U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

PHMSA: Natural Gas Distribution Infrastructure Safety and Modernization Grant Program Programmatic Environmental Assessment

Tier 1 Nationwide Environmental Analysis

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Prepared for:
Natural Gas Distribution Infrastructure Safety and Modernization Grant Program

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1. Introduction

The Pipeline and Hazardous Materials Safety Administration (PHMSA) developed this Tier 1 Nationwide Analysis (Tier 1), a programmatic environmental assessment (PEA), in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR Parts 1500-1508). NEPA and its implementing regulations require that federal agencies assess the impacts on the human environment of any Proposed Federal Action; identify adverse environmental effects that cannot be avoided should the Proposed Action Alternative be implemented; and evaluate a No Action Alternative, and their environmental effects.

PHMSA is using a programmatic, tiered environmental analysis to: (1) describe the effects of implementing the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program ("Program"), as mandated by Congress; and (2) ensure that implementation of the Program at any specific project site complies with environmental laws and does not result in a significant environmental impact. Tiered environmental reviews are authorized by 40 CFR 1501.11. This Tier 1 EA will be followed by multiple site-specific Tier-2 analyses (Tier 2). For PHMSA, using a tiered NEPA approach allows for a broad nationwide analysis that can expedite site-specific environmental analysis and decision-making.

This Tier 1 establishes the Purpose and Need and describes and evaluates the environmental and safety effects of the Proposed Action and the No Action Alternatives on the environment on a nationwide basis. Additionally, this Tier 1 describes the required information that provisionally selected project proponents will provide to PHMSA in the Environmental Questionnaire, hereinafter referred to as the Tier 2 Site Specific Environmental Assessment, which will be used to create the site-specific Tier 2 documents. Additionally, this Tier 1 describes the Tier 2 processes, including the processes for project sites with anticipated and unanticipated adverse environmental impacts.

Finally, based on the analysis in this Tier 1, PHMSA has developed a proposed FONSI, included in Appendix 3, to be used for projects that demonstrate consistency with the anticipated environmental impacts documented in this Tier 1 and that include appropriate site-specific mitigation commitments in the Tier 2 Site Specific Environmental Assessment. This Tier 1 also describes the decision-making process to be used by PHMSA when unanticipated adverse environmental impacts result that would require additional analysis and/or mitigation (See Section 1.4.2).

1.1. Background

On November 15, 2021, the Infrastructure Investment and Jobs Act[1] (IIJA) was enacted, which established the Program. The stated purpose of the Program is for municipality or community owned utilities (not including for-profit entities) "to repair, rehabilitate, or replace its natural gas distribution pipeline system or portions thereof or to acquire equipment to (1) reduce incidents and fatalities and (2) avoid economic losses" by providing grant opportunities to municipality or

[1] (IIJA) (Pub. L. 117-58)

community owned utilities (not including for-profit entities). Furthermore, IIJA orders PHMSA to establish procedures for awarding grants that take into consideration the following: (1) the risk profile of the existing pipeline system operated by the project applicant, including the presence of pipe prone to leakage; (2) the potential of the project for creating jobs; (3) the potential for benefiting disadvantaged rural and urban communities; and (4) economic impact or growth.

Under the Federal Pipeline Safety Laws, 49 U.S.C. §§ 60101 et seq., the Secretary of Transportation (the Secretary) must prescribe minimum safety standards for pipeline transportation and for pipeline facilities. The Secretary has delegated this authority to the PHMSA Administrator (49 CFR 1.97(a)). PHMSA is the federal safety agency responsible for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system.

1.2. Purpose and Need

The purpose of this Program as set forth by IIJA is to reduce incidents, fatalities, and adverse impacts to the public and the human and natural environment and avoid economic losses, particularly in rural and urban disadvantaged communities with municipality or community owned natural gas distribution utilities (not including for-profit entities). PHMSA's overall mandate to regulate pipeline safety is set by federal law under 49 U.S.C. §§ 60101 et seq. with the mission of protecting people and the environment from the risks of hazardous materials transportation. The goals of this Program include: (1) reducing the risk profile of the existing pipeline system operated by the applicant, including the presence of pipe prone to leakage; (2) the potential of the project for creating jobs; (3) the potential for benefiting disadvantaged rural and urban communities; and (4) economic impact or growth. The overall needs addressed by this Program include: (1) improving upon the safe delivery of energy to often underserved communities with municipality or community owned utilities (not including for-profit entities), by reducing incidents and fatalities, as well as methane leaks; (2) avoiding economic losses caused by pipeline failures; and (3) protecting our environment and reducing climate impacts by remediating aged and failing pipelines and pipe prone to leakage.

Incident data analysis and PHMSA subject matter expert experience demonstrate that pipelines constructed of cast and wrought iron, as well as bare steel, are among those pipelines that pose the highest risk for leaks due to age and material.[2] To a lesser extent, plastic pipe that was installed prior to 1979 may also be leak prone based on known mechanical property problems and poor construction practices at the time of installation. Many of these pipelines also serve disadvantaged rural and urban areas with a high proportion of underserved and low socio-economic populations. Even though the amount of cast iron pipelines is declining, there have been a number of recent incidents caused by cast iron gas distribution main failures, highlighting the risks associated with cast and wrought iron pipelines.[3] PHMSA's regulations require gas distribution operators to submit incident reports when a leak causes an injury or fatality, property damage exceeding the regulatory threshold as per 49 CFR 191.3, or the unintentional release of three million standard cubic feet or more of gas. These gas distribution incident reports

[2] Pipeline Replacement Background | PHMSA (dot.gov)
[3] Cast and Wrought Iron Inventory | PHMSA (dot.gov). https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/cast-and-wrought-iron-inventory

(excluding those caused by leaks beyond the customer meter) for 2005 through 2021 further support the need for the Program by highlighting the following:

- Nine percent of the incidents occurring on gas distribution mains involved cast iron mains. However, only two percent of distribution mains are cast iron.
- 39 percent of the cast or wrought iron main incidents caused a fatality or injury, compared to only 21 percent of the incidents on other types of mains.
- 36 percent of all fatalities and 16 percent of all injuries on gas distribution mains involved cast or wrought iron pipelines.

Reducing the inventory of leak prone pipelines in service (e.g., cast iron, wrought iron, bare steel, and certain plastic materials) would reduce safety risks associated with potential exposure to gas from leaking pipes and reduce methane leaks, especially in disadvantaged rural and urban communities that have been unable to fund repair, rehabilitation, or replacement of municipality or community owned natural gas distribution pipeline utilities (not including for-profit entities). Methane emissions are a significant contributor to global climate change because they are at least 25 times more potent than carbon dioxide emissions at trapping heat in the atmosphere. Accordingly, a focus of the Program is to reduce methane leaks to the greatest extent possible.[4] This focus also has the added benefit of reducing safety risks associated with potential exposure to gas from leaking pipes in disadvantaged communities.

1.3. Regulatory Framework

This Tier 1 has been prepared to comply with NEPA (42 U.S.C. §§ 4321 et seq.) and the CEQ regulations implementing NEPA (40 CFR Parts 1500-1508). Applicable requirements, including the statues, regulations, and permit requirements are listed below. Other federal, state, and local requirements not listed below may apply to individual Tier 2 projects.

1.3.1. Summary of Federal Environmental Compliance Requirements

Federal environmental laws, in addition to NEPA, that apply to the Proposed Action Alternative include:

- Clean Air Act, 42 U.S.C. §§ 7401 et seq.
- Clean Water Act, 33 U.S.C. §§ 1251 and 1344, Section 401 and 404
- Rivers and Harbors Act of 1899, 33 U.S.C. § 403
- Coastal Zone Management Act of 1972, 16 U.S.C. § 1452
- Farmland Protection Policy Act, 7 U.S.C. § 4201
- Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601
- Resource Conservation and Recovery Act, 42 U.S.C. §§ 9671 et seq.
- Noise Control Act of 1972, 42 U.S.C. § 4901
- Section 4(f) of the 1966 U.S. Department of Transportation Act, 49 U.S.C. § 303(c)
- Endangered Species Act, 16 U.S.C. § 1536, Section 7

[4] https://www.epa.gov/gmi/importance-methane

- National Historic Preservation Act, 54 U.S.C. § 306108, Section 106
- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, 42 U.S.C 61
- Executive Order 11988, Floodplain Management, 42 FR 26951, signed May 24, 1977
- Executive Order 11990, Protection of Wetlands, 42 FR 26961, signed May 24, 1977
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 FR 7629, signed February 11, 1994

- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, 65 FR 50121, signed August 11, 2000

1.4. Framework for Analysis

1.4.1. Tier 1 Analysis

This Tier 1 assesses the potential environmental effects of implementing this Program throughout the nation. This Tier 1 analyzes the reduction in methane emissions from leak prone pipe and a reduction in safety risks that are anticipated to result from the repair, rehabilitation, or replacement of current natural gas distribution pipeline public utilities. This analysis also discusses the environmental impacts that can result from natural gas distribution pipeline repair, rehabilitation, and replacement, including impacts from excavation, blowdown, and the use of heavy equipment. Throughout Section 2 of this Tier 1, and as summarized in Appendix 2, PHMSA describes mitigation activities that project proponents would perform as necessary to prevent or reduce these impacts. PHMSA has identified both standard avoidance, minimization, and mitigation measures that would be generally applicable to all proposed projects, as well as additional mitigation measures potentially required based on construction activities. PHMSA may also identify additional mitigation measures during its review and analysis of Tier 2 Site Specific Environmental Assessments.

This Tier 1 also proposes a FONSI, included in Appendix 3, for project sites that demonstrate consistency with the anticipated environmental impacts documented in this Tier 1 and where project proponents commit to implement the site-specific mitigation actions described in this document and in the Tier 2 Site Specific Environmental Assessment. PHMSA intends to bundle Tier 2 projects that are limited to equipment purchases with no related construction activities into one FONSI.

PHMSA describes in greater detail below the process for project sites with unanticipated adverse environmental impacts that are not analyzed in this Tier 1. Such project sites would require additional analysis to complete the NEPA process.

Public Comment Period

Finally, this Tier 1 solicits public comments on the assessment of impacts, the mitigation activities presented in this Tier 1, the content of the Tier 2 Site Specific Environmental Assessment as described in Chapter 3, and the process for evaluating site-specific projects with unanticipated adverse impacts. PHMSA will consider all comments submitted on this Tier 1 EA and address any substantive comments, either individually or collectively in accordance with

CEQ regulations. In response to comments, PHMSA will consider all comments on this Tier 1 in the development of the Tier 2 Site Specific Environmental Assessment.

1.4.2. Tier 2 Analysis

The Tier 2 analysis will include the completion of an Environmental Questionnaire, PHMSA's analysis of the Tier 2 Site Specific Environmental Assessment, and the agency's decision-making process for concluding the NEPA process. Project proponents will complete the Tier 2 Site Specific Environmental Assessment to provide PHMSA with site-specific project information for PHMSA to complete its agency review and decision-making process required by NEPA. In its review of the completed Tier 2 Site Specific Environmental Assessment, PHMSA will confirm compliance with federal and state environmental and historic preservation laws, regulations and guidance, identify applicable mitigation, and document commitments by project proponents to complete applicable mitigation. PHMSA will decide at the conclusion of each Tier 2 analysis to issue a FONSI or determine that additional analysis is required.

Completion of Environmental Questionnaire

Provisionally selected project proponents will be provided a Tier 2 Site Specific Environmental Assessment, as described in the May 24, 2022, Notice of Funding Opportunity, in order for PHMSA to assess the site-specific impacts that could result from the repair or replacement of the selected facilities. PHMSA will inform the provisional selectee/project proponent that the Tier 2 Site Specific Environmental Assessment must be complete and accurate, and appropriate mitigation commitments documented in order for PHMSA to obligate and disperse grant funds. PHMSA will provide technical assistance to project proponents as needed during this process.

Chapter 3 of this Tier 1 EA describes the types of information that will be needed by PHMSA to complete the Tier 2 Analysis. These information requirements will be compiled into the Tier 2 Site Specific Environmental Assessment which will be provided to provisional selectees/project proponents.

The Tier 2 Site Specific Environmental Assessment may include field investigations to identify additional resources and impacts that are not known at the Tier 1 stage. With this information, the project proponent and PHMSA will select and/or develop specific mitigation measures as needed for each site-specific project. This Tier 2 analysis considers avoidance and minimization of impacts on sensitive and other environmental resources.

In preparing the Tier 2 Site Specific Environmental Assessment, PHMSA will consider public comment received on this Tier 1. PHMSA may address comments by updating potential mitigation requirements in the Tier 2 documents and/or providing further analysis in the narrative portion of the Tier 2 Site Specific Environmental Assessment. Potential mitigation measures are described in each resource section in Chapter 3 and listed in Appendix 2.

The Tier 2 Site Specific Environmental Assessment will require project proponents to: (1) identify environmental resources, cultural resources, and community information; (2) include an applicable resource analysis using appropriate tools to comply with federal and state

environmental laws; and (3) confirm its commitment to perform mitigation actions described in the document. Along with soliciting information, the Tier 2 Site Specific Environmental Assessment will also include instructions for environmental compliance and completing mitigation to minimize environmental impacts that project proponents must agree to complete.

PHMSA Analysis of Tier 2

Project proponents will provide PHMSA with information for the Tier 2 analysis by completing the Environmental Questionnaire. PHMSA will review the Tier 2 Site Specific Environmental Assessment and determine if any 1) environmental impacts are likely to occur, including any positive, beneficial impacts, and 2) any unanticipated environmental impacts that are likely to occur that were not described in this Tier 1 EA. If adverse environmental impacts are likely to occur, the project proponent will need to commit to corresponding mitigation activities which will be confirmed in PHMSA's analysis of the Tier 2 Site Specific Environmental Assessment. If there are no unanticipated environmental impacts, and the project proponent commits to perform requisite mitigation, PHMSA will incorporate and confirm the proposed FONSI found in Appendix 3 in this Tier 1 document to complete the Tier 2 Analysis. These completed documents will become Tier 2/FONSIs, and their publication in PHMSA website and local posting will complete the NEPA process for those site-specific projects.

Projects with Unanticipated Impacts

If PHMSA determines that a Tier 2 Site Specific Environmental Assessment demonstrates adverse and unanticipated types or levels of environmental impacts, the project proponent will prepare a draft Tier 2 EA, which will include a description and analysis of any unanticipated adverse environmental impacts based on environmental resources identified. This information will be added as a narrative section attached to the Tier 2 Site Specific Environmental Assessment. PHMSA and the project proponent will propose additional mitigation actions, if necessary, to minimize the unanticipated impacts resulting from project activities to a level appropriate for PHMSA to conclude that because of the enhanced mitigation, there is no significant environmental impact.

In these cases, the draft Tier 2 EA will be published for public comment and notice will be provided to the interested and affected community. PHMSA will then review comments, consider environmental impacts, additional mitigation actions, and other factors before determining whether to: (1) proceed with preparation of an environmental impact statement; (2) decline to fund the project; or (3) publish a final Tier 2 EA document including responses to any comments received, modified analysis, and/or mitigation actions, and conclude with a FONSI.

2. Description of the Alternatives

2.1. No Action Alternative

The No Action Alternative, as required under NEPA, serves as a baseline and is used to compare impacts from the Proposed Action Alternative. Under the No Action Alternative, PHMSA would not implement the Program which provides municipality and community owned utilities (not

including for-profit entities) the opportunity to repair, rehabilitate, or replace existing pipelines or to acquire equipment to: (1) reduce incidents and fatalities; and (2) avoid economic losses. Additionally, PHMSA would not be able to reduce the inventory of methane leaks and reduce safety risks by replacing pipe prone to leakage. It is important to note that while NEPA requires that PHMSA must consider the No Action Alternative, PHMSA lacks discretion to carry out this alternative, as PHMSA is obligated to enact the Program by IIJA (Pub. L. 117-58). Under this alternative, pipeline operators would continue to use legacy cast iron, wrought iron, bare steel, and other leak prone pipeline material, and presumably conduct repairs or replacements in the future using non-federal sources of funding, and potentially on an emergency basis, when a pipeline fails. Impacts and benefits associated with replacing existing pipelines with updated material would not be undertaken and the safety risks and methane leaks would remain.

2.2. Proposed Action Alternative

Under the Proposed Action Alternative, PHMSA would implement the Program that would allow municipality and community owned utilities (not including for-profit entities) to apply for funding to repair, rehabilitate, or replace its natural gas distribution pipeline system or portions thereof or to acquire equipment. PHMSA anticipates awarding approximately $196,000,000 annually to support the Program starting in fiscal year 2022 for five years. PHMSA anticipates receiving applications from both rural and urban community utilities resulting in the repair or replacement of approximately 1,000 miles of pipelines over the life of the Program. This Program would not fund new facilities or extensions of existing facilities.

The Program would prioritize repair, rehabilitation, or replacement of leak prone material including iron (cast, wrought, or ductile)[5], and bare steel (bare steel primarily with "higher" leak rates per mile). Older vintage plastic pipe including, but not limited to, pre-1979 PE resins along with PVC would also be prioritized due to known mechanical property problems and poor construction practices. These materials had significantly lower resistance to cracking than modern PE resins, which have improved material requirements required in 49 CFR part 192.[6] Other supporting factors under this Program include the goals identified in Section 1.2 of this EA.

