53E-07	3.98E-06	4.13E-06
Fluorene	86-73-7	POM	-	-	-	-	1.43E-07	1.53E-05	1.54E-05
Formaldehyde	50-00-0	HAP	-	-	7.32E-01	-	3.82E-03	6.17E-04	7.36E-01
Indeno(1,2,3-c,d)pyrene	193-39-5	PAC	-	-	-	-	9.17E-08	1.96E-07	2.88E-07
Methanol	67-56-1	HAP	-	-	-	-	-	-	0.00E+00
Methylene Chloride	75-09-2	HAP	-	-	-	-	-	-	0.00E+00
Naphthalene	91-20-3	HAP	-	-	4.32E-03	-	3.11E-05	4.44E-05	4.40E-03
n-Hexane	110-54-3	HAP	-	-	-	-	2.19E-05	-	2.19E-05
Phenanthrene	85-01-8	POM	-	-	3.69E-04	-	8.66E-07	1.54E-05	3.85E-04
Phenol	108-95-2	HAP	-	-	-	-	-	-	0.00E+00

Pollutant	(CASRN)	Note	Routine	Startup /SD	Total	% SU/SD	3 Gas Heaters	1 Fire Pump	Project Total
Propylene Oxide	75-56-9	HAP	-	-	9.64E-02	-	-	-	9.64E-02
Pyrene	129-00-0	POM	-	-	-	-	2.55E-07	2.50E-06	2.76E-06
Styrene	100-42-5	HAP	-	-	-	-	-	-	0.00E+00
Tetrachloroethane	79-34-5	HAP	-	-	-	-	-	-	0.00E+00
Toluene	108-88-3	HAP	-	-	4.32E-01	-	1.73E-04	2.14E-04	4.33E-01
Vinyl Chloride	75-01-4	HAP	-	-	-	-	-	-	0.00E+00
Xylenes	1330-20-7	HAP	-	-	2.13E-01	-	-	1.49E-04	2.13E-01
Polycyclic Aromatic Compounds	PAC	POM	-	-	-	-	1.64E-06	5.78E-06	7.42E-06
Polycyclic Aromatic Hydrocarbons	PAH	POM	-	-	7.32E-03	-	-	-	7.32E-03
Polycyclic Organic Matter	POM	HAP	-	-	8.22E-03	-	4.49E-06	4.36E-05	8.27E-03
Organic HAP Total	-	-	-	-	1.79E+00	-	4.22E-03	2.03E-03	1.79E+00
Total HAP	-	-	-	-	2.06E+00	-	4.54E-03	2.28E-03	2.06E+00

Notes:

HAP This abbreviation denotes "Hazardous Air Pollutant."

PAC This abbreviation denotes "Polycyclic Aromatic Compounds" (PAC). Although the PAC group is not identified as a Clean Air Act Section 112(b) HAP, it is reportable for Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 (i.e., Toxic Release Inventory [TRI]).

POM This abbreviation denotes "Polycyclic Organic Matter" (POM), which is broad class of organic compounds that includes Polycyclic Aromatic Hydrocarbons (PAH) and Polycyclic Aromatic Compounds (PAC). The POM group is defined as a HAP.

CALCULATION CONSTANTS

Table 1. Molecular Weights [1]

-	Formula	MW
Ammonia	NH3	17.0304
Ammonium Sulfate	(NH4)2SO4	132.1382
Argon	Ar	39.948
Butane	C4H10	58.1236
Carbon Dioxide	CO2	44.00995
Carbon Monoxide	CO	28.01055
Chloride	Cl	35.453
Ethane	C2H6	30.0697
Fluoride	F	18.9984
Formaldehyde	CH2O	30.02635
Hexane	C6H14	86.1775
Hydrogen Chloride	HCl	36.4609
Hydrogen Fluoride	HF	20.0063
Hydrogen Sulfide	H2S	34.0798
Mercury	Hg	200.59
Methane	CH4	16.04275
Natural Gas [2]	-	17.1676532
Nitrogen	N2	28.0134
Nitrogen Monoxide	NO	30.0061
Nitrogen Oxides [3]	NO2	46.0055
Oxygen	O2	31.9988
Pentane	C5H12	72.15055
Propane	C3H8	44.09665
Selenium	Se	78.96
Sulfur	S	32.064
Sulfur Dioxide	SO2	64.0628
Sulfur Trioxide	SO3	80.0622
Sulfuric Acid	H2SO4	98.0774
Water	H2O	18.0152

Note:

1 Chemical Engineers' Handbook, 5th Edition, R.H. Perry & C.H. Chilton, Editors, 1973

2 GE for the 7F.05, 7HA units and LM6000 units are based on the following TVA-supplied natural gas analysis:

Methane	CH4	16.04275	94.71
Ethane	C2H6	30.0697	2.62
Propane	C3H8	44.09665	0.52
Butane	C4H10	58.1236	0.22
Pentane	C5H12	72.15055	0.08
Hexane+	C6H14	86.1775	0.085
Nitrogen	N2	28.0134	0.495
Carbon Dioxide	CO2	44.00995	1.27
		17.1676532	100

Corresponding Lower Heating Value (LHV):

Corresponding Higher Heating Value (HHV):

AP-42 standard cubic feet of gas is at **60** deg F; therefore, natural gas density is

3 Nitrogen oxides (NOX) reported as nitrogen dioxide (NO2)

Table 2. Default Greenhouse-Gas (GHG) Emission Factors (lbs/10^6 Btu) [1]

Fuel	CO2	CH4	N2O	CO2e
Pipeline Natural Gas	117.0	2.20E-03	2.20E-04	117.1
Distillate Oil (No. 2)	163.1	6.61E-03	1.32E-03	163.6

Note:
US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart C, Tables C-1 & C-2, as amended 11-29-13 (78 FR 71904)

Table 3. Global Warming Potentials (GWP) for Combustion-Source Greenhouse-Gas (GHG) Pollutants (100-Year Time Horizon) [1]

-	CO2	CH4	N2O	SF6
Global Warming Potntl	1	25	298	22,800

Note:
1 US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart A, Table A-1, as amended 11-29-13 (78 FR 71904)

Table 4. Molar Volume and F-Factors

Gas Constant:	0.7302	ft^3-atm/(lbmol-deg R)	-
Standard Temp:	68	degF	40 CFR 60 Appendix, Method 19, Table 19-2, Footnote
Standard Press:	1	atm	40 CFR 60 Appendix, Method 19, Table 19-2, Footnote
Molar Volume:	385.3	ft^3/lbmole	-
F Factor - Nat Gas:	8,710	dscf/10^6 Btu	40 CFR 60 Appendix, Method 19, Table 19-2
F Factor - Oil:	9,190	dscf/10^6 Btu	40 CFR 60 Appendix, Method 19, Table 19-2
Perfect Heat Rate:	3,413	Btu/kWh	40 CFR 60 Subpart TTTTa, "Potential electric output" definition

Table 5. Formaldehyde (CH2O) Emission Factor Determination

The AP-42 Section 3.1 - Stationary Gas Turbines - 4/00 database [1] includes test results from a wide variety of combustion turbine (CT) units, which is reflected by a high relative standard deviation (i.e., 206) for the CH2O emission factor. TVA believes the AP-42 emission factor (i.e., 7.1E-04 lb/10^6 Btu) is not representative of the proposed combined cycle-CT unit. The 22 CT units cited in the AP-42 Section 3.1 database include nine (9) units (represents 41 percent of the data set) that have ratings less than 15 MW, and five (5) units (represents 23 percent of the data set) that are aircraft derivative (General Electric [GE] LM series) units. The remainder (eight [8] units) are large frame-type CT units, and six (6) of these are GE frame-type CT units. TVA considers the six (6) GE to be the most representative (see list B).

Note [1]: Access database (file "r03s01.zip") downloaded from EPA's CHIEF Website 4-16-01.

A. Formaldehyde (CH2O) Emission Factors from EPA's Combustion Turbine (CT) Database

(CH2O Measurements at Natural Gas-Fired CT Units at 80 - 110 % Load with no Hazardous Air Pollutant [HAP] Controls)

ID	Manufacturer	Model	Rating (MW)	Load (%)	Flag	Emssn Fctr (lb/10^6 Btu)	Count of Runs	ND Count	Control Device
9	Allison	501 KB5	4	85	<	1.34E-05	3	2	Water Injection
3.1	Brown-Boveri-Sulzer	11-D	61.75	107	<	2.28E-03	3	1	Steam Injection
13.1	General Electric	5221	17	95	<	4.73E-04	3	1	Water Injection
313.1.1	General Electric	Frame 3	7.7	100	-	2.60E-04	3	0	None
27	General Electric	Frame 6	42.5	100	<	5.72E-05	3	1	DLN; SCR w/ NH3 Injctn
18	General Electric	Frame 7	75	100	-	8.42E-05	3	0	Water Injection for NOX
15.1	General Electric	Frame 7B	50	100	-	1.32E-04	2	0	Water Injection
28	General Electric	LM 2500	24	100	-	8.95E-05	3	0	None
318.1.1	General Electric	LM 2500	23	100	-	7.09E-04	3	0	None
315.1	General Electric	LM1500	10.6	100	-	4.19E-03	3	0	None
22	General Electric	LM2500	20.5	95	-	9.87E-05	3	0	Water Injection
2	General Electric	LM5000	23.33	100	<	6.19E-05	3	2	None
12.1	General Electric	MS6000	44	100	-	1.08E-04	3	0	None
26	General Electric	MS7001EA	87.83	100	-	6.70E-06	3	0	None
6.2	General Electric	NS5000P	46.3	100	-	2.94E-04	3	0	None
316.1.1	Rolls Royce	Avon	10.7	100	-	5.61E-03	3	0	None
316.2.1	Rolls Royce	Spey	12.2	100	-	1.84E-05	3	0	None
317.1	Solar	Mars	10.9	100	-	2.21E-06	3	0	None
7	Solar	Mars	9	100	-	7.25E-04	3	0	Water Injection
314.1	Solar	Mars SoLoNOx T14000	10.9	100	-	1.45E-05	3	0	Lean Pre-Mix (SoLoNOX)
313.2.1	Solar	T12000	9.4	100	<	1.55E-05	3	1	None
4.2	Westinghouse	PACE520	63	100	-	3.44E-04	2	0	Water Injection

AP-42 Section 3.1 Emission Factor Analysis

Average Emission Factor =	7.1E-04 lb/10^6 Btu
Count =	22
Standard Deviation =	1.46E-03
Relative Standard Deviation =	206.1**%**

GE Large Frame-Type CT Units (>40 MW) Emission Factor Analysis

Average GE Emission Factor =	1.14E-04 lb/10^6 Btu
GE Count =	6
Standard Deviation =	9.84E-05
Relative Standard Deviation =	86.5 **%**

The data for the GE large frame-type CT units still contain a fair amount of variability (relative standard deviation of 86 percent), so TVA has incorporated a safety margin into the emission factor, using 0.000135 lb/10^6 Btu to estimate CH2O emissions. Additionally, similar considerations concludes TVA to adjust the AP-42 distillate oil-fired CH2O emission factor and will use 0.00023 lb/10^6 Btu.

Table 1 to Subpart YYYY of Part 63 provides a formaldehyde emission limit of 91 PPVD AT 15% o2. For natural firing, this equates to 2.20E-04 lb/10^6 Btu; for oil-firing, this equates to 2.30E-04 lb/10^6 Btu.

Average Capacity Factor Scenario

NEW CALEDONIA GENERATION: GE 7E.03 COMBUSTION TURBINE (CT)

Table 1. Natural Gas-Fired Inputs EP&C APS - Date: 18-Jun-24

Parameter	-	Value	Units	Comment	Note
Number of Units:	-	6		each with 15.6 ft stk ID and 131 ft stack height	A
Annual Operation:	-	1,529	hr/CT-yr	Steady-state hrs sans 163 CT-hrs for startups/shutdowns	1
Max-Modeled Heat Input at -10 deg F:	-	1,166	*10^6 Btu/hr	per CT; M. 19 F-Factor: 8,710 dscf/10^6 Btu	2
Annual-Avg. Heat Input at 59 deg F:	-	994	*10^6 Btu/hr	per CT; M. 19 F-Factor: 8,710 dscf/10^6 Btu	2
Annual Avg. Fuel Heat Content:	-	1,020	Btu/scf	scf = standard ft^3; nominal, higher heating value (HHV)	3
Fuel Sulfur Content:	-	2,000	gr/10^6 scf	gr = grains; equivalent to 6.32E-04 % S (0.04524 lb/scf at 60 deg F)	3,4
Total PM (as TPM10/2.5)	TPM10	4.29E-03	lb/10^6 Btu	Manufacture guarantee: 5 lb/hr; emissions < given rate – GE	2
Sulfur Dioxide:	SO2	6.00E-04	lb/10^6 Btu	AP-42 states 100% fuel S conversion: 0.94* %S (lb/10^6 Btu)	3
Nitrogen Oxides:	NOX	11.0	ppmvd	Manufacturer's data at 15% O2	5
Carbon Monoxide:	CO	14.0	ppmvd	Manufacturer's data at 15% O2	5
Volatile Organic Compounds:	VOC	1.4	ppmvw	Manufacturer's data at 15% O2 (wet)	2
Fuel-Sulfur Oxidation:	-	5.0	%	Estimated portion of fuel-sulfur that is oxidized to SO3 / H2SO4	7

Notes:

A Stack (Stk) internal diameter (ID) and height from GE Tech spec "1640722-G1N1-Rev 3.pdf

1 Equivalent annual hours via the generation restriction determined by 40 CFR Part 60, Subpart TTTTa, potential electric output (PEO) at base load HHV ISO (equiv.) rating times 20% capacity factor for the low load combustion turbine category: 153,000 MWh/CT-yr

2 GE Tech spec "1640722-G1N1-Rev 3_ChangeOrder1.pdf

3 EPA AP-42, Vol. I, 5th Edition, Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

4 AP-42 conversion factor assumes all fuel sulfur is converted to SO2. Emission factor used is the 40 CFR Part 75 App. D, 2.3.1.1.1, default SO2 emission rate for firing pipeline natural gas, which will be subsumed into the operating permit. Part 75 emission rate approximates to 2,000 gr/10^6 scf at 60 deg F.

5 Manufacture's guarantee: L. Kaufman [GE] 6-07-24 email to Mike Hoy, et. al.

6 Manufacture assumes VOC is 20% of the predicted UHC.

7 J.P. Lobene [GE] 3-2-01 email to S.C. Strunk

Table 2. No. 2 Distillate Oil-Fired Inputs

Parameter	-	Value	Units	Comment	Note
Number of Units:	-	6			
Annual Operation:	-	32	hr/CT-yr	2*10^6 gal. of storage sans 13.0 CT-hrs for startups/shutdowns	
Max-Modeled Heat Input at -10 deg F:	-	1,196	*10^6 Btu/hr	per CT; M. 19 F-Factor 9,190 dscf/10^6 Btu	
Annual-Avg. Heat Input at 59 deg F:	-	1,047	*10^6 Btu/hr	per CT; M. 19 F-Factor: 9,190 dscf/10^6 Btu	
Heat Content:	-	140,000	Btu/gal	Nominal, higher heating value (HHV) heat content; approx. AP-42 ref.'s value	1
Fuel Sulfur Content:	-	0.0015	%	Ultra-low-sulfur distillate oil	
Total PM2.5:	TPM2.5	1.88E-02	lb/10^6 Btu	Manufacturer data: 22.5 lb/hr; emissions < given rate - GE	2
Sulfur Dioxide:	SO2	1.52E-03	lb/10^6 Btu	AP-42 states 100% fuel S conversion: 1.01 * %S (lb/10^6 Btu)	1
Nitrogen Oxides:	NOX	42.0	ppmvd	Manufacturer's data at 15 % O2	2
Carbon Monoxide:	CO	20.0	ppmvd	Manufacturer's data at 15 % O2	2
Volatile Organic Compounds:	VOC	3.5	ppmvw	Manufacturer's data at 15 % O2 (wet_	2,3
Fuel-Sulfur Oxidation:	-	5.0	%	Estimated portion of fuel-sulfur that is oxidized to SO3 / H2SO4	5

Notes:

1 EPA AP-42, Vol. I, 5th Edition, Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

2 GE Tech spec "1640722-G1N1-Rev 3_ChangeOrder1.pdf"

3 Manufacture assumes VOC is 50% of the predicted UHC.

4 [Reserved]

5 J.P. Lobene [GE] 3-2-01 email to S.C. Strunk

Table 2. Annual Fuel Burned (per CT)

Fuel	Units	NCG01	NCG02	NCG03	NCG04	NCG05	NCG06
Natrl Gas	10^3 scf/yr	1,491,085	1,491,085	1,491,085	1,491,085	1,491,085	1,491,085
Dist. Oil	10^3 gal/yr	236	236	236	236	236	236
Total	10^6 Btu/yr	1,553,957	1,553,957	1,553,957	1,553,957	1,553,957	1,553,957

Table 3. Criteria/Non-HAP Pollutant Average-Annual Emissions at 59 deg F and Max Short-Term Emissions

Pollutant	(Abbrev.)	Note	Emssn Fctr, lb/10^6 Btu Natrl Gas	No. 2 Oil	Max Hrly, lb/CT-hr	Avg. Hourly, lb/CT-hr Natrl Gas	No. 2 Oil	Avg. Annual, tons/CT-yr Natrl Gas	No. 2 Oil	Total tons/yr
Filterable Particulate Matter	FPM	-	2.14E-03	9.40E-03	1.13E+01	2.13E+00	9.85E+00	1.63E+00	1.55E-01	1.07E+01
FPM < 10-micrometer aero. dia.	FPM10	-	2.14E-03	9.40E-03	1.13E+01	2.13E+00	9.85E+00	1.63E+00	1.55E-01	1.07E+01
FPM < 2.5-micrometer aero. dia.	FPM2.5	1	2.14E-03	9.40E-03	1.13E+01	2.13E+00	9.85E+00	1.63E+00	1.55E-01	1.07E+01
Condensable Particulate Matter	CPM	2	2.14E-03	9.40E-03	1.13E+01	2.13E+00	9.85E+00	1.63E+00	1.55E-01	1.07E+01
Sulfur Dioxide	SO2	-	6.00E-04	1.52E-03	1.81E+00	5.97E-01	1.59E+00	4.56E-01	2.50E-02	2.89E+00
Nitrogen Oxides	NOX	3	4.05E-02	1.63E-01	1.95E+02	4.03E+01	1.71E+02	3.08E+01	2.70E+00	2.01E+02
Carbon Monoxide	CO	3	3.14E-02	4.73E-02	5.66E+01	3.12E+01	4.96E+01	2.39E+01	7.82E-01	1.48E+02
Volatile Organic Compounds	VOC	3	2.43E-03	6.84E-03	8.00E+00	2.42E+00	7.16E+00	1.85E+00	1.13E-01	1.18E+01
Sulfuric Acid (SO3/H2SO4) as H2SO4	H2SO4	-	9.66E-07	2.29E-06	2.74E-03	9.61E-04	2.40E-03	7.35E-04	3.79E-05	4.63E-03
Carbon Dioxide	CO2	5	120.0	163.1	195,059	119,336	170,784	91,254	2,694	563,693
Methane	CH4	6	2.20E-03	6.61E-03	7.91E+00	2.19E+00	6.93E+00	1.68E+00	1.09E-01	1.07E+01
Nitrous Oxide	N2O	6	2.20E-04	1.32E-03	1.58E+00	2.19E-01	1.39E+00	1.68E-01	2.19E-02	1.14E+00
Grnhouse Gas (GHG) as CO2 equiv.	CO2e	-	120.1	163.6	195,729	119,456	171,370	91,346	2,704	564,300

Notes:

1 EPA AP-42, Vol. I, 5th Ed., Sec. 3.1 - Stationary Gas Turbines - 1/95, Table 3.1-2: all FPM may be considered equal to, or less than, 2.5 micron.

2 EPA AP-42, Vol. I, 5th Edition, Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00, states all CPM is less than one micron.

3 Assumed ideal gas - conversion from concentration value utilizing a molar volume of 385.3 ft^3/lbmole at 68 deg F and 1 atmosphere (atm).

4 [Reserve]

5 "Low load" CT units in 40 CFR 60 Subpart TTTTa, Table 2, limit natrl gas-fired ops to 120 lb CO2 per 10^6 Btu.

6 US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart A, Table A-1 and Subpart C, Tables C-1 & C-2, as amended 11-29-13 (78 FR 71904)

Table 4. Trace Elements Average-Annual Emissions at 59 deg F and Max Short-Term Emissions at -10 deg F [1]

-	-	-	Emssn Fctr, lb/10^6 Btu		Max Hrly,	Avg. Hourly, lb/CT-hr		Avg. Annual, tons/CT-yr		Total
Pollutant	(Symbol)	Note	Natrl Gas	No. 2 Oil	lb/CT-hr	Natrl Gas	No. 2 Oil	Natrl Gas	No. 2 Oil	tons/yr
Antimony	Sb	2, HAP	1.80E-07	-	2.10E-04	1.79E-04	-	1.51E-04	-	9.09E-04
Arsenic	As	HAP	2.30E-07	1.10E-05	2.68E-04	2.29E-04	1.15E-02	1.93E-04	1.82E-04	6.90E-03
Barium	Ba	3	4.00E-06	-	4.67E-03	3.98E-03	-	3.37E-03	-	2.02E-02
Beryllium	Be	HAP	1.00E-08	3.10E-07	1.17E-05	9.94E-06	3.25E-04	8.41E-06	5.12E-06	2.12E-04
Cadmium	Cd	HAP	4.00E-08	4.80E-06	4.67E-05	3.98E-05	5.03E-03	3.37E-05	7.93E-05	2.70E-03
Chlorine as HCl	HCl	HAP	-	3.11E-04	-	-	3.25E-01		5.13E-03	1.62E-01
Chromium	Cr	HAP	1.10E-06	1.10E-05	1.28E-03	1.09E-03	1.15E-02	9.25E-04	1.82E-04	1.13E-02
Cobalt	Co	HAP	8.00E-08	-	9.33E-05	7.96E-05	-	6.73E-05	-	4.04E-04
Copper	Cu	3	7.00E-07	1.01E-05	8.17E-04	6.96E-04	1.06E-02	5.89E-04	1.67E-04	8.80E-03
Lead	Pb	HAP	4.00E-07	1.40E-05	4.67E-04	3.98E-04	1.47E-02	3.37E-04	2.31E-04	9.32E-03
Manganese	Mn	HAP	4.00E-07	1.01E-04	4.67E-04	3.98E-04	1.05E-01	3.37E-04	1.66E-03	5.45E-02
Mercury	Hg	HAP	8.00E-10	1.20E-06	9.33E-07	7.96E-07	1.26E-03	6.73E-07	1.98E-05	6.30E-04
Nickel	Ni	HAP	2.40E-06	4.60E-06	2.80E-03	2.39E-03	4.82E-03	2.02E-03	7.60E-05	1.45E-02
Selenium	Se	HAP	2.00E-08	2.50E-05	2.33E-05	1.99E-05	2.62E-02	1.68E-05	4.13E-04	1.31E-02
Vanadium	V	-	1.80E-06	-	2.10E-03	1.79E-03	-	1.51E-03	-	9.09E-03
Zinc	Zn	5	2.84E-05	8.90E-06	3.32E-02	2.83E-02	9.32E-03	2.39E-02	1.47E-04	1.48E-01

Notes:

1 Unless noted, emission factors are from Emission Factors Handbook [EFH] - Guidelines for Estimating Trace Substance Emissions from Fossil Fuel Steam Electric Plants, Electric Power Research Institute (EPRI), Report No. EPRI TR-105611, 11-95, Table 4-1 (Uncontrolled Gas-Fired Boiler Emission Factors)[*]
[*]While EPRI cautioned against using the data in Table 4-1 for gas-fired turbines, TVA believes that the trace-element emission factors should be reasonably applicable to CT units. Fuel composition determines trace-element emissions (mass-per-unit-energy basis) whether burned in a boiler or a CT unit.

