Safe Room Construction

Draft Supplemental Programmatic Environmental Assessment

December 2024

FEMA

This page intentionally left blank.

Executive Summary

Background

This Supplemental Programmatic Environmental Assessment (SPEA) facilitates compliance with the National Environmental Policy Act of 1969 (NEPA; 42 U.S. Code [U.S.C.] 4321 et seq.) for the Federal Emergency Management Agency's (FEMA) federal assistance toward construction, retrofit, or renovation of safe rooms (proposed action), which promote public safety during extreme wind events, such as hurricanes and tornadoes.

In 2011, FEMA published a Final Programmatic Environmental Assessment (PEA) and Finding of No Significant Impact (FONSI) for hazard mitigation safe room construction (hereafter, "2011 PEA"). This SPEA was developed in response to an expansion of FEMA's grant programs that can be used to fund eligible safe room projects and changes to NEPA. FEMA is able to fund eligible safe room projects under the Hazard Mitigation Assistance (HMA) Program through Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA), Hazard Mitigation Grant Program (HMGP) and HMPG Post Fire grants, the Public Assistance (PA) Program, and the Pre-Disaster Mitigation (PDM) Congressionally Directed Spending (CDS) program. The 2011 PEA did not include BRIC, FMA, HMGP Post Fire, or PA as available funding sources for safe room projects.

In 2023, NEPA was amended by the Fiscal Responsibility Act of 2023 (FRA). Section 108 of NEPA, as amended, Programmatic Environmental Document, allows agencies to rely on prior analysis contained within a programmatic environmental document in a subsequent environmental document, "after 5 years, so long as the agency reevaluates the analysis in the programmatic environmental document and any underlying assumption to ensure reliance on the analysis remains valid" (42 U.S.C. 4336b(2)). Therefore, FEMA has developed this SPEA under the authority of NEPA, as amended. Throughout this SPEA, the 2011 PEA is incorporated by reference where the original descriptions, analysis, and conclusions remain valid; it is available for reference at: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa/programmatic-environmental-34.

Summary of Updates to the 2011 PEA

This SPEA reflects changes in the affected environment (referred to as "regulatory framework" in the 2011 PEA) and subsequent considerations in the environmental consequences (referred to as "impact analysis" in the 2011 PEA), since 2011. In addition to the NEPA statutory amendments, the Council on Environmental Quality (CEQ) has promulgated new NEPA implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) since the 2011 PEA was published. Based on the kickoff date for this NEPA analysis, which occurred prior to the release of the May 2024 updates, this SPEA was prepared in accordance with the April 2022 updates of the CEQ's NEPA implementing regulations.

In 2014, the Department of Homeland Security (DHS) issued the DHS Directive 023-01, Revision 01, *Implementation of the National Environmental Policy Act,* and DHS Instruction 023-01-001-01, Revision 01, *Implementation of the National Environmental Policy Act*. These documents are referred to as the DHS Directive and Instruction. In 2018, FEMA issued its Directive 108-1, *Environmental Planning and Historic Preservation Responsibilities and Program Requirements,* and FEMA Instruction 108-1-1, *Implementation of the Environmental Planning and Historic Preservation Responsibilities and Program Requirements*.

The DHS Instruction includes a list of Categorical Exclusions (CATEXs) that typically do not individually or cumulatively have significant impacts on the human environment. Previously, FEMA maintained agency-specific NEPA regulations and a list of CATEXs at 44 CFR Part 10. Upon issuance of the DHS Directive and Instruction in 2014, FEMA removed its procedures at 44 CFR Part 10 in order to comply with the DHS Directive and Instruction. As a result, FEMA CATEXs identified in the 2011 PEA are no longer applicable. FEMA now relies on the CATEXs listed in the DHS Instruction.

CHANGES TO THE PURPOSE, NEED, AND ALTERNATIVES

The purpose and need for the proposed action were modified in this SPEA to reflect the expansion of available grant funding for eligible safe room projects since the issuance of the 2011 PEA. Specifically, the *purpose* of the proposed action has been updated to address FEMA's role in helping individuals and communities adapt to and prepare for more intense and more frequent disasters as a result of climate change. To better manage these threats, FEMA is committed to enhancing the nation's capability to anticipate, prepare for, and adapt to future climate conditions. The HMA Program provides grants to plan for future disasters and mitigate future losses, while the PA Program provides funding for emergency assistance and recovery from disasters. Both of these programs support safe room construction, retrofit, or renovation to ensure that people are able to prepare for and protect themselves during disasters. The *need* for the proposed action has been updated to reflect the increase in the frequency and intensity of extreme wind events, such as hurricanes and tornadoes. Depending on the type of event, there may be little or no warning time and people and first responders may be unable to evacuate. Safe rooms provide life-safety protection that is imperative for populations that cannot remove themselves from harm's way.

The alternatives for the proposed action were updated in this SPEA to reflect the addition of grant funding under HMA and PA programs. The No Action Alternative (i.e., Alternative 1) remained the same as under the 2011 PEA. Alternative 2 was updated to identify new eligibility criteria under the PA Program for retrofitting or renovating existing or proposed facilities. Type A projects under Alternative 2 were also updated to include references to new DHS CATEXs. Alternative 3 was updated to identify new eligibility criteria under the PA Program for using grant funds to renovate a temporary school facility with a safe room. Alternative 4 and Alternative 5 remained the same as under the 2011 PEA; however, the limit for ground-disturbing activity for new construction was increased from 5 acres to 8 acres. This change reflects FEMA's experience funding numerous safe room projects under the 2011 PEA without resulting in significant effects. The increase in the ground disturbance threshold will allow FEMA to potentially fund larger-sized safe rooms to accommodate

greater numbers of individuals seeking shelter from more frequent and intense extreme wind events as a result of climate change.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES UPDATES

The majority of the affected environment and environmental consequences for each resource area has been incorporated by reference into this SPEA from the 2011 PEA, in accordance with CEQ's NEPA Regulations (40 CFR § 1502.12). The information presented for each resource area in the 2011 PEA was evaluated against updates to laws, regulations, or other guidance specific to each resource area. The impact evaluation for each resource was then compared against those updates to identify any changes in legislative requirements or procedures for considering impacts. The following list summarizes substantive revisions and additions based on changes to the affected environment or environmental consequences.

- The term "regulatory framework" is used in the 2011 PEA to describe both the regulatory framework and affected environment analysis for each evaluated resource area. This SPEA replaces that term with "affected environment" to align with terminology used in 40 CFR § 1502.15.

- The term "impact evaluation" is used in the 2011 PEA to identify potential impacts to evaluated resources. This SPEA replaces that term with "environmental consequences" to align with terminology used in 40 CFR § 1502.16.

- Table 1 of the 2011 PEA established the thresholds for determining if a proposed action was covered under the associated FONSI or if a tiered site-specific analysis is required. **Table 17** revises the thresholds for preparing a tiered NEPA analysis based on this programmatic analysis of safe room actions. The thresholds presented in **Table 17** supersede the thresholds presented in the 2011 PEA.

- **Section 5.1, Land Use** – Updates were provided for the environmental consequences related to the Coastal Zone Management Act (CZMA) under Alternative 3. Construction of the safe room beyond the original footprint would result in ground disturbance, which could have the potential to affect coastal resources when located in a designated coastal zone. Potential impacts on land use have not changed from those presented in the 2011 PEA. The impacts of the proposed action and alternatives on land use range from no effect to minor effects.

- **Section 5.2, Geology, Soils, and Seismicity** – Updates were provided for the affected environment, including updated FEMA guidance on building design from 2019 and the issuance of Executive Order (EO) 13717 from 2016. Potential impacts on geology, soils, and seismicity have not changed from those presented in the 2011 PEA. The impacts of the proposed action and alternatives on geology, soils, and seismicity range from no effect to minor effects.

- **Section 5.3, Water Resources** – No updates were made to this section. Potential impacts on water resources have not changed from those presented in the 2011 PEA. The impacts of the proposed action and alternatives on water resources range from no effect to moderate effects.