PHMSA had no role in siting the existing pipelines when they were originally installed, and this Program would not dictate the replacement material used, except that it must comply with Code requirements in 49 CFR Part 192. However, the majority of replacement pipe material includes plastic polyethylene for pressures up to 125 pounds per square inch (psi). Replacements involving pressures in the range of 200-250 psi would typically utilize polyamide (PA)-11 or PA-12. Steel would be required for replacements above 250 psi.

While this Program does not mandate construction methods, many replacement actions would involve inserting plastic material into the existing pipeline. This method involves minor excavation for an entry and exit bore/drill hole. The new pipeline material is then installed within the existing pipeline, minimizing excavation. Entry and exit holes would be required

[5] Ductile iron is lower risk and would be less prevalent.
[6] https://www.aga.org/contentassets/c139635bd829446eb292e2801b321e88/plastic-pipe-timeline-06282022.pdf

approximately every 1,000 feet resulting in the excavation of an approximately six feet by six feet area at both the entry and exit points where the pipeline is inserted. Where the insertion method is not utilized, the old pipeline would be removed. The new pipeline would be installed within the existing trench within the right-of-way (ROW) and tied-in at the end of the replacement. The minimum depth of cover is typically three feet in this installation method. A typical trench to install the new pipe would be four feet deep and six feet wide, with minor deviation from these amounts depending on site-specific conditions. A workspace is also required alongside the trench, which would be disturbed to a lesser degree. Another installation method involves abandoning old pipeline in place and then boring or directional drilling to place the new pipeline in the same ROW with excavations like insertion methods at the ends for tie-in to the existing pipeline system.

A combination of installation methods could be utilized depending on project specific site conditions. Regardless of method utilized, all work, including staging areas, would be located within or adjacent to the existing pipeline ROW or easements. Temporary workspace clearing and grading may be required. Project proponents will provide information about their proposed installation method in their Tier 2 Site Specific Environmental Assessment, which will allow PHMSA to ensure that the required mitigation actions are responsive to installation techniques, soil conditions, proximity to residents, and environmental impacts. All areas disturbed within the project area would be restored and areas outside of the permanent rights of way would be returned to pre-construction conditions. The Proposed Action Alternative also includes funding for the purchase of equipment to reduce incidents and fatalities and avoid economic losses as stated in IIJA.

3. Affected Environment and Environmental Consequences

3.1. Introduction

The affected environment includes municipality and community owned natural gas pipeline infrastructure, their rights of way, and resources that could be affected by these projects throughout the United States. These pipelines exist in a variety of diverse environments from highly populated urban sites to unpopulated rural areas. Because this is a programmatic assessment, the potentially affected environment would be the land area and waterways in the United States where these pipelines are located for which applicants could apply for funding through the Program. Therefore, this chapter provides a broad overview of the natural and human environment that may be encountered, including additional site-specific analysis and agency consultation that would be conducted by PHMSA during the Tier 2 process. Potential impacts for individual resources are presented for the alternatives along with potential mitigation measures that would be considered and committed to during the Tier 2 process.

The resources analyzed in this Tier 1 include air quality and greenhouse gas emissions, water resources (surface water, floodplains, wetlands), ground water, hazardous materials, hazardous waste, soils, biological resources (wildlife, vegetation, and threatened and endangered species), cultural resources, land use, transportation, noise, vibration, socioeconomics, environmental

justice, safety (health, environmental, and emergency services), Section 4(f), and cumulative effects.

PHMSA does not anticipate adverse impacts associated with the Program, as all work includes the repair, rehabilitation or replacement of pipeline materials and is anticipated to take place within existing ROW (ROW) corridors, which are previously disturbed environments. This Tier 1 analyzes potential direct, indirect, or cumulative effects as they relate to construction activities (excavation of entry and exit holes, replacement of pipeline, and associated activities) or acquisition of equipment. Following construction, PHMSA anticipates sites would be restored to pre-existing conditions. This Tier 1 document also analyzes potential positive benefits, especially to environmental justice communities, which would benefit from safer infrastructure with improved integrity vis-a-vis receiving Program funds.

3.2. Air Quality and Greenhouse Gas Emissions

3.2.1. Affected Environment

Emissions from stationary sources, mobile sources, and construction sources all have the potential to degrade air quality and emit greenhouse gas emissions (GHGs). This chapter presents an analysis of the potential effects for the No Action and Proposed Action Alternatives on air quality in accordance with the transportation and general conformity requirements of the Clean Air Act (CAA).

This chapter also presents an analysis of the effects of the Proposed Action Alternative on GHG, including methane emissions from pipelines and CO_2 and other GHG emissions associated with construction and maintenance activities. See Appendix 1, *Air Quality and Greenhouse Gas Analysis*, for additional regulatory information and the methodology used for the following analysis.

The social cost of greenhouse gasses (SC-GHG) is the monetary value of the net harm to society associated with adding a small amount of different GHGs to the atmosphere in a given year.[7] The SC-GHGs represent a monetization of the damages associated with the incremental changes in each GHG (e.g., increased flood risk, disruption of energy systems, environmental damage) on society. The assessed cost provides a benchmark for the economic evaluation of a proposed action. SC-GHGs estimate the current cost of economic damages to avoid costlier damage based on future projections. This chapter also provides the estimated social cost of methane for the No Action and Proposed Action Alternatives.

[7] Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

3.2.2. Environmental Consequences

3.2.2.1. No Action

Air Quality

For purposes of analysis in this Tier 1, PHMSA assumed that under the No Action Alternative, existing natural gas pipeline activities, including construction and maintenance activities, would continue unchanged. Pipeline operators would continue to use legacy cast iron, bare steel, and other leak prone pipe material. Thus, emissions benefits associated with repairing or replacing existing pipelines with updated material would not be achieved and the incident risks and leaks would remain. Depending on the pipeline material, the No Action Alternative may contribute to air quality concerns, which may detrimentally impact communities, especially environmental justice communities, and reduce energy equity. Criteria pollutant and air toxics emissions from pipelines would continue at similar rates as currently observed.

There would also be some degree of air pollution associated with construction activity for maintenance and repairs of existing pipelines under the No Action Alternative, either through planned repair/replacement efforts or unplanned, emergency repairs or replacements. Also, the No Action Alternative may or may not result in the venting of natural gas distribution pipeline segments necessary to conduct repair, remediation, and replacement work that would result from this Program, depending on whether the segments were repaired or replaced later in the future on a planned or unplanned basis. These activities are unlikely to result in an increase in emissions over *de minimis* levels for any applicable National Ambient Air Quality Standards (NAAQS). Pipeline repair or replacement and its associated air quality benefits and impacts might still occur later in the future but would likely be delayed and/or may not occur without available financing and thus would likely produce fewer emissions benefits than that associated with the Program.

Greenhouse Gases

PHMSA anticipates the Program would result in the replacement of approximately 1,000 miles of pipelines. For the No Action Alternative, the leakage of methane from existing pipelines was quantified based on the pipeline material distribution reported by Weller et al. (2020) and emission factors (kg/mile) in EPA's 2020 GHG Inventory. Consistent with Weller et al. (2020), it was assumed that 50 percent of existing pipes were constructed before 1990 and 50 percent between 1990 and 2020.[8] Thus, an average emission rate was developed from the EPA emission factors (Table 1).

The total methane emissions for existing pipelines were extrapolated over 20 years to represent the continuation of methane release under the No Action Alternative (Table 2). Under the No Action Alternative, PHMSA estimates that 237,146 kg of methane would be released each year from existing pipelines. This amounts to over 4.7 million kg of methane over a 20-year time (Table 2).

[8] This analysis uses the best available data. However, methane emissions have been historically undercounted, and thus PHMSA believes the benefit will likely be greater than calculated.

Table 1. Average methane emission factors for natural gas pipelines (adapted from EPA GHG Inventory, Annex 3.6, Table 3.6-2)

Pipeline Material	Pre-1990 Installation (kg/mile)	1990-2020 Installation (kg/mile)	Average Rate (kg/mile/year)
Cast Iron	4,597.40	1,157.30	2,877.35
Unprotected steel	2,122.30	861.3	1,491.80
Protected steel	59.1	96.7	77.90
Plastic	190.9	28.8	109.85

Table 2. Annual methane emissions and methane emissions extrapolated over 20 years from pipeline leaks for the No Action Alternative[9]

Pipeline Material	Percent of Total Reported Distribution Pipeline Miles[10]	Miles of Existing Pipeline[11]	Annual Emissions per Miles for Existing Pipeline (kg)	Emissions over 20 Years (kg)
Cast Iron	2	20	29,836	596,720
Unprotected Steel	4	40	115,094	2,301,880
Protected Steel	38	380	29,602	592,040
Plastic	57	570	62,615	1,252,290
Total	**100**	**1,000**	**237,146**	**4,742,930**

There would also be some degree of GHG emissions associated with construction activity for maintenance and repairs of existing, aging pipelines under the No Action Alternative, including emissions from the venting of natural gas pipelines that must be done prior to performing certain maintenance and repairs. However, maintenance and repair activity are unlikely to cause a significant increase in GHG emissions or significantly contribute to global climate change. Pipeline replacement may also still occur at some point in the future under the No Action Alternative; however, it is likely to occur at a slower rate, if at all, than that associated with the Program. Additionally, if a pipeline segment is not repaired or replaced prior to failure, it is likely to be associated with even more emissions under a No Action Alternative.

[9] Volpe 2022

[10] Reported 2017 PHMSA Data on the Distribution of Miles of Pipeline Material for Mains in Local Distribution Systems in the United States, Rounded to the Nearest 100 (adapted from Weller et al. 2020)

[11] Reported 2017 PHMSA Data on the Distribution of Miles of Pipeline Material for Mains in Local Distribution Systems in the United States, Rounded to the Nearest 100 (adapted from Weller et al. 2020)

The social cost of methane was calculated for the No Action Alternative based on a 20-year program[12] starting in 2023 in five-year increments. Using the estimated emissions in Table 2 and a discount rate of 5 to 2.5 percent, the No Action Alternative would have an adverse impact in terms of the social cost of methane, resulting in a cost to society of $4,740,548 at 5% to $12,616,167 at 2.5% over a 20-year period.

Table 3. Social cost of methane for the No Action Alternative[13]

Year	5% Discount Rate ($1,500 per metric ton, US Dollars)	2.5% Discount Rate ($1,500 per metric ton, US Dollars)
2027	-950,955	-2,632,320
2032	-1,114,586	-2,988,039
2037	-1,304,303	-3,367,473
2042	-1,515,734	-3,723,192
Total	-4,740,548	-12,616,167

3.2.2.2. Proposed Action

Air Quality

The affected area and subsequent air quality impacts will depend on the size, scope, and location of individual projects funded by the Program. The Proposed Action Alternative would result in new air quality impacts associated with construction activities, including the potential intentional venting of existing distribution lines prior to repair or replacement. However, these emissions may not be above the No Action Alternative if an incident occurs on a segment prior to a future repair or replacement occurs.

Construction methods and durations will vary depending on location, pipeline pressure level, and state of the existing pipeline system. Rehabilitation and repair projects typically consist of inserting plastic material into the existing pipeline through entry and exit bore/drill holes, thus resulting in minimal excavation impacts. Replacement projects typically consist of digging a series of trenches to replace pipelines in the same location or adjacent trench within the same ROW corridor. Therefore, replacement projects would result in additional excavation impacts

[12] PHMSA selected a 20-year program to provide a sufficient estimate to compare impacts and benefits of the program. This timeframe allows for changes in emissions sources, as well as the impact of different mitigation measures.

[13] U.S. Interagency Working Group (IWG) interim technical guidance (IWG 2021); OMB Circular A-4. Both documents specify 5% and 2.5% as an acceptable GHG discount rate for monetized values of avoided emissions.

compared to rehabilitation or repair projects. Air quality impacts during construction under the Proposed Action Alternative may include:

1) Venting of natural gas in current facilities, also known as blowdown, in order to begin rehabilitation, repair, or replacement activities
2) Exhaust emissions from construction equipment
3) Fugitive dust emissions associated with construction vehicle movement on unpaved surfaces
4) Fugitive dust associated with trenching, backfilling, and other earth-moving activities

The exhaust emissions from construction equipment would depend on the horsepower rating of the equipment or vehicles used, hours of operation, and fuel type. Due to the restricted size of the pipeline replacement projects, impacts to local air quality resulting from construction activities because of implementing the Proposed Action Alternative, such as dust and exhaust from construction equipment, are expected to be temporary, minimal, and considered *de minimis*. Thus, the Proposed Action Alternative is not expected to require a General Conformity Analysis under Section 176(c)(4) of the CAA at proposed project sites.[14] Project proponents must complete the checklist under Air Quality Analysis Methodology such as the "MOtor Vehicle Emissions Simulator" (MOVES3) to determine the level of analysis required.[15]

Since the Environmental Protection Agency (EPA) mandates the use of ultra-low sulfur diesel fuel for all highway and non-road diesel engines, sulfur oxides (SOx) emitted from the Proposed Action's construction activities are expected to be negligible. There are negligible lead (Pb) emissions associated with the Proposed Action Alternative due to the mandated use of de-leaded fuels in on-road vehicles and non-road equipment.

Pipeline leaks of methane gas, as well as construction activity associated with regular maintenance and repair actions, are expected to decrease under the Proposed Action Alternative. Thus, PHMSA anticipates that criteria pollutant and air toxics emissions under the Proposed Action Alternative would decrease. The Proposed Action Alternative would meet the need to repair, rehabilitate, or replace the existing pipeline systems to reduce leaks, incidents, fatalities, and adverse impacts to the public. Therefore, PHMSA anticipates that the Proposed Action Alternative would result in an improvement in local air quality, which may be especially beneficial to environmental justice communities, that are more vulnerable to pollution, and which are targeted to benefit from the Proposed Action Alternative pursuant to the statutory requirement to support disadvantaged rural and urban communities.

Greenhouse Gases

As described above, rehabilitation and replacement projects would likely result in emissions, including GHG emissions from construction equipment and vehicles, pipeline blowdown, as well as reduced methane emissions from newly installed or rehabilitated pipelines. Similar to criteria

[14] 42 U.S.C. § 7506(c)(4).

[15] https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves See also, Section 3.2.2.4 and Appendix 1.

and air toxics emissions, GHG emissions from construction activities under the Proposed Action Alternative are expected to be temporary and minimal due to the restricted scope of the pipeline replacement projects.

Methane leaks from natural gas distribution pipelines increase with age and are considerably higher for cast iron and steel pipelines, as compared with plastic (Weller et al. 2020). Upgrades to newer, more durable materials would reduce leaks and methane emissions (Weller et al. 2020). PHMSA expects that many of the pipeline repairs or replacements funded by this grant will be plastic: plastic polyethylene for pressures up to 125 psi and polyamide for 200 to 250 psi. Steel pipelines would be required above 250 psi. However, pressures above 250 psi are not typical for natural gas distribution networks. For the purposes of this Tier 1, PHMSA assumed all pipeline replacements under the Program would be plastic and estimated the permanent emissions associated with the Proposed Action Alternative. Based on an estimated 1,000 miles of anticipated pipeline replacements, 28,800 kg of methane emissions would occur under the Proposed Action Alternative, which equates to approximately 576,000 kg of methane over a 20-year time period. In comparison, the No Action Alternative would result in 237,146 kg annual methane emissions and 4,742,930 kg methane emissions over 20 years. Thus, the Proposed Action Alternative would result in annual GHG emissions benefits of 208,347 kg and a reduction of over 4.1 million kg over 20 years.

Table 3. Annual methane emissions and methane emissions extrapolated over 20 years from pipeline leaks under the No Action Alternative compared with the Proposed Action Alternative[16]

Project Scenario	Annual Methane Emissions (kg)	Methane Emissions over 20 Years (kg)
No Action Alternative	237,146	4,742,930
Proposed Action Alternative	28,800	576,000
Difference in No Action vs. Proposed Action Alternatives	208,347	4,166,930

The values presented in Table 4 are based on emissions from pipeline leaks only. PHMSA also considered that fewer pipeline ruptures would occur under the Proposed Action Alternative compared with the No Action. From 2010 to 2020, the average release volume for a rupture was 36,525 MCF (thousand cubic feet), which is equivalent to over 1 million kg of methane (PHMSA 2022). Based on the analysis in Section 3.12 of this EA, PHMSA estimates that the Program would prevent approximately 1.7 incidents over a 20-year timeframe. Therefore,

[16] Volpe 2022

PHMSA estimated that an additional 1.7 million kg of methane release would be avoided through the prevention of pipeline rupture.

PHMSA estimated methane emissions from pipeline blowdowns, which are typically necessary to ensure that construction and maintenance work can be conducted safely on depressurized natural gas facilities and pipelines. A substantial amount of methane may be released during a blowdown event depending on the pipeline pressure, and the pipeline volume (V) between isolated parts of the system. Equation 1 was used to estimate blowdown emissions in MCF, assuming a pipeline diameter (d) and pressure (P) of 4 inches and 250 psi,[17] respectively.

$$E_{blowdown} = V \times \frac{P_{pipe} + P_{atm}}{P_{atm}} \qquad (1)$$

Where the pipeline volume (V) is calculated by multiplying the cross-sectional area of the pipe by the length of pipeline (L):

$$V = \pi \times \frac{d^2}{4} \times L \qquad (2)$$

Assuming 1,000 miles of pipeline will be replaced under the Program, blowdown events during construction would likely result in approximately 8.3 MCF (258 kg) of methane emissions. Blowdown releases are minimal compared with methane emissions from pipeline leaks that occur over time (Table 4). See Section 3.9.2.3 below for mitigation measures to reduce blowdown emissions. PHMSA considered GHG emissions generated by other construction activity and long-term use of the pipelines. While the manufacture of pipeline materials could result in GHG emissions, PHMSA did not analyze these emissions because they are difficult to quantify and PHMSA anticipates these pipelines would be replaced at some point in the future. Although construction activity may result in GHG emissions, the Proposed Action Alternative is expected to have a net benefit to communities, including environmental justice communities, by reducing GHG emissions and their contribution to global climate change over the project lifetime, due to the reduction in leaks and lower number of incidents associated with replacement pipeline.