2 Unless noted, emission factors are from EPA AP-42, Vol. I, 5th Ed., Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

3 Natrl Gas: US EPA, Air Emissions from Scrap Tire Combustion, EPA-600/R-97-115, October 1997 (natural gas-fired rotary-kiln incinerator simulator emission data)

4 [Reserved]

5 Natrl Gas: Emission Factors Handbook [EFH] Addendum, EPRI, 9-98, Table 4-1. Table 3-1 in April 2002 EFH Revision is the current version of this table.

6 No. 2 Oil: HCl and Mn emission factors are derived from TVA Combustion-Turbine (CT) Fuel-Oil Specifications (#2 Distillate) Revision 5.0, 17-Jan-2001:
Cl -6 ppmw; Mn -2 ppmw Density -7.05 lb/gal [AP-42, Vol. 1, 5th Ed., App. A, 9/85 (reformatted 1/95)]

7 No. 2 Oil: Trace Element Emission Factors from Distillate Oil Combustion, Paul Chu, EPRI, 5-13-99 (Source: PISCES database 4-6-99)

8 Natrl Gas: Emission Factors Handbook [EFH] Addendum 2, EPRI, 2-01, Table 4-1. Table 3-1 in April 2002 EFH Revision is the current version of this table.

9 Natrl Gas: EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - Supplement D, 7/98

HAP This abbreviation denotes "Hazardous Air Pollutant.

Table 5. Organic HAP Average-Annual Emissions at 59 deg F and Max Short-Term Emissions at -10 deg F [1]

Pollutant	(CASRN)	Note	Emssn Fctr, lb/10^6 Btu Natrl Gas	Emssn Fctr, lb/10^6 Btu No. 2 Oil	Max Hrly, lb/CT-hr	Avg. Hourly, lb/CT-hr Natrl Gas	Avg. Hourly, lb/CT-hr No. 2 Oil	Avg. Annual, tons/CT-yr Natrl Gas	Avg. Annual, tons/CT-yr No. 2 Oil	Total tons/yr
1,3-Butadiene	106-99-0	HAP	4.30E-07	1.60E-05	5.02E-04	4.28E-04	1.68E-02	3.62E-04	2.64E-04	2.17E-03
2-Methylnaphthalene	91-57-6	2, POM	1.62E-07		1.89E-04	1.61E-04		1.36E-04		8.18E-04
Acetaldehyde	75-07-0	HAP	4.00E-05		4.67E-02	3.98E-02		3.37E-02		2.02E-01
Acrolein	107-02-8	HAP	6.40E-06		7.47E-03	6.36E-03		5.38E-03		3.23E-02
Benzene	71-43-2	HAP	1.20E-05	5.50E-05	1.40E-02	1.19E-02	5.76E-02	1.01E-02	9.09E-04	6.06E-02
Ethylbenzene	100-41-4	HAP	3.20E-05		3.73E-02	3.18E-02		2.69E-02		1.62E-01
Formaldehyde	50-00-0	3, HAP	2.20E-04	2.30E-04	2.57E-01	2.19E-01	2.41E-01	1.85E-01	3.80E-03	1.11E+00
Naphthalene	91-20-3	HAP	1.30E-06	3.50E-05	1.52E-03	1.29E-03	3.67E-02	1.09E-03	5.78E-04	6.56E-03
Phenanthrene	85-01-8	2, POM	1.11E-07		1.29E-04	1.10E-04		9.34E-05		5.60E-04
Propylene Oxide	75-56-9	HAP	2.90E-05		3.38E-02	2.88E-02		2.44E-02		1.46E-01
Toluene	108-88-3	HAP	1.30E-04		1.52E-01	1.29E-01		1.09E-01		6.56E-01
Xylenes	1330-20-7	HAP	6.40E-05		7.47E-02	6.36E-02		5.38E-02		3.23E-01
Polycyclic Aromatic Hydrocarbons	PAH	POM	2.20E-06	4.00E-05	2.57E-03	2.19E-03	4.19E-02	1.85E-03	6.61E-04	1.11E-02
Polycyclic Organic Matter	POM	HAP	2.47E-06	4.00E-05	2.88E-03	2.46E-03	4.19E-02	2.08E-03	6.61E-04	1.25E-02
Organic HAP Total	-	-	5.38E-04	3.76E-04	6.27E-01	5.35E-01	3.94E-01	4.52E-01	6.21E-03	2.71E+00
Total HAP	-	-	5.38E-04	8.59E-04	6.27E-01	5.35E-01	9.00E-01	4.52E-01	1.42E-02	2.71E+00

Notes:

1 EPA AP-42, Vol. I, 5th Edition, Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

2 Gas-Fired Boiler and Turbine Air Toxics Summary Report, EPRI, Report No. EPRI TR-105646, Table S-2, 10-96

3 Table 1 to Subpart YYYY of Part 63 provides a formaldehyde emission limit of 91 ppbvd at 15 % O2. For natural gas firing, this equates to 2.20E-04 lb/10^6 Btu; for oil-firing, this equates to 2.30E-04 lb/10^6 Btu.

HAP This abbreviation denotes "Hazardous Air Pollutant."

POM This abbreviation denotes "Polycyclic Organic Matter" (POM), which is broad class of organic compounds that includes PAH and PAC. The POM group is defined as a HAP.

Table A. Baseload Gross Performance vs. Ambient Temperature [1]

Amb. Temp. deg F	kW/CT Natrl Gas	Btu/kW-hr HHV [2]	LHV	10^6 Btu/CT-hr HHV	LHV	Estimated Eff., %
-10	106,383	10,965	9,896	1,166	-	-
59	88,777	11,202	10,110	994	-	30.0
110 [a]	79,403	11,575	10,447	919	-	-

Note [a]: Performance reflects evap. cooler in service.

Table B. Baseload Flue-Gas Concentrations (%-Volume) vs. Ambient Temperature [1]

Species			Natrl Gas, Amb. Temp. (F)		
-	-	(Mole Wt.)	-10	59	110
Oxygen	O2	32.00	13.64	13.61	13.04
Carbon Dioxide	CO2	44.01	3.41	3.33	3.3
Water	H2O	18.02	6.58	7.36	10.39

Table C. Baseload Flue-Gas Parameters vs. Ambient Temperature [1]

		Natrl Gas, Amb. Temp. (F)		
Parameter	-	-10	59	110
Exhaust Mass Flow Rate per Unit [1]	lb/hr	2,634,000	2,292,000	-
Exhaust Temperature [1]	deg F	970	1,018	-
Average Molecular Weight	lb/lbmole	28.55	28.46	-
Stack-Exit Ambient Pressure	psia	14.519	14.519	-
Stk-Exit Volumetric Flow Rate (Actual)	acfm	1,624,795	1,465,920	-
Stk-Exit Vol. Flow (Dry): 68 deg F | 1 atm	dscfm	553,481	479,106	-
F-Factor at 68 deg F | 1 atm | 0% O2	dscf/10^6 Btu	8,581	8,587	-
[TDEC APC 3] Stack H2O	gr/dscf	23.3	26.3	-
[TDEC APC 3] Stack Velocity	ft/s	-	128	-
[TDEC APC 5] CT Heat Rate	kJ/W-hr	-	10.7	-
Stk-Exit Oxygen (O2)	%-dry	-	14.7	-

Note [1]: GE Tech spec "1640722-G1N1-Rev 3_ChangeOrder1.pdf"
Note [2]: HHV to LHV ratio assumed to equal 1.108
Ref.: GE 7F.05 Tech. Specs., June 2020

Table D. Baseload Gross Performance vs. Ambient Temperature [1]

Amb. Temp. deg F	kW/CT Dist. Oil	Btu/kW-hr HHV [3]	LHV	10^6 Btu/CT-hr HHV	LHV	Estimated Eff., %
-10	105,146	11,377	10,683	1,196	-	-
59	92,009	11,384	10,689	1,047	983	-
110 [a]	80,881	11,640	10,930	941	-	-

Note [a]: Performance reflects evap. cooler in service.

Table E. Baseload Flue-Gas Concentrations (%-Volume) vs. Ambient Temperature [1]

Species			Dist. Oil, Amb. Temp. (F)		
-	-	(Mole Wt.)	-10	59	110
Oxygen	O2	32.00	12.55	12.66	12.42
Carbon Dioxide	CO2	44.01	5.1	4.95	4.81
Water	H2O	18.02	8.21	8.64	10.65

Table F. Baseload Flue-Gas Parameters vs. Ambient Temperature [1]

Parameter		Dist. Oil, Amb. Temp. (F)		
-	--	-10	59	110
Exhaust Mass Flow Rate per Unit [1]	lb/hr	2,618,000	2,355,000	-
Exhaust Temperature [1]	deg F	974	1,010	-
Average Molecular Weight	lb/lbmole	28.620	28.550	-
Stack-Exit Ambient Pressure	psia	14.519	14.519	-
Stk-Exit Volumetric Flow Rate (Actual)	acfm	1,615,482	1,493,336	-
Stk-Exit Vol. Flow (Dry): 68 deg F | 1 atm	dscfm	539,198	483,943	-
F-Factor at 68 deg F | 1 atm | 0% O2	dscf/10^6 Btu	9,352	9,342	-

Note [3]: HHV to LHV ratio assumed to equal 1.065

Ref.: Typical Dual Fuel LM6000PF Plus Emission Envelope.xlsx

NEW CALEDONIA GENERATION: GE 7E COMBUSTION-TURBINE (CT) STARTUP (SU) AND SHUTDOWN (SD) EMISSION ESTIMATES

[1] Startup and shutdown CT performance based on GE proprietary data. EP&C APS - Date: 18-Jun-24

Table 1. Nominal Number of Startup Types and Shutdowns per CT-Year [1]

Event Type		Downtime		GE 7E.03		
-	(Abbrev.)	Hours	No. Units	Gas [1]	Oil [2]	Total
Starts	SU	-	6	150	12	162
Shutdown	SD	-	6	150	12	162

Tbl 1 [1]: Number of starts per CT-year assumed equivalent to the GE simple-cycle frame units installed at CCT and are provided by that project's technical specifications report.

Tbl 1 [2]: Number captures one start per CT-year for unit readiness testing.

Table 2. Natural Gas Inputs at 59 deg F

Parameter		Value	Units	Comment
Heat Input at 59 deg F:	-	994	*10^6 Btu/hr	per CT; M. 19 F-Factor: 8,710 dscf/10^6 Btu at 68 F, 1 atm, & 0% O2 ref.: Appendix A-7 to Part 60
Fuel Sulfur Content:	-	2,000	gr/10^6 scf	gr = grains; equivalent to 6.32E-04 % S (0.04524 lb/scf at 60 deg F) ref.: AP-42, Vol. I, 5th Ed., Sec. 3.1, Sup. F, 4/00
Sulfur Dioxide:	SO2	6.00E-04	lb/10^6 Btu	AP-42 states 100% fuel S conversion: 0.94 * %S (lb/10^6 Btu) ref.: AP-42, Vol. I, 5th Ed., Sec. 3.1, Sup. F, 4/00
Sufuric Acid:	H2SO4	9.66E-07	lb/10^6 Btu	SO3/H2SO4 est. based on mass-balance conversion of SO2 to SO3/H2SO4
Ammonia:	NH3	0.00E+00	lb/10^6 Btu	-
Carbon Dioxide	-	120	lb/10^6 Btu	-
Methane	-	2.20E-03	lb/10^6 Btu	-
Nitrous Oxide	-	2.20E-04	lb/10^6 Btu	-
Grnhouse Gas (GHG) as CO2 equiv.	-	120.1	lb/10^6 Btu	-

					Natural Gas Startup and Subsequent Shutdown, lb/CT-hr											
Event	No. of Units	Duration hour	Avg. Exh. Temp, deg F	Avg. Flow acfm	NOX	CO	VOC	SO2	H2SO4	FPM	FPM2.5	CPM	CO2	CH4	N2O	CO2e
Startup	6	5.00E-01	859	702,221	5.13E+01	2.04E+02	1.40E+02	1.75E-01	2.81E-04	2.14E+00	2.14E+00	2.14E+00	3.50E+04	6.42E-01	6.42E-02	3.50E+04
Shutdown	6	5.83E-01	835	680,008	5.35E+01	1.39E+02	6.39E+01	1.17E-01	1.88E-04	1.09E+00	1.09E+00	1.09E+00	2.34E+04	7.88E-01	7.88E-02	2.34E+04

-	NOX	CO	VOC	SO2	H2SO4	FPM	FPM2.5	CPM	CO2	CH4	N2O	CO2e
Startup and Shutdown, tons/CT-yr:	4.26E+00	1.37E+01	8.04E+00	1.17E-02	1.88E-05	1.28E-01	1.28E-01	1.28E-01	2.33E+03	5.86E-02	5.86E-03	2.34E+03

-	NOX	CO	VOC	SO2	H2SO4	FPM	FPM2.5	CPM	CO2	CH4	N2O	CO2e
Total Startup and Shutdown, tons/yr:	2.56E+01	8.25E+01	4.83E+01	7.00E-02	1.13E-04	7.69E-01	7.69E-01	7.69E-01	1.40E+04	3.51E-01	3.51E-02	1.40E+04

Table 3. No. 2 Distillate Oil Inputs at 59 deg F

Parameter	-	Value	Units	Comment
Heat Input at 59 deg F:	-	1,047	*10^6 Btu/hr	per CT; M. 19 F-Factor: 9,190 dscf/10^6 Btu at 68 F, 1 atm, & 0% O_2 ref.: Appendix A-7 to Part 60
Fuel Sulfur Content:	-	0.0015	%	Ultra-low-sulfur distillate oil
Sulfur Dioxide:	SO_2	1.52E-03	lb/10^6 Btu	AP-42 states 100% fuel S conversion: 1.01 * %S (lb/10^6 Btu) ref.: AP-42, Vol. I, 5th Ed., Sec. 3.1, Sup. F, 4/00
Sufuric Acid:	H_2SO_4	2.29E-06	lb/10^6 Btu	SO_3/H_2SO_4 est. based on mass-balance conversn of SO_2 to SO_3/H_2SO_4 ref.: AP-42, Vol. I, 5th Ed., Sec. 3.1, Sup. F, 4/00
Ammonia:	NH_3	0.00E+00	lb/10^6 Btu	-
Carbon Dioxide	-	163.1	lb/10^6 Btu	-
Methane	-	6.61E-03	lb/10^6 Btu	-
Nitrous Oxide	-	1.32E-03	lb/10^6 Btu	-
Grnhouse Gas (GHG) as CO_2 equiv.	-	163.6	lb/10^6 Btu	-

Event	No. of Units	Duration hour	Avg. Exh. Temp, deg F	Avg. Flow acfm	NOX	CO	VOC	SO_2	H_2SO_4	FPM	FPM2.5	CPM	CO_2	CH_4	N_2O	CO_2e
Startup	6	5.00E-01	-	-	2.28E+02	2.38E+02	1.43E+02	4.49E-01	6.81E-04	1.13E+01	1.13E+01	1.13E+01	4.84E+04	1.96E+00	3.92E-01	4.85E+04
Shutdown	6	5.83E-01	-	-	3.86E+01	1.46E+02	8.74E+01	2.70E-01	4.09E-04	2.25E+01	2.25E+01	2.25E+01	2.91E+04	1.18E+00	2.36E-01	2.92E+04

-	NOX	CO	VOC	SO_2	H_2SO_4	FPM	FPM2.5	CPM	CO_2	CH_4	N_2O	CO_2e
Startup and Shutdown, tons/CT-yr:	8.19E-01	1.22E+00	7.34E-01	2.29E-03	3.47E-06	1.13E-01	1.13E-01	1.13E-01	2.47E+02	1.00E-02	2.00E-03	2.48E+02

-	NOX	CO	VOC	SO_2	H_2SO_4	FPM	FPM2.5	CPM	CO_2	CH_4	N_2O	CO_2e
Total Startup and Shutdown, tons/yr:	4.91E+00	7.34E+00	4.40E+00	1.38E-02	2.08E-05	6.75E-01	6.75E-01	6.75E-01	1.48E+03	6.01E-02	1.20E-02	1.49E+03

NEW CALEDONIA GENERATION: DEWPOINT GAS HEATER (GH) EMISSION ESTIMATES

Table 1. Natural Gas-Fired Gas Heater Inputs

EP&C APS - Date: 18-Jun-24

Parameter	-	Value	Units	Comment	Note
Number of Units:	-	3		each with 2.0 ft stk ID and 30 ft stack height	1,A
Annual Operation:	-	3,500	hr/htr-yr	stack flows: 1,366 dscf/min; 3,956 acf/min and 21. ft/s	A
Heat Input:	-	9.9	*10^6 Btu/hr	stk paramtrs: 780 deg F.; 17.9 % H2O and 3% dry O2	1,A
Heat Content:	-	1,020	Btu/scf	Nominal, higher heating value (HHV) NG heat content (volumetric basis)	2
Fuel Sulfur Content:	-	6.32E-04	%S	Fuel sulfur content analogous with the CT units	-
Filterable Particulate Matter:	FPM10	1.9	lb/10^6 scf	AP-42 ref. states all PM to be less than 1.0 micrometer in diameter	2
Condensable Particulate Matter:	CPM	5.7	lb/10^6 scf	AP-42 ref. states all PM to be less than 1.0 micrometer in diameter	2
Sulfur Dioxide:	SO2	0.6	lb/10^6 scf	Assumed 100% fuel S convrsn; ref. fuel S basis is 2,000 gr/10^6 scf	2
Nitrogen Oxides:	NOX	0.011	lb/10^6 Btu	Manufacturer's data; equivalent to 9 ppmvd at 3% O2	3
Carbon Monoxide	CO	0.074	lb/10^6 Btu	Manufacturer's data; equivalent to 100 ppmvd at 3% O2	4
Volatile Organic Compounds:	VOC	0.015	lb/10^6 Btu	Manufacturer's data; equivalent to 35 ppmvd at 3% O2	4
Fuel-Sulfur Oxidation:	-	5.0	%	Est. portion of fuel-S that is oxidized to SO3 / H2SO4 (analogous w/ CT units)	

Notes:

A Stack internal dia. (ID), stack height, and stack velocity mirrors CCT GH units (221014-WB Heat Spec Sheet.pdf). Stack temperature from JCC GH info (TJS03d.xls) [12*10^6 Btu/hr]

1 Only two gas heaters are necessary to operate. The additional gas heater serves as redundant capacity. Each gas heater is expected to actually run simultaneously at 50% capacity. However, estimates reflect

2 EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - Supplement D, 4/98

3 CCT gas heater emissions performance

4 Similarly sized gas heater (PCC) manufacturer's performance.

Table 2. Theoretical Annual Fuel Burn

Units	GH1	GH2	GH3
10^3 scf/yr	33,971	33,971	33,971
10^6 Btu/yr	34,650	34,650	34,650

Table 3. Criteria / Non-HAP Pollutant Emission Estimates

Pollutant	-	Note	Emission Factor lb/10^6 scf	Emission Factor lb/10^6 Btu	Hourly lb/htr-hr	Annual tons/htr-yr	Total tons/yr
Filterable Particulate Matter	FPM	-	-	1.86E-03	1.84E-02	3.23E-02	9.68E-02
FPM < 10-micrometer aero. dia.	FPM10	-	-	1.86E-03	1.84E-02	3.23E-02	9.68E-02
FPM < 2.5-micrometer aero. dia.	FPM2.5	-	-	1.86E-03	1.84E-02	3.23E-02	9.68E-02
Condensable Particulate Matter	CPM	-	-	5.59E-03	5.53E-02	9.68E-02	2.90E-01
Sulfur Dioxide	SO2	1	-	5.88E-04	5.82E-03	1.02E-02	3.06E-02
Nitrogen Oxides	NOX	-	11.2	1.10E-02	1.09E-01	1.91E-01	5.72E-01
Carbon Monoxide	CO	-	75.5	7.40E-02	7.33E-01	1.28E+00	3.85E+00
Volatile Organic Compounds	VOC	-	15.3	1.50E-02	1.49E-01	2.60E-01	7.80E-01
Sulfuric Acid (SO3/H2SO4) as H2SO4	H2SO4	1	-	9.66E-07	9.56E-06	1.67E-05	5.02E-05
Carbon Dioxide	CO2	2	120,000	117.6	1,165	2,038	6,115
Methane	CH4	3	-	2.20E-03	2.18E-02	3.82E-02	1.15E-01
Nitrous Oxide	N2O	3	-	2.20E-04	2.18E-03	3.82E-03	1.15E-02
Greenhouse Gas (GHG), as CO2 Equiv.	CO2e	3	-	117.8	1,166	2,040	6,121

Notes:

1 SO2 and SO3/H2SO4 emission estimates are based on fuel sulfur mass-bal. calculation for conversion of fuel sulfur to SO2 or SO3/H2SO4.

2 EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - Supplement D, 4/98

3 US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart A, Table A-1 and Subpart C, Tables C-1 & C-2, as amended 11-29-13 (78 FR 71904)

Table 4. Trace Elements Emission Estimates

Pollutant	(Symbol)	Note	Emission Factor [1] lb/10^6 scf	Emission Factor [1] lb/10^6 Btu	Hourly lb/htr-hr	Annual tons/htr-yr	Total tons/yr
Antimony	Sb	2, HAP			1.80E-07	1.78E-06	3.12E-06
Arsenic	As	HAP	2.0E-04	2.0E-04		1.94E-06	3.40E-06
Barium	Ba	-	4.4E-03	4.4E-03		4.27E-05	7.47E-05
Beryllium	Be	HAP	1.2E-05	1.2E-05		1.16E-07	2.04E-07
Cadmium	Cd	HAP	1.1E-03	1.1E-03		1.07E-05	1.87E-05
Chromium	Cr	HAP	1.4E-03	1.4E-03		1.36E-05	2.38E-05
Cobalt	Co	HAP	8.4E-05	8.4E-05		8.15E-07	1.43E-06
Copper	Cu	-	8.5E-04	8.5E-04		8.25E-06	1.44E-05
Lead	Pb	HAP	5.0E-04	5.0E-04	4.90E-07	4.85E-06	8.49E-06
Manganese	Mn	HAP	3.8E-04	3.8E-04		3.69E-06	6.45E-06
Mercury	Hg	HAP	2.6E-04	2.6E-04		2.52E-06	4.42E-06
Nickel	Ni	HAP	2.1E-03	2.1E-03		2.04E-05	3.57E-05
Selenium	Se	HAP	2.4E-05	2.4E-05		2.33E-07	4.08E-07
Vanadium	V	-	2.3E-03	2.3E-03		2.23E-05	3.91E-05
Zinc	Zn	-	2.9E-02	2.9E-02		2.81E-04	4.93E-04

Notes:

1 Unless noted, all emission factors are from EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - Supplement D, 4/98.

2 US EPA, Air Emissions from Scrap Tire Combustion, EPA-600/R-97-115, Oct 1997 (natrl gas-fired rotary-kiln incinerator simulator emssn data)

HAP This abbreviation denotes "Hazardous Air Pollutant."

