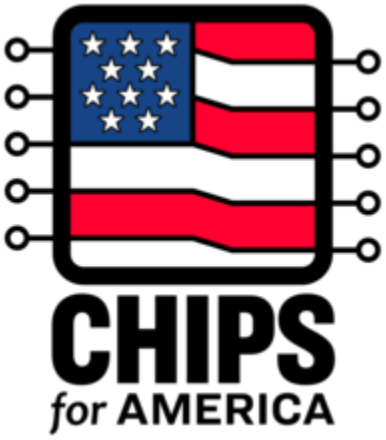
Draft Environmental Assessment for TSMC Arizona



NIST-CPO/EA-002

May 29, 2024

U.S. Department of Commerce
National Institute of Standards and Technology
CHIPS Program Office
Herbert C. Hoover Building
1401 Constitution Avenue NW
Washington, D.C. 20230

Draft Environmental Assessment for TSMC Arizona

Designation	**Draft Environmental Assessment NIST-CPO/EA-002**
Title of Proposed Action	**Draft Environmental Assessment for TSMC Arizona**
Project Location	**City of Phoenix, Maricopa County, Arizona**
Lead Agency	**U.S. Department of Commerce**
Affected Region	**Maricopa County, Arizona**
Action Proponent	**CHIPS Program Office, National Institute of Standards and Technology, U.S. Department of Commerce**
Further Information	**CHIPS Program Office [CHIPSNEPA@chips.gov]**
Date	**May 29, 2024**

ABSTRACT

The CHIPS Program Office (CPO) within the National Institute of Standards and Technology (NIST), an agency of the U.S. Department of Commerce (DOC), has prepared this environmental assessment (EA) pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq.*, and the Council on Environmental Quality (CEQ) NEPA implementing regulations, 40 C.F.R. Parts 1500-1508.

CPO is considering a Proposed Action to provide federal financial assistance under the CHIPS Incentives Program (Program) to TSMC Arizona Corporation, a wholly owned subsidiary of Taiwan Semiconductor Manufacturing Company Limited (TSMC), for the purchase and installation of semiconductor manufacturing equipment (SME) at the TSMC Arizona Corporation semiconductor manufacturing facility in Phoenix, AZ (TSMC AZ or the Facility). SME would be installed in up to three new semiconductor fabrication buildings (fabs), referred to as Phase 1, Phase 2, and Phase 3, to support TSMC AZ's production of advanced semiconductors (the Proposed Project). TSMC is not requesting federal financial assistance for the construction of the TSMC AZ fab buildings.

The purpose of CPO's Proposed Action is to respond to TSMC's application for federal financial assistance for the Proposed Project under the Program. The need for CPO's Proposed Action is to fulfill NIST's statutory responsibilities under the CHIPS Act, 15 U.S.C. § 4651 *et seq.*, which directs the Secretary of Commerce to establish a program to provide federal financial assistance to covered entities to incentivize investment in semiconductor facilities and equipment in the United States.

This EA evaluates the potential environmental effects of two alternatives, the Proposed Action and the No Action Alternative, on the following resource areas: climate change; air quality; water resources; cultural resources; biological resources; land use; noise; transportation; human health and safety; hazardous materials and wastes; environmental justice; and socioeconomics. CPO's analysis of the direct, indirect, and cumulative environmental effects of the alternatives will inform its decision whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI) for the Proposed Project. CPO is issuing the Draft EA for a thirty (30) day public comment period, from May 29, 2024 to June 27, 2024. CPO will consider substantive comments on the Draft EA timely submitted during the public comment period.

EXECUTIVE SUMMARY

ES.1 PROPOSED ACTION

The CHIPS Program Office (CPO) is considering a Proposed Action to provide federal financial assistance under the CHIPS Incentives Program (Program) to TSMC Arizona Corporation, a wholly owned subsidiary of Taiwan Semiconductor Manufacturing Company Ltd. (TSMC), for the purchase and installation of semiconductor manufacturing equipment (SME) at the TSMC Arizona Corporation semiconductor manufacturing facility located at 5088 W. Innovation Circle, Phoenix, AZ (TSMC AZ or the Facility). SME would be installed in up to three new semiconductor wafer fabrication buildings (fabs), referred to as Phase 1, Phase 2, and Phase 3, to support TSMC AZ's production of advanced semiconductors (the Proposed Project). TSMC is not requesting federal financial assistance for the construction of the TSMC AZ fab buildings.

ES.2 PURPOSE AND NEED

The purpose of CPO's Proposed Action is to respond to TSMC's application for federal financial assistance for the Proposed Project under the Program. The need for CPO's Proposed Action is to fulfill the agency's statutory responsibilities under the CHIPS Act, including the requirements of 15 U.S.C. § 4652 to incentivize investment in facilities and equipment in the United States for the fabrication, assembly, testing, advanced packaging, production, or research and development of semiconductors, materials used to manufacture semiconductors, or semiconductor manufacturing equipment.

ES.3 ALTERNATIVES CONSIDERED

This EA includes an analysis of potential environmental effects of two alternatives, the Proposed Action, and the No Action Alternative.

Under the Proposed Action, CPO would provide federal financial assistance to TSMC AZ for the Proposed Project. The Proposed Project is the purchase and installation of SME in up to three new fabs (Phase 1, Phase 2, and Phase 3). The Proposed Action assumes that all three phases would advance to achieve full operational capacity for semiconductor manufacturing. Phase 1 would enable TSMC AZ to manufacture semiconductors at the 4 nanometer (nm) (N4) / 5 nm (N5) technology nodes. Phase 2 would be anticipated to enable TSMC AZ to manufacture semiconductors at the 2 nm (N2) and/or 3 nm (N3) technology nodes. Phase 3 would be anticipated to enable TSMC AZ to manufacture semiconductors at the 2 nm (N2) or possibly a more advanced technology node.

Under the No Action Alternative, CPO would not provide federal financial assistance to TSMC AZ. Although TSMC AZ could potentially procure and install leading-edge SME without federal financial assistance over a span of several years depending on market conditions, to provide a meaningful comparison of environmental effects, the No Action Alternative assumes that TSMC AZ would not install all of the equipment that it otherwise would have procured and installed with federal financial assistance under the Proposed Action. For purposes of this analysis, the No Action Alternative assumes that TSMC AZ would complete Phase 1 by outfitting this fab with limited SME procured without federal financial assistance. Thus, the No Action Alternative assumes a partial installation of equipment in Phase 1 only and is limited to the portion of equipment installed and operational prior to the date of PMT (April 8, 2024) or an estimated 50-70 percent of the wafer manufacturing capacity it otherwise would achieve

under the Proposed Action. The No Action Alternative will be used to analyze the consequences of not undertaking the Proposed Action and will serve to establish a comparative baseline for analysis.

ES.4 SUMMARY OF ENVIRONMENTAL RESOURCES EVALUATED IN THE EA

NEPA and its implementing regulations require NIST (the agency) to analyze the direct, indirect, and cumulative environmental effects of a proposed action and its alternatives on the natural and human environments, including ecological, aesthetic, historic, cultural, economic, social, and health effects, and to determine whether the effects would be significant by analyzing the potentially affected environment and the degree of the effects. This EA analyzes the effects of the Proposed Action and the No Action Alternative on the following resource areas: climate change; air quality; water resources; cultural resources; biological resources; land use; noise; transportation; human health and safety; hazardous materials and waste; environmental justice; and socioeconomics.

ES.5 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The EA analyzes the environmental consequences of the Proposed Action and the No Action Alternative on the resource areas identified above. Table ES-1 summarizes the potential effects on each resource area and the mitigation and best management practices (BMPs) that factor into the effects analysis for the Proposed Action, where applicable.

TABLE ES-1 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Resource Area	No Action Alternative	Proposed Action	Mitigation or BMP
Air Quality	No significant effects	No significant effects with mitigation and BMPs	As a mitigation measure, TSMC AZ would evaluate and adopt appropriate emission control technologies and potential emission offsets to maintain compliance with the National Ambient Air Quality Standards (NAAQS) and the Arizona State Implementation Plan.
Climate Change, Resiliency, and Sustainability	No significant effects	No significant effects with mitigation	TSMC will apply the following BMPs to offset or reduce greenhouse gases (GHGs): 1) TSMC will employ emission control devices that abate 90 percent or more of Fluorinated-GHGs; 2) Offset of Scope 1 and Scope 2 GHGs through purchase of Renewable Energy Credits for 100 percent of Facility energy use and installation of solar panels; and 3) Install 96 electric vehicle charging stations on-site.
Water Resources	No significant effects	No significant effects with BMPs and mitigation	As a BMP, TSMC will install a water treatment and reclamation system that can achieve 95% or greater water reuse. They have also constructed a drainage channel to manage stormwater, erosion and flooding.

Resource Area	No Action Alternative	Proposed Action	Mitigation or BMP
Cultural Resources	No potential effects	No potential effects	As BMP, TSMC will protect unanticipated discoveries of cultural resources during construction and operations and notify relevant authorities.
Biological Resources	No significant effects	No significant effects with BMPs	As BMPs, TSMC will avoid removal of vegetation during breeding season, relocate native plants during construction, and implement protective measures for small animals during construction.
Land Use	No potential effects	No potential effects	Not applicable.
Noise	No significant effects	No significant effects	Not applicable. The site includes a 2,500-foot buffer from residential properties to reduce noise effects to the community[1].
Transportation	No significant effects	No significant effects with BMPs	As BMPs, TSMC will stagger worker shifts to reduce congestion and implement a Travel Reduction Program to reduce single-occupancy vehicle miles traveled.
Human Health and Safety	No significant effects	No significant effects with BMPs	As a BMP, TSMC will apply the most protective worker chemical exposure limits based on published industry standards (on a chemical-by-chemical basis) to its manufacturing operations. TSMC will continue emergency safety coordination with first responders.
Hazardous Materials and Wastes	No significant effects	No significant effects with BMPs	As a BMP, TSMC will segregate known process PFAS-containing chemicals from other waste streams to a closed bulk storage system. This waste is then managed at an off-site permitted treatment and disposal facility. TSMC will follow a BMP to optimize recycling to reduce landfill waste and will adhere to appropriate handling and disposal of waste.
Environmental Justice	No significant effects	No significant effects	No communities with EJ concerns are within the Study Area. As a BMP, TSMC will continue its active stakeholder outreach program and Diversity and Inclusion Program.
Socioeconomics	Beneficial effects from jobs created under Phase 1	Beneficial effects from jobs created under Phases 1, 2, and 3	Not applicable

[1] Currently nearest residences are 8,200 feet from the Facility.

ES.6 PUBLIC INVOLVEMENT

CPO is issuing the Draft EA for a thirty (30) day public comment period, from May 29, 2024 to June 27, 2024. CPO will consider substantive comments on the Draft EA timely submitted during the public comment period.

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
$\mu g/m^3$	micrograms per cubic meter
AADT	Annual Average Daily Travel
ACGIH	American Conference of Governmental Industrial Hygienists
ADEQ	Arizona Department of Environmental Quality
ADOSH	Arizona Division of Occupational Safety and Health
ADOT	Arizona Department of Transportation
AHPA	Archaeological and Historic Preservation Act
AMA	Active Management Area
ANSI	American National Standards Institute
APE	Area of Potential Effects
APS	Arizona Public Service Company
ARS	Arizona Revised Statutes
ASLD	Arizona State Land Department
AZ	Arizona
BACT	Best Available Control Technology
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
CAA	Clean Air Act
CEJST	Climate and Economic Justice Screening Tool
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CH_4	methane
CLOMR	Conditional Letter of Map Revision
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent

Acronym	Description
CPO	CHIPS Program Office
CT	census tract
CWA	Clean Water Act
dB	decibel
DOC	U.S. Department of Commerce
E&EC	Electrical and Electronic Components
EA	Environmental Assessment
EHS	environmental, health, and safety
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERT	Arizona Environmental Review Tool
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
F-GHG	fluorinated greenhouse gas
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
GHG	greenhouse gas
GWP	global warming potential
HAP	hazardous air pollutant
IPaC	Information for Planning and Consultation
IRWP	Industrial Reclamation Water Plant
ISO	International Organization for Standardization
LAER	Lowest achievable emission rate
LOMR	Letter of Map Revision

Acronym	Description
LOS	level of service
MBTA	Migratory Bird Treaty Act
MCAQD	Maricopa County Air Quality Department
MGD	million gallons per day
MT	metric ton(s)
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NIST	National Institute for Standards and Technology
nm	nanometer
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
NOFO	Notice of Funding Opportunity
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSA	noise-sensitive area
NSR	New Source Review
OSHA	Occupational Safety and Health Administration
PFAS	per-and polyfluoroalkyl substances
PM_{10}	particulate matter equal to or less than 10 microns in diameter
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in diameter
PMT	Preliminary Memorandum of Terms
POTW	publicly owned treatment works
PSD	Prevention of Significant Deterioration
PUD	Planned Unit Development
RACT	Reasonably available control technology

Acronym	Description
RCRA	Resource Conservation and Recovery Act
REC	Renewable Energy Credit
ROI	region of influence
SDWA	Safe Drinking Water Act
SEMI	Semiconductor Equipment and Materials International
SFHA	Special Flood Hazard Area
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SME	Semi-conductor manufacturing equipment
SO_2	sulfur dioxide
SOV	single-occupant vehicle
SR	State Route
TIA	Traffic Impact Analysis
TLV	threshold limit value
tpy	tons per year
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
VMT	vehicle miles traveled
VOC	volatile organic compound
WOTUS	Waters of the United States
WRC	Water Resource Center

1. INTRODUCTION

1.1. BACKGROUND

The CHIPS Incentives Program (Program) was authorized by Title XCIX—Creating Helpful Incentives to Produce Semiconductors for America of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Pub. L. 116-283, as amended by the CHIPS and Science Act of 2022, Division A of Pub. L. 117-167 (together, the CHIPS Act or Act). The Program aims to boost semiconductor research, development, and production in America. It provides billions of dollars for semiconductor investment across the country, including high-tech production of semiconductors essential to the national security, manufacturing, critical infrastructure, and technology leadership of the United States. More specifically, the Act provides $50 billion to the U.S. Department of Commerce (DOC) to help revitalize the U.S. semiconductor industry, including $39 billion dedicated to semiconductor manufacturing initiatives. The Act will bolster American leadership in semiconductors, promote innovation in resilient supply chains, and advance technologies of the future. CHIPS Act financial incentives will be provided for semiconductor research, development, manufacturing, and workforce development in the United States. The CHIPS Incentives Program is administered by the CHIPS Program Office (CPO) within the National Institute of Standards and Technology (NIST), an agency of DOC.

The CHIPS Incentives Program—Commercial Fabrication Facilities Notice of Funding Opportunity (NOFO) was published in February 2023 and amended in June 2023. The NOFO solicits applications for the construction, expansion, or modernization of commercial facilities for the front- and back-end fabrication of leading-edge, current-generation, and mature-node semiconductors; commercial facilities for wafer manufacturing; and commercial facilities for materials used to manufacture semiconductors and semiconductor manufacturing equipment, provided that the capital investment equals or exceeds $300 million. The potential amount available under the NOFO is up to $38.22 billion for direct funding and up to $75 billion in direct loan or guaranteed principals.

A potential applicant must be a "covered entity" as defined by the NOFO to be eligible to receive CHIPS incentives. An applicant is required to complete a multi-step application process as outlined in the NOFO. One step of this application process is the completion of an Environmental Questionnaire that includes 26 questions on the project scope, local environment, potential for environmental effects, and permits required for construction of improvements and operation of the facility. CPO conducts a merit review of any applications that meet the eligibility requirements outlined in the NOFO, including an evaluation of the applicant's responses to the Environmental Questionnaire. If an applicant proceeds through merit review, CPO provides the applicant with a Preliminary Memorandum of Terms (PMT) for review and negotiation prior to or upon entering the due diligence phase for the application process.

The National Environmental Policy Act (NEPA) 42 U.S.C. § 4321 *et seq.*, requires federal agencies to consider the potential consequences of major federal actions on both the natural and human environments as part of their planning and decision-making processes. CPO is responsible for completion of the NEPA process before federal financial assistance can be disbursed under the Program.

1.2. PROPOSED PROJECT

CPO is considering a Proposed Action to provide federal financial assistance under the Program to TSMC Arizona Corporation, a wholly owned subsidiary of Taiwan Semiconductor Manufacturing Company Limited (TSMC), for the purchase and installation of state-of-the-art semiconductor manufacturing

equipment (SME) at the TSMC Arizona Corporation facility located at 5088 W. Innovation Circle, Maricopa County, Phoenix, AZ (TSMC AZ or the Facility[2]). SME would be installed at up to three of TSMC AZ's existing and to-be-constructed semiconductor fabrication buildings (fabs), referred to as Phase 1, Phase 2, and Phase 3, to support TSMC AZ's production of advanced semiconductors (the Proposed Project).

TSMC Arizona Corporation purchased the Facility's 1,129-acre site on December 9, 2020. Prior to the purchase, the site was undeveloped desert land originally zoned as a ranch and farmland but was rezoned on October 21, 2020, to a planned unit development, mixed use commercial/commerce park. Much of the site is currently under construction, although the Facility gown building/office building was approved for occupancy in March 2023. The surrounding properties are unused/undeveloped land parcels currently owned by the Arizona State Land Department (ASLD). Figure 1-1 depicts the project location and the surrounding land in the vicinity of the Facility.

2 The term Facility refers to the entirety of the TSMC AZ site.

FIGURE 1-1 FACILITY LOCATION

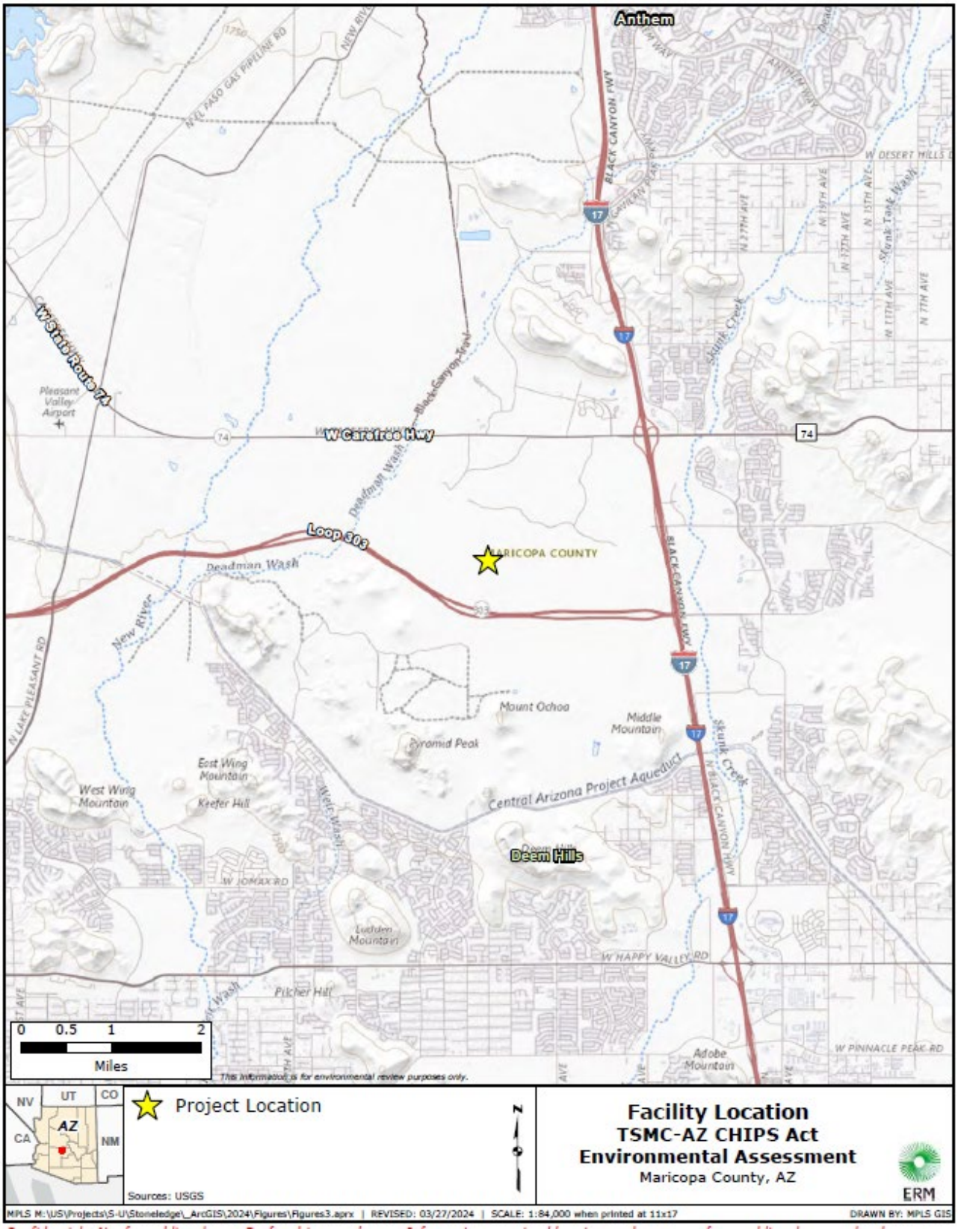


FIGURE 1-2 FACILITY VICINITY

1.3. PURPOSE AND NEED

The purpose of CPO's Proposed Action is to respond to TSMC's application for federal financial assistance for the Proposed Project under the Program. The need for CPO's Proposed Action is to fulfill the agency's statutory responsibilities under the CHIPS Act, including the requirements of 15 U.S.C. § 4652 to incentivize investment in facilities and equipment in the United States for the fabrication, assembly, testing, advanced packaging, production, or research and development of semiconductors, materials used to manufacture semiconductors, or semiconductor manufacturing equipment.

1.4. SCOPE OF ENVIRONMENTAL ANALYSIS

CPO has prepared this Environmental Assessment (EA) on behalf of NIST pursuant to NEPA, 42 U.S.C. § 4321 *et seq.*, and its implementing regulations, 40 C.F.R. Parts 1500-1508. The EA analyzes the direct, indirect, and cumulative environmental effects of the Proposed Action and the No Action Alternative to provide sufficient evidence and analysis for CPO to determine whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI).

The EA analyzes the effects of the Proposed Action and the No Action Alternative on the natural and human environments, including ecological, aesthetic, historic, cultural, economic, social, and health effects, to determine whether the effects would be significant by analyzing the potentially affected environment and the degree of the effects. Specifically, the EA analyzes effects on the following resource areas: climate change; air quality; water resources; cultural resources; biological resources; land use; noise; transportation; human health and safety; hazardous materials and waste; environmental justice; and socioeconomics.

Construction at the TSMC AZ Facility is currently ongoing with non-federal financial support. Therefore, certain current and planned activities at the Facility that would not be supported by federal financial assistance are outside the scope of the Proposed Project but may still bear on the analysis of the Proposed Action. This EA identifies and refers to the Facility's other activities and features (under the term Facility) to the extent necessary to analyze the direct, indirect, or cumulative effects of the Proposed Action. In general, these other activities may include: construction of fab "shells"; outfitting of interior cleanroom spaces; and construction, modification, or upgrade of supporting infrastructure or systems that serve more than one fab, including but not limited to onsite bulk gas and hazardous material storage and delivery systems, wastewater pre-treatment and reclamation systems, air emission control systems, administration buildings, and utility lines.

1.5. AGENCY DECISION

CPO's evaluation of the environmental effects of the Proposed Action will inform its decision on whether to prepare a FONSI or an EIS, including any enforceable mitigation requirements or commitments that may need to be undertaken.

On April 8, 2024, DOC and TSMC Arizona Corporation signed a non-binding preliminary memorandum of terms (PMT) for DOC to provide up to $6.6 billion in direct funding under the CHIPS Act towards the purchase and installation of SME to support TSMC's investment of more than $65 billion in developing the TSMC AZ Facility.

The NEPA process is a component of CPO's multi-faceted project review process prior to disbursing federal financial assistance pursuant to final awards under the CHIPS Act. A completed NEPA decision document is required for each project prior to any disbursement of financial assistance. The outcome of

CPO's NEPA review does not dictate CPO's separate decision whether to disburse federal financial assistance under the CHIPS Incentives Program.

1.6. RELEVANT LAWS, REGULATIONS, AND PERMITS

CPO, in collaboration with the applicant, has prepared this EA based upon an evaluation of federal, state, and local laws, regulations, and policies applicable to the Proposed Action, as described in Section 5 (Table 5-1).

For TSMC AZ to implement the Proposed Project to install SME at the Facility (as described in Section 2), the Facility will need to obtain several environmental permits for operation of the fab buildings. The Facility already holds the environmental permits for the operation of the first two fabs (Phase 1 and Phase 2). Construction of the first two fabs, which began in April 2021 and February 2022, respectively, is covered under a minor source air permit issued by the Maricopa County Air Quality Department (MCAQD) and a wastewater discharge permit issued by the City of Phoenix (the City). Both fabs have been issued a Notice of Intent Certificate by the Arizona Department of Environmental Quality (ADEQ) under the Arizona Pollution Discharge Elimination System Stormwater Multi-Sector General Permit program. TSMC AZ will need to obtain an updated wastewater permit for the second fab prior to June 30, 2028, which will likely include information regarding a planned Industrial Reclamation Water Plant (IRWP). The Facility's third fab is planned but not currently under construction. TSMC AZ would apply for air and water permits for the third fab closer to the date of commencement of Phase 3 of the Proposed Project.

The TSMC AZ Facility is located in an area considered to have air quality worse than the National Ambient Air Quality Standards (NAAQS) (a nonattainment area) for ozone and PM_{10}. Pursuant to the Clean Air Act (CAA) General Conformity Rule, 40 C.F.R. Part 93, federal activities must not cause or contribute to new violations of NAAQS or worsen existing violations or delay attainment of NAAQS. Accordingly, CPO has prepared a draft Conformity Applicability Analysis for the Proposed Action (Appendix A).

1.7. PUBLIC AND AGENCY INVOLVEMENT AND INTERGOVERNMENTAL COORDINATION

In addition to the applicant, CPO involved the public, state, tribal, and local governments, and other relevant agencies to the extent practicable in preparing this EA. CPO sent consultation letters to the state agencies and tribal organizations listed in Section 8 (Distribution List).

The Draft EA will be available for public review and comment for thirty (30) days from May 29, 2024 to June 27, 2024. CPO will consider substantive comments on the Draft EA timely submitted during the public comment period.

The Final EA, including the Final CAA Conformity Determination, will be made available on the CPO NEPA website at https://www.nist.gov/chips/national-environmental-policy-act-nepa.

2. ALTERNATIVES

2.1. FACILITY BACKGROUND

TSMC Arizona Corporation is in the process of building an advanced semiconductor manufacturing facility (TSMC AZ or the Facility) that will be comprised of three fabrication plants (fabs). As explained in Section 1.2, TSMC is not requesting federal financial assistance for the construction of the fabs, but this EA discusses the Facility buildout as context for analyzing the effects of the Proposed Action, which is for CPO to provide federal financial assistance for the purchase and installation of SME at the fabs (the Proposed Project). TSMC's construction of the first fab (Phase 1) is nearly complete. Construction of the second fab (Phase 2) is partially complete. Construction of the third fab (Phase 3) is planned but is expected to begin in 2026. Figure 2-1 presents the Facility's site construction plan and shows the layout of the three fabs.

TSMC's layout of the Facility was guided by the configuration of the fabs and proximity to existing utility interconnect points and site access points. The Facility design reflects the proven designs of other existing efficient semiconductor chip manufacturing sites. TSMC AZ is following the "copy exact" protocol for design of the Facility, meaning that the already established and efficient "Model Fab," (Fab 18) in Tainan, Taiwan will be copied as closely as possible within the framework of the TSMC AZ site's features while adhering to local zoning, building, and regulatory requirements. TSMC AZ's design of Phases 1, 2, and 3 and the surrounding supporting buildings will align with the Model Fab.

TSMC selected the Facility site in Maricopa County based on several factors, including: the presence of an existing semiconductor manufacturing ecosystem; a suitable build site with sufficient acreage; access to adequate reliable power supply; limited potential for natural disasters and adverse weather events; availability of adequate water resources; and proximity to transportation infrastructure.

Facility construction is underway at the TSMC Arizona Corporation campus located south of the newly constructed W Dove Valley Road, north of Loop 303, and bounded on the west by Deadman's Wash, and on the east by the newly constructed 43rd Avenue. When TSMC purchased the property, existing Arizona Public Service Company (APS) utility lines and poles were present, which have been moved to adjacent property owned by ASLD. Per a Development Agreement with the City, three arterial roads have been constructed: W Dove Valley Road, N 43rd Avenue, and N 51st Street. The City has also installed water and wastewater infrastructure to serve the Facility and in anticipation of future development, including a water pump station.

Construction of the Phase 1 building began in April 2021, with volume production (i.e., production at a high output that is economically efficient) of semiconductor wafers[3] anticipated by the first half of 2025. Construction of the Phase 2 building began in February 2022, with volume production anticipated to begin in 2028. Construction of the Phase 3 building is expected to begin in 2026, with volume production anticipated to begin by the end of the decade. Details of SME composition for chip production will be adjusted based on learnings from the Model Fab. The timeline for Phase 3 may shift subject to demand, market conditions, supply chain availability, and funding.

