DOE/EA-1678

FINAL

ENVIRONMENTAL

ASSESSMENT

ENVIRONMENTAL ASSESSMENT FOR DEPARTMENT OF ENERGY LOAN TO NISSAN NORTH AMERICA, INC., FOR ADVANCED TECHNOLOGY ELECTRIC VEHICLE MANUFACTURING PROJECT IN SMYRNA, TENNESSEE

U.S. Department of Energy
Advanced Technology Vehicles Manufacturing Loan Program
Washington, DC 20585

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SUMMARY

Introduction

The U.S. Department of Energy (DOE) is proposing to issue a loan to Nissan North America, Inc., (Nissan) for the production of advanced technology electric vehicles (EVs). Nissan's Electric Vehicle Production Project (EV Project) would include the expansion of the Smyrna, Tennessee Manufacturing Plant through the construction of an approximately 1.3 million square foot lithium-ion (Li-ion) battery plant (EV Battery Plant) to produce the batteries that would power the new EVs. The EV Project would also include reequipping and expanding the existing automobile manufacturing operations at the Smyrna Plant.

DOE has prepared this environmental assessment (EA) to comply with the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR 1500–1508) and DOE National Environmental Policy Act Implementing Procedures (10 CFR 1021). The EA examines the potential environmental impacts associated with the proposed action and No Action Alternative to determine whether the proposed action has the potential for significant environmental impacts.

Purpose and Need

The Energy Independence and Security Act of 2007 (EISA) (P.L. 110-140) authorized several new grant, loan, and aid programs to stimulate the transformation of local communities, states, and industries adopting and adapting to renewable energy and energy conservation programs. The Advanced Technology Vehicles Manufacturing Loan Program (ATVM) was authorized under Section 136 of EISA to facilitate the development of energy-efficient vehicles. On September 30, 2008, the ATVM program was funded and up to $25 billion in direct loans were authorized to eligible applicants for the costs of reequipping, expanding, and establishing manufacturing facilities in the U.S. to produce advanced technology vehicles that provide meaningful improvements in fuel economy performance and components for such vehicles. The purpose and need for agency action is to comply with DOE's mandate under Section 136 of the EISA by selecting eligible projects that meet the goals of the Act. DOE is using the NEPA process to assist in determining whether to issue a loan to Nissan to support the proposed project. Nissan's EV Project would manufacture zero-emission, fully electric vehicles. If these EVs displace vehicles powered by fossil fuels, their use could reduce mobile greenhouse gas emissions (carbon dioxide) by approximately 1 million metric tons each year they remain in service.

Proposed Action and No Action Alternative

DOE's proposed action is to issue a loan to Nissan for the EV Project, which would include construction of an approximately 1.3 million square foot Li-ion battery plant and reequipping and expanding the existing automobile manufacturing operations at the Smyrna Manufacturing Plant located in Smyrna, Tennessee.

A critical component of a fully electric zero emission vehicle is the battery. The EV Project would meet the need for these batteries by expanding the Smyrna facility with the addition of a battery manufacturing facility. The new EV Battery Plant would be constructed east of the manufacturing plant in an existing vehicle test track area. A replacement test track would be constructed in an empty finished vehicle parking lot area located to the east of the main buildings.

The laminated-type Li-ion batteries would be constructed in the new EV Battery Plant. The two main components of EV Battery Manufacturing are Electrode Manufacturing and Battery Assembly. Electrodes are manufactured by coating either an aluminum or copper foil with a thin layer of one of two metal oxides. Battery assembly is where multiple battery cells would be combined together to form a module; each module would contain approximately four cells within a protective housing. Multiple modules would be combined along with other required components to form a complete battery pack. It is this completed multi-module pack that would be transferred to the Trim and Chassis Plant and installed into each EV. Nissan is still developing final plans for how the battery component of the EV would be handled in the sale or lease of the EV. Nissan estimates that the primary lives of the batteries will end between 5 and 6 years of service, when they will have lost approximately 20 to 30 percent of their storage capacity. At the end of their primary lives, the Nissan dealerships would replace the batteries and either ship the reduced-capacity batteries back to the EV Battery Plant (batteries for which Nissan has retained ownership) or to a third-party contracted by Nissan for reuse/recycling.

In addition to the construction of the advanced technology battery plant, the EV project would entail reequipping and expanding certain components of the existing automobile manufacturing operations for EV production. These changes would primarily occur within existing buildings on the Nissan property with a few exceptions. The existing Fascia Plant, where the plastic bumpers are produced, could potentially be expanded. Likewise, Nissan may upgrade certain aspects of the painting operations and potentially replace the existing System 1 Paint Plant. Finally, the AVES test track which is currently located on the site of the proposed battery plant would be relocated to the finished vehicle parking lot.

The manufacturing process for the EVs would be nearly identical to the current vehicle manufacturing operations at the plant. First, vehicle body parts would be manufactured in the Stamping Plant. Next the vehicle body parts would be assembled to form the "uni-body" vehicle structure where the body and platform are manufactured as a single unit. The assembled unpainted bodies would then be transferred by overhead conveyor for painting. After painting, the EVs would be transferred by a conveyor system to the Trim and Chassis Plant for final assembly, where the powertrain, EV battery, plastic fascias, interior and exterior trim, and other components would be installed.

In addition to the proposed action of issuing the loan to Nissan for the EV Project, a No Action Alternative was also evaluated in the EA. Under the No Action Alternative, DOE would not issue the loan to Nissan for the EV Project. Without the DOE loan, it is unlikely that Nissan would implement the project as currently planned. Thus, the No Action Alternative is that no plant would be constructed in Smyrna, Tennessee. Nissan is committed to moving forward internationally with all electric vehicles, and the U.S. is one of Nissan's largest markets, making it a desirable location for an EV production facility. The terms of the DOE loan would make building the EVs at the Nissan Smyrna plant economically feasible. In the absence of DOE financing under the terms contemplated, building the EVs at the Nissan Smyrna plant would not be economically feasible.

The decision for DOE consideration presented in this EA is whether or not to approve the loan for the proposed Nissan EV Project. Before Nissan proposed that the EV Project should be sited at its Smyrna Manufacturing Plant, alternatives were considered, which included modification of either the Decherd or Canton plants for the production of EVs or the construction of a new assembly plant on a greenfield site. Nissan determined that the Smyrna Manufacturing Plant was the optimal site for the fundamental components of the EV Project.

Summary of Environmental Effects

The EA evaluates the potential environmental effects that could result from implementing the proposed action and No Action Alternative. Table S.1 provides a summary of the potential environmental consequences that could result from implementing the proposed action and from the No Action Alternative.

Table S.1. Summary of Impacts by Resource

Resource Area	No Action Alternative	Proposed Action
Land Use	There would be no change in existing conditions and no impacts to land use.	There would be no change in land use associated with the potential System 1 Paint Plant Rebuild (Option D1 and Option D2 described in Chapter 2), the potential Fascia Plant Expansion, the EV Battery Plant (Components A & B) or the test track (part of Component C) since they would be located on previously disturbed sites where the current land use is industrial. The potential System 1 Paint Plant Rebuild (Option D3) would change the existing land use from open space to industrial. All proposed sites are zoned heavy industrial. New buildings would change the current visual landscape but would be consistent with the appearance of the existing facilities located on the property.
Air Quality	There would be no change in existing conditions and no impacts to air quality.	Construction would be phased and construction related air emissions would be short-term (approximately 28 months), sporadic, and localized. Fugitive dust would be controlled to minimize emissions. No adverse impacts would occur. The EV Project would not have a significant impact on regional air quality and would operate under the existing Title V permit for the Nissan facility, which would be modified prior to operation of the EV Project. The EV Project would impact direct CO_2 emissions at the Smyrna facility through: (1) decreasing emissions due to improvements to the existing assembly plant; and (2) increasing emissions due to the estimated energy requirements of the new Battery Plant. Total direct CO_2 emissions for Battery Assembly and Electrode Manufacturing at a capacity of 200,000 units per year are estimated to be 17,700 metric tons (MT)/year. The estimated annual indirect emissions from the electric power that would be used for Battery Assembly and Electrode Manufacturing would be 175,232 MT of CO_2. Assuming 150,000 EVs are produced and that these EVs displace vehicles powered by fossil fuels, their use could reduce mobile source CO_2 emissions by 1 million MT each year they remain in service.
Noise	There would be no change in existing conditions and no noise-related impacts.	Construction would last approximately 28 months. Construction noise would cause a temporary and short-term increase to the ambient sound environment. Workers would be expected to wear appropriate hearing protection. Elevated noise levels would not adversely affect any sensitive receptors located off of the Nissan property. Noise from EV Project operations would primarily be contained within the new facilities.
Geology and Soils	There would be no change in existing conditions and no impacts to geology and soils.	Adverse impacts on site geology are not expected. Geotechnical studies would be conducted by Nissan if required. Affected soils are generally stable and acceptable for standard construction requirements. Erosion prevention and sedimentation control measures would be implemented to minimize the potential for adverse impacts.
Water Resources	There would be no change in existing conditions and no impacts to water resources.	Erosion and sedimentation controls would limit potential impacts on surface water. The existing Storm Water Pollution Prevention Plan (SWPPP) would be updated as needed. No impacts on surface water or groundwater are anticipated from construction and normal facility operations. No impacts on wetlands or floodplains would occur.

Resource Area	No Action Alternative	Proposed Action
Biological Resources	There would be no change in existing conditions and no impacts to biological resources.	The potential System 1 Paint Plant Rebuild (Options D1 and D2), the potential Fascia Plant Expansion (Component E), EV Battery Plant (Components A & B), and the test track (part of Component C) would occur in heavily disturbed areas with very little natural habitat. No adverse impacts on plants or animals would occur. The potential System 1 Paint Plant Rebuild (Option D3) would include indirect or direct mortality or injury to biota and the elimination or further fragmentation of the existing habitat. Affected species are common to the area, and some animal species would be able to relocate to other nearby areas that offer the same type of habitat mix. Adverse impacts would be negligible. No threatened or endangered species or critical habitat has been identified as occurring on the property.
Cultural Resources	There would be no change in existing conditions and no impacts to cultural resources.	No cultural resources are known to exist in the areas that could be developed for the EV Project. No historic properties would be impacted.
Socioeconomics and Environmental Justice	There would be no change in existing conditions and no socioeconomic or impacts or environmental justice concerns.	The EV Project would have beneficial employment and income impacts. No impact on population is anticipated. Up to 1,300 direct, full-time-equivalent jobs could be created. The new employment would represent a negligible increase (1.0 percent) from the 2006 total employment in Rutherford County and an even smaller change (0.1 percent) from the 2006 Nashville Metropolitan Statistical Area employment. No disproportionate adverse health or environmental impacts would occur to any low-income or minority population.
Utilities	There would be no change in existing conditions and no impacts to utilities.	Utility upgrades and modifications would not be needed. The estimated peak natural gas, potable water, and wastewater associated with the proposed action are within the bounds of the established agreements between Nissan and utility providers. The estimated peak electricity demand exceeds the bounds of the established agreement with the local electricity provider, which would require Nissan to renegotiate their agreement.
Transportation	There would be no change in existing conditions and no transportation-related impacts.	The transport of materials and equipment during construction and operation would be over regional and local roadways. This additional amount of truck traffic would have a negligible effect on existing traffic. Employee traffic could increase over current levels due to temporary construction personnel (1,500 at peak) and the subsequent potential hiring of 1,300 new EV Project employees once the project is operational. Commute times could possibly increase.
Waste Management	There would be no change in existing conditions and no impacts related to waste management.	Sufficient regional landfill capacity exists to accommodate construction solid waste debris. Wastes associated with the new System 1 Paint Plant would be comparable to the existing paint system and no new waste stream would be created. Wastes associated with the expanded Fascia Plant would be negligible. A minimal (2 percent) increase in total facility waste would be associated with the addition of the EV Battery Plant. It is expected that none of these waste streams would be hazardous wastes, with the exception of the waste battery cells and waste electrolyte. Nissan would handle and manage these new waste streams the same as they handle existing waste, and no adverse impacts would occur.

Resource Area	No Action Alternative	Proposed Action
Public and Occupational Health and Safety	There would be no change in existing conditions and no impacts to public and occupational health and safety.	Construction workers would be subject to typical hazards and occupational exposures faced at other industrial construction sites. Contractors would be required to establish and maintain a safety plan for construction activities in compliance with Occupational Health and Safety Administration (OSHA) requirements. Nissan would apply existing and standard occupational health and safety protocols to the operational activities associated with the EV Project, and no adverse impacts on public and occupational health and safety are anticipated.
Cumulative Impacts	There would be no change in existing conditions and no cumulative impacts.	The cumulative contribution of impacts that the proposed action would make on the various environmental resources is expected to be minor.

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LIST OF ACRONYMS

ACAM	Air Conformity Applicability Model
AESC	Automotive Energy Supply Corporation
Agreement	Municipal Utility Services Agreement
AVES	Alliance Vehicle Evaluation System
BACT	Best Available Control Technology
BEA	U.S. Bureau of Economic Analysis
BTU	British Thermal Unit
CEC	Civil & Environmental Consultants, Inc.
Census	U.S. Census Bureau
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CHS	comprehensive health services
CO	carbon monoxide
CO_2	carbon dioxide
CY	calendar year
dB	decibel
dBA	decibels A-weighted
DOE	U.S. Department of Energy
EA	environmental assessment
EAP	Emergency Action Plan
EIS	environmental impact statement
EISA	Energy Independence and Security Act of 2007
EH	Electrical Hazard
EMT	emergency medical technician
EPCRA	Emergency Planning and Community Right-to-Know Act
EV	electric vehicle
EV Project	Electric Vehicle Production Project
Fascia Plant	System 3 Plastics Plant
FICON	Federal Interagency Committee on Noise
FY	fiscal year
HEV	Hybrid Electric Vehicle
HWCP	Hazardous Waste Contingency Plan
HVAC	Heating Ventilating and Air Conditioning
ISO	International Organization of Standardization
ISO 14001	International Organization of Standardization, Standard 14001
kV	kilovolt
KWH	Kilowatt Hour
$L_{eq(8)}$	average acoustic energy over an 8-hour period
L_{max}	maximum sound level
lbs/ft^2	pounds per square foot

LEL	Lower Explosion Limit
Li-ion	lithium ion
LQG	Large Quantity Generator
MCF	thousand cubic feet
MEK	methyl ethyl ketone
MGD	million gallons per day
MMBTU/hr	million British Thermal Units per hour
MPG	miles per gallon
MSA	Metropolitan Statistical Area
MT	Metric Ton
MTEMC	Middle Tennessee Electric Membership Corporation
MWH	Megawatt Hour
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NEIC	National Energy Information Center
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
Nissan	Nissan North America, Inc.
NMP	n-methyl-2-pyrrolidone
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
NSR	New Source Review
OEM	Original Equipment Manufacturer
OSHA	Occupational Health and Safety Administration
PM_{10}	particulate matter with an aerodynamic diameter of less than or equal to 10 microns
POTW	publicly owned treatment works
PPE	Personal Protective Equipment
PSD	Prevention of Significant Deterioration
PSM	Process Safety Management of Highly Hazardous Chemicals
RCRA	Resource Conservation and Recovery Act
RTO	Regenerative Thermal Oxidizer
SAIC	Science Applications International Corporation
Smyrna	Town of Smyrna, Tennessee
SO_2	sulfur dioxide
SWPPP	Storm Water Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TRI	Toxic Release Inventory
TVA	Tennessee Valley Authority
USEPA	U.S. Environmental Protection Agency
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WH/m	watt hours per mile

CHAPTER 1
PURPOSE AND NEED

1.1 Purpose and Need for Action

The proposed action evaluated by the U.S. Department of Energy (DOE) in this environmental assessment (EA) is to issue a loan to Nissan North America, Inc., (Nissan) in the amount of $1.636 billion for the manufacture of advanced technology electric vehicles, which would include construction of an approximately 1.3 million square foot lithium-ion (Li-ion) battery plant and reequipping and expanding the existing automobile manufacturing operations at the Smyrna Manufacturing Plant located in Smyrna, Tennessee.

The Advanced Technology Vehicles Manufacturing Loan Program (ATVM) was authorized under Section 136 of The Energy Independence and Security Act of 2007 (EISA) (P.L. 110-140) to facilitate the development of energy-efficient vehicles. On September 30, 2008, the ATVM program was funded and up to $25 billion in direct loans were authorized to eligible applicants for the costs of reequipping, expanding, and establishing manufacturing facilities in the U.S. to produce advanced technology vehicles that provide meaningful improvements in fuel economy performance and components for such vehicles. The purpose and need for agency action is to comply with DOE's mandate under Section 136 of the EISA by selecting eligible projects that meet the goals of the Act. DOE is using the NEPA process to assist in determining whether to issue a loan to Nissan to support the proposed project.

The goal of Nissan's Electric Vehicle Production Project (EV Project) is the manufacturing of zero-emission, fully-electric vehicles in the United States. Fully-electric vehicles do not produce emissions, nor do they consume petroleum products. In addition to tailpipe emissions reductions, the manufacture of EVs in the United States could result in large energy savings if they displace foreign shipment of vehicles and thereby eliminate transportation emissions related to shipment of vehicles from overseas production sites. Another environmental benefit could result from shifting the source of air emissions from the tailpipe of the vehicle to the power plant from which the vehicle would be recharged. This shift would provide the opportunity to use clean and renewable energy sources to power the vehicles.

1.2 Background

The EISA authorized several new grant, loan, and aid programs to stimulate the transformation of local communities, states, and industries adopting and adapting to renewable energy and energy conservation programs. Section 136 authorized funding awards and a direct loan program for original equipment manufacturers and component suppliers that re-equip, expand, or establish manufacturing facilities in the United States to produce qualifying vehicles and components. In November 2008, DOE issued an Interim Final Rule to implement the Advanced Technology Vehicles Manufacturing Loan

Program. (73 Fed. Reg. 66,721 (November 12, 2008)). The fiscal year 2009 Continuing Resolution authorized up to $25 billion in direct loans to eligible applicants under the program.

Nissan submitted its loan application to DOE in December 2008. In its loan application, Nissan proposed that the EV Project be sited at its Smyrna Manufacturing Plant located in Smyrna, Tennessee. Smyrna is located approximately 25 miles southeast of Nashville in Rutherford County (see Figure 1.1). As part of its loan application, Nissan also submitted an environmental report as required by DOE. Nissan submitted additional environmental information on the proposed EV Project in April 2009. On June 23, 2009, DOE made a formal determination that an EA was the appropriate level of environmental review for the proposed action under the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.). DOE and Nissan entered into a conditional commitment to loan Nissan $1.636 billion on June 23, 2009.

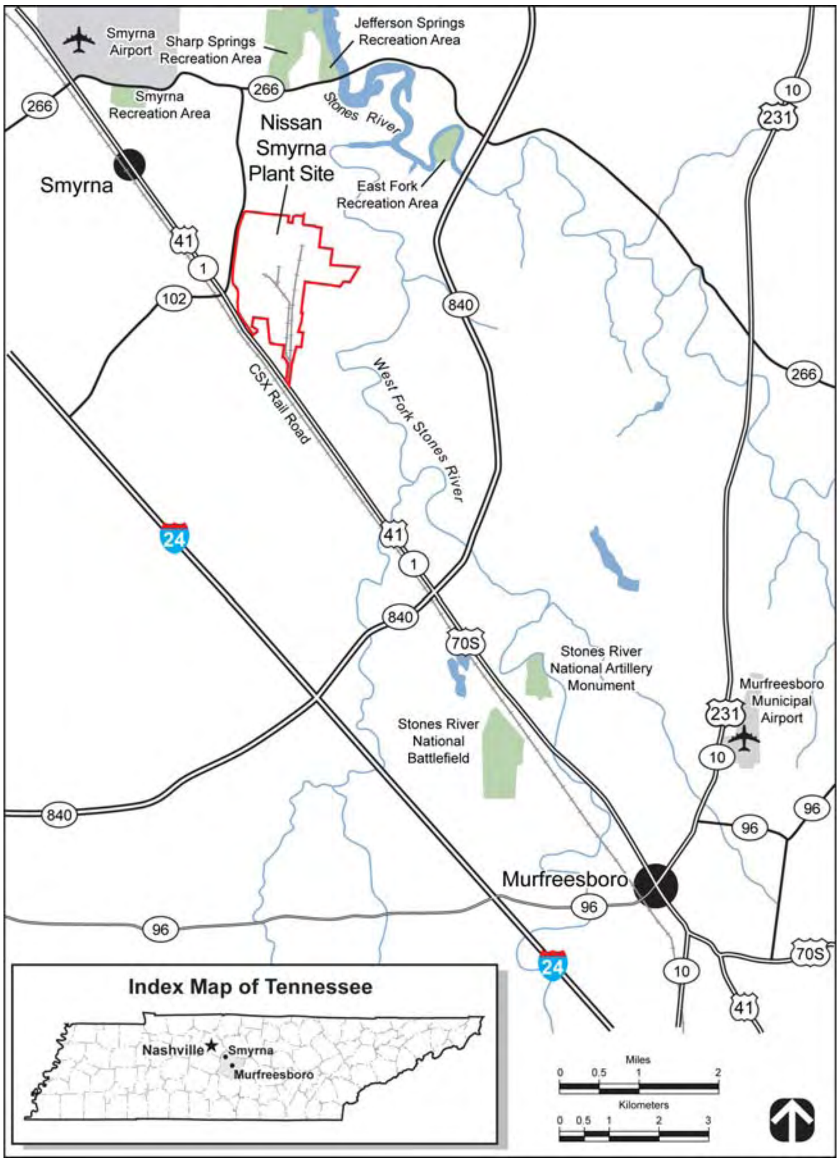

Figure 1.1. Location of the Smyrna, Tennessee Manufacturing Plant

The Nissan manufacturing facility in Smyrna, TN, was originally constructed in 1981 and consists of process areas designed to manufacture automobiles and light-duty trucks. The original plant areas included the Stamping Plant, Body and Frame Assembly Plant, System 1 Paint Plant, Trim and Chassis Plant, Vehicle Evaluation System Building, and Support Operations. The Fascia Plant was added in 1988 to manufacture plastic fascias (i.e., plastic front and rear bumpers). In 1989, Nissan added the System 2 Paint Plant and expanded existing plants (i.e., Stamping Plant, Body Assembly Plant, Trim and Chassis Plant, and Fascia Plant) to increase its manufacturing capacity. It also added facilities to manufacture service parts. The Smyrna Manufacturing Plant employs more than 4,000 direct and 1,500 contract employees at a facility with over 5.8 million square feet under roof (see Figure 1.2).

Figure 1.2. Smyrna Manufacturing Plant

The Smyrna plant has the capacity to produce approximately 550,000 vehicles per year. The current Nissan models manufactured at the Smyrna plant include the Altima, Altima Coupe, Altima Hybrid Electric Vehicle (HEV), Maxima, Frontier, Pathfinder, and Xterra. In addition to these vehicles, the Smyrna plant also produces Service Parts for past and present models which include swing metal parts (e.g., hoods, doors, trunk lids) and plastic fascias.

The manufacturing process begins in the Stamping Plant as shown on Figure 1.3, where vehicle parts are manufactured. Coils of steel and aluminum are fed through one of five blanking press lines that cut the rolled steel and aluminum into blanks. These blanks are processed through 1 of 14 stamping press lines to stamp and shape the steel and aluminum into usable parts. A stamping die is a special, one-of-a-kind precision tool that cuts and forms sheet metal, such as automotive-grade steel, into a desired shape or profile.

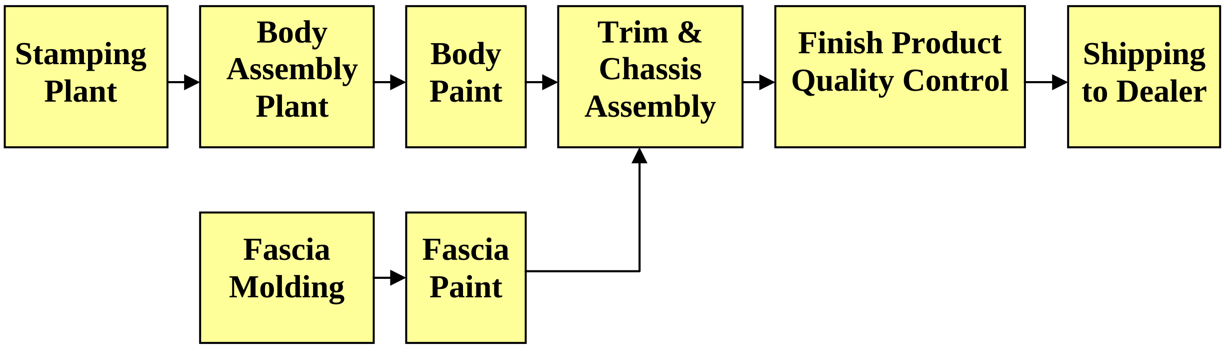

Figure 1.3. General Vehicle Assembly Flow Process

On the body-welding lines, vehicle bodies are constructed from major subassemblies and welded together. Several types of manual and robotic welds are performed on these lines. Doors, hoods, and trunk lids are installed, and the bodies are finished on the metal finishing lines. The assembled bodies (i.e., white metal) are transferred by overhead conveyor to the Paint Plants for painting.

The current Paint Plants are capable of processing multiple vehicle platforms. The pretreatment system uses cleaning stages, surface preparation, and a coating required to prepare the vehicle for electrostatic deposition (e-coat) – the initial prime coat. The e-coat system uses waterborne materials containing pigments, resins, and a small amount of volatile organic compounds (VOCs).

The next step is the application of miscellaneous coatings (e.g., rust preventatives) including mass deadener, interior sealer, exterior sealer, cavity wax, Stoneguard, wheelhouse blackout, and polyvinyl chloride (PVC) undercoatings. Once the coatings cure in a gel oven, the vehicle bodies proceed to a manual sanding operation. Note that several coatings (i.e., cavity wax, PVC undercoating, wheelhouse blackout) can be located instead after the painting process depending on quality requirements.

After the manual sanding operation, vehicle bodies proceed through the painting process. Vehicle painting operations are primarily robotic with manual zones only as a backup in the event of an issue. The current System 1 Paint Plant processes frame based vehicles. Painting operations (i.e., prime, basecoat, and clearcoat) are solvent-borne without booth or oven air emission pollution controls. The current System 2 Paint Plant processes "uni-body" vehicles (i.e., no frame). Painting operations are solvent-borne for prime and clearcoat and waterborne for basecoat. All oven air emissions from all System 2 painting operations are controlled with thermal oxidizers. After the paint process, the vehicles proceed to manual inspection and, if necessary, repair of the fully processed vehicles (e.g., spot paint repair) occurs before they are transferred by a conveyor system to the Trim and Chassis Plant for final assembly.