Table 5. Organic HAP / Compounds Emission Estimates

Pollutant	(CASRN)	Note	Emission Factor, [1] lb/10^6 scf	Emission Factor, [1] lb/10^6 Btu	Hourly lb/htr-hr	Annual tons/htr-yr	Total tons/yr
2-Methylnaphthalene	91-57-6	POM	2.4E-05	-	2.33E-07	4.08E-07	1.22E-06
3-Methylcholanthrene	56-49-5	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
7,12-Dimethylbenz(a)anthracene	57-97-6	PAC	1.6E-05	-	1.55E-07	2.72E-07	8.15E-07
Acenaphthene	83-32-9	POM	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Acenaphthylene	208-96-8	POM	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Anthracene	120-12-7	POM	2.4E-06	-	2.33E-08	4.08E-08	1.22E-07
Benzene	71-43-2	HAP	2.1E-03	-	2.04E-05	3.57E-05	1.07E-04
Benzo(a)anthracene	56-55-3	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Benzo(a)pyrene	50-32-8	PAC	1.2E-06	-	1.16E-08	2.04E-08	6.11E-08
Benzo(b)fluoranthene	205-99-2	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Benzo(g,h,i)perylene	191-24-2	POM	1.2E-06	-	1.16E-08	2.04E-08	6.11E-08
Benzo(k)fluoranthene	207-08-9	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Chrysene	218-01-9	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Dibenzo(a,h)anthracene	53-70-3	PAC	1.2E-06	-	1.16E-08	2.04E-08	6.11E-08
Dichlorobenzene [mixed isomers]	25321-22-6	HAP	1.2E-03	-	1.16E-05	2.04E-05	6.11E-05
Fluoranthene	206-44-0	PAC	3.0E-06	-	2.91E-08	5.10E-08	1.53E-07
Fluorene	86-73-7	POM	2.8E-06	-	2.72E-08	4.76E-08	1.43E-07
Formaldehyde	50-00-0	HAP	7.5E-02	-	7.28E-04	1.27E-03	3.82E-03
Indeno(1,2,3-c,d)pyrene	193-39-5	PAC	1.8E-06	-	1.75E-08	3.06E-08	9.17E-08
Naphthalene	91-20-3	HAP	6.1E-04	-	5.92E-06	1.04E-05	3.11E-05
n-Hexane	110-54-3	2, HAP	4.3E-04	-	4.17E-06	7.30E-06	2.19E-05
Phenanthrene	85-01-8	POM	1.7E-05	-	1.65E-07	2.89E-07	8.66E-07
Pyrene	129-00-0	POM	5.0E-06	-	4.85E-08	8.49E-08	2.55E-07
Toluene	108-88-3	HAP	3.4E-03	-	3.30E-05	5.78E-05	1.73E-04
Polycyclic Aromatic Compounds	PAC	POM	3.22E-05	-	3.13E-07	5.47E-07	1.64E-06
Polycyclic Organic Matter	POM	HAP	8.82E-05	-	8.56E-07	1.50E-06	4.49E-06
Organic HAP Total	-	-	8.28E-02	-	8.04E-04	1.41E-03	4.22E-03
Total HAP	-	-	8.91E-02	8.73E-05	8.65E-04	1.51E-03	4.54E-03

Notes:

1 Unless noted, all emission factors are from EPA AP-42, Vol. I, 5th Ed., Section 1.4 - Natural Gas Combustion - 7-98.

2 B.T. O'Neil & D.A. Orr, "Hexane and Other Alkane Emission Estimates for Natural Gas-Fired Boilers", Electric Power Research Institute (EPRI), 5-5-00

HAP This abbreviation denotes "Hazardous Air Pollutant."

PAC This abbreviation denotes "Polycyclic Aromatic Compounds". This group does not have an associated CASRN.

POM This abbreviation denotes "Polycyclic Organic Matter" (POM), which is broad class of organic compounds that includes PAH and PAC. The POM group is defined as a HAP.

NEW CALEDONIA GENERATION: FIRE-SUPPRESSION DIESEL-ENGINE WATER PUMP (FP)

Table 1. Diesel Engine Inputs

Parameter	-	Value	Units	Comment	Note
Number of Engines:	-	1	-	each with 0.5 ft stk ID and 12 ft stack height	-
Annual Operation:	-	500	hr/yr	stk paramtrs: 832 deg F.; 1,351 acf/min and 115 ft/s	1
Rated Horsepower:	-	299	bhp/eng	Heat input equivalent is 2.1 *10^6 Btu/hr.	2
Fuel Consumption:	-	15.0	gal/eng-hr	Approx. fuel consumption per engine based on 7,000 Btu/hp-hr	3
Fuel Heat Content	-	140,000	Btu/gal	Nominal distillate-oil heat content (HHV)	4
No. 2 Fuel Oil Density:	-	7.05	lb/gal	Nominal distillate-oil density	5
No. 2 Fuel Oil Sulfur Content:	-	0.0015	weight %	Ultra-low-sulfur distillate oil	-
Filterable Particulate Matter:	FPM	0.15	g/hp-hr	40 CFR 60, Subpart IIII, standard for a 175 hp to 300 hp (Tier 3) engine	-
Nitrogen Oxides:	NOX	2.85	g/hp-hr	40 CFR 60, Subpart IIII, standard for a 175 hp to 300 hp (Tier 3) engine	6
Carbon Monoxide:	CO	2.60	g/hp-hr	40 CFR 60, Subpart IIII, standard for a 175 hp to 300 hp (Tier 3) engine	-
Volatile Organic Compounds:	VOC	0.15	g/hp-hr	40 CFR 60, Subpart IIII, standard for a 175 hp to 300 hp (Tier 3) engine	6
Fuel-Sulfur Oxidation:	-	5.0	%	Engine-outlet fuel-S conversion to SO3/H2SO4 (by analogy with CT units)	-

Notes:

1 Potential emergency-use operating hours

2 Estimated to be the approximately the same as Paradise CC (D. Tibbs in 1-12-15 conf. call w/ Strunk, Myers, Byars, Hoy, Wylie, Crooks)

3 EPA AP-42, Vol. 1, 5th Ed., Sec. 3.3 - Gasoline and Diesel Industrial Engines - Supp. B, 10/96; ref. states all PM to be less than 1.0 microns in diameter.

4 EPA AP-42, Vol. I, 5th Edition, Section 1.3 - Fuel Oil Combustion - Supplement E, 9/99 (corrected 5/10)

5 EPA AP-42, Vol. 1, 5th Edition, Appendix A, 9/85 (reformatted 1/95)

6 "CARB Emission Factors for CI Diesel Engines - Percent HC in Relation to NMHC+NOX," June 28, 2004: "When the [NMHC] and [NOX] emission factor is combined, assume a breakdown of 5% and 95%, respectively."

Table 2. Annual Diesel Burned

Units	FP01
gal/yr	7,475
10^6 Btu/yr	1,047

Table 3. Criteria / Non-HAP Pollutant Emission Estimates

Pollutant	-	Note	Emission Factor, g/hp-hr	Emission Factor, lb/10^6 Btu	Hourly, lb/eng-hr	Annual, tons/yr
Filterable Particulate Matter	FPM	-	0.15	4.72E-02	9.89E-02	2.47E-02
FPM < 10-micrometer aero. dia.	FPM10	-	-	4.72E-02	9.89E-02	2.47E-02
FPM < 2.5-micrometer aero. dia.	FPM2.5	-	-	4.72E-02	9.89E-02	2.47E-02
Condensable Particulate Matter	CPM	-	-	4.72E-02	9.89E-02	2.47E-02
Sulfur Dioxide	SO2	2	-	1.43E-03	3.00E-03	7.50E-04
Nitrogen Oxides	NOX	-	2.85	8.98E-01	1.88E+00	4.70E-01
Carbon Monoxide	CO	-	2.60	8.19E-01	1.71E+00	4.28E-01
Volatile Organic Compounds	VOC	-	0.15	4.72E-02	9.89E-02	2.47E-02
Sulfuric Acid (SO3/H2SO4) as H2SO4	H2SO4	2	-	1.16E-04	2.42E-04	6.04E-05
Carbon Dioxide	CO2	3	-	163.1	341	85
Methane	CH4	3	-	6.61E-03	1.38E-02	3.46E-03
Nitrous Oxide	N2O	3	-	1.32E-03	2.77E-03	6.92E-04
Greenhouse Gas (GHG) as CO2 equiv.	CO2e	-	-	163.6	342	86

Notes:

1 [Reserved]

2 SO2 and SO3/H2SO4 emission estimates are based on mass-balance calculation for conversion of fuel sulfur to SO2 or SO3/H2SO4.

3 US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart A, Table A-1 and Subpart C, Tables C-1 & C-2, as amended 11-29-13 (78 FR 71904)

Table 4. Trace Elements Emission Estimates

Pollutant	(Symbol)	Note	Emission Factor, [1] lb/10^3 gal	Emission Factor, [1] lb/10^6 Btu	Hourly, lb/eng-hr	Annual, tons/yr
Arsenic	As	HAP	-	1.10E-05	2.30E-05	5.76E-06
Beryllium	Be	HAP	-	3.10E-07	6.49E-07	1.62E-07
Cadmium	Cd	HAP	-	4.80E-06	1.00E-05	2.51E-06
Chlorine as Hydrogen Chloride	HCl	2,HAP	-	3.11E-04	6.50E-04	1.63E-04
Chromium	Cr	HAP	-	1.10E-05	2.30E-05	5.76E-06
Copper	Cu	3	-	1.01E-05	2.11E-05	5.28E-06
Lead	Pb	HAP	-	1.40E-05	2.93E-05	7.33E-06
Manganese	Mn	2,HAP	-	1.01E-04	2.11E-04	5.27E-05
Mercury	Hg	HAP	-	1.20E-06	2.51E-06	6.28E-07
Nickel	Ni	HAP	-	4.60E-06	9.63E-06	2.41E-06
Selenium	Se	HAP	-	2.50E-05	5.23E-05	1.31E-05
Zinc	Zn	3	-	8.90E-06	1.86E-05	4.66E-06

Notes:

1 Unless noted, emission factors are from EPA AP-42, Vol. I, 5th Ed., Section 3.1 - Stationary Gas Turbines - Supplement F, 4/00

2 No. 2 Oil: HCl and Mn emission factors are derived from TVA Combustion-Turbine (CT) Fuel-Oil Specifications (#2 Distillate) Revision 5.0, 17-Jan-2001: Nominal heat content for distillate fuel oil = 140000 Btu [HHV]/gallon

3 Trace Element Emission Factors from Distillate Oil Combustion, Paul Chu, EPRI, 5-13-99 (Source: PISCES database 4-6-99)

HAP This abbreviation denotes "Hazardous Air Pollutant."

Table 5. Organic HAP Emission Estimates

Pollutant	(CASRN)	Note	Emission Factor, [1] lb/10^3 gal	Emission Factor, [1] lb/10^6 Btu	Hourly, lb/eng-hr	Annual, tons/yr
1,3-Butadiene	106-99-0	HAP	-	3.91E-05	8.18E-05	2.05E-05
Acenaphthene	83-32-9	POM	-	1.42E-06	2.97E-06	7.43E-07
Acenaphthylene	208-96-8	POM	-	5.06E-06	1.06E-05	2.65E-06
Acetaldehyde	75-07-0	HAP	-	7.67E-04	1.61E-03	4.01E-04
Acrolein	107-02-8	HAP	-	9.25E-05	1.94E-04	4.84E-05
Anthracene	120-12-7	POM	-	1.87E-06	3.91E-06	9.78E-07
Benzene	71-43-2	HAP	-	9.33E-04	1.95E-03	4.88E-04
Benzo(a)anthracene	56-55-3	PAC	-	1.68E-06	3.52E-06	8.79E-07
Benzo(a)pyrene	50-32-8	PAC	-	1.88E-07	3.93E-07	9.84E-08
Benzo(b)fluoranthene	205-99-2	PAC	-	9.91E-08	2.07E-07	5.19E-08
Benzo(g,h,i)perylene	191-24-2	POM	-	4.89E-07	1.02E-06	2.56E-07
Benzo(k)fluoranthene	207-08-9	PAC	-	1.55E-07	3.24E-07	8.11E-08
Chrysene	218-01-9	PAC	-	3.53E-07	7.39E-07	1.85E-07
Dibenzo(a,h)anthracene	53-70-3	PAC	-	5.83E-07	1.22E-06	3.05E-07
Fluoranthene	206-44-0	PAC	-	7.61E-06	1.59E-05	3.98E-06
Fluorene	86-73-7	POM	-	2.92E-05	6.11E-05	1.53E-05
Formaldehyde	50-00-0	HAP	-	1.18E-03	2.47E-03	6.17E-04
Indeno(1,2,3-c,d)pyrene	193-39-5	PAC	-	3.75E-07	7.85E-07	1.96E-07
Naphthalene	91-20-3	HAP	-	8.48E-05	1.77E-04	4.44E-05
Phenanthrene	85-01-8	POM	-	2.94E-05	6.15E-05	1.54E-05
Pyrene	129-00-0	POM	-	4.78E-06	1.00E-05	2.50E-06
Toluene	108-88-3	HAP	-	4.09E-04	8.56E-04	2.14E-04
Xylenes	1330-20-7	HAP	-	2.85E-04	5.97E-04	1.49E-04
Polycyclic Aromatic Compounds	PAC	-	-	1.10E-05	2.31E-05	5.78E-06
Polycyclic Organic Matter	POM	HAP	-	8.33E-05	1.74E-04	4.36E-05
Organic HAP Total	-	-	-	3.87E-03	8.11E-03	2.03E-03
Total HAP	-	-	-	4.36E-03	9.12E-03	2.28E-03

Notes:

1	EPA AP-42, Vol. 1, 5th Ed., Chapter 3.3 - Gasoline and Diesel Industrial Engines - Supplement B, 10/96
HAP	This abbreviation denotes "Hazardous Air Pollutant."
PAC	This abbreviation denotes "Polycyclic Aromatic Compounds". This group does not have an associated CASRN.
POM	This abbreviation denotes "Polycyclic Organic Matter" (POM), which is broad class of organic compounds that includes PAH and PAC. The POM group is defined as a HAP.

NEW CALEDONIA GENERATION

Project Potential to Emit (tons/yr)

Table 1. General Operations

Parameter	Note	GE 7E.03 CT Units Routine	Startup/SD	Total	% SU/SD	3 Gas Heaters	1 Fire Pump	Project Total
Natural Gas Annual Operating Hours	per Unit	1,529	163	-	-	3,500	-	-
Startup / Shutdown Events	per Unit	-	150	-	-	-	-	-
No. 2 Fuel Oil Annual Operating Hours	per Unit	32	13	-	-	-	500	-
Startup / Shutdown Events	per Unit	-	12	-	-	-	-	-
Miscellaneous Annual Operating Hours	per Unit	-	-	-	-	-	-	-

Table 2. Criteria / Non-HAP Pollutants

Pollutant	(Abbrev.)	Note	GE 7E.03 CT Units Routine	Startup/SD	Total	% SU/SD	3 Gas Heaters	1 Fire Pump	Project Total	Pollutant	Project Totals	NSR Limits tons/yr
Filterable Particulate Matter	FPM	-	1.07E+01	1.44E+00	1.22E+01	11.9	9.68E-02	2.47E-02	1.23E+01	FPM	12	25
FPM < 10-micrometer aero. dia.	FPM10	-	1.07E+01	1.44E+00	1.22E+01	11.9	9.68E-02	2.47E-02	1.23E+01	TPM10	25	15
FPM < 2.5-micrometer aero. dia.	FPM2.5	-	1.07E+01	1.44E+00	1.22E+01	11.9	9.68E-02	2.47E-02	1.23E+01	TPM2.5	25	10
Condensable Particulate Matter	CPM	-	1.07E+01	1.44E+00	1.22E+01	11.9	2.90E-01	2.47E-02	1.25E+01	-	-	-
Sulfur Dioxide	SO2	-	2.89E+00	8.38E-02	2.97E+00	2.82	3.06E-02	7.50E-04	3.00E+00	SO2	3	40
Nitrogen Oxides	NOX	-	2.01E+02	3.05E+01	2.32E+02	13.2	5.72E-01	4.70E-01	2.33E+02	NOX	233	40
Carbon Monoxide	CO	-	1.48E+02	8.98E+01	2.38E+02	37.8	3.85E+00	4.28E-01	2.42E+02	CO	242	100
Volatile Organic Compounds	VOC	-	1.18E+01	5.27E+01	6.44E+01	81.7	7.80E-01	2.47E-02	6.52E+01	VOC	65	40
Sulfuric Acid	H2SO4	-	4.63E-03	1.34E-04	4.77E-03	2.80	5.02E-05	6.04E-05	4.88E-03	H2SO4	0.0	7
Ammonia	NH3	-	-	-	-	-	-	-	-	-	-	-
Carbon Dioxide	CO2	-	563,693	15,485	579,178	2.67	6,115	85	585,378	-	-	-
Methane	CH4	-	1.07E+01	4.11E-01	1.11E+01	3.70	1.15E-01	3.46E-03	1.12E+01	-	-	-
Nitrous Oxide	N2O	-	1.14E+00	4.72E-02	1.18E+00	3.98	1.15E-02	6.92E-04	1.20E+00	-	-	-
CO2 equivalent (GHGs)	CO2e	-	564,300	15,504	579,804	2.67	6,121	86	586,010	CO2e	586,010	75,000

Table 3. Trace-Element Pollutants

			GE 7E.03 CT Units									
Pollutant	**(Symbol)**	**Note**	**Routine**	**Startup/SD**	**Total**	**% SU/SD**	**3 Gas Heaters**	**1 Fire Pump**	**Project Total**	**Pollutant**	**Project Totals**	**NSR Limits tons/yr**
Antimony	Sb	HAP	-	-	9.09E-04	-	9.36E-06	-	9.18E-04	-	-	-
Arsenic	As	HAP	-	-	6.90E-03	-	1.02E-05	5.76E-06	6.91E-03	-	-	-
Barium	Ba	-	-	-	2.02E-02	-	2.24E-04	-	2.04E-02	-	-	-
Beryllium	Be	HAP	-	-	2.12E-04	-	6.11E-07	1.62E-07	2.13E-04	-	-	-
Cadmium	Cd	HAP	-	-	2.70E-03	-	5.61E-05	2.51E-06	2.76E-03	-	-	-
Hydrogen Chloride	HCl	HAP	-	-	1.62E-01	-		1.63E-04	1.62E-01	-	-	-
Chromium	Cr	HAP	-	-	1.13E-02	-	7.13E-05	5.76E-06	1.14E-02	-	-	-
Cobalt	Co	HAP	-	-	4.04E-04	-	4.28E-06	-	4.08E-04	-	-	-
Copper	Cu	-	-	-	8.80E-03	-	4.33E-05	5.28E-06	8.85E-03	-	-	-
Hydrogen Fluoride	HF	HAP	-	-	-	-	-	-	-	HF	0	3
Lead	Pb	HAP	-	-	9.32E-03	-	2.55E-05	7.33E-06	9.35E-03	Pb	0.01	0.60
Manganese	Mn	HAP	-	-	5.45E-02	-	1.94E-05	5.27E-05	5.46E-02	-	-	-
Mercury	Hg	HAP	-	-	6.30E-04	-	1.32E-05	6.28E-07	6.44E-04	-	-	-
Nickel	Ni	HAP	-	-	1.45E-02	-	1.07E-04	2.41E-06	1.46E-02	-	-	-
Selenium	Se	HAP	-	-	1.31E-02	-	1.22E-06	1.31E-05	1.32E-02	-	-	-
Vanadium	V	-	-	-	9.09E-03	-	1.17E-04	-	9.20E-03	-	-	-
Zinc	Zn	-	-	-	1.48E-01	-	1.48E-03	4.66E-06	1.50E-01	-	-	-

Note:

HAP This abbreviation denotes "Hazardous Air Pollutant."

Table 4. Organic HAP / Compounds

Pollutant	(CASRN)	Note	GE 7E.03 CT Units Routine	Startup /SD	Total	% SU/SD	3 Gas Heaters	1 Fire Pump	Project Total
1,3-Butadiene	106-99-0	HAP	-	-	2.17E-03	-		-	2.19E-03
2-Methylnaphthalene	91-57-6	POM	-	-	8.18E-04	-	1.22E-06	-	8.19E-04
3-Methylcholanthrene	56-49-5	PAC	-	-		-	9.17E-08	2.05E-05	9.17E-08
7,12-Dimethylbenz(a)anthracene	57-97-6	PAC	-	-		-	8.15E-07	-	8.15E-07
Acenaphthene	83-32-9	POM	-	-		-	9.17E-08	-	8.35E-07
Acenaphthylene	208-96-8	HAP	-	-		-	9.17E-08	-	2.74E-06
Acetaldehyde	75-07-0	HAP	-	-	2.02E-01	-	-	-	2.02E-01
Acrolein	107-02-8	HAP	-	-	3.23E-02	-	-	-	3.24E-02
Anthracene	120-12-7	POM	-	-		-	1.22E-07	7.43E-07	1.10E-06
Benzene	71-43-2	HAP	-	-	6.06E-02	-	1.07E-04	2.65E-06	6.12E-02
Benzo(a)anthracene	56-55-3	PAC	-	-		-	9.17E-08	4.01E-04	9.71E-07
Benzo(b)fluoranthene	205-99-2	PAC	-	-		-	9.17E-08	4.84E-05	1.44E-07
Benzo(a)pyrene	50-32-8	PAC	-	-		-	6.11E-08	9.78E-07	1.60E-07
Benzo(g,h,i)perylene	191-24-2	POM	-	-		-	6.11E-08	4.88E-04	3.17E-07
Benzo(k)fluoranthene	207-08-9	PAC	-	-		-	9.17E-08	8.79E-07	1.73E-07
Chrysene	218-01-9	PAC	-	-		-	9.17E-08	5.19E-08	2.76E-07
Dibenzo(a,h)anthracene	53-70-3	PAC	-	-		-	6.11E-08	9.84E-08	3.66E-07
Dichlorobenzene [mixed isomers]	25321-22-6	HAP	-	-		-	6.11E-05	-	6.11E-05
Ethylbenzene	100-41-4	HAP	-	-	1.62E-01	-	-	2.56E-07	1.62E-01
Fluoranthene	206-44-0	PAC	-	-		-	1.53E-07	8.11E-08	4.13E-06
Fluorene	86-73-7	POM	-	-		-	1.43E-07	-	1.54E-05
Formaldehyde	50-00-0	HAP	-	-	1.11E+00	-	3.82E-03	-	1.11E+00
Indeno(1,2,3-c,d)pyrene	193-39-5	PAC	-	-		-	9.17E-08	-	2.88E-07
Naphthalene	91-20-3	HAP	-	-	6.56E-03	-	3.11E-05	-	6.64E-03
n-Hexane	110-54-3	HAP	-	-		-	2.19E-05	1.85E-07	2.19E-05
Phenanthrene	85-01-8	POM	-	-	5.60E-04	-	8.66E-07	3.05E-07	5.77E-04
Propylene Oxide	75-56-9	HAP	-	-	1.46E-01	-	-	-	1.46E-01
Pyrene	129-00-0	POM	-	-		-	2.55E-07	-	2.76E-06
Toluene	108-88-3	HAP	-	-	6.56E-01	-	1.73E-04	-	6.57E-01
Xyelene	50-32-8	PAC	-	-	-	-	9.17E-08	1.49E-04	9.71E-07
Polycyclic Aromatic Compounds	191-24-2	POM	-	-	-	-	9.17E-08	5.78E-06	1.44E-07
Polycyclic Aromatic Hydrocarbons	207-08-9	PAC	-	-	-	-	6.11E-08	-	1.60E-07
Polycyclic Organic Matter	218-01-9	PAC	-	-	-	-	6.11E-08	4.36E-05	3.17E-07
Organic HAP Total	-	-	-	-	-	-	9.17E-08	2.03E-03	1.73E-07

Pollutant	(CASRN)	Note	Routine	Startup /SD	Total	% SU/SD	3 Gas Heaters	1 Fire Pump	Project Total
Total HAP	-	-	-	-	-	-	9.17E-08	2.28E-03	2.76E-07

Notes:

HAP This abbreviation denotes "Hazardous Air Pollutant."