The Gown Building and Warehouse that will serve both Phase 1 and Phase 2 have been approved for full occupancy, and Phase 1 itself and its supporting buildings (Water Resource Center (WRC), Central Utility Plant, Electrical, and Lorry Chemical Building A) have been approved for partial occupancy,

[3] TSMC manufactures patterned semiconductor wafers as an end product, not to be confused with bare silicon wafers, which TSMC purchases from vendors and are used as an input for the early stages of the manufacturing process. TSMC sells its semiconductor wafers to third parties to be packaged into chips. For ease of reference, this EA refers to TSMC's product as "wafers".

while others (Lorry A, Bulk Specialty Gas System, Hazardous Waste Building, and Phase 2) remain under construction. For Phase 3, construction of the fab building and the necessary appurtenant buildings has not yet commenced. The three fabs will share resources, such as certain buildings, water, warehouses, personnel, vendors, and contractors. TSMC AZ's two bulk gas suppliers are building bulk gas plants to serve TSMC AZ's operations at the west end of the Facility. Electricity supplier APS will also be installing a microgrid consisting of Tier 4 diesel-fueled generators to provide backup emergency power for Phase 2 and associated support buildings, eliminating the need for dedicated diesel emergency generators onsite for backup power for Phase 2. In addition to the 1,129-acre parcel owned by TSMC AZ, the company holds an easement to a strip of land north of its owned property on which it has constructed a stormwater drainage channel.

TSMC and its design and construction partners have worked with the relevant permitting authorities, including the City Planning and Development Department, City Water Services Department, City (Phoenix) Fire Department, and MCAQD, to obtain the necessary permits for construction of the Facility. TSMC AZ has applied for and mostly obtained the over 600 phased and unphased permits the Facility will require, spanning disciplines from Site & Site Development, Structural Core & Shell, Mechanical-Electrical-Process, Tenant Improvement, HAZMAT (under the Phoenix Fire Department), Construction, and environmental permits. Relevant environmental permit information is provided in applicable resource sections of this EA.

The Facility design includes construction of two onsite wastewater systems that will recover, treat, and recycle and reuse water.

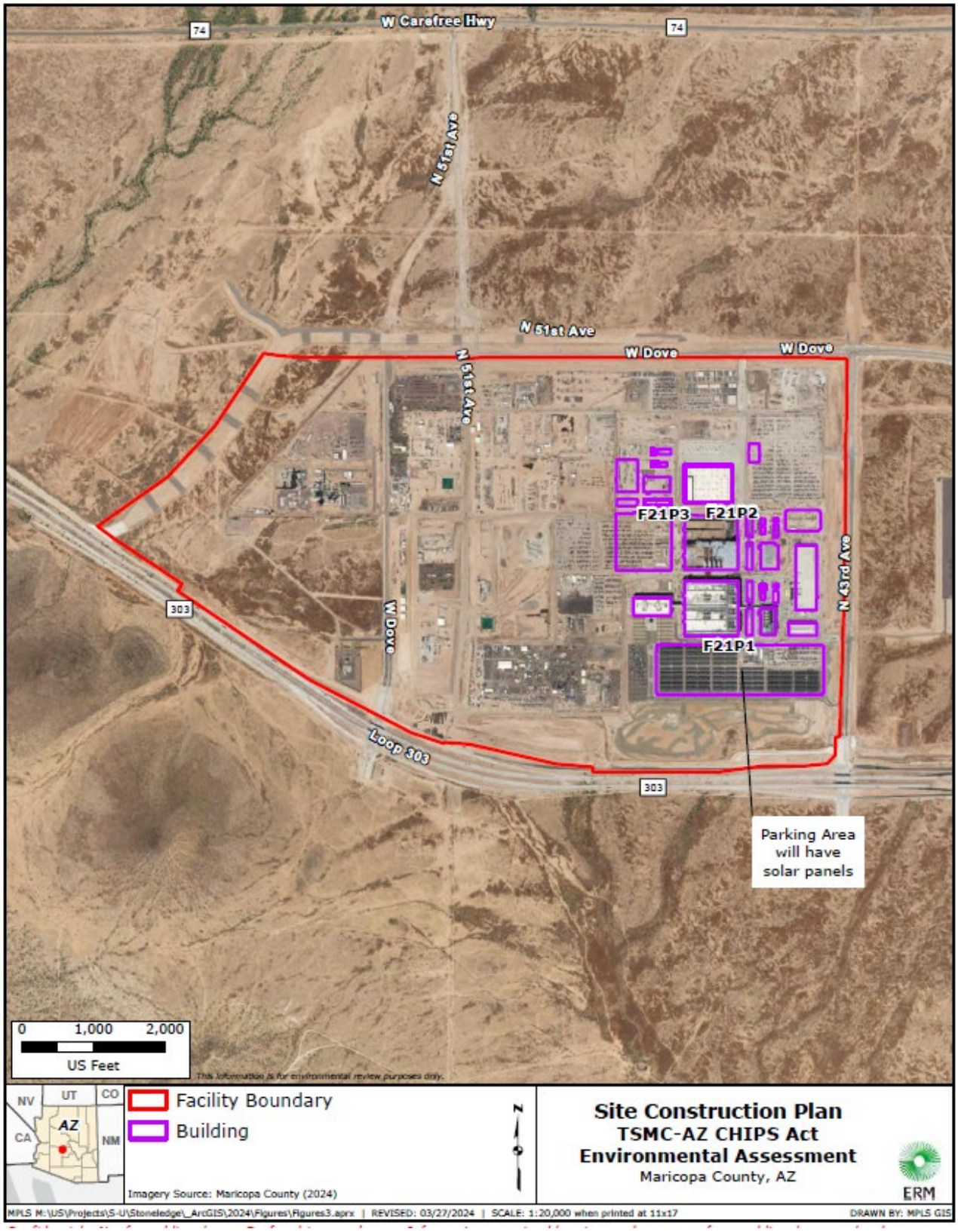
- The WRC will contain the following unit operations: acid waste neutralization; a tetramethylammonium hydroxide treatment system; an ammonia treatment system; a sulfuric acid reclaim system designed to recover sulfuric acid for onsite reuse; a fluoride wastewater treatment system; various process SME water reclaim systems designed to recover wastewater from process equipment and treat and return water for reuse within; and a sludge thickening and dewatering system designed to remove suspended and dissolved solids.

- The IRWP[4] will be designed to treat both organic and inorganic waste streams and will contain the following unit operations: water softening; ion exchange hardness polishing; filtration systems; decarbonators; biological treatment systems; aerobic treatment system; anaerobic/anoxic treatment; odor control systems; and brine concentrator processing units. Completion and operation start of the IRWP is required by June 2028 to comply with TSMC AZ's wastewater permit. The IRWP is based on an operating IRWP at the Model Fab, with improvements to increase the quality and volume of recycled water. The IRWP will be designed to handle wastewater from the current WRC, which supports Phase 1 and Phase 2. The IRWP would allow TSMC AZ to reach "Near Zero Liquid Discharge", i.e., recycling water at a rate of 95 percent or greater. The IRWP will be planned in a modular fashion to accommodate the flows of all three fabs.

Air emission control technologies will be applied to manufacturing processes to reduce criteria pollutants in accordance with applicable air permits. Exposures to hazardous materials and gases during manufacturing operations will be reduced through automated delivery systems to the extent practicable.

[4] The IRWP refers to a specific system design. Another wastewater treatment and reclamation system, or series of treatment systems, that accomplish the same advanced treatment functions, achieve the same water quality results, and recycles the same overall percentage of wastewater could be substituted in the final design with a different nomenclature.

FIGURE 2-1 SITE CONSTRUCTION PLAN



2.2. ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

Based on the purpose and need statement in Section 1.3, CPO identified the following two alternatives to be analyzed in the EA.

2.2.1. NO ACTION ALTERNATIVE

Under the No Action Alternative, the CHIPS Incentives Program would not provide federal financial assistance for SME installation at TSMC AZ. Although TSMC could potentially procure and install leading-edge equipment with non-federal funding over a span of several years depending on market conditions, to provide a meaningful comparison of environmental effects, the No Action Alternative assumes that absent federal financial assistance, new equipment not already purchased or installed as of the date of PMT (April 8, 2024) would not be procured and installed at Phases 1, 2, or 3. The No Action Alternative assumes that TSMC would complete Phase 1 by outfitting Phase 1 with limited SME procured or installed without federal financial assistance as of the date of PMT. Thus, the No Action Alternative assumes a partial installation of equipment in Phase 1 only or an estimated 50-70 percent of the wafer manufacturing capacity it otherwise would achieve under the Proposed Action.

Specifically, under the No Action Alternative:

- Phase 1 would operate with the SME already purchased without federal financial assistance, allowing the fab to operate at 50–70 percent of the wafer manufacturing capacity that otherwise would be anticipated under Phase 1 of the Proposed Action.
- The shell of Phase 2 would be built to a state of 20 percent of completion (prioritizing the structural core and shell of the building to provide weather tightness and site safety) without federal financial assistance, but Phase 2 would not become a functioning fab, and no SME would be installed.
- Phase 3 would not be constructed and no SME would be installed.

The No Action Alternative will be used to analyze the consequences of not undertaking the Proposed Action and will serve to establish a comparative baseline for analysis.

Under the No Action Alternative, TSMC AZ's operational workforce is estimated to be 1,150 workers. Wafer manufacturing steps and required resources under the No Action Alternative would be similar in nature to those described under the Proposed Action (Section 2.2.2). However, due to the lower production rate under the No Action Alternative, the Facility would consume less resources (electricity, water, natural gas, hazardous materials) and release less air emissions and wastewater compared to the Proposed Action.

2.2.2. PROPOSED ACTION

Under the Proposed Action, CPO would provide federal financial assistance to TSMC for the purchase and installation of the SME in Phases 1, 2, and 3 of the Proposed Project as required to support production of advanced semiconductor wafers in these fabs. For purposes of analysis, the EA assumes that under the Proposed Action, all three phases would advance to achieve full operational capacity for semiconductor manufacturing using the equipment. Phase 1 would enable manufacture semiconductors at the 4 nanometer (nm) (N4) / 5 nm (N5) technology nodes. Phase 2 is anticipated to manufacture semiconductors at the 2 nm (N2) and/or 3 nm (N3) technology nodes. Phase 3 is projected to manufacture semiconductors at the 2 nm (N2) or possibly a more advanced technology node. Volume production from

Phase 1 would be anticipated in the first half of 2025. For Phase 2, volume production would be anticipated to begin in 2028. For Phase 3, volume production would be anticipated to begin by the end of the decade, dependent on market demand, supply chain, and construction timeline.

Under the Proposed Action, TSMC would not apply federal financial assistance toward construction or operation of the Arizona fabs or the follow-on operations and maintenance costs of the SME purchased using federal financial assistance after they are installed. This EA analyzes the direct, indirect, and cumulative environmental effects of TSMC AZ's purchase and installation of equipment on the resource areas discussed in Chapter 3.

2.2.3. FACILITY RESOURCE DEMANDS

Table 2-1 describes the expected resource utilization and waste generated during Facility operations associated with the Proposed Action. Because TSMC AZ will try to match equipment model and material suppliers to its Model Fab to the extent possible due to the need for very tight technical specification alignment requirements, estimates for resource use during operations are derived from observations of the Model Fab.

TABLE 2-1 ANTICIPATED RESOURCE DEMAND AND DISCHARGE PER DAY

Resource	Phase	Demand (per day)	Discharge (per day)
Water (City water demand)	Phase 1	4.75[5] MGD*	3.8 MGD average
	Phase 2	**5.70** MGD	4.56 MGD average
	Phase 3	**6.84** MGD	5.47 MGD average
Total Water	All 3 Phases	**17.29** MGD	13.83 MGD average
Electrical**	Each Phase	2.85 gigawatt-hours/day	N/A
Total Electrical	All 3 Phases Combined	8.54 gigawatt-hours/day	N/A
Natural Gas	Each Phase	14,160 therms/day	N/A
Total Natural Gas	All 3 Phases Combined	42,318 therms/day	N/A

*MGD = million gallons per day

**TSMC AZ will purchase Renewable Energy Credits (RECs) for all of the Facility's purchased electricity use. A REC represents renewable energy generated and delivered to the grid, measured in megawatt hours (MWh). RECs are instruments to demonstrate that the holder has contributed renewable electricity to the grid.

Note: Resource demand and discharges are those expected when each phase is operating at full volume production.

Site operations would use a variety of materials and chemicals necessary for semiconductor manufacturing. TSMC is proactively engaging with local and domestic suppliers to obtain materials that meet its operational needs and will rely on proven imported materials to the extent necessary.

The operational workforce associated with the Proposed Project is estimated to be 3,250 workers.

The semiconductor manufacturing process generally consists of steps known as deposition, photoresist, lithography, etch, ionization, and packaging (ASML 2023). In the deposition step, thin films of conducting, isolating, or semiconducting materials are deposited on the wafer to enable the first layer to be printed on it. The wafer is then covered with a light-sensitive coating called 'photoresist', or 'resist'

[5] Water demand values were updated by TSMC on June 3, 2024, after the initial posting of the Draft EA for public comment on May 29. Total city water demand was revised from 14.624 to 17.29 mgd.

for short. Lithography uses ultraviolet light to degrade a precise pattern in the resist layer so that the next process, etching, can remove portions of the layer to create a three-dimensional pattern of open channels. Once the pattern is created, the wafer may be bombarded with positive or negative ions to tune the electrical conducting properties of part of the pattern. Directing electrically charged ions allows for control of electricity flow. To get the chips out of the wafer, it is sliced and diced with a diamond saw into individual chips. Packaging refers to the protective enclosure for a semiconductor device that shields circuitry from corrosion and physical damage while allowing electrical connections. Packaging is generally conducted by specialized third-party facilities.

SME to be purchased and installed under the Proposed Action would generally include equipment that supports the process steps of deposition, photoresist, lithography, etching, and ionization. TSMC currently outsources packaging to outside parties.

Most commercial SME is designed to meet Semiconductor Equipment and Materials International (SEMI) Standard S2, *Environmental, Health, and Safety Guideline for Semiconductor Manufacturing Equipment*.

The semiconductor industry uses many chemical materials in the production of chips (ISMI 2006). These materials are typically used in the manufacturing process and do not remain in the final product. Hazardous materials and wastes are discussed in Section 3.10. As an overview, semiconductor process chemicals can be generally categorized as follows:

- Aqueous solutions such as acids and bases are used to chemically etch or clean the surface of the wafer.
- Specialty gases are typically used in relatively small quantities as precursors to deliver a substance such as arsenic or tungsten onto the wafer or into the silicon lattice. Other specialty gases dry-etch a pattern onto the surface of the wafer.
- Organic compounds are generally solvents, some of which are used as constituents in specialty chemicals. These chemicals clean the wafer. They are also part of the photolithography process.
- Metallic compounds are applied to the wafer in specific locations to create transistors or are used to plate wafers to provide electrical connections.

The Facility design aims to reduce environmental effects. The design includes construction of two onsite wastewater treatment, recycle, and recovery/reuse water systems (described in Section 3.3). The WRC, described in Section 2.1, will receive wastewater from process equipment, treat the water, remove and segregate impurities and solids for disposal, and return water and sulfuric acid for reuse within the fabs. The IRWP will treat both organic and inorganic waste streams from fab operations so water can be reused by the Facility. Air emission control technologies will be applied to manufacturing processes to reduce criteria pollutants and hazardous air pollutants (HAPs) in accordance with applicable air permits. Contact with hazardous materials during manufacturing operations will be reduced through automated delivery systems to the extent practicable.

Additionally, TSMC has committed to several best management practices (BMPs) to avoid or minimize environmental effects of Facility construction and operation (Section 2.3).

2.3. BEST MANAGEMENT PRACTICES INCLUDED IN PROPOSED ACTION

This section presents an overview of the BMPs that will be incorporated into the Proposed Project. BMPs are policies, practices, and measures that TSMC AZ will adopt to reduce the environmental effects of various Facility activities, functions, or processes.

BMPs mitigate potential effects by avoiding, minimizing, or reducing or eliminating effects. BMPs may take the form of (1) committed measures or practices that TSMC will use for the Proposed Project, or (2) ongoing, regularly occurring TSMC practices. Table 2-2 includes a list of BMPs. BMPs and mitigation measures are discussed under specific resource areas, as relevant, in Chapter 3. TSMC's implementation of BMPs and mitigation measures will be subject to CPO monitoring and enforcement.

TABLE 2-2 BEST MANAGEMENT PRACTICES

Topic	BMP	Description	Benefits
Air Quality; Climate Change, Resiliency, and Sustainability	Reduction of Fluorinated GHG (F-GHG) emissions	TSMC AZ will install air emission controls that reduce potent F-GHGs by 90% or greater to reduce Scope 1 emissions.	Reduces the Facility's Scope 1 GHG footprint.
Air Quality; Climate Change, Resiliency, and Sustainability	Purchase Renewable Energy Credits (RECs) to cover 100% of electricity usage	TSMC AZ will purchase voluntary RECs to offset any unabated Scope 1 (direct facility emissions) and Scope 2 (emissions from electricity use) GHG emissions. TSMC AZ has purchased a total of 95,479 RECs from solar projects and 200,185 RECs from wind projects for 2023, with another 16,667 RECs option yet to be exercised.	Reduced carbon footprint and promotion of renewable energy.
Air Quality; Climate Change, Resiliency, and Sustainability	Improve energy efficiency and reduce emissions as sustainability action	TSMC AZ will install solar panels over its parking area producing an estimated 14.5 megawatts (MW) of renewable energy (covering ~4,000 parking spaces). This project began in August 2022 and will be complete in 2024.	Provides a covered parking to protect vehicles and generates renewable energy. Reduced Scope 2 greenhouse gas (GHG) footprint.
Air Quality; Climate Change, Resiliency, and Sustainability	Provide electric vehicle charging stations for staff use	TSMC AZ will make 96 electric vehicle charging stations available to employees, with the potential to add more in future based on demand.	Incentivizes staff to use electric vehicles and reduces criteria air pollutants and GHG emissions based on commuting.
Water Resources	Reduce consumption and increase reuse	Once the IRWP is installed, TSMC AZ will achieve 95% or greater water reuse, with loss due only to evaporation.	Reduces water consumption
Water Resources	Effectively manage stormwater	TSMC AZ installed a 53-acre drainage channel running east to west above the north portion of Project (in easement from ASLD) to bring stormwater from the north and diverts it into Deadman Wash along the western border of TSMC AZ property. The drainage channel is concrete and over 300-feet wide at its widest point.	Abates flood risk management. Also manages erosion and protect surface water quality.
Water Resources	Erosion controls	Stormwater and surface runoff are managed through permanent drainage structures on site throughout the construction phase and will remain on site during operation.	Reduces erosion during construction and protects surface water quality from sediment in surface flow from stormwaters

Topic	BMP	Description	Benefits
Cultural Resources	Unanticipated discovery protocol	TSMC AZ staff and contractors involved in ground disturbance during ongoing construction or maintenance will notify TSMC AZ environmental staff if any cultural materials and/or bone material is encountered and will protect the vicinity from further effects until guidance is provided on how to proceed.	While the construction area has been surveyed for cultural resources, unknown cultural resources may be encountered. TSMC will guide protection and appropriate management of resources.
Biological Resources	Preventative measures and removal of vegetation prior to nesting season	Vegetation removal will be restricted to non-breeding seasons to prevent disturbing Sonoran Desert Tortoises and migratory birds.	Avoids effects to important native and migratory species.
Biological Resources	Relocate protected plants during construction	TSMC AZ removed saguaro cacti prior to construction. TSMC AZ will return these cacti to the site following completion of construction.	Avoids effects to protected plants and enhance the landscaping of the Facility with native plants.
Biological Resources	Cover holes and trenches during construction or provide ramps	During construction, TSMC AZ's contractors will cover holes and trenches when not in use or provide ramps to allow small animals to escape.	Protects local ecosystem, specifically small animals.
Noise	Avoid construction within 2,500 feet of residential structures.	Phoenix noise ordinance requires that no construction occur within 500 feet of an inhabited structure; TSMC AZ has obtained 2,500-foot buffer from residential properties as a best practice to reduce effects to neighboring properties[6].	Noise disturbance to community avoided by buffer surrounding Facility.
Transportation	Planning to reduce commuter traffic congestion	During operation, TSMC AZ will implement worker schedules, shift change protocols and gate configurations to reduce traffic congestion during peak commuting hours. For example, during construction, traffic and congestion was mitigated due to staggered entry times for construction workers, and additional entrance gates	Reduce traffic congestion.

[6] Note: Currently the closest residences are 8,200 feet from the Facility.

Topic	BMP	Description	Benefits
		were added to different sides of the Facility.	
Transportation	Travel Reduction Program	TSMC AZ will implement a Travel Reduction Program with goal to reduce single occupancy vehicle trips or vehicle miles traveled by employees by 10% in the first year and 10% in years 2-5. Measures include the "guaranteed ride home," to encourage car-pooling, and telecommuting options for some staff.	Reduce traffic congestion and emissions.
Human Health and Safety	Apply most protective Occupational Exposure Limits to facility operations	TSMC AZ will apply the most protective Occupational Exposure Limits based on published industry standards on a chemical-by-chemical basis to its facility operations.	Protect worker health and safety.
Human Health and Safety	Safety planning with local first responders	TSMC AZ has held multiple planning meetings and drills with local first responders, as well as with internal safety teams. TSMC AZ will continue coordination with local first responders as the Facility grows.	Optimize emergency response if needed; protect public and worker health and safety.
Hazardous Materials and Waste	Capture per-and polyfluoroalkyl substances (PFAS)-containing wastewater	TSMC AZ will segregate known process PFAS-containing chemicals from other waste streams such that this waste is directed to a closed bulk storage system. This waste is then managed at an off-site permitted treatment and disposal facility.	Reduce contamination of water supplies by PFAS.
Hazardous Materials and Waste	Optimize waste recycling	TSMC AZ will work towards minimizing waste sent to landfills by increasing recycling during facility operation.	Reduce waste.
Stakeholder Inclusion/ Environmental Justice	Stakeholder outreach program	TSMC AZ's stakeholder outreach and communication program will include environmental justice communities and will provide information about the Project and gather feedback. TSMC AZ will continue an active outreach program through the life	Informed public and two-way communication with the Facility. The Facility will benefit from community input and awareness of community concerns.

Topic	BMP	Description	Benefits
		of the Facility, including decommissioning in future.	
Environmental Justice	Diversity and Inclusion Program	TSMC AZ has initiated a Diversity and Inclusion Program designed to establish a baseline, set goals, and improve the company's hiring and retention of historically under-represented communities, including gender, race, veteran, and disability diversity and inclusion.	Enhance diversity and inclusion and equal opportunities.

GHG = greenhouse gas; REC = renewable energy credit; PFAS = per-and polyfluoroalkyl substances

2.4. INCOMPLETE OR UNAVAILABLE INFORMATION

This EA analyzes environmental effects in connection with the purchase and installation of SME at TSMC AZ. As the SME that would be installed are cutting-edge, some of the inputs and outputs described in the EA represent estimates based on assumptions applied to equipment in facilities currently operating in Taiwan. Specifically, the SME technology proposed for Phase 3 is currently under development, and only preliminary data on resource consumption during use are available. Estimates used for the analysis in the EA are based on existing data and engineering judgment and represent a conservative yet reasonable bounding case.

There are several areas of uncertainty regarding air quality in the region, regulations, and the anticipated air emissions of Phase 3. Maricopa County is currently in nonattainment for ozone (moderate) and PM_{10} (serious). Two anticipated changes to applicable air regulations include:

- Upcoming Changes to NAAQS for Ground Level Ozone: The Maricopa County nonattainment area is currently classified as being in moderate nonattainment of the 2015 NAAQS for ground-level ozone. In October 2023, the Environmental Protection Agency (EPA) issued a finding of failure to submit a plan to address moderate ozone attainment. While ADEQ, the Maricopa Association of Governments, and MCAQD are working with EPA Region 9, it is anticipated that Maricopa County will soon move from moderate to serious nonattainment. However, the date for the change in attainment designation is not defined. Additionally, in January 2024, EPA proposed supplemental rulemaking under the Clean Air Act "good neighbor" provision that would designate Arizona an upwind state, requiring Arizona utilities and industry to reduce ground-level ozone emissions that impact neighboring downwind states. This proposed rulemaking would impose a federal implementation plan on the state; however, at this time, advanced manufacturing is not included in the federal implementation plan.

- Upcoming Changes to NAAQS for Particulate Matter 2.5: On February 7, 2024, EPA reduced primary levels of particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$) to 9.0 $\mu g/m^3$ from 12.0 $\mu g/m^3$. The effective date of final action is sixty days following the notice of final rulemaking in the *Federal Register*, with the earliest date of attainment achievement of 2032. EPA will identify attainment status of counties within two years of the new standard. For new and expanding facilities that would require a permit or permit modification in or after 2026, the facilities will be required to work with the permitting agencies to determine the lowest achievable emission rate. (EPA 2024d). Maricopa County was not previously classified as a nonattainment area for particulate matter, but with the 2024 rule, it would be classified as in nonattainment for $PM_{2.5}$ (EPA 2024f). In March 2024, the Arizona Chamber of Commerce and members of the Arizona legislature filed a lawsuit in the U.S. Court of Appeals for the District of Columbia Circuit challenging EPA's authority to impose stricter regulations. This lawsuit follows a court action filed previously by 24 state attorneys general who also challenged the authority of EPA to enforce stricter regulations. These legal challenges have the potential to impact the rollout of the new rules.

The State of Arizona is actively working to collaborate with EPA on these proposed changes, but the future regulatory environment remains uncertain. The changes to attainment status for ozone and $PM_{2.5}$ have implications for the permitting pathway for Phase 3 and will likely require TSMC AZ to apply for a major source (Title V) permit for Phases 1 and 2.

Although initial air modeling for the Proposed Action indicates that the Proposed Project will not cause an exceedance of NAAQS standards, potential regional growth in population and industry could worsen

ambient air quality, particularly for ozone during the period prior to when TSMC would need to apply for a revised air permit to include Phase 3. However, $PM_{2.5}$ emission levels would be expected to begin to decrease over the next two years from planned and implemented local and federal controls, especially controls relating to fleet turnover. Further, although the air modeling methodology incorporated in this EA's analysis relies on the assumptions of the current air permit for Phases 1 and 2, there could be material and technology changes to the fabrication process or advances in emission control technologies that could affect those assumptions.

To account for uncertainty regarding changes in regional air quality, regulations, and emission rates of advanced technologies under Phase 3, CPO assumes that some degree of mitigation may be required to ensure the Proposed Action does not result in significant adverse effects on air quality. These mitigation measures could take the form of (1) applying abatement technologies to the emissions from the SME; (2) securing emission reductions (air credits) at other sources to offset the emissions from the SME; or (3) a combination of both strategies. These mitigation measures (described in Section 3.1.4) would ensure air quality effects would not rise to the level of significance under the Proposed Action.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This Chapter presents a description of the environmental resources and baseline conditions that could be affected from implementing the Proposed Project and includes an analysis of the potential direct and indirect effects.

All potentially relevant environmental resource areas were initially considered for analysis in this EA. Pursuant to NEPA and its regulations, the discussion of the affected environment (i.e., existing conditions) focuses only on those resource areas potentially subject to effects from the Proposed Project. Additionally, the level of detail used in describing a resource is commensurate with the anticipated level of environmental effects.

Accordingly, this Chapter includes sections analyzing the effects of the Proposed Action and the No Action Alternative on air quality, climate change, water resources, cultural resources, biological resources, land use, noise, transportation, human health and safety, hazardous materials and wastes, environmental justice, and socioeconomics.

3.1. AIR QUALITY

This discussion of air quality effects includes criteria pollutants, hazardous air pollutants, standards, sources, and permitting. Greenhouse gases (GHGs) are discussed in Section 3.2, Climate Change, Resiliency, and Sustainability. Air quality in a specific location is defined by the concentration of various pollutants in the atmosphere. A region's air quality is influenced by many factors, including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. In general, the types and amount of air pollution include both human-made and natural sources, and the amount contributed by each varies based on the specific pollutant. Human-made sources of air pollution include mobile sources (e.g., cars, trucks, and buses) and stationary sources (e.g., factories, refineries, and power plants), as well as indoor sources (e.g., some building materials and cleaning solvents). Natural sources of air pollution include activities such as volcanic eruptions, forest fires, and wind-blown dust.

3.1.1. REGULATORY SETTING

3.1.1.1. CRITERIA POLLUTANTS AND NATIONAL AMBIENT AIR QUALITY STANDARDS

The Clean Air Act (CAA), 42 U.S.C. § 7401 *et seq.*, is the primary federal statute governing the control of air quality. The CAA designates six pollutants as "criteria pollutants" for which EPA has established NAAQS to protect health and welfare (Table 3-1): carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead, ground level ozone (which is formed by nitrogen oxides (NO_x) and volatile organic compounds (VOCs)), and particulate matter (PM), including both suspended PM equal to or less than 10 microns in diameter (PM_{10}) and fine particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$). CO, SO_2, NO_2, lead, and some particulates are emitted directly into the atmosphere from emissions sources. Ozone, $PM_{2.5}$ and some NO_2 and particulates are formed through atmospheric chemical reactions from other pollutant emissions (called precursors, which include NO_x and VOCs) that are influenced by weather, ultraviolet light, and other atmospheric processes.

NAAQS are classified as primary or secondary. Primary standards protect against adverse health effects; secondary standards are designed to protect public welfare, such as by preventing damage to farm crops, vegetation, and buildings. Some criteria pollutants have long-term and short-term standards. Short-term standards are designed to protect against acute, or short-term, health effects, whereas long-term standards are designed to protect against chronic health effects.

States can establish their own ambient air quality standards that are more stringent than those set by federal law. ADEQ follows the federal NAAQS with some further protections and enhancements in consideration of public health, safety, and welfare in the state. Local air districts may be established in larger population areas to help administer the provisions of the CAA and state rules, and they may also have rules that further protect the region with lower emission limits. The Proposed Project is located in Maricopa County under MCAQD jurisdiction.