In the Trim and Chassis plant, the powertrain, the engine, plastic fascias, interior and exterior trim, and other components are installed utilizing overhead and floor-mounted conveyors.

The plastic fascias (i.e., injection-molded plastic front and rear bumpers) applied in the Trim and Chassis plant are manufactured within the self-contained Fascia Plant. Fascias are initially injection-molded and then loading onto carriers designed to ensure dimensional integrity. Next, fascias travel through a washer, air blow off, and drying oven. Once cleaned and dried, the fascias travel to a fascia spray booth where automation applies adhesion promoter, basecoat, and clear coat before entering a cure oven. This compressed painting process is solvent-borne and all oven air emissions are controlled with thermal oxidizers. After the curing process, the parts proceed to an inspection station. Completed fascias then travel to the Trim and Chassis Plant either by an automated conveyor system or a manual trucking operation.

After final assembly, vehicles are driven off the production line and continue to the first of two existing test tracks located north of the Trim and Chassis Plant. This test track mimics various road conditions (i.e., bumps, sharp turns, uneven pavement) and provides the initial, and typically only, test drive vehicles receive before being shipped off-site via rail or carrier. In cases where a potential quality issue (e.g., vibration, noise, etc.) is detected, vehicles may proceed on to a second test track for further evaluation and repair, if needed, before being shipped to dealers.

The Smyrna plant operates three natural gas/coal fired boilers. Each boiler is approximately 120 million British Thermal Units per hour (MMBTU/hr) and generates steam that is used to heat water. The High Temperature Hot Water Loop (High Temp System) provides heat to the manufacturing processes year round and supplements perimeter comfort heating during the winter. During the winter months, the Dual Temperature Water Loop (Dual Temp System) heats water that is distributed between comfort heating for the plant and process heating. During the summer months, the Dual Temp System is bypassed and chilled water is provided to the plants for comfort cooling and process cooling (e.g., tempering paint booths). The Boiler House is equipped with baghouse/fabric filters that remove upwards of 99 percent of all PM_{10} from coal burning.

Each of Nissan's U.S. manufacturing plants is a certified International Organization of Standardization, Standard 14001 (ISO 14001) facility. The Smyrna facility has been certified since 1999. ISO promotes the development and implementation of voluntary international standards, both for particular products and for environmental management issues. ISO 14000 refers to a series of voluntary standards in the environmental field, and ISO 14001 is the standard that specifies the requirements for an environmental management system. Nissan's environmental management system is integrated into the company's entire operation and corporate philosophy. As required for ISO certification, Nissan maintains a detailed set of environmental policies and procedures down to job-specific work instructions to assure adherence to the ISO 14001 system. As part of the ISO environmental management system, Nissan regularly conducts internal and external audits of its operations and procedures to ensure conformance with the ISO 14001 standard and compliance with applicable environmental regulations.

1.3 Scope of the Environmental Assessment

DOE has prepared this EA to assess the potential impacts of the proposed action on the human environment in accordance with the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR 1500–1508) and DOE National Environmental Policy Act Implementing Procedures (10 CFR 1021). If the impacts associated with the proposed action are not identified as significant, DOE shall issue a Finding of No Significant Impact and will proceed with the action. If impacts are identified as significant, an environmental impact statement (EIS) will be prepared.

This EA: (1) describes the existing environment at Nissan's Smyrna Manufacturing Plant relevant to potential impacts of the proposed action and No Action Alternative; (2) describes the proposed action; (3) analyzes potential environmental impacts that could result from the proposed action and No Action Alternative; and (4) identifies and characterizes cumulative impacts that could result from the proposed action in relation to other ongoing or reasonably foreseeable activities within the surrounding area.

1.4 Public Meeting

DOE held a public meeting on the proposed action on July 9, 2009, at the Smyrna Town Centre in Smyrna, Tennessee. The purpose of the meeting was to provide information on the proposed project and to solicit the public's concerns regarding environmental impacts stemming from its construction and operation. The meeting was advertised in local newspapers and attended by seventeen members of the public, according to the sign-in sheet. Representatives from both the DOE ATVM program and Nissan presented information and were available to answer questions. As they entered the meeting, attendees were given a sheet on which to provide written comments. No oral comments were presented at the meeting, and only one written comment was submitted from a Smyrna resident pertaining to the potential impacts to human health related to drinking water from J. Percy Priest Lake and the chemicals required to make the batteries.

CHAPTER 2
DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

DOE's proposed action is to issue a loan to Nissan in the amount of $1.636 billion for an EV Project which consists of the following five major components (see Figure 2.1): (A) Electrode Manufacturing, (B) Battery Assembly, (C) EV Assembly and Balance of Plant; (D) System 1 Paint Plant Rebuild, and (E) Fascia Plant Expansion.

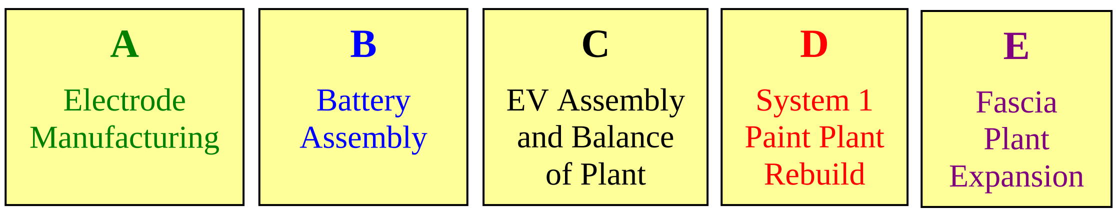

Figure 2.1. Proposed Five Major Components of Nissan's EV Project

Collectively, the proposed components would result in the following activities: (1) expanding the existing Smyrna Manufacturing Plant located in Smyrna, Tennessee by constructing a new production facility for Nissan's advanced technology Li-ion battery (Components A & B); (2) reequipping portions of the existing automobile manufacturing operations to accommodate production of the advanced technology electric vehicles (EV) and upgrade plant facilities (Component C includes modifications to the Stamping Plant, Body Shop, Trim and Chassis plant, cooling tower replacement, and a new transformer and test track, which are described below in more detail); and (3) rebuilding and/or expanding portions of existing operations at the Smyrna Manufacturing Plant (Components D & E). Nissan would have the capacity to manufacture approximately 150,000 EVs per year as a result of the EV Project. This proposed action would not increase the overall plant capacity, which is approximately 550,000 vehicles per year. Instead, the manufacturing of EVs would be scheduled into the existing production plan, and as Nissan approaches plant capacity, EVs could displace a portion of the Internal Combustion Engine (ICE) vehicles manufactured at the site. The broadest scope of the proposed action would be if all components (i.e., A, B, C, D, and E) were implemented.

Figure 2.2 provides a schematic of the Smyrna plant and details locations for the five major proposed components as well as other proposed changes.

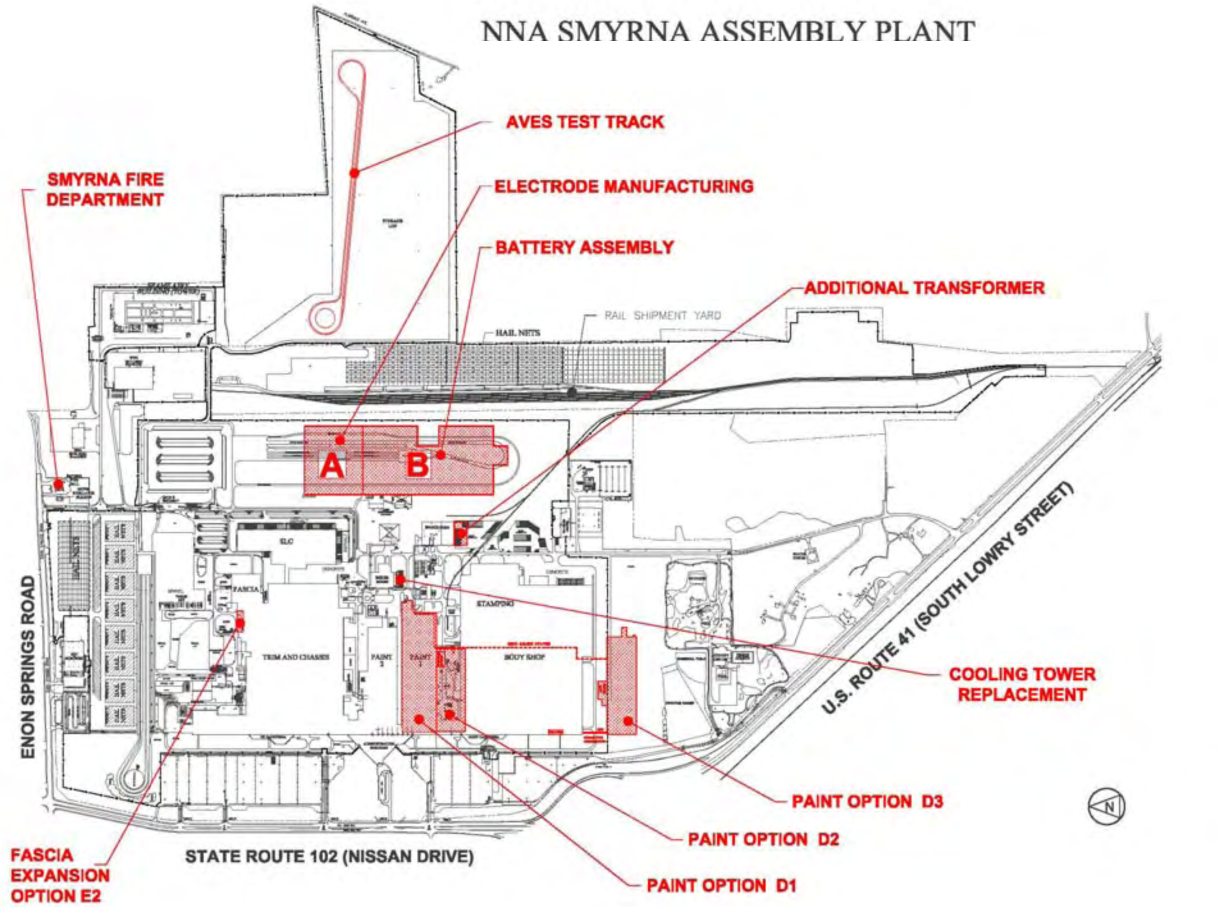

Figure 2.2. Schematic of Smyrna Manufacturing Plant with Five Major Proposed Components

2.1.1 EV Battery Manufacturing

The EV Battery Plant would be the same from a process standpoint as the Automotive Energy Supply Corporation (AESC) facility in Zama, Japan, where the new Li-ion battery technology and manufacturing process was researched and tested; however, the facility layout may vary. The EV Battery Plant would be owned by Nissan but may be managed by a third party such as AESC. Nissan Motor Co., Ltd., NEC Corporation, and its subsidiary, NEC TOKIN Corporation, formed AESC as a joint-venture company to mass produce advanced Li-ion batteries.

A new 1.3 million square foot building for the Li-ion battery manufacturing operation area would be constructed in an existing vehicle test track area east of the manufacturing plant (see Figures 2.2 and 2.3). This building would house both Electrode Manufacturing (Component A) and Battery Assembly (Component B). Of the total area, approximately 400,000 sq. ft. (i.e., ~31 percent) would accommodate Electrode Manufacturing and the remainder would accommodate Battery Assembly. Some additional space would be needed immediately adjacent to the battery facility for parking, loading/unloading areas, utility infrastructure, and pedestrian walkways.

The EV Battery Plant would have a capacity to produce 200,000 battery packs, of which 150,000 would be placed into EVs manufactured at the Smyrna facility. The remaining 50,000 battery packs may be used as replacement batteries for EVs sold in previous years or may be sold to other Original Equipment Manufacturers (OEMs) for use in their own EVs.

Figure 2.3. Proposed Site for Li-ion Electric Vehicle Battery Plant (Components A & B)

Lithium-ion Technology

A key component of Nissan's EV Project is the construction of a Li-ion Battery plant to manufacture the battery for a fully electric vehicle. Li-ion batteries generate higher electric voltage than either lead-acid batteries or nickel-metal hydride batteries, allowing for higher power output. Li-ion batteries generate electricity by means of an electrochemical reaction in which a lithium ion moves between the anode and cathode of the battery cell. The three components in the electrochemical reaction are the anode (negative electrode), cathode (positive electrode), and an electrolyte. The lithium ion moves from the anode to the cathode during discharge and from the cathode to the anode when charging. The cathode of a conventional Li-ion cell is made from carbon or some related material, the anode is a metal oxide, and the electrolyte is a lithium salt in an organic solvent.

The proposed EV Project maximizes the performance and safety of Li-ion batteries by employing a highly efficient laminated battery cell. As opposed to older and less-efficient cylindrical-type cells, the laminated structure provides superior cooling efficiency, keeps temperatures from rising even with twice the energy density, and prevents uncontrolled discharge. Figure 2.4 below demonstrates the lower heat signature of the laminated-type battery.

Figure 2.4. Battery Heat Signature Comparison

EV Battery Component and Assembly

The EV battery packs to be utilized in the EV Project would be constructed in a multi-part process, as shown in Figure 2.5.

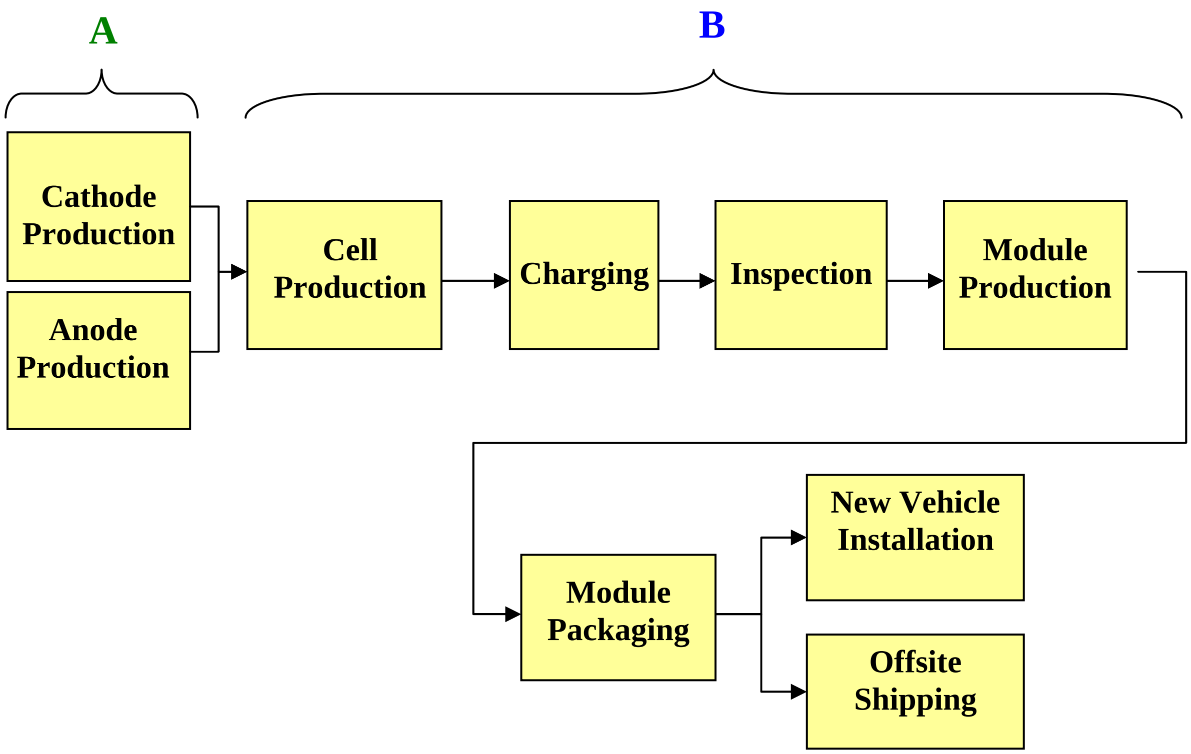

Figure 2.5. Schematic of Li-ion Battery Production (Components A & B)

The manufacturing of the anode and cathode, collectively known as the electrode, would comprise Electrode Manufacturing (Component A). Electrodes are manufactured by coating either an aluminum or copper foil with a thin layer of one of two metal oxides. The metal oxides are applied in this thin layer as a slurry that utilizes an organic solvent (n-methyl-2-pyrrolidone (NMP)) as the carrier. These coils of manufactured electrodes can be stored or fed directly into Battery Assembly (Component B).

Battery Assembly is a multi-stage process that depends on cutting-edge battery technologies and clean-room environments to ensure the successful assembly of a complete battery pack. Rolls of electrodes must first be cut (i.e., slit) into smaller sheets. Initial battery assembly involves the construction of a single cell which is composed of multiple layers of anodes, electrodes, and separators that are immersed in an electrolyte and sealed in a plastic package. A photograph of a completed cell is shown in Figure 2.6.

Figure 2.6. Single Laminated Battery Cell

After initial construction, each cell is subjected to several quality control measures which involve repeated charging and discharging, environmental simulations (i.e., Aging Process), degassing, and testing. Nissan's current estimates are that between two to five percent of cells would fail some component of the testing. Once a cell successfully passes these tests, it is ready for placement in a battery module. A battery module is constructed by layering several cells in a metal casing. A completed battery module is shown in Figure 2.7.

Figure 2.7. Completed Battery Module

Finally, multiple modules are combined along with other required components to form a complete battery pack. The battery packs are then charged. It is this completed multi-module pack that would be installed into the EV body.

In addition to process equipment, the Electrode Manufacturing Plant (Component A) would include routine support equipment such as air handling units, air compressors, chillers, evaporative equipment, and a 1.5 MMBtu/hr natural gas steam boiler to support process operations. The Battery Assembly Plant (Component B) would also include various routine support equipment such as air handling units, air compressors, chillers, and evaporative equipment to support process operations. Equipment would be located on the building roofs, within the buildings, or in some cases immediately adjacent to the buildings.

2.1.2 EV Manufacturing

The general vehicle manufacturing and assembly process would be nearly identical to current vehicle manufacturing operations at the Smyrna plant as described in Figure 1.3. This section describes where modifications or additions would be made to accommodate the manufacturing of the EV. As part of EV Assembly and Balance of Plant (Component C), in the ***Stamping Plant*** new dies used in the stamping process would be required for the specific design features of the EV model cars and for the battery pack casing. In the ***Body Shop***, minor retooling would be necessary to accommodate the new EV body style. In addition, new welding and sealer application processes would be required for the battery pack casings (altogether, Component C).

Paint. As described in Section 1.2, Nissan currently has two painting operations that provide coatings to the vehicle body – the System 1 Paint Plant and System 2 Paint Plant. Nissan is currently planning to paint the EVs in its System 2 Paint Plant. System 2 would need minimal changes to accommodate painting EVs. To provide flexibility in its operations, Nissan may also paint EVs in System 1; therefore Nissan is considering three options for the System 1 Paint Plant Rebuild (Component D). These options are outlined below.

Option D1 would upgrade/replace the current equipment within the existing System 1 Paint Plant. Current operations would be discontinued and dismantled and new equipment would be installed in the existing footprint. This option would stop vehicle painting in System 1 for at least 18 to 24 months while the rebuild takes place.

Option D2 would build out the existing System 1 Paint Plant on the south side between the existing building and the Body Plant (see Figures 2.2 and 2.8). This option would use the existing conveyor delivery systems. It would offer a "phased" approach in that portions of the new paint operations could be constructed in the new built out space (see Figure 2.8) while vehicle production in the existing plant continues. As construction of one portion is completed, the process it replaces could be discontinued and dismantled to create space for construction to begin on the next process.

Option D3 would build a new, 329,000 square foot paint facility on a relatively undisturbed piece of Nissan property adjacent to the south side of the Body Shop (see Figures 2.2 and 2.9). The total area of undeveloped land that would be affected by Option D3 at any point in the EV Project is estimated at 560,000 square feet (i.e., 12.9 acres). Production would continue in the existing System 1 Paint Plant while construction was underway. Once construction was completed, operations in the existing System 1 Paint Plant would be discontinued and the plant dismantled.

Figure 2.8. Proposed Site for System 1 Paint Plant Rebuild Option D2

Figure 2.9. Proposed Site for System 1 Paint Plant Rebuild Option D3

The System 1 Paint Plant Rebuild would result in a more energy efficient operation. The new pretreatment and e-coat processes would utilize compressed cleaning stages and ambient temperature coatings that reduce the energy required to prepare the vehicle for e-coat. The e-coat process improvements would include shortened e-coat tanks and improved oven efficiency for curing units. The e-coat system would continue to use waterborne materials.

In addition to the EV, the battery pack casing would go through the pretreatment and e-coat process before proceeding on to Battery Assembly (Component B) to be assembled into a battery pack.

After e-coat, the EV would proceed on to the new compressed painting process. This new process would eliminate the primer surfacer booth, primer surfacer cure oven and the second manual sanding operation. The compressed painting process would be achieved in one of two ways: (1) abatement processes would be added to solvent borne basecoat and clearcoat spray booths and the topcoat (i.e., combination of basecoat and clearcoat) cure oven or (2) the basecoat process would be converted to waterborne materials with abatement equipment only being added to the clearcoat spray booth, which would continue to be solvent borne, and topcoat cure oven.

Currently, the Boiler House supports the System 1 Paint Plant and the Fascia Plant by providing both Dual Temp and High Temp water for both process equipment and comfort heating. Nissan is studying the most effective way to provide this support as part of the System 1 Paint Plant Rebuild and the Fascia Plant Expansion. There are two scenarios, regardless of which of the options for the System 1 Paint Plant Rebuild (i.e., D1, D2, or D3) and the Fascia Plant Expansion (i.e., E1 or E2 described below) are chosen. Scenario 1 would not utilize the existing boiler house for continued support, but would use localized, direct-fired natural gas boilers to provide support for both the System 1 Paint Plant Rebuild and the Fascia Plant Expansion. Alternatively, Scenario 2 would utilize the existing boiler house, which can either burn natural gas or coal, to continue to support these proposed operations. In either case, Nissan would continue to use direct-fired, natural gas equipment to operate pollution control equipment, some oven heating, some comfort heating (i.e., door heaters at egress points), and miscellaneous other functions.

In the ***Trim and Chassis*** plant (Component C), the installation of the EV battery and associated ancillary powertrain equipment (e.g., wheel motors, inverter, reducer, etc.) would vary from the current process of installing an internal combustion engine and associated ancillary powertrain equipment (e.g., fuel tank, antifreeze, transmission, etc.) because these components would not be needed in all electric vehicles.

The potential expansion of the ***Fascia Plant*** (Component E) would be achieved by one of two options. The first option (E1) involves constructing an additional 14,000 square foot self-contained Fascia Plant on a previously disturbed site immediately adjacent to the existing Fascia Plant (see Figures 2.2 and 2.10). Alternatively, the existing facility would be refurbished by extending one of the two existing Fascia production lines to meet the needs of the EV Project (Option E2). Under Option E2, production would be discontinued on the line being expanded. In either case, the expansion would be required to help process the variety and complexity of fascia on various carriers through the plant and not to increase capacity of vehicles at the Smyrna Plant. The current Fascia Plant utilizes compressed processes to minimize energy use, and this would continue with any changes. In addition, with either option, Nissan would evaluate using booth control and/or waterborne materials to minimize the air emissions.

Figure 2.10. Proposed Site for the Fascia Plant Expansion Option E1

In cases where potential quality issues are identified, EVs would proceed on to the proposed Alliance Vehicle Evaluation System (AVES) test track. This test track is part of Component C (EV Assembly and Balance of Plant) and replaces the existing test track that would be the site for the EV Battery Plant (Components A & B). The AVES test track would be located on an existing finished vehicle parking lot area east of the main buildings (Figure 2.2).

Also as part of EV Assembly and Balance of Plant (Component C), the EV Project may also require changes and upgrades to the plant process and facility support equipment, including the addition of a replacement cooling tower and a new non-PCB transformer. The cooling tower would provide noncontact cooling water for the chillers and air compressors at the Boiler House that support painting operations, which is the same function that the existing cooling tower provides. There are two existing cooling towers; however, one of the current cooling towers has reached the end of its life. The replacement cooling tower would be comparable to the one it is replacing with a capacity of 8,000 tons (i.e., 24,000 gpm). The replacement cooling tower would be located on the site of the existing cooling tower (see Figure 2.2). A new non-PCB transformer would be required to provide additional electrical capacity to the new EV Battery Plant. The new additional transformer would be the same size as the two existing transformers (i.e., 30 MVA). The current switchyard is 79,200 sq. ft. and would have to be expanded by 24,000 sq. ft. to the south on what is now a finished trailer parking lot to accommodate the new transformer (see Figures 2.2 and 2.11).

Figure 2.11. Proposed Site for the New Transformer

2.1.3 Bounding Case for Environmental Analysis

Although Nissan has an understanding of what processes would be added and/or changed to manufacture EVs, the best approach (e.g., Option D1 or Option D3) for achieving this goal is still under study. In order to analyze the upper bounds or largest potential environmental impacts of the proposed action, DOE established the following Bounding Case:

A	B	C	D3	E1
Electrode Manufacturing	Battery Assembly	EV Assembly and Balance of Plant	System 1 Paint Plant Rebuild	Fascia Plant Expansion

Figure 2.12. Bounding Case for Potential Impacts of Proposed Action

DOE used the Bounding Case to analyze all potential environmental impacts related to construction. If a scenario other than this Bounding Case was used in the analysis of potential environmental impacts from operation for a particular resource area, DOE noted that in the Environmental Consequences section and provided an explanation.

2.1.4 Construction

The Bounding Case would involve the most ground disturbing activity and the least use of existing structures. Construction would involve: (1) clearing, grading, demolition, placement, and compaction of earth backfill to establish required building elevations; (2) excavation for the installation of concrete foundations/footings; (3) belowground and aboveground utility connections; (4) building erection; (5) asphalt- or concrete-paved parking areas, access road modifications/improvements, and pedestrian walkways; (6) equipment installation; and (7) installation of the new test track. The total area under construction would be approximately 150 acres. For comparison, the total site acreage is 782.2 acres, of which impervious surfaces currently account for 446.6 acres. Construction would begin in May 2010 and last approximately 28 months. The EV Project may employ up to 1,500 construction workers for a brief period of time. An existing separate site entrance would be used for construction activities.

2.1.5 EV Battery Refurbishment, Reuse, and Recycling

Nissan estimates that the primary lives of the batteries would end between 5 and 6 years of service, when they have lost approximately 20-30 percent of their storage capacity. Nissan is still developing final plans for how the battery component of the EV would be handled in the sale or lease of the EV. Nissan anticipates that initially, at least some of the batteries would be leased to the vehicle owner and others would be sold as part of the vehicle sale. Leased batteries and some other batteries may be returned to the dealers. Nissan is currently evaluating various business options for handling these batteries including returning the batteries to Nissan or to a third party. Nissan is also still evaluating potential business options for batteries that are sold as part of the vehicle sale. Those batteries may become the property of the purchaser just like any other vehicle component, or Nissan may develop a program to have those batteries returned to Nissan or a third party.