- **Section 5.4, Floodplains** – Updates were provided for the affected environment based on implementation of the Federal Flood Risk Management Standard (FFRMS) Final Rule and Policy and update to the EO 11988 class review process. Potential impacts on floodplains have not changed from those presented in the 2011 PEA. The impacts of the proposed action and alternatives on floodplains range from no effect to moderate effects.

- **Section 5.5, Wetlands** – Updates were provided for the affected environment, including updates to Nationwide Permits (NWPs) issued by the U.S. Army Corps of Engineers (USACE) under authority from Section 404 of the Clean Water Act (CWA). Updates were provided for the environmental consequences for Alternatives 3, 4, and 5, noting that tiered NEPA analysis would not be required for projects impacting wetlands if those projects are covered under an NWP or Regional General Permit. The impacts of the proposed action and alternatives on wetlands range from no effect to moderate effects.

- **Section 5.6, Biological Resources** – No updates were made to this section. Potential impacts on biological resources have not changed from those presented in the 2011 PEA. The impacts of the proposed action and alternatives on biological resources range from no effect to moderate effects.

- **Section 5.7, Human Health and Safety –** No updates were made to this section. Potential impacts on human health and safety have not changed from those presented in the 2011 PEA. The impacts of the proposed action and alternatives on human health and safety range from beneficial effects to moderate adverse effects.

- **Section 5.8, Environmental Justice** – Updates were provided for the affected environment, including broader consideration of communities with environmental justice concerns and issuance of EOs 13985, 14008, 14091, and 14096. Updates were also made to the environmental consequences under Alternatives 1, 2, 3, 4, and 5. Potential impacts on communities with environmental justice concerns have been updated since the 2011 PEA and range from no disproportionate adverse effects to potential disproportionate adverse effects.

- **Section 5.9, Historic Properties** – No updates were made to this section. Potential impacts on historic properties have not changed from those presented in the 2011 PEA. The impacts of the proposed action and alternatives on historic properties range from no effect to adverse effects on historic properties.

- **Section 5.10, Air Quality** – Updates were provided for the affected environment, including the revised thresholds established under the National Ambient Air Quality Standards (NAAQS) and the General Conformity Review (GCR). Updates to the air quality analysis for Alternatives 1, 2, 3, 4, and 5. Potential impacts on air quality have been updated since the 2011 PEA and range from no effect to moderate effects.

- **Section 5.11, Climate Change** – This is a new resource section that has been developed for this SPEA and was not discussed in the 2011 PEA. The impacts of the proposed action and alternatives on climate change range from no effect to moderate effects.

- **Section 5.12, Noise** – No updates were made to this section. Potential impacts to noise have not changed from those presented in the 2011 PEA. The impacts of the proposed action and alternatives on noise range from no effect to moderate effects.

- **Section 6, Cumulative Impacts** – Updates were provided for the cumulative impact analysis based on the potential cumulative effects that could result from the construction and operation of safe rooms. Updates include a discussion of environmental justice and climate change impacts as they relate to the cumulative contribution of safe room projects.

- **Section 7, Best Management Practices** – The term "mitigation measures" used in the 2011 PEA was replaced with the term "best management practices"(BMP) to differentiate between existing measures required by law, regulation, or policies that are ongoing and regularly occurring practices, and project-specific mitigation measures that are specifically proposed to avoid, minimize, rectify, reduce, or compensate for project-specific impacts of the proposed action. Additional BMPs have been identified in this SPEA. No project-specific mitigation measures have been identified.

Public Involvement

A Notice of Availability (NOA) for this Draft SPEA was published in the Federal Register to initiate a 30-day public review and comment period. The NOA and Draft SPEA are posted on the FEMA NEPA Repository at: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa/programmatic-environmental-34. Members of the public, agencies, Tribal Nations, or other stakeholders are provided the opportunity to comment on the proposed action, alternatives, and analysis of potential environmental effects as directed in the NOA.

Decision

The supplemental analysis presented in this Draft SPEA results in the same conclusion as was presented in 2011 PEA and Finding of No Significant Impact (FONSI). This Draft SPEA preliminarily makes a finding that the proposed action would not result in any significant impacts to the quality of the human environment. A Draft FONSI has been prepared accordingly.

Following review and consideration of public comments, FEMA will publish the Final SPEA and make one of three decisions regarding the proposed action: (1) determine that the potential environmental impacts associated with the proposed action and alternatives are not significant and sign the FONSI; (2) initiate preparation of a Programmatic Environmental Impact Statement (PEIS) if it is determined that significant impacts would occur through implementation of the proposed action or alternatives; or (3) select the No Action Alternative, whereby the proposed action would not be implemented.

This page intentionally left blank.

Table of Contents

LIST OF TABLES

List of Acronyms

BMP	Best Management Practice
BRIC	Building Resilient Infrastructure and Communities
CAA	Clean Air Act
CATEX	Categorical Exclusion
CAP	Climate Action Plan
CDS	Congressionally Directed Spending
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DHS	Department of Homeland Security
EO	Executive Order
FEMA	Federal Emergency Management Agency
FFRMS	Federal Flood Risk Management Standard
FIP	Federal Implementation Plan
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FONSI	Finding of No Significant Impact
FRA	Fiscal Responsibility Act

GCR	General Conformity Review
GHG	Greenhouse Gas
GWP	Global Warming Potential
HFC	Hydrofluorocarbon
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMGP Post Fire	Hazard Mitigation Grant Program Post Fire
IAC	White House Environmental Justice Interagency Council
ICC	International Code Council
ICSSC	Interagency Committee on Seismic Safety in Construction
MOVES4	Motor Vehicle Emissions Simulator
MT	Metric Tons
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NOFO	Notice of Funding Opportunity
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NRCS	Natural Resources Conservation Service
NSSA	National Storm Shelter Association
NWP	Nationwide Permit

O_3	Ozone
PA	Public Assistance
Pb	Lead
PDM	Pre-Disaster Mitigation
PEA	Programmatic Environmental Assessment
PEIS	Programmatic Environmental Impact Statement
PFC	Perfluorocarbon
PM	Particulate Matter
ppb	parts per billion
ppm	parts per million
REC	Record of Environmental Consideration
RGP	Regional General Permit
SC-GHG	Social Cost of Greenhouse Gases
SFHA	Special Flood Hazard Area
SF_8	Sulfur Hexafluoride
SIP	State Implementation Plan
SPEA	Supplemental Programmatic Environmental Assessment
SO_2	Sulfur Dioxide
T&E	Threatened and Endangered
TIP	Tribal Implementation Plan
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USEPA	Environmental Protection Agency
VOC	Volatile Organic Compound

This page intentionally left blank.

1. Program Background

1.1. Introduction

This Supplemental Programmatic Environmental Assessment (SPEA) facilitates compliance with the National Environmental Policy Act of 1969 (NEPA; 42 U.S. Code [U.S.C.] 4321 et seq.) for the Federal Emergency Management Agency's (FEMA) federal assistance toward construction, retrofit, or renovation of safe rooms (proposed action), which promote public safety during extreme wind events.

In 2011, FEMA published a Final Programmatic Environmental Assessment (PEA) and Finding of No Significant Impact (FONSI) for hazard mitigation safe room construction (hereafter, "2011 PEA") (FEMA, 2011). NEPA implementing regulations published by the Council on Environmental Quality (CEQ) require agencies to prepare a supplement to a PEA when either the "agency makes substantial changes to the proposed action that are relevant to environmental concerns" or there are "significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts" (40 Code of Federal Regulations [CFR] §§ 1502.9(d)(1)(i)-(ii)). This SPEA was developed in response to an expansion of FEMA's grant programs that can be used to fund eligible safe room projects and to capture relevant changes in the regulatory framework and analysis methodology for several resource areas that have evolved in the last 13 years. Additionally, Section 108 of NEPA, as amended in the Fiscal Responsibility Act of 2023 (FRA), requires federal agencies to reevaluate programmatic NEPA documents after five years to ensure their continued validity.