Areas in compliance with the NAAQS are designated as attainment areas. An area that does not meet the NAAQS for a given criteria pollutant is designated as a nonattainment area for that pollutant. A nonattainment area's classification is based on the severity of nonattainment (i.e., marginal, moderate, serious, severe, or extreme nonattainment). Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are also required to adhere to maintenance plans to ensure continued attainment. The CAA requires states to develop general plans to attain and maintain the NAAQS in all areas of the country and specific plans for each nonattainment or maintenance pollutant (including the pollutant's precursor) to achieve (nonattainment) or maintain (maintenance) compliance with the relevant NAAQS for that pollutant. These plans, known as State Implementation Plans (SIPs), are developed by state and local air quality management agencies, and submitted to EPA for approval. Maricopa County is currently in nonattainment for ozone (moderate) and PM_{10} (serious) and is in maintenance for all other pollutants. Based on recent years' ambient air measurements, it is anticipated that the County will be redesignated to serious nonattainment for ozone in the near future, which would lower the VOC and NO_x thresholds for purposes of general conformity (see Section 3.1.1.2) from 100 tons per year (tpy) to 50 tpy.

In addition to the NAAQS for criteria pollutants, the Clean Air Act establishes National Emission Standards for Hazardous Air Pollutants (NESHAPs) under Section 112(b) of the 1990 CAA Amendments. The NESHAPs regulate hazardous air pollutant (HAP) emissions from stationary sources, 40 C.F.R. Part 61, including from specific stationary source categories, 40 C.F.R. Part 63. Subpart BBBBB of 40 C.F.R. Part 63 establishes NESHAPs for the Semiconductor Manufacturing source category. The Semiconductor Manufacturing NESHAPs regulate major semiconductor manufacturing sources with a potential to emit any HAP at a rate of 10 tpy or more or any combination of HAPs at a rate of 25 tpy or more.

3.1.1.2. GENERAL CONFORMITY

The EPA General Conformity Rule, 40 C.F.R. Parts 6, 51, and 93, applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emissions thresholds that trigger requirements for a conformity analysis (i.e., an analysis by the agency to ensure that its action will be in conformity with the relevant SIP) are called de minimis levels. De minimis levels in tpy vary by pollutant and depend on the severity of the nonattainment status for the air quality management area in question.

A conformity applicability analysis is the first step of a conformity evaluation and assesses whether a federal action must be supported by a conformity determination. This is typically done by quantifying

applicable direct and indirect emissions that are projected to result due to implementation of the federal action. Here, direct emissions relate to the operation of the Facility equipment itself, primarily through point or fugitive air emission sources as a result of the federal action; these are typically covered through the air permitting process with the controlling agency (e.g., MCAQD). Indirect emissions are those emissions caused by the federal action and originating in the region of interest, but which can occur later or in a different location from the action itself and are reasonably foreseeable. If the results of the applicability analysis indicate that the total emissions would not exceed the de minimis emissions thresholds, then the conformity evaluation process is completed.

Table 3-1 shows the de minimis thresholds for the various pollutants in nonattainment areas, and Table 3-2 shows the regulated levels for Maricopa County.

TABLE 3-1 DE MINIMIS THRESHOLDS FOR NONATTAINMENT AREAS

Per 40 C.F.R. § 93.153(b)(1)—the following rates apply in nonattainment areas.

Parameters	Tons/year
Ozone (VOCs or NO_x):	
Serious nonattainment areas	50
Severe nonattainment areas	25
Extreme nonattainment areas	10
Other ozone nonattainment areas outside an ozone transport region	100
Other ozone nonattainment areas inside an ozone transport region:	
VOC	50
NO_x	100
Carbon Monoxide: All maintenance areas	100
SO_2 or NO_2: All nonattainment areas	100
PM_{10}:	
Moderate nonattainment areas	100
Serious nonattainment areas	70
$PM_{2.5}$ (direct emissions, SO_2, NO_x, VOC, and Ammonia):	
Moderate nonattainment areas	100
Serious nonattainment areas	70
Lead: All nonattainment areas	25

TABLE 3-2 POLLUTANT ATTAINMENT STATUS FOR MARICOPA COUNTY

Pollutant	Ambient Air Quality Standard	Attainment Status
CO	1971 Primary	Attainment/Unclassifiable
N_2O	1971 Annual Primary & Secondary	Attainment/Unclassifiable
N_2O	2010 1-Hour Primary	Attainment/Unclassifiable
Ozone	1979 1-Hour Ozone (Revoked)	Attainment/Unclassifiable
Ozone	1997 8-Hour Primary & Secondary	Attainment/Unclassifiable
Ozone	2008 8-Hour Primary & Secondary	Moderate Nonattainment
Ozone	2015 8-Hour Primary & Secondary	Moderate Nonattainment (Expected Reclassification as Serious Nonattainment)

Pollutant	Ambient Air Quality Standard	Attainment Status
PM_{10}	1987/2006 Primary & Secondary (24-hour)*	Serious Nonattainment
$PM_{2.5}$	1997 24-Hour/Annual Primary & Secondary	Attainment/Unclassifiable
$PM_{2.5}$	2006 24-Hour Primary & Secondary and Annual Secondary (15.0 µg/m^3)	Attainment/Unclassifiable
$PM_{2.5}$	2012 Annual Primary (12.0 µg/m^3)	Attainment/Unclassifiable
$PM_{2.5}$	2024 Annual Primary (9.0 µg/m^3)***	Moderate Nonattainment
SO_2	1971 Primary (24-hour and Annual)**	Attainment/Unclassifiable
SO_2	1971 3-Hour Secondary	Attainment/Unclassifiable
SO_2	2010 Primary (1-hour)	Attainment/Unclassifiable
Lead	2008 Primary & Secondary (3-month)	Attainment/Unclassifiable

Data sources: 40 C.F.R. § 81.303 (07/01/2018 Edition) and EPA Air Data.
µg/m^3 = microgram per cubic meter; N_2O = nitrous oxide.
*1997 24-hour/annual PM_{10} standards revoked. 1987 annual PM_{10} standard rescinded in 2006.
**1971 secondary annual SO_2 standard revoked in 1973. 1971 primary SO_2 standards (24-hour/annual) revoked in 2010, but 1971 primary SO_2 standards and attainment status may be retained until 2010 designations are completed.
***Anticipated reclassification based on new lower standard.

Arizona's SIP is the cumulative record of all air pollution strategies, state statutes, state rules, and local ordinances implemented under Title I of the CAA by government agencies within Arizona.

Arizona's SIP applies to all geographic areas within the state. For Maricopa County, the Maricopa Association of Governments completes its respective SIP revisions and ADEQ submits them to EPA. De minimis levels in tpy by pollutant and depending on the severity of the nonattainment status is presented in the Tables 3-1 and 3-2 above.

3.1.1.3. PERMITTING

New Source Review (Preconstruction Permit)

New major stationary sources and major modifications at existing major stationary sources are required by the CAA to obtain an air permit before commencing construction. This permitting process for major stationary sources is called New Source Review (NSR) and is required whether the major source or major modification is planned for nonattainment, attainment, or unclassifiable areas. In general, permits for sources in attainment areas and for other pollutants regulated under the major source program are referred to as Prevention of Significant Deterioration (PSD) permits, whereas permits for major sources in nonattainment areas are referred to as nonattainment new source review permits. In addition, a proposed project may have to meet the requirements of nonattainment new source review for the pollutants for which the area is designated as nonattainment and PSD for the pollutants for which the area is attainment. Additional PSD permitting thresholds apply to increases in stationary source GHG emissions. PSD permitting also applies to a new major stationary source (or any net emissions increase associated with a modification to an existing major stationary source) that is constructed within 62 miles (100 kilometers) of a Class I area, and which would increase the 24-hour average concentration of any regulated pollutant in the Class I area by 1 microgram per cubic

meter or more. Class I areas include international parks, national wilderness areas and national memorial parks that exceed 5,000 acres, and national parks that exceed 6,000 acres. PSD is regulated under Part C of Title I of the CAA. NSR for nonattainment areas is regulated under Part D of Title I. Minor NSR is regulated by Section 110(a)(2)(c) of Part A of Title I.

NSR Best Available Control Technology (BACT) requirements apply to major new and modified sources in attainment areas. Under NSR, for any pollutant for which an area is designated as in nonattainment, and for which new or modified source emissions are at or above the applicable threshold (Table 3-3), operators must achieve the Lowest Achievable Emission Rate (LAER) for that pollutant and obtain offsets (emission reductions from other sources that impact the same area) for the proposed emissions of the nonattainment pollutant. Existing sources located in nonattainment areas are subject to Reasonably Available Control Technology (RACT) requirements. All nonattainment NSR programs require an opportunity for public involvement in the permitting process.

Title V (Operating Permit)

The Title V Operating Permit Program consolidates all CAA requirements applicable to the operation of a source, including requirements from the SIP, preconstruction permits, and the air toxics program. It applies to stationary sources of air pollution that exceed the major stationary source emission thresholds, as well as other non-major sources specified in a particular regulation. Major source thresholds are defined in Table 3-3, by area attainment status (MCAQD 2024a).

TABLE 3-3 MAJOR SOURCE THRESHOLDS

Pollutant	Attainment Status	Threshold (tons/year)
Any regulated NSR pollutant	Attainment/Unclassifiable Marginal or Moderate Ozone Nonattainment	100
NO_x	Serious Ozone Nonattainment	50
NO_x	Severe Ozone Nonattainment	25
NO_x	Extreme Ozone Nonattainment	10
VOC	Serious Ozone Nonattainment	50
VOC	Severe Ozone Nonattainment	25
VOC	Extreme Ozone Nonattainment	10
CO	Serious CO Nonattainment	50
PM_{10}	Serious PM_{10} Nonattainment	70
$PM_{2.5}$	Serious $PM_{2.5}$ Nonattainment	70
HAPs - single	Any	10
HAPs - combination	Any	25

Note: Major source is defined in Maricopa County Air Pollution Control Regulations Rule 240, which incorporates 40 C.F.R. § 51.165(a)(1)).

3.1.2. AFFECTED ENVIRONMENT

As discussed in Section 3.1.1.1, Maricopa County is currently in nonattainment for 8-hour ozone (moderate) and PM_{10} (serious) and in maintenance for all other pollutants.

The TSMC AZ Facility is currently subject to a construction and synthetic minor operating permit number P0009668 (the Permit) issued by MCAQD. The Permit was most recently revised and issued

on March 30, 2023. The Permit was revised to authorize construction of two fab buildings (Phases 1 and 2), and it addresses site-wide semiconductor manufacturing operations, emergency engines, cooling towers, fuel burning equipment, organic liquid storage tanks, and the site's wastewater treatment plant. The equipment included in the Permit has potential to generate the following regulated air pollutants: CO; NO_x; SO_2; Total Particulate Matter (PM); PM_{10}; $PM_{2.5}$; VOCs; HAPs, including hydrofluoric acid, hydrochloric acid, arsine, benzene, and formaldehyde; and GHGs, including CO_2, methane, nitrous oxide, and other fluorinated gases (F-GHGs).

The existing permit sets a Facility-wide limit of air pollutant emissions to less than current Title V major source thresholds (the Permit is a Conditional Non-Major or Synthetic Minor Permit). The allowable emissions limit for the pollutants from Phase 1 and Phase 2 are presented in Table 3-4.

TABLE 3-4 ALLOWABLE FACILITY EMISSIONS

Pollutant	12-Month Rolling Total Emission Limits (tons)
VOC	90.0
NO_x	90.0
CO	90.0
PM_{10}	63.0
$PM_{2.5}$	63.0
Total HAPs	22.5
Any Single HAP	9.0

The design of Phase 3 is currently in development. For the purposes of this EA and based upon the best available information at the time of publication, the emissions from Phase 3 are estimated to be approximately the same as the total emissions permitted for Phases 1 and 2.

3.1.3. ENVIRONMENTAL CONSEQUENCES

Effects on air quality are based on estimated direct and indirect emissions associated with the Proposed Project (i.e., the purchase and installation of SME in Phases 1, 2, and 3) and No Action Alternative.

Potential direct air effects from the operation of tools will be managed through MCAQD air permits. Potential air effects from the construction of the Facility are not included in the Proposed Project, because the SME and tool purchases and installation are independent from construction of the fab buildings. Indirect emissions are associated with the installation of the tools and are emissions beyond the actual permitted air emissions for Phases 1 and 2. Indirect emissions will be detailed further in Section 3.1.3.2.

3.1.3.1. PROPOSED ACTION

Under the Proposed Action, CPO would provide federal financial assistance to support the purchase and installation of SME and tools for Phases 2 and 3 as well as the remaining SME and tools needed for full manufacturing capacity of Phase 1. As part of the air permitting process, TSMC will evaluate the Facility's equipment for compliance with BACT, RACT and LAER requirements (as applicable) and incorporate the emission control technologies necessary to meet acceptable emission levels and ensure air emissions meet the applicable NAAQS and Arizona SIP. As stated above, the Facility's existing synthetic minor source permit already allows for direct air effects from the proposed Facility operations of Phases 1 and 2, including Phases 1 and 2 of the equipment installation (as shown in

Table 3-4). The emissions limitations in Table 3-4 served as the upper bound for emissions from these two fabs in the analysis of effects.

TSMC AZ has modeled and CPO has reviewed the estimated criteria pollutant emissions from all three phases (assuming emissions from semiconductor manufacturing at the technology nodes noted in Section 2.2.2) using the same air dispersion modeling software (i.e., AERMOD v21112 and AERMAP v18081) that TSMC used to obtain its current permit for Phases 1 and 2. Background pollutant concentrations were determined from the closest ambient air monitors to the Facility. To achieve a conservative estimate of criteria pollutant emissions from all three phases, TSMC factored all anticipated emissions from full use of the SME and tools that would be installed in Phases 1 through 3 into its modeling approach. The resulting Facility-wide impact from the operations of Phases 1, 2, and 3 was added to the ambient air background levels to determine the total impact of the Proposed Project. This modeling showed that emissions under the Proposed Project would not cause an exceedance of NAAQS standards. These emissions will form the upper bound of emissions for the Facility.

Under the Permit's site-wide allowable emissions limits, TSMC may make certain physical or operational changes to the Facility without a permit modification, subject to certain conditions. Emission controls under the Permit include thermal oxidation (incineration) applied to all process VOC emissions (to the extent practicable), use of wet scrubbers to reduce inorganic HAP emissions, and other air emission control devices incorporated with the SME. Thermal oxidation is the most common destruction method for F-GHGs. Although GHGs are not subject to the Facility's existing air permit, TSMC's emission control technology outlined in their permit would reduce F-GHGs by 90 percent or more (see Section 3.2). The Proposed Project would apply similar emission control technologies for each fab.

TSMC's construction of Phase 3 would only be permitted once the emissions estimates and total emissions are determined to be acceptable by MCAQD. The additional emissions from Phase 3 operations would require permitting of TSMC AZ as a major source of criteria pollutants (i.e., requiring TSMC AZ to obtain a Title V permit), which may entail use of certain emission control technologies and the purchase of emission reduction credits (ERCs). The new Title V permit that would be required with the addition of Phase 3 (anticipated in 2025 or 2026) would be subject to a public notice and comment period in accordance with Maricopa County Air Pollution Regulations Rules 100 and 210, as applicable.

In February 2024, EPA lowered the level of the annual NAAQS for $PM_{2.5}$ from 12.0 to 9.0 micrograms per cubic meter ($\mu g/m^3$), prompting revisions to the NAAQS. Current $PM_{2.5}$ emission levels modeled for Phases 1, 2, and 3 of the Proposed Project demonstrate conformance with the current standard of 12.0 $\mu g/m^3$; however, additional control technologies may be required to meet the proposed revised standard. Conformance with the $PM_{2.5}$ levels will be maintained through MCAQD permits for the equipment.

It is anticipated that a portion of Maricopa County will be redesignated within the next few years as serious nonattainment for the 8-hour ozone standard. At such time, all facilities having potential and/or actual emissions above 50 tpy for NO_x or VOC will be required to apply for a Title V permit. The Facility's existing permit has allowable limits (Table 3-4) over the 50 tpy threshold for each of these pollutants. As part of the permitting process, emissions and control equipment may need to be reassessed to confirm that the emission levels emitted comply with any newly applicable requirements.

As discussed in Section 3.1.1.2, the Proposed Project must meet the thresholds of General Conformity. Under General Conformity guidelines, emissions subject to existing operating permits (i.e., direct emissions) are considered to already conform to the state's SIP and would not cause a violation of the NAAQS. However, non-permitted activities, such as indirect emissions, must be evaluated for conformity. TSMC AZ construction activities and ongoing operations considered in the General Conformity applicability analysis include truck deliveries (e.g., transportation of the SME to the Facility, additional truck deliveries related to operations of this equipment), installation emissions (above and beyond the building emissions already accounted for separately), daily employee travel (for contractors and TSMC employees required specifically for this equipment), and SME-related electricity and natural gas usage. Data presented in Section 3.8.2 was used as inputs for modeling indirect emissions from mobile sources using the California Emissions Estimator Model (CalEEMod, v2022.1.1.22). The modeling results show that the nonattainment pollutants would fall below *de minimis* thresholds (Appendix A).

Overall, the Proposed Project would result in moderate effects on air quality with the use of BMPs, use of renewable energy sources, and mitigation measures (described in Section 3.1.4).

3.1.3.2. NO ACTION ALTERNATIVE

As discussed in Section 2.2.1, for the purposes of comparative analysis, the No Action Alternative assumes a partial installation of equipment and tools in Phase 1 only. Therefore, under this alternative, air emissions would be limited to those associated with the portion of SME installed and operational in Phase 1 prior to the date of PMT (April 8, 2024), which will result in a limited amount of air emissions from Phase 1 (estimated to be between 50 and 70 percent of the total emissions that would otherwise be generated during Phase 1 under the Proposed Action). Potential direct air effects from the operation of this limited portion of SME installed in Phase 1 will be managed within the current permitted limits. These emission levels would fall well below the Facility's permitted emission levels for each pollutant. In accordance with the existing air permit, TSMC would implement Best Available Control Technologies (BACT) as applicable to reduce operational emissions from these limited Phase 1 emissions.

Under the existing permit, sources of nonattainment pollutants ozone and PM_{10} would increase slightly from current levels, but air modelling associated with the permit predicted that these slightly increased levels would not cause a significant degradation of regional air quality or violate the Arizona SIP. A General Conformity Rule Applicability Analysis was not completed for the No Action Alternative as this alternative would not involve federal financial assistance.

3.1.4. BMPS AND MITIGATION

In the event control technologies (discussed in Section 3.1.3.1) are not capable of reducing Facility air emissions below relevant thresholds, TSMC will obtain emission reduction credits to offset emissions. Abatement and use of credits are expected to bring effects to air quality to less than significant levels. MQACD's issuance of a Title V air permit that accounts for operations of Phase 3 will demonstrate that emissions will be appropriately managed and comply with the Arizona SIP. CPO will not disburse federal financial assistance for SME for Phase 3 until its associated MQACD Title V permit is issued. Section 3.2.4 describes TSMC's F-GHG reduction BMP.

3.2. CLIMATE CHANGE, RESILIENCY, AND SUSTAINABILITY

This section discusses climate change, resiliency from climate related effects, and sustainability.

GHGs are gaseous emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with global warming is predicted to produce negative economic and social consequences across the globe.

GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers. Each GHG is assigned a global warming potential. Global warming potential is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one. The CO_2 equivalent (CO_2e) rate is calculated by multiplying the emissions of each GHG by its global warming potential and adding the results together to produce a single, combined CO_2e emissions rate representing all GHGs. Fluorinated GHGs (F-GHGs), used widely by semiconductor manufacturers, are the most potent and long-lasting GHGs emitted by human activities.

Facility-related GHG emissions are grouped into three categories:

1. Scope 1 are those direct emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion units and process use of F-GHGs).

2. Scope 2 emissions are indirect emissions associated with the use of electricity, steam, heat, or cooling.

3. Scope 3 emissions are indirect upstream and downstream emissions not directly controlled by an organization but are associated with its operations (e.g., emissions from supply chain, employee business travel, and employee commuting).

Climate resilience is a facility's or operation's ability to recover from, or to mitigate vulnerability to climate-related shocks such as floods or droughts. Climate resilience is one feature of sustainable development.

Sustainable development, as defined in 1987 by the World Commission on Environment and Development, is that which meets the needs of the present without compromising the ability of future generations to meet their own needs.

3.2.1. REGULATORY SETTING

On February 19, 2021, EO 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, reinstated the Obama Administration's Climate Change EO 13653, Preparing the United States for the Impacts of Climate Change, and the White House CEQ's 2016 Final Guidance for Federal Departments and Agencies on Consideration of GHG Emissions and the Effects of Climate Change in NEPA Reviews. The CEQ guidance directs federal agencies to quantify the direct and indirect GHG emissions of a proposed action and weigh climate change effects in considering alternatives and in evaluating mitigation measures. In January 2023, CEQ published a notice of interim guidance and request for comments in the Federal Register on consideration of GHG emissions and climate change in NEPA documents (CEQ 2023b). The notice directs federal agencies

to quantify reasonably foreseeable GHG emissions whenever possible and place those emissions in appropriate context when analyzing a proposed action's climate effects.

In 2021, Congress passed the American Innovation and Manufacturing Act. It directs the EPA to reduce production and consumption of hydrofluorocarbons in the US by 85 percent over the next 15 years, a measure expected to avoid up to 0.5 degrees Celsius of global warming by 2100 (USEPA 2023b). In September 2021, EPA issued a final rule to implement these requirements, which can be found under 40 C.F.R. § Part 84. EPA issued HFC production and consumption allowances in accordance with the final rule for the 2024 calendar year. From 2024-2028, these allowances will be capped at 40 percent below their baseline historic levels (40 C.F.R. § Part 84 and USEPA 2023b).

EPA's Mandatory Greenhouse Reporting for GHG emissions regulations are under 40 C.F.R. § Part 98. Subparts C and I pertain to reporting requirements for the Electronics Manufacturing Sector, which encompasses Semiconductors and Related Devices. Facilities emitting more than 25,000 metric tons (MTs) of CO_2 equivalent (CO_2e) annually are required to report emissions of fluorinated GHGs and fluorinated heat transfer fluids, as well as CO_2, methane (CH_4), and nitrous oxide (N_2O) combustion emissions from each stationary combustion unit. Semiconductors and Related Devices, North American Industry Classification System Code 334413, is a free-standing reporting category under the program. Data reporting requirements include destruction or removal efficiency of fluorinated GHG or N_2O abatement systems. EPA makes reporting information publicly available through its GHG Reporting Program and associated databases.

3.2.2. AFFECTED ENVIRONMENT

Under CPO's Notice of Funding Opportunity, each applicant is required to submit a Climate and Environmental Responsibility Plan addressing energy, climate resilience, water conservation, sustainability transparency, and community and environmental justice impacts. In particular, the plan must describe how its project will maximize sourcing and use of renewable energy and water recycling. CPO reviews the plan to determine whether a proposed project would pose burdens to local community resources and whether the project's rate of utility consumption would be sustainable over the long term.

Climate refers to the predictable, average weather, temperature, and precipitation patterns that characterize a region, while climate change refers to long-term shifts in the climate of a given region or the Earth as a whole. These shifts can be natural, anthropogenic (i.e., caused by human activities), or both. Climate resiliency and adaptation refer to "changes in processes, practices and structures to moderate potential damages to or benefit from opportunities associated with climate change". Since the 19th century, increased burning of fossil fuels to provide the energy demanded by a rapid increase in the human population and its economic activities (e.g., production and consumption) has been the major driver of observed climate change (IPCC 2023).

TSMC integrates green management into daily operations. According to its 2022 Sustainability Report, TSMC identifies four strategies to address climate and energy goals:

- Strengthen Climate Resilience: develop appropriate climate change response and measure to reduce the impact of climate risk.
- Drive Low-carbon Manufacturing: use best available technology to reduce GHG emissions and become an industry leader in low-carbon manufacturing.

- Use Renewable Energy: continue to purchase renewable energy credits and install solar energy power systems to achieve goal of 100-percent renewable energy use.
- Increase Energy Efficiency: continuously plan and implement new energy saving measures.

Facility design has already incorporated several sustainability and resiliency measures. These include:

- Monsoon and Flood Mitigation: To eliminate hazards from flashfloods, a 53-acre drainage channel was completed at the Facility.
- Dust and Sandstorm Mitigation: TSMC AZ is constructing structures with insulation, air purification, dust-repellent surfaces, and a warning system for incoming dust and sandstorms. Upon these alerts, doors are sealed, and filters are increased within air intakes.
- GHG Reduction: TSMC AZ will purchase renewable energy credits in an amount equal to 100 percent of its electricity use to reduce Scope 2 GHG emissions (See Section 3.2.2.1). The Facility will also incorporate abatement systems to reduce fluorinated GHGs emissions by a minimum of 90 percent.
- Onsite Water Reclamation: By 2028, TSMC AZ will construct and complete an IRWP based on a modular design concept to treat, reuse, and recycle water from all its fabs. The IRWP will reduce the burden on local wastewater infrastructure.
- Power Backup: APS will also be installing a microgrid to provide backup emergency power.

3.2.2.1. GREENHOUSE GASES

GHGs are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities (i.e., global warming). The climate change associated with global warming is predicted to produce negative economic and social consequences across the globe.

GHGs are carbon dioxide (CO_2), methane, NO_x, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and F-GHGs, including nitrogen trifluoride and hydrofluorinated ethers. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. The CO_2e is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emissions rate representing all GHGs. F-GHGs include the most potent and longest lasting GHGs emitted by human activities. Hydrofluorocarbons (HFCs) represent 6 percent on average of GHG emissions from semiconductor and related device manufacturing facilities. Some HFCs have a high GWP which, molecule for molecule, can be up to thousands of times greater than CO_2.

Facility-related GHG emissions are grouped into three categories:

1. Scope 1 are those emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion units and process use of F-GHGs).
2. Scope 2 emissions are indirect emissions associated with the purchase of electricity, steam, heat, or cooling.

3. Scope 3 emissions are indirect emissions not directly controlled by an organization but are associated with its operations (e.g., emissions from vendor delivery vehicles, SME installation emissions, and daily employee travel).

Maricopa County estimated its 2020 annual GHGs at 46.8 million MTs, where nearly 46 percent were attributed to mobile sources and 41 percent were attributed to electricity use (Maricopa County, 2024).

3.2.2.2. ENERGY SOURCES

Electricity is provided to the project site by APS. Natural gas is provided by Southwest Gas. Both companies publish annual corporate sustainability reports. In the APS 2022 report (APS 2022), they highlight the following goals: Provide 100-percent clean, carbon-free energy by 2050; achieve a 2030 target of 65-percent clean resource mix with 45 percent from renewable energy; and exit coal-fired generation by 2031. Similarly, Southwest Gas (Southwest Gas Holdings 2022) promotes sustainability by performing pipeline leak surveys more often than required by law, replacing aging infrastructure, and incorporating renewable natural gas projects from biomass.

3.2.3. ENVIRONMENTAL CONSEQUENCES

3.2.3.1. PROPOSED ACTION ALTERNATIVE

The current estimations for annual Scope 1 GHG emissions for the Facility overall is approximately 1.6 million MT. Associated GHG emissions from the operations related to the SME installed under the Proposed Action would be 1.32 million MT per year. GHG emissions under the Proposed Action Alternative would increase Maricopa County GHG emissions by approximately 2.8 percent.

Similar to other TSMC facilities, SME planned for TSMC AZ will incorporate air control devices for safety purposes. These control devices also abate F-GHGs using electrical heating, fuel combustion, plasma, and catalytic devices that have destruction and removal efficiencies for F-GHGs (e.g., CH_4 and C_2F_6) that, in the aggregate, would reduce F-GHGs by at least 90 percent. These emissions would be subject to EPA's Mandatory Greenhouse Reporting.

As a BMP, Scope 1 and Scope 2 GHG emissions would be offset through purchase of RECs. Based on the estimated electricity use of the Facility, if the Facility were to use typical State sources of electricity (e.g., the current mix of Arizona electricity sources consisting of coal, natural gas, nuclear, etc.,), the Facility's Scope 2 GHGs would be approximately 2.06 million MT per year. However, through the purchase of RECs, the TSMC AZ Facility would offset 2.06 million MT of Scope 2 GHGs. RECs would also be purchased in an amount equivalent to offset its Scope 1 (direct) GHGs. As another BMP, TSMC will install solar panels over its parking area producing an estimated 14.5 megawatts (MW) of renewable energy (covering ~4,000 parking spaces). This project began in August 2022 and will be complete in 2024. Additionally, TSMC AZ will make 96 electric vehicle charging stations available to employees, with the potential to add more in future based on demand.

TSMC would continue to work with their vendors to reduce Scope 3 GHGs. Additionally, they will implement a Travel Reduction Program to reduce Scope 3 GHGs from daily employment travel.

With the existing Facility sustainability and resiliency measures (described in Section 3.2.2) and GHG offset measures for Facility operation, the Proposed Action would pose moderate effects to climate change, resiliency, and sustainability.

3.2.3.2. NO ACTION ALTERNATIVE

Design features of Phase 1 would include the Facility resilience and sustainability measures described in Section 3.2.2. GHG emissions from the operations related to the portion of the Phase 1 equipment installed would be approximately 0.28 million MT per year for Scope 1. The No Action Alternative, under which the Facility would manufacture semiconductors at a far lower rate, would emit 82 percent less Scope 1 GHG emissions than the Proposed action. GHG emissions under the No Action Alternative would increase Maricopa County GHG emissions by approximately 0.6 percent.

Similar to other TSMC facilities, SME planned for TSMC AZ will incorporate air emission control devices for safety purposes. These control devices also abate F-GHGs using electrical heating, fuel combustion, plasma, and catalytic devices that have destruction and removal efficiencies for F-GHGs (e.g., CH_4 and C_2F_6) that, in the aggregate, would reduce F-GHGs by at least 90 percent. These emissions would be subject to EPA's Mandatory Greenhouse Reporting.