Because these batteries are new products, potential secondary uses are not yet well defined. Nissan anticipates that as these batteries become common in the market, and as other renewable energy sources develop, secondary markets may emerge for these batteries or components thereof.

2.1.6 Decommissioning

Nissan expects the EV Project to be a long-term endeavor. However, the structural components of the EV Project would eventually need to be renovated or replaced over the manufacturing plant’s operational life. In the event that Nissan decides not to continue the EV Project at the Smyrna Manufacturing Plant or if the company wants to move the EV Project to another location, either renovation or demolition of the facilities would be required. These options would generate waste that would be disposed of and/or recycled according to existing recycling technologies and markets, as well as, disposal regulations at the time of renovation, replacement, or demolition.

2.2 No Action Alternative

DOE’s regulations implementing NEPA require inclusion of a no action alternative in an EA. Without the DOE loan, it is unlikely that Nissan would implement the project as currently planned. Thus, the No Action Alternative is that no plant would be constructed in Smyrna, Tennessee. Nissan is committed to moving forward internationally with all electric vehicles, and the U.S. is one of Nissan's largest markets, making it a desirable location for an EV production facility. The terms of the DOE loan would make building the EVs at the Nissan Smyrna plant economically feasible. In the absence of DOE financing under the terms contemplated, building the EVs at the Nissan Smyrna plant would not be economically feasible.

The decision for DOE consideration covered by this NEPA review is whether to issue the loan for the proposed Nissan project or not. Nissan’s decision process in selecting the Smyrna site is described in Section 2.3. Further, there are no unresolved conflicts concerning alternative uses of available resources associated with the project site that would suggest the need for other alternatives (40 CFR 1508.9(b)). Therefore, other than no action, there is no alternative to the proposed action considered in this NEPA review.

2.3 Alternatives Considered but Eliminated

The decision for DOE consideration presented in this EA is whether or not to issue the loan for the proposed Nissan EV Project. Before Nissan determined that the EV Project should be sited at its Smyrna Manufacturing Plant, it considered several alternatives. This section provides information on why they were eliminated from further analysis.

To qualify for a loan under Section 136 of the EISA, the project must be undertaken in the United States. Therefore, only alternatives based on undertaking the project in the United States were considered.

In looking at alternatives for developing EV production in the United States, Nissan had essentially four available options: (1) expand and re-equip the existing Smyrna Manufacturing Plant; (2) expand and re-equip the existing Canton, Mississippi, Manufacturing Plant; (3) introduce a manufacturing operation at its Decherd, Tennessee, Engine Plant; or (4) select a greenfield site.

The Canton facility started operations in 2003. Much of the Canton facility is designed to manufacture frame-based vehicles, while the EV is a “uni-body” vehicle where the body and platform are manufactured as a single unit. Nissan has not yet recaptured all of its capital costs that were spent to bring the Canton facility on-line, and the relatively new frame-based manufacturing equipment that would have to be retooled and re-equipped for EV manufacturing has yet to be fully capitalized in its current capacity. The Decherd facility would have required a much more significant expansion than the Smyrna Manufacturing Plant to create both EV automobile manufacturing and assembly operations and EV battery manufacturing. The capital costs would have been far more extensive and would have made the project financially infeasible. Finally, there would not have been air emission offsets available to net out the impact from the EV Project, and the increase in hazardous waste generation would have changed the status of Decherd to a large quantity generator.

Using a new greenfield site to build a fourth vehicle assembly plant would have had a much larger potential to impact the environment. Moreover, given the overall state of the automotive industry, making a capital investment in a new standalone manufacturing plant to build the EVs would not be financially sound when existing facilities with available capacity could be upgraded and retooled to build them.

Nissan also evaluated each location option with respect to the siting of the battery manufacturing component of the project separate from the EV manufacturing. There is no production-based reason that the battery component must be produced at the same location as the vehicle manufacturing plant operation; however, after consideration, Nissan determined that co-location was the most logical option for a number of reasons. The EV battery weighs approximately 500–600 pounds. Transporting 150,000 plus batteries from an offsite location to the EV manufacturing operation would significantly add to the costs of production and would increase the environmental impacts of manufacturing an EV. Nissan also evaluated intangible aspects of co-locating the battery plant with the EV manufacturing operations. A separate manufacturing facility would increase the need for additional administrative and other support services more than a co-located site that could maximize economies of scale.

Combined, these factors helped Nissan determine that the Smyrna Manufacturing Plant is the optimal site for the EV Project.

CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter describes the existing social, economic, and environmental conditions of the project area and the potential environmental effects that could result from implementing the proposed action or No Action Alternative described in Chapter 2. A discussion of potential cumulative effects is also provided in this chapter.

3.2 Land Use and Visual Resources

3.2.1 Affected Environment

The Smyrna Manufacturing Plant is located on 782.2 acres of property leased from the Industrial Development Board in Smyrna, Tennessee. This property is designated as I-3 Heavy Industrial (Smyrna 2009a, 2009b). The site consists of process areas designed to manufacture automobiles and light-duty trucks. Combined, these process areas compose a facility with over 5.8 million square feet under roof (see Figure 1.2). Other parts of the property include large covered and uncovered vehicle storage lots, shipment and warehousing areas, offices, roads, employee parking, test tracks, utilities, a recreation area, undeveloped areas, and other ancillary facilities and structures. There is also a rail shipment yard utilized by Nissan that is owned by CSX.

The Smyrna Manufacturing Plant is bounded by South Lowry Street (U.S. Route 41) on the south end of the property, Nissan Drive (State Route 102) on the east, and Enon Springs Road on the north. The surrounding land use is a mix of commercial and residential properties. Commercial uses are located along Enon Springs Road and Nissan Drive near the intersection with Enon Springs Road. The closest residential property to the Nissan property fence line is a mobile home park approximately 1000 feet from the northeast corner of the property. Additional residential properties are located east of the facility boundary off of Florence Road. No state or national parks, forests, or conservation areas are located on or near the Smyrna Manufacturing Plant. The closest recreation area, the East Fork Recreation Area, is located over two miles northeast of the site.

3.2.2 Environmental Consequences

Proposed Action

The proposed location of the EV Battery Plant is a site currently occupied by an existing vehicle test track. Prior to the construction and operation of this existing test track, the area was used to store backfill from the construction of the original vehicle manufacturing facility. The potential System 1 Paint Plant Rebuild (Option D1 and Option D2) and the potential Fascia Plant Expansion (Option E1) would occur either on previously-disturbed sites directly adjacent to their existing locations or the existing areas would be renovated to accommodate any potential painting and fascia operations. The potential System 1 Paint Plant Rebuild Option D3 would be located in an open field south of the Body Shop. Under Component C, the replacement cooling tower would be located in the exact location of the existing cooling tower. The new transformer would be partially located on the existing switch yard and partially in what is currently a finished truck parking lot. Finally, the new AVES test track would be located in what is currently an empty finished vehicle parking lot located in the eastern portion of the plant site (Figure 2.2). The potential construction of any new buildings would slightly change the current visual landscape but would be consistent with the appearance of the existing vehicle manufacturing facilities located on the property.

No Action Alternative

There would be no major changes in land use at the Smyrna Manufacturing Plant or the surrounding area under the No Action Alternative. Other planned and ongoing operations and plant modifications would continue.

3.3 Air Quality

3.3.1 Affected Environment

Ambient air quality is determined by the type and amount of air pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The levels of air pollutants are generally expressed in terms of concentration, either in units of parts per million or micrograms per cubic meter. The Clean Air Act (CAA) established the principal framework for national, State, and local efforts to protect air quality in the United States (42 USC §§ 7401−7642). Under the CAA, the U.S. Environmental Protection Agency (USEPA) has set standards known as National Ambient Air Quality Standards (NAAQS) for six air pollutants considered to be key indicators of air quality: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and two categories of particulate matter (PM_{10} and $PM_{2.5}$). National primary ambient air quality standards define levels of air quality, with an adequate margin of safety that sets limits to protect the public health, including the health of sensitive populations such as asthmatics, children, and the elderly. National secondary ambient air quality standards define levels of air quality judged necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. State air quality standards are found in Chapter 1200-3-3 of the Tennessee Air Pollution Control Regulations (TNAPCR), under the authority of the Tennessee Code Annotated, T.C.A §§ 68-201-105.

Based on measured ambient air pollutant concentrations, the USEPA classifies areas of the United States according to whether they meet the NAAQS. Those areas demonstrating compliance with the NAAQS are considered "attainment" areas, while those that are not are known as "non-attainment" areas. Those areas that cannot be classified on the basis of available information for a particular pollutant are "unclassifiable" and are treated as attainment areas until proven otherwise.

The Smyrna Manufacturing Plant is located in Rutherford County. The County is currently an attainment area for all NAAQS pollutants (USEPA 2009a). Rutherford County emissions obtained from the USEPA's 2005 National Emissions Inventory (NEI) are presented in Table 3.1. USEPA is still collecting data to compile the 2008 NEI; therefore, 2005 is the most reliable and recent data available for comparison purposes. As the USEPA has the most comprehensive and consistent emission data for each county in the United States, it allows for a consistent, meaningful, and generally accepted NEPA analysis.

The county data include emissions data from point sources, area sources, and mobile sources. *Point sources* are stationary sources that can be identified by name and location. *Area sources* are point sources whose emissions are too small to track individually, such as a home or small office building, or are diffuse stationary sources, such as wildfires or agricultural tilling. *Mobile sources* are any kind of vehicle or equipment with a gasoline or diesel engine. Two types of mobile sources are considered: on-road and non-road. *On-road* mobile sources consist of vehicles such as cars, light trucks, heavy trucks, buses, engines, and motorcycles. *Non-road* mobile sources are aircraft, locomotives, diesel and gasoline boats and ships, personal watercraft, lawn and garden equipment, agricultural and construction equipment, and recreational vehicles (USEPA 2005a).

Table 3.1. Rutherford County Baseline Emissions

	Emissions (tons/year)				
Source Type	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**
Area Sources	6,571	729	15,043	81	4,229
Non-Road Mobile	16,047	2,186	195	238	1,262
On-Road Mobile	35,884	6,682	175	143	2,590
Point Sources	110	228	52	213	3,065
Total	**58,612**	**9,824**	**15,465**	**675**	**11,147**

Source: USEPA 2005b.

Prevention of Significant Deterioration

Nissan's Smyrna facility is a "major source" under the CAA and as such is subject to Prevention of Significant Deterioration (PSD) regulations. Regulated pollutants under these regulations include nitrogen oxides (NO_x), Volatile Organic Compounds (VOCs) (VOCs are a surrogate for ozone), SO_2, particulate matter with an aerodynamic diameter of less than or equal to 10 microns (PM_{10}), lead, and carbon monoxide (CO). Historical air emissions data for these regulated pollutants at the Smyrna facility are provided in Table 3.2. Calendar year 2005 and 2006 data are provided because they represent the most recent data where production levels were closest to the Smyrna facility maximum capacity of approximately 550,000 vehicles per year.

Table 3.2. Historical Smyrna Plant Air Emissions[1]

		Emissions (tons/year)					
Year	**Vehicles**	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
2005	498,886	99.14	189.96	12.29	295.90	2,099.91	0.0035
2006	465,187	78.71	145.80	10.44	213.50	2033.11	0.0025
Average	**482,037**	**88.92**	**167.88**	**11.36**	**255.22**	**2,066.50**	**0.0030**

Over 95 percent of VOC emissions from current operations at the Smyrna facility are associated with painting operations (i.e., System 1, System 2, and Fascia). Almost all (i.e., >99 percent) of the SO_2 emissions are from burning coal in Nissan's three dual fired boilers. The boilers operate on either natural gas or coal and serve two primary functions: provide hot water for various processes (e.g., pretreatment systems, process baths, etc.) and provide heated dual temperature water to the main plant for building comfort heating and paint booth humidity control. Similar to SO_2, both CO and NO_x

[1] The emission factor used for calculating SO_2 in Table 3.2 was updated in Nissan's Smyrna Title V Permit on August 17, 2009. The SO_2 emission factor was changed from 0.99 lbs SO_2/MMSCF to 35S where S is the percent sulfur content of the coal. The data provided in Table 3.1 (i.e., 213 tons) for Point Sources are for the same volume of coal reported for 2005 in Table 3.2.

emissions from the Smyrna facility are products of combustion, either to operate Nissan's boilers or from direct natural gas burning equipment such as process heaters, thermal oxidizers, comfort heaters, etc.

When making modifications to a major source in an attainment area, PSD regulations require a facility to determine whether the emissions associated with the modification would result in a "significant" net emissions increase (Table 3.3). If the modification would result in a "significant" net emissions increase, the modification would be required to undergo PSD permitting.

Table 3.3. Significance Thresholds for Regulated Pollutant Air Emissions

	Regulated Pollutants					
	CO	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
PSD Significance Threshold (tpy)	100	40	15	40	40	0.6

Source TNAPCR 1200-3-9-.01(x)

Conformity Review

Section 176(c) of the CAA requires that Federal actions conform to the appropriate State Implementation Plan (SIP). A SIP is a plan developed at the state level that explains how the state will comply with air quality standards and is enforceable by USEPA. The final rule for "Determining Conformity of Federal Actions to State or Federal Implementation Plans" was promulgated by USEPA on November 30, 1993 (58 FR 63214) and took effect on January 31, 1994 (40 CFR Parts 6, 51, and 93). This "Conformity" rule established the conformity criteria and procedures necessary to ensure that Federal actions conform to the SIP and meet the provisions of the CAA. The rule has been adopted by the State of Tennessee as TNAPCR 1200-3-34-.02. If the proposed action were undertaken in a Federally classified nonattainment or maintenance area, the provisions of the final rule for conformity would apply. The proposed action lies within an attainment area for all criteria air pollutants in Rutherford County and thus the provisions of this rule do not apply.

Greenhouse Gases

Greenhouse gases are gases in the Earth's atmosphere that are opaque to short-wave incoming solar radiation, but absorb long wave infrared radiation re-emitted from the Earth's surface, or in simple terms they "trap heat." Gases exhibiting greenhouse properties come from both natural and human sources. Water vapor, carbon dioxide (CO_2), methane, and nitrous oxide are examples of greenhouse gases that have both natural and manmade sources, while other greenhouse gases such as chlorofluorocarbons are exclusively manmade. In the United States, greenhouse gas emissions come mostly from energy use. Ever increasing emissions are driven largely by the demands of economic growth as a primary result of the combustion of fossil fuel for electricity generation, transport, and other needs. Energy-related CO_2 emissions resulting from petroleum, coal, and natural gas represent 82 percent of total U.S. manmade greenhouse gas emissions (NEIC 2008).

3.3.2 Environmental Consequences

The air quality analysis addresses both construction and operational emissions. Construction activities include emissions from heavy construction machinery, tractor-trailer rigs, and contracted employees' personal vehicles.

Proposed Action

Construction Emissions

The Bounding Case (Figure 2.12) was evaluated for construction emissions with construction of all of the components occurring simultaneously. Construction emissions would result in short-term air quality impacts such as dust generated by clearing and grading activities, exhaust emissions from gas- and diesel-powered construction equipment, and vehicular emissions associated with the commuting of construction workers. Construction would last approximately 28 months. In this analysis, it was assumed that 100 percent of the square footage for the EV Battery Plant (Components A & B) and the potential System 1 Paint Plant Rebuild (Option D3) would require grading, and an additional 20 percent of the given square footage for each facility would be paved for parking, additional pedestrian walkways, etc. For the AVES test track (part of Component C) it was assumed that grading would be required, and for the potential Fascia Plant Expansion (Option E1), it was assumed that no grading or paving would be necessary as the site is currently paved and parking is already established for the building. Estimates of air emissions from construction activities for the Bounding Case are shown in Table 3.4.

Table 3.4. Construction Emissions

	Emissions (tons/year)				
Source	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOC**
Grading Equipment	1.87	7.04	0.58	0.71	0.75
Grading Operations	0.00	0.00	206.31	0.00	0.00
Acres Paved	0.00	0.00	0.00	0.00	0.01
Mobile Equipment	10.72	25.56	2.06	3.16	2.34
Non-Residential Architectural Coatings	0.00	0.00	0.00	0.00	1.71
Residential Architectural Coatings	0.00	0.00	0.00	0.00	0.03
Stationary Equipment	72.69	1.88	0.05	0.10	2.72
Workers Trips	13.54	0.67	0.11	0.00	0.62
Total	**98.82**	**35.15**	**209.12**	**3.97**	**8.17**

U.S. Department of Defense developed Air Conformity Applicability Model (ACAM)

Impacts would be short-term, temporary, and localized. Impacts of PM_{10} from grading would be minimized by best management practices including dust control by water spraying, surface coagulants, vegetation, and speed control of on-site vehicles.

Operational Emissions

Estimates of criteria air pollutant emissions for the proposed action were compared to estimates of pre-project emissions to determine if any increases exceeded the PSD significance thresholds described in 3.3.1. Appendix A contains a detailed demonstration that estimated net changes would not exceed any of the PSD significant thresholds. The emissions data in Appendix A were prepared to support an application to the Tennessee Department of Environment and Conservation Air Permit Division (TDEC) for a minor source construction permit and a modification to the Smyrna facility's existing Title V permit. After finalizing the options and scenarios for the proposed action, Nissan would apply to TDEC for a minor source construction permit and a modification to its existing Title V permit.

As described in Appendix A, a maximum impact Bounding Case for operations was analyzed assuming that all five components of Nissan's proposed EV Project would be implemented concurrently. The analyses showed that there would be small net increases in emissions of some pollutants, (Table A.9 and Table A.10 in Appendix A), but these increases were small and would not exceed PSD significance thresholds. The analyses documented in Appendix A supports the conclusion that impacts to air quality would be small.

Greenhouse Gas (CO_2) Emissions

Direct Emissions—Battery Assembly and Electrode Manufacturing

The EV Project would impact direct CO_2 emissions at the Smyrna facility through: (1) decreasing emissions due to improvements to the existing assembly plant; and (2) increasing emissions due to the estimated energy requirements of the new Battery Plant. Direct CO_2 emissions are defined here as those attributable to the combustion of carbon fuels, natural gas, and coal at the Smyrna manufacturing plant. Emission factors used are based upon DOE Energy Information Administration Form EIA-1605 Appendix B, "Fuel and Energy Source Codes and Emissions Coefficients." Appendix B contains additional details regarding the CO_2 Emissions Analysis.

Total direct CO_2 emissions for Battery Assembly and Electrode Manufacturing at a capacity of 200,000 units per year are estimated to be 17,700 metric tons (MT)/year. Direct CO_2 emissions from Battery Assembly include fuel consumption from VOC abatement (13,640 MT/year), desiccant regeneration for dry rooms (1,725 MT/year), process heat for the Aging Process (13 MT/year), and seasonal building heating and cooling (1,200 MT/year). Direct CO_2 emissions from Electrode Manufacturing include seasonal building heating and cooling (734 MT/year) fuel consumption for a dedicated process steam boiler (388 MT/year).

Indirect Emissions—Battery Assembly and Electrode Manufacturing

Indirect CO_2 emissions are defined here as those attributable to the use of electricity generated off-site by public utilities. Electricity supplied to Nissan's Smyrna plant is produced and transmitted by public utilities and is derived from a number of different generation activities, including, solar, wind, hydro, nuclear, and conventional fossil fuel fired power plants using a variety of fuels (e.g. coal, natural gas and oil). The variety of sources combined with the impact of transmission losses limits the precision to which indirect CO_2 emissions can be estimated.

For the purpose of estimation, a CO_2 emissions factor of 0.553 MT of CO_2 per MWH of electricity was used as supplied by the Tennessee Valley Authority (TVA), which provides power to the Smyrna plant. The estimated annual indirect emissions from the 316,876 MWH per year of electric power that would be used for Battery Assembly and Electrode Manufacturing would be 175,232 MT of CO_2.

Estimated Impact of EVs on Mobile Source CO_2 Emissions

An estimate of the impact on the mobile source emissions from the introduction of EV's can be derived from DOE's standard for Highway Fuel Economy Driving Schedule Energy Consumption Value and USEPA's conversion factor for CO_2 emissions for gasoline fuel, based upon miles per gallon (mpg).

The calculated petroleum equivalent CO_2 emissions per mile of the EV is 24.19 grams per mile (gm/mile). This value takes into account the CO_2 generated to produce and power EVs. Assuming the EV is driven 15,000 miles per year, the estimated annual indirect CO_2 emissions would be 0.36 metric tons per vehicle (24.19 gm/mile multiplied by 15000 miles/year divided by 453.59237 gm/pound divided by 2,200 pounds/metric ton).

Nissan anticipates the early-model EV would be comparable in size and functionality to a Nissan Sentra. According to USEPA's Green Vehicle Guide, an online, searchable database, USEPA estimates that a 2008 2.5-liter, 4-cylinder Sentra emits 471.3 gm per mile (USEPA 2009b). Thus an EV would produce 447 grams of CO_2 per mile less than a

Nissan Sentra. When compared to a Sentra, an individual EV driven 15,000 miles per year would represent a reduction of 6.71 metric tons of CO_2 annually (447 gm/mile multiplied by 15000 miles/year divided by 453.59237 gm/pound divided by 2,200 pounds/metric ton). Assuming 150,000 EVs (the annual production rate of the proposed action) are produced and that these EVs displace vehicles powered by fossil fuels, their use could reduce mobile source CO_2 emissions by 1 million metric tons each year they remain in service. The typical service life of a Nissan vehicle is 7 years; therefore assuming the continued purchase and use of the EV by consumers over time, by the seventh year, a reduction in mobile source emissions of CO_2 of more than 7 million metric tons per year would be possible.

No Action Alternative

If no action would occur, there would be no new emissions or changes in air quality over current operations.

3.4 Noise

Defining characteristics of noise include sound level (amplitude), frequency (pitch), and duration. Each of these characteristics plays a role in determining the intrusiveness and level of impact of the noise on a noise receptor. The term "noise receptor" is used in this document to mean any person, animal, or object that hears or is affected by noise.

Sound levels are recorded on a logarithmic decibel (dB) scale, reflecting the relative way in which the ear perceives differences in sound energy levels. Noise values associated with different sources are not added up, but are aggregated as a logarithmic function[2]. A sound level that is 10 dB higher than another would normally be perceived as twice as loud, while a sound level that is 20 dB higher than another would be perceived as four times as loud. Under laboratory conditions, the healthy human ear can detect a change in sound level as small as 1 dB. Under most non-laboratory conditions, the typical human ear can detect changes of about 3 dB.

Based on numerous sociological surveys and recommendations of federal interagency councils, the most common benchmark referred to is the day-night average sound level of 65 decibels – A Weighted (dBA). The difference between a decibel and a decibel-A Weighted is that a dBA is used to measure a more specific range of frequencies. Since the human ear does not respond equally to all frequencies, the A Weighted Scale is used to mimic the human ear by equipping a sound meter with an "A weighting filter" that filters out very low and very high frequencies. This threshold is often used to determine residential land use compatibility around airports, highways, or other transportation corridors. Two other average noise levels are also useful:

- A day-night average noise level of 55 dBA was identified by the U.S. Environmental Protection Agency (USEPA) as a level, ". . . requisite to protect the public health and welfare with an adequate margin of safety." Noise may be heard, but there is no risk to public health or welfare.
- Effects other than annoyance may occur at day-night average noise levels of 75 dBA. This threshold is 10 to 15 dBA below levels at which hearing damage is a known risk (OSHA, 1983); however, it is also a level above which some adverse health effects cannot be categorically discounted.

Public annoyance is the most common impact associated with exposure to elevated noise levels. When subjected to Day-Night Average Sound Levels of 65 dBA, approximately 12 percent of persons exposed will be "highly annoyed" by the noise. At levels below 55

[2] Where dBA1 is noise from Source 1, and dBA2 is noise from Source 2, etc., dBA total = 10log ($10^{dBA1/10}$ + $10^{dBA2/10}$ + etc.)

dBA, the percentage of annoyance is correspondingly lower (less than 3 percent). The percentage of people annoyed by noise never drops to zero (some people are always annoyed), but at levels below 55 dBA, it is reduced enough to be essentially negligible (Finegold et al., 1994).

3.4.1 Affected Environment

Ambient noise at the facility is primarily associated with normal plant operations and traffic noise from the nearby roads. Potential offsite receptors are located in residential areas within a mile northeast and southeast of the proposed location for the EV Battery Plant (Components A & B). Employees working at the plant would be the primary receptors of noise.

Tennessee does not have state-level noise restrictions or requirements. According to the Rutherford County Building Codes Department, noise ordinances only exist for residential areas. The Town of Smyrna, where the plant is located, has no noise ordinance specifically applicable to the construction or operation of the proposed action.

3.4.2 Environmental Consequences

Proposed Action

Construction Noise

Noise impacts were analyzed by estimating expected noise levels and their possible effects on people in the area. The noise analysis incorporated several aspects of construction including the various types of construction equipment; the potential of multiple construction projects occurring concurrently; and the potential impacts on the ambient noise levels. A threshold of 65 dBA was selected as the accepted level of noise without harm or annoyance to most humans. This threshold was selected based on the criteria discussed in Section 3.4.

Potential noise sources included variable pitch and volumes from vehicles and equipment involved in site clearing and grading, creating and/or placing of engineered structures, and conducting interior/exterior finish work. Table 3.5 lists the construction equipment that was assumed would be used during construction and associated maximum noise levels.

Table 3.5. Maximum Noise Levels at 50 Feet for Common Construction Equipment

Equipment Type	Maximum Noise Level L_{max} at 50 feet (dBA, slow)
Dozer	85
Dump Truck	84
Excavator	85
Flat Bed Truck	84
Grader	85
Paver	85
Pneumatic Tools	85
Pickup Truck	55

Key: dBA = decibels A-weighted; L_{max} = maximum sound level.
Source: USDOT FHWY 2006.

A background noise level of 55 dBA was assumed for the purposes of the noise analysis to account for ambient noise in the estimates provided in Table 3.6.

The Bounding Case would include multiple construction projects occurring simultaneously; however, the sites are separated from each other such that the combining of noise from construction activities would not occur. The distances would be at least 1,000 feet between the EV Battery Plant (Components A & B) and either the System 1 Paint Plant Rebuild options, the Fascia Plant Expansion options, or the AVES test track. Furthermore, the Fascia Plant Expansion would require limited construction equipment in comparison to the EV Battery Plant or System 1 Paint Plant Rebuild options. Therefore, sufficient distance is present between the construction sites such that the noise levels from each would have little effect on each other.