FEMA has developed this SPEA under the authority of NEPA, as amended, and the CEQ NEPA implementing regulations (40 CFR Parts 1500-1508). Based on the kickoff date for this NEPA analysis, which occurred prior to the release of the May 2024 updates, this SPEA was prepared in accordance with the April 2022 updates of the CEQ's NEPA implementing regulations. Throughout this SPEA, the 2011 PEA is incorporated by reference where the original descriptions, analysis, and conclusions remain valid. The 2011 PEA can be referenced at: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa/programmatic-environmental-34.

1.2. Program Background and Relevant Grant Programs

FEMA makes federal assistance available for the construction, retrofit, or renovation of safe rooms through Hazard Mitigation Assistance (HMA) grants and Public Assistance (PA) grants as authorized under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended, 42 U.S.C. 5121 et seq. (Stafford Act).

- FEMA's **HMA grants** provide funds to state, local, tribal, and territorial governments so they can plan for and implement activities that *mitigate future disaster losses* in local communities. FEMA's HMA grant programs include Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA), Hazard Mitigation Grant Program (HMGP), and Hazard

Mitigation Grant Program Post Fire (HMGP Post-Fire), and Pre-Disaster Mitigation (PDM) Congressionally Directed Spending (CDS).

- FEMA's **PA grants** assist communities *responding to and recovering from major disasters or emergencies* declared by the President. The PA Program provides funding for emergency assistance to save lives and protect property, and assists with funding for permanently restoring community infrastructure affected by a federally declared incident.

Specific grant eligibility criteria and requirements for safe room activities are detailed in the most recent versions of the HMA Program and Policy Guide (FEMA, 2023d) and the PA Program and Policy Guide (FEMA, 2020c), respectively. In general, eligible applicants may seek HMA or PA grants for safe room activities under the following authorities:

- Sections 203 and 404 of the Stafford Act authorize FEMA to provide assistance for eligible residential and community safe rooms for tornadoes and hurricanes under the HMGP, HMGP Post-Fire, and BRIC grant programs. The HMGP, HMGP Post-Fire, and BRIC grant programs recognize four types of eligible safe rooms: hurricane residential safe rooms; hurricane community safe rooms; tornado residential safe rooms; and tornado community safe rooms. For hurricane safe rooms, FEMA considers funding only for projects designed for populations that cannot remove themselves from harm's way during an impending hurricane threat. Assistance is not available through these grant programs for general population shelters, including evacuation and recovery shelters. The emergency management measures necessary to afford protection to thousands of occupants of large, public venues, such as stadiums or amphitheaters, are beyond the scope of BRIC, HMGP, and HMGP Post Fire grant programs.

- Section 403 of the Stafford Act (Emergency Work) identifies safe rooms for temporary school facilities as emergency protective measures. PA grant funding for accessible safe rooms, as part of a temporary school facility, may be available if the disaster-damaged school contained a safe room or other space that served as a storm shelter, and there are no other cost-effective, reasonable alternatives available to address the safety needs of the students and faculty.

- Section 406 of the Stafford Act (Permanent Work) grants FEMA the authority to fund the permanent restoration of an eligible applicant's disaster-damaged facilities. The PA program requires that applicants repair or replace structures to, at a minimum, the latest edition of the International Code Council's ICC-500/National Storm Shelter Association Standard for the Design and Construction of Storm Shelters.

2. Use of this Supplemental Programmatic Environmental Assessment

Section 2 of the 2011 PEA is incorporated here by reference, except where regulations and agency policy have changed. This section discusses relevant updates to policy and regulations and presents information on public and agency review specific to this SPEA.

Since publication of the 2011 PEA, the FRA amended NEPA for the first time since 1982, and the CEQ has revised its NEPA implementing regulations at 40 CFR Parts 1500-1508. FEMA has developed this SPEA under the authority of NEPA, as amended, and the CEQ regulations (except where superseded by the 2023 statutory amendments to NEPA).

In addition to NEPA and CEQ regulations, FEMA must comply with Department of Homeland Security (DHS) and internal FEMA policies. Applicable DHS policies include DHS Directive 023-01, Revision 01, *Implementation of the National Environmental Policy Act,* and DHS Instruction 023-01-001-01, Revision 01, *Implementation of the National Environmental Policy Act* (hereafter, "DHS Instruction").[1] Applicable FEMA policies include FEMA Directive 108-1, *Environmental Planning and Historic Preservation Responsibilities and Program Requirements,*[2] and FEMA Instruction 108-1-1, *Implementation of the Environmental Planning and Historic Preservation Responsibilities and Program Requirements* (hereafter, "FEMA Instruction").[3] The DHS Instruction includes a list of actions, referred to as Categorical Exclusions (CATEX), that typically do not individually or cumulatively have significant impacts on the human environment. An action that would normally qualify for a CATEX, however, may have one or more of ten extraordinary circumstances that preclude the application of a CATEX for that action. The complete list of DHS CATEXs is included in Table 1 of the DHS Instruction; within this table, CATEXs in Section A through Section G and Section N may be applied across the entire Department. CATEXs in Section M are for the exclusive use of FEMA. The list of DHS extraordinary circumstances is included in Section V of the DHS Instruction and provided in **Appendix A** of this SPEA.

2.1. Project-Specific Application of this SPEA

In accordance with 40 CFR § 1501.11, an agency may prepare a programmatic environmental document to evaluate the environmental effects of policies, programs, plans, or groups of related activities. Programmatic environmental documents provide the broad analysis for which subsequent actions can be implemented and provide the basis for decision-making and approval of actions that are similar in nature, timing, geography, or scope. Project- or site-specific analysis can be tiered from the broader programmatic analysis, allowing agencies to analyze narrower issues without completing

[1] https://www.fema.gov/sites/default/files/2020-07/fema_dhs_instruction-manual_023-01-001-01.pdf

[2] https://www.fema.gov/sites/default/files/2020-07/fema_ehp_requirements_2018.pdf

[3] https://www.fema.gov/sites/default/files/2020-07/fema_ehp_instructions_implementation_2018.pdf

repetitive analysis. This SPEA analyzes and discloses the potential impacts of most actions related to the construction, retrofit, or renovation of safe rooms on a nationwide scale. However, this SPEA does not address individual, site-specific considerations of a proposed safe room project or its effects. Compliance with all applicable laws, regulations, and Executive Orders (EOs) is required for each potential project and would be evaluated on a project-specific basis by FEMA. If a future project is consistent with the scope and effects described in this SPEA, then FEMA would prepare a Record of Environmental Consideration (REC) for that project. The REC would refer to this SPEA in its analysis, address site-specific conditions, evaluate effects relating to other project elements, list any BMPs, or mitigation measures if required, and document compliance with applicable environmental and historic preservation laws.

If a future project is not consistent with the scope and effects described in this SPEA (i.e., it entails project-specific components not sufficiently analyzed in this SPEA, or the effects of the project would be greater than those disclosed in this SPEA), then additional analysis would be required. FEMA would prepare a tiered NEPA analysis for those specific actions, in accordance with 40 CFR § 1501.11 and requirements in the FEMA Instruction, Chapter 3.6.E. Any tiered NEPA analysis would incorporate by reference the analysis reached in this SPEA, while expanding upon the specific project elements and issues requiring further analysis. **Table 17** of this SPEA presents resource-specific thresholds that would require a safe room project to complete a tiered NEPA analysis.

2.2. Public Involvement

In accordance with CEQ regulations and DHS procedures, the public and other agencies are being provided with an opportunity to review and comment on this Draft SPEA. Agency and public involvement in the NEPA process promotes open communication and enhances the decision-making process. In addition to public involvement, interagency and intergovernmental coordination is a federally mandated process for informing and coordinating with other agencies regarding federal proposed actions. This coordination also fulfills requirements under EO 12372, *Intergovernmental Review of Federal Programs* (amended by EO 12416 and supplemented by EO 13132), which requires federal agencies to coordinate with state and local officials and consider their views in implementing a federal proposal, such as federal financial assistance or direct federal development. Additionally, FEMA's statutory and regulatory responsibilities under NEPA and the National Historic Preservation Act (NHPA) of 1966 Section 106 process are further underscored in EO 13175, *Consultation and Coordination with Indian Tribal Governments*, which requires federal agencies to invite federally recognized Native American tribes to participate in the NEPA and NHPA Section 106 processes as Sovereign Nations.