PHMSA also considered the resiliency of replacement, repair, or rehabilitated pipeline to climate change and determined that replacement, including with plastic pipe and coated steel, under the Proposed Action Alternative would be less prone to failure and leaks due to sea level rise, storm surge, increased temperatures, and other extreme weather events as compared with the No Action Alternative. Insertion of plastic into existing pipe under the Program also provides the secondary benefits of additional protection from external damage and leaks – the original pipe serves as a barrier and conduit and may help contain or reduce emissions initially in the case of a leak.

[17] A diameter of 4 inches is an estimate of the average pipe size replacement based on PHMSA experience. The high range of PE at 250 psi was selected to provide a conservative estimate of the emissions released during blowdown.

The social cost of methane was calculated based on a 20-year program starting in 2023 in five-year increments. Using the estimated reduction in methane emissions in Table 4 and a discount rate of 5 to 2.5 percent, the Proposed Action Alternative would have a beneficial impact in terms of the social cost of methane, resulting in an estimated cost savings of $4,727,393 at 5% and $12,438,315 at 2.5% over a 20-year period.

Table 5. Social cost of methane for the Proposed Action Alternative

Year	**5% Discount Rate ($1,500 per metric ton, US Dollars)**	**2.5% Discount Rate ($1,500 per metric ton, US Dollars)**
2027	835,471	2,312,651
2032	979,230	2,625,172
2037	1,145,908	2,958,527
2042	1,333,420	3,271,047
Total	4,727,393	12,438,315

3.2.2.3. Avoidance, Minimization, and/or Mitigation Measures

PHMSA analyzed compliance with all federal, state, and local emissions regulations as part of the Program, including adherence to requirements in applicable State Implementation Plans (SIP) and Tribal Implementation Plans (TIP). Compliance with applicable emissions regulations, as well as implementation of mitigation actions, would minimize impacts to local air quality and greenhouse gas emissions.

During construction activity, mitigation actions include the following:

- Efficient use of on-road and non-road vehicles, by minimizing speeds and vehicles
- Minimizing excavation to the greatest extent practical
- Use of cleaner, newer, non-road equipment as practicable
- Minimizing all vehicle idling and at minimum, conforming with local idling regulations
- Ensuring that all vehicles and equipment are in proper operating condition

Combustion emissions from construction equipment would be minimized as on-road and non-road engines must meet EPA exhaust emission standards (40 CFR Parts 85, 86, and 89). Fugitive particulate matter would be further mitigated through the use of dust suppression techniques in construction zones near residential and commercial areas.

Dust suppression techniques may include:

- Covering open-bodied trucks while transporting materials

- Watering, or use of other approved dust suppressants, at construction sites and on unpaved roadways, as necessary
- Minimizing the area of soil disturbance to those necessary for construction
- Minimizing construction site traffic by the use of offsite parking and shuttle buses, as necessary

As a result of these mitigation measures, construction equipment emissions and fugitive dust emissions from soil disturbance are not anticipated to adversely impact compliance with the NAAQS. GHG emissions during construction can be mitigated by minimizing or eliminating idling emissions from construction equipment as appropriate. Methane release due to blowdown can be mitigated by implementing the following measures:[18,19]

- Transfer gas to a parallel line
- Operate downstream compression after upstream valve is closed
- Use additional compressors to move gas or pull line down to lower pressure (e.g., incremental gain)

3.2.2.4. Tier 2 Analysis

PHMSA will consider the following in order to assess project level impacts on local air quality and determine whether a conformity analysis is required:

- Is the project located in an area designated by the EPA as in non-attainment or maintenance status for one or more of the NAAQS?[20]
- Does the project comply with, cause, or contribute to new violations of the NAAQS, worsen existing violations of the NAAQS, or delay attainment of the NAAQS?
- If the project is in a non-attainment or maintenance area, would the project produce emissions exceeding *de minimis* thresholds?
- Would the project produce emissions that interfere with requirements in an air quality plan (SIP or TIP)?
- Are there sensitive receptors (individuals, groups, or locations with heightened risk of adverse effects due to the exposure to pollutants) located within 400 feet of the project?

The following sections describe project-level analyses required to demonstrate air quality conformity. Conformity determination is only required if the project is located in a non-attainment or maintenance area for one or more NAAQS.

[18] U.S. EPA. 2011. Inject Blowdown Gas into Low Pressure Mains or Fuel Gas System. Pro Fact Sheet No. 401. https://www.epa.gov/sites/default/files/2016-06/documents/injectblowdowngas.pdf

[19] U.S. EPA. 2006. Reducing Emissions When Taking Compressors Off-Line. https://www.epa.gov/sites/default/files/2016-06/documents/ll_compressorsoffline.pdf

[20] Attainment status can be found in 40 CFR Part 81, or in EPA's Green Book: https://www.epa.gov/green-book

Construction Analysis

PHMSA would estimate emissions associated with construction of site-specific projects. This entails determining the duration and scheduling of construction activities. PHMSA anticipates the majority of the pipelines under the Program would be inserted with entry/exit holes excavated every 1,000 feet. If inserting is not feasible due to site-specific constraints, full replacement or construction of a new pipeline adjacent to the old pipeline may be required; these approaches have the potential to cause higher emissions and soil disturbance. Individual projects could involve less than a mile to several miles of pipeline length replaced or constructed.

The construction air quality analysis should utilize EPA's MOVES3 model or another EPA-approved emissions model to calculate exhaust emissions in grams per operating hour (g/hr.). Net construction exhaust emissions for the project are calculated multiplying the emission rates for each type of construction equipment by the associated construction hours required to complete construction. Equipment types may include excavators, graders, backhoes, and trucks.

The construction analysis should also account for fugitive dust emissions (PM2.5 and PM10) from land-disturbing activities, including excavation activities and vehicle movement on unpaved roads. The EPA provides methodologies for estimating fugitive dust emissions in AP-42 Compilation of Emission Factors, Chapter 13.2. Project proponents should utilize emission factors and methodologies in the following AP-42 sections depending on the specific construction methods and materials utilized in the pipeline replacement:

- Chapter 13.2.2: Unpaved Roads
- Chapter 13.2.3: Heavy Construction Operations
- Chapter 13.2.4: Aggregate Handling and Storage Piles
- Chapter 13.2.5: Industrial Wind Erosion

Project proponents will coordinate with PHMSA during completion of the Tier 2 Site Specific Environmental Assessment to include applicable monitoring practices and mitigation measures in the construction emissions analysis. See Avoidance, Minimization, and/or Mitigation Measures in Section 3.2.2.3 for mitigation actions to reduce project emissions, including fugitive dust.

Conformity Determination

Upon receipt of completed draft Tier 2 Site Specific Environmental Assessments from project proponents, PHMSA will estimate construction emissions based on project-specific parameters, including construction methods and type of equipment. Refer to the Air Quality Analysis Methodology in Appendix 1.

For each site, PHMSA will develop an emissions inventory for the expected duration of construction activity and total construction emissions (exhaust and fugitive dust) should then be compared to the General Conformity *de minimis* pollutant thresholds for non-attainment areas

and maintenance areas, as appropriate to the project location.[21] For project-level emissions below *de minimis* levels, no further analysis is required. If project emissions exceed the *de minimis* thresholds, the EPA's AERMOD dispersion model (or another EPA-approved model) should be used to model impacts on air quality, including at sensitive receptors in the study area. The EPA provides guidance and training on how to demonstrate conformity and conduct air quality modeling for a General Conformity Determination (EPA 2022e). The Tier 2 document will provide project proponents with relevant links for this analysis and provide assistance when needed.

3.3. Water Resources

3.3.1. Affected Environment

Water resources include wetlands, streams, rivers, and floodplains. Wetlands are defined as areas inundated with water at or near the surface of the soil all year or periodically throughout the year that support specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils (EPA 2022g). Streams and rivers are waters that exhibit an ordinary high-water mark (OHWM)[22] with defined bed and banks (USACE 2022). The Federal Emergency Management Agency (FEMA) defines floodplains as any land area susceptible to being inundated by floodwaters from any source (FEMA 2011).

There are several laws and regulations that protect these water resources at the federal and state level. The primary federal regulation that protects water resources is the Clean Water Act (CWA). The CWA regulates pollutant discharge into Waters of the United States (WOTUS) defined as territorial seas and traditional navigable waters; tributaries; lakes, ponds, and impoundments of jurisdictional waters; and adjacent wetlands. Authorization from the Army Corps of Engineers (ACOE) under Section 404 of the CWA is required when there is a discharge of dredge or fill material into a WOTUS, including streams, rivers, or wetlands. The EPA has established primary and secondary water quality standards under the CWA. Various states implement these standards set by the EPA under 401 certifications or other stormwater regulations, which further regulates the discharge of pollutants into surface and groundwater.

Executive Order 11988, Floodplain Management, requires federal agencies to reduce flood losses and losses to environmental values served by floodplains and avoid actions that adversely affect floodplains.

Executive Order 11990 directs federal agencies to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands" (EPA, 2009c). To meet these objectives, federal agencies, in planning their actions, must consider

[21] See the EPA's *de minimis* Tables here: https://www.epa.gov/general-conformity/de-minimis-tables.

[22] The line on the shore in non-tidal areas established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area.

alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided.

Distribution of these resources will vary depending on the location of individual Tier 2 project sites. While the Program supports repair or replacement of existing pipeline segments, these segments could traverse near or across these water resources. Water resources could also be located adjacent to the pipeline and associated construction staging areas. See Tier 2 Analysis in Section 3.3.2.4 for additional analysis required and resources to identify site-specific water resource conditions for Tier 2 projects.

3.3.2. Environmental Consequences

3.3.2.1. No Action

Under the No Action Alternative, impacts to water resources may remain unchanged from existing conditions—unless and until an incident occurs, which may necessitate emergency repairs or replacement. Impacts associated with repair or replacement of the segments under the Program thus, may not occur or may be significantly delayed. Increased need for maintenance and repair would be expected under the No Action Alternative, which could result in localized impacts to water resources when and where repair activities occur.

3.3.2.2. Proposed Action

Where a pipeline would cross a surface water such as a wetland, river, or stream, horizontal directional drilling or direct boring techniques would typically be used. Bores/drills require entry and exit pits and associated laydown and work areas. Boring/drilling methods allow for the crossing of surface water bodies without obstructing or impeding flow. Therefore, repair or replacement of pipelines across surface waters could result in minor, short-term impacts from runoff or siltation resulting from construction and excavation activities. These impacts could occur as a result of in-stream construction activities, minor earth disturbances within the stream floodways, or construction on slopes adjacent to the waterbody. Minor and temporary localized increases in turbidity levels and downstream sediment deposition could occur.

PHMSA anticipates any wetland or stream crossing would comply with the conditions of and be authorized under ACOE Nationwide Permit (NWP) 12 for individual projects. Authorization under ACOE NWP 12 allows for the construction and repair of utility lines, including natural gas pipelines, and associated features provided that the activities do not result in the loss of 0.5-acre of WOTUS. Pipelines could cross state jurisdictional 401 Water Quality Certification areas. Therefore, PHMSA also anticipates projects could require 401 certifications, which are typically issued by the state. PHMSA will verify 401 certification requirements upon review of a draft completed Tier 2 Site Specific Environmental Assessment.

Impacts to floodplains are not anticipated because the Proposed Action Alternative would not result in fill within a floodplain, nor would it impact water quantity, flow rates, or hydrologic conditions. However, temporary work within a floodplain may require coordination and permit requirements from applicable state floodplain management agencies. PHMSA will verify that

proper coordination has occurred upon review of a completed draft Tier 2 Site Specific Environmental Assessment.

3.3.2.3. Avoidance, Minimization, and/or Mitigation Measures

Completion of construction and restoration mitigation activities will minimize the potential impacts associated with wetland and stream crossings. All impacted natural areas would be restored to pre-construction contours with either existing soil or clean fill free of invasive species. Disturbed areas would then be seeded with native plant species within any stream or wetland areas.

Project proponents must ensure staging and laydown areas are not located within wetland or floodplain areas to further reduce impacts. Consultation with and submittal of applicable permit documentation would be conducted during the Tier 2 analysis. Additional mitigation measures would be implemented based on the completion of the draft Tier 2 Site Specific Environmental Assessment and results of agency coordination during the permitting process.

3.3.2.4. Tier 2 Analysis

During the Tier 2 analysis, PHMSA would work with project proponents to utilize existing desktop sources to identify potential water resources within the project area. While sources vary by state, the U.S. Fish and Wildlife Service's National Wetland Inventory mapper provides a baseline to determine potential water resources within individual project areas (USFWS 2022a).[23] Field surveys would be required to accurately delineate water resources within a project area if resources are potentially present based on the desktop review of available sources. FEMA provides a listing of Flood Insurance Rate Maps which are the official community maps that shows special flood hazard areas. This source would also be reviewed to determine if any floodplains are within a project area (FEMA 2022).[24]

3.4. Groundwater and Hazardous Materials/Waste

3.4.1. Affected Environment

Water is a central component of any community for both the biological inhabitants and the human population. Groundwater can be described as the water found underground in the spaces within the soil, sand, and rock. Groundwater is recharged primarily by percolation/infiltration of direct precipitation and intermittent stormwater flow. The water is then stored underground and moves slowly through geologic formations of soil, sand, and rocks, accumulating in aquifers. The availability of water, including groundwater, and the quality of the groundwater, plays a critical role in determining the natural community quality and structure and in supporting anthropological activity.

There are several laws and regulations that protect both hydrology and water quality on the federal, state, and regional levels. On the federal level, the primary law is the CWA. State-issued

[23] https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/
[24] https://msc.fema.gov/portal/home

401 certifications under the CWA also protect water quality, and ACOE issued Section 404 Permit under the CWA protects WOTUS. The Safe Drinking Water Act protects the quality of the nation's drinking water and provides limited protection of groundwater resources. The Resource Conservation and Recovery Act (RCRA) regulates management of hazardous waste. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) established superfunds to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Projects that require consideration and/or permitting under any of the aforementioned laws and regulations could result in impacts to groundwater.

PHMSA must consider the generation of waste from this Program and related activities in managing resources, particularly water resources. Hazardous waste is defined as liquid, solid, contained gas, or sludge wastes that contain properties that are dangerous or potentially harmful to human health and/or the environment. The management of hazardous waste is regulated under the EPA's RCRA and CERCLA. Waste is considered hazardous as defined in 40 CFR Part 261.

Hazardous materials are associated with chemical handling and industrial processes and may be identified and classified based on laws and regulations that define their characteristics and use, including 49 CFR Part 171.

Groundwater and hazardous materials/waste occurrences would differ based on location of the pipeline and level of ground disturbance. While the Program supports repair or replacement of existing pipelines, these pipelines could intersect or encounter groundwater and areas containing hazardous materials. Natural gas distribution lines dating from 1880 to 1920 in various states may have transported coal gas or "manufactured gas," before the lines were converted to natural gas service.[25] In some cases, residue from the transportation of coal gas remains in the pipelines or possibly in the trenches in which the pipelines are buried that could persist today. In addition, hazardous waste may be produced because of construction activities and soil removal. The operation of natural gas distribution pipelines does not normally result in the production of hazardous wastes or hazardous materials. Except for pipelines that previously transported coal gas, it is unlikely that project proponents will encounter hazardous wastes or hazardous materials in the existing trenches.

3.4.2. Environmental Consequences

3.4.2.1. No Action

Under the No Action Alternative, ground disturbing activities would not occur, unless and until an incident on the pipeline segment occurred and required an emergency repair or replacement action, and therefore impacts to groundwater and any existing hazardous materials and/or generation of waste could remain unchanged from existing conditions until a repair or replacement occurred in the future.

[25] According to the EPA Coal Gas Data Sheet, coal gas municipal projects existed in the following states: AL, CA, CT, FL, GA, IL, IN, IA, KS, MA, MI, MN, MO, NE, NJ, NY, ND, SC, SD, and WV.

3.4.2.2. Proposed Action

Groundwater may be encountered and/or utilized during construction as existing pipelines may extend through various topographical points and different groundwater environments, including unconsolidated alluvial deposits, unconsolidated residual soils, and bedrock. While construction activities will vary, if full replacement is required, necessary excavation trenches are anticipated to be three to four feet deep. The required workspace adjacent to the trench is also expected to be disturbed, but to a lesser degree. PHMSA does not anticipate impacts to groundwater at such shallow depths. If pipelines cross surface water resources, excavation would likely extend into shallow groundwater and temporarily increase water turbidity. However, this is not expected to negatively impact shallow groundwater since any groundwater that is discharged during construction would go through filtration and back into adjacent streams or filtered into the adjoining undisturbed soils and sediments.