PAC This abbreviation denotes "Polycyclic Aromatic Compounds" (PAC). Although the PAC group is not identified as a Clean Air Act Section 112(b) HAP, it is reportable for Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 (i.e., Toxic Release Inventory [TRI]).

POM This abbreviation denotes "Polycyclic Organic Matter" (POM), which is broad class of organic compounds that includes Polycyclic Aromatic Hydrocarbons (PAH) and Polycyclic Aromatic Compounds (PAC). The POM group is defined as a HAP.

CALCULATION CONSTANTS

Table 1. Molecular Weights [1]

-	Formula	MW
Ammonia	NH_3	17.0304
Ammonium Sulfate	$(NH_4)_2SO_4$	132.1382
Argon	Ar	39.948
Butane	C_4H_{10}	58.1236
Carbon Dioxide	CO_2	44.00995
Carbon Monoxide	CO	28.01055
Chloride	Cl	35.453
Ethane	C_2H_6	30.0697
Fluoride	F	18.9984
Formaldehyde	CH_2O	30.02635
Hexane	C_6H_{14}	86.1775
Hydrogen Chloride	HCl	36.4609
Hydrogen Fluoride	HF	20.0063
Hydrogen Sulfide	H_2S	34.0798
Mercury	Hg	200.59
Methane	CH_4	16.04275
Natural Gas [2]	-	17.1676532
Nitrogen	N_2	28.0134
Nitrogen Monoxide	NO	30.0061
Nitrogen Oxides [3]	NO_2	46.0055
Oxygen	O_2	31.9988
Pentane	C_5H_{12}	72.15055
Propane	C_3H_8	44.09665
Selenium	Se	78.96
Sulfur	S	32.064
Sulfur Dioxide	SO_2	64.0628
Sulfur Trioxide	SO_3	80.0622
Sulfuric Acid	H_2SO_4	98.0774
Water	H_2O	18.0152

Note:

1 Chemical Engineers' Handbook, 5th Edition, R.H. Perry & C.H. Chilton, Editors, 1973

2 GE for the 7F.05, 7HA units and LM6000 units are based on the following TVA-supplied natural gas analysis:

Methane	CH_4	16.04275	94.71
Ethane	C_2H_6	30.0697	2.62
Propane	C_3H_8	44.09665	0.52
Butane	C_4H_{10}	58.1236	0.22
Pentane	C_5H_{12}	72.15055	0.08
Hexane+	C_6H_{14}	86.1775	0.085
Nitrogen	N_2	28.0134	0.495
Carbon Dioxide	CO_2	44.00995	1.27
		17.1676532	100

Corresponding Lower Heating Value (LHV): 20,539 Btu.lb

Corresponding Higher Heating Value (HHV): 22,759 Btu/lb

AP-42 standard cubic feet of gas is at **60** deg F; therefore, natural gas density is 0.04524 lb/scf,

3 Nitrogen oxides (NOX) reported as nitrogen dioxide (NO_2)

Table 2. Default Greenhouse-Gas (GHG) Emission Factors (lbs/10^6 Btu) [1]

Fuel	CO2	CH4	N2O	CO2e
Pipeline Natural Gas	117.0	2.20E-03	2.20E-04	117.1
Distillate Oil (No. 2)	163.1	6.61E-03	1.32E-03	163.6

Note:
US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart C, Tables C-1 & C-2, as amended 11-29-13 (78 FR 71904)

Table 3. Global Warming Potentials (GWP) for Combustion-Source Greenhouse-Gas (GHG) Pollutants (100-Year Time Horizon) [1]

-	CO2	CH4	N2O	SF6
Global Warming Potntl	1	25	298	22,800

Note:
1 US EPA, Code of Federal Regulations, Title 40, Part 98, Subpart A, Table A-1, as amended 11-29-13 (78 FR 71904)

Table 4. Molar Volume and F-Factors

Gas Constant:	0.7302	ft^3-atm/(lbmol-deg R)	-
Standard Temp:	68	degF	40 CFR 60 Appendix, Method 19, Table 19-2, Footnote
Standard Press:	1	atm	40 CFR 60 Appendix, Method 19, Table 19-2, Footnote
Molar Volume:	385.3	ft^3/lbmole	-
F Factor - Nat Gas:	8,710	dscf/10^6 Btu	40 CFR 60 Appendix, Method 19, Table 19-2
F Factor - Oil:	9,190	dscf/10^6 Btu	40 CFR 60 Appendix, Method 19, Table 19-2
Perfect Heat Rate:	3,413	Btu/kWh	40 CFR 60 Subpart TTTTa, "Potential electric output" definition

Appendix C – USACE Jurisdictional Determination Documentation

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT
600 VESTAVIA PARKWAY, SUITE 203
THE SHELBY BUILDING
VESTAVIA HILLS, AL 35216

REPLY TO
ATTENTION OF:

April 18, 2024

North Branch
Regulatory Division

SUBJECT: Department of the Army File Number SAM-2023-1145-CMS, Caledonia Combustion Turbine Site, Caledonia, Lowndes County, Mississippi

Tennessee Valley Authority
Attention: Mr. Roger Waldrep
1101 Market Street, LP 5D-C
Chattanooga, Tennessee 37402

Transmitted electronically to rtwaldrep@tva.gov

Dear Mr. Waldrep:

This is in response to your request for a Department of the Army (DA) Approved Jurisdictional Determination (AJD) on a 120-acre parcel in Caledonia, Lowndes County, Mississippi. More specifically, the site is located in Sections 27 and 28, Township 16 South, Range 17 West and is centered at Latitude 33.6473359, Longitude -88.3140115 as depicted on the attached figure.

Based on information obtained during our site visit on February 29, 2024, our review of the information and wetland determination data forms you furnished, and other desktop information available to our office, we have completed an AJD for the site. Attached is an AJD Memorandum for Record (MFR) that describes the features identified on the site that are and are not subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE). Please be advised that this determination reflects current policy and regulation.

The features identified as E001, E002, E003, E004, P001, P002, W001, W002, W003, and W004, as depicted on the attached exhibit entitled “Figure 2 Delineation Map”, are not waters of the United States and therefore are not subject to DA jurisdiction. The features identified as S001 and S002 are waters of the United States and therefore are subject to DA jurisdiction. The attached AJD MFR further describes these areas. Please be advised that this AJD MFR is based on current policy and regulation and is valid for a period of five (5) years from the date of this letter. If after the 5-year period this jurisdictional determination has not been specifically revalidated by the USACE, it shall automatically expire. If the information you have submitted, and on which the USACE has based its determination is later found to be in error, this decision may be revoked.

Your delineation site was reviewed pursuant to Section 404 of the Clean Water Act. Section 404 of the Clean Water Act requires that a DA permit be obtained for the placement or discharge of dredged and/or fill material into waters of the U.S., including streams and wetlands, prior to conducting the work (33 U.S.C. 1344). For regulatory purposes, the USACE defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Please be advised that land clearing operations involving removal of vegetation with mechanized equipment such as front-end loaders, backhoes, or bulldozers with sheer blades, rakes, or discs; windrowing vegetation; land leveling; or other soil disturbance in areas subject to USACE jurisdiction are considered a discharge of dredged and/or fill material under our permitting jurisdiction If future work proposed at this site includes a discharge or placement of dredged and/or fill material into waters of the U.S., a DA permit is required prior to initiating work.

This letter contains an AJD MFR. If you object to this determination, you may request an administrative appeal under USACE regulations at 33 CFR Part 331. Attached you will find a Notification of Administrative Appeal (NAP) Options and Process and Request for Appeal (RFA) form. If you request to appeal this determination, you must submit a completed RFA to the USACE, South Atlantic Division Office at the following mailing address and e-mail address: Krista Sabin, Regulatory Review Officer, 60 Forsyth Street Southwest, Floor M9, Atlanta, Georgia 30303; Krista.D.Sabin@usace.army.mil.

In order for an RFA to be accepted, the USACE must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this letter.

The statements contained herein do not convey any property rights, or any exclusive privileges and do not authorize any injury to property, nor shall it be construed as excusing you from compliance with other Federal, State, or local statutes, ordinances, or regulations that may affect proposed work at this site.

The delineation included herein has been conducted to identify the location and extent of the aquatic resources for purposes of the Clean Water Act for the particular site identified in this request. This delineation may not be valid for the Wetland Conservation Provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should discuss the applicability of an NRCS Certified Wetland Determination with the local USDA service center, prior to starting work.

If you intend to sell property that is part of a project that requires DA authorization, it may be subject to the Interstate Land Sales Full Disclosure Act. The Property Report, required by Housing and Urban Development Regulation, must state whether or not a permit for the development has been applied for, issued, or denied by the USACE (Part 320.3(h) of Title 33 of the Code of Federal Regulations).

An electronic copy of this letter is being provided to Britta Lees at bplees@tvs.gov.

We appreciate your cooperation with the Corps of Engineers' Regulatory Program. Please refer to file number **SAM-2024-1145-CMS** in all future correspondence regarding this project or if you have any questions concerning this determination.

Please contact me by telephone at (205) 381-8108 or by e-mail at courtney.m.shea@usace.army.mil should you have any questions. For additional information about our Regulatory Program, visit our web site at http://www.sam.usace.army.mil/Missions/Regulatory.aspx. Please take a moment to complete our customer satisfaction survey located under the menu header on the right side of the webpage. Your responses are appreciated and will allow us to improve our services.

Sincerely,

Courtney Shea
Digitally signed by Courtney Shea
Date: 2024.04.18 13:47:45 -05'00'

Courtney Shea
Team Leader

Attachments

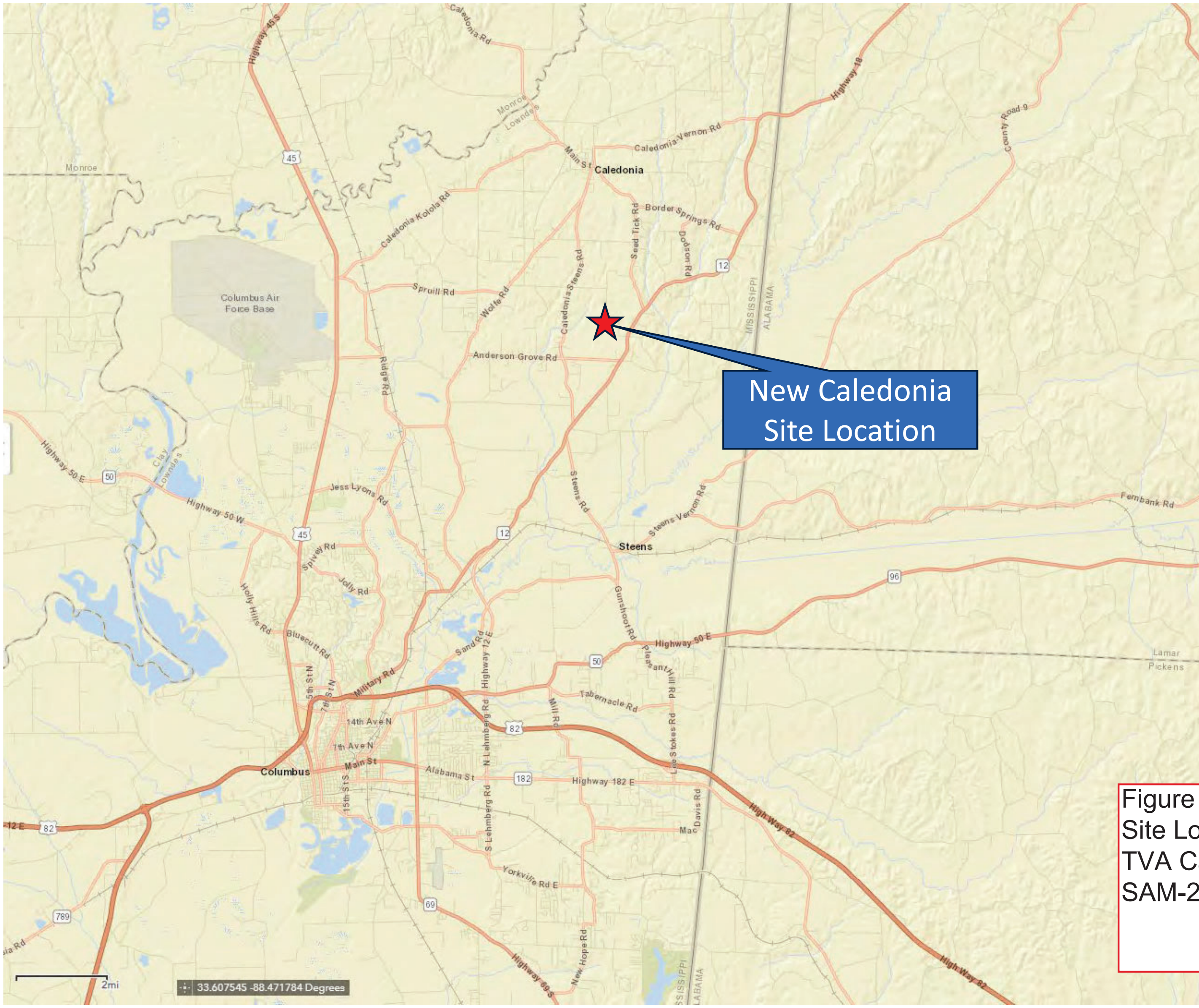

Figure 1
Site Locator
TVA Caledonia site
SAM-2023-1145-CMS

Proposed TVA New Caledonia Site

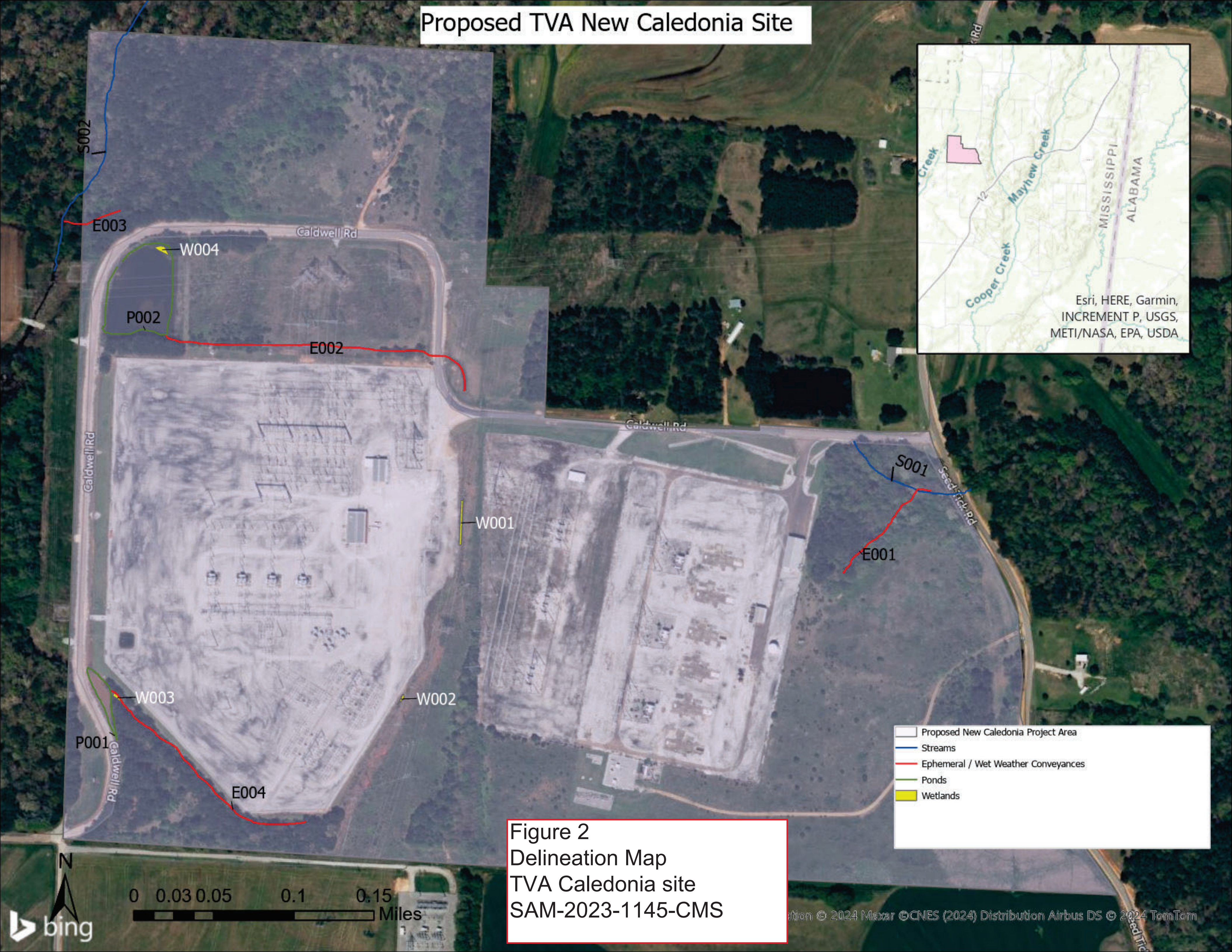

Figure 2
Delineation Map
TVA Caledonia site
SAM-2023-1145-CMS

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT
600 VESTAVIA PARKWAY SUITE 203
VESTAVIA HILLS, ALABAMA 35216

CESAM-RD-N April 18, 2024

MEMORANDUM FOR RECORD

SUBJECT: US Army Corps of Engineers (Corps) Pre-2015 Regulatory Regime Approved Jurisdictional Determination in Light of *Sackett v. EPA*, 143 S. Ct. 1322 (2023) ,[1] SAM-2023-1145-CMS, MFR #1 of #1[2]

BACKGROUND. An Approved Jurisdictional Determination (AJD) is a Corps document stating the presence or absence of waters of the United States on a parcel or a written statement and map identifying the limits of waters of the United States on a parcel. AJDs are clearly designated appealable actions and will include a basis of JD with the document.[3] AJDs are case-specific and are typically made in response to a request. AJDs are valid for a period of five years unless new information warrants revision of the determination before the expiration date or a District Engineer has identified, after public notice and comment, that specific geographic areas with rapidly changing environmental conditions merit re-verification on a more frequent basis.[4] For the purposes of this AJD, we have relied on section 10 of the Rivers and Harbors Act of 1899 (RHA),[5] the Clean Water Act (CWA) implementing regulations published by the Department of the Army in 1986 and amended in 1993 (references 2.a. and 2.b. respectively), the 2008 *Rapanos-Carabell* guidance (reference 2.c.), and other applicable guidance, relevant case law and longstanding practice, (collectively the pre-2015 regulatory regime), and the *Sackett* decision (reference 2.d.) in evaluating jurisdiction.

This Memorandum for Record (MFR) constitutes the basis of jurisdiction for a Corps AJD as defined in 33 CFR §331.2. The features addressed in this AJD were evaluated consistent with the definition of "waters of the United States" found in the pre-2015 regulatory regime and consistent with the Supreme Court's decision in *Sackett*. This AJD did not rely on the 2023 "Revised Definition of 'Waters of the United States,'" as

[1] While the Supreme Court's decision in *Sackett* had no effect on some categories of waters covered under the CWA, and no effect on any waters covered under RHA, all categories are included in this Memorandum for Record for efficiency.
[2] When documenting aquatic resources within the review area that are jurisdictional under the Clean Water Act (CWA), use an additional MFR and group the aquatic resources on each MFR based on the TNW, interstate water, or territorial seas that they are connected to. Be sure to provide an identifier to indicate when there are multiple MFRs associated with a single AJD request (i.e., number them 1, 2, 3, etc.).
[3] 33 CFR 331.2.
[4] Regulatory Guidance Letter 05-02.
[5] USACE has authority under both Section 9 and Section 10 of the Rivers and Harbors Act of 1899 but for convenience, in this MFR, jurisdiction under RHA will be referred to as Section 10.

amended on 8 September 2023 (Amended 2023 Rule) because, as of the date of this decision, the Amended 2023 Rule is not applicable in Mississippi due to litigation.

1. SUMMARY OF CONCLUSIONS.

   a. Provide a list of each individual feature within the review area and the jurisdictional status of each one (i.e., identify whether each feature is/is not a water of the United States and/or a navigable water of the United States).

Waters_Name	**Latitude**	**Longitude**	**Waters Size**	**Type Of Aquatic Resource**	**Geographic Authority**
E001	33.6479	-88.3101	540 FEET	NON-WOTUS-TRIB.NEGATIVE-A5	None
E002	33.64951	-88.31477	1600 FEET	NON-JD - RAPANOS.GUIDE - DITCH	None
E003	33.65069	-88.31854	193 FEET	NON-WOTUS-TRIB.NEGATIVE-A5	None
E004	33.64574	-88.3173	936 FEET	NON-JD - RAPANOS.GUIDE - DITCH	None
P001	33.64634	-88.3183	.25 ACRES	NON-JD - PREAMBLE - ART.LAKE.POND	None
P002	33.65004	-88.318	1.87 ACRES	NON-JD - PREAMBLE - ART.LAKE.POND	None
S001	33.6479	-88.3101	532 FEET	A5.TRIB-404	Section 404
S002	33.65146	-88.31843	1119 FEET	A5.TRIB-404	Section 404
W001	33.64803	-88.31448	.02 ACRES	NON-WOTUS-WETL.NEGATIVE-A7	None
W002	33.64643	-88.31507	.01 ACRES	NON-WOTUS-WETL.NEGATIVE-A7	None
W003	33.64638	-88.31816	.01 ACRES	NON-JD – PREAMBLE ART LAKE POND	None
W004	33.65044	-88.3178	.02 ACRES	NON-JD – PREAMBLE ART LAKE POND	None

2. REFERENCES.

   a. Final Rule for Regulatory Programs of the Corps of Engineers, 51 FR 41206 (November 13, 1986).

   b. Clean Water Act Regulatory Programs, 58 FR 45008 (August 25, 1993).

   c. U.S. EPA & U.S. Army Corps of Engineers, Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States & Carabell v. United States* (December 2, 2008)

   d. *Sackett v. EPA*, 598 U.S. _, 143 S. Ct. 1322 (2023)

   e. November 15, 2023 presentation "Updates for Tribes and States on 'Waters of the United States'" by USEPA and Department of the Army (https://www.epa.gov/wotus/2023-rule-revised-definition-waters-united-states-training-presentations)

   f. Revised Definition of "Waters of the United States", Federal Register Vol. 88, No. 11, January 18, 2023

3. REVIEW AREA. The review area encompasses approximately 120 acres of land, which is comprised of a former TVA combustion turbine site that was dismantled in 2007, an adjacent area that is a TVA substation currently in operation, and some undeveloped acreage. The review area is located in New Caledonia, Lowndes County, Mississippi and is centered at latitude 33.6473359, longitude -88.3140115.