A Notice of Availability (NOA) for this Draft SPEA was published in the Federal Register to initiate a 30-day public review and comment period. During the public review and comment period, the Draft SPEA will be available to receive comments from the public; federal, state, and local agencies; and federally recognized Tribal Nations. The NOA and Draft SPEA may be accessed on the FEMA NEPA Repository at: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa/programmatic-environmental-34. Any substantive comments received during this period will be reviewed and addressed in the Final SPEA, as appropriate., as appropriate.

The supplemental analysis presented in this Draft SPEA results in the same conclusion as was presented in 2011 PEA and FONSI. This Draft SPEA preliminarily makes a finding that the proposed action would not result in any significant impacts to the quality of the human environment. A Draft FONSI has been prepared accordingly.

Following review and consideration of public comments, FEMA will publish the Final SPEA and make one of three decisions regarding the proposed action: (1) determine that the potential environmental impacts associated with the proposed action and alternatives are not significant and sign the FONSI; (2) initiate preparation of a Programmatic Environmental Impact Statement (PEIS) if it is determined that significant impacts would occur through implementation of the proposed action or alternatives; or (3) select the No Action Alternative, whereby the proposed action would not be implemented.

This page intentionally left blank.

3. Purpose and Need

3.1. Purpose

The *purpose* of the proposed action is to reduce the potential for loss of life or injury resulting from extreme wind events, such as hurricanes and tornadoes through the construction, retrofit, or renovation of safe rooms. Safe rooms provide "near-absolute protection" against both wind forces and the impact of wind-borne debris and meet specific FEMA design criteria. Near-absolute protection means that, based on current knowledge of extreme wind events, the occupants of a safe room will have a very high probability of being protected from injury or death.

FEMA's mission is to help people before, during, and after disasters. Additionally, in the face of climate change, disasters are becoming more intense and more frequent. To better manage these threats, FEMA is committed to enhancing the nation's capability to anticipate, prepare for, and adapt to future climate conditions (FEMA, 2023a). FEMA's grant programs support its mission by promoting cost-effective mitigation measures that reduce or eliminate the risk of loss of life, injury, and property caused by major disasters or emergencies. Specifically, the HMA Program provides grants to plan for future disasters and implement measures to mitigate future losses. The PA Program provides funding for emergency assistance and to restore infrastructure affected by a disaster. The construction, retrofit, or renovation of safe rooms through these programs supports FEMA's mission by ensuring that people have the capability to prepare for and protect themselves during disasters.

3.2. Need

The *need* for adequate evacuation and sheltering facilities like safe rooms is linked to an increase in frequency and intensity of extreme wind events (US Global Change Research Program, 2023). In extreme wind events, such as tornadoes, there may be little or no warning to allow the general population to leave the area of immediate impact, and they must, therefore, seek immediate life-saving protection that can be provided by a safe room. When there is sufficient warning time in advance of extreme wind events, such as hurricanes, the general population can be expected to leave the area of anticipated immediate impact and seek shelter outside of the impacted area. However, first responders, those supporting emergency operations, and those who are physically unable to evacuate will remain in harm's way. Therefore, the need for residential and community hurricane safe rooms remains for populations that cannot remove themselves from harm's way during an impending hurricane threat.

This page intentionally left blank.

4. Alternatives

This section discusses the No Action Alternative and four action alternatives that encompass the full scope of the proposed action related to constructing, retrofitting, and renovating safe rooms. The discussion of each alternative includes both individual and community safe rooms.

Safe rooms are hardened structures specifically designed to meet FEMA's criteria, set out in FEMA P-361, and provide near-absolute protection in extreme wind events, including tornadoes and hurricanes. Safe rooms are intended to provide protection for a minimum of 2 hours in tornado events and 24 hours in hurricane events (FEMA, 2021b). The design criteria for individual and community safe rooms discussed in this document are defined in the following FEMA Publications:

- FEMA P-320: Taking Shelter from the Storm, Fifth Edition. March 2021
- FEMA P-361: Safe Rooms for Tornadoes and Hurricanes, Guidance for Community and Residential Safe Rooms, Fourth Edition. April 2021
- FEMA's Highlights of ICC 500-2020 – The 2020 update of the International Code Council and National Storm Shelter Association (ICC/NSSA) Standard for the Design and Construction of Storm Shelters. August 2021

FEMA P-320 and P-361 have been updated since the publication of the 2011 PEA. References to these publications or safe room design specifications throughout this SPEA refer to the most recent editions of these publications.

Information included in Section 4 of the 2011 PEA regarding general descriptions of safe rooms and their characteristics, as well as how funds may and may not be used for safe room projects, is still applicable, and is incorporated here by reference. Additionally, the PA Program established a source of grant funding for some eligible safe room activities since the publication of the 2011 PEA. In order for costs for safe room projects to be eligible for funding under the PA program, applicants must adhere to the requirements established in the PA Program and Policy Guide, Chapter 6, *Cost Eligibility* (FEMA, 2020c).

4.1. Alternative 1: No Action

The No Action Alternative as described in Section 4.1 of the 2011 PEA is incorporated by reference.

4.2. Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility

4.2.1. TYPE A: EXISTING FACILITIES

The description of Alternative 2, Type A, as provided in Section 4.2 of the 2011 PEA is incorporated here by reference. This incorporated information includes a description of what retrofit and

renovation projects may entail, potential upgrades, and other detail regarding how HMA grant funds may be used to retrofit or renovate structures.

Since the publication of the 2011 PEA, new eligibility criteria have been established to allow for the use of PA grant funds for repairing a damaged, existing safe room. Under this alternative, PA grant funding could also be applied to existing buildings with storm shelters or safe rooms that were damaged in a tornado or hurricane. FEMA requires that these structures be repaired to meet, at a minimum, the most recent design criteria included in Section 113, *Evaluation, Maintenance, and Repairs*, of the ICC-500 (ICC, 2020; FEMA, 2023c). Buildings damaged in a storm that did not already have a safe room are not eligible to add a safe room under this requirement. PA grant funding for repairs to disaster-damaged safe rooms is considered permanent work.

The FEMA CATEXs referenced in the 2011 PEA are no longer applicable. FEMA now relies on CATEXs listed in the DHS Instruction. Retrofits or renovations of existing structures with no or minimal ground disturbance beyond the existing footprint are covered by DHS CATEX N2 and N7.

4.2.2. TYPE B: NEW FACILITIES OR SIGNIFICANT RENOVATION OF EXISTING FACILITIES

The description of Alternative 2, Type B, as provided in Section 4.2 of the 2011 PEA is incorporated here by reference. This incorporated information includes a description of what is considered a new facility or a significant renovation and provides detail on the applicability of HMA grant funds. It also identifies the criteria that distinguish construction of the safe room as its own project, without federalizing a larger construction project of which it is a part.

Since the publication of the 2011 PEA, new eligibility criteria have been established to allow for the use of PA grant funds for constructing new facilities or performing significant renovation of existing facilities. Under this alternative, PA grant funding allows for safe rooms to be added to new construction being completed in order to replace destroyed facilities or for improved projects (FEMA, 2023c). Similar to Type A activities, these structures are required to meet the most recent design criteria in Section 113 of the ICC-500. PA grant funding for new facilities or significant renovation of existing facilities is considered permanent work.

4.3. Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint

The description of Alternative 3 as provided in Section 4.3 of the 2011 PEA is incorporated here by reference. This incorporated information includes a description of constructing a safe room as an annex or addition to an existing building and discusses the potential for ground-disturbing activities since the safe room would extend beyond the original footprint of the building. It also discusses additional features that may be included in community safe rooms and that could contribute to the overall project footprint, and lists potential activities associated with construction of the safe room.