Using the Federal Highway Administration’s Roadway Construction Noise Model, the noise analysis was conducted to evaluate noise levels for receptors at 100-foot increments. Noise abatement measures were not considered in this analysis. The same types of equipment were assumed to be used on each construction site. Long term average decibel levels are measured in a unit called equivalent noise level, abbreviated L_{eq}. Noise levels were calculated as an equivalent noise level over an 8-hour period ($L_{eq(8)}$). This is the noise of all the construction equipment operating over an 8-hour period based on the percent usage for each piece of equipment. The maximum sound level (L_{max}) shows the sound level of the loudest piece of equipment, which generally has the most impact on the $L_{eq(8)}$ sound level. The results of the noise analysis are presented in Table 3.6.

Table 3.6 shows the noise levels expected at receptor distances in 100-foot increments for the largest single construction site, the EV Battery Plant (Components A & B). Table 3.6 may also be used to determine the noise levels expected at the closest residence to the Nissan plant. This residence is approximately 1,000 feet from the site of the proposed AVES test track.

Table 3.6. Noise Levels at Specific Distances from the Construction Site[3]

Distance from Construction Site (feet)	Maximum Noise Level (L_{max}) dBA	Equivalent Noise Level ($L_{eq(8)}$) dBA
100	83.5	81.7
200	77.5	75.7
300	73.9	72.2
400	71.4	69.7
500	69.5	67.8
1,000*	63.5	61.7
1,500	60.0	58.2
2,000**	57.5	55.7
2640	55.0	53.3

*The closest residence to a construction site (the AVES test track) would be 1000 feet from the northeast corner of the plant property line.
**The closest residence to the battery plant is approximately 2,000 feet from its southeast corner.

Overall, construction noise would cause a temporary increase to the ambient sound environment. Construction activities would be limited to daytime hours and would be expected to last approximately 28 months. Workers associated with construction activities would wear appropriate hearing protection as required by the Occupational Safety and Health Act of 1970. As demonstrated in Table 3.6, construction activities would cause noise levels in excess of 65 dBA within 500 feet of any construction sites.

[3] The noise levels in Table 3.6 were derived using the Federal Highway Administration’s Roadway Construction Noise Model, available at www.fhwa.dot.gov/environment/noise/cnstr_ns.htm.

Personnel within the 500-foot range may be annoyed by the elevated noise levels as it may interfere with conversation and other activities. The closest residents are located approximately 1,000 feet to the northeast and 2,000 feet to the southeast from the proposed construction activity. The expected noise levels at these locations are under 65 dBA; therefore, these residents are not expected to be adversely affected by the construction noise.

Operational Noise

Operation of the Bounding Case is not expected to impact the surrounding residents or the employees working inside the facilities. There would be no new external sources of noise that would impact nearby residents.

Noise generated inside the battery facility is expected to be 80 dBA or below, based on information provided from the current operations in Japan. Noise monitoring would be conducted during the initial production phase. At that time, evaluations would be made to implement noise reduction activities or make hearing protection mandatory if the noise level is 85dB(A) or more. Noise generated from the other components of the Bounding Case would be similar to existing noise levels and no new noise sources would be introduced.

Per Nissan's Safety Department procedure, any new equipment must not be louder than 85 dBA when in full operation. Any equipment that fails to meet those criteria is evaluated to determine what noise reducing methods can be installed to meet the 85 dBA target. Equipment that cannot be made quieter is enclosed by noise absorbing walls to isolate the noise. In addition, workers exposed to elevated noise levels would wear appropriate hearing protection as required by OSHA.

No Action Alternative

Noise from vehicle traffic and ongoing plant operations would continue under the No Action Alternative. Noise attributable to the construction and operation of the proposed action would not occur. Current facility operations would continue and no changes to the existing noise levels would occur.

3.5 Geology and Soils

3.5.1 Affected Environment

Geology

The Smyrna Manufacturing Plant is located in the Central Basin physiographic province of Tennessee. The Central Basin can be subdivided into an Inner and Outer Basin on the basis of exposed rock units and distinct topographic features. The plant is situated in what is considered to be the Inner Basin, which is underlain mostly by Ordovician-age limestones. The topography of the Inner Basin is very gently rolling to nearly flat in some areas, with a few low hills (Miller and Maher 1972).

Geologic maps of Rutherford County (Galloway 1919; Piper 1993) show that the plant lies within the outcrop area of the Ridley Limestone, which generally forms nearly level topographic areas (Miller and Maher 1972).

Although portions of east and west Tennessee are designated as moderate- to major-damage seismic risk zones, the Central Basin of Tennessee is designated as a minor seismic risk zone (Stearns and Miller 1977). The U.S. Geological Survey estimates that the probability of an earthquake in the Smyrna area exceeding a magnitude of 4.75 on the Richter scale within a 500-year timespan is less than 10 percent (USGS 2002).

Soils

The heterogeneous soil overlying bedrock at the facility includes a mixture of fill, reworked soils, and native residual soils. During historical construction activity, soils were extensively modified by excavation and refilling, which resulted in disturbing most of the natural soil structure. No prime or unique farmland soils, as defined by the Farmland Protection Policy Act (PL 97-98; 7 U.S.C. 4201 et seq.), are present within the Nissan property.

The location of potential System 1 Paint Plant Rebuild (Option D3) represents the primary area of the affected environment where soils have only been minimally disturbed previously. The native soils occupying this area primarily belong to the Bradyville, Harpeth, Talbott, and Gladeville series.

3.5.2 Environmental Consequences

Proposed Action

Based on the existing geologic and soil conditions, there are no major impediments or hazards to construction or operational activities associated with the EV Project. Bedrock is adequate to support the new structures using standard construction techniques or low-geological-impact foundations (e.g., shallow footings, micro piles, etc.) to minimize excavation. Soils are generally stable and acceptable for standard construction requirements, and, due to their high clay content, would not be susceptible to liquefaction resulting from a seismic event should one occur.

Grading, excavation, and site development activities could cause soil erosion and compaction. To minimize the potential for adverse impacts on soils, the use of best management practices, including erosion prevention and sediment control measures, would be implemented by Nissan as part of their construction storm water permit(s) and site-specific Storm Water Pollution Prevention Plan (SWPPP).

No Action Alternative

Under the No Action Alternative, the proposed action would not take place, and current manufacturing activities would continue at the facility. Thus, there would be no new impacts from a geology and soils perspective.

3.6 Water Resources

3.6.1 Affected Environment

The Nissan Smyrna property is located in the Stones River watershed. This watershed is approximately 921 square miles and drains into the Cumberland River. The Stones River watershed includes parts of Rutherford, Davidson, Wilson, and Cannon Counties (TDEC 2000).

Groundwater

Groundwater monitoring wells previously located at the Nissan Smyrna property showed the groundwater at ± 30 feet below grade, with a flow direction to the north-northeast toward Stones River.

Surface Hydrology

The nearest surface-water bodies to the Smyrna Manufacturing Plant are Stewart Creek, located approximately 1.3 miles to the west; West Fork Stones River, located about 1 mile east; and Stones River, located approximately 1.6 miles northeast of the facility. No wild and scenic rivers are located in the vicinity of the site.

The only surface water present within the Smyrna property is associated with conveyance for storm water and the facility's storm water retention pond. The storm water retention pond has a capacity to hold up to 64 million gallons. Storm water released from the retention pond flows into a storm water conveyance that discharges to the West Fork Stones River. Storm water discharges from ongoing operations at the facility are covered under the Tennessee General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Tennessee Multi-Sector Permit). As part of this permit, Nissan maintains a SWPPP that outlines all potential pollutant sources for the site, as well as the measures and controls in place to minimize pollutants in storm water discharge.

Wetlands

Science Applications International Corporation (SAIC) performed a visual survey of the proposed locations for the major project components on April 3, 2009. The proposed site of the EV Battery Plant (Components A & B) and the paint option (Component D3) are the only proposed component locations that would involve any ground disturbance. The remaining components are located in existing structures or on existing paved lots. The visual survey and National Wetlands Inventory (NWI) map of the Nissan Smyrna manufacturing plant location were used to determine if wetlands were potentially located within the proposed Components A, B, and D3. The NWI map does not indicate there are wetlands located in Component D3; however, the NWI map does indicate there are potential wetlands located within Component A & B in the area of the existing test track. In order to confirm the presence or absence of wetlands within the existing test track area, Mr. Jose Garcia, Civil & Environmental Consultants, Inc. (CEC), performed a delineation of the site on October 2, 2009. The results of the onsite delineation indicated that there are no areas within the existing test track location that meet the three criteria to be considered a wetland (dominance of hydrophytic vegetation, hydric soils, and wetland hydrology). These results confirm that no wetlands are present within the areas of the proposed action.

Floodplains

The locations of all components that comprise the Bounding Case are designated as "Other Area Zone X." according to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map. This means that the property has been determined to be outside of the 100 and 500 year floodplains (FEMA 2007, 2008).

The storm water retention pond is the only area in the Nissan Smyrna property designated as "Other Flood Areas Zone X." This means that the storm water retention pond itself is characterized as an area with a 0.2 percent annual chance of flood, a one percent annual chance of a 100-year flood with average depths of less than one foot or with drainage areas less than one square mile, and as protected by levees from one percent annual chance flood (FEMA 2007, 2008).

3.6.2 Environmental Consequences

Proposed Action

Construction

To minimize the potential for adverse impacts on groundwater and surface water hydrology, the use of best management practices, including erosion prevention and sediment control measures, would be implemented by Nissan as part of their construction storm water permit(s) and site-specific Storm Water Pollution Prevention Plan (SWPPP). Since all potential construction projects are located in the onsite retention pond's watershed, all storm water associated with construction activities would be directed into the existing storm water retention pond via the existing onsite storm water conveyances. The storm water retention pond has a retention capacity of 38 million gallons and a total storage capacity of 64 million gallons. As part of the construction SWPPP, a hydraulic analysis would be conducted to confirm that Nissan's storm water retention pond has ample capacity to hold runoff generated as a result of the proposed action. The retention pond is operated such that the primary discharge gate valve is always closed, with the exception of being opened for discharge. Therefore, storm water is only discharged from the retention pond when water quality parameters are deemed acceptable per the guidelines of the existing SWPPP.

Operations

Protection of groundwater and surface water resources from facility operations would continue to be achieved by following best management practices already in place, including conducting monthly inspections of all outside areas; providing secondary containment or appropriate spill cleanup materials for all chemical containers stored either inside or outside; installing emergency shutoff valves for bulk chemical unloading docks; providing personnel to supervise tank loading and unloading activities; and providing continuous emergency spill response coverage. These measures would also help to ensure that groundwater is protected.

Liquid materials utilized as part of the proposed EV Battery Plant would be managed in portable containers. These containers would be located indoors. New tanks would be required with the System 1 Paint Plant Rebuild and the Fascia Plant Expansion; however, most of these tanks would be located inside (e.g., Paint Mix Rooms, Pretreatment Process, etc.). There may be instances where tanks associated with Components D and E are currently located outside and the proposed action involves rebuilding or expanding into the location where the tanks are currently located. In such cases, the tanks would be relocated to another outside location.

Nissan currently manages hundreds of portable containers at their facility in either bulk storage areas with secondary containment or at individual locations within the facility with either secondary containment or an appropriately-sized spill kit. Nissan currently maintains 39 bulk storage tanks onsite that range in volume from 300 gallons to 142,000 gallons. These tanks are utilized for the storage of products and waste materials. Nissan's standard operating procedure for the installation of a bulk storage tank includes the construction of a secondary containment area using materials compatible with the product being stored and having the capacity to store the volume of the largest tank in the enclosure. For bulk storage tanks located outdoors, Nissan installs manual storm water removal equipment and implements procedures to observe and retain any chemically-impacted storm water prior to discharge. All product or waste transfer facilities associated with any future bulk storage tanks would be constructed with engineered collection systems which include drainage, a collection sump, and an emergency shutoff valve to prevent spilled material from entering the storm water collection system. Regardless of the ultimate liquid material storage system, Nissan has extensive experience with installing, maintaining, and managing liquid materials.

The existing SWPPP would be updated and if needed, additional control measures would be developed and implemented. Storm water is only discharged from the retention pond when water quality parameters are deemed acceptable per the guidelines of the existing SWPPP and Tennessee General NPDES Permit.

In the unlikely event of an accident caused by equipment malfunction, human error, or natural phenomena, releases of hazardous material or waste to surface water or groundwater could occur from a spill or leak. To mitigate the potential for adverse effects from these releases, Nissan has a Hazardous Waste Contingency Plan. The Hazardous Waste Contingency Plan provides procedures on how Nissan personnel and its subcontractors would respond to fires, explosions, or any unplanned or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water at the facility. Emergency response actions include Nissan personnel and security responsibilities; environmental emergency coordinator responsibilities; and incident information collection, assessment, reporting, coordination, waste management, and documentation. The plan also includes emergency response arrangements with local authorities and emergency response contractors.

Wetlands and Floodplains

The proposed EV Project would have no impacts to wetlands since no wetlands are located in the potentially affected areas of the Nissan Smyrna plant property. None of the areas potentially affected by the proposed action are located in a floodplain; therefore, there would be no floodplain-related impacts due to the proposed action.

No Action Alternative

The Nissan EV Project would not take place under the No Action Alternative, and there would be no impacts on water resources.

3.7 Biological Resources

3.7.1 Affected Environment

Biological resources include native or naturalized plants and animals and their habitats. Protected and sensitive biological resources include specific habitats and the plant and animal species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the Tennessee Department of Environment and Conservation (TDEC) or are otherwise protected under Federal or state law.

Existing Habitat

Existing habitat at the Smyrna Manufacturing Plant includes a mix of industrial, urban, and natural habitat. Most of the site consists of large buildings, parking areas, and roads interspersed with large, mowed lawns. Most of the site is highly disturbed from past and present Nissan activities and contains relatively small areas of natural vegetation. Vegetation primarily consists of planted grass lawns, shrubs, and trees that are mainly used for landscaping near buildings. There is a small amount of natural forest and woodland habitat dominated by eastern red cedar *(Juniperus virginiana)* on the southern side of the property between U.S. Highway 41, the railroad spur, and the plant. Wildlife present would include species typically found in urban, developed areas of middle Tennessee.

Threatened and Endangered Species

The TDEC Division of Natural Areas lists threatened and endangered species by 7.5 Minute US Geological Survey Quadrangles. Table 3.7 lists the threatened or endangered plants and animals occurring in the quadrangle where the site is located and includes species listed by USFWS (TDEC TDNA 2009).

Table 3.7. State and Federally Listed Threatened and Endangered Species

Scientific Name	Common Name	State Status	Federal Status
Vascular Plant			
Anemone caroliniana	Carolina Anemone	Endangered	–
Arabis perstellata	Braun's Rockcress	Endangered	Endangered
Astragalus bibullatus	Pyne's Ground-plum	Endangered	Endangered
Astragalus tennesseensis	Tennessee Milk-vetch	Special Concern	–
Dalea foliosa	Leafy Prairie-clover	Endangered	Endangered
Echinacea simulata	Wavy-leaf Purple Coneflower	Threatened	–
Eleocharis compressa	Flat-stemmed Spike-rush	Special Concern	–
Evolvulus nuttallianus	Evolvulus	Special Concern	–
Fimbristylis puberula	Hairy Fimbristylis	Threatened	–
Isoetes melanopoda	Blackfoot Quillwort	Endangered	–
Leavenworthia exigua var. exigua	Glade-cress	Special Concern	–
Lesquerella densipila	Duck River Bladderpod	Threatened	–
Lesquerella stonensis	Stones River Bladderpod	Endangered	–
Mirabilis albida	Pale Umbrella-wort	Threatened	–
Phlox bifida ssp. stellaria	Glade Cleft Phlox	Threatened	–
Schoenolirion croceum	Yellow Sunnybell	Threatened	–
Stellaria fontinalis	Water Stitchwort	Threatened	–
Talinum calcaricum	Limestone Fame-flower	Special Concern	–
Invertebrate Animal			
Epioblasma florentina walkeri	Tan Riffleshell	Endangered	Endangered
Vertebrate Animal			
Etheostoma cinereum	Ashy Darter	Threatened	–
Etheostoma microlepidum	Finescale Darter	Deemed in Need of Management	–
Etheostoma tippecanoe	Tippecanoe Darter	Deemed in Need of Management	–
Notropis rupestris	Bedrock Shiner	Deemed in Need of Management	–
Percina phoxocephala	Slenderhead Darter	Deemed in Need of Management	–
Typhlichthys subterraneus	Southern Cavefish	Deemed in Need of Management	–
Tyto alba	Common Barn-owl	Deemed in Need of Management	–

Source: Tennessee Department of Environment and Conservation, Tennessee Division of Natural Areas, List of Rare Species by 7.5’ USGS Quadrangle, Walterhill, TN Quadrangle, http://tn.gov/environment/na/pdf/quad.pdf.

All of the species have specific habitat requirements that limit their occurrence. During a site visit to the Nissan facility in March 2009, it was confirmed that no suitable habitat for the listed species is present and no threatened or endangered species were observed.

A biologist with extensive knowledge of the Smyrna area and of habitat requirements for threatened and endangered species conducted the threatened and endangered species evaluation.

3.7.2 Environmental Consequences

Proposed Action

The proposed location for the new EV Battery Plant (Components A & B) is currently developed and construction of the new facility would not have any adverse impacts on biological resources. Two of the potential rebuilds (Options D1 and D2) of the System 1 Paint Plant would occur within the existing building or in a developed area directly adjacent to the existing building. The third potential rebuild (Option D3) for the System 1 Paint Plant would be located south of the Body Shop in a frequently mowed open field and a portion of cedar woodland. Option D3 would require clearing up to three acres of the wooded habitat and would include indirect or direct mortality or injury to biota and the elimination or further fragmentation of the existing habitat. Affected species are common to the area, and some animal species would be able to relocate to other nearby areas that offer the same type of habitat mix. Adverse impacts would be negligible. Either of the two options for the Fascia Plant Expansion would occur in a developed area directly adjacent to the existing building or within the existing building.

Based on habitat requirements and observations made during a site visit in March 2009, no listed threatened or endangered species or critical habitat are present in the areas that would be disturbed for Bounding Case. In addition, operational activities of the EV Project would not have direct or indirect adverse impacts on any threatened or endangered species or critical habitat. The USFWS concurred with DOE's determination that the proposed action would have no effect on threatened or endangered species or critical habitat (Appendix C).

No Action Alternative

No adverse impacts on biological resources or changes in the baseline conditions would occur as a result of the No Action Alternative.

3.8 Cultural Resources

3.8.1 Affected Environment

Cultural resources include historic properties, as defined in the National Historic Preservation Act; archaeological resources, as defined in the Archaeological Resources Protection Act; and cultural items, as defined in the Native American Graves Protection and Repatriation Act. Cultural resources thus include, but are not limited to, the following broad range of items and locations.

- Archaeological materials (i.e., artifacts) and sites that date to the prehistoric, historic, and ethnohistoric periods that are currently located on, or are buried beneath, the ground surface
- Standing structures and/or their component parts that are over 50 years of age or are important because they represent a major historical theme or era
- Structures that have an important technological, architectural, or local significance
- Cultural and natural places, select natural resources, and sacred objects that have importance for American Indians
- American folk life traditions and arts

The Smyrna plant property has never been surveyed for cultural resources; however, due to the disturbance that occurred during the construction of the plant, intact archaeological resources are unlikely to be present in the areas that would be disturbed for the EV Project. No historic properties eligible for or listed in the National Register of Historic Places (NRHP) are present on the Nissan property. The closest known property listed in the NRHP is the Sam Davis Home, which is located approximately 2 miles northeast of the facility.

3.8.2 Environmental Consequences

Proposed Action

No intact cultural resources are known to exist at the Smyrna Manufacturing Plant, and it is highly unlikely that any adverse impacts would occur. The EV Project would not have any impact on the Sam Davis Home, which is the closest known property listed in the NRHP.

In September of 2009, DOE extended the opportunity to engage in government to government consultation on the proposed project to ten Federally recognized Tribes listed in the U.S. Department of Housing and Urban Development Tribal Directory Assessment Tool as having an historical interest in Rutherford County. The Tribes contacted did not express concern or provide information that would indicate that the proposed project has the potential to affect sites of cultural or religious significance.

The Tennessee Historical Commission concurred with DOE's finding that no National Register of Historic Places listed or eligible properties would be affected by the proposed action under Section 106 of the National Historic Preservation Act (Appendix C).

If, during construction activities, an unanticipated discovery of cultural materials or sites is made, all excavation would cease in the immediate vicinity, and Nissan would contact the Tennessee Historical Commission office. Appropriate consultation requirements would be initiated and completed prior to any further disturbance of the discovery-site area.

No Action Alternative

If no construction would occur, there would be no impact on historic, archaeological, or American Indian resources.

3.9 Socioeconomics and Environmental Justice

3.9.1 Affected Environment

Demographic and Economic Characteristics

The region of influence for this analysis includes Rutherford County, which includes the cities of Murfreesboro and Smyrna. Rutherford County is also part of the Nashville, Tennessee, Metropolitan Statistical Area (MSA), which includes the cities of Nashville, Murfreesboro, and Franklin.

Table 3.8 summarizes population, per capita income, and wage and salary employment in Rutherford County from 2002 to 2006, the last year for which figures are available. Population has increased at an average rate of about 4 percent per year, while employment rose from 108,519 in 2002 to 131,831 in 2006. Per capita income grew from \$26,603 to \$30,519 over the same period, generating a total county income of \$7 billion in 2006. For comparison, the Nashville MSA included a population of 1,486,695 and total employment of 1,017,256 in 2006 (BEA 2009).

Table 3.8. Demographic and Economic Characteristics: Smyrna, Tennessee, Region of Influence

Rutherford County	2002	2003	2004	2005	2006	Percentage Annual Growth 2002–2006
Population	196,049	202,623	210,695	219,839	230,980	4.18
Per Capita Income ($)	26,603	27,395	28,454	29,565	30,519	3.49
Total Employment	108,519	112,249	121,592	127,841	131,831	4.99

Source: BEA 2009.

Table 3.9 shows the estimated distribution of minority populations in Rutherford County in 2009. For the purposes of this analysis, a minority population consists of any geographic area in which minority representation is greater than the national average of 30.7 percent. Based on the 2008 census estimates, minorities represented 21.7 percent of the total Rutherford County population, compared with the national average of 30.7 percent. Minorities include individuals classified by the U.S. Census Bureau as Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Hispanic or Latino, and those classified under “two or more races.”

Table 3.9. Estimated Race or Ethnic Distribution for Rutherford County, Tennessee, Population: 2008

Race or Ethnic Group	Number	Percentage of Population
Not Hispanic or Latino		
White	195,328	78.3
Black or African American	30,161	12.1
American Indian or Alaska Native	747	0.3
Asian	6,730	2.7
Native Hawaiian and Other Pacific Islander	93	0.0
Two or More Races	3,240	1.3
Hispanic or Latino[1]	13,959	5.6
Total	249,270	100.0

[1] May be of any race. Those classified as Hispanic or Latino are excluded from other categories to avoid double counting.

Source: Census 2009.

Because the proposed action is limited to modifications to an existing industrial site, impacts may be limited to the area immediately surrounding the site. Therefore it is also important to examine the census tracts closest to the facility. Although current estimates are not available at the tract level, as of the 2000 census, minority populations ranged from 11.0 to 22.5 percent of the population in the three census tracts closest to the Nissan Smyrna Manufacturing Plant, well below the national average. For comparison, minorities represented 21.0 percent of the population in Tennessee (Census 2000). No federally recognized American Indian groups live within 80 kilometers (50 miles) of the proposed site.

According to the 2000 census, 12.4 percent of the U.S. population and 13.5 percent of the Tennessee population had incomes below the poverty level in 1999 (Census 2000). In this analysis, a low-income population consists of any census tract in which the proportion of individuals below the poverty level exceeds the national average. In Rutherford County, 9.0 percent of the population had incomes below the poverty level in 1999. In each of the three tracts closest to the Smyrna Manufacturing Plant, less than 10 percent of the population had incomes below the poverty level (Census 2000).

3.9.2 Environmental Consequences

Proposed Action

This section assesses the potential socioeconomic impacts of the proposed project.

Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires agencies to identify and address disproportionately high and adverse human health or environmental effects its activities may have on minority or low-income populations. Since no high and adverse human health impacts are anticipated as a result of the construction or operational phases of the proposed action, no such impacts on minority or low-income populations are expected. Moreover, no concentrations of protected populations were identified near the facility.

Employment and Income

As with most construction projects, the associated construction employment would be limited and temporary and would not represent a permanent change in local employment. At peak, the EV Project may employ up to 1,500 construction workers for a brief period of time. Even at the peak of construction, the combined employment impact of construction and operations would represent a negligible change (0.3 percent) from the Nashville MSA employment in 2006. During most of the project, the average level of construction employment is expected to be much lower.

This analysis assumes that the EV Project would create up to 1,300 direct, full-time-equivalent jobs (Nissan 2009). This figure represents a negligible increase (1.0 percent) from the 2006 total employment in Rutherford County, shown in Table 3.7. Rutherford County is also one of the primary counties in the Nashville MSA, and some employees are likely to commute from this wider area. The new employment would represent an even smaller change (0.1 percent) from the 2006 Nashville MSA employment.

Nissan has determined that approximately 47% of the current Nissan Smyrna plant workforce commutes from outside of Rutherford County with a commuter being defined as an individual whose residence lies outside of Rutherford County. In fact, employees at the Nissan Smyrna plant reside in 45 different counties within both Tennessee and Kentucky. Assuming that the residences of the new employees would follow a similar trend, Nissan expects the impact from these full-time jobs to be mitigated across a large portion of Middle Tennessee.

Indirect employment impacts are expected to be similarly small. Changes in regional income from the proposed action would depend on the actual compensation paid but are expected to be proportional to the number of jobs generated.

Population

Based on the number of estimated jobs created, no impact on population is anticipated.

No Action Alternative

Under the No Action Alternative, there would be no major change in anticipated population, employment, or income and no impact on minority or low-income populations within the region of influence.

3.10 Utilities

3.10.1 Affected Environment

The Town of Smyrna (Smyrna) provides natural gas, potable water, and wastewater services to Nissan under a Municipal Utility Services Agreement (Agreement). The

Agreement includes a provision that allows Nissan to exceed the supply quantities stipulated in the Agreement through a surcharge rate schedule based on daily usage. The Agreement, issued in October of 1980, has no expiration date but has been revised to reflect changes in the scale and operation of the Smyrna Manufacturing Plant. Electric power to Nissan is provided from Tennessee Valley Authority (TVA) generation sources and distributed via the Middle Tennessee Electric Membership Corporation (MTEMC).

Nissan has its own utility infrastructure to support its activities, including a central utilities plant, cooling towers, electrical switchyard and transformers, and an industrial wastewater pretreatment system. The central utilities plant provides utilities (process chilled water, dual-temperature water, and compressed air). For high-temperature process water, Nissan operates three boilers that are fueled by either natural gas or coal. Electric chillers provide process chilled water to the vehicle painting operations. Nissan currently operates two cooling towers that provide noncontact cooling water for the powerhouse equipment (primarily the chillers and air compressors) which indirectly support Nissan's Painting operations.