In the cases where insertion techniques are utilized, pits may be required for boring and directional drilling. Directional drilling may present a risk to groundwater as escaping mud and fluids known as Inadvertent Returns (IR) can include contaminants that may pollute groundwater, in addition to cross-contamination of separated aquifers (NJDEP 2021).

In most cases, pipeline removal would not be required, but rather repair and rehabilitation will occur. In the instances where pipeline removal is required, there is generally no residue on natural gas pipelines. Because liquids and solids are removed from natural gas in processing, hazardous waste is not anticipated from pipeline removal. However, it is possible that some pipelines were historically used to transport coal gas which could contain contaminated materials. Should pipelines be encountered that conveyed coal gas, proper disposal protocol would be followed.

During pipeline repair and/or rehabilitation, hazardous waste may be generated through construction activities, site grading, and boring/drilling. Contaminated soils, not associated with the pipeline, may be treated in ground (in-situ) or removed from the site (es-situ) for remediation. Project proponents should ensure that proper mitigation (EPA 1997) and personal protection equipment for human safety is utilized if the project proponent has reason to believe hazardous wastes or materials may be present.

The Proposed Action Alternative and associated infrastructure may require the use of hazardous materials. If these materials are managed with standard procedures, including proper containment, separation of incompatible and reactive chemicals, worker warning and protection systems, handling procedures to ensure safe operations, and training, no impacts due to hazardous materials are expected.

No adverse impacts are anticipated with the Proposed Action Alternative, as all work includes the repair, rehabilitation, or replacement of existing pipelines and is anticipated to take place within existing ROW corridors. Specific project sites would be restored to pre-existing conditions.

3.4.2.3. Avoidance, Minimization, and/or Mitigation Measures

Avoidance, minimization, and mitigation measures usually include the development of a Stormwater Pollution Prevention Plan, which includes the implementation of construction and restoration mitigation activities to minimize the potential impacts to groundwater. If groundwater may be encountered a Groundwater Management Plan would be prepared to address the procedures for management of groundwater during construction. This plan could include the oversight of soil moving activities, groundwater screening procedures, handling, temporary storage, characterization, disposal of contaminated groundwater, and contingencies for collecting, stabilizing, and disposal of drilling mud that may be exposed to contaminated groundwater. All impacted areas would be restored to pre-construction contours, and seeding would occur within project areas to ensure percolation of surface water to groundwater.

Project proponents must ensure boring/drilling, staging, and laydown areas are not located within EPA superfund sites or areas containing known wastes to further reduce impacts. A Soil Management Plan may be prepared to address the likelihood and procedures for encountering contaminated soils. This plan could include soil screening requirements, the oversight or monitoring of soil moving activities, contingency plans for the handling, removing, temporarily storing, characterizing, disposing of contaminated materials, and measures for containing, treating, and disposing of stormwater that may contact exposed soils. In the event of a release of hazardous materials/waste into the environment, project proponents notify the appropriate emergency response agencies, potentially impacted residents, and regulatory agencies.

An IR plan would be developed by the project proponent that defines methodologies to control and minimize the impacts to sensitive resources from IR of drilling fluids where boring/directional drilling is required.

3.4.2.4. Tier 2 Analysis

Project proponents would provide PHMSA with any information about groundwater concerns or concerns that hazardous wastes could be encountered within the project area. While sources vary by state, the U.S. Geological Survey Groundwater Data for the Nation (USGS 2022a) and Groundwater Watch (USGS 2022b) provide baseline groundwater information to determine potential impacts and locations. The EPAs EnviroAtlas Interactive Map (EPA 2022h) provides baseline hazardous waste information and locations. A Phase I Environmental Site Assessment conducted under the American Society for Testing and Materials (ASTM) standards (ASTM 2021), which may include the use of online environmental historical and risk databases. This review may be necessary to identify and characterize the extent of contamination from all known hazardous waste sites within the project area if contaminated soil could be encountered. The Tier 2 will solicit information from the project proponent to identify whether the pipeline segment to be repaired or replaced could have been used in coal gas service. If a project site is identified as previously utilizing coal gas service, the pipe must be inspected prior to removal, and if residue exists, proper removal and disposal procedures will be required to ensure that any residue in the pipes may not contaminate surrounding areas and is disposed of properly. These removal and disposal procedures will be described in the Tier 2 Site Specific Environmental Assessment for applicable projects. Based on information provided from above listed sources, PHMSA may

require the inclusion of certain procedures in a Soil Management Plan during pipeline repair or replacement efforts.

3.5. Soils

3.5.1. Affected Environment

Soils include the organic and inorganic material on the earth's surface. Considerations for soils may also include the topography (shape of the earth's surface) and geologic features (physical features of the earth's surface) within a given area.

The majority of pipelines are installed below-ground and covered by approximately three feet of soil to prevent damage to the pipeline. Pipeline ROWs are typically cleared and maintained in a state free of woody vegetation to prevent damage to the pipeline associated with plant root growth, so any soil cover generally consists of herbaceous vegetation only.

As pipelines may cross a variety of environments, soils surrounding the pipelines may consist of a range of materials. Materials could include blasted bedrock and/or imported fill in areas with naturally shallow soils where pipelines have been installed such as hillsides or where rock ledges are encountered. In areas where soils are naturally rocky and coarse, the existing backfill material present during the initial construction of the pipeline may have been screened to remove rocks, or clean, screened soil may have been brought in to cover the pipeline. Pipelines may also be installed beneath wetland (hydric) soils such as those beneath lakes, rivers, streams, marshes, or coastal areas. Pipelines may also be present beneath soils used for agricultural activities such as grazing or crop production, or within urban environments where soils may consist of imported fill, such as that used for constructing roadways. For existing pipelines, soils and topography within the pipeline ROW may be previously disturbed from the original installation of the pipeline and any subsequent maintenance activities that have occurred.

3.5.2. Environmental Consequences

3.5.2.1. No Action

Under the No Action Alternative, existing pipelines would remain in service and no soil disturbance would occur until the time that normal pipeline maintenance or emergency repair would be required. Repair or replacement of existing facilities would likely occur at a later, unknown date. Leak prone materials often require more maintenance, which requires minor soil disturbance to excavate and expose pipelines for repair. The excavation would typically be localized to the point of repair along the pipeline, and soils would be temporarily excavated and stockpiled adjacent to the pipeline location. When the repairs are complete, soils would be replaced and the area would be restored to pre-construction condition, including any soil stabilization measures.

3.5.2.2. Proposed Action

Under the Proposed Action Alternative, existing gas pipelines prone to leakages would be repaired, rehabilitated, or replaced. Refer to Section 2.2 for a full description of typical construction methods. Although the Program does not mandate construction methods beyond compliance with 49 CFR Part 192, typical construction methods would consist of inserting pipe, which involves localized excavations for entry and exit bore/drill holes at the start and end of the segment to be replaced, and every 1,000 feet. Bore/drill holes would measure approximately six feet by six feet. Old pipelines could also be abandoned in place and a new pipeline would be installed adjacent using boring or horizontal directional drilling, involving excavations in similar amounts and frequencies required for inserting new pipeline. Pipelines abandoned in place would not result in contamination. PHMSA issued an advisory bulletin to clarify the regulatory requirements for classifying pipelines based on their operational status.[26] The bulletin highlights procedures for changing the status of a pipeline facility from "active" to "abandoned" for owners and operators of gas and hazardous liquid pipeline facilities and federal and state pipeline safety personnel. On the other hand, open trench construction methods would require excavation along the entire pipeline segment. A typical trench to remove existing pipeline and install the new pipe would be four feet deep and six feet wide, with minor deviation from these amounts depending on site-specific conditions. Regardless of construction method, soil disturbance to perform pipeline replacement or repairs would be temporary and restored upon completion of construction. Excavated soils would typically be stockpiled adjacent to the excavation and backfilled upon completion of construction, followed by site stabilization and restoration measures. All construction methods would also require workspace surrounding the excavated areas but would be disturbed to a lesser degree.

While pipeline operators typically adhere to certain practices to minimize or mitigate environmental damage during excavation, these activities result in ground disturbance that has the potential to cause sedimentation into adjacent wetlands and waterways. This could reduce water quality and diminish aquatic habitat. In addition, disturbance to vegetation could reduce available wildlife habitat for terrestrial species. Excavation could also disturb historical and archaeological resources and farmland, if any of these resources are present. However, impacts associated with these excavations are expected to be localized to the area immediately adjacent to the work area and temporary in duration. If excavations are required in areas where soils have been contaminated with hazardous substances, special handling procedures may be required, including off-site disposal. The CWA regulates stormwater discharges from construction sites that would result in one or more acres of soil disturbance. Pipeline operators that will disturb one or more acres of soil as part of construction must obtain a permit under the National Pollutant Discharge Elimination System (NPDES).

No adverse impacts are anticipated associated with the Proposed Action Alternative, as all work includes the replacement of existing pipelines and is anticipated to take place within existing ROW corridors. Specific project sites would be restored to pre-existing conditions.

[26] https://www.phmsa.dot.gov/news/phmsa-clarifies-regulatory-requirements-regarding-abandoned-pipelines

3.5.2.3. Avoidance, Minimization, and/or Mitigation Measures

Project proponents would commit to implementing construction and restoration mitigation actions for soil stabilization, including erosion and sediment controls. Erosion and sediment control measures include silt fence, check dams, covering all bare areas, and other standard measures. All impacted areas would be restored to pre-construction contours, and soils would be stabilized using materials which could include temporary mulch, vegetative cover, or gravel. Project proponents must acquire applicable NPDES permits prior to construction. NPDES permits will include specific mitigation measures. Additional mitigation measures would be implemented based on the subsequent project-level permitting process.

3.5.2.4. Tier 2 Analysis

Project proponents would quantify the approximate area of soil disturbance that would occur as part of construction in order to determine stormwater permitting requirements. Project proponents would utilize existing desktop sources to identify soil types within the project area and areas of disturbance. The Natural Resources Conservation Service (NRCS) Web Soil Survey tool (USDA 2019) provides a baseline to determine soil types within a project area, including soils that may indicate the need to consider other environmental resources such as prime farmland soils or hydric soils.

3.6. Biological Resources

3.6.1. Affected Environment

Biological resources generally include plants, wildlife, and the natural environment where they occur. Applicable regulatory requirements include the Endangered Species Act (ESA), Marine Mammal Protection Act, and the Migratory Bird Treaty Act. The primary regulatory requirement that protects species and their habitat is the ESA which requires federal agencies, in consultation with the U.S. Fish and Wildlife Service (FWS) and/or the National Marine Fisheries Service (NMFS), collectively, "the Services," to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. Section 7 of the ESA requires federal agencies to consult with the FWS and/or NMFS to ensure that actions they authorize, fund, or carry out will not jeopardize listed species or destroy or adversely modify designated critical habitat.

A threatened species is defined under the ESA as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."[27] An endangered species is defined under the ESA as "any species which is in danger of extinction throughout all or a significant portion of its range."[28] Species designated as threatened or endangered are called "listed species." Critical habitat that has been designated by FWS or NMFS is the habitat needed to support recovery of listed species. The law also prohibits any

[27] 16 U.S.C. § 1532(20).
[28] 16 U.S.C. § 1532(6).

action that causes a "taking" of any listed species. Take as defined under the ESA means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”[29] Incidental take is an unintentional, but not unexpected, taking.

When an action that an agency authorizes, funds, or carries out may affect a listed endangered or threatened species or designated critical habitat, the agency must initiate consultation under Section 7 of the ESA. If the action is not likely to adversely affect (NLAA) a listed species and/or critical habitat, the agency submits an informal consultation request to the relevant Service for concurrence. During informal consultation the FWS and/or NMFS may require PHMSA to provide additional information or conduct appropriate biological studies if there is insufficient information to conclude that the proposed activity is not likely to jeopardize the species or its habitat.

If the Services determine that a federally funded project would jeopardize the species, they must offer “reasonable and prudent alternatives” about how the Proposed Action Alternative could be modified to avoid jeopardy. Formal consultation would then be conducted which requires that a biological assessment be completed by the federal agency undertaking the action, and the Services responding with a biological opinion. In addition to the ESA, individual states maintain their own lists of threatened and endangered species. While these resources vary greatly across project specific locations and across the nation it is likely site-specific projects would occur within the range of listed species and/or critical habitat. See Section 3.6.2.4 for Tier 2 Analysis for evaluating site-specific habitat.

3.6.2. Environmental Consequences

3.6.2.1. No Action

Under the No Action Alternative, impacts to biological resources would remain unchanged from existing conditions. Impacts associated with repair or replacement of the pipeline segment would not occur in the short term. Increased maintenance and repair would be expected under the No Action Alternative which could result in localized impacts to biological resources where repair activities occur.

3.6.2.2. Proposed Action

Construction activities involve noise, fugitive dust, waste materials, and potential impacts to water and air quality which may affect vegetation and wildlife at or near the site. Construction activities often necessitate removal of plants which includes removal of ground cover to access Tier 2 project sites. Repeated disturbance of vegetation (i.e., due to vehicle passes or foot traffic) during construction in areas where plants are not cleared would cause damage to plants and destruction of vegetation. Any changes to native vegetation would likely be limited to a small area and would not affect the viability of the resources, and full recovery would be expected to occur in a reasonable time. Construction activities and human presence could cause temporary displacement and disturbance of resident wildlife for the duration of construction. Species, however, often return to the area after construction is completed. Some species may be prevented

[29] 16 U.S.C. § 1532(19).

from using the resources due to habitat alteration or destruction. These impacts are expected to be localized and limited to the immediate area of the Tier 2 project site. Activities that affect wildlife habitat often impact component resources such as vegetation, soil, and water. In urban or suburban settings, construction activities should have fewer impacts as wildlife and vegetation is already in a disturbed condition.

Construction activities could also result in effects to listed species or their critical habitat. Listed species would be subject to temporary noise impacts and disturbances similar to other wildlife. The Proposed Action Alternative would replace existing pipelines within previously disturbed areas. Therefore, any effect to a federally listed species or its critical habitat would be so small that it likely would not be of any measurable or perceptible consequence to the protected individual or its population. PHMSA anticipates this effect for individual projects would result in a "no effect" or "not likely to adversely affect" determination in accordance with Section 7 of the ESA. No adverse impacts are anticipated associated with the Proposed Action Alternative, as all work includes the replacement of existing pipelines and is anticipated to take place within existing ROW corridors. Specific project sites would be restored to pre-existing conditions.

3.6.2.3. Avoidance, Minimization, and/or Mitigation Measures

Avoidance measures typically include time of year restrictions to avoid sensitive habitat during mating and nesting times. Biological monitors and exclusion fencing are also employed to separate construction equipment from transient species that could cross work areas. Other measures developed through FWS and/or NMFS consultation would also be implemented.

3.6.2.4. Tier 2 Analysis

Project proponents would provide information to PHMSA in the Tier 2 Site Specific Environmental Assessment related to the general habitat within the site-specific project area and any measures that would be taken to avoid impacts. Project proponents would also request a species list from the FWS Information for Planning and Consultation (USFWS 2022b) and identify any potential habitat for those species within the project area. Depending on whether potential habitat or species are identified in the project area and the type of species and habitat identified within the project area, field surveys may be required to further evaluate potential impacts. If a species or habitat are present within a project area, PHMSA would conduct consultation with the Services to determine if a project may affect listed species. The outcome of the consultation could result in additional mitigation measures to avoid or minimize impacts.

3.7. Cultural Resources

3.7.1. Affected Environment

The National Historic Preservation Act of 1966 (NHPA) (54 U.S.C. §§ 300101 et seq.) is comprehensive federal preservation legislation intended to protect cultural resources. Section 106 of the NHPA (54 U.S.C. § 306108), as implemented in 36 CFR Part 800, requires federal agencies to consider the effects of undertakings on historic properties, should any such properties exist. As a federal agency, PHMSA must comply with Section 106.

The term historic properties refer to buildings, structures, objects, districts, or sites that are listed on or are eligible for listing on the National Register of Historic Places (NRHP), including both above-ground and below-ground resources. Historic properties are generally 50 years of age or older (except in cases of exceptional significance), must meet at least one of the National Register Criteria for Evaluation, and must retain sufficient historical integrity from its period of significance.

Due to the nature of the proposed undertaking, which is limited to repairing, replacing, or rehabilitating existing pipelines, the Area of Potential Effects (APE) for each pipeline repair or replacement project is expected to be limited to previously disturbed areas, and the undertaking would therefore have limited potential to contain intact archaeological resources or historic structures. However, since the extent of prior cultural resource surveys is unknown, the entire APE would be reviewed for its potential to contain historic or archaeological resources. This review would include identification of previously documented historic properties, properties over 50 years in age that may be eligible for listing in the NRHP, and assessment of the potential for intact archaeological resources within the APE.

The Advisory Council on Historic Preservation (ACHP) published an exemption relieving all Federal agencies from the requirement of taking into account the effects of their undertakings on historic natural gas pipelines (67 FR 16364; April 5, 2002). However, the exemption applies to the abandonment of a historic natural gas pipeline only if certain documentation requirements are met. The exemption does not apply on tribal lands. A pipeline is not considered abandoned if its structure is utilized for insertion of new pipe material. In projects including abandonment of a historic pipeline, the federal agency is required to document the pipeline and evaluate its eligibility for listing in the NRHP, including whether it retains sufficient historical integrity from the period of significance. The documentation must be filed in an appropriate repository, accessible to the general public, in each state crossed by the pipeline and filed with the appropriate State Historic Preservation Officer (SHPO).