As a BMP, Scope 1 and Scope 2 GHG emissions would be offset through purchase of RECs. Based on the estimated energy use of the Facility, if the Facility were to use typical State sources of electricity (e.g., the current mix of Arizona electricity sources consisting of coal, natural gas, nuclear, etc.,), the Facilities Scope 2 GHGs would be approximately 0.48 million MT per year. However, through the purchase of RECs, the TSMC AZ Facility would avoid 0.48 million MT of Scope 2 GHGs. As another BMP, TSMC will install solar panels over its parking area producing an estimated 14.5 megawatts (MW) of renewable energy (covering ~4,000 parking spaces). This project began in August 2022 and will be complete in 2024. Additionally, TSMC AZ will make 96 electric vehicle charging stations available to employees, with the potential to add more in future based on demand.

TSMC would continue to work with their vendors to reduce Scope 3 GHGs. Additionally, they will implement a Travel Reduction Program to reduce Scope 3 GHGs from daily employment travel.

With the existing Facility sustainability and resiliency measures (described in Section 3.2.2) and GHG mitigation measures for Facility operation, the No Action Alternative would pose minor to moderate effects to climate change, resiliency, and sustainability.

3.2.4. BMPS AND MITIGATION

TSMC will implement several BMPs related to climate change, resiliency, and sustainability. TSMC will employ emission control devices that abate 90 percent or more of Scope 1 fluorinated-greenhouse gases (F-GHGs). TSMC will offset Scope 1 and Scope 2 GHGs through purchase of Renewable Energy Credits for 100 percent of Facility energy use and provide on-site renewable energy with installation of solar panels. They will also install 96 on-site electric vehicle charging stations to reduce Scope 3 GHG emissions associated with daily employee travel.

3.3. WATER RESOURCES

This discussion of water resources includes surface water, groundwater, and floodplains. There are no shorelines, wetlands, lakes, rivers, or streams present on the project site although ephemeral water features are present. Off-site surface water resources potentially affected by water use are addressed. Water supplies, stormwater and wastewater are also discussed.

Groundwater is water that flows or seeps downward and saturates soil or rock, supplying springs and wells. Groundwater is used for water consumption, agricultural irrigation, and industrial applications.

Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition. Sole source aquifer designation provides limited protection of groundwater resources, which serve as drinking water supplies.

Floodplains are areas of low-level ground present along rivers, stream channels, large wetlands, or coastal waters. Floodplain ecosystem functions include natural moderation of floods, flood storage and conveyance, groundwater recharge, and nutrient cycling. Floodplains also help to maintain water quality and are often home to a diverse array of plants and animals. In their natural vegetated state, floodplains slow the rate at which the incoming overland flow reaches the main water body. Floodplain boundaries are most often defined in terms of frequency of inundation, that is, the 100-year and 500-year flood. Floodplain delineation maps are produced by the Federal Emergency Management Agency (FEMA) and provide a basis for comparing the locale of the Proposed Project to the floodplains.

3.3.1. REGULATORY SETTING

3.3.1.1. GROUNDWATER

Groundwater is protected through several federal laws that control and limit discharge of pollution into groundwater. These laws include the Safe Drinking Water Act (SDWA), 42 U.S.C. § 300f *et seq.*; the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601 *et seq.*; the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 *et seq.*; and the Clean Water Act (CWA), 33 U.S.C. § 1251 *et seq.*. Groundwater is also regulated by a combination of appropriation systems, pollution statutes, and land ownership rights that vary by state. Though groundwater is often connected to surface water, most states regulate surface water and groundwater separately.

3.3.1.2. SURFACE WATER

The U.S. Army Corps of Engineers (USACE) regulates the discharge of dredge or fill material into "waters of the United States" (WOTUS). WOTUS may include (1) the territorial seas and traditional navigable waters, (2) tributaries, (3) certain lakes ponds, and impoundments, and (4) adjacent wetlands (regulated under Section 404 of the CWA). Section 404 authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredge or fill material into wetlands and other WOTUS. Wetlands are jointly defined by EPA and USACE as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." The CWA has now been interpreted to extend only to those wetlands that are "as a practical matter indistinguishable from waters of the United States."

Through the National Pollutant Discharge Elimination System (NPDES) program, the CWA establishes federal limits on the amounts of specific pollutants that can be discharged into surface waters. The NPDES program regulates the discharge of point (e.g., end of pipe) and nonpoint sources (e.g., stormwater) of water pollution. Most states are authorized to administer NPDES permit programs.

3.3.1.3. WATER SUPPLY

The SDWA is the federal law that protects public drinking water supplies. Under the SDWA, EPA sets standards for drinking water quality. Groundwater quality and quantity are regulated under several statutes and regulations, including the SDWA.

Arizona's Assured and Adequate Water Supply Programs are implemented under Arizona Administrative Code Title 12, Chapter 15, A.R.S. § 45-101 *et seq.* The Assured Water Supply Program operates within Arizona's five Active Management Areas (AMAs). It is designed to sustain the state's economic health by preserving groundwater resources and promoting long-term water supply planning. AMAs are those areas of the state where significant groundwater depletion has occurred historically and include portions of Maricopa, Pinal, Pima, Santa Cruz, and Yavapai counties. The Adequate Water Supply Program operates outside of the AMAs. It ensures that water adequacy or inadequacy is disclosed in the public report provided to potential first purchasers and that any water supply limitations are described in promotional or advertising material.

3.3.1.4. STORMWATER AND WASTEWATER

The NPDES program regulates the discharge of point (e.g., end of pipe) and nonpoint (e.g., stormwater) sources of water pollution. Most states are authorized to administer NPDES permit programs. There are two types of NPDES permits: Individual and General. Individual permits are specifically tailored to an individual facility based on the type of activity, nature of the discharge, and receiving water quality. Construction site operators engaged in clearing, grading, and excavating activities that disturb one acre or more must obtain a NPDES Construction General Permit for stormwater discharges with development of a Stormwater Pollution Prevention Plan, when other conditions are met.

Pretreatment standards for water effluent are pollutant discharge limits that apply to industrial users. Effluent guidelines are uniform national standards developed by EPA for specific industrial categories. EPA promulgated the Electrical and Electronic Components (E&EC) Effluent Guidelines and Standards at 40 C.F.R. Part 469 in 1983. The E&EC category includes semiconductor manufacturing facilities. Process and major wastewater sources regulated include cutting and slicing; lapping and polishing; and cleaning, rinsing, and degreasing (EPA 2024e).

3.3.1.5. FLOODPLAINS

Executive Order (EO) 11988, Floodplain Management, requires federal agencies to avoid to the extent possible the long- and short-term adverse effects associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development unless it is the only practicable alternative. Flood potential of a site is usually determined by the 100-year floodplain, which is defined as the area that has a 1-percent chance of inundation by a flood event in a given year.

EO 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input, amends EO 11988 and establishes the Federal Flood Risk Management Standard to improve the nation's resilience to current and future flood risks, which are anticipated to increase over time due to the effects of climate change and other threats.

3.3.2. AFFECTED ENVIRONMENT

The following discussions provide a description of the existing conditions for each of the categories under water quality resources at the Facility.

3.3.2.1. SURFACE WATER AND GROUNDWATER

Field investigations conducted from October 13 through October 16, 2020 identified nine ephemeral water features (i.e., features that are generally dry but flow in response to precipitation events). A Jurisdictional Determination request was submitted to the USACE Los Angeles District on December 11, 2020. An approved Jurisdictional Determination was received on April 8, 2021 for the area within the TSMC AZ Facility determining that WOTUS are not present. There are no other surface water features on the site.

Groundwater resources potentially affected are discussed under Section 3.3.2.2.

3.3.2.2. WATER SUPPLY

The City of Phoenix's water supply comes from a diverse portfolio of surface water supplies from the Salt, Verde, and Colorado Rivers, groundwater reserves, and reclaimed wastewater for non-potable purposes (City of Phoenix 2021a). In 1995, the state adopted Assured and Adequate Water Supply Rules that require all new development within Phoenix and the other most populous areas of the state to prove the availability of a 100-year water supply. As of June 2023, new groundwater modeling for the Phoenix Aquifer Management Area led to a state determination that existing Certificates or Designations of Assured Water Supply can continue, but that new development would need to demonstrate alternative water sources. Despite increases in population, Phoenix's residential gallons per capita per day water use has fallen roughly 30 percent over the last twenty years. The City currently uses only around half of its Salt and Verde River water supplies and about two-thirds of its Colorado River supplies. Only a small amount of the City's water supply comes from wells (groundwater). During years when adequate water supplies are available, the City banks water. This is done by storing excess water in underground aquifers. During times of water restrictions, this water can be pumped back up and used as a supply to meet demand. In 2014, the City of Phoenix and the City of Tucson entered into a water-sharing agreement whereby Phoenix can store some of its unused water from the Central Arizona Project in aquifers in southern Tucson (University of Arizona 2014).

3.3.2.3. WASTEWATER

The City reclaims and reuses treated wastewater for agricultural irrigation, local power generation, groundwater recharge, and wetland restoration. The 91st Avenue Wastewater Treatment Plant in Phoenix is an end-of-the-line facility that receives flows from Phoenix, Glendale, Scottsdale, Mesa, and Tempe. Water purification is being added to this plant to purify up to 60 million gallons per day (MGD), enough to replace half of the water Phoenix receives from the Colorado River each year. Additionally, the City plans to reopen the Cave Creek Water Reclamation Plant with purification technology to treat and produce up to 6.7 MGD of potable water by 2026.

3.3.2.4. FLOODPLAINS

According to FEMA Flood Insurance Rate Maps effective October 16, 2013, the Facility lies primarily within Flood Insurance Rate Maps panel No. 04013C0845L and a small portion within 04013C04840L, and is designated as having Special Flood Hazard Areas (SFHAs) of Zone A and

"Other Flood Areas" Zone X. Approximately 78.3 acres and 133.8 acres of the Facility currently lay within the Deadman Wash Tributary 2 and Tributary 2A FEMA SFHA Zone A 100-year floodplains, respectively. The remaining approximately 931.2 acres of the Facility lay outside of the FEMA SFHA in a FEMA "Other Flood Areas" Zone X and 12.7 acres of the Facility lies within the Upper Buchanan Wash FEMA SFHA Zone A floodplain.

Special Flood Hazard Areas are subject to inundation by the 1-percent annual chance flood (100-year flood), which is a flood that has a 1-percent chance of being equaled or exceeded in any given year. The SFHA is the area subject to flooding by the 1-percent chance flood. Zone A is defined by FEMA as "No Base Flood Elevations determined." "Other Flood Areas" Zone "X" is defined by FEMA as "Areas of 0.2% Annual Chance Flood; Areas of 1% Annual Chance Flood with Average Depths of Less Than 1 Foot or with Drainage Areas Less than 1 Square Mile; and Areas Protected by Levees from 1% Annual Chance Flood." Special Flood Area Zone AE is described as "Base Flood Elevations Determined." Being in the Special Flood Zone areas A and AE require adherence to architectural and insurance standards set by USACE.

A Conditional Letter of Map Revision (CLOMR) was submitted for DHS-FEMA review (FEMA Case No. 21-09-0845) and was approved August 20, 2021 for development of an approximately 300-feet wide concrete channel along the north edge of the property, conveying flood waters coming from the north and diverting these waters to Deadman Wash to the west. Next steps include (1) completion of as-built Plans for the City's review and approval (approximately 4-to-6-week process; FEMA could take 3 to 6 months after the City's approval), and (2) contractor Wood Patel will prepare a Letter of Map Revision (LOMR) in Q4 2024.

For the Upper Buchanan Wash Channel design and construction along the southern border of the Facility, the Arizona Department of Transportation (ADOT) completed the FEMA CLOMR (FEMA Case No. 22-09-0190R). The CLOMR was approved by FEMA on May 9, 2022. Construction started on September 12, 2022. The channel construction is 90 percent complete and is projected to be completed by mid-October 2024. ADOT is in the process of preparing the LOMR for FEMA submittal.

3.3.3. ENVIRONMENTAL CONSEQUENCES

In this EA, the analysis of water resources looks at the potential effects on groundwater, surface water, and floodplains. Although the installation of SME and tools will not directly impact floodplains, the potential of the Facility to impact floodplains or be impacted by floodwaters was assessed.

3.3.3.1. PROPOSED ACTION

Groundwater

Under the Proposed Project, the Facility would not draw groundwater directly, although it may indirectly use some regional groundwater for its water supply from the City of Phoenix. No direct effects to groundwater would occur.

Surface Water

Under the Proposed Project, there would be no direct effects to surface water bodies, although the Facility may indirectly use some regional surface water for its water supply from the City of Phoenix. No direct effects to surface water would occur under the Proposed Action.

Water Supply

Water demand from the operation of SME for wafer production in Phases 1, 2, and 3 would indirectly affect water resources. Water would be obtained from the City in accordance with the Development Agreement that assures adequate water supply up to a maximum of 11.4 MGD as applicable (September 2023 Memo from City to TSMC AZ, §§ 6.6-6.7 & Exhibit C). TSMC AZ would work with the City to amend or create a new Development Agreement to provide up to **17.3**[7] MGD to accommodate operation of Phase 3. A new or revised Development Agreement with the City's Water Services Department would take into account regional water demands to ensure adequate water supply would be provided to support the Proposed Action and ensure this increased use would not affect the City's Assured Water Supply.

Potential adverse effects from the Facility's demand for water in wafer production would be managed by optimizing reuse of process water. The onsite WRC and IRWP wastewater reclaim/treatment systems would be designed to incorporate the ability to return out-of-specification effluent to the beginning of a treatment system or divert out-of-specification effluent to another system for further treatment. This would allow for close control of any effluent concentrations. The Proposed Project would also incorporate wastewater holding tanks right before the discharge point to the POTW. The holding tank would provide several operational capabilities: (1) ability to perform additional analytical testing or measurements, (2) hold effluent for a short period of time, and (3) return water to the treatment system. The IRWP would be constructed and operational by 2028 and would recycle at least 90 percent of the Facility's wastewater for reuse. With TMSC's BMP for onsite water recycling, plus a mitigation to enact a new or amended Development Agreement with the City, effects on local and regional water supply would be moderate.

Stormwater and Wastewater

The stormwater collection system utilizes underground piping and swales to collect stormwater from the Facility and carries water to four collection basins, most of which are located on the south side of the Facility. The collection pipes are outfitted with sluice gates to ensure accidental discharges are not sent to the basins. The project has incorporated test protocols for all sumps before discharge to the stormwater system.

Under the Proposed Action, TSMC AZ would discharge its pre-treated wastewater from Phases 1, 2, and 3 (up to 13.83 MGD) from the Facility to the City's 91st Avenue POTW. The planned WRC is currently designed for flows from Phases 1 and 2 but would be expanded under the Proposed Project to accommodate Phase 3 to meet all the City discharge requirements. The IRWP would allow the Facility to fully treat and recycle all wastewater generated by the facility, except for waste streams specifically captured and containerized for offsite treatment and disposal. The IRWP design would be based on an operating IRWP at the Model Fab, with improvements to increase quality and volume of recycled water. The IRWP is currently under design for Phases 1 and 2, but under the Proposed Project, the IRWP would be designed and constructed in a modular fashion to receive water from all three Proposed Project phases. The IRWP, to be completed by June 2028, would recycle water from all three phases and would allow TSMC AZ to reach "Near Zero Liquid Discharge" and achieve a water recycling rate of 95 percent or greater. With the construction of the two wastewater treatment systems, to meet discharge limits and recycle 95 percent of wastewater for reuse, combined with more than adequate capacity of the City's POTW to receive the Proposed Project's wastewater, these measures

[7] **Note: Water demand values were updated by TSMC on June 3, 2024, after the initial posting of the Draft EA for public comment on May 29. Total city water demand was revised from 14.624 to 17.29 mgd (Table 2-1).**

would result in no significant effects on the wastewater treatment systems that will be managing TSMC AZ's wastewater discharges.

Floodplains

To reduce flood risk, and in accordance with EO 11988, TSMC AZ worked with USACE and ASLD to construct a 53-acre drainage channel running east to west above the north portion of the TSMC AZ owned property in an easement from ASLD. The channel, completed in 2022, brings stormwater from the north and diverts it into Deadman Wash along the western border of TSMC AZ's property. The drainage channel is concrete and over 300 feet wide at its widest point. The channel design resulted in FEMA approved Conditional Letters of Map Revision (CLOMRs), Case No. 21-09-0845 and Case No. 22-09-0190R (Appendix B).

3.3.3.2. NO ACTION ALTERNATIVE

Groundwater

The Facility would not draw groundwater directly, although it may use some regional groundwater for its water supply indirectly from the City of Phoenix. No direct effects to groundwater would occur. Hazardous materials and waste stored at the Facility would be within enclosed systems that include monitoring or secondary containment to prevent discharges to groundwater.

Surface Water

Under the No Action Alternative, there would be no direct effects to surface water bodies, although it may indirectly use some regional surface water for its water supply from the City of Phoenix. No direct effects to surface water would occur under the No Action Alternative.

Water Supply

Under the No Action Alternative, water demand would be 4.02 MGD. Water would be obtained from the City in accordance with the Development Agreement that assures adequate water supply up to a maximum of 5.7 MGD (September 2023 Memo from the City to TSMC AZ, §§ 6.6-6.7 & Exhibit C). TSMC's proposed water use has been coordinated with the City's Water Services Department to ensure adequate supply is available to support the No Action Alternative and would not affect the City's Assured Water Supply.

The potential for water resource effects based on demand for water in wafer production at Phase 1 will be managed by optimizing reuse of process water. Each wastewater reclaim/treatment system (the WRC and IRWP, see Section 2.1) is designed to incorporate the ability to return out-of-specification effluent to the beginning of a treatment system or divert out-of-specification effluent to another system for further treatment. This allows for close control of any effluent concentrations. The project has also incorporated wastewater holding tanks right before the discharge point to the publicly owned treatment works (POTW). The holding tank provides several operational capabilities: (1) ability to perform additional analytical testing or measurements, (2) hold effluent for a short period of time, and (3) return water to the treatment system.

Stormwater and Wastewater

Stormwater would be managed as discussed in Section 3.3.3.1.

The industrial wastewater discharge rate for under the No Action is estimated to be 3.8 MGD. TSMC AZ would discharge its industrial wastewater from the Facility to the City's 91st Avenue POTW. TSMC AZ would construct two onsite wastewater treatment, recycle, recovery/reuse water systems/facilities, the WRC and IRWP, to treat and recycle wastewater received from Phase 1. These facilities would reduce the burden on the City's POTW, resulting in no significant impacts to the wastewater treatment systems that will be managing TSMC AZ's wastewater discharges.

Floodplains

Floodplains and flood risk for the Facility has already been mitigated, as discussed in Section 3.3.3.1. Based on the CLOMRs, the project site's floodplain designation has been revised and the No Action Alternative would comply with EO 11988.

3.3.4. BMPS AND MITIGATION

TSMC would complete an IRWP as part of the Proposed Project (as a BMP) to recycle 95 percent of Facility wastewater for reuse at the Facility by 2028. TSMC has already installed a 53-acre drainage channel to manage flood risk, reduce erosion and protect surface water quality. Other stormwater and surface water runoff will be managed through drainage structures on the site.

TSMC would finalize an amended or revised Development Agreement with the City of Phoenix to obtain the necessary water supply for all three phases as a mitigation measure.

3.4. CULTURAL RESOURCES

This discussion of cultural resources includes historic properties, architectural resources, archaeological resources, cultural items subject to the Native American Graves Protection and Repatriation Act, Indian sacred sites, and other properties of cultural significance.

3.4.1. REGULATORY SETTING

Cultural resources are governed by federal laws and EOs, including, but not limited to, the National Historic Preservation Act (NHPA), 54 U.S.C. § 300101 *et seq.*, and the Archaeological and Historic Preservation Act (AHPA), 54 U.S.C. § 312501–312508. For the purposes of this analysis, the term "cultural resource" refers to all resources of cultural importance protected by these federal laws and EOs that could potentially be affected by projects and sites evaluated under the CHIPS Incentives Program.

The NHPA is the nation's primary historic preservation law, which defines the legal responsibilities of federal agencies for the identification, management, and stewardship of historic properties. NHPA Section 106 requires federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. Through consultation with interested parties, the federal agency identifies historic properties potentially affected by the undertaking, assesses effects, and seeks ways to avoid, minimize, or mitigate any adverse effects on historic properties.

The AHPA requires federal agencies to provide for the preservation of historical and archaeological data (including relics and specimens) that might otherwise be irreparably lost or destroyed as the result of any alteration of the terrain caused by a federal action.

On private lands in Arizona, A.R.S. § 41-865 protects human remains and funerary objects that exceed 50 years in age. Maricopa County and state permitting authorities may require review of potential cultural resource effects.

3.4.2. AFFECTED ENVIRONMENT

In compliance with the NHPA, CPO will consult with the ACHP, the State of Arizona, Indian Tribes, and other interested parties to identify historic properties and other cultural resources that may be impacted by the Proposed Project. The NHPA defines historic properties as any district, site, building, structure, or object listed in, or eligible for listing in, the National Register of Historic Places (NRHP). For the purposes of this analysis, historic properties can be divided into three major categories:

- Archaeological resources (prehistoric and historic) include the place or places where the remnants of a past culture survive in a physical context that allows for the interpretation of these material remains.
- Architectural resources include standing buildings, structures, landscapes, and other built environment resources of historic or aesthetic significance.
- Traditional cultural properties include properties associated with cultural practices and beliefs of a living community that are (1) rooted in the community's history and (2) important to maintaining the continuing cultural identity of the community.

The area of potential effects (APE) for cultural resources is the geographic area or areas within which an undertaking (project, activity, program, or practice) may cause changes in the character, visual setting, or use of any historic properties present. The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. For the purposes of this EA and the NHPA review, the direct APE consists of the three fab buildings in which SME would be installed, and the indirect APE consists of the immediately adjacent areas within the Facility.

Studies conducted at the Facility considered larger APEs designed to capture effects from development of the Facility in addition to the installation of SME in the fab buildings. Between September 8 and October 9, 2020, the Facility was surveyed to identify cultural resources (Klebacha et al. 2020). The survey defined indirect and direct APEs for the purposes of the study. The direct APE surveyed for archaeological and structural resources consisted of a 2,200-acre tract. The indirect APE of 1 mile surrounding the direct APE was surveyed for architectural resources. This investigation was conducted in accordance with the Arizona State Historic Preservation Act, A.R.S. § 41-861 et seq., the Arizona Antiquities Act, A.R.S. § 41-841 et seq., and the City of Phoenix Historic Preservation Ordinance, Chapter 8, Section 802(B2).

Background research was conducted on Arizona State Museum's AZSITE, the Arizona Register of Historic Places, and the NRHP in September 2023. Research identified nine previously conducted surveys within the direct APE. A total of eight isolated occurrences were recorded during the 2020 survey within the direct APE. None of the isolated occurrences documented during the survey are significant cultural resources considered potentially eligible for listing on the Arizona Register of Historic Places or the NRHP. There are no previously recorded archaeological historic resources or standing historic structures within the boundaries of the direct APE.

The 2020 field investigations identified 11 historic structures within the indirect APE, including four roadways, the Gibson Tank, the Pepe Tank, three unnamed water tanks, a corral, and a telephone line. All items first appear on the 1965 Biscuit Flats U.S. Geological Survey (USGS) topographic map and first appear on historical aerial photographs in 1961 (USGS 1965; NETROnline 2023). These 11 historic items are unlikely to contribute information within the greater context of ranching or land use within the Biscuit Flat area and are therefore not significant.

On December 7, 2020, the ASLD sent a letter to the Arizona State Historic Preservation Officer (SHPO) outlining its findings and recommendations relative to the 2020 survey report (Klebacha et al. 2020). Of the historic structures identified, all but one were deemed ineligible for listing on the NRHP. Only the Gibson Tank was identified for further examination for potential eligibility but ASLD concluded no field documentation nor avoidance measures were necessary. The SHPO concurred with ASLD's findings on December 22, 2020. During Section 106 consultation for the Proposed Project, CPO will ascertain whether the archival research for the Gibson Tank was completed.

3.4.2.1. GOVERNMENT-TO-GOVERNMENT CONSULTATION

As part of the land sale process for the Facility site, the ASLD asked 11 tribes whether they had any comments or concerns regarding the sale. Following that outreach by ASLD, CPO identified five additional tribes who may have an interest in the Proposed Project. CPO initiated consultation with these 16 tribes (listed in Section 8) with letters dated February 21, 2024, providing follow-up emails approximately a week later. Results of the government-to-government consultation will be provided in the Final EA.

3.4.3. ENVIRONMENTAL CONSEQUENCES

Analysis of potential effects on cultural resources considers both direct and indirect effects. Direct effects may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment that contribute to the importance of the resource, introducing visual, atmospheric, or audible elements that are out of character for the period the resource represents (thereby altering the setting), or neglecting the resource to the extent that it deteriorates or is destroyed. Indirect effects on historic properties are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable.

Because undiscovered cultural resources could be encountered even though the Facility footprint has been surveyed for cultural resources, TSMC AZ staff and contractors involved in ground disturbance during ongoing Facility construction or maintenance will notify TSMC AZ environmental staff if any cultural material and/or bone material is encountered and will protect the vicinity from further effects until guidance is provided on how to proceed.

3.4.3.1. PROPOSED ACTION

No significant cultural resources were identified within or adjacent to the Facility. Therefore, the Proposed Project does not have the potential to affect cultural resources. CPO has determined that the Proposed Action of the purchase and installation of SME would have no effects on historic properties. CPO provided correspondence to the Arizona SHPO requesting concurrence with this finding on April 11, 2024. Arizona SHPO replied on May 10, 2024, concurring with the finding, and recommending that CPO consult with the City of Phoenix Archaeology Office as the Certified Local Government (Appendix C). On May 14, 2024, the City Archaeology Office also concurred with CPO's finding of

no adverse effect for this undertaking. CPO also sent correspondence to 16 Tribes in the area to consult on the Proposed Action. The Final EA will provide the results of these consultations.

3.4.3.2. NO ACTION ALTERNATIVE

Under the No Action Alternative, there will be no change to the potential effects on cultural resources.

3.4.4. BMPS AND MITIGATION

No historic properties were identified within or adjacent to the Facility. However, as a BMP, TSMC staff would protect any unanticipated discoveries of cultural resources until guidance is provided on how to proceed.

3.5. BIOLOGICAL RESOURCES

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to generally as vegetation, and animal species are referred to generally as wildlife. Habitat can be defined as the resources and conditions present in an area that support a plant or animal.

Within this EA, terrestrial vegetation and terrestrial wildlife are considered. Threatened, endangered, and other special status species are discussed in their respective categories.

3.5.1. REGULATORY SETTING

Special-status species, for the purposes of this assessment, are those species listed as threatened or endangered under the Endangered Species Act (ESA) (16 U.S.C. § 1531 *et seq.*) or the Migratory Bird Treaty Act (MBTA) (16 U.S.C. § 703 *et seq.*), or the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. § 668 *et seq.*).

The purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend and to conserve and recover listed species. Section 7 of the ESA requires action proponents to consult with the US Fish and Wildlife Service (USFWS) to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species or result in the destruction or adverse modification of designated critical habitat.

Birds, both migratory and most native-resident bird species, are protected under the MBTA, and their conservation by federal agencies is mandated by EO 13186 (Migratory Bird Conservation). Under the MBTA it is unlawful by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, [or] possess migratory birds or their nests or eggs at any time, unless permitted by regulation.

Bald and golden eagles are protected by the BGEPA. This act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles, including their parts, nests, or eggs. The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.”

The Arizona Game and Fish Department conserves diverse wildlife resources and manages them for the safe, compatible outdoor recreation opportunities for current and future generations. The Department provides the Arizona Wildlife Conservation Strategy that identifies and publishes a list of

Species of Greatest Conservation Need (SGCN) with their vulnerability scores. The Strategy identifies key conservation species, sensitive plant species, and additional influential species (species that can affect SGCN and their habitats directly or indirectly through overgrazing, outcompeting native species, or altering predator-prey interactions (Arizona Game and Fish Department, 2022)).

3.5.2. AFFECTED ENVIRONMENT

The following discussions provide a description of the existing conditions for each of the categories under biological resources at the Facility. Threatened and endangered species are discussed in each respective section below.

The Facility is within the Arizona Upland Subdivision of Sonoran Desert scrub biotic community (Brown and Lowe 1980). Mapped vegetation communities include Sonora-Mohave Creosotebush-White Bursage Desert Scrub, which apparently covered most of the Facility prior to development; Sonoran Paloverde-Mixed Cacti Desert Scrub, generally associated with xeric washes interspersed throughout the Facility and the hills in the southwest part of the Facility; and incursion of Invasive Perennial Grassland. Deadman Wash, located in the western part of the Facility is mapped as Wash. The hills to the southwest are shown as Sonoran Paloverde Mixed Cacti Desert Scrub (Griffith et.al. 2014).

In support of overall Facility development, biologists and botanists conducted reconnaissance-level field investigation from October 13 through October 16, 2020. Field teams surveyed protected native plants (protected under ARS 3-903), mapping those in the highly safeguarded category (see Appendix D, Section 4.2.1) and noting the presence of salvage restricted species.

Terrestrial vegetation identified within the Facility was within the following vegetation communities:

- Sonoran Paloverde-Mixed Cacti Desert Scrub—This plant community is described as “a diverse mixture of evergreen and deciduous leguminous trees, shrubs, and cacti” (Bennett et al. 2013). This vegetation community was located within uplands in the northeast and southwest corners of the Facility.