Electricity

Nissan's recently renegotiated contract with the TVA and MTEMC is for a maximum electrical power demand of 57 megawatts (MW)[4]. The historical peak electric power demand recorded for the facility is 66 megawatts; however, this was in the context of the earlier electrical power demand contract of 70 MW. On an annual basis, Nissan's total electricity usage at the Smyrna Manufacturing Plant has averaged about 268,944 megawatt-hours (based on the last 3 years). Nissan receives electric power from TVA/MTEMC on two incoming 161-kilovolt (kV) transmission lines, one from the north and one from the south for redundancy. These transmission lines provide power to the entire plant. The transmission lines are routed into the Nissan switchyard and connect to two 30/40/50 megavolt-ampere main power transformers. The transformers step the voltage down from 161 kVs to a 13.8-kV distribution voltage. This voltage is routed through a 15-kV switchgear lineup that contains two main breakers and 30 distribution breakers. Each distribution breaker supplies a 13.8-kV distribution voltage for specific areas of the entire manufacturing facility.

Natural Gas

Under the Agreement, Smyrna is required to provide Nissan up to 160,000 thousand cubic feet (MCF) per month (about 19,200,000 MCF annually) of natural gas. Nissan's total natural gas consumption has averaged about 817,799 MCF annually (based on the last 3 years). Nissan receives natural gas from Smyrna through a 6-inch pipeline with a maximum capacity of 11,112 MCF per day. The existing Smyrna infrastructure includes three stations on the 30-inch Texas Eastern pipeline, of which only two are being used to handle Smyrna's current demand (Reinhard 2009).

Potable Water

Smyrna is required to provide Nissan up to 2.5 MGD of potable water (about 912.5 million gallons annually). Nissan's total water usage has averaged about 469.6 million gallons annually (based on the last 3 years). Nissan receives potable water from the Smyrna Water Treatment Plant through an 18-inch pipeline. The Smyrna Water Treatment Plant currently has the capacity to provide 15.2 MGD (Relford 2009). An expansion to the water plant is currently in the design phase to increase the capacity to 18.2 MGD (Relford 2009). This expansion is being performed independent of, and unrelated to, the proposed action.

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[4] A megawatt (MW) is a measure of instantaneous electricity use, that is, electricity use at one point in time. A megawatt-hour (MWH) is a measure of electricity use over time. For example, a power plant would be rated in MW, but its annual energy sales would be in MWH.

Wastewater

Nissan operates an industrial wastewater pretreatment facility that removes solids from process wastewater prior to discharging to the Smyrna publicly owned treatment works (POTW). Under the Agreement, Smyrna is required to accept up to 1.5 MGD of wastewater. Discharge amounts above 1.5 MGD are acceptable; however, Nissan receives a surcharge (or rate schedule increase). Nissan discharges wastewater to the Smyrna POTW through an 18-inch pipeline. The frequency of operation above 1.5 MGD, in which Nissan pays a surcharge, is approximately 40 percent during peak months. For the summer of 2008, the peak discharge was 2.0 MGD. During the peak months, which are seasonal and driven by peak cooling tower operation, wastewater discharge averaged 1.7 MGD for each day exceeding 1.5 MGD. During the period of April to September 2009, the maximum daily flow recorded was 1.065 MGD.

3.10.2 Environmental Consequences

Proposed Action

Electricity

The estimated peak demand from the proposed action is 24 MW. The current contract demand for the existing Smyrna plant is 57 MW. This was recently reduced from 70 MW. To service the additional load from EV Battery manufacturing, the future total contract demand would be 81 megawatts (i.e., current demand of 57 MW and future demand of 24 MW). Currently, the unused peak capacity at the Smyrna plant for existing 161,000 volt service is estimated by the power distributor (i.e., MTEMC) and TVA to be 132 megawatts (Duncan and Brockette 2009), which exceeds the estimated increase required to supply the new facilities proposed. Therefore, the MTEMC and TVA have additional capacity to accommodate the estimated peak demand for the proposed action. No additional utility infrastructure other than the new non-PCB transformer at the Nissan switchyard would be required as a result of the proposed action. The new transformer would not generate any air, water, or waste emissions and thus would not have any impacts to the resource areas analyzed in the EA.

To serve the increased load requirements, Nissan would request that the contract demand be increased. Nissan has discussed the expected increase in contract demand required with MTEMC and would finalize the request to change the contract demand in 2010.

Natural Gas

Nissan's estimated peak natural gas usage, including activities associated with the proposed action, is projected to be 8,960 MCF per day. This estimated peak usage is below the 160,000-MCF-per-month supply available to Nissan under the Agreement. Smyrna's current capacity is sufficient to handle this demand with no expansion of the existing infrastructure (Reinhard 2009).

Potable Water

The estimated peak usage, including activities associated with the proposed action, is projected to be 2.18 MGD, which is below the maximum usage of 2.5 MGD established by the Agreement. The Smyrna Water Treatment Plant has sufficient capacity to meet the projected demand, with an existing capacity of 15.2 MGD (Relford 2009).

Wastewater

No major changes are anticipated in the industrial wastewater characteristics due to the EV Project; the wastewater would continue to be processed by the onsite industrial wastewater pretreatment facility. Nissan currently meets all permitted discharge limits for the Smyrna POTW and would continue to meet these limits with the proposed action.

The maximum estimated peak discharge of wastewater from the entire Smyrna plant, including activities associated with the proposed action, is projected to be 2.53 MGD. This value was calculated by adding the FY2006 maximum daily flow (2.49 MGD) and the anticipated sanitary discharge from Electrode Manufacturing and Battery Assembly (Components A & B) (0.035 MGD). FY2006 data was chosen because vehicle production volumes were near the maximum capacity for the Smyrna facility. No industrial wastewater discharges are expected from the new EV Battery Plant (Components A & B) except for sanitary discharges associated with employees. Sanitary wastewater from the System 1 Paint Plant Rebuild and the Fascia Plant Expansion would not change from current levels.

No net increase in process wastewater discharges would occur as a result of the proposed action. There would be no process wastewater from either Electrode Manufacturing or Battery Assembly (components A & B), process wastewater discharges from Component C would not change from current levels, process wastewater discharges for the System 1 Paint Plant Rebuild (Option D) would decrease due to efficiencies, and those decreases would more than offset the increase in process wastewater discharges from the Fascia Plant Expansion (Option E).

The existing Smyrna POTW has sufficient capacity to meet the projected treatment demand with an existing capacity of 5.85 MGD (Roberts 2009). According to the Smyrna POTW plant operators, the plant is currently operating at a capacity of 4.9 MGD and has an excess capacity of 0.95 MGD (Roberts 2009). Given the estimated wastewater discharge increase due to sanitary wastewater from Electrode Manufacturing and Battery Assembly of approximately 0.035 MGD, the existing Smyrna POTW has the capacity to handle this increase and modifications to the existing contract are not anticipated. Nissan may be required to pay surcharges for processing wastewater in excess of its current contract.

No Action Alternative

If the No Action Alternative is implemented, there would be no impact on utilities.

3.11 Transportation

3.11.1 Affected Environment

The Smyrna Manufacturing Plant is accessible by road and rail. Vehicle circulation at the site may be divided into two sectors: offsite and onsite circulation. Offsite circulation consists of staff movements to and from work and materials delivery and transport. Offsite roads include State Route 102 (Nissan Drive) and U.S. Route 41 (South Lowry Road), which provide access to the west entrances to the facility, including employee and visitor parking. Enon Springs Road provides access to the northern end of the Nissan property. Employee parking lots are gated to limit access to the property. The Enon Springs entrance is also gated and staffed with security personnel. Onsite circulation consists of materials handling, movement of personnel between buildings and parking lots, and contractor and vendor personnel movement. The roads within the Nissan property are closed to unauthorized traffic.

The largest portion of the offsite traffic circulation generated by the Nissan facility is personnel commuting to and from work. The average commute of a Nissan employee working in Smyrna is about 35 miles. Peak traffic occurs between 6:30 and 7:30 a.m. with the arrival of workers at the site, and between 4 and 5 p.m. with their departure. Minimal traffic delays are experienced during these peaks because work shifts are staggered, car and vanpooling are practiced, and most deliveries to and shipments from Nissan are timed to avoid the rush hour.

3.11.2 Environmental Consequences

Proposed Action

The transport of materials and equipment associated with construction activities would be over regional and local roadways. This additional amount of truck traffic would have a negligible effect on existing traffic. Construction traffic would enter the plant through the Enon Springs entrance.

EVs produced as a result of the proposed action would be shipped by rail and not contribute to additional truck traffic. Impacts to rail traffic are not expected, since the total number of cars produced by the Nissan Smyrna plant would not increase as a result of the proposed action. The proposed action would result in new trucks delivering supplies to the Battery Plant; however, they would be offset by a reduction in the number of trucks delivering supplies for internal combustion engine vehicles currently produced at the Smyrna plant, which would decrease to accommodate for the production of EVs. The proposed action would not increase the current overall plant capacity to produce vehicles.

Employee traffic to the Nissan site would likely increase over current levels because the proposed action would result in a facility operation employment increase over current levels (1,300 new employees) and additional temporary construction personnel (up to 1,500 new employees at peak construction). Thus, some impacts on traffic loading would occur, and commute times could possibly increase.

Employee parking would not be impacted by the proposed action. An existing spare parking lot within the Nissan property would be designated for construction parking and lay down of construction materials.

No Action Alternative

If the No Action Alternative is selected, traffic would likely continue to remain close to current levels, and no impacts are anticipated.

3.12 Waste Management

3.12.1 Affected Environment

In general, hazardous materials include substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health or the environment when released into the environment. Storage and usage of hazardous materials are regulated by a variety of statutes, including the Emergency Planning and Community Right-to-Know Act (EPCRA). Hazardous wastes that are regulated under RCRA are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that either exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or are listed as a hazardous waste under Title 40 of the *Code of Federal Regulations* (CFR), Part 261.

Waste Management

Nissan has the capacity to manage greater than 10,000 metric tons of waste material per month at the Smyrna Manufacturing Plant. The generated waste materials are composed of scrap metal, recyclable materials, hazardous waste, universal waste, and nonhazardous solid waste. Scrap metal is shipped off site for recycling by various methods, including metal shredding and mill-direct delivery of steel bundles. Recyclable materials (e.g., cardboard, office paper, plastic bottles, and mixed plastics) are recycled by multiple vendors throughout middle Tennessee and the southeastern United States. A summary of the waste quantities managed by the Smyrna Manufacturing Plant over the last three calendar years is provided in Table 3.10.

Table 3.10. Total Annual Solid Waste Generation Summary

	CY06	CY07	CY08
Number of Vehicles Produced	464,694	411,942	312,282
Recycling Rate, %	95.1%	93.7%	96.3%
Total Waste Volume (tons)	106,748	94,174	74,035
Total Scrap Metal Recycled (tons)	91,465	81,074	62,412
Total Volume of Recycled Commodities (tons) [includes plastic bottles, aluminum cans, mixed plastics, office paper, wooden pallets, scrap wood, boiler ash, waste solvents, containers, used oil, automotive glass, etc.]	10,080	7,123	8,872
Total Volume of Landfilled Materials (tons) [includes wastewater treatment sludge, paint sludge, production trash, eCoat, phosphate sludge, corrosive/acid wastes, etc.]	5,203	5,977	2,752

Key: CY = calendar year.

The Smyrna Manufacturing Plant is a RCRA-Large Quantity Generator (LQG) of hazardous waste with a USEPA Identification Number of TND054481205. Active hazardous waste streams generated as a result of the manufacturing process include solvents, cleaners, waste fuel, and paint and paint-related debris. In addition, a variety of materials classified as universal wastes (e.g., fluorescent lights, lead-acid batteries, etc.) are generated. These materials are shipped off site for reclamation or recycling.

The volume of hazardous and universal waste generated on site varies according to the number of vehicles manufactured and the type of materials required for use in the manufacturing process. The statistics regarding hazardous wastes that were shipped off site in calendar year (CY) 2008 are shown in Table 3.11. For comparison, the table includes the hazardous waste volumes that were shipped off site in the two previous CYs, CY06 and CY07.

Table 3.11. Hazardous Waste Generation

	CY06	**CY07**	**CY08**
Number of Vehicles Produced	464,694	411,942	312,282
Hazardous Wastes Shipped Off Site (tons)	1,286	1,319	1,089
Hazardous Wastes Shipped Off Site That Were Reclaimed or Recycled (tons)	1,091	1,154	915
Hazardous Wastes Shipped Off Site That Were Fuel Blended or Used in Cement Kiln (tons)	142	113	106
Hazardous Wastes Shipped Off Site That Were Either Incinerated or Stabilized and Disposed of in a Landfill (tons)	53	52	68

Key: CY = calendar year.

Nissan manages pollution prevention through recycling, treatment, and restriction of hazardous waste generated on site. Nissan has maintained procedures to minimize the generation of hazardous waste at the Smyrna Manufacturing Plant and, since the early 1990s, has reduced the amount of materials sent off site by implementing practices such as recycling, product substitution, and the use of returnable containers. Currently, Nissan recycles over 95 percent of the total wastes managed each month.

Nissan's environmental engineering staff reviews all material safety data sheets for products that may be used at the plant. This review is conducted to determine if potential environmental concerns may be associated with the use of these products in any part of the plant. This review includes an analysis of the product's impact on the amount of hazardous waste generated annually for the plant. The environmental engineering staff also researches alternate methods to reuse, recycle, treat, or dispose of hazardous wastes. Concurrent with these efforts, Nissan has implemented a Hazardous Waste Minimization Plan to document efforts to minimize the generation of hazardous wastes.

To minimize any adverse impacts associated with hazardous wastes, Nissan maintains a comprehensive Hazardous Waste Contingency Plan (HWCP), which documents and implements all emergency response measures required during a hazardous waste or hazardous constituent release. The HWCP outlines the procedures and actions Nissan personnel and subcontractors would take in response to fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water at the Smyrna Manufacturing Plant. The HWCP is required by Tennessee Rule 1200-1-11-.05(4)(b) (40 CFR 265.51) for owners and operators of large-quantity hazardous waste generator facilities. The HWCP provides detailed procedures for mitigating impacts on the environment and human health from hazardous waste spills and releases (Nissan 2008).

Additionally, Nissan has prepared an RCRA-LQG Personnel Training Plan to train and prepare onsite personnel, including contractors, in the proper management of hazardous wastes and to ensure that facility personnel are able to effectively respond to emergencies involving hazardous wastes.

Hazardous Materials Use and Reporting

EPCRA was enacted by Congress in 1986 as the national legislation on community safety. EPCRA establishes requirements for Federal, state, and local governments; American Indian tribes; and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals. The Community Right-to-Know provisions help increase the public's knowledge of and access to information on chemicals at individual facilities, their uses, and releases into the environment. To comply with EPCRA, Nissan submits reports to Federal, state, and local regulatory agencies documenting the volume of chemicals stored on site and the total annual usage of certain chemicals. For CY08, Nissan submitted 22 TRI Form R reports to document the usage of regulated chemicals at the plant (Nissan 2009). It should be noted that the EPCRA program is separate from the RCRA program, such that, a material listed under the EPCRA program that has the potential to affect human health or the environment from controlled/uncontrolled releases does not necessarily fall under regulatory umbrella of the RCRA program.

3.12.2 Environmental Consequences

Proposed Action

Construction

Nissan has established procedures to evaluate each new waste stream and to perform an annual review of each existing waste stream to ensure that the wastes are being properly managed. Based on these evaluations, Nissan selects the appropriate vendor to manage these waste materials based on the vendor's financial standing, environmental compliance history, and an environmental site audit.

Construction activities related to the Bounding Case (Components A, B, C, and Options D3 and E1) would result in the generation of solid wastes, including construction materials for buildings, concrete and asphalt rubble, and land-clearing debris. The solid waste generation rate during nonresidential construction activities is 3.89 pounds per square foot (lbs/ft^2) of debris within the United States (USEPA 1998). Using this formula, the maximum estimated quantity of construction and demolition waste generated from construction was estimated as follows:

$$\text{Construction: } [(3.89 \text{ lbs/ft}^2) \times (1{,}680{,}954 \text{ ft}^2)] \div 2{,}000 \text{ pounds} = 3{,}269 \text{ tons}$$

Construction is designed and required to comply with Federal, state, and local statutes and regulations related to solid waste. It is not anticipated that land clearing and grading activities would generate a need for disposal of soil and wood waste. This was based upon the assumptions that soils generated would be used as fill during construction projects and wood wastes would be chipped and reused as mulch or compost. Therefore, these materials would not be expected to impact solid waste resources. Other remaining construction debris and excess materials may be generated and require disposal. Construction waste would be generated over the life of the construction project. Management of construction debris would include recycling and reuse when possible.

Sufficient regional landfill capacity exists to accommodate solid waste generated as a result of construction activities (Nolan 2009). The Rutherford County Landfill and the adjacent Middle Point Landfill have sufficient capacity to accommodate construction-related solid waste (Table 3.12).

Table 3.12. Rutherford County Landfill Capacity

Facility Information	Middle Point Landfill	Rutherford County Landfill
Location	Rutherford County, TN	Rutherford County, TN
Acreage	400	285
Estimated Life Expectancy	15 years	10 years
Average Throughput	4,000 to 5,000 tons/month[1]	700 to 1,000 tons/month[2]
Permitted Waste Types	Class I/II, agricultural, construction/demolition/ mixed municipal	Class I/II, agricultural, construction/demolition

[1] Can accommodate up to 6,100 tons per day.
[2] Can accommodate up to 3,000 tons per day.
Source: Nolan 2009.

Operations

A minimal increase is expected in total facility waste from operations of the EV Battery Plant (Components A & B). No increase is expected in the total facility waste due to the EV Assembly and Balance of Plant activities (Component C) since these are just modifications to or replacement of existing equipment. It is estimated that approximately 114 tons of waste per month would be generated from the EV Battery Plant. For comparison, the Smyrna Manufacturing Plant is currently managing 4,101 tons of waste materials per month during FY09. The EV Battery Plant operations would only represent a 2 percent increase in the plant's total waste volume.

For the System 1 Paint Plant Rebuild (Component D), Nissan expects little to no impact on the total facility waste volume since the process would be similar to what is already in existence. For the Fascia Plant Expansion (Component E), Nissan would realize a slight increase in the volume of paint sludge and waste purge solvent used in this plant. This increase would be on the order of one to two tons per month.

Potential new waste streams only exist from operation of the Electrode Manufacturing and Battery Assembly. These could include a n-methyl-2-pyrrolidone (NMP) condensate (a by-product from the evaporation of the slurry used to deposit the metal oxide coatings on the anode and cathode materials), waste slurry composed of metal oxides and NMP, waste battery cells, waste electrolyte, baghouse dust, recyclable materials, and solid waste. Based on the most current information, it is expected that none of these waste streams would be hazardous wastes, with the exception of the waste battery cells and waste electrolyte. At this time, Nissan plans to manage these waste streams as described in Table 3.13.

Table 3.13. Waste Streams Resulting from Implementation of Proposed Action

Waste Stream	Applicable Battery Plant Component	Anticipated Annual Volume	Waste Disposition
N-methyl-2-pyrrolidone (NMP) Condensate	A	825 tons per year	Condensate would be shipped off site for fuel blending.
Waste Slurry	A	358 tons per year	This material would be managed by either fuel blending[1] or stabilization for landfill disposal, depending on the final characteristics of the waste.
Waste Battery Cells	B	38,400 cells per year	The waste cells would either be recycled as hazardous or universal wastes, depending on the final waste characteristics.
Waste Electrolyte	B	0.48 tons per year	The waste electrolyte would be recycled as a D003 (water reactive) hazardous waste.
Baghouse Dust	A	20 tons per year	These materials would be disposed of as an approved special waste.
Solid Wastes	A&B	10 tons per year	These materials would enter the existing waste streams.

[1] Fuel blending is the process of producing alternative fuels from waste materials with high energy contents (i.e., waste materials with greater than 5,000 British Thermal Units (BTUs) per pound).

Management and recycling of the waste battery cells and waste electrolyte would be conducted in accordance with the existing State of Tennessee and Federal hazardous waste regulations for water-reactive hazardous wastes due to the lithium present in the electrolyte. These types of hazardous wastes are characterized as waste materials that react violently with water (e.g., materials become white-hot). Although these materials are extremely hazardous during the reaction with water, they do not pose any long-term health concerns associated with chronic toxicity since the hazard is mitigated after the reaction with water. For comparison, traditional lead-acid batteries are hazardous based on their corrosivity (due to the sulfuric acid electrolyte) and the presence of lead in the electrodes and terminal. The hazards associated with lead-acid batteries include the potential for chemical burns due to the corrosive nature of the electrolyte and the potential for health impacts due to the presence of lead. The hazards associated with both lithium and lead-acid batteries are based on the release of the internal materials from the external casings.

The Smyrna Manufacturing Plant may require special waste permit approvals associated with the new EV Battery Plant (Components A & B) waste streams (e.g., baghouse dust). These special waste approvals, which are issued by the State of Tennessee, would authorize the plant to dispose of the waste streams at permitted Class I/II landfills. Special waste approvals are required for the disposal of any waste streams, especially industrial waste streams, which can not be characterized as a municipal solid waste. The State of Tennessee evaluates these waste streams to ensure that the waste material would not pose a risk to human health or the environment if placed in a Class I/II landfill. Additionally, the individual landfills review the applications for these waste streams and have the ability to reject these materials if they believe it will adversely impact their environmental compliance or capacity. The special waste approvals are routine, and Nissan would work with regulatory authorities to obtain them in 30 days or less.

Regardless of the types of waste generated during the operations of these processes, Nissan would use its established procedures, including financial analysis and environmental audits, to ensure that the third-party vendors procured to process these wastes comply with all Federal, state, and local environmental regulations. Nissan would also continue to search for ways to eliminate these waste streams by identifying new opportunities for reclamation or recycling.

Hazardous Materials Use and Reporting

The operation of the EV Battery Plant (Components A & B) would increase the number of TRI Form R reports that Nissan would be required to submit. Nissan has previously submitted TRI Form R reports for the nickel compounds, manganese compounds, and NMP that are proposed for the EV Battery Plant. Additional reports would potentially be required to document the usage of the following two chemicals: aluminum (dust) and cobalt compounds. The reporting for aluminum (dust) and cobalt compounds would be the result of the slitting operations required for cell construction. Nissan expects that aluminum (dust) would be generated during the slitting of the aluminum cathode. However, Nissan is unable, at this time, to determine whether or not 25,000 pounds of aluminum dust would be generated. If so, aluminum dust would be reported. The cobalt compounds would be reported due to the presence of cobalt in lithium oxide coating on the cathode.

The aluminum dust and cobalt compounds would not have an adverse impact on the neighboring community or local emergency management agencies because the release of these chemicals would be minimized through particulate matter capture and abatement and the resulting waste would be recycled as either scrap aluminum or at a third-party recycling facility that specializes in lithium oxide reclamation.

EV Battery Refurbishment, Reuse, and Recycling

For the battery cells, modules, and/or packs that cannot be used for a secondary purpose or have reached the end of their life, Nissan would establish a recycling program to properly manage these materials. For the steel battery pack casing, the module aluminum casing, and the miscellaneous electronic components, these materials would enter into the existing recycling streams that Nissan maintains to manage the current waste materials. However, the lithium compounds that are included in the battery cells would require a new recycling stream for Nissan. Currently, Nissan has received a preliminary determination from an existing lithium recycling company that they can recycle these materials depending on the final composition of the battery technology.

No Action Alternative

The EV Project would not be implemented under the No Action Alternative, and the waste generated at the Smyrna Manufacturing Plant would continue at current levels. Current waste management and hazardous waste management activities would also continue.

3.13 Public and Occupational Health and Safety

This section addresses public health and safety associated with current and proposed operations at the Smyrna Manufacturing Plant, as well as construction activities associated with the EV Project. Public health issues include compliance with EPCRA requirements and emergency response and preparedness to ensure operational mishaps do not pose a threat to public health. Safety issues related to Nissan operations include occupational (worker) safety in compliance with Occupational Safety and Health Administration (OSHA) standards; these safety standards are also applicable to construction activities.

3.13.1 Affected Environment

With regard to public and occupational safety, Nissan maintains an Emergency Action Plan (EAP) for the Smyrna Manufacturing Plant to ensure the safety of the public and all people working on or near the facility in the event of any natural or manmade emergency. The EAP was written to comply with the OSHA requirements of Title 29 of the CFR, Section 1910.38, "Emergency Action Plan." This plan defines the roles and responsibilities of designated personnel to detect emergencies, initiate appropriate response actions, train all affected personnel, and maintain all required documentation. The EAP specifically outlines processes and procedures for emergency response associated with such potential public health hazards as hazardous chemical releases or spills and fire emergencies. The EAP also defines requirements for emergency notification to outside agencies in the event of a mishap and for communications to the media (Nissan 2009a).

More specific to occupational health and safety, the Occupational Health and Safety Act of 1970 (as amended in 2004) was enacted to ensure safe and healthful work environments for all employees. OSHA administers the regulatory requirements of the act. Nissan complies with OSHA requirements through development of a comprehensive safety program called Safety One. The Safety One program encourages employee involvement in health and safety via formal safety committees, scheduled safety audits for every level of management in the facility, employee interaction with management and the safety department, and an "open door" policy. Nissan utilizes a comprehensive safety and ergonomic audit system to identify and address workplace safety and health concerns before an incident occurs and conducts a comprehensive investigation and mitigation effort for all work-related incidents. Nissan has established a safety department consisting of safety engineers (including a chemical engineer), ergonomic engineers, and industrial hygiene personnel; onsite medical facilities with physicians, nurse practitioners, and nurses provide emergency care and are available to treat work-related and personal medical conditions. In addition, an in-house emergency response ambulance is available for medical emergencies (Nissan 2009b).

Nissan also employs an extensive safety training program for managers, engineers, technicians, contractors, and new employees. Through Nissan's implementation of OSHA's Process Safety Management of Highly Hazardous Chemicals (PSM), the facility complies with the requirements of OSHA, found in Title 29 of the CFR, Section 1910.119, "Process Safety Management of Highly Hazardous Chemicals." The primary focus of this program is to prevent or minimize the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals through sound engineering, maintenance, and administrative practices. PSM is applied to all processes utilizing materials conforming to the OSHA regulation. Nissan meets regulatory requirements and revalidates established process hazard analysis every 3 years in addition to being audited by external consultants.

Nissan complies with the requirements of OSHA, found in Title 29 of the CFR, Section 1910.1200, "Hazard Communication," via a comprehensive hazard communication program, which includes container labeling and other forms of warnings, material safety data sheets, and employee training (Nissan 2009b).