If historic properties exist that are not exempted, PHMSA must consult with the appropriate SHPO or Tribal Historic Preservation Officer (THPO), federally recognized tribes with an interest in the area, local historical organizations, and members of the public to notify them of Section 106 findings and request any comments or concerns regarding identification of historic properties or the undertaking's impacts to historic properties. Once all historic properties in the APE have been identified, the agency must assess effects.

3.7.2. Environmental Consequences

3.7.2.1. No Action

Under the No Action Alternative, there would be no changes to the existing infrastructure and no potential to affect historic properties in the short term. Because a federal undertaking would not occur, the Section 106 process would not be required under the No Action Alternative.

3.7.2.2. Proposed Action

The Proposed Action Alternative involves the in-kind replacement, repair, or rehabilitation of existing pipelines. These project activities, which include noise, waste materials, staging and stockpiling of materials, and ground disturbance, may have the potential to affect historic properties, should any such properties exist in the APE. One potential construction method involves the use of in-place, inserting of existing pipes with alternative materials, which would require entry and exit holes excavated approximately every 1,000 feet. Other potential construction methods could involve full-scale pipe replacement, requiring extensive excavations or directional boring/drilling of pipeline adjacent along existing rights-of-way.

The Section 106 process may result in a finding of No Historic Properties Affected, No Adverse Effect to Historic Properties, or Adverse Effect to Historic Properties. An adverse effect occurs when the undertaking results in the alteration of a character-defining feature of a historic property that compromises its eligibility for listing in the NRHP. If the agency receives concurrence of No Historic Properties Affected or No Adverse Effect to Historic Properties from the SHPO/THPO, then the Section 106 process concludes. If it is determined that the undertaking would result in an Adverse Effect to Historic Properties and the SHPO/THPO concurs with this finding, the agency must work with the consulting parties to resolve any adverse effects through avoidance, minimization, or mitigation to conclude the Section 106 process.

Construction activities are expected to be largely limited to previously disturbed areas, and PHMSA anticipates there would be limited potential to impact cultural resources. PHMSA does not anticipate adverse effects to NRHP-eligible or listed historic or archaeological resources. However, if any ground disturbance takes place in previously undisturbed areas, the construction activities could impact archaeological resources. If any pipelines over 50 years in age are proposed to be abandoned, which may result in an adverse effect, the pipelines will be documented and evaluated for eligibility for listing in the NRHP, and the information will be filed with the SHPO/THPO and made available to the public, in accordance with the ACHP's Exemption Regarding Historic Preservation Review Process for Projects Involving Historic Natural Gas Pipelines (2002). No further consultation or execution of agreement documents is required if the pipeline is the only historic property adversely affected.

No adverse impacts are anticipated associated with the Proposed Action Alternative, as the work includes the repair or replacement of existing buried pipelines and is anticipated to take place within existing ROW corridors. Specific project sites would be restored to pre-existing conditions.

3.7.2.3. Avoidance, Minimization, and/or Mitigation Measures

PHMSA anticipates that for many sites, no historic properties or archeological resources will be identified. For sites where resources exist, PHMSA does not anticipate adverse effects to NRHP-eligible or listed historic or archaeological resources, therefore, no mitigation measures are anticipated. However, if an adverse effect is identified, then PHSMA would develop additional mitigation measures in consultation with interested parties, including the SHPO/THPO, and should be commensurate with the adverse effect of the project on historic resources.

These mitigation measures could include archaeological monitoring during initial excavation activities if there is high potential for archaeological resources to be encountered during construction. PHMSA and the project proponent will provide archeologists with information if there is the potential to encounter any contaminated or hazardous materials that may be present and resulting from pipe residue from older coal gas distribution (as described in Section 3.4.2.4). Post-review discovery plans may also be considered in case any buried archaeological resources are discovered during construction. If any historic or archaeological resources are identified by project proponents or their contractors during construction, PHMSA would open consultation with SHPO/THPO to assess the effects of the undertaking on the newly identified resource.

3.7.2.4. Tier 2 Analysis

Project proponents would coordinate with PHMSA to prepare the required documentation for receiving SHPO/THPO concurrence. The Section 106 process must also include consultation with all interested parties, including federally recognized tribes, local historical organizations, and the public to identify any concerns regarding site-specific projects and their potential to impact historic resources. Supporting documentation could include a project description, APE map, identified historical and archaeological resources, proposed effect determinations for each resource, consultation efforts, and any proposed mitigation measures for each project.

3.8. Section 4(f)

3.8.1. Affected Environment

Section 4(f) of the US Department of Transportation Act of 1966 as amended (Section 4(f)) (49 U.S.C. § 303(c)); is a federal law that applies to transportation projects that require funding or other approvals by DOT. The purpose of Section 4(f) is to preserve "the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites" and to "include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities." Section 4(f) prohibits the Secretary of Transportation from approving any program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or any land from an historic site of national, state, or local significance unless:

- There is no feasible and prudent alternative to the use of the land
- The program or project includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site, resulting from such use

Unlike other operating administrations (OAs) within the DOT, PHMSA has not promulgated regulations for the enactment of Section 4(f). This is because PHMSA has not previously been involved in the funding, siting, or construction of pipeline infrastructure until the Program provided authorization for funding. As described above, the buried natural gas distribution pipelines of the various project sites were originally sited and constructed without approval from PHMSA or any predecessor agency within DOT. Nonetheless, PHMSA will evaluate each Tier 2 project site for Section 4(f) impacts. In these evaluations, the regulations enacted by other OAs are informative but not binding on PHMSA.

The term "use" means the permanent incorporation of land into a transportation project or the temporary occupancy or use of a Section 4(f) resource.[30] "Permanent incorporation" occurs when some portion of a 4(f) property is permanently acquired for a transportation project. A "temporary occupancy" is use of a 4(f) property, in whole or in part, during construction-related activities. A temporary occupancy only occurs when the effects are considered adverse. Temporary construction activities can be considered a temporary occupancy when activities are adverse in terms of the preservation purpose of the Section 4(f) resource. For example, construction activities that close a park for the entirety of the construction period would be a temporary occupancy. In contrast, construction activities may be considered minor and not adverse when the duration of the use of the Section 4(f) resource is less than the time to construct the entire project, the scope of work is minor, there are no permanent physical impacts, and the land is fully restored to its prior state. For example, the repair or replacement of a pipeline at the entrance of a park where the construction period is limited, and a detour is provided so that access to the park is uninterrupted would likely not be considered a temporary occupancy.

If there is no use of a 4(f) property, including no permanent incorporation and no temporary occupancy and a finding of "no adverse effect" from the SHPO/THPO pursuant to Section 106 (as described above), then the 4(f) evaluation is complete.

In situations where there is either a permanent incorporation or a temporary occupancy, the Secretary may determine that a transportation program or project will have a *de minimis* impact on a historic site or publicly owned park, recreation area, and/or wildlife or waterfowl refuge. With respect to historic sites, the Secretary may make a finding of *de minimis* impact only if Section 106 consultation results in a finding of "no adverse effect" or "no historic properties affected" and written concurrence has been received from the applicable SHPO/THPO. With respect to parks, recreation areas, or wildlife or waterfowl refuges, the Secretary may make a finding of *de minimis* impact only if the Secretary has determined, after public notice and opportunity for public review and comment, that the transportation program or project would not adversely affect the activities, features, and attributes of the park, recreation area, or wildlife or waterfowl refuge eligible for protection under this section; and the finding of the Secretary has received concurrence from the Officials with Jurisdiction (OWJ) over the park, recreation area, or wildlife or waterfowl refuge. An alternatives analysis is not required for the Secretary to make a finding of *de minimis* impact.

3.8.2. Environmental Consequences

3.8.2.1. No Action

Under the No Action Alternative, there would be no changes to existing pipeline infrastructure pursuant to federal funding or approval authorized by the Program. Therefore, there would be no use of Section 4(f) property under the No Action Alternative.

[30] Federal Highway Administration, Section 4(f) Policy Paper, 2012 (77 FR 42802)

3.8.2.2. Proposed Action

The Proposed Action Alternative is not anticipated to result in a permanent use, a temporary occupancy, or a constructive use from a Section 4(f) property. The Tier 2 Site Specific Environmental Assessment will solicit information about the anticipated uses, both short and long term, to Section 4(f) resources. The information will be used by PHMSA to verify that the project does not result in a permanent use, temporary occupancy, or a constructive use. PHMSA will evaluate each project on a case-by-case basis to confirm that no use would result.

Property acquisitions are not anticipated for the repair, replacement or rehabilitation of existing pipelines to be improved by the Program. Thus, the Proposed Action Alternative is not likely to result in a permanent use of a Section 4(f) property. If a project requires property acquisitions or utility easements, those activities would be evaluated on a case-by-case basis to determine if the use would be considered de minimis (See Section 3.8.2.4).

Construction activities would include stockpiling of materials in construction staging areas and ground disturbance that would be temporary in duration. The construction would occur within public street right-of-way and/or utility easements where access for maintenance has been previously authorized by the property owners. The projects funded under this Program are not anticipated to be adverse, would not be longer than construction, and the property would be returned to pre-construction conditions; therefore, the activities are not expected to be considered a temporary occupancy.

A constructive use would be unlikely as the pipe replacement would occur primarily underground and permanent, long-term impacts are not anticipated. Constructive uses are those that substantially impair the qualities that make the resources important and are not anticipated.

3.8.2.3. Avoidance, Minimization, and/or Mitigation Measures

PHMSA does not anticipate a use of Section 4(f) resources. Therefore, no mitigation measures are anticipated. However, if PHMSA selects a project proponent with a ROW within or that intersects a Section 4(f) property, then PHSMA will develop additional mitigation measures in consultation with the OWJ of that Section 4(f) resource. Given that the Program is funding the repair or replacement of existing distribution pipelines in existing ROWs, there would be no feasible and prudent alternative to use another ROW at a separate site. In that case, PHMSA would use all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site, resulting from such use.

These mitigation measures could include ensuring access to the Section 4(f) resource during construction, restoring the site to pre-existing conditions, or other enhanced mitigation measures to ensure no permanent use, temporary occupancy, or constructive use occurs for project specific sites. In cases where the agency makes a *de minimis* determination, the conditions that help to minimize any impacts will be identified as mitigation commitments.

3.8.2.4. Tier 2 Analysis

As part of the Tier 2 Site Specific Environmental Assessment, project proponents would provide an inventory of Section 4(f) properties within the project area to assist PHMSA in identifying a potential use of Section 4(f) properties and determine any associated coordination and documentation requirements. Section 4(f) properties would be identified through determining land uses in the project area, including park and recreation lands, wildlife and waterfowl refuges, and historic sites. Historic sites should be identified in conjunction with Tier 2 Site Specific Environmental Assessment analysis on cultural resources. Park and recreation lands, and wildlife and waterfowl refuges can be identified through GIS and local municipality data. Depending on the nature of the project and potential use of Section 4(f) properties, PHMSA would work with the project proponent in order to prepare appropriate documentation and meet the requirements for obtaining concurrence from the relevant OWJ.

The Tier 2 Site Specific Environmental Assessment will also verify that property acquisition is not needed and whether work will take place within existing public right-of-way and/or utility easements. Information about the duration of construction, construction methods, resulting noise and vibration impacts, traffic access during construction, and plans for the property to be restored to pre-existing conditions, among others will be examined to confirm that temporary construction impacts do not result in a temporary occupancy. PHMSA will examine effects to confirm that a constructive use would not occur.

If PHMSA makes a determination that a *de minimis* impact would result, PHMSA will consult with the OWJ of the resource. For historic resources, the SHPO/THPO's concurrence with a "no effect" or "no adverse effect" determination and with PHMSA's *de minimis* determination will complete the Section 4(f) requirements. For parks, recreation areas and wildlife and waterfowl refuges, PHMSA will obtain written concurrence from the OWJ and will seek public input on the agency's determination by providing notification using local notification procedures used by each project proponent as specified in any local regulations regarding public notifications.

In the rare case where a project does require a use (permanent use, temporary occupancy, or a constructive use) of a Section 4(f) property, PHMSA would evaluate whether any feasible or prudent alternatives exist and that all planning to minimize harm has been completed. A Section 4(f) Statement would be prepared by PHMSA and circulated to the OWJ, Department of the Interior, and other appropriate parties for a 45-day review period, before issuing a FONSI.

3.9. Land Use and Transportation

3.9.1. Affected Environment

3.9.1.1. Land Use

Land use can be defined as the management and modification of natural resources and the environment into a built environment that may include settlements, residential areas, commercial and industrial areas, semi-natural habitats, and natural habitats. Land use is governed and maintained at the local level, with the exception of federally owned lands. State, regional, and

local governments have regulatory power to enact regulations and ordinances regarding land use. A complete inventory of adopted local and regional plans, ordinances or guidelines related to land use should be compiled when assessing consistency of use and impacts of a project. A high amount of variation can exist in a small geographic area due to local policies and ordinances, and these regulations may also differ in severity.

While land use is governed at the local level, there are relevant federal laws to consider for federal actions:

- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, 42 U.S.C. 61
- Coastal Zone Management Act of 1972, 16 U.S.C. § 1452
- Farmland Protection Policy Act, 7 U.S.C. § 4201

As mentioned in Section 3.1, the affected environment for the Proposed Action Alternative exists in a variety of diverse settings, including highly populated urban sites and unpopulated rural areas. Specific analysis of land uses, policies, and regulations would be documented in the Tier 2 Site Specific Environmental Assessment.

For purposes of this Tier 1, PHMSA provides a broad description of possible land use. Land cover refers to the vegetation and artificial structures that cover the land's surface. Examples of land cover include trees, grass, crops, wetlands, water, developed land (low intensity, high intensity, commercial/industrial), and pavement (i.e., transportation). The USGS Land Cover Institute created and maintains the National Land Cover Database.

3.9.1.2. Transportation

The movements of persons and goods encompasses several modes (e.g., highway, rail, transit, waterways, air, and pedestrian). A local transportation network provides the means for moving through and accessing a community. This network includes major roads such as freeways and highways, as well as local roads in neighborhoods. Analysis of transportation includes assessing these access points, traffic, and parking. Traffic may be affected by the size, location, and type of the construction occurring for the project. Travel conditions include connectivity between modes, access to existing destinations, new means of access to locations presently unavailable, and expanded transit options. Other factors that can be considered in a transportation analysis are railways, public transit, and bicycle and pedestrian routes.

State and local jurisdictions have the ability to create specific laws and regulations for several modes. A high amount of variation can exist in a small geographic area due to local policies and ordinances. Local and regional organizations include cities and townships, municipal planning organizations, or local organizations specific to a certain cause (i.e., bicycle or pedestrian travel). Existing pipelines may be located within transportation corridors where other transportation infrastructure, such as roadways, exist.

3.9.2. Environmental Consequences

3.9.2.1. No Action

Under the No Action Alternative, land use and transportation facilities would remain unchanged from existing conditions unless and until an incident occurs on the pipeline segment. Impacts associated with replacement of the pipeline might not occur in the near term. Additionally, the benefits of providing a safer pipeline material through adjacent properties and nearby transportation facilities would not occur, and communities where pipelines traverse would be subject to incident risks and methane emission leakage associated with the existing pipeline.

3.9.2.2. Proposed Action

3.9.2.2.1. Land Use

No significant effects are anticipated as a result of the Proposed Action Alternative. The Proposed Action Alternative is consistent with existing land use in communities throughout the U.S. The repair, rehabilitation, or replacement of pipelines under the Proposed Action Alternative is anticipated to occur within existing ROW corridors. As the Proposed Action Alternative does not involve new facilities or the extension of existing facilities, no land cover conversions or change in existing land use would occur. Additionally, since the Proposed Action Alternative includes work that is anticipated to occur within the existing ROW corridor, no land acquisition or residential and business displacement would occur as a result of implementation.

Where a pipeline occurs in developed areas, during construction of the Proposed Action Alternative, there may be minor, short-term impacts to adjacent residences and businesses traffic patterns. These impacts, including noise, dust, and transportation accessibility, could occur as a result of construction and construction staging activities along with, minor disturbances within the pipeline ROW and adjacent properties. See Section 3.6 for more discussion of impacts to biological resources.

Effects to farmland and other sensitive land uses would be assessed at the site-specific level during subsequent Tier 2 analysis. This would also involve assessment of local plans, policies, and regulations as they relate to the proposed project. Additionally, if projects occur within coastal zone management areas (CZMAs), appropriate coordinate with the local agency responsible for CZMA consistency determination would be required.

3.9.2.2.2. Transportation

Any increased use of existing transportation facilities resulting from the Proposed Action Alternative are expected to be minimal and short-term. Construction associated with pipeline repair and replacement could result in short-term transportation impacts. Local and state regulations would guide the transport of machinery, equipment, and automobiles around the construction areas. Temporary traffic impacts may occur on the local road network and adjacent pedestrian routes. Consideration of emergency response vehicles, travel restrictions, and oversized loads will need to be considered and documented in the Tier 2 Site Specific Environmental Assessment. Construction workers commuting to the project area could also

cause localized traffic congestion; however, this would only last for the duration of construction and would be considered negligible. Minor disruptions to on street parking may occur, but access to existing residences and businesses would not be impacted. Impacts to transit facilities are not anticipated. Depending on the magnitude of the renovation or construction project, the intensity and duration of transportation impacts could vary, but they are not expected to be significant.