4. NEAREST TRADITIONAL NAVIGABLE WATER (TNW), INTERSTATE WATER, OR THE TERRITORIAL SEAS TO WHICH THE AQUATIC RESOURCE IS CONNECTED. The nearest TNW to which the aquatic resources are connected is Luxapallila Creek. Luxapallila Creek is on Mobile District's Section 10 waters list. Section 10 waters are a subset of TNWs. [6] Luxapallila Creek is located approximately 6 direct miles south of the review area.

5. FLOWPATH FROM THE SUBJECT AQUATIC RESOURCES TO A TNW, INTERSTATE WATER, OR THE TERRITORIAL SEAS.

[6] This MFR should not be used to complete a new stand-alone TNW determination. A stand-alone TNW determination for a water that is not subject to Section 9 or 10 of the Rivers and Harbors Act of 1899 (RHA) is completed independently of a request for an AJD. A stand-alone TNW determination is conducted for a specific segment of river or stream or other type of waterbody, such as a lake, where upstream or downstream limits or lake borders are established.

S002 is a relatively permanent water that flows from the western property boundary a distance of approximately 2 miles to Howard Creek. Howard Creek then flows approximately 5 miles to Luxapallila Creek, a TNW.

E002 flows into P002 and W004 is adjacent to P002 and within the ordinary high water mark (OHWM) of P002. P002 has a discharge pipe under Caldwell Road that takes flow into a small rirap lined catchment before discharging to S002 (RPW) outside of the review area, which flows approximately 2 miles to Howard Creek. From that point Howard Creek flows approximately 5 miles to Luxapallila Creek, a TNW.

E003 flows for approximately 193 feet into S002 (RPW) outside of the review area. S002 flows approximately 2 miles to Howard Creek. From that point Howard Creek flows approximately 5 miles to Luxapallila Creek, a TNW.

E001 (nonRPW) flows into S001 (RPW) in the review area. S001 flows into a culvert under Seed Tick Road and continues approximately 1,800 linear feet to Cooper Creek, which then flows approximately 5 miles to Yellow Creek, which flows approximately 1.6 miles to Luxapallila Creek, a TNW.

E004 flows into P001 and W003 is below the OHWM of P001. An outfall pipe was not observed in P001, but approximately 150 north of P001 there appears to be a storm sewer inlet where during times of high flow water from P001 could enter and the storm sewer appears to discharge on the west side of Caldwell Road into a small riprap lined catchment which would discharge water offsite to S002 which flows approximately 2 miles to Howard Creek. Howard Creek then flows approximately 5 miles to Luxapallila Creek, a TNW.

W001 and W002 do not flow to a TNW, interstate water or territorial seas.

6. SECTION 10 JURISDICTIONAL WATERS[7]: Describe aquatic resources or other features within the review area determined to be jurisdictional in accordance with Section 10 of the Rivers and Harbors Act of 1899. Include the size of each aquatic resource or other feature within the review area and how it was determined to be jurisdictional in accordance with Section 10.[8] N/A

[7] 33 CFR 329.9(a) A waterbody which was navigable in its natural or improved state, or which was susceptible of reasonable improvement (as discussed in § 329.8(b) of this part) retains its character as “navigable in law” even though it is not presently used for commerce, or is presently incapable of such use because of changed conditions or the presence of obstructions.

[8] This MFR is not to be used to make a report of findings to support a determination that the water is a navigable water of the United States. The district must follow the procedures outlined in 33 CFR part 329.14 to make a determination that water is a navigable water of the United States subject to Section 10 of the RHA.

7. SECTION 404 JURISDICTIONAL WATERS: Describe the aquatic resources within the review area that were found to meet the definition of waters of the United States in accordance with the pre-2015 regulatory regime and consistent with the Supreme Court's decision in *Sackett*. List each aquatic resource separately, by name, consistent with the naming convention used in section 1, above. Include a rationale for each aquatic resource, supporting that the aquatic resource meets the relevant category of "waters of the United States" in the pre-2015 regulatory regime. The rationale should also include a written description of, or reference to a map in the administrative record that shows, the lateral limits of jurisdiction for each aquatic resource, including how that limit was determined, and incorporate relevant references used. Include the size of each aquatic resource in acres or linear feet and attach and reference related figures as needed.

    a. TNWs (a)(1): N/A

    b. Interstate Waters (a)(2): N/A

    c. Other Waters (a)(3): N/A

    d. Impoundments (a)(4): N/A

    e. Tributaries (a)(5): **S001** is a relatively permanent water that exhibits perennial flow. This determination was made based on the presence of baseflow during mild drought conditions (February 29, 2024), iron oxidizing bacteria, hydric soil indicators observed in soil sample taken at the base of the bank, well defined bed and banks. S001 flows into a culvert under Seed Tick Road and continues approximately 1,800 linear feet to Cooper Creek, which then flows approximately 5 miles to Yellow Creek, which flows approximately 1.6 miles to Luxapallila Creek, a TNW.

       S002 is a relatively permanent water that exhibits perennial flow. This determination was made based on the presence of baseflow during mild drought conditions (February 29, 2024), well defined bed and banks, fish observed in pools (April 2023). S002 flows from the western property boundary a distance of approximately 2 miles to Howard Creek. Howard Creek then flows approximately 5 miles to Luxapallila Creek, a TNW.

    f. The territorial seas (a)(6): N/A

    g. Adjacent wetlands (a)(7): N/A

8. NON-JURISDICTIONAL AQUATIC RESOURCES AND FEATURES

a. Describe aquatic resources and other features within the review area identified as "generally non-jurisdictional" in the preamble to the 1986 regulations (referred to as "preamble waters").[9] Include size of the aquatic resource or feature within the review area and describe how it was determined to be non-jurisdictional under the CWA as a preamble water.

   P001 is a 0.25-acre pond that was dug in uplands when the TVA facility was constructed to collect stormwater runoff, which could also be defined as a settling basin to allow for solids to settle out before discharging into downstream waters. In accordance with the preamble to the 1986 regulations, artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing are generally not jurisdictional. Because P001 was built in uplands and is a settling pond it is not a water of the U.S. **W003** is a 0.01-acre emergent wetland that formed within the confines of P001. In accordance with the preamble to the Revised Definition of "Waters of the United States" (Federal Register Vol. 88, No. 11, January 18, 2023, page 3105), the agencies, "find that wetlands that develop entirely within the confines of an excluded feature are not jurisdictional. This interpretation is consistent with the agencies' longstanding approach to this issue and with the agencies' rationale for excluding these features." Since W003 developed within the confines of non-jurisdictional P001, W003 is not jurisdictional.

   P002 is a 1.87-acre pond that was dug in uplands when the TVA facility was constructed to collect stormwater runoff, which could also be defined as a settling basin to allow for solids to settle out before discharging into downstream waters. In accordance with the preamble to the 1986 regulations, artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing are generally not jurisdictional. Because P002 was built in uplands and is a settling pond it is not a water of the U.S. **W004** is a 0.02-acre emergent wetland that formed within the confines of P002. In accordance with the preamble to the Revised Definition of "Waters of the United States" (Federal Register Vol. 88, No. 11, January 18, 2023, page 3105), the agencies, "find that wetlands that develop entirely within the confines of an excluded feature are not jurisdictional. This interpretation is consistent with the agencies' longstanding approach to this issue and with the agencies' rationale for excluding these features." Since W004 developed within the confines of non-jurisdictional P002, W004 is not jurisdictional.

[9] 51 FR 41217, November 13, 1986.

b. Describe aquatic resources and features within the review area identified as "generally not jurisdictional" in the *Rapanos* guidance. Include size of the aquatic resource or feature within the review area and describe how it was determined to be non-jurisdictional under the CWA based on the criteria listed in the guidance.

   E002 is a 1,600 linear foot ditch dug in uplands, draining only uplands, with less than a relatively permanent flow of water. E002 appears to have been constructed when the TVA facility was built to direct stormwater runoff to P002. It is a relatively straight feature with uniform width and riprap lining portions of the channel. E002 sits above the water table and only flows in response to precipitation events. In accordance with the 2008 Rapanos guidance, ditches dug in uplands, draining only uplands with less than a relatively permanent flow of water are not jurisdictional waters of the U.S.

   E004 is a 936-foot-long ditch dug in uplands, draining only uplands, with less than a relatively permanent flow of water. E004 appears to have been constructed when the TVA facility was built to direct stormwater runoff to P001. It is a relatively straight feature with uniform width and riprap lining the majority of the channel. E002 sits above the water table and only flows in response to precipitation events. The start of the channel holds water (as evidenced in photos from the Feb. 29, 2024 site visit) but it appears to sit lower in elevation than the downgradient portion of the ditch, so the water sits in a bowl. The remainder of the channel was dry during the Corps' site visit in February 2024. There were quite a bit of pine needles in the channel indicating lack of regular or sustained flow. In accordance with the 2008 Rapanos guidance, ditches dug in uplands, draining only uplands with less than a relatively permanent flow of water are not jurisdictional waters of the U.S.

c. Describe aquatic resources and features identified within the review area as waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA. Include the size of the waste treatment system within the review area and describe how it was determined to be a waste treatment system. N/A

d. Describe aquatic resources and features within the review area determined to be prior converted cropland in accordance with the 1993 regulations (reference 2.b.). Include the size of the aquatic resource or feature within the review area and describe how it was determined to be prior converted cropland. N/A

e. Describe aquatic resources (i.e. lakes and ponds) within the review area, which do not have a nexus to interstate or foreign commerce, and prior to the January 2001 Supreme Court decision in "*SWANCC*," would have been jurisdictional based solely on the "Migratory Bird Rule." Include the size of the aquatic resource or feature, and how it was determined to be an "isolated water" in accordance with *SWANCC*. N/A

f. Describe aquatic resources and features within the review area that were determined to be non-jurisdictional because they do not meet one or more categories of waters of the United States under the pre-2015 regulatory regime consistent with the Supreme Court's decision in *Sackett* (e.g., tributaries that are non-relatively permanent waters; non-tidal wetlands that do not have a continuous surface connection to a jurisdictional water).

E001 is a 540-foot-long non-relatively permanent water (non-RPW). E001 sits above the water table and only flows in response to rainfall events. E001 exhibited weak bed and banks, leaf litter in the channel, lack of sediment sorting, and lack of hydric soil indicators at the toe of bank. Because E001 is a non-RPW it is not a jurisdictional water.

E003 is a 193-foot-long non-relatively permanent water (non-RPW). E003 sits above the water table and only flows in response to rainfall events. E003 exhibited weak bed and banks, leaf litter in the channel, upland vegetation growing in the channel, lack of sediment sorting, and lack of hydric soil indicators at the toe of bank. Because E003 is a non-RPW it is not a jurisdictional water.

W001 is a 0.02-acre emergent wetland that formed in a ditch that appears to have been created when the TVA facility was constructed. W001 exhibited wetland hydrology, hydrophytic vegetation, and hydric soil indicators. W001 is surrounded by uplands and does not have a continuous surface connection to a TNW, RPW, territorial seas, interstate water or impoundment of a jurisdictional water.

W002 is a 0.01-acre emergent wetland that formed in a ditch that appears to have been created when the TVA facility was constructed. W002 exhibited wetland hydrology, hydrophytic vegetation, and hydric soil indicators. W002 is surrounded by uplands and does not have a continuous surface connection to a TNW, RPW, territorial seas, interstate water or impoundment of a jurisdictional water.

9. DATA SOURCES. List sources of data/information used in making determination. Include titles and dates of sources used and ensure that information referenced is available in the administrative record.

a. Corps project manager's site visit February 29, 2024.

b. TVA's JD request dated December 8, 2023 and updated delineation figure and aquatic resource table received March 12, 2024.

c. Antecedent Precipitation Tool

d. USACE National Regulatory Viewer (NRV) accessed April 2, 4, 9 and 10, 2024.

e. Google Earth Pro accessed April 2, 4, 9 and 10, 2024.

f. Shape files obtained from TVA – project boundary, streams, wetlands, ponds

10. OTHER SUPPORTING INFORMATION. N/A

11. NOTE: The structure and format of this MFR were developed in coordination with the EPA and Department of the Army. The MFR's structure and format may be subject to future modification or may be rescinded as needed to implement additional guidance from the agencies; however, the approved jurisdictional determination described herein is a final agency action.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: TVA	File Number: SAM-2023-01145-CMS	Date: 4/18/2024
Attached is:		See Section below

	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL WITHOUT PREJUDICE	C
	PERMIT DENIAL WITH PREJUDICE	D
X	APPROVED JURISDICTIONAL DETERMINATION	E
	PRELIMINARY JURISDICTIONAL DETERMINATION	F

SECTION I

The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/appeals/ or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C. PERMIT DENIAL WITHOUT PREJUDICE: Not appealable
You received a permit denial without prejudice because a required Federal, state, and/or local authorization and/or certification has been denied for activities which also require a Department of the Army permit before final action has been taken on the Army permit application. The permit denial without prejudice is not appealable. There is no prejudice to the right of the applicant to reinstate processing of the Army permit application if subsequent approval is received from the appropriate Federal, state, and/or local agency on a previously denied authorization and/or certification.

D: PERMIT DENIAL WITH PREJUDICE: You may appeal the permit denial
You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information for reconsideration

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety and waive all rights to appeal the approved JD.

- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

- RECONSIDERATION: You may request that the district engineer reconsider the approved JD by submitting new information or data to the district engineer within 60 days of the date of this notice. The district will determine whether the information submitted qualifies as new information or data that justifies reconsideration of the approved JD. A reconsideration request does not initiate the appeal process. You may submit a request for appeal to the division engineer to preserve your appeal rights while the district is determining whether the submitted information qualifies for a reconsideration.

F: PRELIMINARY JURISDICTIONAL DETERMINATION: Not appealable
You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also, you may provide new information for further consideration by the Corps to reevaluate the JD.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision you may contact:	If you have questions regarding the appeal process, or to submit your request for appeal, you may contact:
U.S. Army Corps of Engineers, Mobile District Regulatory Division, North Branch Attention: Courtney Shea 600 Vestavia Parkway Suite 203 Vestavia Hills, Alabama 35216 Courtney.m.shea@usace.army.mil 205-381-8108	Krista Sabin Regulatory Review Officer South Atlantic Division 60 Forsyth St SW, Floor M9 Atlanta, Georgia 30303-8803 Krista.D.Sabin@usace.army.mil 904-314-9631

SECTION II – REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT	
REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. Use additional pages as necessary. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)	
ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.	
RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15-day notice of any site investigation and will have the opportunity to participate in all site investigations.	
______________________________ Signature of appellant or agent.	Date:
Email address of appellant and/or agent:	Telephone number:

Appendix D – Bat Strategy Project Review Form

Project Review Form - TVA Bat Strategy *(06/2019)*

This form should only **be completed if project includes activities in Tables 2 or 3 (STEP 2 below). This form is not required if project activities are limited to Table 1 (STEP 2) or otherwise determined to have no effect on federally listed bats. If so, include the following statement in your environmental compliance document (e.g., add as a comment in the project CEC): "Project activities limited to Bat Strategy Table 1 or otherwise determined to have no effect on federally listed bats. Bat Strategy Project Review Form NOT required." This form is to assist in determining required conservation measures per TVA's ESA Section 7 programmatic consultation for routine actions and federally listed bats.**[1]

Project Name: New Caledonia Gas Plant **Date:** Nov 2, 2023

Contact(s): Erica McLamb, Robert Kulisek **CEC#:** **Project ID:** 2023-15

Project Location (City, County, State): Caledonia, Lowndes County, Mississippi

Project Description:

Construction and operation of a 500MW gas plant consisting of six dual-fueled frame combustion turbines (CT) at the existing New Caledonia Gas Plant. Clearing of vegetation timing is TBD. Delivery of units is expected to begin in 08/2025 and construction to start shortly afterwards.

SECTION 1: PROJECT INFORMATION - ACTION AND ACTIVITIES

STEP 1) Select TVA Action. If none are applicable, contact environmental support staff, Environmental Project Lead, or Terrestrial Zoologist to discuss whether form (i.e., application of Bat Programmatic Consultation) is appropriate for project:

☐ 1 Manage Biological Resources for Biodiversity and Public Use on TVA Reservoir Lands	☐ 6 Maintain Existing Electric Transmission Assets
☐ 2 Protect Cultural Resources on TVA-Retained Land	☐ 7 Convey Property associated with Electric Transmission
☐ 3 Manage Land Use and Disposal of TVA-Retained Land	☐ 8 Expand or Construct New Electric Transmission Assets
☐ 4 Manage Permitting under Section 26a of the TVA Act	☐ 9 Promote Economic Development
☒ 5 Operate, Maintain, Retire, Expand, Construct Power Plants	☐ 10 Promote Mid-Scale Solar Generation

STEP 2) Select all activities from Tables 1, 2, and 3 below that are included in the proposed project.

TABLE 1. Activities with no effect to bats. Conservation measures & completion of bat strategy project review form NOT required.

☐ 1. Loans and/or grant awards	☐ 8. Sale of TVA property	☐ 19. Site-specific enhancements in streams and reservoirs for aquatic animals
☐ 2. Purchase of property	☐ 9. Lease of TVA property	☐ 20. Nesting platforms
☐ 3. Purchase of equipment for industrial facilities	☐ 10. Deed modification associated with TVA rights or TVA property	☐ 41. Minor water-based structures (this does not include boat docks, boat slips or piers)
☐ 4. Environmental education	☐ 11. Abandonment of TVA retained rights	☐ 42. Internal renovation or internal expansion of an existing facility
☐ 5. Transfer of ROW easement and/or ROW equipment	☐ 12. Sufferance agreement	☐ 43. Replacement or removal of TL poles
☐ 6. Property and/or equipment transfer	☐ 13. Engineering or environmental planning or studies	☐ 44. Conductor and overhead ground wire installation and replacement
☐ 7. Easement on TVA property	☐ 14. Harbor limits delineation	☐ 49. Non-navigable houseboats

TABLE 2. Activities not likely to adversely affect bats with implementation of conservation measures. Conservation measures and completion of bat strategy project review form REQUIRED; review of bat records in proximity to project NOT required.

☒ 18. Erosion control, minor	☐ 57. Water intake - non-industrial	☐ 79. Swimming pools/associated equipment
☐ 24. Tree planting	☐ 58. Wastewater outfalls	☐ 81. Water intakes – industrial
☐ 30. Dredging and excavation; recessed harbor areas	☐ 59. Marine fueling facilities	☐ 84. On-site/off-site public utility relocation or construction or extension
☐ 39. Berm development	☐ 60. Commercial water-use facilities (e.g., marinas)	☐ 85. Playground equipment - land-based
☐ 40. Closed loop heat exchangers (heat pumps)	☐ 61. Septic fields	☒ 87. Aboveground storage tanks
☐ 45. Stream monitoring equipment - placement and use	☐ 66. Private, residential docks, piers, boathouses	☐ 88. Underground storage tanks
☐ 46. Floating boat slips within approved harbor limits	☒ 67. Siting of temporary office trailers	☐ 90. Pond closure
☒ 48. Laydown areas	☐ 68. Financing for speculative building construction	☐ 93. Standard License
☒ 50. Minor land based structures	☐ 72. Ferry landings/service operations	☐ 94. Special Use License
☒ 51. Signage installation	☐ 74. Recreational vehicle campsites	☐ 95. Recreation License
☐ 53. Mooring buoys or posts	☐ 75. Utility lines/light poles	☐ 96. Land Use Permit
☒ 56. Culverts	☐ 76. Concrete sidewalks	

Table 3: Activities that may adversely affect federally listed bats. Conservation measures AND completion of bat strategy project review form REQUIRED; review of bat records in proximity of project REQUIRED by OSAR/Heritage eMap reviewer or Terrestrial Zoologist.

☐ 15. Windshield and ground surveys for archaeological resources	☒ 34. Mechanical vegetation removal, includes trees or tree branches > 3 inches in diameter	☐ 69. Renovation of existing structures
☐ 16. Drilling	☐ 35. Stabilization (major erosion control)	☐ 70. Lock maintenance/ construction
☐ 17. Mechanical vegetation removal, does not include trees or branches > 3” in diameter (in Table 3 due to potential for woody burn piles)	☒ 36. Grading	☐ 71. Concrete dam modification
☒ 21. Herbicide use	☐ 37. Installation of soil improvements	☐ 73. Boat launching ramps
☒ 22. Grubbing	☐ 38. Drain installations for ponds	☐ 77. Construction or expansion of land-based buildings
☐ 23. Prescribed burns	☐ 47. Conduit installation	☐ 78. Wastewater treatment plants
☐ 25. Maintenance, improvement or construction of pedestrian or vehicular access corridors	☐ 52. Floating buildings	☐ 80. Barge fleeting areas
☐ 26. Maintenance/construction of access control measures	☐ 54. Maintenance of water control structures (dewatering units, spillways, levees)	☐ 82. Construction of dam/weirs/ levees
☐ 27. Restoration of sites following human use and abuse	☐ 55. Solar panels	☐ 83. Submarine pipeline, directional boring operations
☐ 28. Removal of debris (e.g., dump sites, hazardous material, unauthorized structures)	☐ 62. Blasting	☐ 86. Landfill construction
☒ 29. Acquisition and use of fill/borrow material	☐ 63. Foundation installation for transmission support	☐ 89. Structure demolition
☒ 31. Stream/wetland crossings	☐ 64. Installation of steel structure, overhead bus, equipment, etc.	☐ 91. Bridge replacement
☐ 32. Clean-up following storm damage	☐ 65. Pole and/or tower installation and/or extension	☐ 92. Return of archaeological remains to former burial sites
☐ 33. Removal of hazardous trees/tree branches		

STEP 3) Project includes one or more activities in Table 3? ○ YES (Go to Step 4) ○ NO (Go to Step 13)

STEP 4) Answer questions a through e below (applies to projects with activities from Table 3 ONLY)

a) Will project involve continuous noise (i.e., ≥ 24 hrs) that is greater than 75 decibels measured on the A scale (e.g., loud machinery)?

- ○ **NO** (NV2 does not apply)
- ◉ **YES** (NV2 applies, subject to records review)

b) Will project involve entry into/survey of cave?

- ◉ **NO** (HP1/HP2 do not apply)
- ○ **YES** (HP1/HP2 applies, subject to review of bat records)

c) If conducting **prescribed burning (activity 23)**, estimated acreage: ______ and timeframe(s) below; ■ **N/A**

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 31	☐ Apr 1 - May 31, Aug 1- Oct 14	☐ Jun 1 - Jul 31
VA	☐ Sep 16 - Nov 15	☐ Nov 16 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 15	☐ Jun 1 - Jul 31
AL	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 15	☐ Mar 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
NC	☐ Oct 15 - Nov 14	☐ Nov 15 - Apr 15	☐ Apr 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
MS	☐ Oct 1 - Nov 14	☐ Nov 15 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 30	☐ Jun 1 - Jul 31

d) Will the project involve vegetation piling/burning?

- ◉ **NO** (SSPC4/ SHF7/SHF8 do not apply)
- ○ **YES** (SSPC4/SHF7/SHF8 applies, subject to review of bat records)

e) If **tree removal (activity 33 or 34)**, estimated amount: ______ ◉ **ac** ○ **trees** ○ **N/A**

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 31	☐ Apr 1 - May 31, Aug 1- Oct 14	☐ Jun 1 - Jul 31
VA	☐ Sep 16 - Nov 15	☐ Nov 16 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 15	☐ Jun 1 - Jul 31
AL	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 15	☐ Mar 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
NC	☐ Oct 15 - Nov 14	☐ Nov 15 - Apr 15	☐ Apr 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
MS	☐ Oct 1 - Nov 14	■ Nov 15 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 30	☐ Jun 1 - Jul 31

If warranted, does project have flexibility for bat surveys (May 15-Aug 15): ◉ **MAYBE** ○ **YES** ○ **NO**

**** For **PROJECT LEADS** whose projects will be reviewed by a Heritage Reviewer (Natural Resources Organization only), **STOP HERE**. Click File/ Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date", and submit with project information. Otherwise continue to Step 5. ****

SECTION 2: REVIEW OF BAT RECORDS (applies to projects with activities from Table 3 ONLY)

STEP 5) Review of bat/cave records conducted by Heritage/OSAR reviewer?