Through implementation of the Safety One, PSM, and hazard communication programs, proactive safety and health management efforts have resulted in over a 75 percent reduction in OSHA recordable cases, and over a 65 percent reduction in OSHA lost time cases since 2000 (Nissan 2009b).

3.13.2 Environmental Consequences

The analysis of potential environmental consequences associated with public and occupational safety as previously described is based on an evaluation of the construction and siting of facilities and facility operations. Environmental consequences are assessed according to the potential to increase or decrease safety risks or likelihood of harm to personnel, the public, and property from implementation of the proposed action. The prediction of risk is based on qualitative analysis.

Proposed Action

Construction

All construction activities for all components of the EV Project would be performed by a licensed, experienced construction entity. Historical safety performance is regarded during the selection process of the contractors to perform work for Nissan. The contractor would execute a robust safety program for their employees onsite and are contractually required to comply with or exceed the safety standards and practices stipulated in Nissan's Contractor Safety Manual. In addition, Nissan Safety personnel would provide oversight throughout the project and have the authority to stop work in the event of observing a life-threatening or imminently dangerous condition.

Possible scenarios that have potential to expose personnel to injury during the construction of any of the components of the EV Project include, but are not limited to, the following:

- extensive hot work (i.e., welding activities) necessary for demolition and installation;
- fall hazards from working at heights above six feet;
- excavation/trenching;
- steel erection activities; and,
- other miscellaneous construction activities.

These possible, more typical, potential hazards are addressed in Nissan's Contractor Safety Manual. There are two activities that represent atypical scenarios that have the potential to expose personnel to injury during the construction of the System 1 Paint Plant Rebuild (Component D) and the Fascia Plant Expansion (Component E). The first is decommissioning of tanks, and the second is temporary lack of fire suppression systems when all of the process equipment containing these systems are removed but the building remains (i.e., Option D1). Contractors with specific expertise in these processes would perform these two activities. In the case of decommissioning tanks, both the contractor and Nissan Safety would establish a procedure to test the atmospheric conditions, when necessary, in any tanks to ensure there are no hazards present. If hazards are present, both parties would take appropriate corrective action to ensure the atmosphere in an enclosed vessel presents no hazards to decommissioning (i.e., forced ventilation, purging, etc.). To ensure adequate fire protection, Nissan Security would develop a Fire Plan to ensure adequate backup measures exist (i.e., water or other media) in the event that either the System 1 Paint Plant Rebuild or Fascia Plant Expansion work area fire suppression systems are temporarily out of service.

In the event of a serious injury or personal medical condition (e.g., chest pain), Nissan's onsite health care provider, Comprehensive Health Services (CHS), may see contractors initially. CHS operates their onsite clinic during production hours. CHS staff includes a physician, advanced care givers, registered nurses, and an EMT. Nissan Security and Medical also work closely with local Fire and Medical agencies and can request additional resources if needed due to construction of the proposed EV project.

Operations

Electrode Manufacturing (Component A)

Nissan's Process Safety Management (PSM) program would be applied to Electrode Manufacturing to ensure process and employee safety is established and practiced. The greatest potential for incident anticipated in Electrode Manufacturing is fire. Preventive measures and appropriate fire suppression systems would be in place to eliminate or extinguish a fire in case of such an event. Additionally, an on-site fire brigade is trained and would be available to assist with fire fighting in the event of an incident. Finally, the Smyrna Fire Department is located at the north exit of the Smyrna facility on Enon Springs Road (Figure 2.2).

The principle causes for fire include (1) static electricity during dispensing of solvent: (2) shipping containers, drums or totes, that have been damaged, spilled, leaked or vented; and (3) process deviations during the mixing, coating, or drying steps (e.g. equipment failure or operator error). Additional hazards include inhalation of dust or fumes and skin contact with chemicals used in the process. Procedures for addressing each individual emergency scenario would be incorporated into the plant's standard operating procedures and current Emergency Action Plan (EAP).

Basic safety requirements to eliminate potential incidents include the following. During the transportation and storage of materials in Electrode Manufacturing, all battery components/chemicals associated with the electrode process would be transported and stored in accordance with Department of Transportation (DOT) and National Fire Protection Association (NFPA) requirements. When working in Electrode Manufacturing, the following conditions would be implemented:

- component chemicals would be blended into a slurry utilizing enclosed and automated process systems that would eliminate the possibility of any moisture contacting the components of the electrode or being introduced into the manufacturing process;
- the coating process would be totally enclosed to eliminate the possibility of moisture contacting the materials in the process;
- a dust/fume collection system would be in installed and operated; and
- the slurry drying process would utilize an electric dryer to ensure no moisture is present or created during the final phase of the electrode manufacturing process.

When working in Electrode Manufacturing, the following safety procedures would be implemented for the employees. (1) Employees would wear PPE (personal protective equipment) that would prevent perspiration, saliva, and fluid from the eye from coming into contact with battery components. (2) The EAP would be updated to ensure employees are trained and have practiced evacuating the facility in the event of emergency. (3) Based on information from current Zama operations in Japan, the noise level in Electrode Manufacturing would be 80 dBA or below. Noise monitoring would be conducted during the initial production phase to verify the noise level. At that time, the results would be evaluated to determine if noise abatement countermeasures or the use of hearing protection would be required.

Battery Assembly (Component B)

Nissan's PSM program would be applied to Battery Assembly to ensure process and employee safety is established and practiced. The greatest potential for incident anticipated in Battery Assembly, similar to Electrode Manufacturing, is fire. Preventive measures and appropriate fire suppression systems would be in place to eliminate or extinguish a fire in case of such an event. Additionally, an on-site fire brigade is trained and would be available to assist with fire fighting in the event of an incident. Finally, the Smyrna Fire Department is located at the north exit of the Smyrna facility on Enon Springs Road (Figure 2.2).

The four principle causes for fire include: (1) process deviations involving the electrolyte; (2) hot cells; (3) cells that have leaked or vented; and (4) cells that have exploded. Procedures for addressing each individual emergency scenario would be incorporated into the plant's standard operating procedures and current EAP.

Basic safety requirements to eliminate potential incidents include the following. During the transportation and storage of materials include the following:

- all battery components/chemicals associated with the electrode process would be transported and stored in accordance with DOT and NFPA requirements;
- the electrolyte, which is a water-reactive material, would be stored separately and at least 50 feet from the building;
- the electrolyte storage building would be safeguarded with a CO_2 fire suppression system;
- battery cells would be aged for a certain period of time to evaluate the presence of contaminants in the cell; and
- battery cells would be continuously monitored for any temperature deviation. An increase in temperature could be an early indicator of a potential fire. If a temperature change occurs, the battery cell would be removed from the aging room, decommissioned, and isolated in a protective area.

Process safety requirements to eliminate potential incidents include the following:

- Slitting operations would be enclosed and automated. The dried product would be in a roll configuration, which would be unwound, cut into strips, and stacked to form the battery cell.
- Electrolyte fill process would be totally enclosed to greatly reduce the possibility of moisture contacting the materials in the process. Safeguards would include Lower Explosive Limits (LEL) monitoring of vapors and fumes in the area, relief valves, isolation valves, and explosion venting.
- Fire suppression systems would be installed and maintained.

Employee safety requirements to eliminate potential incidents would include the following:

- Access to the dry room would be limited to authorized personnel only.

- The dry room environment may pose respiratory health concerns for employees working in the dry environment. Employees with access to the dry room would be medically evaluated (i.e., pulmonary function test) to identify presence of respiratory health issues and would be required to be cleared medically for access authorization to the dry room.
- Based on information provided by Zama operations in Japan, the noise level in the Battery Assembly process facility is expected to be 80 dBA or below. Noise monitoring would be conducted during the initial production phase to verify the noise level.
- There is the potential for exposure to electrical shock to employees handling components of the battery. Battery modules would be charged prior to final assembly. To eliminate the possibility of electrical shock, employees would be trained and issued appropriate personal protective equipment (PPE) such as electrical hazard (EH) rated mats, shoes, and gloves.

EV Assembly (Component C)

EV batteries would be installed in the current manufacturing assembly facility utilizing safe handling procedures consistent with current hybrid electric vehicle (HEV) requirements, including training on emergency response for damaged batteries and enhanced fire suppression systems. During the transportation and storage of materials, all assembled batteries would be transported and stored in accordance with DOT and NFPA requirements. Employee safety requirements to eliminate potential incidents would include (1) precautions such as conveyance systems and/or assist devices to ensure the battery can be safely moved and installed in the vehicle and (2) to eliminate the possibility of electrical shock, employees would be trained and issued appropriate PPE such as EH rated mats, shoes, and gloves. Finally, an emergency response plan would be in place to handle batteries that are dropped or damaged during transference.

System 1 Paint Plant Rebuild

Nissan has a top safety performance record for car and light truck manufacturing. For example, System 1 Paint Plant operations during FY2008 had an OSHA Recordable rate of 3.92 and OSHA Lost Time rate of 1.57. The OSHA incidence rates indicate the level of safety, such that 3.92 out of 100 employees had injuries that were required to be reported to OSHA, and 1.92 out of 100 employees had injuries that required them to miss time at work. The rates represent day-to-day injury types from contusions to strain sprains. Nissan has not experienced any catastrophic injuries.

After the rebuild is complete and production resumes, the hazard presenting the greatest potential for incident is anticipated to be fire in the Paint Mix Room or the Paint Spray Booths. The Paint Mix Rooms store and process bulk chemicals, paints, and other solvents prior to introduction into the paint process.

Several steps would be taken to eliminate the potential for incident in the Mix Room. First, activities would be covered under Nissan's PSM program. Nissan Smyrna does not use any chemicals at the threshold quantity listed in Appendix A of the PSM standard; however, combined usage is 10,000 pounds or more of flammables, which triggers the PSM standard. Second, a CO_2 system for extinguishing fires and building sprinklers would be incorporated. The CO_2 systems are triggered by ultraviolet/infrared (UV/IR) detectors and have a high sensitivity (the flash from a camera triggers the sensors). In the event of a fire, Nissan's on-site fire brigade would assist with firefighting efforts. Nissan's EAP would also be updated.

To eliminate the potential for incidents in the Paint Booth, robots would be installed and operated in accordance with the Robot Safety Standard (ANSI/RIA R.15.06-1999). In addition, all paint booths would be protected by high speed deluge water, triggered by UV/IR detectors. When detectors are activated by the smallest flash or flame, they immediately dump water in the booths at a high rate of speed and volume to extinguish any fire. Finally, the facility has an onsite fire brigade who can assist with firefighting efforts if necessary. Finally, the Smyrna Fire Department is located at the north exit of the Smyrna facility on Enon Springs Road.

Fascia Plant Expansion

Expansion of the Fascia Plant would likely result in one additional production line and paint spray booth and would be similar to the existing operations. Historical data indicates that the current Fascia operations are very safe. The FY2008 OSHA Recordable rate was 2.61 and OSHA Lost Time rate was 0.00. These OSHA incidence rates indicate the level of safety, thus 2.61 out of 100 employees had injuries that were required to be reported to OSHA and 0 out of 100 employees had injuries that required them to miss time at work. The potential issues described in the System 1 Paint Plant Rebuild section above would be the same for the Fascia Plant Expansion.

The existing EAP would be modified to address these new facilities and operations associated with the proposed action. In addition, a process hazard analyses would be conducted as standard practice to identify any potential occupational health and safety issues associated with these operations. Finally, as is standard protocol, the PSM would be applied to these new processes to prevent or minimize the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. The hazard communication and Safety One programs would also apply to these new facilities and operations, and employees would be trained regarding any new potential workplace hazards.

Provided Nissan applies existing and standard occupational health and safety protocols as described previously to new facilities and processes associated with the proposed action, no adverse impacts on public and occupational health and safety are anticipated.

Intentionally Destructive Acts

The likelihood of intentionally destructive acts associated with the EV Project is extremely low; however, it is possible, that random acts of vandalism could occur. Sections 13.3.1 and 13.3.2 provide information on measures in place to respond to incidents at the facility. Appropriate measures are implemented by Nissan to control facility access and provide security at the Smyrna Manufacturing Plant. Security measures include an 8-foot chain link fence with a 3-strand barbed wire top guard. The fence is also secured with cement barriers in many locations. Security cameras are situated throughout the plant, and they are monitored continuously in the Central Security Monitor Room. Several barrier arm gates control vehicle access. Pedestrian traffic is controlled through turnstiles that require an active access card. Security officers work at all times throughout the plant to ensure access is provided to the appropriate individuals, including incoming and outgoing freight deliveries. These measures would limit access and deter intruders. If a destructive act were to occur, its consequences would not exceed those already set forth in this analysis.

No Action Alternative

If the proposed action does not occur, no personnel or members of the public would be exposed to hazardous conditions beyond those that currently exist.

3.14 Cumulative Impacts

Cumulative impacts are those that may result from the incremental impacts of an action considered additively with the impacts of other past, present, and reasonably foreseeable future actions. Cumulative impacts are considered regardless of the agency or person undertaking the other actions (40 CFR 1508.7; CEQ 1997) and can result from the combined or synergistic effects of actions that are minor when considered individually over a period of time.

Other than the discussion about greenhouse gases below, no past, present, or reasonably foreseeable future actions that are considered pertinent to the analysis of cumulative impacts for the proposed EV Project have been identified at this time. The cumulative contribution of impacts that development of the property would make on the various environmental resources is expected to be minor.

While the scientific understanding of climate change continues to evolve, the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report has stated that warming of the Earth's climate is unequivocal, and that warming is very likely attributable to increases in atmospheric greenhouse gases caused by human activities (anthropogenic) (IPCC Fourth Assessment Report, Climate Change 2007: Synthesis Report (IPCC 2007)). The IPCC's Fourth Assessment Report indicates that changes in many physical and biological systems, such as increases in global temperatures, more frequent heat waves, rising sea levels, coastal flooding, loss of wildlife habitat, spread of infectious disease, and other potential environmental impacts are linked to changes in the climate system, and that some changes may be irreversible (IPCC 2007).

The release of anthropogenic greenhouse gases and their potential contribution to global warming are inherently cumulative phenomena. Greenhouse gas emissions from the proposed action (e.g. emissions related to manufacturing and charging EVs) are relatively small compared to the 8,026 million tons (7,282 million metric tonnes) of CO_2-equivalent greenhouse gases emitted in the U.S. in 2007 (Energy Information Administration, Report # DOE/EIA-0573 (2007)) and the 54 billion tons (49 billion metric tonnes) of CO_2-equivalent anthropogenic greenhouse gases emitted globally in 2004 (IPCC 2007). However, emissions from the proposed action in combination with past and future emissions from all other sources would contribute incrementally to the climate change impacts described above. However, at present there is no methodology that would allow DOE to estimate the specific impacts (if any) this increment of climate change would produce in the vicinity of the facility or elsewhere.

Although the proposed action would contribute to cumulative increases in greenhouse gases and related climate change when combined with other projects globally, emissions from the manufacture, assembly, and distribution of EVs is expected to be more than offset by the increased availability and use of EVs for transportation in the marketplace. As discussed in Section 3.3.2 and Appendix B, an EV would produce 447 grams of CO_2 per mile less than a Nissan Sentra.

CHAPTER 4
LIST OF AGENCIES CONTACTED

The following agencies and persons were contacted during the preparation of this EA:

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CHAPTER 6
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APPENDIX A

OPERATIONAL AIR EMISSIONS ANALYSIS

Environmental Consequences Air Emissions Analysis for Operations

The Bounding Case evaluated for operational emissions included all of the following components operating simultaneously:

A	B	C	D	E
Electrode Manufacturing	Battery Assembly	EV Assembly and Balance of Plant	System 1 Paint Plant Rebuild	Fascia Plant Expansion

Figure A.1. Bounding Case for Operational Impacts of Proposed Action

Air emissions from D1, D2, and D3 would be the same, as would air emissions from E1 or E2, which is why they are not differentiated in the diagram above (see Section 2.1). There are two scenarios for the Bounding Case. One would provide process support through the use of new, localized, direct-fired natural gas boilers (Scenario 1) and the other would utilize the existing boiler house (Scenario 2) to provide support to both the System 1 Paint Plant Rebuild and the Fascia Plant Expansion.

The emissions estimate data in this appendix were prepared to support an application to the Tennessee Department of Environment and Conservation Air Permit Division (TDEC) for a minor source construction permit and a modification to the Smyrna facility's existing Title V permit. After finalizing the options and scenarios for the proposed action, Nissan would apply to TDEC for a minor source construction permit and a modification to its existing Title V permit.

Electrode Manufacturing (Component A)

The estimated emissions from Electrode Manufacturing are provided in Table A.1.

Table A.1. Estimated Emissions from Electrode Manufacturing (Component A)

	Emissions (tpy)					
Source Type	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Process Emissions	0	0	1.92	0	10.02	0
Direct Energy Emissions	4.69	5.59	0.42	0.034	0.31	2.80E-05
Total	**4.69**	**5.59**	**2.34**	**0.034**	**10.33**	**2.80E-05**

PM_{10} emissions from Electrode Manufacturing would be generated from mixing metal oxides with n-methyl-2-pyrrolidone (NMP). PM_{10} emissions would be reduced by a pollution control device (i.e., baghouse fabric filter) that would achieve at least of 99 percent removal efficiency.

VOC emissions from Electrode Manufacturing would occur when NMP would be driven off of the electrodes by heating. Over 97 percent of the NMP stream would be concentrated and recycled back into the process. VOC emissions from the remaining NMP stream would be routed to a pollution control device (i.e., Regenerative Thermal Oxidizer (RTO)) that would achieve at least 95 percent destruction efficiency.

All direct energy emissions associated with Electrode Manufacturing would be from the consumption of natural gas. These emissions would be attributed to building comfort heating (seasonal), operating the VOC pollution control device, and a small steam process boiler. The small direct-fired boiler provides heat used to drive off the NMP solvent from the electrode. The remaining energy usage would be indirect through the use of electricity.

Battery Assembly (Component B)

The estimated emissions from Battery Assembly are provided in Table A.2.

Table A.2. Estimated Emissions from Battery Assembly (Component B)

	Emissions (tpy)					
Source Type	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Process Emissions	0	0	0	0	22.34	0
Direct Energy Emissions	14.76	17.57	1.34	0.105	0.97	8.82E-05
Total	**14.76**	**17.57**	**1.34**	**0.105**	**23.31**	**8.82E-05**

VOC emissions from Battery Assembly would occur from injection of the electrolyte into the cells. VOC emissions would be routed to a pollution control device (i.e., RTO) that achieves at least 95 percent destruction efficiency. Additional VOC emissions may result from the cell Degassing process. Once a cell has been filled with electrolyte, it would proceed to the Aging Process where it would undergo a test mimicking environmental conditions. Upon exiting the Aging process, cells would be “degassed” (i.e., slit to release any gases that may have built up during Aging). Studies indicate that emissions from this process would be minimal.

Direct energy emissions (i.e., consumption of natural gas) associated with Battery Assembly would be attributed to building comfort heating (seasonal), operating the VOC pollution control device, desiccant regeneration for dry rooms, and heat for the Aging Process (i.e., heating the room that houses the cells). The remaining energy usage would be indirect through the use of electricity.

EV Assembly and Balance of Plant (Component C)

The largest sources of PM_{10} and VOCs emissions from the Body Shop would be the resistance welding process and sealer application, respectively. The additional PM_{10} emissions from welding the battery casing would be negligible and would not change from the current site condition (i.e., unpermitted insignificant emissions). The additional VOC emissions associated with sealer application to the battery casing would be minimal and covered by the existing plant-wide sealer VOC limit in Nissan’s Title V permit.

VOC emissions associated with e-coating the battery casings would also be minimal and would be allowed under one of the existing E-coat VOC limits in Nissan’s Title V permit.

In general, under Component C, the assembling of the EV would not be different from the assembly of internal combustion engine vehicles at the Smyrna Plant. Any emissions from sealer application in either the Body Shop or the Trim & Chassis Plant would be included under existing plant-wide VOC limits in Nissan’s Title V permit. There would be a small overall VOC emissions savings in the Trim and Chassis Plant because EVs do not receive gasoline or windshield washer fluid that contains methanol.

The replacement cooling tower and the transformer would not have any associated air emissions.

EV tailpipe emissions would be zero so no increase in air emissions would result from AVES Test Track operations.

In summary, changes to the current processes would be insignificant for all regulated air pollutants.

System 1 Paint Plant Rebuild (Component D)

None of the three options (i.e., D1, D2, and D3) for the System 1 Paint Plant Rebuild would vary significantly in their impact on air emissions. All options would involve new equipment and the processes would be constructed virtually the same regardless of where they would be located on the Smyrna site.

VOC and PM_{10} emissions would differ little based on whether process support would be provided by localized, direct-fired natural gas units (i.e., Scenario 1) or the boiler house (i.e., Scenario 2). Over 99 percent of VOC emissions would be associated with the painting and curing process, with a negligible amount associated with direct energy consumption. VOC emissions from the paint booths and the ovens would be routed to pollution control devices (i.e., RTOs). Most of the PM_{10}, emissions would also come from the painting process (i.e., paint overspray that would pass through a scrubber), although small amounts would be associated with various applications (i.e., underbody, cavity wax, sealer, etc.). The remaining PM_{10} emissions would be associated with combustion. The current boiler house is equipped with baghouse/fabric filters that remove upwards of 99 percent of all PM_{10} from burning coal.

Emissions of CO, NOx, and SO_2 would differ based on whether process support would be provided by localized, direct-fired natural gas burning units (i.e., Scenario 1) or the boiler house (i.e., Scenario 2) because the boiler house burns primarily coal. Switching from the boiler house to small, localized natural gas fired boilers would reduce the emission of these pollutants. In addition, the proposed System 1 Paint Plant Rebuild would emit less CO, NOx, and SO_2 than the existing System 1 Paint Plant as a result of process improvements. These improvements would include shorter tanks, more efficient ovens, improved process air handling equipment, and eliminating a spray booth, cure oven, and sanding operation. In addition, the paint booths would be compressed, which significantly reduces energy use by reducing the volume of air that must be conditioned for the painting process.

The estimated emissions from the System 1 Paint Plant Rebuild are provided in Tables A.3 and A.4.

Table A.3 provides estimated emissions for the System 1 Paint Plant Rebuild if energy for process bath heat, conditioning of booth air, etc. were supplied solely by localized natural gas burning combustion equipment (i.e., Scenario 1).

Table A.3. Estimated Emissions from System 1 Paint Plant Rebuild (Component D with Scenario 1)

	Emissions (tpy)					
Source Type	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Process Emissions	0	0	4.41	0	800	0
Direct Energy Emissions	15.84	18.86	1.43	0.11	1.04	9.47E-05
Total	**15.84**	**18.86**	**5.84**	**0.11**	**801**	**9.47E-05**

Table A.4 provides estimated emissions assuming that the boiler house would continue to provide dual temperature and high temperature water to the System 1 Paint Plant Rebuild for process bath heat, conditioning of booth air, etc. (i.e., Scenario 2).

Table A.4. Estimated Emissions from System 1 Paint Plant Rebuild (Component D with Scenario 2)

	Emissions (tpy)					
Source Type	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Process Emissions	0	0	4.41	0	800	0
Direct Energy Emissions	22.07	41.16	1.70	64.16	0.97	8.53E-04
Total	**22.07**	**41.16**	**6.11**	**64.16**	**801**	**8.53E-04**

Fascia Plant Expansion (Component E)

When comparing the two options (i.e., E1 and E2) for the Fascia Plant Expansion, neither of the options would vary significantly in their impact on air emissions because either option would add the same amount of new equipment despite different layouts.

VOC and PM_{10} emissions would differ little based on whether process support would be provided by localized, direct-fired natural gas fired units (i.e., Scenario 1) or the boiler house (i.e., Scenario 2). Over 99 percent of all VOC emissions would be associated with the painting and curing process, with a negligible amount associated with direct energy consumption. VOC emissions would be limited through the use of booth and/or oven controls (i.e., RTOs) and/or waterborne materials (i.e., adhesion promoter). Most of the PM_{10}, emissions would also be from the painting process (i.e., paint overspray that would pass through a scrubber). The remaining PM_{10} emissions would be associated with combustion. The current boiler house is equipped with baghouse/fabric filters that remove upwards of 99 percent of all PM_{10} from coal burning.

Much the same as the System 1 Paint Plant Rebuild, notable differences would exist for CO, NOx, and SO_2 emissions under Scenario 1 versus Scenario 2 because the boiler house burns primarily coal. Switching from the boiler house to small, localized natural gas fired boilers would reduce the emission of these pollutants. Both E1 and E2 would be designed with process improvements, including more efficient ovens, which would result in reductions in CO, NOx, and SO_2 emissions.

The estimated emissions from the Fascia Plant Expansion are provided in Tables A.5 and A.6. Table A.5 provides estimated emissions for the Fascia Plant Expansion if energy for process bath heat, conditioning of booth air, etc. were supplied solely by localized natural gas burning combustion equipment (i.e., small steam boilers) (i.e., Scenario 1).

Table A.5. Estimated Emissions from Fascia Plant Expansion (Component E with Scenario 1)

	Emissions (tpy)					
Source Type	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Process Emissions	0	0	3.37	0	175	0
Direct Energy Emissions	3.50	4.17	0.32	0.025	0.23	2.09E-05
Total	**3.50**	**4.17**	**3.69**	**0.025**	**175**	**2.09E-05**

Table A.6 provides estimated emissions assuming that the boiler house would provide dual and high temperature water to the Fascia Plant Expansion for process bath heat, conditioning of booth air, etc (i.e., Scenario 2).

Table A.6. Estimated Emissions from Fascia Plant Expansion (Component E with Scenario 2)

	Emissions (tpy)					
Source Type	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Process Emissions	0	0	3.37	0	175	0
Direct Energy Emissions	4.31	7.06	0.35	8.32	0.22	1.19E-04
Total	**4.31**	**7.06**	**3.72**	**8.32**	**175**	**1.19E-04**

Emissions Impact of Bounding Case

As previously defined in Figure A.1, the Bounding Case for operational impact for Nissan's EV Project would be if all five components were implemented (i.e., Electrode Manufacturing, Battery Assembly, EV Assembly and Balance of Plant, System 1 Paint Plant Rebuild, and the Fascia Plant Expansion). There are two scenarios for the Bounding Case. One would provide process support through the use of localized, direct-fired natural gas boilers (Scenario 1), and the other would utilize the boiler house (Scenario 2) to provide support to both the System 1 Paint Plant Rebuild and the Fascia Plant Expansion. The post-project emissions from the Bounding Case scenarios are compared with PSD significance thresholds for each regulated pollutant in Table A.7.