3.9.2.3. Avoidance, Minimization, and/or Mitigation Measures

Implementation of mitigation would minimize the effects to surrounding land uses during construction. All impacted areas would be restored to pre-construction conditions. Coordination would occur with property owners, as needed, to further reduce impacts. Specific mitigation requirements needed to adhere to local ordinances and regulations, such as noise ordinances, would be considered as part of Tier 2 environmental reviews.

During construction activities, traffic flows would be maintained by keeping construction equipment as far off the road as much as possible and by providing flag bearers to assist traffic negotiating through construction areas, as needed. Coordination with state and local agencies may be needed should detours or routing adjustments be needed during construction. Residents and business owners would be notified of any impacts to parking prior to construction.

3.9.2.4. Tier 2 Analysis

During Tier 2 environmental reviews, project proponents will be asked to provide information about surrounding land uses and local land use plans, policies, and regulations in order to assess any impacts from the proposed project. For projects occurring near farmland, NRCS farmland classifications (prime farmland, unique farmland, and land of statewide or local importance) should be evaluated for impacts. As part of the identification of land use and related functions (historical areas, undeveloped areas, high-density development), any potentially sensitive areas (historic districts, parkland, wildlife refuges) near the project area should be identified.

For the Tier 2 analysis, the applicant would identify and document in the Tier 2 Site Specific Environmental Assessment the highway and street network, rail, and sidewalks, including intersections and related transportation elements. Local policies concerning the context of transportation-related impacts (e.g., Congestion Management Plans) would be evaluated with proposed construction impacts related to transportation access and connectivity. Additionally, the Tier 2 analysis would consider changes to travel modes, routes, and average speeds, and travel times, delays, parking reduction, pedestrian accessibility, and reliability, particularly during peak periods. Assessment of changes in traffic conditions as a result of the Proposed Action Alternative would inform construction-related impacts.

3.10. Noise and Vibration

3.10.1. Affected Environment

Noise is commonly defined as unwanted sound and has the potential to interfere with human activities and in extreme cases, human health. Human response to noise varies depending on the

type and characteristics of the noise, the distance between the noise source and the receptor, receptor sensitivity, and time of day.

Noise magnitude is typically reported in A-weighted decibel units, noted as dBA, which includes a frequency-weighting factor to account for how humans experience sounds at different frequencies. Additional objective metrics are used to describe noise relative to how humans experience it, accounting for the level, frequency, duration, and other qualities of the sound. A typical noise assessment will use the metrics described in Table 6

Table 6. Common sound level metrics used for environmental noise assessments[31]

Metric	Description
$L_{Aeq(T)}$	The A-weighted average sound level over the time T. This value is equivalent to the continuous constant sound level that has the same amount of energy as the measured sound over a defined period. Usually, the time T is 1 hour, 8 hours, 16 hours, 24 hours, or another period that is relevant to daily human activities.
L_{dn}	Day-night average sound level (also shown as DNL). This metric is a 24-hour average of sound levels over the course of the entire day, with a 10 dBA weighting added on to sound levels at nighttime hours, usually between 10 pm and 7 am. This is the basic unit of measure for most federal agencies.

Closely related to noise, vibration can be interpreted as energy transmitted in waves through the ground, affecting both humans and nearby structures. In extreme cases, vibration can cause damage to buildings. Metrics to quantify vibration include peak particle velocity (PPV) and root-mean-square (RMS) amplitude. PPV is most frequently used to describe the potential for vibration impacts to buildings. RMS is used to convey the magnitude of the vibration signal felt by the human body. The background vibration velocity level in residential areas is usually 50 VdB or lower, and the threshold of perception for humans is approximately 65 VdB.

Table 7. Common vibration metrics used for environmental assessments[32]

Metric	Description
Peak particle velocity (PPV)	The maximum instantaneous peak of the vibration signal in inches per second (in/sec). Often used in monitoring of blasting vibration and appropriate to describe the potential for vibration impacts to buildings.
Root mean square (RMS) amplitude	The average of the squared amplitude of the signal, typically calculated over a 1-second period. Commonly expressed in decibels (VdB). Used to convey the magnitude of the vibration signal felt by the human body.

[31] Source: Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment
[32] Source: Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment

The Noise Control Act of 1972 (42 U.S.C. §§ 4901 et seq.) directs federal agencies to comply with applicable federal, state, interstate, and local noise control regulations. In 1982, the primary responsibility of regulating noise was transferred to state and local governments. As a result, many states and local municipalities have enacted noise regulations, and project proponents should ensure these regulations are followed during construction. There are no standardized criteria at the federal level for assessing construction noise and vibration impacts related to transportation projects.

Construction during pipeline repair or replacement projects has the potential to result in noise impacts at locations of human activity (receptors) surrounding the construction areas, particularly where projects occur over a prolonged period (one month or more) during weekday business hours. The number and magnitude of potential impacts will be site-specific and depend on the number and location of noise-sensitive receptors (residences, schools, houses of worship, etc.), the specific construction equipment and pipeline replacement methods used, and the duration of construction and pipeline replacement-related activities. If the project will include blasting operations, impacts related to vibration may occur.

3.10.2. Environmental Consequences

3.10.2.1. No Action

Under the No Action Alternative, there may not be temporary or permanent changes to the existing noise environment in the short term, unless a pipeline incident occurs. As noted above, increased maintenance and repair would be expected under the No Action Alternative, which could result in localized noise impacts where repair activities occur.

3.10.2.2. Proposed Action

Under the Proposed Action Alternative, construction activities would cause temporary noise and vibration impacts to nearby noise-sensitive receptors. Machinery such as rock drills, jackhammers, excavators, rollers, and pavers can generate noise. Individual pieces of equipment may generate noise levels of 80 to 90 dBA at a distance of 50 feet. However, such elevated noise levels would be temporary and of short duration (less than one month) at most locations and thus result in no adverse effects.

No adverse impacts are anticipated associated with the Proposed Action Alternative, as all work includes the repair or replacement of existing pipelines and is anticipated to take place within existing ROW corridors. Specific project sites would be restored to pre-existing conditions.

3.10.2.3. Avoidance, Minimization, and/or Mitigation Measures

Project proponents will identify applicable state, local, and tribal noise regulations and ensure that construction methods, equipment, and activities are compliant. Compliance would likely include mitigation measures such as:

- Limiting activities to occur only during normal weekday business hours, when noise restrictions (if applicable) are not in place
- Proper maintenance of equipment mufflers

- Use of acoustical noise tent and/or enclosures surrounding hoe rams, jackhammers, or pavement breakers, to the extent practicable given space constraints at work sites

3.10.2.4. Tier 2 Analysis

During Tier 2, project proponents would consider specific state and local noise impact criteria and describe the potential for noise and vibration impacts to sensitive receptors at the project level. The scale of the project and surrounding land use would determine the type of description and analysis required – qualitative or quantitative. The majority of pipeline projects would be of short duration (less than one month), and construction noise may be adequately addressed through a qualitative discussion. The discussion would include identification of any sensitive receptors, the duration of construction (overall project and at specific locations), equipment to be used, hours of operation and limits on time (e.g., daytime use only), compliance with local ordinances, and consideration of noise control treatments. PHMSA would utilize this information to confirm no adverse effects would occur.

A quantitative analysis may be required if construction-related activities are anticipated to have any of the following attributes:

- Occur for more than one month at any single location, or during nighttime hours
- Occur in very close proximity (less than 50 feet) to noise-sensitive receivers or
- Require blasting or other extremely high-noise and vibration-inducing construction methods

For this type of analysis, project proponents would, through quantitative modeling techniques provided in the Tier 2 Site Specific Environmental Assessment, confirm that state and local ordinances are met at all noise sensitive receptors. Project proponents may utilize a simplified manual calculation technique such as that outlined in the Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment or software tools such as the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) (USDOT 2017).

3.11. Environmental Justice

3.11.1. Affected Environment

The EPA defines the term “Environmental Justice” (EJ) as the “fair treatment and meaningful involvement of all people, regardless of race, ethnicity, income, national origin, or educational level with respect to the development, implementation and enforcement of environmental laws, regulations and policies” (EPA 2016b). No population should bear any disproportionally high and/or adverse health, environmental, social, and economic impacts of transportation decisions, programs, projects, or policies made at the federal, state, local, or tribal level.

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed in 1994, states that “each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” The

Executive Order established the Interagency Working Group on Environmental Justice (EJ IWG) (EPA 2021c) and directs each federal agency to develop their own strategies for implementing environmental justice (USDOT 2016).

The United States Department of Transportation (DOT) Environmental Justice Strategy (USDOT 2016), which was most recently updated in 2016, describes how DOT incorporates EJ and equity principles in all transportation planning and decision-making processes and environmental reviews. The strategy references DOT Order 5610.2(a) (most current version USDOT 5610.2C), *Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This Order, which builds on DOT's 1997 EJ Order, applies to all DOT Operating Administrations, including PHMSA, and describes the differences between Title VI and EJ compliance and outlines the framework and procedures for identifying and addressing disproportionately high and adverse human health or environmental effects on minority and low-income populations. PHMSA published an Environmental Justice Policy (USDOT 2012a) document in 2012 that reiterated their commitment to carry out DOT's EJ Order guidance.

DOT Order 5610.2C defines a low-income person as a person whose median household income is at or below the Department of Health and Human Services Poverty Guidelines (HHS 2022) and minority as a person who is Black; Hispanic or Latino; Asian American; American Indian and Alaskan Native; or Native Hawaiian and other Pacific Islander. A low-income population is defined as any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy, or activity. Minority population is defined as any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy, or activity (USDOT 2012b).

Executive Order 14008: Tackling the Climate Crisis at Home and Abroad, signed in 2021, further direct agencies to "make achieving environmental justice part of their missions." The Executive Order describes that it the policy of the Administration to "secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care" (Exec. Order No. 14008).

The location of the existing natural gas pipeline systems that meet the criteria of the Program will be used to determine the potential affected area. Numerous municipalities and communities across the country are eligible to apply for funding through this Program. The affected area may extend beyond the physical location of the natural gas pipeline system as EJ communities directly abutting, adjacent to, and/or proximate to the pipeline system may be impacted by both the No Action and Proposed Action Alternatives (40 CFR 1508.1(g)). Project-specific geographical information would be used to determine the affected areas of individual projects funded through the Program. See Section 3.11.2.4 for Tier 2 analysis considerations.

3.11.2. Environmental Consequences

3.11.2.1. No Action

There would be no new construction impacts to minority and low-income populations as part of the No Action Alternative, unless and until an incident occurred that required immediate repairs or replacement of pipeline facilities. However, due to the location of existing natural gas pipelines in relation to minority and low-income populations, especially in disadvantaged rural and urban communities, which are targeted by this Program, there may be continued impacts to these populations as a result of ongoing safety concerns, incidents, and emergency repair activities. Repair activities may include excavation to locate and address the issue or incident, thus resulting in impacts to the surrounding populations. The need to repair, rehabilitate, or replace the existing pipeline systems to reduce incidents, fatalities, and adverse impacts to the public, particularly in disadvantaged communities, would not be met under the No Action Alternative. Therefore, the No Action Alternative may result in disproportionately high or adverse effects on minority and/or low-income populations depending on the location, condition, and safety concerns of the existing natural gas pipeline systems.

3.11.2.2. Proposed Action

The Proposed Action Alternative may result in impacts to minority and low-income populations as a result of construction activities. Construction methods would vary depending on location, pressure level, and state of the existing pipeline system. Different construction methods associated with the repair, rehabilitation, and replacement projects are described in Section 2.2.

Impacts to minority and low-income populations may include:

- Detours, road closures, and other access impacts to transportation or community facilities (note that all work would take place in the existing pipeline ROW or easements)
- Increased noise levels and ground vibrations to surrounding communities during working hours
- Temporary disruptions in natural gas distribution and service
- Increased dust or silt runoff to nearby surface waters

These impacts would be temporary in nature as they are associated with construction activities. While PHMSA does not anticipate disproportionately high or adverse effects to disadvantaged populations including minority and low-income populations, an EJ analysis would need to be conducted at a project-specific level to confirm this determination. See Section 3.11.2.4. The Proposed Action Alternative would meet the need to repair, rehabilitate, or replace the existing pipeline systems to reduce incidents, fatalities, and adverse impacts to the public, particularly in disadvantaged rural and urban communities. Therefore, PHMSA anticipates minority and low-income populations would also experience benefits under the Proposed Action Alternative, including:

- Reduction in emergency maintenance activities to address incidents such as leaks, fires, and explosions (specifically in disadvantaged rural and urban communities)

- Reduction in risk of injuries and fatalities associated with the existing pipeline systems resulting in improved public safety
- Reduction in emissions resulting in improved air quality
- Increased reliability in natural gas distribution and services
- Creation of jobs and dependable service resulting in support to the local economy

3.11.2.3. Avoidance, Minimization, and/or Mitigation Measures

DOT's Environmental Justice Strategy emphasizes that "active and meaningful participation of all affected communities would help ensure that transportation plans and projects avoid, and when avoidance is not possible, minimize, or mitigate these impacts on minority and low-income populations" (USDOT 2016). Public participation is an essential component of environmental justice. PHMSA, as described in their EJ Policy, is "committed to building relationships with stakeholders, including state and local partners and those who serve underrepresented populations, recognizing that community leaders are ideally positioned to champion the public engagement process and disseminate information to their constituents" (USDOT 2012a). As part of the Tier 2 analysis, the Tier 2 Site Specific Environmental Assessment would include description of applicable public involvement efforts to outline how project proponents would engage specifically with minority, low-income, and other vulnerable populations to avoid, minimize, or mitigate potential impacts caused by the Proposed Action Alternative. Efforts should include coordination with local community leaders and groups. Mitigation measures could include advanced notification of service disruptions and the construction schedule. Projects will be planned to reduce the duration of service interruptions. If necessary, service would be maintained as needed via temporary facilities.

3.11.2.4. Tier 2 Analysis

PHSMA will require that project proponents conduct a project-specific EJ analysis to determine potential impacts to minority and low-income populations and discuss avoidance, minimization, and mitigation measures as necessary. For analysis purposes, project proponents will use EJScreen (EPA 2022) to perform this analysis. Project proponents can insert a shapefile of the relevant pipeline segment and will select a half-mile buffer around the site. EJScreen will provide demographic data about the affected population that the project proponent will provide in the Tier 2 Site Specific Environmental Assessment. The Tier 2 Site Specific Environmental Assessment will include detailed instructions.

PHMSA would use results of the EJScreen tool to provide demographic information for analysis purposes, confirm no adverse effects would occur, and to identify any applicable avoidance, minimization, and/or mitigation efforts related to EJ impacts. PHMSA will also identify any positive benefits to disadvantaged rural and urban communities with EJ populations related to the Program.

To inform the Tier 2 Site Specific Environmental Assessment and as part of the Tier 2 analysis, project proponents would engage in public involvement efforts specifically with minority, low-income, and other vulnerable populations to avoid, minimize, or mitigate potential impacts caused by the Proposed Action Alternative. Efforts should include coordination with local

community leaders and groups and would be described in the Tier 2 Site Specific Environmental Assessment.

3.12. Socioeconomics

3.12.1. Affected Environment

The Program allocates $196 million/fiscal year for up to five years. Single municipalities or communities may not be awarded more than 12.5 percent ($125,000,000) of the total amount of the Program. PHMSA anticipates maximizing the socioeconomic impact of the Program by providing funding to numerous municipalities and communities, including disadvantaged rural and urban communities with or without EJ populations. The affected area, and subsequent socioeconomic costs and benefits of the Program, would depend on the size, scope, and location of individual projects funded by the Program.

3.12.2. Environmental Consequences

3.12.2.1. No Action

No new socioeconomic costs associated with new construction activities would be incurred by any population under the No Action Alternative, unless and until either planned or emergency repair or replacement efforts commence. However, socioeconomic costs related to ongoing safety concerns, incidents, and emergency repair activities will continue under the No Action Alternative. Emergency repair activities may include excavation to locate and address the issue or incident, thus resulting in potential economic impacts to businesses and service disruptions to the surrounding communities. While there will be no new socioeconomic costs introduced under the No Action Alternative, there will also not be any socioeconomic benefits introduced to surrounding communities. The need to repair, rehabilitate, or replace the existing pipeline systems to reduce incidents, fatalities, and adverse impacts to the public, particularly in disadvantaged communities, will not be met under the No Action Alternative. Therefore, the No Action Alternative may result in net negative socioeconomic costs to communities across the country.