- Sonora-Mohave Creosotebush-Bursage Desert Scrub—This community is described as “very open evenly spaced low diversity stand of microphyll shrubs, containing a few scattered trees and cactus species with a perennial cover of 10–20 percent” (Bennett et al. 2013). This vegetation community was located within the flats across large expanses of the Facility.

Terrestrial wildlife identified within the Facility consisted of numerous wildlife species and signs observed during the October 2020 field surveys. Numerous excavations of various ground-dwelling mammalian species were observed during surveys and included two SGCN species: Harris’ Antelope Squirrels (*Ammospermophilus harrisii*) and Kit Foxes (*Vulpes macrotis*). Survey noted evidence of Javelina (*Pecari tajacu*), Mule Deer (*Odocoileus hemionus*), Pronghorn (*Antilocapra americana*). The Facility is outside the range of the federally listed Sonoran Pronghorn (*Antilocapra americana sonoriensis*), and Bighorn Sheep (*Ovis canadensis*).

During field surveys numerous existing nest structures were discovered and included nests that belong to Cactus Wren (*Campylorhynchus brunneicapillus*), which is a species protected under the MBTA. Additionally, saguaros were identified during surveys and serve as prime nesting substrate. Nests within saguaros belonged to Great Horned Owls (*Bubo virginianus*), Cactus Wrens, and swallows.

Several nest cavities of the appropriate size to be utilized by Gilded Flickers (*Colaptes chrysoides*) were also identified. During surveys, 30 avian species were observed in or flying over the Facility.

The following discussions provide a description of the existing conditions for each of the categories under biological resources at the Facility.

3.5.2.1. ESA

A search of USFWS's Information for Planning and Consultation database (IPaC) on October 8, 2020, identified four federally listed species with potential to be in or near the Facility and stated no federally designated critical habitats are within the Facility (USFWS 2020). Additionally, the Arizona Environmental Review Tool (ERT) (Arizona Game and Fish Department 2020) was utilized to generate information on potential sensitive species and resources that are within the Facility and resulted in the addition of two species. Data that documents bird distribution, abundance, habitat use is collected through a species database known as eBird, which is managed by the Cornell Lab of Ornithology (eBird 2020). eBird data listed an additional federally listed avian species occurrence recorded within 3 miles of the Facility. These data are included in Appendix D.

The species identified by IPaC, ERT, and eBird include Ocelot (*Leopardus pardalis*), endangered (ERT); Jaguar (Panthera onca), endangered (ERT); Yellow-billed Cuckoo (*Coccyzus americanus*), threatened (IPaC); Southwestern Willow Flycatcher (*Empidonax traillii extimus*), endangered (eBird); California Least Tern (*Sterna antillarum brown*), endangered (IPaC); Sonoran Desert Tortoise (*Gopherus morafkai*), candidate (IPaC, ERT); and Gila Topminnow (*Poeciliopsis occidentalis*), endangered (IPaC). Six of these species are unlikely to be present within the Facility boundaries. Only the Sonoran Desert Tortoise, which is a federal candidate species, is also protected under Arizona state law and is likely to be present within the Facility boundaries based on habitat and field surveys, which include the presence of potential burrows in the Facility; however, no Sonoran Desert Tortoises were identified during efforts to relocate the Sonoran Desert Tortoise conducted in March 2021 (GHD 2020).

3.5.2.2. MBTA

Numerous existing nest structures were discovered during the October 2020 field surveys that included nests belonging to Cactus Wrens (*Camphlorhynchus brunneicapillus*), which is a species protected under the MBTA. Other nests identified within the Facility included those belonging to Great Horned Owls (Bubo virginianus) and swallows, which are also protected under the MBTA. Vegetation removal prior to construction was restricted to non-breeding seasons to prevent disturbing migratory birds.

3.5.2.3. BALD AND GOLDEN EAGLE PROTECTION ACT

Some nesting habitat is present within the Facility for the Bald Eagle (*Haliaeetus leucocephallus*); however, the lack of nearby perennial water sources makes the Facility conditions marginal for the species. No suitable nesting habitat is present within the Facility regarding the Golden Eagle (*Aquila chrysaetos*) and the species has moderate potential for forage in the Facility (USFWS 2020). No Bald or Golden Eagle nests were identified during the 2020 October field surveys (GHD 2020). The Bald and Golden Eagle Protection Act prohibits take of Bald or Golden Eagles without prior USFWS permit.

3.5.2.4. STATE PROTECTED SPECIES

TSMC AZ coordinated with the Arizona Department of Agriculture to relocate species of plant designated as threatened or endangered by the state that were found onsite to a temporary nursery as part of the land development process in March 2021 with the intention to return them to the site at the conclusion of construction. Species included saguaro, Engelmann's hedgehog cactus, desert barrel cactus, compass barrel cactus, desert ironwood, Engelmann's prickly pear, honey mesquite, and velvet mesquite.

As stated previously, two ground-dwelling SGCN species, Harris' Antelope Squirrels and Kit Foxes, were identified during the 2020 October field studies (GHD 2020). The survey also noted evidence of SGCN-listed Javelina, Mule Deer, Pronghorn.

3.5.2.5. INVASIVE SPECIES

Several invasive/non-native species of plant were detected onsite prior to pre-construction vegetation removal. They included sahara mustard, red brome, rattail fescue, wall barley, cheeseweed mallow, night-scented stock, globe chamomile, littleseed canarygrass, and woolly plantain. The Facility also contained very large portions of invasive grassland that is seen from the lack of shrubs and high cover of grasses.

3.5.3. ENVIRONMENTAL CONSEQUENCES

This analysis focuses on wildlife or vegetation types that are important to the function of the ecosystem or are protected under federal or state law.

3.5.3.1. PROPOSED ACTION ALTERNATIVE

Because of the current industrial land use of the Facility, its lack of natural habitat and lack of connection to intact natural habitats and resultant low potential for wildlife use, and the results of informal consultation with the USFWS and AZGFD, impacts on biological resources would not be significant. The Proposed Project has no potential to significantly directly impact any biological resources. Construction of the Facility was and is being managed to avoid significant impacts to biological resources. For example, TSMC coordinated the temporary removal of state protected plants from the site prior to construction with the intention to return them at the conclusion of construction.

Other potential indirect effects on biological resources are expected to be minor. Noise and lighting levels during construction would likely cause disturbance to the species within the Facility boundaries, but these effects would only last temporarily while construction is occurring. During operation, noise and lighting effects to biological resources would be negligible. Similarly, the increase in vehicular traffic would result in minor disturbances to biological resources in the area. Dust and emissions during construction are expected to increase over current levels; however, due to the implementation of BMPs and the temporary nature of the construction phase, effects to biological resources are expected to be minor and temporary.

3.5.3.2. NO ACTION ALTERNATIVE

Because of the current industrial land use of the Facility, its lack of natural habitat and lack of connection to intact natural habitats and resultant low potential for wildlife use, and based on the

results of the informal consultation with the USFWS and AZGFD, effects on biological resources would not be significant.

During construction to date, time of year restrictions to vegetation removal have been followed to the extent practical to avoid effects on MBTA species and the Sonoran Desert Tortoise. Other potential effects to biological resources during construction from noise, traffic and lighting would be minor and temporary and are being managed to reduce effects to the extent practical. Effects on biological resources during construction are expected to be minor and temporary.

3.5.4. BMPS AND MITIGATION

No significant effects on biological resources were identified. However, TSMC will implement BMPs to restrict vegetation removal to non-breeding seasons, return saguaro cacti to the site after completion of construction, and ensure construction contractors cover holes and trenches when not in use or provide ramps to allow small animals to escape.

3.6. LAND USE

This discussion of land use includes current and planned uses and the regulations, policies, or zoning that may control the proposed land use. The term land use refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas; however, there is no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, labels, and definitions vary among jurisdictions.

Natural conditions of property can be categorized as unimproved, undeveloped, conservation or preservation area, and natural or scenic area. There is a wide variety of land use categories resulting from human activity including residential, commercial, industrial, agricultural, institutional, and recreational. Often changes in land use can be accompanied by changes to the visual landscape. To the extent land use affects visual resources, these effects will be addressed in this section.

3.6.1. REGULATORY SETTING

The Farmland Protection Policy Act (FPPA) (7 U.S.C. § 4201 *et seq.*) is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

3.6.2. AFFECTED ENVIRONMENT

The following discussions provide a description of the existing conditions for each of the categories under land use resources at the Facility.

The Facility's land was formerly undeveloped desert land originally zoned as "S-1", Ranch or Farm Residence District, and was rezoned in October 2020 to Planned Unit Development (PUD) in Ordinance G-6756 by the Council of the City, which includes a 2,500-foot residential buffer where residential development is prohibited. According to the United States Department of Agriculture

(USDA) Web Soil Survey, the entirety of the Facility is classified as not prime farmland (USDA-NRCS 2023).

Facility construction began in April 2021, as described in Section 2.1. Bulk gas plants to serve Proposed Project operations are being constructed in the western portion of the Facility, and a microgrid for backup emergency power will be installed by APS. To support the development of the Proposed Project, the City constructed three arterial roads and one frontage road in anticipation of increased traffic. The City installed a lift station to accommodate increase in water volume.

The surrounding properties are unused/undeveloped land parcels currently owned by the ASLD and reserved for future development. State Trust land is intended to provide substantial benefit to the local community through economic stimulation through supporting and planning infrastructure and development corridors (ASLD 2023).

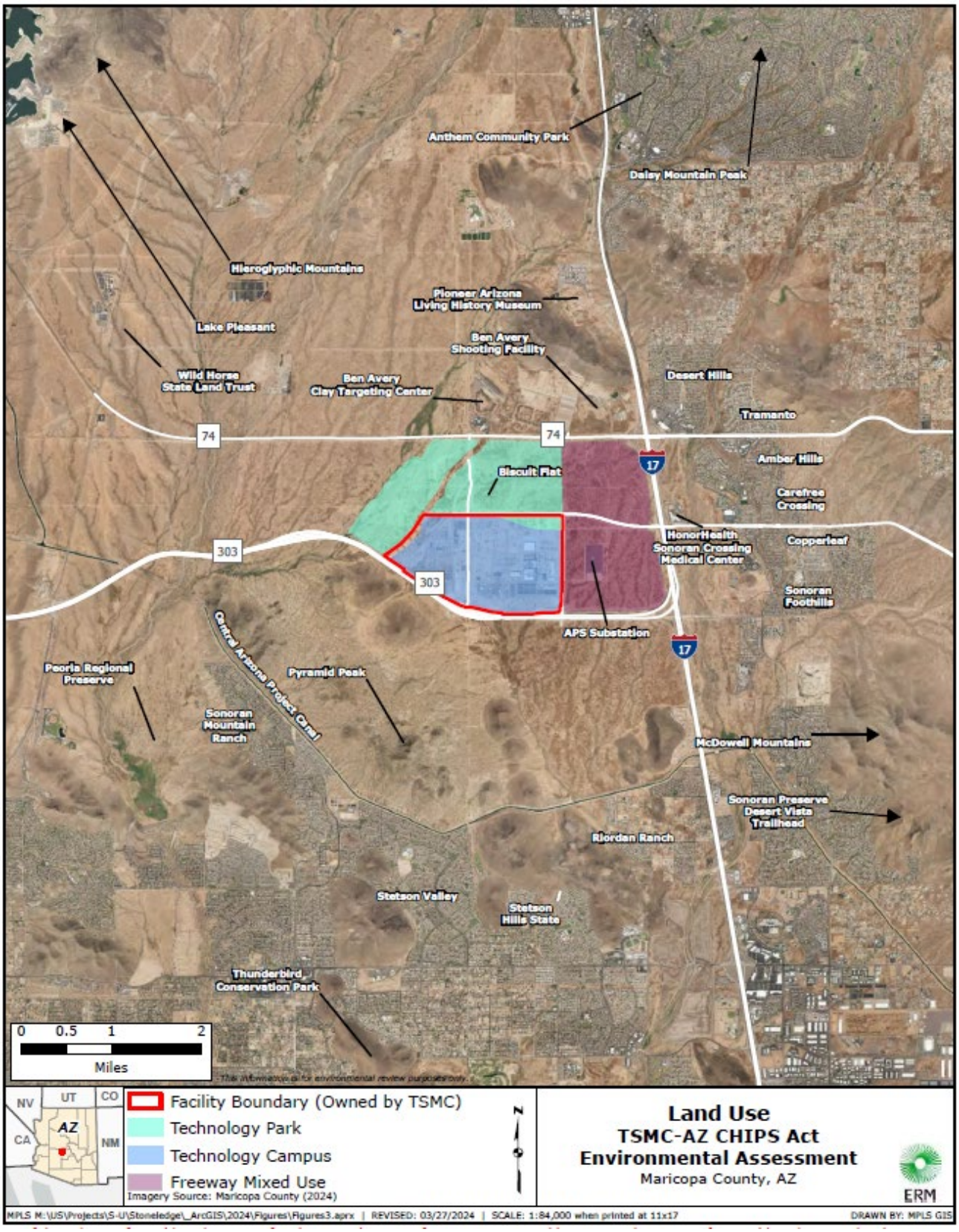
3.6.2.1. LAND USE COMPATIBILITY

The City adopted a 2015 General Plan that provides the vision and policies that determine how the City will grow and develop. The current plan is founded on three community benefits of prosperity, health, and the environment. Economic development, leading edge technology, and job opportunities are outlined as vital resources for the City to serve as a hub for future investment (City of Phoenix 2015).

3.6.2.2. AESTHETIC AND VISUAL RESOURCES

The Facility is located northwest of the interchange of Interstate 17 and State Highway 303 in the North Phoenix region of the City. State Highway 303 runs along the southern boundary of the Facility, and Interstate 17 is approximately 1.1 miles east. West Dove Valley Road runs along the northern boundary of the Facility. North 43rd Avenue runs along the eastern boundary of the Facility and does not extend beyond West Dove Valley Road or State Highway 303, so it is not considered a public use road for travelers and commuters and currently only acts as an access road to the Facility and the APS Substation to the east. Views from the Facility to the north, west, and south are open desert of the Biscuit Flat area along with the roadways mentioned above. To the south multiple hills and mountains are visible, including Pyramid Peak. Looking west the open desert leads to views of the McDowell Mountain Range and the Hieroglyphic Mountains to the west and north around Lake Pleasant. To the east the Sonoran Preserve and associated mountains are visible east of the Sonoran Hills and Norterra dense residential areas. Figure 3-1 depicts the surrounding areas and land use in the Facility vicinity.

FIGURE 3-1 SURROUNDING LAND USE



3.6.3. ENVIRONMENTAL CONSEQUENCES

The location and extent of a Proposed Action needs to be evaluated for its potential effects on a Facility and adjacent land uses. Factors that could affect land use include a project's compatibility with onsite and adjacent land uses, potential restrictions of public access to land, or change in an existing land use that is valued by the community. Other considerations are given to proximity to a proposed action to other land uses, the duration of a proposed activity, and its permanence.

3.6.3.1. PROPOSED ACTION ALTERNATIVE

Changes to land use zoning of the site occurred prior to 2021. The Facility is now considered industrial in nature. Prior to rezoning of the land from "Ranch or Farm Residence District", the land was vacant. The site also contains no prime farmland. Based on these factors, adverse effects to ranching and farming land uses from the rezoning were expected to be minor. The development of the site, including the TSMC AZ Facility, meets the City General Plan's objective for building prosperity and attracting talent to the City.

The Proposed Action of purchasing and installing SME would not cause direct effects to land use. The SME would not be visible from the outside of the structures and would therefore have no visual effects.

Indirect visual effects from the build-out and operation of the Facility were assessed. Due to the flat and open landscape of the surrounding area, the existing Facility buildings are visible from, but not visually intrusive on, the residences on the east side of Interstate 17 in the Sonoran Hills and Norterra residential areas, as well as by travelers along Interstate 17, State Highway 303, West Carefree Highway, users of the Ben Avery Shooting Facility to the north, Honor Health Sonoran Crossing Medical Center campus, and the nearby hiking trails in the area. The Facility is also potentially visible from, but not visually intrusive on, residences on the southwest side of the Central Arizona Project Canal and by recreationalists along the Central Arizona Project Trail in the area west of Interstate 17. Significant adverse visual effects to any future residential properties in the area will be reduced or avoided through the Facility's existing 2,500-foot buffer, where residential development is prohibited. While buildings at the Facility would be visible from local vantage points, they would be of sufficient distance to not significantly impact the viewshed from residential and recreational areas.

Potentially unsightly operational aspects of the Facility, such as exterior waste receptacles, storage, electrical transformers, exhaust/emission points, loading/unloading and docking areas and other supporting infrastructure, will be screened or located so they are not visible from typical viewpoints outside of the Facility fence line. No significant impacts to land use are anticipated from land use.

Overall, the Proposed Action would not pose significant direct or indirect effects to land use or viewsheds.

3.6.3.2. NO ACTION ALTERNATIVE

Changes to land use zoning of the site occurred prior to 2021. The Facility is now considered industrial in nature. The No Action Alternative would not affect prime farmland or agricultural land use. While Facility buildings including the Phase 1 and shell of Phase 2 would be visible from local vantage points, they would be sufficiently distant to not significantly impact the viewshed from residential areas. Adverse visual effects to any future residential properties in the area will be reduced or avoided from the Facility through the existing 2,500-foot buffer, where residential development is prohibited. As stated in subsection 3.6.3.1, unsightly operational features would be screened from typical

viewpoints outside the Facility. No significant direct or indirect effects to land use or viewsheds are anticipated from the No Action Alternative.

3.6.4. BMPS AND MITIGATION

No significant effects to land use or viewsheds are anticipated. No BMPs or mitigation measures are required.

3.7. NOISE

This discussion of noise includes the types or sources of noise and the associated sensitive receptors in the human environment. Noise in relation to biological resources and wildlife species is discussed in the Biological Resources section (Section 3.5).

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. The perception and evaluation of sound involves three basic physical characteristics:

- Intensity—the acoustic energy, which is expressed in terms of sound pressure, in decibels (dB)
- Frequency—the number of cycles per second the air vibrates, in Hertz
- Duration—the length of time the sound can be detected.

Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although continuous and extended exposure to high noise levels (e.g., through occupational exposure) can cause hearing loss, the principal human response to noise is annoyance. The response of different individuals to similar noise events is diverse and is influenced by the type of noise, perceived importance of the noise, its appropriateness in the setting, time of day, type of activity during which the noise occurs, and sensitivity of the individual. An extensive amount of research has been conducted regarding noise effects, including annoyance, speech interference, classroom/learning interference, sleep disturbance, effects on recreation, potential hearing loss, and nonauditory health effects.

Noise associated with the Proposed Project is not expected to rise to the level of being damaging to hearing, and this analysis focuses on noise as disruptive or annoying.

3.7.1. REGULATORY SETTING

The City has a general noise ordinance that restricts unreasonably loud sounds (City of Phoenix 2023). These types of ordinances are commonly referred to as nuisance ordinances with no decibel-specific performance standards. The ordinance does regulate allowable hours for construction activity, but only if construction occurs within 500 feet of an inhabited structure. Since there are no inhabitable structures located within 500 feet of the Facility, this noise ordinance is not applicable to the Proposed Project. The ordinance does not contain any restrictions on operational noise applicable to the Proposed Project.

The Maricopa County noise ordinance (Maricopa County 2006) is only applicable to unincorporated areas of the county and is therefore not applicable to the Proposed Project.

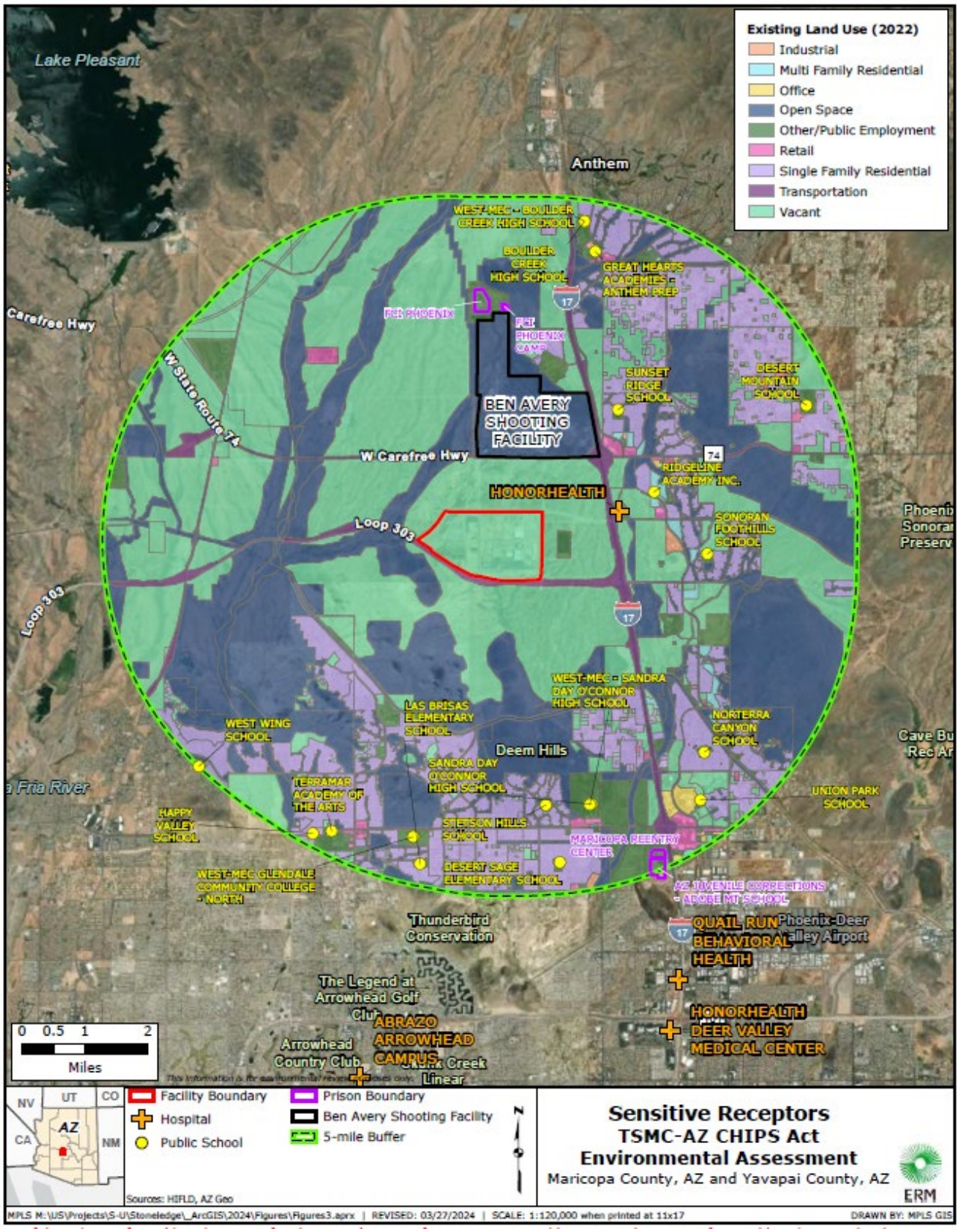
The Maricopa County Hours of Construction Ordinance (Maricopa County 2004) limits the allowable hours of construction for commercial and industrial projects when construction will occur within 1,500 feet of an occupied residence. Since there are no occupied residences within 1,500 feet of the Facility, this ordinance is also not applicable to the Proposed Project.

No State of Arizona noise standards applicable to the Proposed Project were identified.

3.7.2. AFFECTED ENVIRONMENT

Many components may generate noise and warrant analysis as contributors to the total noise impact. Response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and whoever hears it (the receptor), receptor sensitivity, and time of day. A noise sensitive receptor is defined as a land use where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise. Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, and libraries. Sensitive receptors may also include noise-sensitive cultural practices, some domestic animals, or certain wildlife species. The noise-sensitive areas (NSAs) for this analysis were identified through review of aerial photography (Figure 3-2).

FIGURE 3-2 NOISE-SENSITIVE AREAS



Biological effects were evaluated in Section 3.5 including sensitive species identified with the Facility that were known to occur or potentially occurring in the region of influence (ROI). As construction during breeding seasons was avoided, species within the Facility should not be impacted by noise disturbance during construction.

The area adjacent to the Facility is largely undeveloped with no NSAs. State Route (SR) 303 borders the Facility to the south. Interstate 17 is located east of the Facility, adjacent to the NSA communities. The nearest identified NSAs include residential communities that are located over 8,000 feet to the east of the Facility. Provided in Table 3-5 is a summary of the nearest identified NSA areas, and their distance and direction from the edge of the Facility.

TABLE 3-5 IDENTIFIED NOISE SENSITIVE AREAS

NSA	Land Use Type	Approximate Distance/Direction from Facility
1—North Valley Parkway	Residential Community	8,500 feet/northeast
2—North 30th Lane	Residential Community	8,200 feet/east-northeast
3—North 26th Glen	Residential Community	10,800 feet/east-southeast

3.7.2.1. BASICS OF SOUND AND HUMAN HEARING

The loudest sounds that can be comfortably heard by the human ear have intensities a trillion times higher than those of sounds barely heard. Because of this vast range, it is unwieldy to use a linear scale to represent the intensity of sound. As a result, a logarithmic unit known as dB is used to represent the intensity of a sound, also referred to as the sound level. Normal speech has a sound level of approximately 60 dB. To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements are usually on an "A-weighted" scale, which places less weight on very low and very high frequencies to replicate human hearing sensitivity. A-weighting is a frequency-dependent adjustment of sound level used to approximate the natural range and sensitivity of the human auditory system.

3.7.2.2. NOISE SOURCES—CONSTRUCTION

While construction is not included in the Proposed Project, construction is considered here as a related action. Because the Facility is 8,200 feet from the nearest residences, no restrictions on hours of construction from local ordinances pertain (Phoenix City Code Noise Ordinance 23-12). The construction equipment utilized will differ during different stages but will include dozers, cranes, cement mixers, dump trucks, and loaders. Noise is generated during construction primarily from diesel engines, which power the equipment. Noise levels of construction equipment that may be used for Facility construction are summarized in Table 3-6 (FHWA 2006).

Noise transmitted from the Facility will be attenuated by a variety of mechanisms. The most significant of these mechanisms is the divergence of the sound waves with distance (attenuation by divergence). In general, this mechanism will result in a 6 dBA decrease in the sound level with every doubling of distance from the source. Additional reductions in noise are achieved through absorption by the atmosphere. Table 3-6 also provides the calculated construction-related sound levels at the NSA locations. Construction noise levels were calculated by considering hemispherical spreading (distance

to the NSA) and absorption of sound by the atmosphere in accordance with the methodology provided in the International Standard for Organization (ISO) 9613-1 method.

TABLE 3-6 CALCULATED CONSTRUCTION EQUIPMENT NOISE LEVELS (DBA)

Equipment Type	Maximum Noise Level at 50 Feet, dBA	Noise Levels at North Valley Parkway, dBA (8,500 Feet)	Noise Levels at North 30th Lane, dBA (8,200 Feet)	Noise Levels at North 26th Glen, dBA (10,800 Feet)
Cement Trucks	79	20	21	15
Front End Loaders	79	20	21	15
Graders	85	26	27	21
Dozers	82	23	24	18
Pickup Trucks	55	0	0	0
Backhoes	78	19	20	14
Concrete Mixers	79	20	21	15
Air Compressor	78	19	20	14
Dump Trucks	77	18	19	13
Cranes	81	22	23	17
Flatbed Trucks	74	15	16	10

Source: FHWA 2006.

3.7.2.3. NOISE SOURCES—OPERATIONS

Operation of SME are considered in this EA as connected actions. Related operations at the Facility are necessary for the operation of the fabs and are therefore considered here as being related to but not included in the Proposed Action. Operational Facility noise sources will include, but not be limited to, emergency electricity generators, cooling towers, rooftop vents, transformers, HVAC units, and a variety of pumps and compressors. Many noise sources will be contained within buildings. Noise levels from the operational noise sources are expected to be lower than noise levels generated during construction activities. Facility-related vehicular traffic from commuting workers and trucks receiving and shipping materials will access the Facility from Interstate 17 and SR 303, resulting in additional operational noise, particularly during peak morning and afternoon traffic hours.

Significant existing sources of noise in the area of the NSAs are Interstate 17 and State Route 303, which is located either adjacent to, or within about 0.5 mile of the NSAs. Existing ambient noise levels in the area were estimated by determining the land uses in the area through a review of aerial photography. General ambient noise levels by land use have been estimated by the EPA (USEPA 1978). However, a more detailed estimate is provided in American National Standards Institute (ANSI) standard 12.9-2013/Part 3 (ANSI 2013). The standard provides estimates of existing noise levels based on detailed descriptions of land use categories. The levels are in general agreement with those published by EPA. The ANSI standard noise estimation divides land uses into six distinct categories. These categories, their descriptions, and the estimated existing daytime and nighttime L_{eq} sound levels are provided in Table 3-7. The L_{eq} is a single value of sound that includes all of the varying sound energy in a given duration.