Table A.7. Post-Project Emissions of Regulated Pollutants[1]
(A+B+C+D+E)

	Regulated Pollutants (tpy)					
	CO	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Bounding Case with Scenario 1 (gas)	38.80	**46.19**	13.21	0.28	**1009.9**	2.32E-04
Bounding Case with Scenario 2 (coal)	45.84	**71.38**	13.52	**72.62**	**1009.8**	1.09E-03
PSD Significance Thresholds	**100**	**40**	**15**	**40**	**40**	**0.6**

The data in Table A.7 show that there would be three pollutants where the estimated emissions increases would exceed the significance level. These would be NOx, SO_2 (only with the Scenario that utilizes the boiler house in support of Components D & E), and VOCs.

Net Emissions Impact of Bounding Case

As a major source, Nissan can "net out" of PSD for each regulated pollutant by reducing or eliminating emissions of the same pollutant from another pollution unit or units within the same site-specific permitted source. Under the Bounding Case, the System 1 Paint Plant would be replaced and therefore, by definition, it would no longer have any emissions or contribute to post-project emissions. Some of the processes that would no longer occur in the System 1 Paint Plant Rebuild include pretreatment, e-coat,

[1] Pre- and post-project emissions have been calculated following both the U.S. Environmental Protection Agency (EPA) and TDEC's requirements for estimating pre- and post-project emissions to determine whether a project constitutes a "major modification" for PSD/NSR purposes. See 40 CFR § 51.166 and TNAPCR Rule 1200-3-9-.1(04).

Stoneguard, cavity wax, undercoating, primer surfacer, and topcoat. Emissions were associated with these processes, and it follows that these emissions would no longer occur in the System 1 Paint Plant Rebuild. This represents a reduction of those emissions from these pre-project processes to be "netted out" as a decrease.

Under Scenario 1, the Boiler House would no longer operate and would be replaced by localized, direct-fired natural gas boilers, the emissions of which have been accounted for in post-project emissions estimates (Table A.7). Under Scenario 2, the Boiler House would continue to operate. Because its emissions have already been accounted for in post-project emission estimates (Table A.7), the pre-project Boiler House emissions represent a net decrease that can also be "netted out." Table A.8 shows the emission decreases that were computed for the System 1 Paint Plant Rebuild under Scenarios 1 and 2. The pre-project emissions reduction estimates under each scenario for the System 1 Paint Plant were calculated using the average of the total emissions for a two year period from 2005 and 2006.

Table A.8. Average Past Actual Emissions Associated with System 1 Paint Plant

	Emissions (tpy)					
Source Data	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Average Past Actual Emissions from System 1 Paint Plant	14.48	17.24	2.61	0.10	1201.9	8.65E-05
Average Past Actual Emissions from System 1 Paint Plant and Associated Boiler House Emissions	32.65	69.04	3.74	120.71	1201.9	1.56E-03

The pre-project emissions (Table A.8) are subtracted from the post-project emissions (Table A.7) to determine if the difference, which represents the emissions from the proposed action, would exceed the significance thresholds (Tables A.9 and A.10). Negative numbers indicate a reduction in emissions. Scenario 1 would utilize new, localized, direct-fired natural gas burners to support Components D & E.

Table A.9. Difference in Post-Project Emissions and Pre-Project Emissions – Scenario 1

	Emissions (tpy)					
Source Data	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Bounding Case with Scenario 1	38.80	46.19	13.21	0.28	1009.9	2.32E-04
Average Past Actual Emissions from System 1 Paint Plant	14.48	17.24	2.61	0.10	1201.9	8.65E-05
Net Change in Emissions from Proposed Action	**24.32**	**28.95**	**10.6**	**0.18**	**-192**	**1.45E-04**
PSD Significance Thresholds	**100**	**40**	**15**	**40**	**40**	**0.6**

Under Scenario 1, the net change in emissions would not exceed any of the significant thresholds. In the case of VOCs, a net decrease in emissions would be expected.

Scenario 2 would utilize the existing boiler house to support Components D & E.

Table A.10. Difference in Post-Project Emissions and Pre-Project Emissions – Scenario 2

	Emissions (tpy)					
Source Data	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**	**Lead**
Bounding Case with Scenario 2	45.84	71.38	13.52	72.62	1009.8	1.09E-03
Average Past Actual Emissions from System 1 Paint Plant and Associated Boiler House Emissions	32.65	69.04	3.74	120.71	1201.9	1.56E-03
Net Change in Emissions from Proposed Action	**13.19**	**2.34**	**9.78**	**-48.08**	**-192.1**	**-4.71E-04**
PSD Significance Thresholds	**100**	**40**	**15**	**40**	**40**	**0.6**

Under Scenario 2, the net change in emissions would not exceed any of the significance thresholds. In the case of VOCs and SO_2, a net decrease in emissions would be expected. In the case of the remaining pollutants, the increases would be less than compared with those in Table A.9. By utilizing the boiler house, which currently exists at the Smyrna facility, there are historical emissions available to net out. In addition, the proposed System 1 Paint Plant Rebuild would demand less dual and high temperature water from the boiler house because of its energy efficient processes (i.e., compressed paint processes, smaller process baths, more efficient ovens). This would more than offset the increased load from the Fascia Plant Expansion. Conversely, the localized, direct-fired natural gas boilers would increase the potential emissions for the proposed action and the entire Smyrna facility by adding new equipment without reducing potential emissions from the boiler house.

Provided Nissan nets out the pre-project emissions from the Bounding Case proposed action, PSD review would not be required and no adverse impacts to air quality would be anticipated.

APPENDIX B

GREENHOUSE GAS (CO_2) EMISSIONS ANALYSIS

Direct Emissions—Battery Assembly and Electrode Manufacturing

The EV Project would impact direct CO_2 emissions at the Smyrna facility through: (1) decreasing emissions due to improvements to the existing assembly plant; and (2) increasing emissions due to the estimated energy requirements of the new Battery Plant. Direct CO_2 emissions are defined here as those attributable to the combustion of carbon fuels, natural gas, and coal at the Smyrna manufacturing plant. Emission factors used are based upon DOE Energy Information Administration Form EIA-1605 Appendix B, "Fuel and Energy Source Codes and Emissions Coefficients."

Direct CO_2 emissions from Battery Assembly include fuel consumption from VOC abatement, desiccant regeneration for dry rooms, process heat for the Aging Process, and seasonal building heating. Estimated natural gas use for VOC abatement will be 34 MCF per hour or 248,000 metric cubic feet (MCF)/year based upon the planned operating schedule (3 shift 7 day). The current estimate of direct CO_2 emissions from VOC abatement in Battery Assembly is 13,640 metric tons (MT) per year based upon an emissions factor of 0.055 MT/MCF.

Desiccant regeneration will be required to maintain the specification of dry air in four process dry rooms for battery manufacturing operations. The total estimated hourly fuel use is estimated to be 4.3 MCF per hour or 31,400 MCF per year, adding a total of 1,725 MT of direct CO_2 emissions to the battery assembly operation.

The Aging Process will require holding each cell at a temperature of 115^{o}F for approximately 30 days. Raising the temperature of each cell by 45^{o}F will require approximately 1,200 British Thermal Units (BTU). On an annual basis the manufacture of 200,000 batteries will require the equivalent of 240 MCF/Yr of fuel, contributing an additional 13 MT of CO_2 emissions.

Battery Assembly, at a capacity of 200,000 units per year, will have an estimated footprint of 750,000 square feet. The design of building services (Heating Ventilating and Air Conditioning (HVAC) systems) has not been finalized and it is not clear to what extent waste heat generated in the manufacturing processes can be used to minimize the requirement for building heat. Using an existing building at the Smyrna plant site which supplies 100% of its heating requirements with roof top gas fired HVAC systems, the annual heating load for a two shift operation is 0.029 MCF/Sqft/Yr. Applying this heating factor to Battery Assembly, the heating requirement for building HVAC service is 21,750 MCF/Yr or 1,200 MT when converted to CO_2 emissions.

Electrode Manufacturing, at a capacity of 200,000 units per year, will have an estimated footprint of 460,000 square feet. Electrode Manufacturing will also likely be heated with roof top gas fired HVAC systems. Applying the same heating factor as Battery Assembly above, the heating requirement for building HVAC service is 13,340 MCF/Yr or 734 MT when converted to CO_2 emissions. Electrode Manufacturing, in addition to the HVAC requirements for fuel, requires a dedicated process steam boiler capable of 1.5 MMBTU per hour of live steam. The estimated natural gas fuel requirements for this boiler at capacity are 7,056 MCF/yr and will generate an additional estimated 388 MT CO_2 emissions.

Total direct CO_2 emissions for Battery Assembly and Electrode Manufacturing are estimated to be 17,700 MT/Yr

Indirect Emissions—Battery Assembly and Electrode Manufacturing

Indirect CO_2 emissions are defined here as those emissions attributable to the use of electricity generated off-site by public utilities. Electricity supplied to Nissan's Smyrna plant is produced and transmitted by public utilities and is derived from a number of different generation activities, including, solar, wind, hydro, nuclear, and conventional fossil fuel fired power plants using a variety of fuels (e.g. coal, natural gas and oil). The variety of sources combined with the impact of transmission losses, limits the precision to which indirect CO_2 emissions can be estimated. For the purpose of estimation, a CO_2 emissions factor of 0.553 metric tons of CO_2 per MWH of electricity was used. This represents an average of the emission factors from FY2006 through FY2009 as supplied by the Tennessee Valley Authority (TVA), which provides power to the Smyrna plant. During this period, the emissions factor ranged between 0.530 and 0.569 MT of CO_2/MWH.

The estimated peak electrical demand for Battery Assembly will be 24 MW at a capacity of 200,000 units per year. The estimated load factor for the plant for a 3 shift 7 day operation is 0.9 and would use approximately 189,216 MWH per year. Appling the CO_2 conversion factor, the estimated annual indirect emissions from electric power use for Battery Assembly would be 104,636 MT.

Electrode Manufacturing, at a capacity of 200,000 units per year, will have an estimated footprint of 460,000 square feet. The intensity of electric power consumption (kilowatt hour (kWH)/Sqft) is estimated to be comparable to Battery Assembly for the same operation schedule. Total estimated electric power use for the Electrode Manufacturing will be 127,660 megawatt hours (MWH)/Yr at capacity or 70,596 MT per year when converted to CO_2.

Estimated Impact of EVs on Mobile Source CO_2 Emissions

An estimate of the impact on the mobile source emissions from the introduction of EV's can be derived from DOE's standard for Highway Fuel Economy Driving Schedule Energy Consumption Value and USEPA's conversion factor for CO_2 emissions for gasoline fuel, based upon miles per gallon (mpg).

For Corporate Average Fuel Economy (CAFE), which is the sales weighted average fuel economy expressed in miles per gallon (mpg), EV fuel economy is derived by measuring kilowatts per mile and then calculated using a petroleum equivalency factor to derive the petroleum equivalent fuel economy. For Nissan's EV, the estimated energy consumption values are 219.18 Watt-hours per mile city and 228.57 watt-hours per mile highway for a combined 223.41 watt-hour/mile (city 55% and highway 45%).

Applying the DOE's petroleum equivalency factor (82,049 mpg/combined watt-hour per mile for electric vehicles without petroleum powered accessories) the combined city-highway electric energy use per mile results in a petroleum equivalent fuel economy of 367.26 mpg for the EV (82,049/223.41).

To derive the petroleum equivalent CO_2 Emissions, EPA uses a conversion factor of 8,887 grams (gm) of CO_2 per mile per mpg for gasoline fuel. On this basis, the calculated petroleum equivalent CO_2 emissions per mile are 24.19 gm/ mile (8,887/367.26). Assuming the EV is driven 15,000 miles per year, the estimated annual indirect CO_2 emissions would be 0.36 metric tons per vehicle (24.19 gm/mile multiplied by 15,000 miles/year divided by 453.59237 gm/pound divided by 2,200 pounds/metric ton).

Nissan anticipates the early-model EV would be comparable in size and functionality to a Nissan Sentra. According to USEPA's Green Vehicle Guide, an online, searchable database, USEPA estimates that a 2008 2.5-liter, 4-cylinder Sentra emits 471.3 gm per mile (USEPA 2009b). Thus an EV would produce 447 grams of CO_2 per mile less than a Nissan Sentra. When compared to a Sentra, an individual EV driven 15,000 miles per year would represent a reduction of 6.71 metric tons of CO_2 annually (447 gm/mile multiplied by 15000 miles/year divided by 453.59237 gm/pound divided by 2,200 pounds/metric ton). Assuming 150,000 EVs (the annual production rate of the proposed action) are produced and that these EVs displace vehicles powered by fossil fuels, their use could reduce mobile source CO_2 emissions by 1 million metric tons each year they remain in service. The typical service life of a Nissan vehicle is 7 years; therefore assuming the continued purchase and use of the EV by consumers over time, by the seventh year, a reduction in mobile source emissions of CO_2 of more than 7 million metric tons per year would be possible.

APPENDIX C

AGENCY COORESPONDENCE

TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

September 29, 2009

Ms. Sharon Thomas
U.S. Department of Energy
CF-1.3
1000 Independence Avenue, S.W.
Washington, DC 20585

RE: DOE, NISSAN LITHIUM-ION BATTERY PROJ., SMYRNA, RUTHERFORD COUNTY

Dear Ms. Thomas:

The Tennessee State Historic Preservation Office has reviewed the above-referenced undertaking received on Friday, September 18, 2009 for compliance by the participating federal agency or applicant for federal assistance with Section 106 of the National Historic Preservation Act. The Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

After considering the documentation submitted, we concur with your agency that there are no National Register of Historic Places listed or eligible properties affected by this undertaking. This determination is made either because of the location, scope and/or nature of the undertaking, and/or because of the size of the area of potential effect; or because no listed or eligible properties exist in the area of potential effect; or because the undertaking will not alter any characteristics of an identified eligible or listed property that qualify the property for listing in the National Register or alter such property's location, setting or use. Therefore, this office has no objections to your proceeding with the project.

If your agency proposes any modifications in current project plans or discovers any archaeological remains during the ground disturbance or construction phase, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. You may direct questions or comments to Jennifer M. Barnett (615) 741-1588, ext. 105. This office appreciates your cooperation.

Sincerely,

E. Patrick McIntyre, Jr.

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb

Department of Energy
Washington, DC 20585

September 16, 2009

Dr. Joe Garrison
Historic Preservation Specialist
Tennessee Historical Commission
2941 Lebanon Road
Nashville, TN 37243-0442

Dear Dr. Garrison:

The Department of Energy (DOE) is preparing an Environmental Assessment (EA) under the National Environmental Policy Act for a Federal loan to Nissan North America, Inc. (Nissan) to support construction of its Electric Vehicle Production Project (EV Project) in Smyrna, Tennessee, at the site of an existing Nissan facility. This letter is to request concurrence on a "finding of no historic properties affected" for the Nissan EV project on the basis of those materials required by 10 CFR Part 800.11d (1) through (3).

1) A description of the undertaking, specifying the Federal involvement, and its area of potential effects (APE), including photographs, maps, drawings, as necessary:

The proposed action evaluated by DOE in its EA is to issue a loan to Nissan for its EV Project, which would include the expansion of the Smyrna, Tennessee Manufacturing Plant through the construction of an approximately 1.3 million square foot lithium-ion battery plant to produce the batteries that would power the new EVs. The EV Project would also include reequipping the existing automobile manufacturing operations at the Smyrna Plant.

The APE is the property within the Smyrna plant boundary. The Smyrna Manufacturing Plant is located on 864.4 acres of property designated as I-3 Heavy Industrial and consists of process areas designed to manufacture automobiles and light-duty trucks. Combined, these process areas compose a facility with over 5.8 million square feet under roof. Other parts of the property include large covered and uncovered vehicle storage lots, shipment and warehousing areas, offices, roads, employee parking, test tracks, utilities, a recreation area, undeveloped areas, and other ancillary facilities and structures. The plant is bounded by South Lowry Street (U.S. Route 41) on the south end of the property, Nissan Drive (State Route 102) on the east, and Enon Springs Road on the north and is located at 983 Nissan Drive Smyrna, TN, 37167 (see enclosed Figure 1).

The proposed location of the EV Battery Plant is a site currently occupied by an existing vehicle test track. Prior to the construction and operation of this existing test track, the area was used to store backfill from the construction of the original vehicle manufacturing facility. Reequipping the existing automobile manufacturing operations for EV production would primarily occur within existing buildings on the Nissan property; however, for the Fascia Plant and System 1 Paint Plant, Nissan is considering various options that may require additional construction. Expansion of the Fascia Plant would occur on a previously-disturbed site adjacent to the existing Trim and Chassis building. Three options are being considered for the System 1 Paint Plant replacement. These include: Option 1 - upgrade/replacement of the equipment entirely within the existing System 1 Paint Plant building; Option 2 - expansion of the System 1 Paint Plant building on the south side between the existing building and the Body Shop; and Option 3 - construction of a new paint facility adjacent to the south side of the Body Shop (see enclosed Figure 2).

The potential paint plant expansions (Option 1 and Option 2) and the potential Fascia Plant expansion would occur either on previously-disturbed sites directly adjacent to their existing locations or the existing facilities would be renovated. Only one option under consideration, replacement of the Paint Plant (Option 3), would require construction in currently open space south of the Body Shop (see enclosed Figure 3 and maps).

2) A description of the steps taken to identify historic properties, including, as appropriate, efforts to seek information pursuant to Part 800.4(b);

No historic properties eligible for or listed in the National Register of Historic Places (NRHP) are present on the Nissan property. The closest known property listed in the NRHP is the Sam Davis Home, which is located approximately 2 miles northeast of the facility. The EV Project would not have an impact on the Sam Davis Home. No intact cultural resources are known to exist at the Smyrna Manufacturing Plant, and it is highly unlikely that any adverse impacts would occur. Due to the disturbance that occurred during the construction of the Smyrna plant property, intact archaeological resources are unlikely to be present in the areas that would be disturbed for the EV Project.

DOE has extended the opportunity to engage in government to government consultation on the proposed project to ten Federally-recognized Tribes that may have an historical interest in Rutherford County based on the list prepared by your office (Contacts For Section 106 Consultation – Federally Recognized Tribes – Appendix "D") and the U.S. Department of Housing and Urban Development Tribal Directory Assessment Tool. To date no concerns have been reported to DOE. In addition, DOE held a public scoping meeting on the proposed project on July 9, 2009, at the Smyrna Town Centre in Smyrna, Tennessee. The purpose of the meeting was to provide information on the proposed project and to solicit the public's concerns regarding environmental and cultural resource impacts stemming from its construction and operation. A representative from DOE explained the NEPA and Section 106 consultation process. Seventeen people attended the meeting and were given the opportunity to submit written comments. No one submitted comments with concerns regarding cultural resources.

3) The basis for determining that no historic properties are present or affected.

Based on our review of the project and the information provided above, DOE has determined that no historic properties would be affected by the proposed project and No Effect on Historic Properties as defined in NHPA regulations would occur (36 CFR 800.16(b)).

If, during construction activities, an unanticipated discovery of cultural materials or sites is made, all excavation would cease and your office would be contacted. Appropriate consultation requirements would be initiated and completed prior to any further disturbance of the discovery-site area.

DOE would appreciate a concurrence on our determination of no effect. You may fax this information to me at (202) 586-7809, send via email at sharon.r.thomas@hq.doe.gov, or mail to Sharon Thomas, U.S. Department of Energy, CF-1.3, 1000 Independence Ave. S.W., Washington, DC 20585. You may also contact me by phone at 202-586-5335 if you have any questions.

Sincerely,

SR Thomas

Sharon R. Thomas
Environmental Protection Specialist

Enclosures

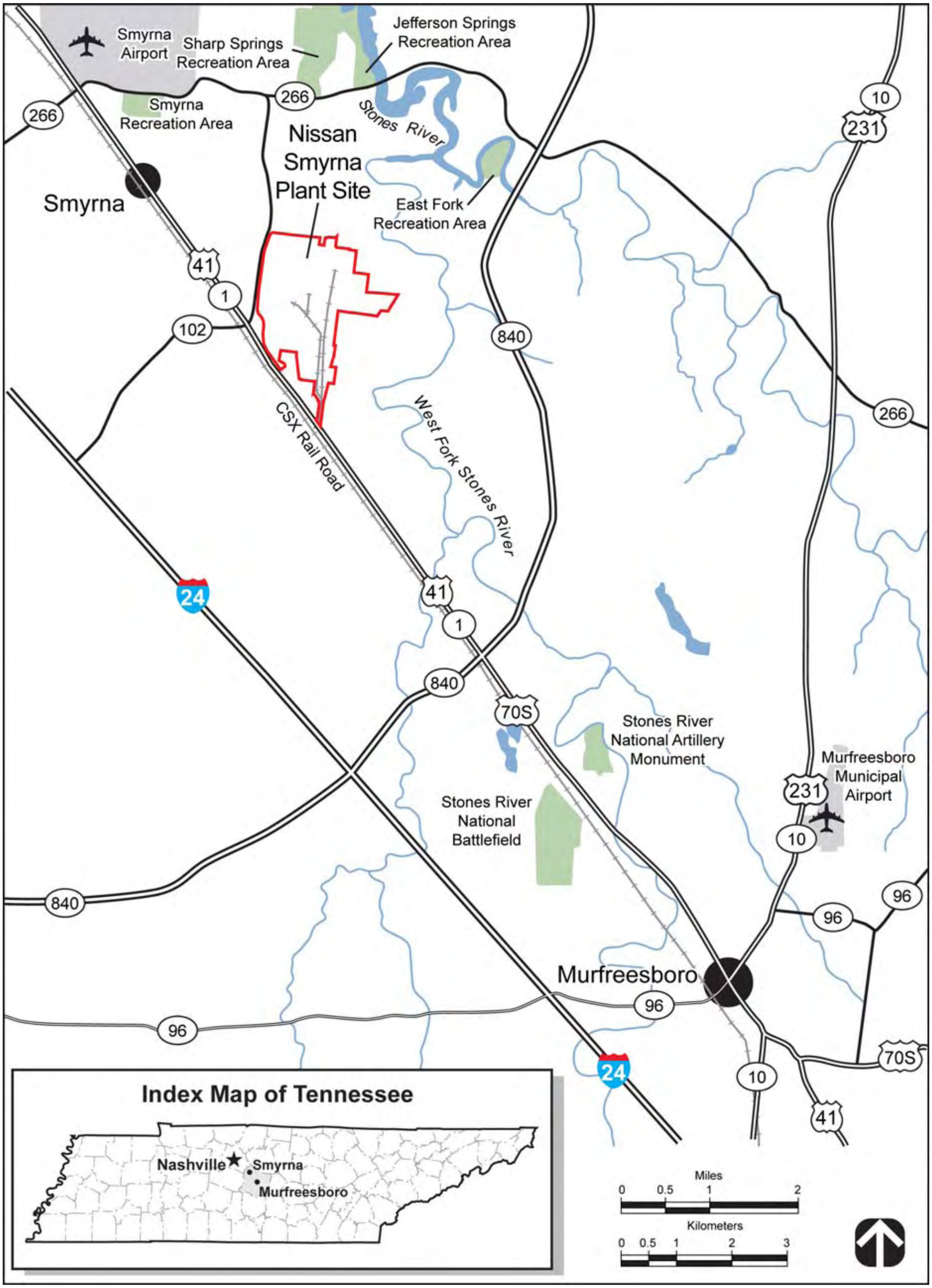


Figure 1: Location of the Smyrna, Tennessee Manufacturing Plant

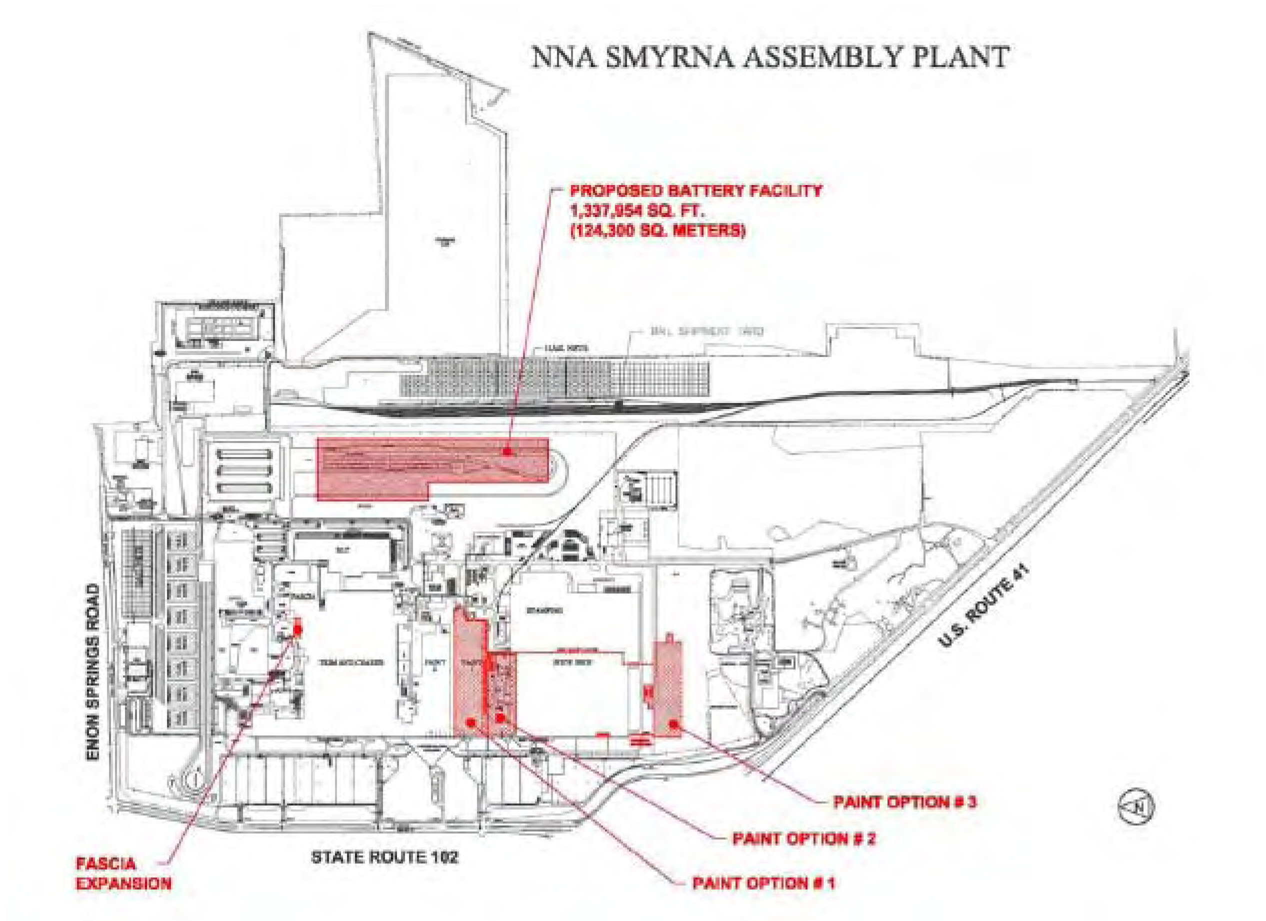


Figure 2: Schematic of Smyrna Manufacturing Plant, Proposed Battery Plant, and Potential Expansion Options