3.12.2.2. Proposed Action

The Proposed Action Alternative would result in new socioeconomic costs associated with construction activities. Construction methods and durations will vary depending on location, pressure level, and state of the existing pipeline system. Rehabilitation and repair projects typically consist of inserting plastic material into the existing pipeline through entry and exit bore/drill holes, thus resulting in minimal excavation impacts. Repair or replacement projects typically consist of digging a series of trenches to replace pipelines in the same location. Therefore, replacement projects would result in additional excavation impacts compared to rehabilitation or repair projects. Socioeconomic costs during construction under the Proposed Action Alternative may include:

- Detours, road closures, and other access impacts to transportation or community facilities (note that all work will take place in the existing pipeline ROW or easements)
- Increased noise levels and ground vibrations to surrounding communities
- Temporary disruptions in natural gas distribution and service
- Potential disruptions in agricultural or recreation activities

Note that these impacts listed are temporary in nature as they are related to construction activities. The Proposed Action Alternative would meet the need to repair, rehabilitate, or replace the existing pipeline systems to reduce incidents, fatalities, and adverse impacts to the public, particularly in disadvantaged communities. Therefore, the Proposed Action Alternative would also result in an increase in socioeconomic benefits. These benefits may include:

- Reduction in emergency maintenance activities to address incidents such as leaks, fires, and explosions (specifically in disadvantaged rural and urban communities)
- Reduction in risk of injuries and fatalities associated with the existing pipeline systems resulting in improved public safety
- Reduction in emissions resulting in improved air quality
- Increased reliability in natural gas distribution and services
- Creation of jobs resulting in economic growth

3.12.2.3. Avoidance, Minimization, and/or Mitigation Measures

Active public participation would help project proponents avoid, minimize, and mitigate potential community impacts. Timely and meaningful public engagement throughout planning, design, construction, and operation would help reduce the potential for project delivery delays as a result of public controversy. Project proponents funded by the Program should coordinate with community leaders to develop an engagement plan that is appropriate for the scope, location, and nature of each project. Outreach plans should include strategies to engage with all populations, including Limited English Proficiency (LEP) and low literacy populations that may not have access to traditional outreach communications or methods.

3.12.2.4. Tier 2 Analysis

To evaluate socioeconomic costs and benefits of the Proposed Action Alternative under a Tier 2 analysis, the project proponent will complete the Tier 2 Site Specific Environmental Assessment with qualitative and quantitative data about the population, demographics, economy, and community institutions of the affected area. The following data points may be used to conduct the analysis:

- Population: size, age, and gender
- Demographics: race, ethnicity, education levels, and predominant non-English languages spoken
- Economy: employment status, commuting trends, income, and housing market
- Community institutions: hospitals, parks, schools, places of worship, transit centers, and community buildings

The topics described in the bullets above should be discussed for each project; however, the level of detail would depend upon the project specifics and surrounding project area. Up-to-date data available from the United States Census Bureau can be utilized to conduct a Tier 2 analysis of socioeconomic impacts for the Proposed Action Alternative. Additionally, EPA's NEPAssist and EJScreen tools can be utilized to map the specific project area in relation to community facilities, cultural and environmental resources, and demographic indicators. A thorough analysis would help PHMSA understand the population of the affected area, what costs and benefits may be experienced by specific populations, and determine what avoidance, minimization, or mitigation measures may apply.

3.13. Safety

3.13.1. Affected Environment

PHMSA protects people and the environment by advancing the safe transportation of energy and other hazardous materials that are essential to daily lives. To do this, PHMSA establishes national policy, sets and enforces standards, educates, and conducts research to prevent incidents. PHMSA also prepares the public and first responders to reduce consequences if an incident does occur. The natural gas distribution pipeline system is prone to leakage, causing incidents and fatalities.

Pipeline incidents can result in death, injury, property damage, and environmental damage. Pipelines that are known to leak based on the material include cast iron, bare steel, wrought iron, and historic plastics with known issues (PIPES Act of 2020). PHMSA establishes safety regulations for all pipelines (49 CFR Parts 190-199). In 2011, following major natural gas pipeline incidents, DOT and PHMSA issued a Call to Action to accelerate the repair, rehabilitation, and replacement of the highest-risk pipeline infrastructure (USDOT 2014). Among other factors, pipeline age and material are significant risk indicators. Pipelines constructed of cast and wrought iron, as well as bare steel, are among the pipelines that pose the highest risk. PHMSA continues to encourage legacy pipeline repair or replacement to increase the safety of these segments of the gas distribution systems. Additionally, PHMSA provides grant opportunities to improve pipeline safety, including the Pipeline Safety Program State Base Grant, State Damage Prevention grants, and Technical Assistance and pipeline emergency response grants.

The number of miles of bare steel and cast iron pipes have been decreasing steadily over the years (USDOT 2021). However, based on gas distribution incident reports (excluding those caused by leaks beyond the customer meter) for 2002 through 2021, there continues to be incidents. Based on incident reports, PHMSA identified nine percent of incidents occurring on gas distribution mains involved cast and wrought iron mains with 36 percent of all fatalities and 16 percent of all injuries involving cast or wrought iron pipelines. Table 8 provides the safety statistics by pipeline material, as reported by PHMSA for annual incident reports received and occurring from 2017 through 2021.

Table 8. Safety statistics by pipeline material based on PHMSA Annual Incident Reports, 2017-2021[33]

Metric	Cast/Wrought Iron	Plastic	Steel
5 Year Average Total Mileage	21,414	1,771,767	523,663
Total Incidents 2017-2021	10	32	45
Average Number of Incidents per 100k Main Miles per Year	9.3	0.84	1.72
Incidents next 20 years*	1.86	0.17	0.34
Total Injuries 2017-2021	3	14	7
Average Number of Injuries per 100k Main Miles per Year	3.27	0.36	0.26
Injuries next 20 years*	0.65	0.07	0.05
Total Fatalities 2017-2021	2	3	1
Average Number of Fatalities per 100k Main Miles per Year	2.18	0.08	0.04
Fatalities next 20 years*	0.44	0.02	0.01

* The projections for the next 20 years of incidents, fatalities, and injuries is based on the rate occurring per mile of the 5-year reporting period on 1,000 main miles.

3.13.2. Environmental Consequences

3.13.2.1. No Action

Under the No Action Alternative, it would be likely that the current patterns of safety incidents, fatalities, and injuries would continue as there would not be an increase in repair and/or replacement of existing higher risk pipeline segments. It is likely that the rate of incidences involving public health and safety with pipeline materials as a contributing factor would continue and possibly increase as the age of the pipeline material continues to result in further deterioration. Therefore, the No Action Alternative would result in a less favorable safety outcome and would not mitigate current risk levels if there is no repair and/or replacement of existing pipelines in comparison with proceeding with the Program.

3.13.2.2. Proposed Action

The primary purpose of the Proposed Action Alternative involves addressing safety issues around legacy and leak prone pipeline materials and equipment. As authorized in IIJA (Pub. L. 117-58), implementation of the Proposed Action Alternative would result in repair, rehabilitation, or replacement of pipelines to improve the safe delivery of energy by reducing

[33] PHMSA Gas Distribution Incident reports (Data as of 06/30/2022) and Gas Distribution Annual Reports. Data as of 07/18/2022

incidents and fatalities and to protect our environment and climate impacts by remediating aged and failing pipelines prone to leakage. The Proposed Action Alternative would reduce the risk profile of existing pipeline systems prone to methane leakage and would also benefit disadvantaged rural and urban communities with the safe provision of natural gas. The Proposed Action Alternative responds to the need to address the potentially unsafe condition of the natural gas distribution system of pipelines.

The information summarized above on current safety risks and incident data suggests that repairs and replacements are needed to improve the safety of pipelines and the transmission of natural gas and decrease the likelihood of injuries and deadly incidents. Replacements involving pressures up to 125 psi would typically consist of polyethylene plastic. Replacements involving pressures in the range of 200 - 250 psi would typically be polyamide (PA) 11 or PA-12 allowed by Code. Replacement plastics allow for insertion into existing pipe, allowing the reduction in excavation impacts. There are also fewer joints needed for plastics, which are inserted off a spool/reel, and this further reduces the potential for leaks at joints. In using this material, many spools can go thousands of feet before a joint is needed versus steel installations that typically need to be welded approximately every 40 feet. Material replacement would result in less opportunity for leaks.

Table 9 provides incident rates on aging distribution pipelines, in comparison to newly installed distribution pipelines under the Proposed Action Alternative, to provide a reasonable estimate of potentially avoided safety incidents per mile, over a 20-year period. Estimates of avoided incidences are calculated using information on fatalities, injuries, and pipeline mileage.

Table 9. 20-Year outlook for incidents, fatalities, and injuries for municipal owned cast/wrought iron pipeline[34]

20 Year Outlook	No Action Alternative	Proposed Action Alternative	Avoided Incidents, Fatalities, and Injuries
Total Incidents	1.86	0.17	1.69
Total Fatalities	0.65	0.07	0.58
Total Injuries	0.44	0.02	0.42

This information is based on 1,000 miles of municipal owned cast and wrought iron pipeline that could be replaced under the Program. The incidents, fatalities, and injuries are projected based on the 5-year trend from PHMSA annual incident reports, 2017-2021.

The repair, rehabilitation, or replacement of pipelines would be constructed in accordance with industry best practices and would comply with all local, state, and federal regulations, including those for safety. Best management practices would be used to minimize any temporary impacts related to construction and would be further defined as part of the Tier 2 Site Specific Environmental Assessment.

[34] Volpe 2022

The Proposed Action Alternative would reduce safety risks associated with potential exposure to gas and methane from leaking pipes. Therefore, the Proposed Action Alternative would result in a positive benefit to safety.

3.13.2.3. Avoidance, Minimization, and/or Mitigation Measures

Federal pipeline safety regulations (49 CFR 192.616) require natural gas distribution pipeline operators to develop and implement public awareness programs that follow the guidance provided by the American Petroleum Institute (API) Recommended Practice (RP) 1162, "Public Awareness Programs for Pipeline Operators" (incorporated by reference in federal regulations). Public awareness would be incorporated into implementation and construction on the Proposed Action Alternative. The Federal pipeline safety regulations also require that distribution pipeline operators prepare a written integrity management (IM) plan of the mechanisms or procedures that the operator will use to implement its integrity management program. Distribution system operators are required to update their DIMP procedures at intervals not exceeding five years. The requirements for the IM plan and procedures are in 49 CFR part 192, subpart P. This subpart also contains requirements and information about materials, components, tests, welding qualifications, and cathodic protection.

Use of standard construction safety methods and procedures that protect human health and prevent/minimize hazardous materials releases during construction, including personal protection, workplace monitoring, and site-specific health and safety plans, should occur when the Proposed Action Alternative is implemented.

3.13.2.4. Tier 2 Analysis

During the application review process, prior to the Tier 2 analysis, PHMSA will analyze the parts of the applicants' distribution integrity management plan (DIMP) that are specific to the project. PHMSA will evaluate to what extent a repair or replacement would improve/reduce risk scores. The Tier 2 Site Specific Environmental Assessment will include this DIMP information and other relevant information from the PHMSA safety analysis. The project proponent would be required to update their DIMP procedures to account for new materials or any changes to the facility.

Additionally, the Tier 2 Site Specific Environmental Assessment would include measures that would be used during construction that include the development of a safety plan and methods to protect human health and prevent/minimize hazardous materials releases.

3.14. Cumulative Effects

3.14.1. Affected Environment

The CEQ NEPA regulations (40 CFR 1508.1(g)(3)) define cumulative effects or impacts as the "effects on the environment that result from the incremental 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."

The CEQ's "Considering Cumulative Effects under the National Environmental Policy Act" provides a framework for advancing environmental analysis by addressing considerations for cumulative effects (CEQ 1997a). The affected environment sets the baseline and thresholds of environmental change that are important for analyzing cumulative effects, which includes delineating the cause-and-effect relationship between multiple actions and the resources, ecosystems, and communities of concern (CEQ 1997a). Essentially, the Proposed Action Alternative is evaluated in context of other developments and activities occurring on relevant resources.

Identifying past, present, and future actions establish the geographic and time boundaries for the cumulative effects analysis. The availability of data and an understanding of trends or patterns for the resources under review determines the timeframe for examining past effects. If the data for past actions is limited, the discussion may be qualitative. Identifying similar actions underway may involve coordination with local officials and other agencies. Identifying foreseeable actions requires investigation of regional and local plans and policies that guide development activities and actions. The CEQ released the Phase 1 Final Rule in April 2022, which restores the 1978 CEQ provisions on direct, indirect, and cumulative. This Tier 1 EA addresses direct and indirect effects within each resource chapter.

3.14.2. Environmental Consequences

3.14.2.1. No Action

Under the No Action Alternative, the Program would not be implemented; therefore, cumulative effects are not anticipated beyond those that could occur because of other public and private projects. The No Action Alternative would not provide for the repair, rehabilitation, or replacement of existing pipelines. Without the repair or replacement of existing pipeline materials, incident risks and methane leaks would continue.

3.14.2.2. Proposed Action

For cumulative effects assessment, PHMSA would include comparison of the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant; however, at this stage in the process and appropriate with a Tier 1, limited information is known about other ongoing actions specific to where the Proposed Action Alternative would be implemented. Looking across the program to encompass all projects that would occur with the Proposed Action, the anticipated cumulative effect would be a reduction in pipeline incidents, increase in safety associated with pipelines in need of repair, and a reduction in methane emissions. Local information of ongoing and related actions specific to project areas would be evaluated for additive consideration for effects on individual resources identified in the Tier 2 Site Specific Environmental Assessments. The Tier 2 Site Specific Environmental Assessment would include a review of other project area policies and projects that would include a focus on safety improvements and methane reductions.

If there are other construction projects occurring at the same time as the Proposed Action Alternative, it is possible that there would be minor cumulative effects; however, construction impacts could be avoided or minimized through the implementation of appropriate mitigation actions and would be considered during the Tier 2 process as part of completing the Tier 2 Site Specific Environmental Assessment. Impacts to the regions where proposed projects may include additional economic benefits and reductions in climate pollution attributed to methane leak reduction. Individual projects related to Program implementation may affect specific resources; however, these potential impacts will be analyzed when the scope of the specific project is identified and as part of the Tier 2 Site Specific Environmental Assessment as discussed below.

3.14.2.3. Tier 2 Analysis

Tier 2 Site Specific Environmental Assessment would include additional analyses regarding potential cumulative effects. The site-specific evaluation would consider cumulative effects of both short-term and long-term impacts of past, present, and future actions, separated by resource categories. Key resource topics will vary depending on the resources identified for that site-specific project. Topics that would be considered and addressed in the analysis of cumulative effects in the Tier 2 Site Specific Environmental Assessment include:

- Would the proposed project disrupt existing or planned area development and land uses?
- For the area of the proposed project, what other activities and actions have occurred or are planned to occur?
- Would the project cause change in travel patterns and accessibility?
- Does the project, when considered with other actions, endanger the long-term productivity or sustainability of the resource?
- What is the relative sensitivity of existing areas near project alternatives to conditions arising from construction of the project alternatives in conjunction with other area activities?

In evaluating cumulative effects for Tier 2 projects, the magnitude and extent of the effect on a resource depends on whether the cumulative effects exceed the capacity of the resource to sustain itself and remain productive or the desired conditions of functioning and quality for that resource deteriorate.

4. Consultation and Public Involvement

As part of this Tier 1 EA, PHMSA is soliciting public comments through a public comment period. The availability of this Tier 1 EA will be released on PHMSA's website with a docket number where comments can be submitted on regulations.gov. PHMSA will accept public comments for 30 days on this Tier 1 EA. PHMSA will consider comments received and incorporate responses to comments in the decision-making process. Consultation with appropriate agencies on related processes, regulations, and permits would occur at Tier 2 for applicable resources.

5. Decision about the Degree of Environmental Impact

Based on the above analysis in this Tier 1 PHMSA has not identified any significant adverse impact on human health or the environment that would result from implementation of the Proposed Action Alternative, but requests comment on these matters.

Based on the above analysis in this Tier 1, PHMSA is proposing to a make a Finding of No Significant Impact (FONSI) for each project site that meets the following conditions:

- The Tier 2 Site Specific Environmental Assessment is complete and accurate.
- The types and extent of anticipated environmental impacts are as expected in this Tier 1 EA.
- Project proponent commits to compliance with applicable Federal and State environmental requirements.
- The project proponent commits to perform appropriate and applicable mitigation as determined by PHMSA in its review of the project proponent's Tier 2 Site Specific Environmental Assessment and as documented in a FONSI.
- PHMSA's review of the Tier 2 Site Specific Environmental Assessment does not identify adverse and unanticipated types or levels of environmental impacts.

If PHMSA's review of a Project Proponent's Tier 2 Site Specific Environmental Assessment does identify potential adverse and unanticipated types or levels of environmental impacts, PHMSA will conduct additional analysis as described in Section 1.4.2 above.

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8. Appendix 1 Air Quality and Greenhouse Gas Analysis

8.1. Regulatory Framework

The Clean Air Act (42 U.S.C. §§ 7401-7671q), as amended, gives the EPA the responsibility to establish the primary and secondary NAAQS (40 CFR Part 50) that set acceptable concentration levels for seven criteria pollutants: particulate matter with a diameter less than or equal to a nominal 10 micrometers (PM_{10}), particulate matter with a diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), nitrous oxides (NO_x), ozone (O_3), and lead (Pb) (EPA 2021a). Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects. Each state has the authority to adopt standards stricter than those established under the federal program; however, many states accept the federal standards.

The General Conformity Rule was established under the CAA (Section 176(c)(4)) to ensure that federal actions do not cause or contribute to new violations of the NAAQS, worsen existing violations of the NAAQS, or delay attainment of the NAAQS (EPA 2021b). Federal regulations designate regions in violation of the NAAQS as non-attainment areas. Federal regulations designate regions with levels below the NAAQS as attainment areas. Maintenance regions are areas that have previously been designated non-attainment and have been re-designated to attainment for a probationary period through the implementation of maintenance plans. Federal agencies are required to work with state, tribal, and local governments in nonattainment and maintenance areas to ensure that federal actions conform to their air quality plans, including SIP and TIP.