Since the publication of the 2011 PEA, new eligibility criteria have been established to allow for the use of PA grant funds for renovating a temporary school facility with a safe room. Under this alternative, PA grant funding may be used to construct a safe room in temporary school facilities that

are constructed due to damages to the permanent school, if the disaster-damaged school contained a safe room or other storm shelter. To be eligible for this funding, there can be no other cost-effective, reasonable alternatives to address the safety of school students and faculty. The safe room capacity is based on the quantity and needs of the students and faculty and cannot exceed the capacity of the safe room that was part of the damaged school. PA grant funding for these safe rooms is provided at the same time as funding for the temporary school facility, to ensure that the safe room is available on the opening day of the temporary school facility. These safe rooms must comply with the requirements of FEMA P-361. PA grant funding for adding a safe room to a temporary school facility is considered emergency work.

4.4. Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas

Alternative 4 as described in Section 4.4 of the 2011 PEA is incorporated here by reference. However, the threshold of maximum ground disturbance is increased from 5 to 8 acres. This change reflects FEMA's experience funding numerous safe room projects under the 2011 PEA without resulting in significant effects. The increase in the ground disturbance threshold will allow FEMA to potentially fund larger-sized safe rooms to accommodate greater numbers of individuals seeking shelter from more frequent and intense extreme wind events as a result of climate change.

4.5. Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas

Alternative 5 as described in Section 4.5 of the 2011 PEA is incorporated here by reference. However, the threshold of maximum ground disturbance is increased from 5 to 8 acres. This change reflects FEMA's experience funding numerous safe room projects under the 2011 PEA without resulting in significant effects. It also accounts for the potential need for a higher quantity of larger-sized safe rooms to accommodate greater numbers of individuals seeking shelter from more frequent and intense extreme wind events as a result of climate change.

This page intentionally left blank.

5. Affected Environment and Environmental Consequences

Introductory text in Section 5 of the 2011 PEA is incorporated here by reference, which describes the different levels of potential impacts of an action, except for the definition provided for "significant impact." The definition of significance used in the 2011 PEA has been rescinded and is no longer applicable. This SPEA relies on revised CEQ regulations at 40 CFR § 1501.3(b) in determining if the effects of the proposed action are significant.

This SPEA largely incorporates by reference the original descriptions, analysis, and conclusions contained in the 2011 PEA except where modified herein. Section 5 of the 2011 PEA includes the regulatory framework, impact analysis, and a table of thresholds for preparing a site-specific tiered NEPA analysis. This SPEA makes the following edits to terms used in the 2011 PEA for clarity and consistency with the CEQ regulations:

- The term "regulatory framework" has been replaced with the term "affected environment" in this SPEA to capture both the regulatory framework discussion and the affected environment analysis, in accordance with 40 CFR § 1502.15.
- The term "impact evaluation" used as a header throughout Section 5 of the 2011 PEA, has been replaced with the term "environmental consequences" in this SPEA, in accordance with 40 CFR § 1502.16.
- Table 1 of the 2011 PEA established thresholds for determining if a proposed action was covered under the associated FONSI or if a tiered site-specific analysis is required. A revised version of the table (now **Table 17**) is included in **Section 5.13** of this SPEA. The thresholds presented in Table 17 supersede the thresholds presented in the 2011 PEA.

Additionally, in the 2011 PEA, the largest safe room projects included in the alternatives (i.e., under Alternatives 4 and 5) entailed up to 5 acres of ground disturbance. Accordingly, this was the limit of associated impacts analyzed and disclosed in that PEA. As noted in **Sections 4.4** and **4.5**, this SPEA covers safe room projects with up to 8 acres of ground disturbance. Resources evaluated in the 2011 PEA for which impacts were associated with up to 5 acres of ground disturbance are assumed herein to experience the same range of impacts with a modified magnitude of up to 8 acres of ground disturbance. This change applies globally to resources evaluated in this SPEA; it is not reiterated in each resource analysis or **Table 17**.

The following sections identify specifically where the affected environment or environmental consequences for each resource either has been incorporated by reference or revised.

5.1. Land Use

5.1.1. AFFECTED ENVIRONMENT

The affected environment for land use as described in Section 5.1.1 of the 2011 PEA is incorporated here by reference. No updates are required.

5.1.2. ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

The environmental consequences for Alternative 1 as described in Section 5.1.2 of the 2011 PEA are incorporated here by reference.

Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility

The environmental consequences for Alternative 2, including Type A and Type B projects, as described in Section 5.1.2 of the 2011 PEA are incorporated here by reference.

Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint

The environmental consequences for Alternative 3 as described in Section 5.1.2 of the 2011 PEA are incorporated here by reference, except for the discussion related to the Coastal Zone Management Act (CZMA). Construction of the safe room beyond the original footprint would result in ground disturbance, which could have the potential to affect coastal resources when located in a designated coastal zone. For proposed projects beyond the original footprint that occur within a state's designated coastal zone, FEMA will require the grantee or sub-grantee to coordinate with the state Coastal Management Agency to obtain a consistency determination.

Actions that are consistent to the maximum extent practicable with a state's coastal management plan and incorporated enforceable policies would have no, negligible, or minor effects on land use.

Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas

The environmental consequences for Alternative 4 as described in Section 5.1.2 of the 2011 PEA are incorporated here by reference.

Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas

The environmental consequences for Alternative 5 as described in Section 5.1.2 of the 2011 PEA are incorporated here by reference.

5.2. Geology, Soils, and Seismicity

5.2.1. AFFECTED ENVIRONMENT

The affected environment for geology, soils, and seismicity as described in Section 5.2.1 of the 2011 PEA is incorporated here by reference, except for some referenced documents which have been updated in the interim.

The fourth edition of FEMA P-361 and the fifth edition of FEMA P-320 were published in 2021 and supersede the prior versions referenced in the 2011 PEA. As described in Section 4, these documents contain updated information on safe room design specifications and minimization requirements (FEMA, 2021a; FEMA, 2021b). These publications also contain information on multi-hazard threats, such as earthquake and flood hazards. FEMA P-361 includes guidance on the consideration of adopting a multi-hazard approach to safe room design.

The third edition of FEMA P-646, *Guidelines for Design of Structures for Vertical Evacuation from Tsunamis*, was published in 2019 and supersedes the prior version referenced in the 2011 PEA. This document contains updated information on the design and construction of structures in tsunami inundation areas (FEMA, 2019).

EO 12699, *Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction*, issued in 1990, was revoked by EO 13717, *Establishing a Federal Earthquake Risk Management Standard*, issued on February 2, 2016. EO 13717 addresses seismic safety for all new or existing buildings that are owned or leased by federal agencies or financed by federal programs. "Buildings" are defined in the EO as any structure, fully or partially enclosed, used or intended for sheltering persons or property. EO 13717 encourages federal agencies to design buildings that exceed existing earthquake codes and standards to ensure they are resilient to earthquake hazards and damages. At a minimum, agencies should adopt standards developed by the Interagency Committee on Seismic Safety in Construction (ICSSC), which is led by the National Earthquake Hazards Reduction Program (NEHRP) and is therefore responsible for promulgating these standards. These standards are also used as the basis for local building codes in most municipalities. NEHRP periodically publishes new standards; the most recent standards were published in 2020, and consist of two volumes (FEMA, 2020a; 2020b).

5.2.2. ENVIRONMENTAL CONSEQUENCES

The environmental consequences for Alternatives 1, 2, 3, 4, and 5 as described in Section 5.2.2 of the 2011 PEA are incorporated here by reference. No updates are required.

5.3. Water Resources

5.3.1. AFFECTED ENVIRONMENT

The affected environment for water resources as described in Section 5.3.1 of the 2011 PEA is incorporated here by reference. No updates are required.

5.3.2. ENVIRONMENTAL CONSEQUENCES

The environmental consequences for Alternatives 1, 2, 3, 4, and 5 as described in Section 5.3.2 of the 2011 PEA are incorporated here by reference. No updates are required.