○ **YES** ○ **NO** (Go to Step 13)

Info below completed by:

- ☐ **Heritage Reviewer** (name) ______ Date ______
- ☐ **OSAR Reviewer** (name) ______ Date ______
- ☐ **Terrestrial Zoologist** (name) ______ Date ______

Gray bat records: ☐ None ☐ Within 3 miles* ☐ Within a cave* ☐ Within the County

Indiana bat records: ☐ None ☐ Within 10 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Northern long-eared bat records: ☐ None ☐ Within 5 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Virginia big-eared bat records: ☐ None ☐ Within 6 miles* ☐ Within the County

Caves: ☐ None within 3 mi ☐ Within 3 miles but > 0.5 mi ☐ Within 0.5 mi but > 0.25 mi* ☐ Within 0.25 mi but > 200 feet* ☐ Within 200 feet*

Bat Habitat Inspection Sheet completed? ○ **NO** ○ **YES**

Amount of SUITABLE habitat to be removed/burned (may differ from STEP 4e): ______ (○ **ac** ○ **trees**)* ○ **N/A**

STEP 6) Provide any additional notes resulting from Heritage Reviewer records review in Notes box below **then** . . . .
. ... **Go to Step 13**

Notes from Bat Records Review (e.g., historic record; bats not on landscape during action; DOT bridge survey with negative results):

STEPS 7-12 To be Completed by Terrestrial Zoologist (if warranted):

STEP 7) Project will involve:

- ☐ Removal of suitable trees within 0.5 mile of P1-P2 Indiana bat hibernacula or 0.25 mile of P3-P4 Indiana bat hibernacula or any NLEB hibernacula.
- ☐ Removal of suitable trees within 10 miles of documented Indiana bat (or within 5 miles of NLEB) hibernacula.
- ☐ Removal of suitable trees > 10 miles from documented Indiana bat (> 5 miles from NLEB) hibernacula.
- ☐ Removal of trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity roost tree.
- ☐ Removal of suitable trees within 2.5 miles of Indiana bat roost trees or within 5 miles of Indiana bat capture sites.
- ☐ Removal of suitable trees > 2.5 miles from Indiana bat roost trees or > 5 miles from Indiana bat capture sites.
- ☐ Removal of documented Indiana bat or NLEB roost tree, if still suitable.
- ☐ N/A

STEP 8) Presence/absence surveys were/will be conducted: ◯ **YES** ◯ **NO** ◯ **TBD**

STEP 9) Presence/absence survey results, on ______ ◯ **NEGATIVE** ◯ **POSITIVE** ◯ **N/A**

STEP 10) Project ◯ **WILL** ◯ **WILL NOT require use of Incidental Take in the amount of** ______ ◯ **acres or** ◯ **trees**
proposed to be used during the ◯ **WINTER** ◯ **VOLANT SEASON** ◯ **NON-VOLANT SEASON** ◯ **N/A**

STEP 11) Available Incidental Take (prior to accounting for this project) as of ______

TVA Action	Total 20-year	Winter	Volant Season	Non-Volant Season
5 Operate, Maintain, Retire, Expand, Construct Power Plants				

STEP 12) Amount contributed to TVA's Bat Conservation Fund upon activity completion: $ ______ OR ◯ N/A

TERRESTRIAL ZOOLOGISTS, after completing SECTION 2, review Table 4, modify as needed, and then complete section for Terrestrial Zoologists at end of form.

SECTION 3: REQUIRED CONSERVATION MEASURES

STEP 13) Review Conservation Measures in Table 4 and ensure those selected are relevant to the project. If not, manually override and uncheck irrelevant measures, and explain why in ADDITIONAL NOTES below Table 4.

Did review of Table 4 result in ANY remaining Conservation Measures in **RED**?

◯ **NO** (Go to Step 14)

◯ **YES** (STOP HERE; Submit for Terrestrial Zoology Review. Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date", and submit with project information).

Table 4. TVA's ESA Section 7 Programmatic Bat Consultation Required Conservation Measures

The Conservation Measures in Table 4 are automatically selected based on your choices in Tables 2 and 3 but can be manually overridden, if necessary. To Manually override, press the button and enter your name.

Manual Override

Check if Applies to Project	Activities Subject To Conservation Measure	Conservation Measure Description
☒	15, 16, 17, 18, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 45, 47, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96	**NV1** - Noise will be short-term, transient, and not significantly different from urban interface or natural events (i.e., thunderstorms) that bats are frequently exposed to when present on the landscape.
☐	16, 25, 26, 37, 47, 52, 62, 63, 64, 65, 70, 71, 73, 78, 80, 82, 83, 86, 91	**NV2** - Drilling, blasting, or any other activity that involves continuous noise (i.e., longer than 24 hours) disturbances greater than 75 decibels measured on the A scale (e.g., loud machinery) **within a 0.5 mile radius of documented winter and/or summer roosts** (caves, trees, unconventional roosts) will be conducted when bats are absent from roost sites.
☐	16, 26, 62	**NV3** - Drilling or blasting **within a 0.5 mile radius of documented cave** (or unconventional) roosts will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the roost site.
☐	16, 26, 62	**NV4** - Drilling or blasting **within 0.5 miles of a documented roost site** (cave, tree, unconventional roost) that needs to occur when bats are present will first involve development of project-specific avoidance or minimization measures in coordination with the USFWS.
☐	15, 26, 92	**HP1** - Site-specific cases in which potential impact of human presence is heightened (e.g., conducting environmental or cultural surveys within a roost) will be closely coordinated with staff bat biologists to avoid/ minimize impacts below any potential adverse effect. Any take from these activities would be covered by TVA's Section 10 permit.
☐	15, 26, 92	**HP2** - Entry into roosts known to be occupied by federally listed bats will be communicated to the USFWS when impacts to bats may occur if not otherwise communicated (i.e., via annual monitoring reports per TVA's Section 10 permit). Any take from these activities would be covered by TVA's section 10 permit.
☐	23	**SHF1** - Fire breaks will be used to define and limit burn scope.
☒	17, 23, 34	**SHF2** - Site-specific conditions (e.g., acres burned, transport wind speed, mixing heights) will be considered to ensure smoke is limited and adequately dispersed away from caves so that smoke does not enter cave or cave-like structures.
☐	23	**SHF3** - Acreage will be divided into smaller units to keep amount of smoke at any one time or location to a minimum and reduce risk for smoke to enter caves.
☒	17, 23, 34	**SHF4** - If burns need to be conducted during April and May, when there is some potential for bats to present on the landscape and more likely to enter torpor due to colder temperatures, burns will only be conducted if the air temperature is 55° or greater, and preferably 60° or greater.
☐	23	**SHF5** - Fire breaks will be plowed immediately prior to burning, will be plowed as shallow as possible, and will be kept to minimum to minimize sediment.
☐	23	**SHF6** - Tractor-constructed fire lines will be established **greater than 200 feet from cave entrances**. Existing logging roads and skid trails will be used where feasible to minimize ground disturbance and generation of loose sediment.
☒	17, 22, 23, 32, 33, 34, 35, 36	**SHF7** - Burning will only occur if site specific conditions (e.g. acres burned, transport wind speed, mixing heights) can be modified to ensure that smoke is adequately dispersed away from caves or cave-like structures. This applies to prescribed burns and burn piles of woody vegetation.
☒	17, 22, 23, 32, 33, 34, 35, 36	**SHF8** - Brush piles will be burned a **minimum of 0.25 mile from documented, known, or obvious caves or cave entrances** and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.

▣	17, 23, 34	**SHF9** - A **0.25 mile buffer of undisturbed forest** will be maintained around documented or known gray bat maternity and hibernation colony sites, documented or known Virginia big-eared bat maternity, bachelor, or winter colony sites, Indiana bat hibernation sites, and northern long-eared bat hibernation sites. Prohibited activities within this buffer include cutting of overstory vegetation, construction of roads, trails or wildlife openings, and prescribed burning. Exceptions may be made for maintenance of existing roads and existing ROW, or where it is determined that the activity is compatible with species conservation and recovery (e.g., removal of invasive species).
▣	33, 34	**TR1*** - Removal of potentially suitable summer roosting habitat during time of potential occupancy has been quantified and minimized programmatically. TVA will track and document alignment of activities that include tree removal (i.e., hazard trees, mechanical vegetation removal) with the programmatic quantitative cumulative estimate of seasonal removal of potential summer roost trees for Indiana bat and northern long-eared bat. Project will therefore communicate completion of tree removal to appropriate TVA staff.
▣	33, 34	**TR2** - Removal of suitable summer roosting habitat **within 0.5 mile of Priority 1/Priority 2 Indiana bat hibernacula, or 0.25 mile of Priority 3/Priority 4 Indiana bat hibernacula or any northern long-eared bat hibernacula** will be prohibited, regardless of season, with very few exceptions (e.g., vegetation maintenance of TL ROW immediately adjacent to a known cave).
▣	33, 34	**TR3*** - Removal of suitable summer roosting habitat within documented bat habitat (i.e., within 10 miles of documented Indiana bat hibernacula, within 5 miles of documented northern long-eared bat hibernacula, within 2.5 miles of documented Indiana bat summer roost trees, within 5 miles of Indiana bat capture sites, within 1 mile of documented northern long-eared bat summer roost trees, within 3 miles of northern long-eared bat capture sites) will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
▣	33, 34	**TR4*** - Removal of suitable summer roosting habitat within potential habitat for Indiana bat or northern long-eared bat will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
▣	33, 34	**TR5** - Removal of any trees **within 150 feet of a documented Indiana bat or northern long-eared bat maternity summer roost tree** during non-winter season, range- wide pup season or swarming season (if site is within known swarming habitat), will first require a site-specific review and assessment. If pups are present in trees to be removed (determined either by mist netting and assessment of adult females, or by visual assessment of trees following evening emergence counts), TVA will coordinate with the USFWS to determine how to minimize impacts to pups to the extent possible. May include establishment of artificial roosts before removal of roost tree(s).
▣	33, 34	**TR6** - Removal of a documented Indiana bat or northern long-eared bat roost tree that is still suitable and that needs to occur during non-winter season, range-wide pup season, or swarming season (if site is within known swarming habitat) will first require a site-specific review and assessment. If pups are present in trees to be removed (determined either by mist netting and assessment of adult females, or by visual assessment of trees following evening emergence counts), TVA will coordinate with USFWS to determine how to minimize impacts to pups to the extent possible. This may include establishment of artificial roosts before removal of roost tree(s).
▣	33, 34	**TR7** (**Existing Transmission ROW only**) - **Tree removal within 100 feet of existing transmission ROWs will be limited to hazard trees**. On or adjacent to TLs, a hazard tree is a tree that is tall enough to fall within an unsafe distance of TLs under maximum sag and blowout conditions and/or are also dead, diseased, dying, and/or leaning. Hazard tree removal includes removal of trees that 1) currently are tall enough to threaten the integrity of operation and maintenance of a TL or 2) have the ability in the future to threaten the integrity of operation and maintenance of a TL.
▣	33, 34	**TR8** (**TVA Reservoir Land only**) - Requests for removal of hazard trees on or adjacent to TVA reservoir land will be inspected by staff knowledgeable in identifying hazard trees per International Society of Arboriculture and TVA's checklist for hazard trees. Approval will be limited to trees with a defined target.
▣	33, 34	**TR9** - If removal of suitable summer roosting habitat occurs when bats are present on the landscape, a funding contribution (based on amount of habitat removed) towards future conservation and recovery efforts for federally listed bats would be carried out. Project can consider seasonal bat presence/absence surveys (mist netting or emergence counts) that allow for positive detections without resulting in increased constraints in cost and project schedule. This will enable TVA to contribute to increased knowledge of bat presence on the landscape while carrying out TVA's broad mission and responsibilities.

☐	69, 77, 89, 91	**AR1** - Projects that involve structural modification or demolition of buildings, bridges, and potentially suitable box culverts, will require assessment to determine if structure has characteristics that make it a potentially suitable unconventional bat roost. If so a survey to determine if bats may be present will be conducted. Structural assessment will include: ○ Visual check that includes an exhaustive internal/external inspection of building to look for evidence of bats (e.g., bat droppings, roost entrance/exit holes); this can be done at any time of year, preferably when bats are active. ○ Where accessible and health and safety considerations allow, a survey of roof space for evidence of bats (e.g., droppings, scratch marks, staining, sightings), noting relevant characteristics of internal features that provide potential access points and roosting opportunities. Suitable characteristic may include: gaps between tiles and roof lining, access points via eaves, gaps between timbers or around mortise joints, gaps around top and gable end walls, gaps within roof walling or around tops of chimney breasts, and clean ridge beams. ○ Features with high-medium likelihood of harboring bats but cannot be checked visually include soffits, cavity walls, space between roof covering and roof lining. ○ Applies to box culverts that are at least 5 feet (1.5 meters) tall and with one or more of the following characteristics. Suitable culverts for bat day roosts have the following characteristics: • Location in relatively warm areas • Between 5-10 feet (1.5-3 meters) tall and 300 ft (100 m) or more long • Openings protected from high winds • Not susceptible to flooding • Inner areas relatively dark with roughened walls or ceilings • Crevices, imperfections, or swallow nests ○ Bridge survey protocols will be adapted from the Programmatic Biological Opinion for the Federal Highway Administration (Appendix D of USFWS 2016c, which includes a Bridge Structure Assessment Guidance and a Bridge Structure Assessment Form). ○ Bat surveys usually are NOT needed in the following circumstances: • Domestic garages /sheds with no enclosed roof space (with no ceiling) • Modern flat-roofed buildings • Metal framed and roofed buildings • Buildings where roof space is regularly used (e.g., attic space converted to living space, living space open to rafters) or where all roof space is lit from skylights or windows. Large/tall roof spaces may be dark enough at apex to provide roost space
☐	69, 77, 89, 91	**AR2** - Additional bat P/A surveys (e.g., emergence counts) conducted if warranted (i.e., when AR1 indicates that bats may be present).
☐	91	**AR3** - Bridge survey protocols will be implemented, either by permittee (e.g., state DOT biologists) or qualified personnel. If a bridge is determined to be in use as an unconventional roost, subsequent protocols will be implemented.
☐	69, 89	**AR4** - Removal of buildings with suitable roost characteristics within six miles of known or presumed occupied roosts for Virginia big-eared bat would occur between Nov 16 and Mar 31. Buildings may be removed other times of the year once a bat biologist evaluates a buildings' potential to serve as roosting habitat and determines that this species is not present and/or is not using structure(s).

■	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 56, 61, 62, 63, 64, 65, 67, 69, 84, 89	**SSPC1** (**Transmission only**) - Transmission actions and activities will continue to Implement A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities. This focuses on control of sediment and pollutants, including herbicides. Following are key measures: ○ BMPs minimize erosion and prevent/control water pollution in accordance with state-specific construction storm water permits. BMPS are designed to keep soil in place and aid in reducing risk of other pollutants reaching surface waters, wetlands and ground water. BMPs will undertake the following principles: • Plan clearing, grading, and construction to minimize area and duration of soil exposure. • Maintain existing vegetation wherever and whenever possible. • Minimize disturbance of natural contours and drains. • As much as practicable, operate on dry soils when they are least susceptible to structural damage and erosion. • Limit vehicular and equipment traffic in disturbed areas. Keep equipment paths dispersed or designate single traffic flow paths with appropriate road BMPs to manage runoff. • Divert runoff away from disturbed areas. • Provide for dispersal of surface flow that carries sediment into undisturbed surface zones with high infiltration capacity and ground cover conditions. • Prepare drainage ways and outlets to handle concentrated/increased runoff. • Minimize length and steepness of slopes. Interrupt long slopes frequently. • Keep runoff velocities low and/or check flows. • Trap sediment on-site. • Inspect/maintain control measures regularly & after significant rain. • Re-vegetate and mulch disturbed areas as soon as practical. ○ Specific guidelines regarding sensitive resources and buffer zones: • Extra precaution (wider buffers) within SMZs is taken to protect stream banks and water quality for streams, springs, sinkholes, and surrounding habitat. • BMPs are implemented to protect and enhance wetlands. Select use of equipment and seasonal clearing is conducted when needed for rare plants; construction activities are restricted in areas with identified rare plants. • Standard requirements exist to avoid adverse impacts to caves, protected animals, unique/ important habitat (e.g., cave buffers, restricted herbicide use, seasonal clearing of suitable habitat).
■	16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 70, 71, 73, 76, 77, 78, 80, 81, 82, 83, 86, 87, 88, 89, 90	**SSPC2** - Operations involving chemical/fuel storage or resupply and vehicle servicing will be handled outside of riparian zones (streamside management zones) in a manner to prevent these items from reaching a watercourse. Earthen berms or other effective means are installed to protect stream channel from direct surface runoff. Servicing will be done with care to avoid leakage, spillage, and subsequent stream, wetland, or ground water contamination. Oil waste, filters, other litter will be collected and disposed of properly. Equipment servicing and chemical/fuel storage will be limited to locations greater than 300-ft from sinkholes, fissures, or areas draining into known sinkholes, fissures, or other karst features.

■	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66, 67, 69, 70, 71, 73, 76, 77, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 91	**SSPC3** (**Power Plants only**) - Power Plant actions and activities will continue to implement standard environmental practices. These include: ○ Best Management Practices (BMPs) in accordance with regulations: • Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy • Maintain every site with well-equipped spill response kits, included in some heavy equipment • Conduct Quarterly Internal Environmental Field Assessments at each sight • Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. • When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage ○ Construction Site Protection Methods • Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites • Storm drain protection device • Check dam to help slow down silt flow • Silt fencing to reduce sediment movement ○ Storm Water Pollution Prevention (SWPP) Pollution Control Strategies • Minimize storm water contact with disturbed soils at construction site • Protect disturbed soil areas from erosion • Minimize sediment in storm water before discharge • Prevent storm water contact with other pollutants • Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac) ○ Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to • Minimize fuel and chemical use Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy • Maintain every site with well-equipped spill response kits, included in some heavy equipment • Conduct Quarterly Internal Environmental Field Assessments at each sight • Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. • When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage ○ Construction Site Protection Methods • Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites • Storm drain protection device • Check dam to help slow down silt flow • Silt fencing to reduce sediment movement ○ Storm Water Pollution Prevention (SWPP) Pollution Control Strategies • Minimize storm water contact with disturbed soils at construction site • Protect disturbed soil areas from erosion • Minimize sediment in storm water before discharge • Prevent storm water contact with other pollutants • Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac) ○ Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to minimize fuel and chemical use
■	17, 22, 32, 33, 34, 35, 36	**SSPC4** (**Transmission only**) - Woody vegetation burn piles associated with transmission construction will be placed in the center of newly established ROWs to minimize wash into any nearby undocumented caves that might be on adjacent private property and thus outside the scope of field survey for confirmation. Brush piles will be burned a **minimum of 0.25 miles from documented caves** and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.

■	17, 18, 21, 22, 24, 25, 26, 30, 31, 33, 34, 35, 36, 40, 46, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 66, 67, 68, 69, 70, 72, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 87, 88, 91, 93, 95, 96	**SSPC5** (**26a, Solar, Economic Development only**) - Section 26a permits and contracts associated with solar projects, economic development projects or land use projects include standards and conditions that include standard BMPs for sediment and contaminants as well as measures to avoid or minimize impacts to sensitive species or other resources consistent with applicable laws and Executive Orders.
■	21, 54	**SSPC6** - Herbicide use will be avoided **within 200 ft of portals associated with caves, cave collapse areas, mines and sinkholes** are capable of supporting cave-associated species. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and label requirements.
■	17, 21, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 54, 55	**SSPC7** - Clearing of vegetation **within a 200-ft radius of documented caves** will be limited to hand or small machinery clearing only (e.g., chainsaws, bush-hog, mowers). This will protect potential recharge areas of cave streams and other karst features that are connected hydrologically to caves.
■	16, 26, 36, 37, 38, 39, 48, 50, 52, 59, 60, 62, 66, 67, 69, 72, 75, 77, 78, 79, 86	**L1** - Direct temporary lighting away from suitable habitat during the active season.
■	16, 26, 36, 37, 38, 39, 48, 50, 52, 59, 60, 62, 66, 67, 69, 72, 75, 77, 78, 79, 86	**L2** - Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution when installing new or replacing existing permanent lights by angling lights downward or via other light minimization measures (e.g., dimming, directed lighting, motion-sensitive lighting).

[1]Bats addressed in consultation (02/2018), which includes gray bat (listed in 1976), Indiana bat (listed in 1967), northern long-eared bat (listed in 2015), and Virginia big-eared bat (listed in 1979).

Hide All Unchecked Conservation Measures

○ HIDE

○ UNHIDE

Hide Table 4 Columns 1 and 2 to Facilitate Clean Copy and Paste

○ HIDE

○ UNHIDE

NOTES (additional info from field review, explanation of no impact or removal of conservation measures).

STEP 14) Save completed form (Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date") in project environmental documentation (e.g. CEC, Appendix to EA) AND send a copy of form to batstrategy@tva.gov
Submission of this form indicates that Project Lead/Applicant:

☐ (name) is (or will be made) aware of the requirements below.

- Implementation of conservation measures identified in Table 4 is required to comply with TVA's Endangered Species Act programmatic bat consultation.
- TVA may conduct post-project monitoring to determine if conservation measures were effective in minimizing or avoiding impacts to federally listed bats.

For Use by Terrestrial Zoologist Only

☐ Terrestrial Zoologist acknowledges that Project Lead/Contact (name) ☐ has been informed of any relevant conservation measures and/or provided a copy of this form.

☐ For projects that require use of Take and/or contribution to TVA's Bat Conservation Fund, Terrestrial Zoologist acknowledges that Project Lead/Contact has been informed that project will result in use of Incidental Take ☐ ◯ ac ◯ trees and that use of Take will require $ ☐ contribution to TVA's Conservation Fund upon completion of activity (amount entered should be $0 if cleared in winter).

Appendix E – Environmental Justice Assessment Report

Environmental Justice Assessment – New Caledonia Gas Plant Project

JULY 2024

PREPARED FOR

Tennessee Valley Authority

PREPARED BY

SWCA Environmental Consultants

Environmental Justice Assessment

NEW CALEDONIA GAS PLANT PROJECT

Prepared on behalf of
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July 2024

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Acronyms and Abbreviations

ACS	American Community Survey
CEQ	Council on Environmental Quality
CT	Combustion Turbine
DOE	Department of Energy
EJ	Environmental Justice
EJ IWG	Federal Interagency Working Group on Environmental Justice and NEPA Committee
ENGO	Environmental Non-governmental Organizations
EO	Executive Order
NCG	New Caledonia Simple Cycle Facility
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
PM	particulate matter
Project	New Caledonia Gas Plant Project
RfCs	reference concentrations
TVA	Tennessee Valley Authority
USCB	United States Census Bureau

1 PROJECT LOCATION AND DESCRIPTION

The New Caledonia Simple Cycle Facility (NCG) is proposed to be located on an existing approximately 63-acre parcel of federally owned property managed by the Tennessee Valley Authority (TVA). It is situated in Lowndes County, Mississippi, approximately 10 miles northeast of Columbus, Mississippi. The property is a decommissioned former combustion turbine (CT) site. Much of the property is fenced and graveled, with the remaining portions undeveloped. The undeveloped areas are largely composed of early succession forest along steep slopes, while the flatter portions of the property are largely fallow field.