The General Conformity process requires a determination of whether an action would increase emissions of criteria pollutants above established thresholds (40 CFR 93.153). The thresholds are referred to as *de minimis* criteria[35] and vary depending upon the pollutant. The EPA provides *de minimis* tables[36] for nonattainment areas (40 CFR 93.153(b)(1)) and maintenance areas (40 CFR 93.153(b)(2)) in tons per year of criteria pollutants and their precursors. If an action may result in emissions above *de minimis* levels, federal agencies are required to demonstrate that the action will conform with requirements in the SIP/TIP. Project-level air quality analyses are described in detail above in Section 3.2.2.4 under Tier 2 Analysis.

In addition to the criteria pollutants, the CAA Section 112 also requires the EPA to regulate hazardous air pollutants (HAPs), also known as air toxics, from stationary and mobile sources.

[35] The EPA defines *de minimis* levels as the minimum threshold for which a conformity determination must be performed, for various criteria pollutants in various areas (40 CFR 93.153).

[36] See *de minimis* Tables here: https://www.epa.gov/general-conformity/de-minimis-tables

The National Emission Standards for Hazardous Air Pollutants (NESHAP) include standards for oil and natural gas production facilities as well as natural gas transmission[37] and storage facilities. The EPA issued a final rule for natural gas facilities in 2012 (40 CFR Part 63 Subpart HHH) to establish standards for five different HAPs: benzene, toluene, ethyl benzene, mixed xylenes, and n-hexane. These HAP standards are only applicable to "major sources," which are defined at 40 CFR 63.2 as:

> "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants, unless the [EPA] Administrator establishes a lesser quantity, or in the case of radionuclides, different criteria from those specified in this sentence."

Mobile source air toxics (MSATs) are HAPs emitted from cars, trucks, and construction equipment. MSAT emissions have been reduced by over 50 percent since 1990 as a result of mobile source rules targeting diesel engines. Other regulatory and non-regulatory programs have also worked in concert to significantly reduce MSATs – these programs include Tier 3 vehicle and fuel standards low-sulfur gasoline and diesel requirements, heavy-duty engine and vehicle standards, standards for nonroad diesel engines, EPA's Ports Initiative, and EPA's Diesel Emissions Reduction Program (DERA).

On December 7, 2009, the EPA added GHGs to the definition of pollutants covered by the CAA (74 FR 66496), where GHGs include carbon dioxide (CO_2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHGs are gases that trap heat in the atmosphere and contribute to global warming and climate change. CO_2 is the most abundant GHG across all sectors – it is emitted from natural and anthropogenic combustion processes, some industrial processes such as the manufacture of cement, mineral production, metal production, and the use of petroleum-based products, from volcanic eruptions, and from the decay of organic matter. CO_2 is removed from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. CH4 is emitted from oil and gas operations, landfills, agriculture, and mining activity, with natural gas production, processing, transport, and distribution responsible for over 40 percent of CH4 emissions in the U.S. The transmissions and storage segments account for 19 percent of total oil and gas CH4 emissions, with pipelines making up 14 percent of transmission and storage emissions (EPA 2022a).

Emissions of GHGs are quantified in terms of carbon dioxide equivalents (CO_2e) by multiplying emissions of each GHG by its respective global warming potential (GWP) as defined under 40 CFR 98, Subpart A, Table A-1. The GWP is a ratio relative to CO_2 regarding each GHG's ability to absorb solar radiation and its residence time in the atmosphere.[38] EPA has not established

[37] Natural gas transmission means the pipelines used for the long-distance transport of natural gas (excluding processing). Specific equipment used in natural gas transmission includes the land, mains, valves, meters, boosters, regulators, storage vessels, dehydrators, compressors, and their driving units and appurtenances, and equipment used for transporting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas to one or more distribution area(s) (40 CFR Part 63 Subpart HHH).

[38] CO_2 has a GWP of 1, while CH4 and N2O have GWPs of 25 and 298, respectively.

NAAQS for any listed GHG, as their impact occurs on a global basis and not a local/regional basis (EPA 2022a).

8.2. Methodology

PHMSA considered the potential for local air quality impacts from operational and construction-related sources within a representative project's study area. The study area is defined as the Tier 2 project site. For the purposes of the GHG analysis, the study area also includes routes for travel of construction workers, materials, and services to comprise the area in which the project could cause impacts.

Criteria pollutant, HAP, and GHG emissions from stationary and mobile sources were considered for natural gas pipeline replacement projects. Emissions may occur during pipeline construction, regular maintenance, incident response, and pipeline operation. Construction emissions are related to on-road vehicle and non-road equipment activity, while operational emissions are related to leaks in pipeline infrastructure. PHMSA has observed that pipelines constructed of cast and wrought iron, and bare steel, are among those pipelines that pose the highest risk for leaks due to age and material; these types of pipelines may have a higher potential for air quality impacts and GHG emissions.

8.2.1. Air Quality

The potential for air quality impacts associated with emissions sources were analyzed for the No Action Alternative and the Proposed Action Alternative. Primary emission sources include fossil-fueled construction equipment, dust-generating construction activities, pipeline venting, and leaks during pipeline operations following replacement or other repair activity. In general, much of the heavy equipment used in construction is powered by diesel engines that produce relatively high levels of NOx and particulate matter (PM) emissions. Fugitive dust generated by construction activities is also a source of PM emissions. Gasoline engines also produce relatively high levels of CO. Leaks from pipelines can contribute to volatile organic compound emissions, which may result in air quality concerns in ozone non-attainment and maintenance areas.[39] The majority of repair, rehabilitation, and replacement of pipelines under the Program will be with plastic polyethylene. In general, there are fewer joints required for plastic pipelines and thus less opportunities for leaks at joints. However, plastic pipelines that accommodate lower pressure of distribution lines may allow a minimal amount of natural gas permeation (i.e., escape from the pipe itself), which is not the case for well-maintained modern coated steel pipelines. Nonetheless, the cost of plastic pipe is significantly less than coated steel pipelines, and any permeation is minimal, especially in comparison with the leak prone pipelines targeted for replacement and repair in this Program. Use of plastic pipe allows PHMSA to fund the replacement of more leak prone facilities and equipment that have higher rates of failure and associated injuries and death.

[39] Methane is excluded from the regulatory definition of volatile organic compounds (VOC) under the CAA. There is a current petition into the EPA to remove methane and ethane from the 'Negligibly Reactive' VOC List and thus require these compounds to be included in criteria pollutant emissions inventories.

For projects in non-attainment or maintenance areas, PHMSA is required to calculate the total direct and indirect emissions as an annual emissions inventory and determine whether additional analysis is needed for a General Conformity Determination. The emissions must be reasonably foreseeable at the time the conformity determination is made. At the project level, on-road vehicles and non-road equipment should be included in the emissions inventory. Vehicles and construction equipment used during the project should adhere to all relevant federal and state fuel economy and emissions standards, including Tier 4 Emissions Standards for Non-Road Compression-Ignition Engines (EPA 2022b).

PHMSA does not expect pipeline operations under the Program to be a significant source of criteria pollutant emissions as defined by the CAA. Methane is not a criteria pollutant and is excluded from the definition of VOC under the CAA and leaks from repaired and replaced pipelines are not expected to contribute to worsening air quality in non-attainment and maintenance areas.

See Table 10 for components of the emissions inventory and potential data sources and further detail in the Tier 2 Analysis in Section 3.2.2.4.

Table 10. Emissions inventory source types and data sources

Source	Details	Emissions Data Sources
On-Road Vehicles	Include emissions from on-road vehicles (cars and trucks) expected during pipeline construction and maintenance. Identify the vehicle type, the duration, and the applicable project phase. Include tailpipe emissions, as well as particulate matter from brake and tire wear and fugitive dust.	EPA MOVES Other EPA-approved Emissions Model (e.g., EMFAC)
Non-Road Equipment, including Construction	Include non-road emissions from construction and maintenance equipment. Identify the type of equipment, the duration, and the applicable project phase. Include tailpipe emissions, as well as particulate matter from brake and tire wear and fugitive dust.	EPA MOVES (Nonroad module) Other EPA-approved Emissions Model (e.g., EMFAC)

If the project results in no emissions increases in a non-attainment or maintenance area or total emissions are below *de minimis* levels, the project is exempt from additional conformity

analysis. Pipeline replacement projects are not expected to cause an increase in emissions above *de minimis* levels. However, if PHMSA determines based on the emissions inventory analysis described in Section 3.2.2.4, that the project will result in an increase in emissions above *de minimis* levels, additional air quality modeling may be required. See further detail under Tier 2 Analysis in Section 3.2.2.4.

8.2.2. Greenhouse Gases

The environment affected by GHG emissions includes the global atmosphere and the impact of increased GHG concentrations on human and natural systems. GHG and climate change impacts are not detailed in this Tier 1 EA but can be found in other reference documents such as the Intergovernmental Panel on Climate Change's (IPCC) latest synthesis report (IPCC 2014). Natural gas is mostly made of methane or CH4, a greenhouse gas with a global warming potential 81 to 83 times greater than CO_2 over a 20-year period and 27 to 30 times greater over a 100-year period (EPA 2022c). PHMSA estimates that between 2010 and 2015, the average release volume for a pipeline rupture was 33,081 MCF, or approximately $700,000 in climate change related damage. [40] This may modestly overstate the impacts of a rupture because natural gas contains other pollutants such as CO_2 and other hydrocarbons and CH4 emissions may be lower if it is partially converted to CO_2 if the incident ignites (PHMSA 2022).

The EPA has also developed emissions estimates from distribution pipeline leaks based on two primary studies: the first by the Gas Research Institute and EPA (GRI/EPA) in the 1990s and the second by Lamb et al. in the early 2010s. These emissions estimates are calculated as the product of a material-specific emission factor (emissions per leak) and an activity factor (leaks per length of each material). Previous studies have shown that a small number of emissions sources ("super-emitters") account for the majority of emissions across the natural gas supply chain (Brandt et al. 2014; Zimmerle et al. 2014; Weller et al. 2020). More recently, Weller et al. (2020) assessed methane leaks from natural gas distribution systems and estimated the total number of leaks, as well as emission factors (as leaks per mile and leaks per minute), for different materials. Findings from their analysis indicate that leaks increase significantly with age for bare steel, coated steel, and cast iron pipes and, consistent with previous studies, are considerably lower for plastic pipes (see Table 1). Weller et al. (2020) notes that there was no plastic installed prior to 1960 and no bare steel and cast iron installed after 1979 and 1959, respectively. Weller et al.'s (2020) estimated emission factors (g/min) are higher than those reported by Lamb (2015) and GRI/EPA (1996), which they attribute primarily to more accurate activity estimates (i.e., accounting for uncertainty and underreporting of leaks).

There have been several recent methane emissions studies conducted on local distribution systems. As part of a National Institute of Standards and Technology project, researchers measured and modeled methane emissions in Indianapolis and found low-level enhancement of methane throughout the city, indicating diffuse natural gas leakage from distribution systems and downstream usage (Lamb et al. 2016). Another study in Massachusetts found yearly loss rates between 2.1 and 3.3 percent from natural gas infrastructure in Boston urban areas (McKain et al. 2015). In addition, Lamb (2015) directly measured methane emissions from facilities and

[40] U.S. Interagency Working Group (IWG) interim technical guidance (IWG 2021); OMB Circular A-4. Both documents specify 3% as an acceptable GHG discount rate for monetized values of avoided emissions.

distribution pipelines managed by 13 utilities across the country and found that methane emissions from older infrastructure were significant (Lamb et al. 2015).

For the purposes of this analysis and the subsequent Tier 2 project-level emissions analysis described in Section 3.2.2.4, PHMSA is relying on the most recent GHG inventory developed by the EPA for natural gas and petroleum systems (EPA 2022d; EPA 2016a). Emission factors in this inventory were calculated using data from Lamb (2015) and GRI/EPA (1996).

9. Appendix 2 Summary of Environmental Resources and Mitigation Measures

Resource	Activity	Standard Avoidance, Minimization, and/or Mitigation Measure[41]	Additional Mitigation Potentially Required Based on Construction Activities
Air Quality and Greenhouse Gas	Combustion Emissions from Construction Equipment	• Efficient use of on-road and non-road vehicles, by minimizing speeds and vehicles • Minimizing excavation to the greatest extent practical • Use of cleaner, newer, non-road equipment as practicable • Minimizing all vehicle idling and at minimum, conforming with local idling regulations • Ensuring that all vehicles and equipment are in proper operating condition	
		• On-road and non-road engines must meet EPA exhaust emission standards (40 CFR Parts 85, 86, and 89)	
	Suppression of Particulate Matter	• Covering open-bodied trucks while transporting materials • Watering, or use of other approved dust suppressants, at construction sites and on unpaved roadways, as necessary • Minimizing the area of soil disturbance to those necessary for construction • Minimizing construction site traffic by the use of offsite parking and shuttle buses, as necessary	
	GHG Emissions	• Minimizing/eliminating idling of equipment	

[41] If these measures are not possible or impracticable, project proponent can provide a brief explanation to justify the reason.

Resource	Activity	Standard Avoidance, Minimization, and/or Mitigation Measure[41]	Additional Mitigation Potentially Required Based on Construction Activities
	Methane Release/Pipeline Blowdown	• If possible, operate downstream compression after upstream valve is closed • If possible, use additional compressors to move gas or pull line down to lower pressure (e.g., incremental gain)	• Transfer gas to a parallel line
Water Resources	Construction in Wetland and Stream Crossings	• Avoidance of staging and laydown areas in wetland or floodplain • Reseeding of native plant species, if disturbed • Restore to pre-construction contours • Adherence to additional mitigation measures in accordance with applicable permits	
Groundwater and Hazardous Materials/Waste	Construction and Restoration	• Stormwater Pollution Prevention Plan • No boring/drilling, staging, and laydown areas within EPA superfund sites or areas containing known waste	• Groundwater Management Plan • Soil Management Plan • Notification program to alert emergency response agencies, residents, regulatory agencies of release or exposure • IR plan to control and minimize impacts to sensitive resources, if boring/drilling required
Soils	Soil Stabilization	• Erosion and sediment control • Silt fence, check dams, covering all bare areas • All impacted areas to be restored to pre-construction contours • Permanent stabilization via appropriate materials	
Biological Resources	ESA Listed Species and Critical Habitat		• Avoid mating and nesting season • Placement of exclusion fencing • Use of biological monitors on-site • Adherence to additional measures based on agency consultation

Resource	Activity	Standard Avoidance, Minimization, and/or Mitigation Measure[41]	Additional Mitigation Potentially Required Based on Construction Activities
Cultural Resources	Adverse Effects		• Archaeological monitoring during initial excavation • Post-review discovery plans
Land Use	Construction	• Impacted areas restored to pre-construction conditions • Coordination with property owners • Traffic Control Plan • Coordination with emergency services and other agencies • Notification to residents and business of parking impacts	
Noise and Vibration	Construction and Equipment	• Adhere to state, local, and tribal noise regulations • Limiting activities to occur only during normal weekday business hours, when noise restrictions are not in place • Proper maintenance of equipment mufflers • Use of acoustical noise tent and/or enclosures surrounding hoe rams, jackhammers, or pavement breakers, to the extent practicable given space constraints at work sites	
Environmental Justice	Public Participation	• Coordination with local community leaders and groups • Advanced notification of service disruptions and construction schedule • Services maintained at temporary facilities, if appropriate	
Socioeconomics	Community Impacts	• Public engagement to reduce project delivery delays and public controversy	

Resource	Activity	Standard Avoidance, Minimization, and/or Mitigation Measure[41]	Additional Mitigation Potentially Required Based on Construction Activities
		• Outreach plans to involve and engage all populations	
Safety	Public Awareness	• Incorporate public awareness programs	
	Construction	• Use of standard construction safety methods and procedures	
Section 4(f)	Use of Property	• Ensuring access to resource during construction • Restoring site to pre-existing conditions	• Additional measures determined through coordination with OWJ

10. Appendix 3 Proposed FONSI for Individual Tier 2 Project Sites

Based on the analysis in the Tier 2 Site Specific Environmental Assessment PHMSA has determined that the project would not have a significant adverse impact on the environment. PHMSA has determined that the implementation of this project, described in the Tier 2 Site Specific Environmental Assessment will have no significant impact. PHMSA concludes based on the analysis in the Tier 2 Site Specific Environmental Assessment, that the project site is consistent with the anticipated types and levels of environmental impacts described in the Tier 1 EA document.

Based on the analysis in the Tier 1 EA and confirmed in the Tier 2 Site Specific Environmental Assessment for this project, PHMSA is making a FONSI for this project and confirmed it meets the following conditions:

- The Tier 2 Site Specific Environmental Assessment is complete and accurate.
- The types and extent of anticipated environmental impacts are consistent with the Tier 1 EA.
- Project proponent commits to compliance with applicable Federal and State environmental requirements.
- The project proponent commits to perform mitigation measures described in the Tier 2 Site Specific Environmental Assessment.
- PHMSA's review of the Tier 2 Site Specific Environmental Assessment determined the project would not result in adverse or unanticipated types or levels of environmental impacts.

PHMSA takes full responsibility for the accuracy, scope, and content of the Tier 2 and the information provided in this FONSI.