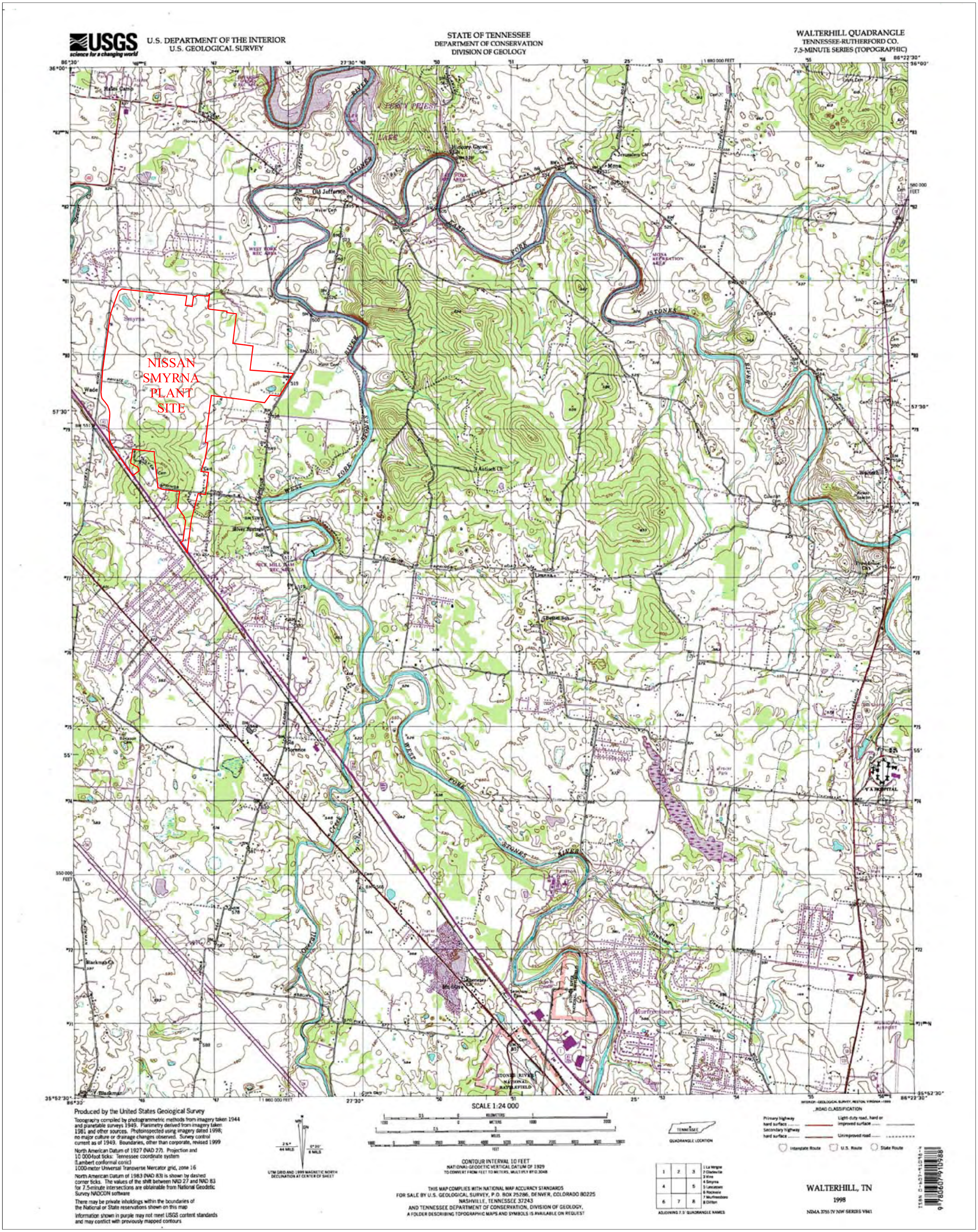
Figure 3: Pictures of Proposed Battery Plant Location and Other Potential Expansion Options

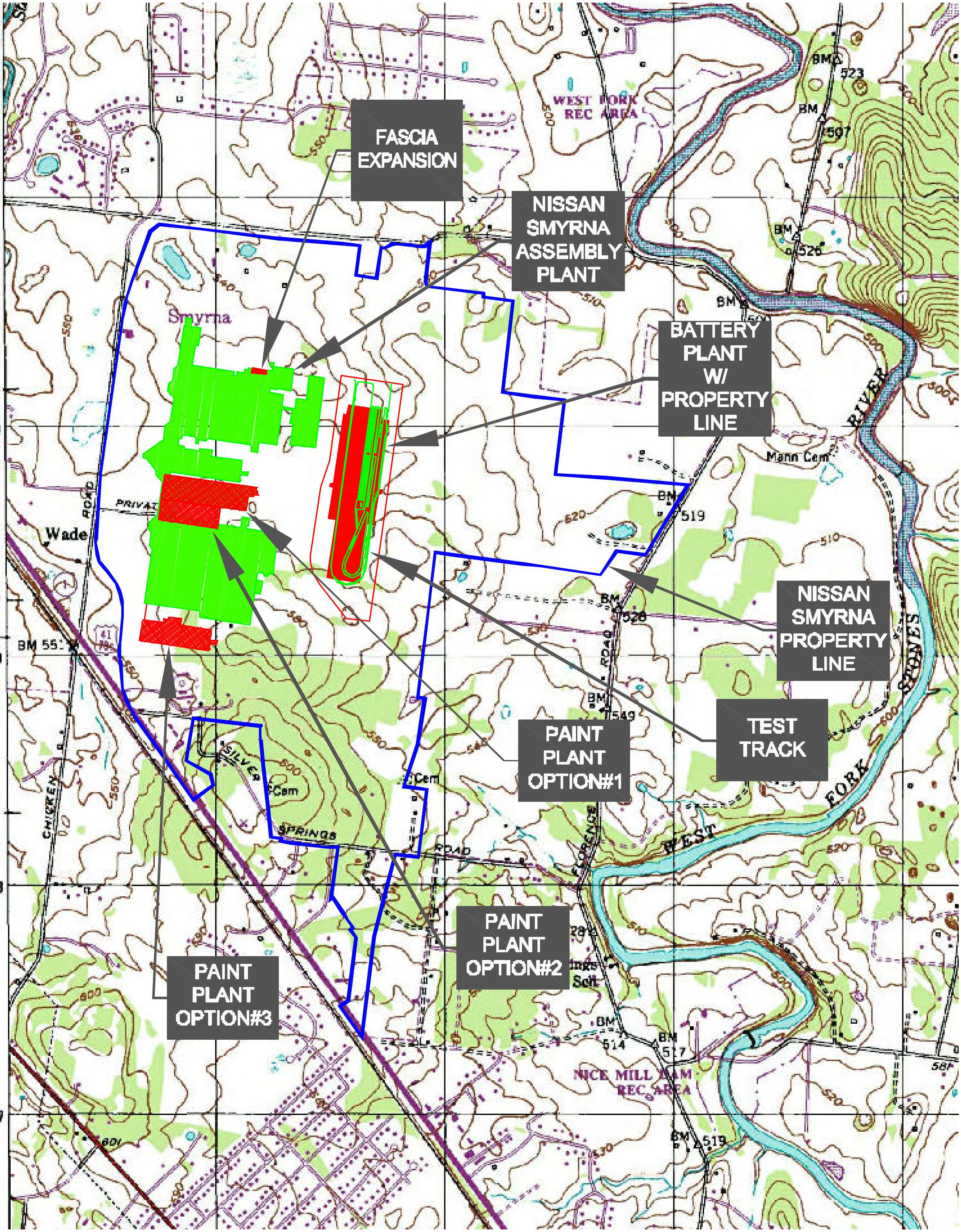
Proposed Site for Li-ion Electric Vehicle Battery Plan

Site for the Potential Fascia Plant Expansion


Proposed Site for System 1 Paint Plant Option 2


Proposed Site for System 1 Paint Plant Option 3


USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
STATE OF TENNESSEE
DEPARTMENT OF CONSERVATION
DIVISION OF GEOLOGY
WALTERHILL QUADRANGLE
TENNESSEE-RUTHERFORD CO.
7.5-MINUTE SERIES (TOPOGRAPHIC)
NISSAN
SMYRNA
PLANT
SITE
Hales Camp
Old Jefferson
Hickory Grove
Jerusalem Ch
Mona
WEST FORK REC AREA
MONA RECREATION AREA
STONES RIVER
EAST FORK
WEST FORK
PERCY PRIEST LAKE
Smyrna
Wade
Antioch Ch
Walterhill
Florence
V A HOSPITAL
Murfreesboro
STONES RIVER NATIONAL BATTLEFIELD
Blackman
Produced by the United States Geological Survey
Topography compiled by photogrammetric methods from imagery taken 1944 and planetable surveys 1949. Planimetry derived from imagery taken 1981 and other sources. Photoinspected using imagery dated 1998; no major culture or drainage changes observed. Survey control current as of 1949. Boundaries, other than corporate, revised 1999
North American Datum of 1927 (NAD 27). Projection and 10 000-foot ticks: Tennessee coordinate system (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 16
North American Datum of 1983 (NAD 83) is shown by dashed corner ticks. The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software
There may be private inholdings within the boundaries of the National or State reservations shown on this map
Information shown in purple may not meet USGS content standards and may conflict with previously mapped contours
UTM GRID AND 1999 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
TO CONVERT FROM FEET TO METERS, MULTIPLY BY 0.3048
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, P.O. BOX 25286, DENVER, COLORADO 80225
NASHVILLE, TENNESSEE 37243
AND TENNESSEE DEPARTMENT OF CONSERVATION, DIVISION OF GEOLOGY,
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
TENNESSEE
QUADRANGLE LOCATION
1 La Vergne
2 Gladeville
3 Vine
4 Smyrna
5 Lascassas
6 Rockvale
7 Murfreesboro
8 Dillon
ADJOINING 7.5' QUADRANGLE NAMES
ROAD CLASSIFICATION
Primary highway hard surface
Light-duty road, hard or improved surface
Secondary highway hard surface
Unimproved road
Interstate Route
U.S. Route
State Route
WALTERHILL, TN
1998
NIMA 3755 IV NW-SERIES V841


FASCIA EXPANSION
NISSAN SMYRNA ASSEMBLY PLANT
BATTERY PLANT W/ PROPERTY LINE
NISSAN SMYRNA PROPERTY LINE
TEST TRACK
PAINT PLANT OPTION#1
PAINT PLANT OPTION#2
PAINT PLANT OPTION#3
WEST FORK REC AREA
Smyrna
Wade
Mann Cem
NICE MILL DAM REC AREA
WEST FORK STONES RIVER
SILVER SPRINGS ROAD
FLORENCE ROAD
CHICKEN ROAD

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

October 16, 2009

Ms. Sharon R. Thomas
Department of Energy
Washington, DC 20585

Subject: Notification of No Effect Determination for Nissan's Electric Vehicle Production Project (EV Project) in Smyrna, Tennessee

Dear Ms. Thomas:

Thank you for your letter and enclosures of September 10, 2009, concerning the preparation of an environmental assessment (EA) to evaluate the impacts of the proposed Nissan EV Project in Smyrna, Tennessee. The information submitted states that a 1.3 million square foot lithium-ion battery plant would be constructed to produce the batteries that would power the EVs. The battery plant would be constructed east of the assembly plant in an existing vehicle test track area. Also, expansion of the Fascia Plant and replacement of the System 1 Paint Plant are options that would be considered as part of the proposed project. The Department of Energy (DOE) has concluded that because of the industrial and disturbed nature of the site, no suitable habitat exist for federally listed threatened or endangered species. Therefore, the DOE has determined that the proposed project would have no effect on federally listed threatened and endangered species or their habitat.

Endangered species collection records available to the Service do not indicate that federally listed or proposed endangered or threatened species occur within the impact area of the project. We note, however, that collection records available to the Service may not be all-inclusive. Our data base is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitat and thus does not necessarily provide conclusive evidence that protected species are present or absent at a specific locality. However, based on the best information available at this time, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. Obligations under section 7 of the Act must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Based on the disturbed nature of the site and no records of federally listed species occurring near the site, we concur that the proposed actions would result in no significant adverse impacts to fish and wildlife species and have no effect on federally listed threatened and endangered species or their habitat.

These constitute the comments of the U.S. Department of the Interior in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). Please contact Robbie Sykes (telephone 931/528-6481, ext. 209) of my staff if you have questions regarding the information provided in this letter.

Sincerely,

Brad Bh— for

Mary E. Jennings
Field Supervisor

Department of Energy

Washington, DC 20585

September 10, 2009

Ms. Mary Jennings
Field Supervisor
U.S. Fish and Wildlife Service
Cookeville Field Office
446 Neal Street
Cookeville, TN 38501

Subject: **Notification of No Effect Determination for Nissan's Electric Vehicle Production Project (EV Project) in Smyrna, Tennessee**

Dear Ms. Jennings:

The Department of Energy (DOE) is preparing an Environmental Assessment (EA) under the National Environmental Policy Act for a Federal loan to Nissan North America, Inc. (Nissan) to support construction of its Electric Vehicle Production Project (EV Project) in Smyrna, Tennessee, at the site of an existing Nissan facility. As part of the review process for this facility, DOE has determined that the proposed project will have no effect on Federally-listed threatened and endangered species or their habitat.

Nissan's EV Project would include the expansion of the Smyrna, Tennessee Manufacturing Plant through the construction of an approximately 1.3 million square foot lithium-ion battery plant to produce the batteries that would power the new EVs. The EV Project would also include reequipping the existing automobile manufacturing operations at the Smyrna Plant. The plant is located at 983 Nissan Drive Smyrna, TN 37167 (see enclosed Figure 1). The majority of the site consists of large buildings, parking areas, and roads interspersed with large, mowed lawns.

The battery manufacturing building would be constructed east of the assembly plant in an existing vehicle test track area. Expansion of the Fascia Plant and replacement of the System 1 Paint Plant are options that are also being considered as part of the proposed project. Expansion of the Fascia Plant would occur on a previously-disturbed site adjacent to the existing Trim and Chassis building. Three options are being considered for the System 1 Paint replacement. These include: Option 1 - upgrade/replacement of the equipment entirely within the existing System 1 Paint building; Option 2 - expansion of the System 1 Paint building on the south side between the existing building and the Body Shop; and Option 3 - construction of a new paint facility adjacent to the south side of the Body Shop (see enclosed Figure 2).

Enclosed is the Tennessee Department of Environment and Conservation Division of Natural Areas list of threatened and endangered species for the 7.5 Minute U.S. Geological Survey Quadrangle for the area surrounding the Smyrna Manufacturing Plant, which includes both Federally-listed species and those listed by the State of Tennessee.

All of the species have specific habitat requirements that limit their occurrence. Most of the site is highly disturbed from past and present Nissan activities and contains relatively small areas of natural vegetation. Due to the industrial and disturbed nature of the Nissan facility, none of these species or suitable habitat is known to be present on the Nissan property. During a site visit to the Nissan facility in March 2009, it was confirmed that no suitable habitat for the listed species is present and no rare species were observed. Based on the information currently available, no Federally-listed or proposed threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) are known to occur in the project area.

If you have questions regarding this project please contact me at 202-586-5335.

Sincerely,

SR Thomas

Sharon R. Thomas
Environmental Protection Specialist

Enclosures

cc: Mr. Robert Todd
Tennessee Wildlife Resources Agency
Ellington Agricultural Center
P.O. Box 40747
Nashville, TN 37204

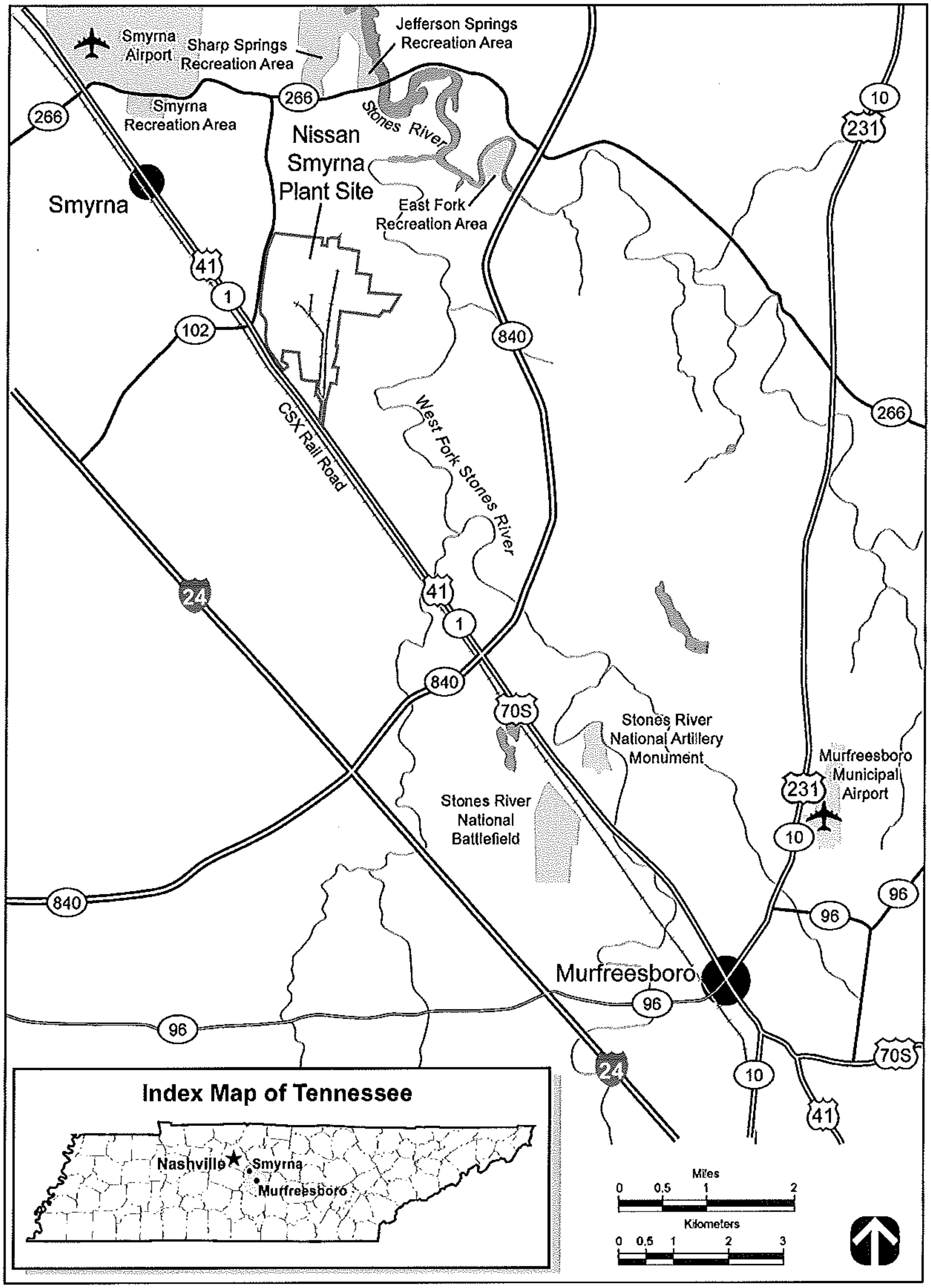


Figure 1: Location of the Smyrna, Tennessee Manufacturing Plant

NNA SMYRNA ASSEMBLY PLANT

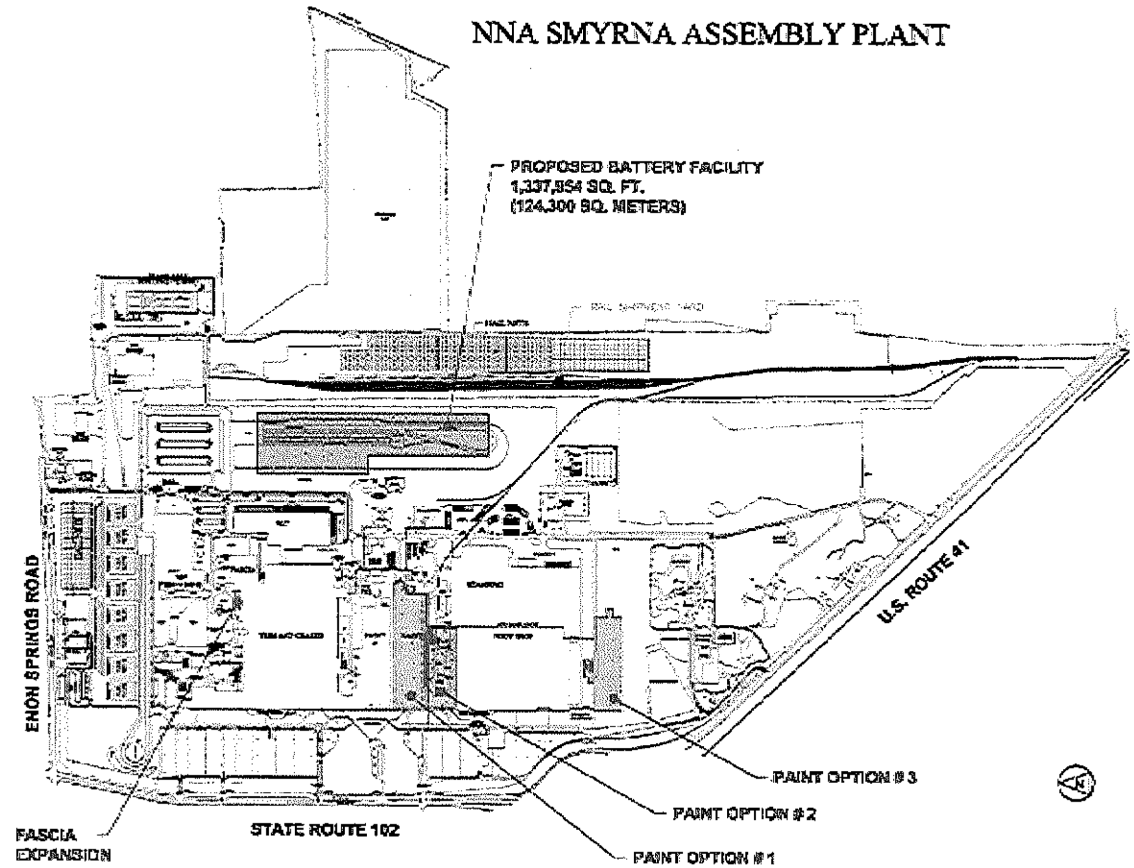


Figure 2: Schematic of Smyrna Manufacturing Plant, Proposed Battery Plant, and Potential Expansion Options

WALTERHILL — Known Species: 28

Ecological Systems: 1		St. Rank	Global Rank	St. Prot.	Fed. Prot.
Eleocharis compressa - Schoenolirion croceum - Carex crawei - Allium cernuum Herbaceous Vegetation	Central Basin Limestone Seep Glade	SNR	G2?	--	--

Invertebrate Animals: 2		St. Rank	Global Rank	St. Prot.	Fed. Prot.
Epioblasma florentina walkeri	Tan Riffleshell Found in river headwaters, in riffles and shoals in sand and gravel substrates; Tennessee & Cumberland river systems.	S1	G1T1	E	LE
Simpsonaias ambigua	Salamander Mussel In sand or silt under large, flat stones in areas of swift current; occurred historically in E Fk Stones R; 2005 obs in lower Duck R.	S1	G3	--	--

Vascular Plants: 18		St. Rank	Global Rank	St. Prot.	Fed. Prot.
Anemone caroliniana	Carolina Anemone Glades And Cedar Woodlands	S1S2	G5	E	--
Arabis perstellata	Braun's Rockcress Limestone Bluffs	S1	G2	E	LE
Astragalus bibullatus	Pyne's Ground-plum Ordovician Limestone Glades	S1	G1	E	LE
Astragalus tennesseensis	Tennessee Milk-vetch Glades	S3	G3	S	--
Dalea foliosa	Leafy Prairie-clover Rocky Washes In Glades	S2S3	G2G3	E	LE
Echinacea simulata	Wavy-leaf Purple Coneflower Glades And Barrens	S2	G3	T	--
Eleocharis compressa	Flat-stemmed Spike-rush Wet Limestone Glades	S1	G4	S	--
Evolvulus nuttallianus	Evolvulus Glades	S3	G5	S	--
Fimbristylis puberula	Hairy Fimbristylis Wet Prairies And Woods	S1S2	G5	T	--
Isoetes melanopoda	Blackfoot Quillwort Wet Fields	S1S2	G5	E	--
Leavenworthia exigua var. exigua	Glade-cress Glades	S3	G4T3	S	--
Lesquerella densipila	Duck River Bladderpod Cultivated Fields	S3	G3	T	--
Lesquerella stonensis	Stones River Bladderpod Cultivated Fields	S1	G1	E	--

WALTERHILL . . . Continued Known Species: 28

Vascular Plants: 18 . . . Continued		St. Rank	Global Rank	St. Prot.	Fed. Prot.
Mirabilis albida	Pale Umbrella-wort Glades	S2	G5	T	--
Phlox bifida ssp. stellaria	Glade Cleft Phlox Glades	S3	G5?T3	T	--
Schoenolirion croceum	Yellow Sunnybell Wet Areas In Glades	S3	G4	T	--
Stellaria fontinalis	Water Stitchwort Seeps And Limestone Creek Beds	S3	G3	T	--
Talinum calcaricum	Limestone Fame-flower Glades	S3	G3	S	--

Vertebrate Animals: 7		St. Rank	Global Rank	St. Prot.	Fed. Prot.
Etheostoma cinereum	Ashy Darter Small to medium upland rivers with bedrock or gravel substrate and boulders.	S2S3	G2G3	T	--
Etheostoma microlepidum	Smallscale Darter Small rivers, in deep, strongly flowing riffles with gravel, boulder, and coarse rubble substrates; Cumberland River drainage.	S2	G2G3	D	--
Etheostoma tippecanoe	Tippecanoe Darter Medium to large rivers in shallow riffle areas containing fine cherty gravel; Cumberland River watershed.	S1S2	G3G4	D	--
Notropis rupestris	Bedrock Shiner Bedrock pools of some low-gradient streams of the Nashville Basin.	S2	G2	D	--
Percina phoxocephala	Slenderhead Darter Small-large rivers with moderate gradient in shoal areas with moderate-swift currents; portions of Tenn & Cumb river watersheds.	S3	G5	D	--
Typhlichthys subterraneus	Southern Cavefish Aquatic cave obligate; cave streams, karst waters, and water supply wells; reported from all karst regions excluding RV & BR.	S3	G3G4	D	--
Tyto alba	Barn Owl Open and partly open country, often around human habitation; farms.	S3	G5	D	--

-- End of WALTERHILL --