5.4. Floodplains

5.4.1. AFFECTED ENVIRONMENT

The following discussions from the affected environment for floodplains, as described in Section 5.4.1 of the 2011 PEA, are incorporated by reference: information on the definition of a floodplain; National Flood Insurance Act and National Flood Insurance Program; EO 11988, *Floodplain Management*; the 8-step decision-making process; and minimizing impacts to the floodplain. Revisions and new information incorporated into this section of the SPEA since the publication of the 2011 PEA include the issuance of the Final Federal Flood Risk Management Standard (FFRMS) Rule[4] and Policy,[5] revision to the EO 11988 class review process for safe rooms, to include Step 5 of the 8-step decision-making process, and incorporation of the latest versions of FEMA P-320 and P-361.

Since the publication of the 2011 PEA, EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, was issued in 2015. This EO created the FFRMS to encourage federal agencies to improve flood resiliency by considering and managing current and future flood risks. It amended EO 11988, *Floodplain Management*, requiring agencies to expand management beyond the current base floodplain. The EO also established a new requirement to consider natural systems, ecosystem processes, and nature-based solutions when developing alternatives. The FFRMS is a resilience standard. For the purposes of compliance with FFRMS, floodplains include both a vertical extent (flood elevation) and a horizontal extent.

On July 11, 2024, FEMA published a Final FFRMS Rule and Policy revising its regulations at 44 CFR Part 9 on *Floodplain Management and Protection of Wetlands*.[6] The revised regulations and FEMA Policy 206-25-005, which fully implement the FFRMS, are effective September 9, 2024. For disaster-related programs (e.g., HMGP), this policy applies to disasters declared on or after September 9, 2024. For non-disaster grant programs, this policy is applicable to Notices of Funding

[4] https://www.federalregister.gov/documents/2024/07/11/2024-15169/updates-to-floodplain-management-and-protection-of-wetlands-regulations-to-implement-the-federal

[5] https://www.fema.gov/sites/default/files/documents/fema_floodplain-management_ffrms-policy_072024.pdf

[6] https://www.fema.gov/floodplain-management/intergovernmental/federal-flood-risk-management-standard

Opportunities (NOFOs) published on or after September 9, 2024.[7] FEMA's FFRMS policy applies to safe room construction projects when a project is considered new construction, repair of substantial damage, or substantial improvement. The policy requires consideration of nature-based solutions among project alternatives and establishes two different sets of minimum flood risk minimization requirements for projects depending on whether they are classified as critical actions or non-critical actions. FEMA-funded actions for safe rooms are generally considered critical actions.

The FFRMS requires determining whether an applicable FEMA-funded action is located in the FFRMS floodplain, considering if there are practicable alternatives, and applying the appropriate critical or non-critical flood risk minimization requirements. See FEMA Policy 206-25-005 for additional requirements on determining the FFRMS floodplain and the corresponding flood elevations for the minimization requirements.

The fourth edition of FEMA P-361 and the fifth edition of FEMA P-320 were published in 2021 and supersede the prior versions referenced in the 2011 PEA. As described in **Section 4**, these documents contain updated information on safe room design specifications and minimization requirements (FEMA, 2021a; FEMA, 2021b). These publications also contain information on the siting and approval of safe rooms in special flood hazard areas (SFHAs).[8] Chapter B4 of FEMA P-361 and Chapter 3.2 of FEMA P-320 provide safe room siting criteria. FEMA would adhere to all design specifications and minimization requirements contained within these guidance documents to minimize impacts to the safe room as well as impacts from floods to the safe room. These measures generally apply to the location of structures, equipment, and building contents in floodplain areas, and include elevating facilities above the base flood elevation or flood-proofing structures. The siting of safe rooms must also comply with minimization standards provided in 44 CFR § 9.11(d) if located in or likely to affect a floodplain.

Since the publication of the 2011 PEA, FEMA has evaluated and funded a substantial number of safe rooms and has engaged in the EO 11988 8-step decision-making process before approving these facilities. FEMA recognizes the risk created by locating safe rooms in the floodplain; however, construction of safe rooms in the floodplain is sometimes unavoidable. As a result, FEMA developed a EO 11988 class review process in the 2011 PEA to aid in the evaluation of safe rooms located in the floodplain and streamline the 8-step decision-making process for projects evaluated under the PEA.

[7] For disasters declared and NOFOs issued before September 9, 2024, FEMA's FFRMS partial implementation requirements may apply. FEMA Policy 104-22-0003 partially implements the FFRMS for projects funded under the PA program, and FEMA Policies 206-21-003, 206-21-003-0001, and 206-21-001 partially implement the program for projects funded under HMA programs.

[8] SFHAs are areas delineated on Flood Insurance Rate Maps (FIRMs) for purposes of administering the National Flood Insurance Program. SFHAs officially represent areas subject to inundation during a 1% annual chance flood based on statistical analysis of historical data. Because 1% annual chance floodplains may change over time, the actual 1% annual-chance floodplain at any given moment may not be identical to the SFHA.

Under the EO 11988 class review, FEMA does not need to complete Step 2, early public notification; Step 4, evaluation of impacts; Step 6, re-evaluation of alternatives; or Step 7, final notification, of the 8-step decision-making process. Those steps have been completed in the 2011 PEA. The 2011 PEA did not require completion of Step 5, minimization; however, Step 5 has been reinstated for this SPEA. For Step 5, safe rooms in the floodplain that have no practicable alternative to being located outside of the floodplain must meet the minimization and siting requirements provided in the FFRMS policy, 44 CFR § 9.11, FEMA P-320, and P-361. These minimization requirements would minimize flood risk to the safe rooms by ensuring they are adequately protected from the floodplain.

In applying the class review for each project, FEMA must complete the following steps: Step 1, determination of whether the safe rooms are in the floodplain; Step 3, identification of practicable alternatives and documentation that no practicable alternative exists to locating the safe room in the floodplain; Step 5, minimization of flood risks (through adherence to FEMA P-320, P-361, and the minimization requirements outlined in the FEMA FFRMS policy and 44 CFR § 9.11); and Step 8, implementation and monitoring, where the safe room would be constructed in accordance with the requirements laid out in the class review.

5.4.2. ENVIRONMENTAL CONSEQUENCES

The environmental consequences for Alternatives 1, 2, 3, 4, and 5 as described in Section 5.4.2 of the 2011 PEA are incorporated here by reference. No updates are required.

FEMA would apply the class review to safe rooms projects, including applying the FFRMS requirements where applicable. FEMA would ensure that safe rooms are only located in the floodplain if there is no practicable alternative outside of the floodplain and would ensure that the applicable minimization standards are applied to minimize flood risk to the safe room as well as impacts to the floodplain.

5.5. Wetlands

5.5.1. AFFECTED ENVIRONMENT

The affected environment for wetlands as described in Section 5.5.1 of the 2011 PEA is incorporated here by reference, except for references to Nationwide Permits (NWPs) issued by the U.S. Army Corps of Engineers (USACE) under authority from Section 404 of the Clean Water Act (CWA), as these NWPs have been updated since that time.

In 2021, USACE reissued all existing 52 NWPs and proposed to issue five new NWPs, for a total of 57 NWPs (USACE, 2021; 2022). There are several NWPs for activities in waters of the U.S. that may cover specific aspects of the development of the proposed activities. Some of the applicable NWPs may include the following:

- NWP 3 (Maintenance) – May apply to activities related to the repair, rehabilitation, or replacement of an existing structure.

- NWP 14 (Linear Transportation Projects) or NWP 57 (Electric Utility Line and Telecommunications Activities) – May apply to the construction of utility lines and access roads for new facilities.
- NWP 18 (Minor Discharges) or NWP 19 (Minor Dredging) – May apply to sites where in-water impacts are expected to be minimal.
- NWP 29 (Residential Developments) – May apply to the construction of residential safe rooms.
- NWP 39 (Commercial and Institutional Developments) – May apply to actions involving the expansion or construction of security facilities.