TABLE 3-7 LAND USE CATEGORIES FOR ESTIMATING AMBIENT NOISE LEVELS

Category	Land Use	Description	Estimated Existing Daytime L_{eq}	Estimated Existing Nighttime L_{eq}
1	Noisy Commercial and Industrial Areas	Very heavy traffic conditions, such as in busy downtown commercial areas, at intersections of mass transportation and other vehicles, including trains, heavy motor trucks and other heavy traffic, and street corners where motor buses and heavy trucks accelerate.	66	58
2	Moderate Commercial and Industrial Areas, and Noisy Residential Areas	Heavy traffic areas with conditions similar to Category 1 but with somewhat less traffic, routes of relatively heavy or fast automobile traffic but where heavy truck traffic is not extremely dense, and motor bus routes.	61	54
3	Quiet Commercial, Industrial Areas, and Normal Urban and Noisy Residential Areas	Light traffic conditions where no mass transportation vehicles and relatively few automobiles and trucks pass, and where these vehicles generally travel at low speeds. Residential areas and commercial streets and intersections with little traffic comprise this category.	55	49
4	Quiet Urban and Normal Residential Areas	These areas are similar to Category 3 above but, for this group, the background is either distant traffic or is unidentifiable.	50	44
5	Quiet Suburban Residential Areas	Isolated areas, far from significant sources of sound.	45	39
6	Very Quiet, Sparse Suburban or Rural Areas	These areas are similar to Category 5 above but are usually in unincorporated areas and, for this group, there are few if any near neighbors.	40	34

Source: ANSI 2013.

Utilizing the ANSI standard, existing ambient noise levels at the NSAs in the area were estimated. Based upon a review of the land uses in the area of the NSAs, including the presence of Interstate 17, the NSAs fell into a Category 3 land use (Quiet Commercial, Industrial Areas, and Normal Urban and Noisy Residential Areas), with estimated daytime L_{eq} sound levels of 55 dBA and nighttime L_{eq} sound levels of 49 dBA.

3.7.3. ENVIRONMENTAL CONSEQUENCES

3.7.3.1. PROPOSED ACTION ALTERNATIVE

As shown in Table 3-6, construction related noise levels at the very large distances between the Facility and the NSA communities will be very low, and well below the estimated existing ambient condition of 55 dBA during the day and 49 dBA at night. Noise would not interfere with speech, impair learning nor cause adverse health effects in children or adults. Construction-related noise impacts would be less than significant on NSAs.

The installation of SME would involve far less construction activity, and would result in lesser noise effects, when compared to the fab building construction phases. Many operational noise sources would be contained within buildings. The noise levels presented in Table 3-6 demonstrated that construction noise levels will be well below ambient conditions at the NSA communities located over 8,000 feet away from the Facility. Accordingly, operational noise levels are predicted to be well below ambient conditions at the NSAs. As a result, operational noise would not interfere with speech, impair learning nor cause adverse health effects in children or adults. The Proposed Project anticipates that vehicular traffic associated with operations will be negligible compared to the existing traffic volume on the I-17 highway. As such, increases in traffic related noises at the NSA locations will be negligible. Similarly, under the No Action Alternative, traffic related noises at the NSA locations would be negligible. No operational noise effects are therefore expected to occur due to the installation of SME. No significant noise effects are anticipated from the Proposed Project.

3.7.3.2. NO ACTION ALTERNATIVE

The No Action Alternative will not result in noise effects for any sensitive receptors or NSAs. Noise would be managed according to construction permits. Noise levels (L_{eq}) from Facility construction at NSAs would fall within Category 3 and would not be impactful above and beyond the local highway system baseline noise. Operational noise levels associated with the operation of the SME installed in Phase 1 are also expected to be well below ambient conditions at the NSAs. The negligible increase in vehicular traffic over existing traffic volumes during operation of Phase 1 will result in negligible increases in traffic-related noise levels at the NSA locations (see Section 3.8 regarding Transportation for information regarding traffic volume). As a result, operational and construction noise would not interfere with speech, impair learning nor cause adverse health effects in children or adults. Noise will have no significant impact under the No Action Alternative.

3.7.4. BMPS AND MITIGATION

No significant noise effects are identified. As a BMP, TMSC's site has a 2,500-foot buffer from residential properties to reduce the potential for noise effects to neighboring properties.,

3.8. TRANSPORTATION

This discussion of transportation includes the land-based movement of passengers and goods. A transportation system can consist of any or all of the following: roadways, bus routes, railways, subways, bikeways, trails, waterways, airports, and taxis, and can be looked at on a local or regional scale.

Traffic is commonly measured through average daily traffic and design capacity. These two measures are used to assign a roadway with a corresponding level of service (LOS). The LOS designation is a

professional industry standard used to describe the operating conditions of a roadway segment or intersection. The LOS is defined on a scale of A to F that describes the range of operating conditions on a particular type of roadway facility. LOS A through LOS B indicates free flow travel. LOS C indicates stable traffic flow. LOS D indicates the beginning of traffic congestion. LOS E indicates the nearing of traffic breakdown conditions. LOS F indicates unacceptable congestion and delay and thus represents the threshold for potentially significant effects on vehicle transportation.

3.8.1. REGULATORY SETTING

Transportation is regulated by laws and provisions at the federal, state, and local level. The state routes and highways within the vicinity of the Facility are under the jurisdiction of ADOT. Any proposed changes to roadways or traffic patterns would be subject to ADOT standards and regulations including the Roadway Engineering Group Roadway Design guidelines (ADOT 2022a). Local roadways in the vicinity of the Facility are under the jurisdiction of the City Department of Transportation. Any proposed changes to roadways or traffic patterns would be subject to City standards and regulations (City of Phoenix 1992, 2009, and 2018). Interstate highways are subject to Federal Highway Administration and ADOT authority.

3.8.2. AFFECTED ENVIRONMENT

3.8.2.1. ROADWAY NETWORK

The Facility is located west of Interstate (I)-17 and is bordered by Arizona State Route (SR) 303 (Loop 303) to the south, North 43rd Avenue to the east, West Dove Valley Road to the north, and North 51st Avenue to the west. The location is within the North Phoenix 3,500 PUD—which encompasses the area between I-17, Loop 303, and SR 74 (Carefree Highway) and extends approximately 3 miles west of I-17. The North Phoenix 3,500 PUD would include the Facility, future mixed-use development (including residential), and a future technology park (City of Phoenix 2020).

Current access to the Facility is via West Dove Valley Road and the 43rd Avenue exit on Loop 303. The roads in the vicinity of the Facility are shown in Figure 3-3 and described in **Error! Reference source not found.**.

FIGURE 3-3 FACILITY TRAFFIC

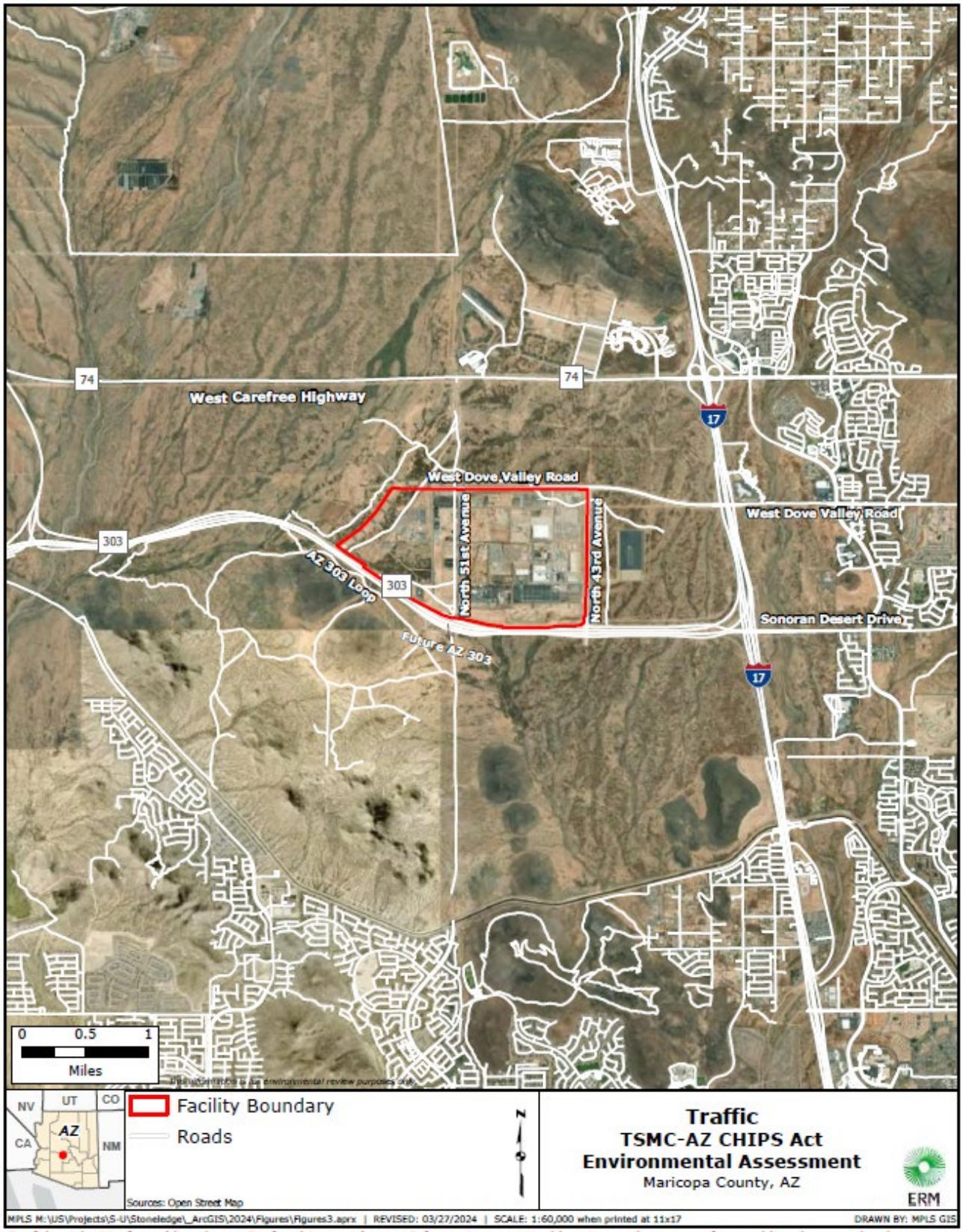


TABLE 3-8 ROADS IN VICINITY OF FACILITY

Road	Description	Facility Access
I-17	A north-south interstate highway with three general purpose lanes and one high occupancy vehicle lane in each direction.	I-17 has exits to Loop 303, W Dove Valley Road, and SR 74/W Carefree Highway east of the Facility.
Loop 303	A state freeway with two general purpose lanes in each direction, running east-west near the Facility. The freeway's eastern terminus is at I-17 where it becomes Sonoran Desert Road.	Loop 303 has an existing interchange at N 43rd Avenue (opened in September 2023), and an interchange under construction at N 51st Avenue. The entry and exit ramps for these interchanges are signalized. Both interchanges provide direct access to the Facility.
Sonoran Desert Drive	East-west roadway that becomes Loop 303 to the west of I-17.	Located east of the facility.
SR 74/West Carefree Highway	A state highway running east-west with one lane in each direction. The roadway widens to accommodate turning lanes at the interchange with I-17.	Located north of Facility. Provides indirect access from the north via N 51st Avenue and an interchange with I-17.
West Dove Valley Road	An east-west roadway with two lanes in each direction.	Provides access to the northeast corner of the Facility. W Dove Valley Road has an interchange with I-17 east of the Facility and intersects with N 43rd Avenue at the Facility.
North 43rd Avenue	A north-south divided roadway between Loop 303 and W Dove Valley Rd with two travel lanes in each direction.	Runs along the eastern border of the Facility, with multiple access points to the Facility. N 43rd Avenue has an interchange with Loop 303 and an intersection with W Dove Valley Road.
North 51st Avenue	A north-south roadway between Loop 303 and W Dove Valley Rd. The segment of the road near Loop 303 is a divided street with two travel lanes in each direction. The northern portion of the road has one travel lane in each direction with no median.	Located in the western portion of the Facility, with multiple access points to the Facility. N 51st Avenue has an interchange with Loop 303 and an intersection with W Dove Valley Road.

I-17 = Interstate 17; SR = State Road

3.8.2.2. EXISTING TRAFFIC AND LEVEL OF SERVICE

Annual Average Daily Traffic (AADT) for roads around and near the TSMC Facility (2019 data) are provided below:

- SR 303L, between Lake Pleasant Parkway and I-17 (Milepost 135.85): 26,433
- I-17, between Dixileta Drive and Sonoran Desert Drive (Milepost 221.11): 114,992
- I-17, between Sonoran Desert Drive and Sonoran Blvd (Milepost 222.46): 97,424

The Final Design Concept Report for SR303L, Lake Pleasant Parkway to I-17 (ADOT, 2022) provided 2020 peak hours LOS for local intersections, as shown in Table 3-9. All intersections were C or above, except for Sonoran Desert Drive and North Valley Parkway which was rated as D.

TABLE 3-9 ADOT REPORTED 2020 TRAFFIC LEVEL OF SERVICE

Intersection	LOS AM	LOS PM	Delay (seconds) AM	Delay (seconds) PM
SR 303 SB & Lake Pleasant Parkway	B	B	12.6	12.5
SR 303 NB & Lake Pleasant Parkway	B	B	13.7	12.5
I-17 NB & Dove Valley Road	B	C	18.9	23.1
I-17 SB & Dove Valley Road	B	A	11.3	9.8
Loop 303/I-17 & Sonoran Desert Drive NB	C	C	21.6	33.9
Loop 303/I-17 & Sonoran Desert Drive SB	C	B	22.8	16.8
Sonoran Desert Drive and North Valley Parkway	C	D	34.9	54.4

Source: ADOT, 2022

AM = morning peak hour; LOS = Level of Service; NB = northbound; PM = afternoon peak hour; SB = southbound

In September 2022, the Arizona Department of Transportation, in coordination with the Maricopa Association of Governments, the Federal Highway Administration and the City of Phoenix, began construction on new Loop 303 traffic interchanges at 51st and 43rd avenues. The new interchanges will address expected traffic growth prompted by current and planned development in the area. The interchanges were completed and opened in September 2023 (ADOT 2024). In addition to the new traffic interchanges, the project also included:

- New bridges on Loop 303 over 51st and 43rd avenues
- The extension of the southbound frontage road from 43rd to 51st avenues
- Drainage improvements at 51st and 43rd avenues
- New signals at ramp and crossroad intersections
- New signs, pavement markings and lighting
- The 51st Avenue interchange was shifted slightly to the west to accommodate the realignment of 51st Avenue.

Other funded improvement projects that are slated to begin in 2024 include:

- I-17 pavement rehabilitation between Happy Valley Road to SR 74
- Dove Valley Road between I-17 and N 43rd Avenue

In April 2024, ADOT held a virtual public meeting on three additional planned road improvements in the area of the North Phoenix 2,500 PUD. These improvements include:

- Adding a third general purpose lane on Loop 303
- Adding 67th Ave bridges to accommodate a future interchange
- Creating a direct I-17/Loop 303 Interchange

If approved, these projects would be slated to begin construction between mid-2026 and mid-2027 (ADOT, 2024).

The 2022 ADOT study evaluated the broader traffic impacts of the build-out of the North Phoenix 3,500 PUD. This build-out includes Phases 1 and 2 of the Proposed Project at the TSMC Facility, planned residential and commercial development in the PUD, including a Technology Park. This study evaluated the improvements needed and LOS of the year 2040, including the improvements described in the 2024 virtual public meeting. The TIA evaluates traffic in a 2040 or approximately 10 years after the peak traffic associated with the Proposed Project would occur. The findings of this impact assessment are described in Cumulative Effects Section 4.4.8.

As part of MCAQDs Travel Reduction Program (MCAQD 2024b), TSMC AZ has a target to reduce the number of single occupancy vehicle trips to reduce air emissions. While the Travel Reduction Program is primarily an air quality requirement, it's implementation (which is mandatory) also reduces vehicle trips, which can further reduce congestion on nearby roads. Options for reducing SOV and air pollution include a compressed work week, carpooling and guaranteed ride home, and telecommuting (MCAQD 2023).

Nearly 67 percent of TSMC AZ employees traveled to the Facility in SOV in Year 1 of Facility use (indicating one-third of employees used ridesharing), which accounted for 69 percent of vehicle miles traveled (VMT) (MCAQD 2023). TSMC's Year 2 goal target is to reduce SOV travel by another 7 percent to 60 percent (where forty percent of employees would rideshare), which would reduce SOV VMT to 62 percent of the total.

3.8.3. ENVIRONMENTAL CONSEQUENCES

Effects on traffic and transportation are analyzed by comparing the likely changes in existing traffic conditions due to the Proposed Project to the capacity of area roadways to accommodate those changes.

3.8.3.1. PROPOSED ACTION ALTERNATIVE

This section evaluates the effects of traffic from the Proposed Project on the roads described in Section 3.8.2. The primary sources of vehicle trips under the Proposed Project would be TSMC AZ employees and vendors. Deliveries of SME would also contribute some traffic.

SME will be sourced both from the US and foreign sources. SME originating in the US would be delivered to the Facility by air and/or truck. SME originating overseas would be delivered to the US by vessel or air and then carried to the Facility by truck. The delivery of the SME to the Facility would occur separately for each fab and thus would occur over several years. On average, three transport trucks can deliver an entire tool set from the receiving warehouse to the Facility and each Phase would have approximately 1,000 tools. In addition to SME delivery, depending on the year and Facility construction schedule, construction-related trips may also occur, adding to overall Facility-related daily trips.

TSMC estimates that approximately 2,300 personnel (TSMC employees and vendors) would travel to and from the Facility daily during Phase 1, with an additional 1,900 personnel during Phase 2, and an additional 1,950 personnel during Phase 3. Each phase would require an average of 25 truck deliveries per day. This includes 8 truck deliveries per day for SME and 17 deliveries per day for other materials and supplies.

As a result, the peak vehicle trips at the Facility would occur approximately in 2029, when a total of approximately 6,150 TSMC AZ employees and vendors would travel to and from the Facility, in addition to 75 daily deliveries of SME and other materials and supplies.

The Facility would operate two daily shifts, with most workers on site during the day shift. Table 3-10 summarizes the potential distribution of employee and delivery trips throughout the day associated with incremental implementation of the phases of the Proposed Project. The trip counts in Table 3-10 are based on a conservative estimate using only SOV travel (no ride sharing or use of mass transit). TSMC AZ confirmed that while actual shift times and traffic volumes shown for Years 2027 and 2029 may vary according to detailed operational and engineering needs, the shifts and trips shown in Table 3-10 provide a reasonable basis to assess Proposed Project traffic impacts (TSMC 2024).

TABLE 3-9 ESTIMATED CUMULATIVE PROPOSED PROJECT DAILY TRAFFIC

Year	Shift	Worker Type	Start Time	End Time	Total Workers or Deliveries	Total Trips [a]	Peak Hour Trips [a]
2024	Day	TSMC-AZ [b]	07:30 to 09:00	16:30 to 18:00	1,500	3,000	2,000
	Day	Vendors	07:00	19:00	400	800	800
	Night	Vendors	19:00	07:00	400		
	Day	Truck Deliveries [c]	07:00	19:00	25	50	4
	Total				**2,325**	**3,850**	**2,804**
2027	Day	TSMC-AZ [b]	07:30 to 09:00	16:30 to 18:00	2,600	5,200	3,467
	Day	Vendors	07:00	19:00	800	1,600	1,600
	Night	Vendors	19:00	07:00	800		
	Day	Truck Deliveries [c]	07:00	19:00	50	100	8
	Total				**4,250**	**6,900**	**5,375**
2029	Day	TSMC-AZ [b]	07:30 to 09:00	16:30 to 18:00	3,750	7,500	5,000
	Day	Vendors	07:00	19:00	1,200	2,400	2,400
	Night	Vendors	19:00	07:00	1,200		
	Day	Truck Deliveries [c]	07:00	19:00	75	150	12
	Total				**6,225**	**10,500**	**7,412**

Source: TSMC 2024.

[a] Total Trips indicates the number of employees or deliveries entering and exiting the Facility each day; Peak Hour Trips indicates the number of Total Trips that would occur during each morning (AM) and afternoon/evening (PM) peak hour. Trip estimates assume that all workers travel alone to and from the Facility.

[b] Includes workers in the Facility main office and gown buildings.

[c] Includes deliveries of SME as well as other materials and supplies.

Trips related to the Proposed Project would incrementally increase vehicular traffic on major public roads surrounding the Facility. Project-related trips during non-peak hours and weekends would likely not cause adverse effects to traffic. Any oversized/overweight loads delivered by truck would occur

infrequently and would be transported in compliance with the provisions of ADOT and local authority permits.

Trips related to the Proposed Project during peak AM and PM hours would cause minor to moderate effects to traffic congestion at unimproved intersections within a mile of the Facility. Assuming the current reduction of SOV of one-third for day-shift employees and vendors, TSMC AZ operations would contribute approximately 4,900 daily trips on local roads. As stated earlier, SR303 currently has an AADT of 26,433 and I-17 has a AADT between 97,424 and 114,992. If all the employees utilized I-17, the Proposed Project would account for between 4 and 5 percent of daily traffic. Conversely, if all traveled on SR303, these trips would increase AADT by 19 percent. However, it is more likely that personnel would approach the site from both SR303 and I-17. While there was some reported congestion accessing the facility during its initial few months of construction, these delays have been remedied by better management of security gate queues and the completion of intersection improvements at 51st and 43rd Avenues. Overall, based on the relatively minor daily trips associated with the Proposed Project, plus implementation of TSMC's TRP and use of shifts to reduce travel during peak rush hours, effects to transportation would be minor to moderate.

3.8.3.2. NO ACTION ALTERNATIVE

Under the No Action Alternative, traffic effects would be substantially reduced relative to the Proposed Action. In this alternative, only Phase 1 would become operational and at a lesser production rate than under the Proposed Action. Construction traffic related to completing the shell of Phase 2 to a state of weather tightness would be relatively short in duration and would involve far fewer workers on site than full implementation of Phase 2. As a result, the No Action Alternative would not create significant impacts on transportation.

3.8.3.3. .BMPS AND MITIGATION

TSMC would continue implementation of its Travel Reduction Program and manage its workforce scheduling to reduce trips during peak rush hours as BMPs.

3.9. HUMAN HEALTH AND SAFETY

This discussion of human health and safety analyzes activities, occurrences, or operations that have the potential to affect the safety, well-being, or health of workers and members of the public. A safe environment is one in which there is no, or optimally reduced, potential for death, serious bodily injury, or illness, where the primary goal is to identify and prevent potential accidents or harmful effects on the general public. Accordingly, this Section discusses community emergency services and focuses on identifying human health and safety effects that may result from construction activities, noise, operations, and environmental health and safety risks. Noise effects on human health are also addressed in Section 3.7.

3.9.1. REGULATORY SETTING

Several federal, state, and local laws and regulations aim to protect human health and safety at semiconductor fabrication facilities and in surrounding communities. The Occupational Safety and Health Administration (OSHA) has promulgated health and safety regulations for general industry at 29 C.F.R. Part 1910. These regulations address a wide range of topics related to workplace safety, including hazard communication, electrical safety, machinery and equipment safety, personal

protective equipment (PPE), and training requirements. EPA also issues regulations related to hazardous materials, chemical emergencies, and reporting.

3.9.1.1. OSHA

OSHA mandates safety requirements to protect workers and the public. OSHA standards most relevant to the semiconductor manufacturing sector include:

- Subpart G, Occupational Noise Exposure, 29 C.F.R. § 1910.95, establishes guidelines and standards to protect workers from excessive noise in the workplace.
- Subpart H, Hazardous Materials, 29 C.F.R. § 1910.119, establishes requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals.
- Subpart H, Hazardous Materials, 29 C.F.R. § 1910.124, establishes general requirements for dipping and coating operations. The standards cover: dip tank construction and entry; ventilation, air recirculation, and exhaust hoods; first aid training, treatment, and supplies; required hygiene facilities; and dip tank cleaning, inspection, and maintenance.
- Subpart I, PPE, 29 C.F.R. § 1910.132, establishes general requirements for PPE. The employer is responsible for ensuring the proper application, adequacy, and selection of PPE based on hazard assessment. The employer must provide PPE and associated training to employees. In addition, 29 C.F.R. § 1910.134 establishes specific respiratory protection requirements.
- Subpart Z, Toxic and Hazardous Substances, 29 C.F.R. Part 1910, establishes requirements relating to employee exposures to toxic and hazardous substances, including air contaminants, inorganic arsenic and lead.

3.9.1.2. EPA

Regulations and reporting under the Toxic Substances Control Act (TSCA) and the Emergency Planning and Community Right-to-Know Act (EPCRA) provide communities with essential information about hazardous material use in their neighborhoods.

- TSCA, 15 U.S.C. § 2601 *et seq.* TSCA requires reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures including the use, and disposal of specific chemicals including polychlorinated biphenyls. TSCA provides the EPA with authority to regulate the production, use, and disposal of chemicals that have the potential to cause harm to human health or the environment.
- EPCRA, 42 U.S.C. Chapter 116. EPCRA helps communities plan for chemical emergencies. EPCRA was established in 1986 to protect both workers and communities from the potential environmental and safety hazards of accidents resulting from storage and handling of toxic chemicals. It includes requirements for: Emergency Planning (§ 301 to 303), Emergency Release Notification (§ 304), Hazardous Chemical Inventory Reporting (§ 311 and 312), and Toxic Release Inventory mandatory federal reporting (§ 313) on chemicals that may pose a threat to human health and the environment.

Additionally, pursuant to CAA § 112(r), and EPA regulations at 40 C.F.R. Part 68, facilities that use more than threshold quantities of hazardous air pollutants (HAPs) are required to develop and

implement a risk management program and submit a risk management plan (RMP) to EPA. The RMP must identify the potential effects of a chemical accident, steps the facility is taking to prevent an accident, and emergency response procedures. These plans provide valuable information to local fire, police, and emergency response personnel.

3.9.1.3. EXECUTIVE ORDER 13045

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires federal agencies to "make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."

3.9.2. AFFECTED ENVIRONMENT

3.9.2.1. INDUSTRY STANDARDS AND HISTORICAL HEALTH RISKS

Historically, semiconductor manufacturing has been subject to a series of lawsuits pertaining to human health and safety. Many of the root causes of these health risks have been addressed over the last 30 years due to stricter emissions, storage, regulations, and reporting under the TSCA and EPCRA. Clean rooms and equipment now incorporate advanced leak detection methods that rapidly alert personnel and shut down equipment. Personal protective equipment has improved in recent decades to provide additional worker protection.

Semiconductor Equipment and Materials International (SEMI) standard S2 is one of the primary guidelines for Environment, Health and Safety for designing and manufacturing SME. The S2 standard addresses environmental, health, and safety practices and incorporates several other standards, addressing: equipment installation, gas effluent handling, exhaust ventilation, ergonomics, risk assessment, equipment decontamination, fire risk mitigation, electrical design. It references several other industry standards including, but not limited to: American National Standards Institute Standards, Institute of Electrical and Electronics Engineers Standards; International Organization for Standardization (ISO) Standards; National Fire Protection Association (NFPA) Standards; Underwriters Laboratories Standards; US standards for radiological health and performance standards for electronic products; American Conference of Governmental Industrial Hygienists (ACGIH), Industrial Ventilation Manual; American Society of Hearing, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 110; Semiconductor Exhaust Ventilation Guidebook; Uniform Building Code; and Uniform Fire Code.

3.9.2.2. EFFECT OF POLLUTION ON LOCAL COMMUNITIES

During construction and manufacturing operations activities, the potential for toxic materials and hazardous waste releases into the environment is present. Pollution from construction and manufacturing operations can contaminate groundwater, surface water, soil, and air, posing a threat to the health and safety of local communities.

The Facility houses hazardous materials necessitated by its manufacturing process that are handled, transported, and disposed of to mitigate contamination into the environment, as consistent with regulatory requirements and industry standards. Mishandling of hazardous materials can lead to spills,

leaching, and releases into the environment and may have short term and long-term detrimental effects on groundwater and soil.

3.9.2.3. NOISE

Noise evaluation and management is important, as hearing loss is the third most common chronic health condition in the US. Continual exposure to noise can cause stress, anxiety, depression, high blood pressure, heart disease, and many other health problems (CDC 2017). Noise can pose a serious threat to a child's physical and psychological health, learning and behavior. Examples of effects include interference with speech and language, impaired learning, impaired hearing, elevated blood pressure and cardio-vascular ailments, and disrupted sleep (USEPA 2009).

3.9.2.4. CONSTRUCTION SAFETY

While construction of the Facility is not included in the Proposed Project, construction of the fab buildings is a precursor to the Proposed Project. Installation of SME requires activities involving skilled tradespeople. Typical health and safety hazards associated with construction and SME installation include, but are not limited to, falling, slipping and tripping, noise, heavy machinery, being struck by moving construction equipment, and electrocutions.

3.9.2.5. PROVISIONS FOR CHEMICAL SAFETY

TSMC AZ's current and future operations must comply with regulations guiding the safe management of various activities within TSMC AZ's operations. Chemical hazards include the potential for direct and indirect exposure to hazardous materials, regulated or managed under:

- Air Permit — in accordance with the Clean Air Act, which limits airborne chemicals emitted from the Facility
- Wastewater Permit (discussed in further detail in Section 3.3.1.3) — defines discharge limits
- Notice of Intent Certificate
- Risk Management Plan — EPA process safety program (Section 112r of the CAA Amendments)
- Process Safety Plan — OSHA process safety program (29 C.F.R. § 1910 Subpart H Hazardous Materials)

TSMC AZ's Environmental Management System ensures regulatory compliance and appropriate measures to protect human health and safety.

Hazardous substances will be inventoried, maintained, and reported per the requirements of the EPCRA, including an annual Tier II chemical inventory report (Section 312) and toxic release inventory (Section 313).

Employers are required to identify and evaluate the respiratory hazard(s) in their workplaces. OSHA sets enforceable permissible exposure limits (PELs) to protect workers against the health effects of exposure to hazardous substances, including limits on the airborne concentrations of hazardous chemicals in the air. Most enforceable OSHA PELs were issued shortly after the adoption of the Occupational Safety and Health Act in 1970 and have not been updated since (OSHA, No Date). Based on the experiences of industrial professionals, new technological developments, and scientific data,

many PELs are found to be outdated and inadequate for protecting worker health, which has led many technical, professional, industrial, and governmental organizations in the U.S. and abroad to identify alternative exposure limits.