The proposed NCG plant (Project) would include, but would not necessarily be limited to, the following actions and components:

- Gas system upgrades to existing infrastructure to connect the plant to an existing gas pipeline;
- Construction of an onsite stormwater pond;
- New fuel oil storage and water storage tanks;
- Existing and new natural gas-fired dew point heaters;
- New electric and diesel emergency firewater pumps; and
- Six gas-fired Frame CTs (500 MW) with inlet evaporative cooling.

In addition to the major equipment systems, the proposed NCG facilities include plant equipment and systems, such as natural gas metering and handling systems; instrumentation and control systems; transformers; and either refurbished or new administration and warehouse/maintenance buildings.

The proposed Project would support the continued load growth within the Tennessee Valley. The environmental justice (EJ) screening that follows is intended to inform public outreach, decision-making, and permitting processes.

2 ENVIRONMENTAL JUSTICE

2.1 Background

The purpose of this EJ assessment is to identify minority and low-income communities and to determine if these populations are likely to be adversely and disproportionately affected by the proposed Project. This section describes the regulatory framework that guided the EJ assessment, the environment that may be affected from an EJ perspective, and the potential for disproportionate and adverse impacts among EJ communities.

Executive Order (EO) 12898, Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of agency programs, policies, and activities on minority populations and low-income populations, known collectively as EJ populations. In 2021, EO 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, broadly reaffirmed the importance of EJ and EO 14008, Tackling the Climate Crisis at Home and Abroad, updated elements of the EJ assessment process. EO 14008 also introduced the Justice40 initiative, under which the federal government established a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. Issued in 2023, EO 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All, reiterated a "whole of government approach" to ensure proper attention is paid to EJ issues.

However, none of the recent EOs fundamentally change the way EJ assessments are performed. The primary guidance for implementing EJ assessments at the federal level was prepared in response to EO 12898 and outlines the principles for EJ analysis (Council on Environmental Quality [CEQ] 1997). This was further supplemented in 2004 by guidance from the Department of Energy (DOE 2004). In 2016, guidance on how to identify minority populations under these two standards was provided by the Federal Interagency Working Group on Environmental Justice (EJ IWG) and the National Environmental Policy Act (NEPA) Committee, and in 2019, the EJ IWG identified and discussed a range of potential approaches to EJ assessment (EJ IWG 2016, 2019).

EJ communities are identified based on race and income. The potential for disproportionate and adverse impacts to EJ communities is evaluated by considering whether members of the EJ communities would be more sensitive to Project-related impacts than the general public due to income status, historical exclusion based on race or ethnicity, inability to respond to the action, or increased exposure potential. If such impacts are judged likely to occur, mitigation methods are identified.

2.2 Identifying Environmental Justice Communities

The EJ analysis area includes all 32 block groups[1] within 10 miles of the Project, as illustrated in Figure 1. Most Project-related changes (e.g., changes in air quality, noise levels, dust, and traffic) are likely to be observable near the facility and dissipate quickly over the course of a mile or two. The 10-mile threshold for the EJ analysis was selected to be consistent with the area of effects evaluated for potential air quality impact.

[1] A Census Block Group is the smallest geographical unit for which the Census Bureau consistently publishes the demographic data needed to identify EJ communities. Block Groups typically have a population of 600 to 3,000 people.

Appendix A identifies each block group in the EJ analysis area and includes several measures relevant to the assessment of EJ. Because the EJ assessment area includes parts of Lamar, Pickens, Clay, Lowndes, and Monroe counties, similar information is reported for these counties.

For the purpose of this study, a low-income person is defined as a person associated with an income at or below 200% of the Federal poverty level as reported in Table C17002 of the 2022 American Community Survey (ACS) 5-year estimates. A minority person is a person who self-identifies as any race other than "white-alone, not Hispanic" in Table B03002 in the 2022 ACS 5-year estimates[2].

Consistent with the CEQ (1997) guidance, the following criteria were used to characterize block groups with respect to income and ethnicity.

- Low-income block groups are defined as those in which the percentage of low-income households exceeds 50 percent OR the proportion of low-income households exceeds the same measure for the county within which the block group is located.
- Minority block groups are defined as those in which the percentage of the block group's population self-identifying as a minority exceeds 50 percent OR the percentage of the block group's population self-identifying as a minority exceeds 110 percent of (i.e., is 10 percent higher than) the same measure for the county in which the block group is located.

As reported in Appendix A, illustrated in Figure 1, and summarized in Table 1, out of the 32 block groups that make up the EJ analysis area, 4 block groups are identified as EJ communities due to ethnicity only, 2 block groups are identified as EJ communities due to income only, and 4 block groups are identified as EJ communities due to both income and ethnicity. The nearest block group containing an EJ community, block group 3 of census tract 301.01 in Lamar County, Alabama, is approximately 2.9 miles east of the Project area.

Appendix B presents the proportion of persons in each block group who have limited English proficiency (LEP), which can be used to inform public outreach efforts and engagement opportunities. For this analysis, a person with limited English proficiency is defined as a person aged 5 or older, as reported in Table B16004 of the 2022 ACS 5-year estimates as speaking English "less than very well." Limited English proficiency block groups are defined as those in which the percentage of the block group's population (aged 5 or older) that self-identify as speaking English "less than very well" exceeds 5 percent, or the number of persons (aged 5 or older) that self-identify as speaking English "less than very well" exceeds 1,000. A total of three block groups in the EJ analysis area are identified as containing populations with limited English proficiency; it is likely that the primary languages among individuals in this area who report limited English proficiency are Spanish, Vietnamese and Chinese (including Mandarin and Cantonese) (USCB 2023d)[3]. Figure 2 illustrates English proficiency among block groups within the EJ analysis area. Only block group 2 of census tract 9505.01 was identified as both an EJ community and containing an LEP population.

[2] These are the same definitions and data sources cited in CEQ 2022. However, the data have been updated relative to CEQ (2022) and the data are applied at the higher resolution block group level as opposed to the census tract level reported in CEQ (2022).

[3] Table B16004 of the 2022 ACS 5-year estimates (USCB 2023c) reports language data at the block group level; however, the language categories are very broad (i.e., one category is "Asian and Pacific Island languages"). Table C16001 of the 2022 ACS 5-year estimates (USCB 2023d) reports language data with more specific language categories at the census tract level. The likely predominant non-English languages for block groups with LEP populations were determined by cross referencing Table B16004 with Table C16001.

Table 1

Summary of Environmental Justice and Limited English Proficiency Status Among Block Groups in the Environmental Justice Analysis Area for the Project

Characteristic	Number of Block Groups that Meet Criteria	Proportion of Block Groups within 10 miles (%)
Total Number of Block Groups	32	100%
Minority[a]	4	12.5%
Low-Income[b]	2	6.3%
Minority and Low-Income	4	12.5%
Limited English Proficiency[c]	3	9.4%

[a] Minority block groups are defined as those in which the percentage of the block group's population self-identifying as something other than "white-alone not Hispanic" exceeds 50 percent OR if the percentage of the block group's population self-identifying as something other than "white-alone not Hispanic" exceeds 110 percent of the same measure for the county in which the block group is located.

[b] Low-income block groups are defined as those in which 50% of the households are defined as low-income, OR the proportion of low-income households exceeds the same measure for the county within which the block group is located.

[c] A person with limited English proficiency is defined as a person aged 5 or older, as reported in Table B16004 of the 2022 ACS 5-year estimates as speaking English "less than very well." Limited English proficiency block groups are defined as those in which the percentage of the block group's population (aged 5 or older) that self-identify as speaking English "less than very well" exceeds 5 percent, OR the number of persons (aged 5 or older) that self-identify as speaking English "less than very well" exceeds 1,000.

Note: One block group (block group 2 of census tract 9505.01) was identified as both an EJ community and containing an LEP population. This block group met the criteria for both low-income and minority populations.

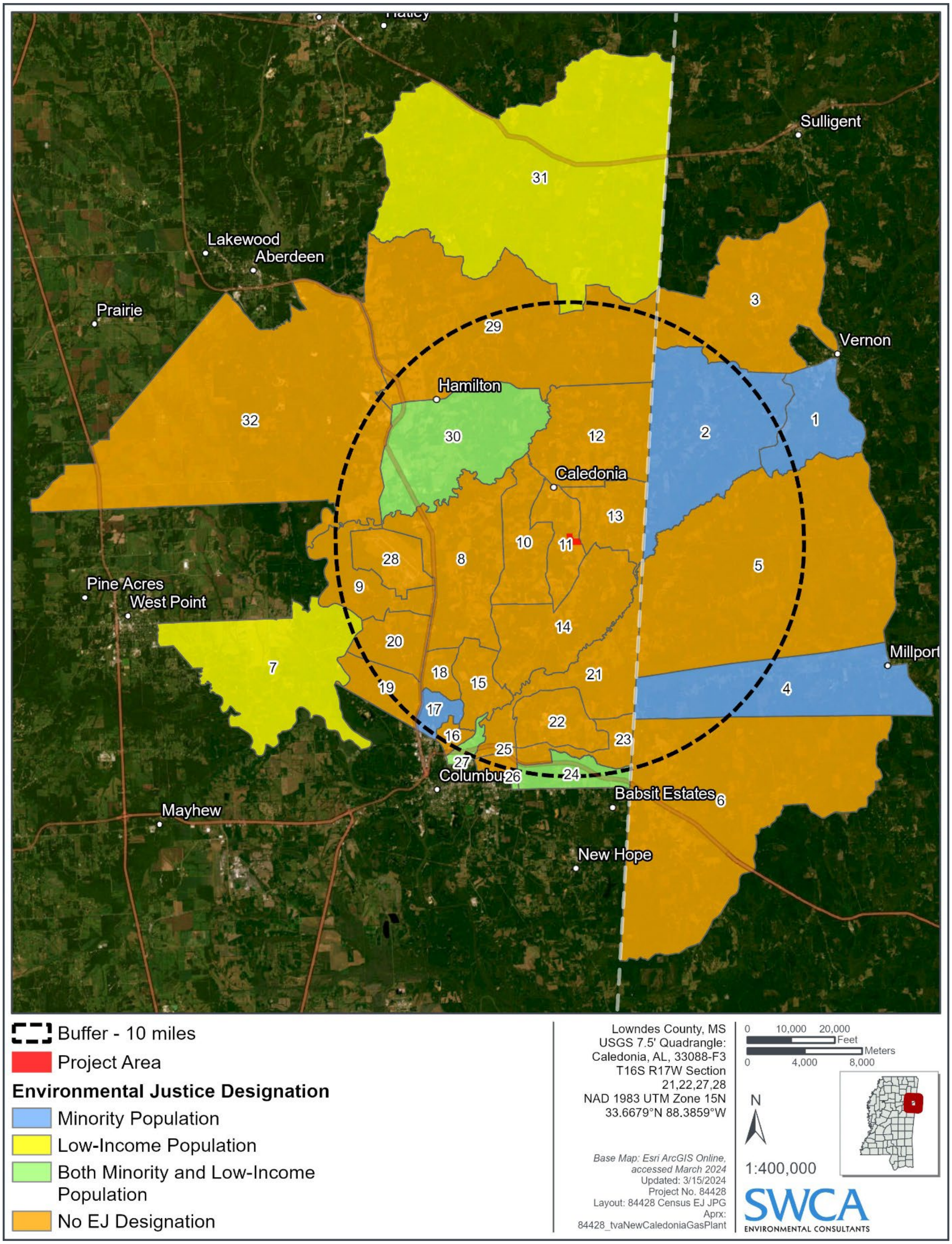

Figure 1. Minority and Low-Income Communities in the Environmental Justice Analysis Area

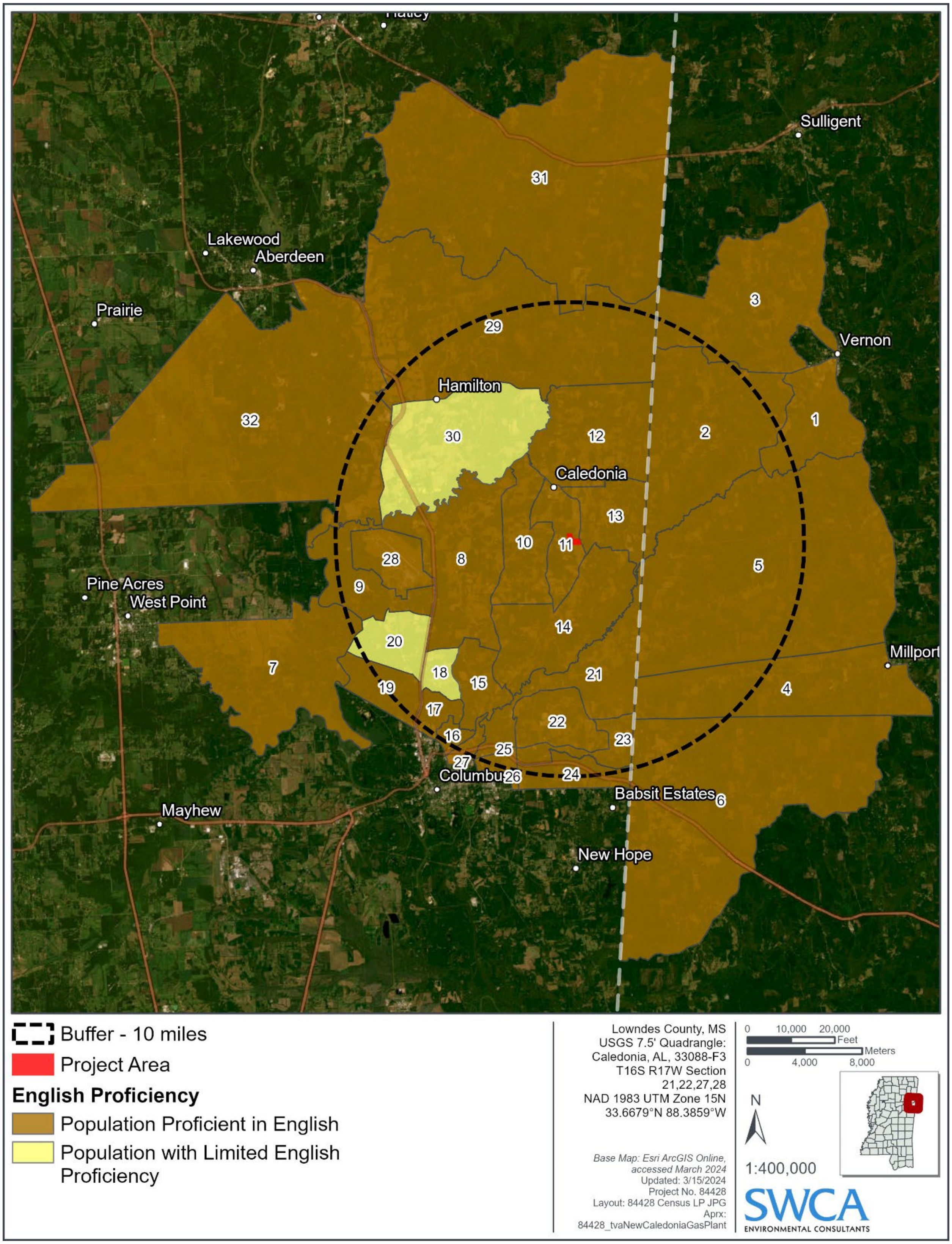

Figure 2. English Proficiency in the Environmental Justice Analysis Area

2.3 Additional TVA Efforts to Identify Environmental Justice Communities

TVA's Regional Relations team also conducted early outreach activities to EJ communities, local leadership, and environmental non-governmental organizations (ENGOs) in an effort to identify additional EJ communities that may not be readily apparent based on census data alone. No additional EJ communities were identified.

2.4 Evaluating The Potential for Disproportionate and Adverse Impacts

When conducting this EJ assessment, the full range of Project-related changes that could affect humans was considered (e.g., construction and or operations-related changes in air quality, changes in water quality, degradation of cultural resources, socioeconomic alterations, etc.).

Table 2 summarizes the key determinations anticipated to be associated with each resource. For each determination, consideration was given as to whether minority and/or low-income populations would have different ways, relative to the general population, of being adversely affected by the Project. Three specific questions were posed, and both direct and indirect Project impacts were considered when answering these questions:

1. Are residents of EJ communities likely to be disproportionality and adversely affected because they are more sensitive to a given level of exposure due to pre-existing medical conditions and/or reduced access to health care and/or because they are exposed to higher baseline concentrations of health stressors such as particulate matter (PM) 2.5?

2. Are residents of EJ communities likely to be disproportionally and adversely affected due to lifestyle approaches such as subsistence fishing and/or because they have different cultural, community, or religious practices?

3. Are residents of EJ communities likely to be disproportionally and adversely affected because of their economic status, or do language barriers prevent them from taking mitigating actions that general members of the public might readily adopt, such as closing doors and windows to limit dust exposure?

Where the answer to any question was "yes," the distance over which disproportionate adverse effects might reasonably be anticipated is identified in the righthand column of Table 2. If the answer to all three questions was "no," then "No significant risk of adverse and disproportionate impact" is reported in the righthand column of Table 2. In all cases, the EJ determinations reported in Table 2 assume that public outreach and coordination will be conducted in a manner that facilitates the meaningful involvement of all people regardless of race, color, national origin, or income.

Table 2

Summary of Key Determinations Across Resources

Resource	Summary of Key Determinations	Relevant Distance and EJ Implications
Surface Water, Wetlands and Floodplains	Significant long-term impacts to existing surface water, wetlands and/or floodplains are not expected.	No significant risk of adverse and disproportionate impact.
Wildlife, Vegetation, Aquatic Ecology, and Threatened and Endangered Species	Significant impacts to fisheries resources and/or wildlife are not anticipated. Much of the 63-acre parcel is currently graveled. Revegetation of disturbed land will occur post-construction to the extent practicable.	No significant risk of adverse and disproportionate impact.
Cultural Resources	One archaeological site is under evaluation for eligibility with the National Register of Historic Places (NRHP). Impacts to this site will be avoided if determined to be eligible. The presence of additional sensitive areas and unanticipated discoveries are unlikely because the project area is a previously disturbed location.	No significant risk of adverse and disproportionate impact.
Socioeconomics	Significant impacts to socioeconomic resources (population levels, housing, employment, tourism, public services, tax revenue, and transportation) are not anticipated.	No significant risk of adverse and disproportionate impact.
Geology and Soils	Degradation of geological resources is not anticipated; Best management practices (BMPs) would minimize soil erosion; Impacts would be minor and temporary.	No significant risk of adverse and disproportionate impact.
Groundwater	No anticipated impacts to groundwater associated with construction or operation of the simple cycle frame combustion turbine facility or stormwater ponds.	No significant risk of adverse and disproportionate impact.
Land Use	Land use would remain industrial. Significant impacts to prime farmland are not anticipated.	No significant risk of adverse and disproportionate impact.
Visual Resources	Clearing of forested areas and construction of NCG Plant components, particularly six new CT stacks, would alter the viewshed where trees and terrain do not screen them.	Generally less than 3 miles impact area during operation and not within view of the identified EJ communities. Therefore, no significant risk of adverse and disproportionate impact.
Air Quality	Construction impacts would be localized and temporary. The increase in operational emissions would not be expected to contribute to an exceedance of NAAQS[a] or a PSD increment for any criteria air pollutants.	1.25 miles impact area during construction[b] as a result of fugitive dust mobilization, construction equipment and vehicle exhaust. No significant risk of adverse and disproportionate impact during construction. Up to 10 miles impact area during operations as a result of emissions from the facility. No significant risk of adverse and disproportionate impact.
Climate	Operation of the Project would reduce TVA's system-wide GHG emissions.	No significant risk of adverse and disproportionate impact.

Table 2

Summary of Key Determinations Across Resources

Resource	Summary of Key Determinations	Relevant Distance and EJ Implications
Noise	Construction impacts would be temporary and localized. The increase in noise levels would be mitigated such that impacts would be minor at the nearest noise sensitive area during operation.	Less than 0.5 miles impact area during construction and operation. No significant risk of adverse and disproportionate impact.
Transportation	Minor localized congestion associated with commuting workers and material delivery for the duration of construction and operation.	Traffic congestion limited to MS 12 and Seed Tick Road in the immediate vicinity of the Project Area and not within identified EJ communities. No significant risk of adverse and disproportionate impact.
Utilities, Service Systems, and Safety	The Project would be operated in compliance with applicable rules, regulations, and standards, including TVA's Standard Programs and Processes and contractors' health and safety plans, to reasonably assure public safety.	No significant risk of adverse and disproportionate impact
Solid and Hazardous Waste	Waste generated by the facility would be handled in compliance with applicable rules and regulations.	No significant risk of adverse and disproportionate impact

[a] The National Ambient Air Quality Standards (NAAQS) are established by the EPA to provide protection for the nation's public health and the environment.

[b] Choi et al. (2013) found that, under conditions that tend to maximize the size of plumes, air contaminant plumes surrounding freeways extended less than 1.25 miles. While this study did not evaluate operation of the specific construction equipment at issue, its conclusion represents a reasonable estimate of the geographic range for which air quality may be affected during construction.

For all resources, it was determined that there is no significant risk of adverse and disproportionate impacts among EJ communities. The determination is based on two factors. First, most resources at issue are not expected to be materially altered. Second, there is no reasonable expectation that EJ communities would be disproportionately and adversely impacted even if the resource were materially altered.

With respect to air quality, the determination of no significant risk of adverse and disproportionate impacts during operation is based on the following rationale. Generally, EJ communities may be more sensitive to operation-related emissions due to higher frequency of pre-existing health conditions, such as asthma, (Louisias and Phipatanakul 2017) and/or a decreased ability to take mitigating actions; however, the increase in emission of criteria air pollutants is not expected to contribute to the exceedance of National Ambient Air Quality Standards (NAAQS). As required by the Clean Air Act (40 CFR part 50), the NAAQS primary standards are developed to protect human health with an adequate margin of safety for sensitive subgroups of the population. These sensitive subgroups include: children, older adults, people with heart or lung conditions, communities of color, and low economic status populations. NAAQS primary standards are based on reference concentrations (RfCs) that represent continuous inhalation that is likely to be without appreciable risk of deleterious effects during a lifetime of exposure for these sensitive subgroups. RfCs also include a 10-fold safety factor to address uncertainty. The NAAQS standards specifically protect the sensitive subgroups of the surrounding minority and low-income overburden communities during lifetime exposures. Therefore, project operation will not harm sensitive individuals in the surrounding EJ communities because emissions will not exceed the primary NAAQS standards, which were developed specifically to protect those individuals.

Potential changes to visual resources, transportation, and noise associated with construction and/or operation of the Project would be localized and impacts are not expected to reach the nearest EJ community (block group 3, census tract 301.01 of Lamar County).

2.5 Environmental Justice Summary

Having considered the potential Project-related changes that could affect the human population (see Table 2), only one source was identified with the potential for disproportionate and adverse impacts: changes to air quality associated with operation of the Project. However, air modelling analysis indicates that operational emissions are not expected to contribute to NAAQS exceedances and, therefore, would not pose a significant risk of adverse and disproportionate impacts among EJ communities. It is unlikely that changes to air quality, noise, and transportation during construction of the Project, and visual resources during Project operation, would adversely affect EJ communities due to their distance from the Project area.