The NWP program has numerous guidelines and conditions that must be met for an activity to qualify for a permit. USACE Districts may also have Regional General Permits (RGPs) that function similarly to NWPs but are more specific in the actions they cover and are more stringent in conditions and reporting requirements. If none of the NWPs apply to the proposed activity and no applicable RGP exists, an Individual Permit from the USACE may be required.

5.5.2. ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

The environmental consequences for Alternative 1 as described in Section 5.5.2 of the 2011 PEA are incorporated here by reference.

Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility

The environmental consequences for Alternative 2, including Type A and Type B projects, as described in Section 5.5.2 of the 2011 PEA are incorporated here by reference.

Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint

If the proposed safe room is not located in or adjacent to a wetland, there would be no effect. If a proposed safe room project occurs in or adversely affects a wetland, but the action is covered under an NWP or RGP issued by the USACE or a state regulatory authority, impacts would be minor to moderate. The required permit would identify terms and conditions for minimizing or rectifying anticipated impacts. Additionally, FEMA would complete the 8-step decision-making process in accordance with 44 CFR Part 9.

Tiered NEPA analysis would be required to assess project-specific impacts to wetlands if the project cannot be covered under an NWP or RGP (e.g., projects that may require an Individual Permit). FEMA would complete the 8-step decision-making process in accordance with 44 CFR Part 9.

Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas

If the proposed safe room is not located in or adjacent to a wetland, there would be no effect. If a proposed safe room project occurs in or adversely affects a wetland, but the action is covered under

an NWP or RGP issued by the USACE or a state regulatory authority, impacts would be minor to moderate. The required permit would identify terms and conditions for minimizing or rectifying anticipated impacts. Additionally, FEMA would complete the 8-step decision-making process in accordance with 44 CFR Part 9.

Tiered NEPA analysis would be required to assess project-specific impacts to wetlands if the project cannot be covered under an NWP or RGP (e.g., projects that may require an Individual Permit). FEMA would complete the 8-step decision-making process in accordance with 44 CFR Part 9.

Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas

If the proposed safe room is not located in or adjacent to a wetland, there would be no effect. If a proposed safe room project occurs in or adversely affects a wetland, but the action is covered under an NWP or RGP issued by the USACE or a state regulatory authority, impacts would be minor to moderate. The required permit would identify terms and conditions for minimizing or rectifying anticipated impacts. Additionally, FEMA would complete the 8-step decision-making process in accordance with 44 CFR Part 9.

Tiered NEPA analysis would be required to assess project-specific impacts to wetlands if the project cannot be covered under an NWP or RGP (e.g., projects that may require an Individual Permit). FEMA would complete the 8-step decision-making process in accordance with 44 CFR Part 9.

5.6. Biological Resources

5.6.1. AFFECTED ENVIRONMENT

The affected environment for biological resources, including descriptions specific to vegetation, terrestrial wildlife and aquatic resources, and listed species (i.e., threatened and endangered [T&E] species), critical habitat, and special-status species, as described in Section 5.6.1 of the 2011 PEA is incorporated here by reference. No updates are required.

5.6.2. ENVIRONMENTAL CONSEQUENCES

The environmental consequences for Alternatives 1, 2, 3, 4, and 5 as described in Section 5.6.2 of the 2011 are incorporated here by reference. No updates are required.

5.7. Human Health and Safety

5.7.1. AFFECTED ENVIRONMENT

The affected environment for human health and safety as described in Section 5.7.1 of the 2011 PEA is incorporated here by reference. No updates are required.

5.7.2. ENVIRONMENTAL CONSEQUENCES

The environmental consequences for Alternatives 1, 2, 3, 4, and 5 as described in Section 5.7.2 of the 2011 PEA are incorporated here by reference. No updates are required.

5.8. Environmental Justice

5.8.1. AFFECTED ENVIRONMENT

Information on EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* in Section 5.8.1 of the 2011 PEA is incorporated here by reference. New EOs and guidance related to communities with environmental justice concerns have been published in the interim. These updates, which are discussed below, supersede other information provided in Section 5.8.1 of the 2011 PEA.

EO 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All*, was issued in April 2023. It builds off EO 12898 and develops a federal government-wide approach to encourage each agency to make achieving environmental justice part of its mission. It states that each agency shall "identify, analyze, and address disproportionate and adverse human health and environmental effects (including risks) and hazards of Federal activities, including those related to climate change and cumulative impacts of environmental and other burdens on communities with environmental justice concerns." It emphasizes the need to invest in and engage with underserved and overburdened communities and incorporates climate change, health risks, and cumulative impacts into agency considerations. It also provides an updated definition of environmental justice. In EO 14096, environmental justice is defined as:

> The just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation or disability, in agency decision-making and other Federal activities that affect human health and the environment so that people:
>
> (i) are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and
> (ii) have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices.

In 1997, the CEQ published guidance for implementing EO 12898 in *Environmental Justice: Guidance under the National Environmental Policy Act*. In 2016, the U.S. Environmental Protection Agency (EPA) Federal Interagency Working Group on Environmental Justice (now the White House Environmental Justice Interagency Council, or IAC) published additional guidance in *Promising Practices for EJ Methodologies in NEPA Reviews*. These two documents established practical

definitions of environmental justice communities and a framework on how to identify minority and low-income communities and assess potential environmental and human health impacts.

For the purposes of identifying communities with environmental justice concerns, FEMA considers a minority or low-income population to be present if the minority or low-income population equals or exceeds the 50th percentile in comparison to the state (FEMA, 2023b). Based on the U.S. Census, minority populations include persons who identify as American Indian or Alaskan Native; Asian or Pacific Islander; Black or African American, or non-white Hispanic. Low-income populations as those individuals whose household income is less than twice the federal poverty level. Persons with disabilities includes individuals with hearing, vision, cognitive, walking, self-care, or independent living difficulties. FEMA does not currently have a threshold for persons with disabilities.

Recently, other EOs related to equity have also been issued, that require federal agencies to advance equity and address climate change concerns as they relate to communities with environmental justice concerns:

- EO 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government* – Defines "equity;" establishes an agenda to address inequities in implementation of laws, policies, and programs; and requires federal agencies to advance equity and support underserved communities.
- EO 14091, *Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government* – Supplements EO 13985; describes internal agency requirements and identifies external approaches for creating equitable outcomes.
- EO 14008, *Tackling the Climate Crisis at Home and Abroad* – Develops programs to mitigate effects of climate change as they relate to communities with environmental justice concerns; establishes the Justice40 Initiative, a program designed to improve equitable distribution of the benefits of federal programs by directing 40 percent of the benefits of certain federal investments to disadvantaged communities.

In addition to EOs, there are also statutory requirements for addressing communities with environmental justice concerns. The Stafford Act contains a nondiscrimination provision in Section 308 that states "no person should be excluded from receiving federal disaster assistance based on race, color, religion, nationality, sex, age, disability, English proficiency, or economic status." Title VI of the Civil Rights Act of 1964 also prohibits discrimination; information on Title VI contained within Section 5.8.1 of the 2011 PEA is incorporated by reference. FEMA has incorporated these provisions into official agency policy at 44 CFR Part 7, *Nondiscrimination in Federally-Assisted Programs*.

5.8.2. ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action

The No Action Alternative would result in disproportionate and adverse effects on communities with environmental justice concerns. FEMA would not provide grant funding for the construction, retrofit,

or renovation of safe rooms that would protect lives during an extreme wind event (e.g., hurricane or tornado). Communities with environmental justice concerns that live in areas susceptible to extreme wind events may not have sufficient resources to fund the installation of residential or community safe rooms, leaving them vulnerable to these hazards. Additionally, due to the impacts of climate change on extreme wind and other weather events, these communities would increasingly face more frequent and intense storms and would be disproportionately exposed to those hazards.