The American Conference of Governmental Industrial Hygienists (ACGIH) is a private, not-for-profit, nongovernmental scientific association that develops guidelines, such as Threshold Limit Values (TLVs), to assist in the control of occupational health hazards. TLVs represent airborne concentrations of chemical substances under which it is believed nearly all employees may be exposed daily over a working lifetime without adverse effects. ACGIH TLVs are health-based values that give no consideration to economic or technical feasibility. Therefore, ACGIH does not intend TLVs to be adopted as enforceable standards in their entirety without additional multifaceted analysis. However, ACGIH TLVs are widely recognized as authoritative, and are required to be included on safety data sheets by the OSHA Hazard Communication Standard.

National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits are Federal agency recommendations established according to the legislative mandate for NIOSH to recommend standards to OSHA. Recommended Exposure Limits are recommended exposure limits for hazardous substances in the workplace to protect worker health.

TSMC's current practice (BMP) is to apply the most protective chemical exposure levels based on published standards on a chemical-by-chemical basis to protect worker safety.

3.9.2.6. INTERNAL SITE SAFETY

TSMC AZ has organized and maintained various internal controls for safety and health while introducing new initiatives for continued growth. Fab-level industrial health and safety is promoted through workplace risk inspections, chemical exposure assessments, noise and radiation protection, ergonomic engineering management, various committees, performance targets, and more. Educational training is administered to employees and contractors with specific courses relevant to job-specific tasks. TSMC AZ also has implemented the Safety Performance Index to measure safety performance and goals across the Facility and the company. TSMC AZ applies the most protective Occupational Exposure Limits (see Section 3.9.1.2) established by industry standards to its operations.

As noted above in Section 3.9.2.2 and outlined in 40 C.F.R. § 265.51, each owner or operator of hazardous waste treatment, storage, and disposal facilities must have a contingency plan for that facility. The contingency plan must be designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water. The provisions of the plan must be carried out immediately whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents which could threaten human health or the environment. A formal copy of the plan will be sent to emergency responders to assure awareness and understanding of the hazards associated with hazardous chemicals and waste managed on the Facility. The plan will also emphasize any waste stream that requires specialized medical treatment in the event of exposure.

3.9.2.7. EMERGENCY RESPONSE SERVICES

Fire Department

To strengthen emergency response efforts, TSMC has hosted walks and evaluations with local fire departments to familiarize those who may be responding in the event of an emergency with the

Facility. These visits focus on fire protection code and requirements, reviewing chemical storage areas, chemicals to be stored onsite, and hazards associated with these chemicals. The fire departments also discussed with TSMC AZ which departments would be able to respond to various emergencies based on available emergency equipment.

Live Tabletop Exercise

TSMC conducted an emergency exercise in which a chemical release scenario was presented to identify and evaluate effectiveness and gaps within the various emergency responses. The range of which exercises were studied included response considerations, communications, equipment availability, training, chemical hazard awareness, evacuation plans, community notifications, and roles and responsibilities. The scenario included participation from federal, state, and local law enforcement agencies, fire departments, federal and state environmental agencies, local medical facilities, and company internal representatives from various departments.

3.9.3. ENVIRONMENTAL CONSEQUENCES

This section discusses the potential effects on human health and safety under the No Action Alternative and the Proposed Action.

3.9.3.1. PROPOSED ACTION

Occupational Safety

TSMC would promote human health and safety under the Proposed Project through its overarching safety requirements and protocols. TSMC would implement its Internal Site Safety procedures (Section 3.9.2.6) to its proposed operations across Phases 1, 2, and 3. These procedures include education and training, workplace risk inspections, chemical exposure assessments, noise and radiation protection, ergonomic engineering management, safety and health committee program reviews, and tracking of performance targets.

TSMC recognizes that the OSHA PELs are not adequately protective and thus, as a BMP, TSMC applies the most protective Occupational Exposure Limits based on published industry standards for each chemical use (see Section 3.2.8.5) across its Facility operations to promote worker health and safety. Therefore, TSMC will apply the most protective exposure standard on a chemical by chemical basis to protect worker health and safety under the Proposed Action.

To ensure the SME purchased under the Proposed Action meet all appropriate safety and health standards, TSMC will require a SEMI S2 compliance report before purchasing equipment from the manufacturer.

Community Safety

Under the Proposed Action, CHIPS financial assistance would result in changes to the types and volumes of hazardous materials used and stored at the facility to support increased semiconductor wafer manufacturing. TSMC's facility design, best practices, culture of safety, and commitment to environmental integrity have been or will be implemented at the Facility to help reduce the risk of any chemical releases. TSMC maintains a written Emergency Response Plan that will be followed should a RCRA reportable event or spill occur, in accordance with 40 C.F.R. § 265.51. TSMC will inventory, maintain and report its hazardous material use as described above (Section 3.9.2.5). As a BMP, TSMC

will continue to coordinate with, and conduct exercises with, the local fire department and emergency services to ensure accidents and emergencies would be responded to quickly, efficiently and safely.

The Proposed Action is unlikely to have effects on children's health and safety, in accordance with EO 13045. The property is bounded by highways and is industrial in nature and children would not access the Facility. Indirectly, project related vehicle deliveries would not be routed through residential neighborhoods limiting potential harm from traffic accidents. The Facility's air emissions would be permitted to comply with applicable air quality standards and are unlikely to disproportionately affect children.

Health effects of noise would not be significant under the Proposed Action as described in Section 3.7.

Construction Safety

The Arizona Division of Occupational Safety and Health (ADOSH) and TSMC AZ entered into a voluntary partnership program on May 26, 2023 in order to implement safety and health measures to provide a safe and healthful work environment for construction worker employees. This program would extend to contract workers engaged with installation of SME in Phases 1, 2 and 3 given the skilled trades required to complete the fabrication process. TSMC AZ contractors are required to comply with minimum performance requirements for worker health and safety in accordance with the program.

No significant effects to human health and safety from construction-related hazards are anticipated as these hazards are managed through:

- Ensuring all safety equipment, guardrails, and controls align with OSHA standards.
- Use of proper personal protective equipment.
- Developing job hazard analysis to identify job-related hazards.
- Certifying all project employees and contractors are up to date in health and safety training.
- Actively providing safety information to employees and perform daily construction safety inspections.
- Holding safety meetings to discuss hazards associated with specific tasks.
- Appointing onsite health and safety professional(s) to identify and execute precautionary measures and prevention strategies for workplace accidents.

Overall

No significant effects to human health and safety of workers or the public are anticipated from the Proposed Project under normal operating conditions. Accidents and emergencies would be minimized through BMPs, internal site safety procedures, ongoing collaboration and communication with community emergency response agencies, and safe hazardous material handling and storage processes.

3.9.3.2. NO ACTION ALTERNATIVE

Under the No Action Alternative, no significant adverse effects on human health and safety are anticipated, because the same safety management strategies outlined for the Proposed Action (Section 3.9.3.1.) would be implemented. Health effects of noise would not be significant under the No Action Alternative, as described in Section 3.7.

3.9.4. BMPS AND MITIGATION

TSMC will apply the most protective Occupational Exposure Limits based on published industry standards on a chemical-by-chemical basis to its facility operations to protect worker safety and health. TSMC will also continue to coordinate emergency response plans with local first responders that accounts for changes to Facility operations over time.

3.10. HAZARDOUS MATERIALS AND WASTES

This section discusses hazardous materials, hazardous waste, toxic substances, and contaminated sites.

3.10.1. REGULATORY SETTING

Hazardous materials are defined by the Department of Transportation and the Pipeline and Hazardous Materials Safety Administration as "hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table, and materials that meet the defining criteria for hazard classes and divisions in 49 C.F.R. § 173." 49 C.F.R. § 171.8. The Department of Transportation regulates transportation and labeling of hazardous materials.

Hazardous wastes are defined under RCRA Section 1004(5) as: "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." 42 U.S.C. § 6903(5).

Universal wastes and their associated regulatory requirements are specified under 40 C.F.R. § 273. Five types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, mercury containing equipment, aerosol cans, and hazardous waste lamps, such as fluorescent light bulbs.

Special hazards are those substances that might pose a risk to human health such as asbestos-containing material, polychlorinated biphenyls, and lead-based paint. As the Proposed Project involves no special hazards, special hazard regulations are not applicable.

RCRA Subtitle C authorizes the EPA to regulate hazardous waste. This includes all stages of the waste's life cycle: generation, transportation, treatment, storage, and disposal. It requires tracking hazardous waste (manifests) from generation to disposal, and permitting of hazardous waste management facilities. Treatment, storage, and disposal (TSD) facilities carry out hazardous waste management using different pre-approved methods. These may include final waste treatment using chemicals, incineration or oxidation, or physical waste-processing to reduce, remove or destroy the

contaminated element of the waste. In some cases, recycled waste may be re-used in other manufacturing processes. Storage facilities temporarily hold quantities of hazardous waste, produced on or off-site until they are treated or disposed, in containers, tanks, containment buildings, waste piles or surface impoundments. Disposal facilities permanently hold hazardous waste in landfills using specifically designed and constructed units that safeguard groundwater and surface water resources (USEPA 2023c).

EPA released a final rule under EPCRA and the Pollution Prevention Act pursuant to the National Defense Authorization Act for Fiscal Year 2020 that added certain PFAS to the list of Lower Thresholds for Chemicals of Special Concern (USEPA 2021).

This rule, effective on November 30, 2023, will increase reporting of PFAS to the Toxics Release Inventory (TRI) by eliminating an exemption (de minimis) that allowed facilities to bypass reporting requirements when those chemicals were used in small concentrations. Under this new rule, certain PFAS will be subject to the same reporting requirements as other chemicals of special concern and EPA will receive more comprehensive data on PFAS.

3.10.2. AFFECTED ENVIRONMENT

Semiconductor manufacturing in general requires the use of many chemicals, including those that are hazardous. Some of these substances include ammonia, acids, alcohols, glycol ethers, ketones, organic hydrocarbons, pyrophoric materials, water-reactive, toxic heavy metals, organic halogens, nitrate compounds, phosphines, fluorinated chemicals, photoresists, and developers.

Bulk gases to be stored at the Facility include hydrogen, nitrogen, oxygen, argon, helium, and some specialty gases. TSMC AZ uses and stores such materials in accordance with EPA, ADEQ, and applicable local codes. As discussed in Section 3.9.2.5, EPCRA regulatory requirements will be followed, including preparation and maintenance of chemical emergency response plans and regulatory reporting.

At TSMC facilities worldwide, 96 percent of waste is recycled with less than 1 percent of waste generated having been sent to landfills for the past 13 consecutive years. The Proposed Project intends to recycle in similar fashion. TSMC promotes waste reduction internally by source separation, recycling, and reuse. TSMC requires vendors to provide low chemical consumption equipment. TSMC also collaborates with vendors to develop new waste recycling technology to increase the amount of wastes being recycled and reused.

TSMC, at a corporate level, implemented a Hazardous Substance Process Management System in 2005. This system ensures that products comply with the EU Restriction of Hazardous Substance (RoHS), Perfluorooctane Sulfonates (PFOS), Ozone Depletion Substance (ODS), and Halogen free regulations.

PFAS are a group of manufactured fluorinated chemicals that are long lasting and break down very slowly over time. The most commonly studied PFAS are perfluorooctanoic acid (PFOA) and PFOS. PFOA and PFOS have been phased out of production and use in the US. PFAS compounds are linked to health effects including fertility issues, liver disease and cancer. PFAS is used in the photolithography, plasma etch, wet etching, chamber clean and deposition processes, as well as a use for lubrication of equipment, and in heating and cooling systems in semiconductor manufacturing. Although the semiconductor industry has worked to eliminate and replace some of these compounds, in some cases, substitute materials have not yet been identified that can achieve the same performance.

TSMC is a member of the international Semiconductor Industry Association (SIA) PFAS Consortium seeking to reduce or eliminate PFAS use within the industry. Since 2018, TSMC eliminated the use of long-chain fluorinated chemicals such as PFOA and PFOS. However, there are no viable alternatives currently for shorter chain fluorinated chemicals. The company's goal is to eliminate PFAS having more than four carbons by 2030 and they have been testing alternative materials. In 2022, TSMC amended its green procurement procedures to expand the list of prohibited substances from PFAS with eight or more carbons to PFAS with more than four carbons to reduce long-chain PFAS at the source. As an existing BMP, TSMC designs its manufacturing processes to segregate known process PFAS-containing chemicals from other waste streams such that this waste is directed to a closed bulk storage system. This waste is then managed at an off-site permitted treatment and disposal facility.

3.10.3. ENVIRONMENTAL CONSEQUENCES

3.10.3.1. PROPOSED ACTION ALTERNATIVE

Wastes associated with the delivery and installation of SME would be minor. Operations associated with the Proposed Project would use, and require disposal of, hazardous materials and waste at a rate approximately three times higher than under the No Action Alternative. Project-related storage, handling and disposal would follow the applicable laws and permit conditions described below and health and safety processes described in Section 3.8.2.6.

TSMC AZ received approval from ADEQ for recycling of both spent sulfuric acid and spent isopropyl alcohol. ADEQ approved two methods of recycling for spent sulfuric acid on November 2, 2022, wherein it will be reused onsite, and also shipped offsite for reuse; both methods meet the recycling provisions of 40 C.F.R. § 261.2(e). Approval of recycling of isopropyl alcohol was granted by ADEQ on June 29, 2023 under recycling of secondary materials under 40 C.F.R. § 261.43 and the transfer-based exclusion of 40 C.F.R. § 261.4(a)(24). As requested, TSMC will reevaluate the applicability of the secondary material exclusion every 3 years.

TSMC AZ is currently classified as a Large Quantity Generator and regulated under ADEQ rules. A Large Quantity Generator is defined as generating more than 2,200 pounds of hazardous waste or more than 2.2 pounds of acute hazardous waste per calendar month. The Facility is regulated as a single entity based on total hazardous waste generated on a monthly basis (EPA ID# AZR000526244). No waste is stored longer than 90 days; therefore, no RCRA permit is required. There are no plans to add operations in the future that would require an RCRA permit. All hazardous waste will be managed according to RCRA regulations as adopted by ADEQ and codified in the Arizona Administrative Code under 18.A.A.C. 08 and published in the Arizona Revised Statutes under Title 49, Chapter 5, Article 2.

All bulk waste storage tanks are situated within secondary containment designed for sufficient containment volume for the largest tank. Piping that carries liquid chemical waste from the fabs to the waste collection systems runs within an enclosed bridge and has secondary containment and leak detection within the pipes. These areas have restricted access and leak-detection elements. All hazardous waste storage tanks and containers are managed according to hazardous characteristics and are separated in accordance with compatibility requirements. All shipments of hazardous materials and waste follow requirements under US Department of Transportation regulations.

TSMC is working internally and with industry partners to eliminate and identify alternatives for PFAS chemical and has implemented systems and disposal management options to minimize any effects through wastewater discharge. As a BMP, TSMC AZ would segregate known process PFAS-

containing chemicals from other waste streams, such that this waste would be directed to a closed bulk storage system. This waste is then managed at an off-site permitted treatment and disposal facility. Under this process, these streams would not enter the Facility's wastewater treatment systems or downstream wastewater delivered to the POTW.

As described in Section 3.9.3, TSMC would develop a contingency plan (per 40 C.F.R. § 265.51) for the Facility that is designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water. Additionally, as described in Section 3.9.2.7, TSMC AZ works closely with the local fire departments to ensure the Facility meets fire protection code and requirements, including reviewing chemical storage areas, chemicals to be stored onsite, and hazards associated with these chemicals. TSMC AZ has completed an emergency exercise in which a chemical release scenario was presented to identify and evaluate effectiveness and gaps within the various emergency responses. As BMP, TSMC would continue coordination with local first responders as the Facility grows to routinely train for emergencies and improve response effectiveness.

The Proposed Project would require larger quantities of hazardous materials and wastes to be transported to and from the Facility. Under normal conditions and by following all transportation regulations, accidents and spills are anticipated to be rare.

All hazardous materials and wastes related to the Proposed Project would be managed and disposed of appropriately and in accordance with law and the company's Hazardous Substance Process Management System, therefore, no significant effects from hazardous materials and waste are anticipated.

3.10.3.2. NO ACTION ALTERNATIVE

All hazardous materials related to the operation of partial SME installed in Phase 1 would be managed and disposed of appropriately and in accordance with law and BMPs as described above for the Proposed Action Alternative; therefore, no significant effects from hazardous materials and waste are anticipated.

3.10.4. BMPS AND MITIGATION

As a BMP, TSMC will segregate known process PFAS-containing chemicals from other waste streams to a closed bulk storage system. This waste will then be managed at an off-site permitted treatment and disposal facility. TSMC will also optimize recycling at the Facility to reduce landfill waste and ensure appropriate handling and disposal of waste.

3.11. ENVIRONMENTAL JUSTICE

EPA defines environmental justice (EJ) as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (EPA 2024a).

3.11.1. REGULATORY SETTING

In accordance with Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq.), each Federal agency shall ensure that all programs or activities receiving Federal financial assistance that affect

human health or the environment do not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin.

Executive Order 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All*, defines "environmental justice" as the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, tribal affiliation, or disability, in agency decision making and other federal activities that affect human health and the environment so that people:

(i) are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative effects of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and

(ii) have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices.

EO 12898, *Federal Actions to Address EJ in Minority Populations and Low-Income Populations*, requires federal agencies to consider as a part of their actions any disproportionately high and adverse human health or environmental effects to minority and low-income populations. Federal agencies are required to ensure that these potential effects are identified and addressed.

3.11.2. AFFECTED ENVIRONMENT

Demographic and socioeconomic data, including U.S. Census Bureau data and EPA's EJScreen tool (CEQ 2023a), can help identify potential communities with EJ concerns, in line with EO 12898's directive to address environmental and human health conditions in minority and low-income communities. DOC and the State of Arizona do not have an established radius for EJ analysis. For purposes of this EA, a 1-mile radius around the Facility was selected as a sufficiently broad initial EJ screening value based on the likely concentration and extent of construction activities, noise, and visual, economic, and traffic effects associated with the Facility. For more information on the methodology used to assess communities with EJ concerns, as well as the data tables for the Census Tracts (CT) that comprise the EJ Study Area, please refer to Appendix G.

In general, the land immediately surrounding the Facility is undeveloped, open land. Most of the population surrounding the Facility lives on the eastern side of Interstate 17 in several planned communities built in the 2000s, such as Stoneledge, Carefree Crossing, Amber Hill, Desert Hills, and Tramonto (NetrOnline 2023). The nearest tribal lands to the Facility are the Salt River Reservation, approximately 21 miles southeast. For more information on surrounding schools, neighborhoods, and recreation sites, see Appendix E.

The population of the Study Area is significantly less diverse than that of Arizona or Maricopa County (Appendix E). The population of both CTs is majority non-Hispanic white. Hispanic or Latino is the largest minority ethnicity present in both CTs. The low-income populations of both CTs are at or below the State and County average. Spanish is the most spoken language in the home after English, but linguistic isolation is minimal in the Study Area compared to surrounding areas.

Based on the EJScreen, CT 6100.02 exceeds the 80th percentile for wastewater discharge (96th percentile compared to the state) (EPA 2023b). No other pollutant or hazard sources for this tract were in the 80th percentile or greater. Based on the data presented in Appendix E, there are no communities with EJ concerns within the Study Area. Pockets of linguistic isolation may exist within the Study Area. Spanish is the next highest language spoken in this CT after English. During the public comment

period of the draft EA, notices were provided in both English and Spanish to ensure fuller participation.

3.11.3. ENVIRONMENTAL CONSEQUENCES

This analysis focuses on potential disproportionate and adverse effects on communities with EJ concerns.

3.11.3.1. PROPOSED ACTION

The Proposed Action would result in increased air emissions and waste generation when compared to the No Action Alternative; however, because no communities with EJ concerns or populations that are facing burdens or have pre-existing vulnerabilities have been identified in the Study Area, the Proposed Action would not have significant or disproportionate and adverse effects on communities with EJ concerns.

3.11.3.2. NO ACTION ALTERNATIVE

Because no communities with EJ concerns or populations that are facing burdens or have pre-existing vulnerabilities have been identified in the Study Area, the No Action Alternative is not anticipated to have any disproportionate effects on such communities, notwithstanding air emissions or waste generation from the Facility.

3.11.4. BMPS AND MITIGATION

No significant negative effects to EJ communities are anticipated under the Proposed Action. As a BMP, TSMC will continue its active stakeholder outreach program and Diversity and Inclusion Program.

3.12.SOCIOECONOMICS

This section discusses population demographics, employment characteristics, schools, housing occupancy status, economic activity, tax revenue, and related data providing key insights into the socioeconomic conditions that might be affected by a proposed action.

3.12.1. REGULATORY SETTING

Socioeconomic data shown in this section are presented at the U.S. Census Bureau tract (CT), Metropolitan Statistical Area, state, and national levels to characterize baseline socioeconomic conditions in the context of regional, state, and national trends. A Metropolitan Statistical Area is a geographic entity defined for use by federal statistical agencies based on the concept of a core urban area with a high degree of economic and social integration with surrounding communities. Data have been collected from previously published documents issued by federal, state, and local agencies and from state and national databases (e.g., U.S. Bureau of Economic Analysis Regional Economic Information System).

3.12.2. AFFECTED ENVIRONMENT

The semiconductor industry is a major driver of economic development. Semiconductors are a critical input for more than 300 downstream economic sectors, accounting for more than 26 million U.S. workers. The semiconductor industry's jobs multiplier is 6.7, meaning that for each U.S. worker directly employed by the semiconductor industry, an additional 5.7 jobs are supported in the wider U.S. economy (U.S. Semiconductor Industry Workforce 2022).

Unemployment in CT 6100.02 and CT 6113 are 2 and 3 percent, respectively, which is below the state average of 6 percent. The per-capita incomes in these CTs are $35,918 and $44,792, respectively. Neither CT has a housing burden as defined by EJScreen (households earning less than 80 percent of the U.S. Department of Housing and Urban Development's area median family income calculations and spending more than 30 percent of their income on housing costs). In CT 6100.02, 85 percent of homes are owner-occupied, and in CT 6113, 43 percent are owner-occupied (EPA 2023b).

TSMC AZ has engaged local undergraduate, community college and K–12 schools in the region to develop a pipeline of talent, with a focus on outreach to communities traditionally under-represented in STEM and high-technology fields. TSMC AZ has also initiated a Supplier Diversity program to increase the number of women and minority-owned businesses serving the semiconductor industry. TSMC has a corporate policy supporting the value of a diverse and inclusive workforce (Liu 2019; TSMC AZ 2024).

The area around the Facility is developing rapidly, with most of the population living in several planned communities built in the 2000s such as Stoneledge, Carefree Crossing, Amber Hill, Desert Hills, and Tramonto to the east of Interstate 17 (NetrOnline 2023).

The City is divided into 15 urban villages. Each village has a Village Planning Committee that is part of the Planning & Development Department and reports to the Mayor and the City Council. The Facility is part of the North Gateway Village. The 2021 North Gateway Annual Report describes receiving multiple proposals for new multifamily residential developments in the North Gateway Village core ("Core") to accommodate an influx of workers for the TSMC AZ Facility. The Report notes that the developers for the various projects are working together to design a pedestrian network that incorporates a critical pedestrian spine for the Core, thereby increasing accessibility to employment opportunities as well as goods and services. The job creation, influx of workers, and associated housing development from the Proposed Project will act as a facilitator for economic growth by increasing consumer traffic and spending in the area. This increased supply and demand will support and bolster local businesses and generate additional tax revenue for local governments.

In support of growing and advancing the local workforce through quality jobs and job training, TSMC and the Arizona Building and Construction Trades Council announced an agreement in December of 2023 (U.S. Semiconductor Industry Workforce 2022). The agreement focuses on a new framework for cooperation with respect to TSMC AZ construction and installation of SME as part of the Proposed Project. The agreement outlines mutually decided priorities that will guide the relationship and provides for union workplace training and development, workforce safety, channels of communication, and staffing.

3.12.3. ENVIRONMENTAL CONSEQUENCES

This analysis focuses on the potential for significant socioeconomic effects.

3.12.3.1. PROPOSED ACTION

The Proposed Action would positively affect socioeconomics in the area. The direct operational workforce under the Proposed Action is estimated to be 3,250 workers. Indirect jobs are estimated at approximately 800. TSMC AZ pays market rates for all positions (Greater Phoenix Economic Council 2022).

In addition, purchases by TSMC AZ staff outside of the Facility would also contribute to indirect employment. The Proposed Action is anticipated to positively affect socioeconomics by providing both direct and indirect employment and supporting the local economy through staff and corporate spending, as well as taxes.

3.12.3.2. NO ACTION ALTERNATIVE

Under the No Action Alternative, only jobs associated with Phase 1 would be created (see Section 3.8.3 for jobs data). TSMC AZ estimates that the Proposed Project would employ approximately 1,150 direct employees for Phase 1 plus an additional estimated 800 indirect jobs (TSMC 2024, Greater Phoenix Economic Council 2022). The positive effects on employment under the No Action Alternative would be less than under the Proposed Action.

3.12.4. BMPS AND MITIGATION

The Proposed Action would positively affect socioeconomics in the area. No BMPs or mitigation is required.

3.13. SUMMARY OF POTENTIAL EFFECTS TO RESOURCES AND IMPACT AVOIDANCE AND MINIMIZATION

A summary of the potential effects associated with each of the action alternatives and the No Action Alternative is provided in Table 3-11. BMPs to avoid and minimize effects are presented in Chapter 2. The only potentially significant effects identified are for air quality, specific to Phase 3. Because the SME to be installed in Phase 3 are still being designed, emissions data are not available. To avoid significant effects to air quality from Phase 3 SME emissions and to obtain air permits for Phase 3, mitigations may be required. CPO will continue to work with TSMC as plans for Phase 3 are developed to evaluate air effects and determine appropriate mitigations if required. TSMC's implementation of BMPs and mitigation measures will be subject to CPO monitoring and enforcement.

TABLE 3-11 SUMMARY OF POTENTIAL EFFECTS TO RESOURCE AREAS

Resources Area	No Action Alternative	Proposed Action Alternative
Air Quality	No significant effects	No significant effects with BMPS and mitigation
Climate Change, Resiliency, and Sustainability	No significant effects with BMPs	No significant effects with BMPs
Water Resources	No significant effects	No significant effects with BMPs and mitigation
Cultural Resources	No potential effects	No potential effects
Biological Resources	No significant effects	No significant effects
Land Use	No potential effects	No potential effects

Resources Area	No Action Alternative	Proposed Action Alternative
Noise	No significant effects	No significant effects
Transportation	No significant effects	No significant effects
Human Health and Safety	No significant effects	No significant effects
Hazardous Materials and Wastes	No significant effects	No significant Impact
Environmental Justice	No significant effects	No significant effects
Socioeconomics	Moderate positive impact from jobs created under Phase 1 for engineering wafer production only	Greater positive impact from jobs created under Phases 1, 2, and 3

4. CUMULATIVE EFFECTS

This Chapter: (1) defines cumulative effects; (2) describes past, present, and reasonably foreseeable future actions relevant to the cumulative effects analysis; (3) analyzes the incremental interaction the Proposed Action may have with other actions; and (4) evaluates cumulative effects potentially resulting from these interactions.

4.1. DEFINITION OF CUMULATIVE EFFECTS

The approach taken in the analysis of cumulative effects follows the objectives of NEPA, the NEPA regulations, and CEQ guidance. Cumulative effects are defined as "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time." 40 C.F.R. § 1508.1(g)(3).

Cumulative effects are most likely to arise when a relationship or synergism exists between a Proposed Action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the Proposed Action would be expected to have more potential for a relationship than those more geographically separated.

4.2. SCOPE OF CUMULATIVE EFFECTS ANALYSIS

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this EA, the study area delimits the geographic extent of the cumulative effects analysis. In general, the study area will include those areas previously identified in Chapter 3 for the respective resource areas. The extended study area considered includes the Facility that will house the SME proposed for Phases 1, 2, and 3 and a 1-mile area surrounding the Facility from the boundary (see Figure 4-1). The timeframe for cumulative effects centers on the timing of the Proposed Action. The SME to be installed under the Proposed Action are anticipated to operate for approximately 25 years. The overall Facility, with upgrades and possibly additions, is expected to operate for multiple decades, longer than the life of the SME being installed, which can be updated in the future.

For the purposes of this analysis, public documents prepared by federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions include notices of intent for EISs and EAs, management plans, land use plans, and other planning related studies.

4.3. PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

Other projects included in this analysis are listed in Table 4-1 and briefly described in the following subsections.

TABLE 4-1 CUMULATIVE EFFECTS EVALUATION

Past, Present, and Reasonably Foreseeable Future Actions or Trends	Timing	Affected resource area(s) or intersection of effects
Loop 303, Lake Pleasant Parkway to I-17 (43rd and 51t Avenues complete; 67th and other activities pending)[1]	Completed and future pending	Transportation
Z-37-20-1 PUD; North Phoenix 3,500[2] (includes Facility)	Present and future pending	Land Use, Transportation, Socioeconomics, Air Quality, Water Resources, Noise, Biological Resources
GPA-NG-1-20; Arizona State Land department; proposed commercial/commerce/business park (Includes Facility)[3]	Present and future pending	Land Use, Transportation, Socioeconomics, Air Quality, Water Resources, Noise, Biological Resources
Linde PLC Plant[4]	Present	Air Quality
APS microgrid[5]	Present	Air Quality, Noise, Hazardous Materials and Waste
Expansion of TSMC AZ Facility with additional fabs[6]	Future possible	Transportation, Air Quality, Water Resources, Hazardous Materials and Waste

[1] Central District Projects | Department of Transportation (azdot.gov).