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APPENDIX A

Race, Ethnicity, and Poverty Statistics for Block Groups within 10 Miles of Project Facilities

Race, Ethnicity, and Poverty Statistics within 10 Miles of Project Facilities (2018-2022 Five-Year Estimates)

Block Group Reference Number[a]	Location	Total Population	White Alone (not Hispanic or Latino)	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races	Hispanic or Latino	Total Racial Minority[b,c]	% Low-Income[c]
N/A	Alabama	5,028,092	64.6%	26.2%	0.3%	1.4%	0.0%	0.3%	2.6%	4.6%	35.4%	34.8%
N/A	Lamar County	13,885	85.7%	11.0%	0.4%	0.2%	0.0%	0.3%	2.0%	0.5%	14.3%	37.2%
1	Block Group 1, Census Tract 301.01	810	77.2%	21.2%	0.0%	0.9%	0.0%	0.0%	0.0%	0.7%	**22.8%**	19.8%
2	Block Group 3, Census Tract 301.01	511	81.6%	18.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**18.4%**	23.7%
3	Block Group 4, Census Tract 301.01	1,191	95.0%	3.9%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	5.0%	28.6%
4	Block Group 3, Census Tract 302	1,220	68.4%	29.7%	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%	**31.6%**	29.9%
5	Block Group 4, Census Tract 302	885	96.4%	0.0%	0.0%	1.6%	0.0%	0.0%	2.0%	0.0%	3.6%	28.0%
N/A	Pickens County	18,925	53.6%	39.2%	0.2%	0.1%	0.0%	0.1%	1.7%	5.2%	46.4%	44.4%
6	Block Group 1, Census Tract 502	1,536	76.5%	23.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	23.5%	28.0%
N/A	Mississippi	2,958,846	55.9%	37.1%	0.4%	1.0%	0.0%	0.3%	2.1%	3.3%	44.1%	40.7%
N/A	Clay County	18,598	38.0%	60.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.2%	62.0%	52.2%
7	Block Group 3, Census Tract 9505	1,799	50.8%	46.2%	0.2%	0.0%	0.0%	0.0%	2.7%	0.0%	49.2%	**51.8%**
N/A	Lowndes County	58,547	50.0%	44.5%	0.1%	1.1%	0.0%	0.4%	1.5%	2.4%	50.0%	39.7%
8	Block Group 1, Census Tract 1.02	1,222	75.5%	13.0%	0.0%	0.6%	0.0%	0.0%	3.1%	7.8%	24.5%	22.3%
9	Block Group 2, Census Tract 1.02	815	75.1%	24.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	24.9%	36.6%
10	Block Group 1, Census Tract 1.03	1,508	69.8%	25.1%	0.0%	0.0%	0.0%	0.0%	4.4%	0.8%	30.2%	11.7%
11	Block Group 2, Census Tract 1.03	1,066	81.9%	15.9%	0.0%	0.4%	0.0%	0.0%	0.8%	1.0%	18.1%	14.1%
12	Block Group 3, Census Tract 1.03	1,881	94.2%	0.0%	2.1%	2.0%	0.0%	0.0%	0.6%	1.1%	5.8%	24.0%

Block Group Reference Number[a]	Location	Total Population	White Alone (not Hispanic or Latino)	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races	Hispanic or Latino	Total Racial Minority[b,c]	% Low-Income[c]
13	Block Group 4, Census Tract 1.03	925	65.8%	11.2%	0.0%	0.0%	0.0%	8.9%	2.5%	11.6%	34.2%	27.0%
14	Block Group 1, Census Tract 1.04	1,725	80.7%	8.3%	0.3%	0.0%	0.0%	0.0%	10.7%	0.0%	19.3%	36.0%
15	Block Group 1, Census Tract 3.01	1,351	53.1%	42.8%	0.1%	0.7%	0.0%	0.0%	0.3%	3.1%	46.9%	25.5%
16	Block Group 2, Census Tract 3.01	398	93.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	7.0%	0.0%
17	Block Group 3, Census Tract 3.01	1,462	47.9%	51.4%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	**52.1%**	20.9%
18	Block Group 1, Census Tract 3.02	1,178	74.8%	14.9%	0.0%	5.4%	0.0%	0.0%	2.0%	2.8%	25.2%	18.8%
19	Block Group 2, Census Tract 3.02	1,769	73.6%	18.3%	0.0%	0.0%	0.0%	0.0%	0.0%	8.1%	26.4%	22.3%
20	Block Group 3, Census Tract 3.02	881	64.5%	24.5%	0.0%	1.9%	0.0%	0.0%	0.0%	9.1%	35.5%	30.1%
21	Block Group 1, Census Tract 4.05	856	50.5%	41.1%	0.0%	0.0%	0.0%	0.0%	5.7%	2.7%	49.5%	38.1%
22	Block Group 2, Census Tract 4.05	1,911	57.7%	39.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	42.3%	36.9%
23	Block Group 3, Census Tract 4.05	775	69.8%	28.0%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	30.2%	37.8%
24	Block Group 4, Census Tract 4.05	2,398	28.3%	69.8%	0.0%	0.0%	0.0%	0.0%	0.6%	1.3%	**71.7%**	**66.6%**
25	Block Group 1, Census Tract 5	1,194	56.3%	33.6%	0.0%	5.3%	0.0%	0.0%	3.0%	1.8%	43.7%	27.7%
26	Block Group 2, Census Tract 5	1,336	12.1%	86.8%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	**87.9%**	**47.8%**
27	Block Group 1, Census Tract 8	1,074	11.8%	88.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**88.2%**	**70.5%**
28	Block Group 1, Census Tract 9800	1,428	61.4%	3.9%	0.0%	5.3%	0.0%	0.4%	6.0%	23.1%	38.6%	25.7%
N/A	Monroe County	34,168	66.7%	30.2%	0.0%	0.3%	0.0%	0.0%	1.3%	1.5%	33.3%	38.8%
29	Block Group 1, Census Tract 9505.01	2,102	95.9%	1.4%	0.0%	0.0%	0.0%	0.0%	0.2%	2.5%	4.1%	22.8%
30	Block Group 2, Census Tract 9505.01	920	44.7%	46.5%	0.0%	8.8%	0.0%	0.0%	0.0%	0.0%	**55.3%**	**65.2%**
31	Block Group 1, Census Tract 9505.02	2,306	97.4%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%	**50.5%**

Block Group Reference Number[a]	Location	Total Population	White Alone (not Hispanic or Latino)	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races	Hispanic or Latino	Total Racial Minority[b,c]	% Low-Income[c]
32	Block Group 3, Census Tract 9506	602	83.1%	16.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.9%	27.9%

Sources: U.S. Census Bureau 2023a and 2023b

[a] A reference number is assigned to each block group within the environmental justice assessment area for reporting purposes. These numbers link to Figures 1 and 2.

[b] “Minority” refers to people who self-identify as something other than White Alone, not Hispanic or Latino.

[c] Low-income and minority populations exceeding the established thresholds are indicated by in bold.

Due to rounding differences in the dataset, the totals may not reflect the sum of the addends.

APPENDIX B

Language Proficiency Statistics for Block Groups within 10 Miles of Project Facilities

Language Proficiency Statistics within 10 Miles of Project Facilities
(2018-2022 Five-Year Estimates)

Block Group Reference Number[a]	Location	Population Aged 5 and Older	Population with Limited English Proficiency[b]	% Limited English Proficiency[b]	% Asian and Pacific Island Languages for Block Groups with LEP Populations	% Spanish for Block Groups with LEP Populations
N/A	Alabama	4,736,236	101,319	2.1%	N/A	N/A
N/A	Lamar County	12,939	9	0.1%	N/A	N/A
1	Block Group 1, Census Tract 301.01	754	0	0.0%	N/A	N/A
2	Block Group 3, Census Tract 301.01	511	0	0.0%	N/A	N/A
3	Block Group 4, Census Tract 301.01	1,191	0	0.0%	N/A	N/A
4	Block Group 3, Census Tract 302	1,148	0	0.0%	N/A	N/A
5	Block Group 4, Census Tract 302	814	0	0.0%	N/A	N/A
N/A	Pickens County	17,981	517	2.9%	N/A	N/A
6	Block Group 1, Census Tract 502	1,488	0	0.0%	N/A	N/A
N/A	Mississippi	2,780,600	44,971	1.6%	N/A	N/A
N/A	Clay County	17,519	24	0.1%	N/A	N/A
7	Block Group 3, Census Tract 9505	1,651	9	0.5%	N/A	N/A
N/A	Lowndes County	54,738	605	1.1%	N/A	N/A
8	Block Group 1, Census Tract 1.02	1,145	0	0.0%	N/A	N/A
9	Block Group 2, Census Tract 1.02	766	0	0.0%	N/A	N/A
10	Block Group 1, Census Tract 1.03	1,409	0	0.0%	N/A	N/A
11	Block Group 2, Census Tract 1.03	982	10	1.0%	N/A	N/A
12	Block Group 3, Census Tract 1.03	1,614	34	2.1%	N/A	N/A
13	Block Group 4, Census Tract 1.03	826	35	4.2%	N/A	N/A
14	Block Group 1, Census Tract 1.04	1,721	0	0.0%	N/A	N/A
15	Block Group 1, Census Tract 3.01	1,296	0	0.0%	N/A	N/A

Block Group Reference Number[a]	Location	Population Aged 5 and Older	Population with Limited English Proficiency[b]	% Limited English Proficiency[b]	% Asian and Pacific Island Languages for Block Groups with LEP Populations	% Spanish for Block Groups with LEP Populations
16	Block Group 2, Census Tract 3.01	380	0	0.0%	N/A	N/A
17	Block Group 3, Census Tract 3.01	1,324	0	0.0%	N/A	N/A
18	Block Group 1, Census Tract 3.02	1,086	65	**6.0%**	**4.9%**	**1.1%**
19	Block Group 2, Census Tract 3.02	1,769	77	4.4%	N/A	N/A
20	Block Group 3, Census Tract 3.02	881	73	**8.3%**	**0.0%**	**8.3%**
21	Block Group 1, Census Tract 4.05	805	0	0.0%	N/A	N/A
22	Block Group 2, Census Tract 4.05	1,702	18	1.1%	N/A	N/A
23	Block Group 3, Census Tract 4.05	763	0	0.0%	N/A	N/A
24	Block Group 4, Census Tract 4.05	2,192	0	0.0%	N/A	N/A
25	Block Group 1, Census Tract 5	1,152	11	1.0%	N/A	N/A
26	Block Group 2, Census Tract 5	1,283	0	0.0%	N/A	N/A
27	Block Group 1, Census Tract 8	1,013	0	0.0%	N/A	N/A
28	Block Group 1, Census Tract 9800	1,231	35	2.8%	2.8%	3.2%
N/A	Monroe County	32,224	209	0.6%	N/A	N/A
29	Block Group 1, Census Tract 9505.01	2,022	1	0.0%	N/A	N/A
30	Block Group 2, Census Tract 9505.01	911	80	**8.8%**	**8.8%**	**0.0%**
31	Block Group 1, Census Tract 9505.02	2,131	0	0.0%	N/A	N/A
32	Block Group 3, Census Tract 9506	594	0	0.0%	N/A	N/A

Sources: U.S. Census Bureau 2023a and 2023c

[a] A reference number is assigned to each block group within the environmental justice assessment area for reporting purposes. These numbers link to Figures 1 and 2.

[b] Limited English proficiency populations exceeding the established thresholds are indicated in bold.

[c] “Other Languages” includes “other Indo-European languages” and “other languages” as reported in U.S. Census Bureau 2023c.

APPENDIX C

Further Characterization of Census Tracts with Block Groups Containing Environmental Justice Communities

Further Characterization of Census Tracts with Block Groups containing Communities of Environmental Justice Concern

Percentile Rank

Census Tract	Annual Mean Days Above O3 Regulatory Standard	Annual Mean Days Above PM2.5 Regulatory Standard	Ambient Concentrations of diesel PM/m3	Probability of Contracting Cancer	Area Within 1-Mile of EPA National Priority List Site	Area Within 1-Mile of EPA Toxic Release Inventory Site	Area within 1-Mile of EPA Treatment, Storage, and Disposal Site	Area Within 1-Mile of EPA Risk Management Plan Site	Area Within 1-Mile of Coal Mine	Area Within 1-Mile of Lead Mine	Percentage of Houses Built pre-1980 (Lead Exposure)	Area Within 1-Mile of Railroad	Area Within 1-Mile of Highway	Area Within 1-Mile of Airport	Area Intersecting Impaired/Impacted Watershed at the HUC12 Level	Percentage Minority Persons	Percentage Below 200% Poverty	Percentage of Persons with No High School Diploma (age 25+)	Unemployment Rate	Percentage Renters	Percentage of Persons Aged 65 or Older	Percentage of Persons Aged 17 or Younger	Percentage of Civilian Noninstitutionalized Population with a Disability	Percentage of Persons (age 5+) who Speak English " Less than Well"	Percentage in Mobile Homes	Prevalence of High Blood Pressure	Prevalence of Asthma	Prevalence of Cancer	Prevalence of Diabetes	Percentage of Individual Reporting Not Good Mental Health	Count of Attributes Exceeding the 89th Percentile
Census Tract 301.01, Lamar County, AL	0	55	9	85	0	38	92	0	0	0	49	0	0	88	12	28	75	69	90	45	67	55	92	0	85	93	77	82	89	85	**5**
Census Tract 302, Lamar County, AL	0	54	9	86	0	40	0	0	0	0	56	42	33	0	18	31	63	74	49	27	88	20	90	0	84	94	65	87	85	71	**2**
Census Tract 9505, Clay County, MS	0	60	21	89	0	44	0	71	0	0	14	52	26	89	35	70	69	71	9	15	80	38	21	0	95	94	60	61	89	56	**3**
Census Tract 4.05, Lowndes County, MS	0	57	18	90	92	33	91	66	0	0	22	52	48	0	24	47	63	63	79	52	28	69	55	21	82	81	57	49	67	71	**3**
Census Tract 5, Lowndes County, MS	0	59	37	93	93	69	92	85	0	0	56	54	59	0	23	79	80	67	75	40	88	25	85	0	63	97	67	92	94	66	**6**
Census Tract 8, Lowndes County, MS	0	60	47	96	99	79	99	93	0	0	72	79	62	0	25	92	95	91	99	83	68	49	59	0	64	99	96	37	99	96	**12**
Census Tract 9505.01, Monroe County, MS	0	56	14	88	0	33	0	0	0	0	32	37	33	0	13	22	57	58	75	28	60	21	84	0	96	80	43	59	66	65	**1**
Census Tract 9505.02, Monroe County, MS	0	54	16	86	0	0	0	63	0	0	37	49	36	89	17	19	78	80	33	15	70	53	86	0	98	88	67	61	86	86	**2**
Count of Attributes Exceeding the 89th Percentile	**0**	**0**	**0**	**3**	**3**	**0**	**4**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**1**	**1**	**1**	**2**	**0**	**0**	**0**	**2**	**0**	**3**	**5**	**1**	**1**	**3**	**1**	

Note: The census tracts in this table align with those in Table A; however, the census tracts used in CDC (2023) are based on the Census Bureau's 2010 decennial census. The names and boundaries of some census tracts have changed since 2010. Therefore, the data shown in this table for census tract 301.01 (Lamar County) and census tract 4.05 (Lowndes County) are presented in CDC (2023) under census tracts 301 and 4.01, respectively.

Appendix F – List of Preparers

LIST OF PREPARERS

NEPA Project Management

Erica McLamb

Education	B.S. Marine Biology
Project Role	NEPA Specialist
Experience	24 years Ecological Evaluations, Environmental Permitting, Regulatory Compliance, and NEPA Compliance

Carol Freeman, PG

Education	M.S., Geological Sciences and B.S., Geology
Project Role	NEPA Specialist
Experience	14 years managing and performing NEPA compliance

Robert Kulisek

Education	M.S., Engineering Management; B.S., Mechanical Engineering
Project Role	Senior Project Manager
Experience	21 years in operations, design, and construction

Rachel Bell, PMP

Education	B.S., Environmental Science, Auburn University
Project Role	SWCA Project Director
Experience	18 years in natural resources planning and NEPA compliance, including project management, preparation of Environmental Assessments (EAs) and Environmental Impact Statements (EISs), state and federal permitting, and biological and environmental studies and analysis.

Susan Fischer

Education	M.S., Wildlife Ecology, Texas State University
Project Role	SWCA Project Manager
Experience	11 years in environmental resource surveys and permitting, including EIS and EA preparation, state and federal permitting, and environmental studies and analysis.

Angel Peltola

Education	B.S., Biology, Texas State University
Project Role	SWCA Assistant Project Manager
Experience	6 years of experience with environmental regulation enforcement, monitoring, training, and document review.

Other Contributors
Tennessee Valley Authority

Paul Smith

Education	B.S., Business – Marketing; M.B.A.
Project Role	Fuel Operations
Experience	26 years in natural gas infrastructure development

Nathan Schweighart

Education	B.S. Electrical Engineering, M.B.A.
Project Role	Transmission
Experience	23 years in Transmission Planning and Operations

Tyson Myers

Education	M.S., Chemical Engineering; B.S., Chemistry
Project Role	Air Program Support
Experience	22 years in Utility Combustion Engineering, Air Pollution Control Design calculations, Emission Chemistry, and Air Permitting

Toree Myers-Cook

Education	M.S., Atmospheric Science; B.S., Chemistry
Project Role	Air Program Support
Experience	23 years in Atmospheric and Meteorology Sciences and Instrumentation, Air Dispersion Modeling, and Air Permitting

Andrea Crooks

Education	M.S., Materials Engineering; B.S., Materials Engineering
Project Role	Air Specialist
Experience	31 years in Air Pollution permitting, testing, and related activities

Nathan Holland

Education	B.S. Chemical Engineering, B.S. Mechanical Engineering
Project Role	Power Operations, Plant Integration
Experience	14 years in Engineering, Outage & Projects, Operations & Maintenance

Roger Pierce

Education	M.B.A.; B.S.M.E., Mechanical Engineering
Project Role	Resource Planning & Strategy
Experience	15 years of TVA experience in resource planning

Alex Britt

Education	M.S., Industrial-Organizational Psychology; M.B.A.
Project Role	Resource Planning & Strategy
Experience	5 years in strategic planning

Matthew Reed

Education	M.S. Wildlife and Fisheries Science; QHP
Project Role	Aquatics
Experience	13 years working with threatened and endangered aquatic species in the Southeastern United States; 7 years in Endangered Species Act (ESA), NEPA, and Clean Water Act (CWA) compliance and stream assessments

David Mitchell

Education	M.S Soil and Water Science, B.S. Horticulture
Project Role	Botany
Experience	18 years of experience with botany, ecosystem restoration, and land management; 6 years of project/program management in environmental research

Chloe Sweda

Education	B.S. Earth and Environmental Sciences
Project Role	Managed and Natural Areas
Experience	5.5 years in Natural Resource Management

Liz Hamrick

Education	M.S., Wildlife and Fisheries Science and B.A. Biology
	Terrestrial Ecology (Animals), Terrestrial Threatened and Endangered Species
Project Role	Terrestrial Zoology
Experience	18 years conducting field biology, 12 years technical writing, 8 years compliance with NEPA and ESA

Parker Fallon Hutcheon

Education	M.S., Environmental Studies; B.S. Biology
Project Role	Wetlands
Experience	5 years in wetland delineation, wetland impact analysis, and CWA and NEPA compliance

Steve Cole

Education	Ph.D., Anthropology; M.A., Anthropology; and B.A., Anthropology
Project Role	Cultural Compliance
Experience	33 years in Archaeology and Cultural Resources Management

Carrie Williamson, P.E., CFM

Education	B.S. and M.S. Civil Engineering
Project Role	Floodplains
Experience	11 years in Floodplains and Flood Risk; 3 years in River Forecasting; 11 years in Compliance Monitoring

Britta Lees

Education	M.S. Botany; B.S. Biology
Project Role	Soil Erosion and Surface Water
Experience	25 years in wetland assessment, field biology, NEPA contributions, and water permitting

SWCA Environmental Consultants

Sean Peacock

Education	B.S., Environmental Science, Georgia College
Project Role	Surface Water
Experience	8 years of experience performing preliminary site assessments, completing listed species surveys and permitting, biological monitoring, aquatic resource assessments, construction monitoring, wetland delineations and assessments, environmental permitting, and data management.

Phil Pearce

Education	B.S., Geology, Trinity University
Project Role	Geology, Groundwater, and Hazardous Materials, and Solid Waste
Experience	32 years of geologic and environmental consulting experience conducting various geologic and karst assessments, groundwater availability studies, Phase I and II environmental site assessments, hazardous materials investigations, cave hydrogeologic evaluations, water quality monitoring, tank removals, and waste excavation and disposal.

Hillary Skowronski

Education	M.S., Environmental Biology; University of West Florida
Project Role	Geology, Groundwater, and Hazardous Materials, and Solid Waste
Experience	10 years of experience in the natural sciences, including environmental surveys, reporting, and compliance for various public and private sector clients, as well as extensive watershed and aquatic habitat research.

Fiona Cook

Education	B.S., Marine Biology, Texas A&M University at Galveston
Project Role	Soils, Prime Farmland, Land Use
Experience	11 years of experience completing wetland and waterbody delineations, wetland and waterbody assessments, wetland monitoring, threatened and endangered species surveys, vegetation surveys, as well as permitting.

Brad Sohm

Education	B.S., Chemical Engineering, option Environmental Engineering; University of Arizona
Project Role	Air Quality, Greenhouse Gases, Noise and Vibration
Experience	20 years in air quality and environmental planning, including preparation of EAs and EISs, state and federal air quality permitting, and noise studies and analysis.

Daniel Hampton

Education	B.S.E Chemical Engineering; Arizona State University
Project Role	Air Quality, Greenhouse Gases, Noise and Vibration
Experience	6 years in air quality and noise, air quality compliance and permitting, air and noise analysis and modeling, and emission inventories. Expertise includes analysis and technical writing for air quality and noise sections of NEPA impact assessments and FERC environmental impact studies.

Garet Openshaw

Education	M.L.A., Landscape Architecture and Environmental Planning
Project Role	Visual Resources
Experience	7 years of experience in landscape architecture and environmental planning, including visual resources analysis.

Jeff Wakefield

Education	Ph.D., Economics, University of Delaware
Project Role	Socioeconomics and Environmental Justice
Experience	23 years of experience evaluating the environmental and social impacts of infrastructure development and government policies. This includes evaluating socioeconomic, environmental justice, land use, visual impacts, project purpose, and alternatives under NEPA and conducting natural resource damage assessments.

Tony Theis

Education	M.S., Statistics; University of Minnesota
Project Role	Socioeconomics and Environmental Justice
Experience	5 years in EA and EIS preparation supporting NEPA compliance, biological surveys, technical writing, and statistical analysis.

Oliver Pahl

Education	M.A., Applied Economics, University of North Carolina at Greensboro
Project Role	Public Health and Safety, Utilities
Experience	14 years of environmental and economic consulting with specialized expertise in socioeconomic and environmental justice impact assessments and Regional Economic Impact Assessments, including the use of the economic modeling software IMPLAN to produce socioeconomic studies supporting NEPA documents.

Allison McKenzie

Education	M.S., Forestry, Mississippi State University
Project Role	Transportation
Experience	12 years of experience in the natural sciences, including environmental assessments, permitting, and compliance for various public and private sector clients, as well as extensive fisheries, watershed, and forestry research.