[2] Planning and Development Planned Unit Development & Planned Community District Current Cases (phoenix.gov).

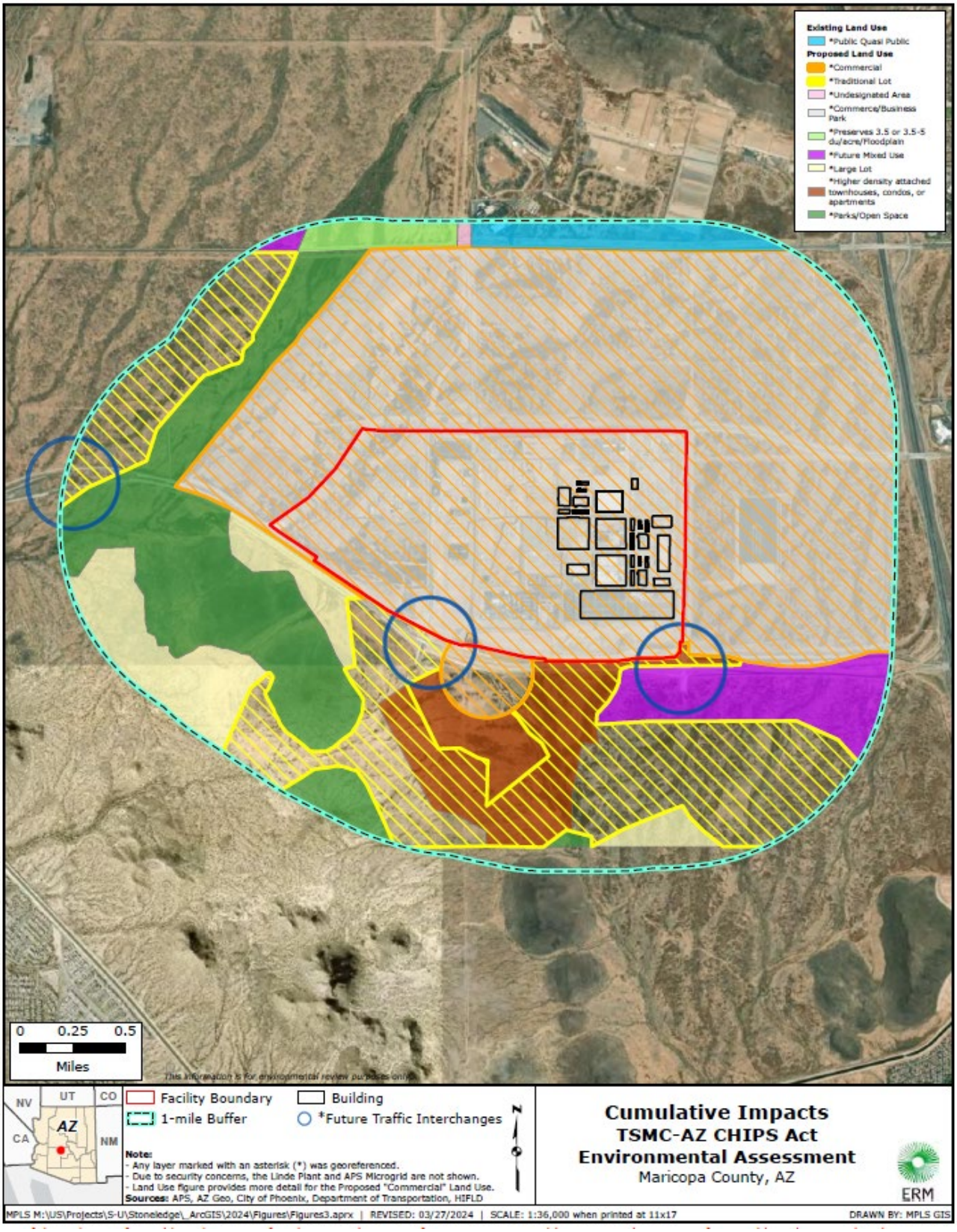
[3] General Plan Amendment, Rezoning & Text Amendments (phoenix.gov).

[4] MCAQD Permit P0008966; 05/20/2022.

[5] MCAQD Permit P0009779; 10/23/2023.

[6] Expansion of the TSMC AZ campus beyond three fabs is not proposed within the next 5 years and is purely conceptual as of the preparation of this EA. Advantages of future expansion would include shared infrastructure and resources, concentrated location (which reduces travel needs), and building fabs in the same location (which encourages a "cluster effect" from suppliers).

FIGURE 4-1 CUMULATIVE EFFECTS



4.3.1. PAST ACTIONS

Table 4-1 lists one past project considered in this analysis. The Loop 303, Lake Pleasant Parkway to I-17 transportation project was partially completed in September of 2023.

4.3.2. PRESENT AND REASONABLY FORESEEABLE ACTIONS

Table 4-1 lists five potential projects considered in this analysis. One partially completed transportation project consists of existing road and highway improvement projects. Four projects are development projects, two of which include the Facility. Most of the area immediately surrounding the North Phoenix 3,500 Planned Unit Development (PUD) zone, including the Facility, is zoned S-1 for Ranch or Farm Residence. Additionally, bulk gas plants (Linde PLC) to serve Facility operations are being constructed in the western portion of the Facility campus, and a microgrid for backup emergency power will be installed by APS. The SR303 Loop Final Traffic Report studied future traffic conditions in 2040 and included approximately 16,000 daily trips from the Facility, as well as proposed commercial and residential development associated with the PUD. The SR303 Loop Final Traffic Report (ADOT 2022b) build conditions included:

- A Loop 303 configuration with three general purpose mainline lanes in both directions from Lake Pleasant Parkway to I-17.
- Full interchanges constructed at 67th Avenue, 51st Avenue, and 43rd Avenue.
- A full system interchange at I-17 with direct connecting ramps between I-17 and Loop 303 (instead of the current at-grade on- and off-ramps at Loop 303/Sonoran Desert Drive).

Under the 2040 build scenario evaluated by ADOT, the following intersections with direct access or in close proximity to the Facility would all operate at LOS D [level of service indicating the beginning of traffic congestion] or better:

- I-17 (both directions) at Loop 303/Sonoran Desert Drive
- I-17 (both directions) at Dove Valley Road
- SR 303 (both directions) at Lake Pleasant Pkwy
- SR 303 (both directions) at 67th St, 51st St, and 43rd St.

The North Phoenix 3,500 PUD (Z-37-20-1) consists of three Land Use Districts, with various Development Units within each district. As stated in the City staff report on Z-37-20-1 (City of Phoenix 2020), the PUD provides a zoning and regulatory framework to guide the development of an employment hub. The entire site was owned by the ASLD. Rezoning of the site from S-1 (Ranch or Farm Residence District) to PUD will accommodate future auctions by the ASLD, one of which is scheduled for May 29, 2024 (ASLD 2024). An entity of Mack Real Estate Group, Biscuit Flats Dev LLC, submitted an application to buy 2,500 acres of state land on the northwest side of Loop 303 and Interstate 17 (azcentral 2024). Rezoning of the PUD was part of an ongoing collaboration between the City and ASLD to attract investment to the area and partner on infrastructure financing and development. Trust lands are managed by the ASLD to generate revenue for K-12 schools and 13 additional institutional beneficiaries.

The Land Use Districts include the Technology Campus, Technology Park, and Freeway Mixed Use. The Technology Campus District is generally located at the center of the PUD site between 43rd Avenue and 51st Avenue. The District consists of 1,078 acres and will support the most intensive planned uses (City of Phoenix 2020). The Technology Park District is generally located in the northern and western portions of the PUD area and is comprised of 1,217-acres of planned employment and commerce park uses that may support the Technology Campus and that may also stand alone with separate and distinct uses (City of Phoenix 2020).

The Freeway Mixed Use District is 1,243-acres in size and is located east of 43rd Avenue, adjacent to the I-17 freeway corridor. Uses within this district may include additional employment uses, regional commercial, office, hospitality, schools, churches, hospitals, group homes, and multi-family development types (City of Phoenix 2020). Permitted and conditional residential, school, church, hospitality, hospital, or group home uses as allowed in the Freeway Mixed Use District shall require a minimum building setback of 2,500 feet from the west edge of the 43rd Avenue right-of-way (City of Phoenix 2020). These uses are complementary and supportive to the Technology Campus and Technology Park District uses and will benefit from their location at the confluence of two major freeway corridors. The Freeway Mixed Use Land Use District consists of three Development Units: MU-A, MU-B, and MU-C. MU-A and MU-B permitted uses differ from the MU-C permitted uses; however, all three include types of intermediate commercial (C-2), commercial office (C-O), and multi-family residential (R-5). Development in the North Phoenix PUD carries several City measurable and enforceable sustainability practices, including, but not limited to, use of LED and energy efficient lighting, reflective roofing materials, bike parking, landscape and stormwater management to reduce storm runoff, and efficient irrigation technology (City of Phoenix 2020).

In the future, TSMC AZ may expand the Facility to include more than the three fabs supported by the Proposed Action, possibly including a total of six or more fabs capable of producing 100,000 or more wafers per month. Whether this expansion occurs depends on market demand and the commercial and technical success of Phases 1, 2, and 3. The efficiency of the Facility expansion could include:

- Shared infrastructure (e.g., piping, electricity, storage tanks, etc.) and resources (e.g., spare parts, backup equipment, recycled water, etc.).
- Reduced travel due to concentrated location (product and staff can move from fab to fab within the same facility rather than between facilities over great distances).
- Encouraging a “cluster effect” from suppliers (e.g., materials, equipment, parts, and services).

4.4. CUMULATIVE EFFECT ANALYSIS

Where feasible, the cumulative effects of the Proposed Action were assessed using quantifiable data; however, where quantifiable data were not available, a qualitative analysis was undertaken. In addition, where an analysis of potential environmental effects for future actions has not been completed, assumptions were made regarding cumulative effects for purposes of this EA. The analytical methodology presented in Chapter 3, which was used to determine potential effects on the various resource areas analyzed in this EA, was also used to evaluate cumulative effects.

4.4.1. AIR QUALITY

The ROI for assessing air quality effects is the regional planning area in which the Facility is located, the Phoenix Planning Area. The same ROIs will be used to consider cumulative effects.

As described in Section 3.1.2, Maricopa County and the ROI are currently considered serious nonattainment for PM_{10} and moderate nonattainment for 8-hour ozone. Maricopa County and the ROI are currently considered in attainment or unclassifiable for all other criteria pollutants (EPA 2024c). Additional development within the ROI could add pollutants to the air, including more of the same regulated pollutants as those potentially generated by the Proposed Project. Development within the district for smoke, gas, and odor emissions shall comply with Regulation III of the Maricopa County Air Pollution Control Rules and Regulations (City of Phoenix Municipal Code Section 626).

Despite Maricopa being one of the fastest growing and largest counties in the nation, air quality has improved over the last 20 years. According to the MCAQD 2023 Annual Report, the Department has implemented several community programs to reduce air pollution. The Travel Reduction Program has over 1,100 participating employers. Their Business Assistance air pollution reduction programs are helping replace gas powered equipment with electric or battery powered versions. Additionally, their Propane Firepit and Fireplace Retrofit programs are helping reducing $PM_{2.5}$ emissions.

As TSMC AZ will adhere to all permit requirements, no significant adverse effects on air quality are anticipated. The permitting process requires reevaluation in the event of newly applicable requirements, which will maintain compliance with air requirements through the life of the Facility. No significant GHG effects are anticipated from the construction or operation of the Facility. Associated GHG emissions from the operations related to the SME installed under the Proposed Action would be approximately 1.32 million MT per year but would be offset through the purchase of RECs to address Scope 1 GHGs. Indirect emissions from employee trips and truck deliveries will be managed by BMPs (described in Chapter 2, Table 2-2) to reduce vehicle traffic to the extent possible, and to encourage employee use of alternative fuel vehicles such as electric vehicles. The Facility will follow the requirements of Maricopa County's Trip Reduction Plan to reduce single occupant vehicle trips or miles traveled by set percentages each year until a 60-percent single occupant vehicle rate is achieved. Additionally, as a BMP, TSMC AZ will make 96 electric vehicle charging stations available to employees, with the potential to add more in future based on demand, that would reduce commuter tailpipe air pollutants and GHGs to a minor degree.

The Linde plant is located on the westernmost portion of the Facility separated from the production areas by a public road (W. 51st Ave.). The Linde plant is owned and operated by Linde and the land parcel is leased to Linde. The plant will provide bulk quantities of nitrogen, oxygen, and argon to TSMC Phases 1 through 3 and will provide the same gases to the general market. Linde will sublease a part of their land parcel to Air Liquide which will provide bulk hydrogen to both the Facility and the general market. The Linde Plant is independently permitted by Linde, Inc., MCAQD Permit #P0008966, issued on May 20, 2022.

APS will own and operate the microgrid and is the power provider for the TSMC AZ Facility. The microgrid is an aggregation of electrical generators that will be located near Phase 2, within the fence line of the Facility. Access to the area is controlled by APS only; TSMC personnel will not have independent access. The generators are intended to provide power generation to the grid and provide emergency power to Phase 2 in the event of a power loss event. The microgrid will consist of 78 Tier 4 generators. The microgrid is independently permitted by Arizona Public Service Company, MCAQD Permit #P0009779, issued on October 23, 2023.

Future industrial development within the ROI, including any potential future expansion of the TSMC AZ Facility, may be limited to those projects that can meet tightening air permitting requirements. This limitation should ensure significant cumulative effects from industrial and commercial sources on air quality fall below significant levels.

The North Phoenix 3,500 PUD would likely include or induce additional residential development and commuter traffic, increasing non-permitted sources of criteria pollutants. Conversely, transportation initiatives such as the SR30 Loop and MCAQD's Travel Reduction Program may alleviate emissions from travel or at least reduce the rate of emission increases. Other MCAQD initiatives would also likely continue to improve air quality. Overall, cumulative effects to air quality are likely to be minor to moderate depending on the degree of economic development in the local area and associated population increase.

4.4.2. CLIMATE CHANGE, RESILIENCY, AND SUSTAINABILITY

The ROI for assessing GHG and climate change is generally global, although relative effects of a project may be assessed against regional, state, or local climate goals.

Maricopa County has adopted Vision 2030, the Maricopa County Comprehensive Plan, to guide sustainable growth that best serves the community while protecting public health and safety. Vision 2030 includes several energy-related goals focusing on climate change, resiliency, and sustainability.

- Energy Goal #2: make Maricopa County a leader in alternative energy research and development.
- Energy Policy #7: support efforts to assist businesses and individuals with renewable energy options and energy conservation.
- Energy Policy #8: support implementation of its Green Government program, which defines short and long-term strategies for the County to reduce its own energy consumption and uses a "lead by example" approach to encourage energy conservation and efficient energy use. (MCAQD 2024a).

Maricopa County supports state and local efforts to attract solar research and development in the region and supports expanding other forms of renewable energy production in support of Vision 2023.

The Phoenix City Council adopted the 2050 Sustainability Goals, which establish long-term outcomes to fulfill the vision of 'becoming the most sustainable desert city on the planet', and the City 2021 Climate Action Plan (City of Phoenix 2021b), which outlines actions to achieve these long-term 2050 goals.

TSMC integrates green management into daily operations, as noted in its 2022 Sustainability Report (Section 3.2.2). The TSMC AZ Facility design incorporates several sustainability and resiliency measures to manage extreme weather conditions, optimize water reclamation, reduce GHGs, and assure power supply (Section 3.2.2). TSMC has committed to: a water reclamation BMP to recycle and reuse at least 95 percent of its wastewater; reducing Scope 2 GHGs through the purchase of RECs; and reducing Scope 1 GHG emissions by abating F-GHGs by 90 percent or more through emission controls as discussed in Section (3.2.4).

Supporting facilities to TSMC, like the Linde PLC and APS Microgrid would also increase GHG emissions in the local area. Planned use developments to build out the Technology Park, Technology Campus, Freeway Mixed Use District would increase industrial, commercial and residential development that would increase GHGs from manufacturing processes and vehicle traffic. However, the PUD also carries several City measurable and enforceable sustainability practices, including, but not limited to, use of LED and energy efficient lighting, reflective roofing materials, bike parking, landscape and stormwater management to reduce storm runoff, and efficient irrigation technology (City of Phoenix 2020). Aspects such as LEDs, energy efficient lighting and reflective roofing would

reduce energy needs, resulting is somewhat lower Scope 2 GHGs than would otherwise occur without these measures. Efficient irrigation technology at the PUD would also reduce burdens on water sources and water sustainability to some degree.

Overall, cumulative effects on climate change, resiliency and sustainability would be minor to moderate depending on the degree of economic development in the local area and associated population increase.

4.4.3. WATER RESOURCES

No wetlands or other WOTUS are present within the Facility.

The Proposed Project has the potential to affect water resources based on the water demands necessitated by wafer production in Phases 1, 2, and 3. This potential impact will be managed by optimizing reuse of process water, including treatment in the POTW and in the onsite WRC (Section 3.3).

The TSMC AZ Facility includes Special Flood Area Zone areas A and AE, and adherence to architectural and insurance standards determined by USACE is therefore required. The Facility will adhere to these floodplain requirements and has already added a 53-acre drainage channel to manage potential storm runoff (see Section 3.3.2.3).

New industries added to the study area will be required to work with the regional providers to assure sufficient availability of water for their own processes, and to appropriately manage and reuse wastewaters. Because TSMC would treat and reuse approximately 95 percent of its wastewater, the project's cumulative effects on local and regional water supply would be minor to moderate.

Additional industrial development and enhancement of road systems in the study area will potentially impact stormwater runoff and will require additional flood management activities. As new or expanded roadway projects and new industrial/commercial facilities will require permits and will need to adhere to insurance requirements, new construction should appropriately manage stormwater to avoid significant effects and significant cumulative effects on the floodplain are not anticipated.

Arizona's water position is notably different from that of other dry western regions. Due to increased conservation and a decrease in agriculture, Arizona is below 1957 water usage levels despite massive population growth. The state has five times more water stored than it uses, and the Colorado River shortage declaration will not impact municipal or residential uses. The 1980 Groundwater Management Act provided Arizona with the legal and physical infrastructure to maintain a 100-year assured water supply (Greater Phoenix Economic Council 2021). Further, the State of Arizona has granted a "Designation of Assured Water Supply" to the City of Phoenix, affirming that at least 100 years of water supply is physically, legally, and continuously available to serve the City's existing customers and additional growth (City of Phoenix 2024).

The State and City's efforts to provide an assured water supply would help ensure future growth would not cause significant adverse effects to water sources. New industries added to the study area will be required to work with the regional providers to assure sufficient availability of water for their own processes, and to appropriately manage and reuse wastewaters. Because TSMC would treat and reuse approximately 95 percent of its wastewater, the project's cumulative effects on local and regional water supply would be minor to moderate.

4.4.4. CULTURAL RESOURCES

Prior to development of the Facility, cultural resources surveys were conducted to identify any historic properties within the Facility footprint. No historic properties were identified. As no historic properties that would be sensitive receptors subject to visual effects were identified within the 1-mile study area, new development within the study area would not be anticipated to have any significant cumulative effects on cultural resources.

4.4.5. BIOLOGICAL RESOURCES

Prior to development of the Facility, biological surveys were conducted to identify protected native plants, bird nests, threatened/endangered/protected species habitat, and invasive plants (see Section 3.5.2). As a BMP, protected native plants identified were removed from the disturbance area prior to the onset of construction; they will be returned to the Facility grounds upon completion of construction. No bird nests were identified, and no threatened, endangered, or protected animals were found onsite; however, as a BMP, all time of year restrictions to vegetation removal were followed to the extent practical to avoid effects on MBTA species and effects on the Sonoran Desert Tortoise. Although noise, dust, and emissions during construction may disturb species in the area, the effects would be temporary and have been managed to the extent possible by BMPs.

New development in the study area would be expected to follow local guidance regarding landscaping to avoid effects on native species. Assuming that no critical habitat is removed or destroyed by future construction, no significant cumulative effects on biological resources are anticipated.

4.4.6. LAND USE

Land use of the Facility was undeveloped desert originally zoned as “S-1”, Ranch or Farm Residence District, and was rezoned to “PUD”, Planned Unit Development, in Ordinance G-6756 by the City Council, which includes a 2,500-foot residential buffer where residential development is prohibited.

Construction of the Facility began in April 2021. Bulk gas plants to serve Facility operations are being constructed in the western portion of the campus, and a microgrid for backup emergency power will be installed by APS. To support the development of the Facility, the City constructed three arterial roads and one frontage road in anticipation of increased traffic. Additional road development planned is described in Section 4.3.2, above. The City installed a lift station to accommodate water volume required for operations.

The surrounding properties are unused/undeveloped land parcels currently owned by the ASLD and reserved for future development, potentially to include a science/technology industrial park adjacent to the Facility. The TSMC AZ Facility meets the City 2015 General Plan’s objective for building prosperity and attracting talent to the City. Future development in the study area is expected to be consistent with the General Plan as well, and to blend in with the Facility. No significant cumulative effects on land use are anticipated.

4.4.7. NOISE

The nearest NSAs are more than 1.5 miles from the Facility. There are no NSAs within the study area. The potential for noise annoyance is greatest during construction, and at no time during construction will noise effects rise to the level of significance. Operational noise levels will also remain below the level of significance. Noise from the microgrid with all 13 powerblocks running at the NSAs would

be less than 30 dBA. Assuming that new facilities developed in the study area would use similar construction equipment and have similar operational noise levels, no significant cumulative effects from noise on NSAs are anticipated.

4.4.8. TRANSPORTATION

Traffic from the Facility would add to existing traffic as well as N Phoenix 3500 PUD traffic, but according to the ADOT SR 303 Loop traffic study, if improvements are made (per the study) traffic would not cause LOS E or LOS F at intersections around the Facility.

The road capacity improvements planned by ADOT as part of the SR303 Loop improvements are designed to keep pace with demand from new development, including added trips for workers, vendors, deliveries, and indirect workers supporting added population in the area (ADOT 2022b). These improvements would be in line with ADOT's goals listed in its 2050 Long-Range Transportation Plan, including, but not limited to, the following: enhance safety and security, support economic vitality, and improve mobility, reliability, and accessibility. Implementing the improvements would also help ADOT achieve its vision to safely connect people and empower the state's economy. As discussed in Section 3.8, major employers in Maricopa County are required to comply with MCAQD's Travel Reduction Program (MCAQD 2024b), which would alleviate cumulative traffic effects to some degree. However, provided that road capacity upgrades remain on schedule (starting mid-2026 to mid-2027), the cumulative traffic generated by the Proposed Project and other nearby development should not result in significant cumulative traffic effects.

4.4.9. HUMAN HEALTH AND SAFETY

Potential effects on human health and safety from hazards associated with potential releases to air, soil, surface water, and groundwater would be reduced or avoided through compliance with regulatory and permitting requirements as well as BMPs. Any new industrial development in the study area would be required to comply with permit and regulatory requirements. For example, air permits will manage emissions to avoid harmful releases to air and OSHA will mandate responsibilities of employers to ensure employee safety. The City fire code (in line with International Fire Code 2018) requires new businesses to apply for construction and operational permits with the Fire Department (Phoenix Fire Code 2018). First responders are anticipated to coordinate with new businesses in the area so that they are prepared to respond as efficiently as possible to emergencies that could possibly occur at new facilities. Industry standard BMPs, such as an employee culture of safety ownership, are anticipated to be practiced at new facilities in the study area. Assuming that the existing safeguards to human health and safety are maintained as new facilities are added to the study area, no significant cumulative effects to human health and safety are anticipated.

4.4.10. HAZARDOUS MATERIALS AND WASTES

New industrial facilities that may be added to the study area will be subject to regulations regarding the safe handling, storage, and disposal of hazardous materials and waste. All hazardous waste would be managed according to RCRA regulations as adopted by ADEQ, A.R.S. § 49-901 *et seq.*; 18 A.A.C. 8. ADEQ will also oversee recycling of hazardous materials. U.S. Department of Transportation regulations would govern the shipment of hazardous materials. Assuming that any new industrial facilities in the study area manage and dispose of hazardous materials in accordance with law, no significant cumulative effects from hazardous materials and wastes are anticipated.

4.4.11. ENVIRONMENTAL JUSTICE

The study area does not currently show presence of EJ populations. Based on the current status of the study area, significant cumulative effects on EJ populations are not anticipated.

4.4.12. SOCIOECONOMICS

Future industrial development in the study area will provide improved economic opportunities for the current population as well as new residents who may relocate to the area. Jobs at future industrial facilities in the area will also stimulate other businesses in the vicinity and create indirect jobs. New residents and businesses will contribute to taxes in the area. Cumulative effects on socioeconomics are anticipated to be positive.

5. OTHER CONSIDERATIONS REQUIRED BY NEPA

5.1. CONSISTENCY WITH OTHER FEDERAL, STATE, AND LOCAL LAWS, PLANS, POLICIES, AND REGULATIONS

In accordance with 40 C.F.R. § 1502.16, analysis of environmental consequences shall include discussion of possible conflicts between the Proposed Action and the objectives of federal, regional, state, and local land use plans, policies, and controls. Table 5-1 identifies the principal federal and state laws and regulations that are applicable to the Proposed Action and describes briefly how compliance with these laws and regulations would be accomplished.

TABLE 5-1 PRINCIPAL FEDERAL AND STATE LAWS POTENTIALLY APPLICABLE TO THE PROPOSED ACTION

Federal, State, Local, and Regional Land Use Authorities, Plans, and Policies	Status of Compliance
National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq.*; CEQ NEPA implementing regulations, 40 C.F.R. Parts 1500-1508.	To be assessed at the Final EA.
Clean Air Act (CAA), 42 U.S.C. § 7401 *et seq.*	Effects on air quality were assessed and would be less than significant with the application of mitigation measures. (See Section 3.1.4)
Clean Water Act (CWA), 33 U.S.C. § 1251 *et seq.*	No WOTUS (CWA Section 404) were identified within the property and therefore TSMC AZ would not be regulated under CWA Sections 404 or 401. The Facility is compliant with CWA Section 402. (See Section 3.3)
Safe Drinking Water Act (SDWA) 42 U.S.C. § 300f *et seq.*	Effects to groundwater resources covered under the SDWA are minimal. The Facility receives potable water from a POTW compliant with the SDWA and is not regulated as a public drinking water distribution system. (See Section 3.3)
Coastal Zone Management Act, 16 U.S.C. § 1451 *et seq.*	Not applicable.
National Historic Preservation Act (NHPA), 54 U.S.C. § 300101 *et seq.* Archeological and Historic Preservation Act (AHPA), 54 U.S.C. §§ 312501-312508.	NHPA Section 106 consultation is underway and will be complete by the Final EA. (See Section 3.4)
Endangered Species Act (ESA), 16 U.S.C. § 1531 *et seq.*	Operations would not affect endangered species. Time of year restrictions for vegetation removal are implemented during construction to avoid effects. (See Section 3.5)
Migratory Bird Treaty Act, 16 U.S.C. § 703 *et seq.*	Operations would not affect migratory birds. Time of year restrictions for vegetation removal are implemented during construction to avoid effects. (See Section 3.5)
Bald and Golden Eagle Protection Act, 16 U.S.C. § 668 *et seq.*	No adverse effects to Bald or Golden Eagles are expected. (See Section 3.5.2.3)

Federal, State, Local, and Regional Land Use Authorities, Plans, and Policies	Status of Compliance
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601 *et seq.*	Not applicable.
Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. § 11001 *et seq.*	Operations would comply with EPCRA. (See Sections 3.9.1 and 3.10.1)
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. § 136 *et seq.*	Not Applicable. FIFRA does not apply; TSMC AZ does not manufacture, distribute, sell, or utilize pesticides under FIFRA.
Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 *et seq.*	Operations would comply with RCRA. (See Section 3.10)
Toxic Substances Control Act (TSCA), 15 U.S.C. § 2601 *et seq.*	Operations would comply with TSCA. (See Section 3.10)
Farmland Protection Policy Act, 7 U.S.C. § 4201 *et seq.*	Not applicable. The site contains no prime farmland. The land was rezoned to Planned Unit Development. (See Section 3.6.2)
Executive Order 11988, Floodplain Management	Measures to divert floodwaters from the site have been completed. LOMR documentation is in progress. (See Section 3.3)
Executive Order 11990, Protection of Wetlands	Not applicable. (See Section 3.3)
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations Executive Order 14096 Revitalizing our Nation's Commitment to Environmental Justice for All	The Study Area does not contain EJ populations that may be facing burdens or have pre-existing vulnerabilities. (See Section 3.11)
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks	Operations at the site would not disproportionately affect children. (See Section 3.9.1.3)
Executive Order 13112, Invasive Species	Installation of SME would not involve activities that could spread invasive species.
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments	CPO has consulted Tribes on the Proposed Action. (See Section 3.4.2.1)

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Pioneer Living History Museum	
Las Colinas at Black Canyon	
Canyon Crossroads	
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MAA Foothills Apartments	
Nova North Valley Apartments	
MAA Foothills Luxury Apartments	
Pioneer RV Resort	
Sonoran Foothills Community	
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Colorado River Indian Tribes
Fort McDowell Yavapai Nation*
Fort Mojave Indian Tribe*
Gila River Indian Community
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Mescalero Apache Tribe
Pascua Yaqui Tribe*
Pueblo of Zuni*
Salt River Pima-Maricopa Indian Community*
San Carlos Apache Tribe*
Tohono O'odham Nation
Tonto Apache Tribe*
White Mountain Apache Tribe*
Yavapai-Apache Nation*
Yavapai-Prescott Indian Tribe*
*indicates Tribes also contacted by ASLD at the time of sale of the land to TSMC