Alternatives 2, 3, 4, and 5

Safe room construction, retrofit, or renovation that would occur under the proposed action is not expected to result in disproportionate and adverse human health or environmental effects on communities with environmental justice concerns. Safe room construction in communities with environmental justice concerns may result in emissions of criteria pollutants, but these emissions would not be expected to change the attainment status of the area. Any particulate matter emissions would be controlled to the extent practicable and would cease following construction. The installation of diesel generators may also result in emissions but would mostly be limited to use in emergency situations. Further, power provided by emergency generators is often critical for ensuring the safety and well-being of communities with environmental justice concerns following a disaster.

Grant funding provided would enable the installation of residential and community safe rooms, including in communities with environmental justice concerns that might otherwise not have sufficient funds for safe rooms. Due to the life-saving protections afforded by safe rooms in the event of an extreme wind event, all populations would benefit from safe rooms. As climate change leads to more frequent and intense extreme wind events, safe rooms are essential for protecting vulnerable populations and increasing resiliency. Community safe rooms would be accessible to all members of the community and would be designed in accordance with sizing criteria provided in FEMA P-361 to ensure sufficient space and access to accommodate community members who may be disabled (FEMA, 2021b). The implementation of Alternatives 2, 3, 4, or 5 would be beneficial to all members of the community, including communities with environmental justice concerns.

5.9. Historic Properties

5.9.1. AFFECTED ENVIRONMENT

The affected environment for historic properties, including both archaeological sites and other historic properties, as described in Section 5.9.1 of the 2011 PEA is incorporated here by reference. No updates are required.

5.9.2. ENVIRONMENTAL CONSEQUENCES

The environmental consequences for Alternatives 1, 2, 3, 4, and 5 as described in Section 5.9.2 of the 2011 PEA are incorporated here by reference. No updates are required.

5.10. Air Quality

5.10.1. AFFECTED ENVIRONMENT

The affected environment for air quality as described in Section 5.10.1 of the 2011 PEA is incorporated here by reference, except for emission limits established under the National Ambient Air Quality Standards (NAAQS) and updates to the General Conformity Review (GCR) emissions thresholds.

The USEPA has developed the NAAQS in accordance with the Clean Air Act, which set emission standards for six criteria pollutants that can be harmful to public health and the environment. Primary standards provide public health protection and secondary standards provide public welfare protection (USEPA, 2024c). Table 3 in the 2011 PEA identified the NAAQS that were applicable in 2011. These standards are periodically reviewed and revised to offer stronger protections for human health and the environment. A revised version of Table 3 is provided below (now **Table 1**) that provides the revised NAAQS as established in 40 CFR Part 50, *National Primary and Secondary Ambient Air Quality Standards*.

The GCR, established under Section 176(c)(4) of the Clean Air Act (CAA) (42 U.S.C. § 7506(c), introduced in the CAA amendments of 1990) requires federal agencies to work with territory, tribal, and local governments in a NAAQS nonattainment or maintenance area to ensure that federal actions conform to the initiatives established in the applicable State Implementation Plan (SIP), Federal Implementation Plan (FIP), or Tribal Implementation Plan (TIP). Before a federal action is taken, it must be evaluated for conformity with the applicable implementation plan. Conformity is determined by assessing a federal action's annual emissions (for construction and/or operation as appropriate) and comparing them to *de minimis* thresholds. Note that areas in attainment/unclassifiable for a given NAAQS are not required to develop a SIP, FIP, or TIP for those pollutants. Therefore, no *de minimis* thresholds exist for attainment/unclassifiable pollutants. If a federal action's estimated emissions are below *de minimis* thresholds, no further analysis is needed. However, if a federal action's estimated emissions exceed *de minimis* thresholds, further analysis must be conducted to determine whether they would conform with the SIP, FIP, or TIP. *De minimis* thresholds are shown in **Table 2**.

States as well as regional and local authorities have established emission standards and permitting requirements for emission sources in their jurisdictions. Generators and emergency generators as well as construction activity are regulated under these permitting frameworks and facilities must check with these authorities to determine applicability of these requirements.

Table 1: National Ambient Air Quality Standards

Pollutant	*Averaging Time*	*Level*	*Form*
Carbon Monoxide (CO)	8-hour	9 ppm	Not to be exceeded more than once per year
	1-hour	35 ppm	
Lead (Pb)	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide (NO_2)	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, 3-year average
	Annual	53 ppb	Annual mean
Ozone (O_3)	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, 3-year average
Particulate Matter (PM)	$PM_{2.5}$ Annual (primary)	12 µg/m^3	Annual mean, 3-year average
	$PM_{2.5}$ Annual (secondary)	15 µg/m^3	Annual mean, 3-year average
	$PM_{2.5}$ 24-hour	35 µg/m^3	98th percentile, 3-year average
	PM_{10} 24-hour	150 µg/m^3	Not to be exceeded more than once per year, 3-year average
Sulfur Dioxide (SO_2)	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, 3-year average
	3-hour	0.5 ppm	Not to be exceeded more than once per year

Notes: ppb = parts per billion, ppm = parts per million, µg/m^3 = micrograms per cubic meter of air
Source: (USEPA, 2024c)

Table 2: General Conformity *De Minimis* Thresholds

Pollutant	*Nonattainment Thresholds (tons per year)*	*Maintenance Threshold (tons per year)*
CO	100	100
Pb	25	25
NO_2	100	100
O_3 Precursors (VOC or NO_x)[1] Outside an O_3 Transport Area[2]	▪ Serious Nonattainment: 50 ▪ Severe Nonattainment: 25 ▪ Extreme Nonattainment: 10 ▪ Other Nonattainment Areas: 100	100
O_3 Precursors (VOC or NO_x)[1] Inside an O_3 Transport Area[2]	▪ Serious Nonattainment: 50 ▪ Severe Nonattainment: 25 ▪ Extreme Nonattainment: 10 ▪ Other Nonattainment Areas: ○ VOC: 50 ○ NO_x: 100	VOC: 50 NO_x: 100
$PM_{2.5}$ (Direct Emissions, SO_2, NO_x, VOC, Ammonia)	▪ Moderate Nonattainment: 100 ▪ Serious Nonattainment: 70	100
PM_{10}	▪ Moderate Nonattainment: 100 ▪ Serious Nonattainment: 70	100
SO_2	100	100

Source: (USEPA, 2023)
Notes:
1. VOC = Volatile Organic Compounds; NO_x = Oxides of Nitrogen
2. As of March 14, 2022, the Ozone Transport Region consists of the entire States of Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; portions of Maine; and the Consolidated Metropolitan Statistical Area that includes the District of Columbia and portions of northern Virgina (40 CFR § 81.457).

5.10.2. ENVIRONMENTAL CONSEQUENCES

Quantitative criteria pollutant emissions were estimated for Alternatives 2, 3, 4, and 5 based on representative build scenarios developed for each alternative. The build scenarios were modeled using the latest version of the USEPA's Motor Vehicle Emissions Simulator (MOVES4). The project size assumptions, construction equipment and emergency generator usage rates, construction employee travel, construction material delivery rates, and emission rates used to estimate emissions for each scenario are provided in **Appendix B**.

Alternative 1: No Action

No effects on air quality would occur under the no action alternative.

Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility

Type A

Retrofitting or renovation activities would have negligible to minor effects on air quality. Short-term impacts to air quality may occur during facility renovation or retrofitting activities. However, these impacts would be limited due to the limited size of projects falling under this category. No particulate matter emissions would occur from land clearing and grading activities, as the projects are confined to existing building footprints. Construction employee commuting, operation of diesel and gasoline fueled equipment (e.g., forklifts), and material delivery and demolition debris hauling activities would each contribute to overall criteria pollutant emissions. Older structures often contain hazardous materials such as lead-based paint or asbestos, which are considered hazardous air pollutants. Any activities associated with the modification or demolition of facilities must be done in accordance with federal and state laws and regulations regarding the proper handling and disposal of hazardous materials to eliminate dispersion and human health exposure risk. Additional information on potential impacts from lead and asbestos is located in **Section 5.7** of this SPEA, which has been incorporated by reference from Section 5.7 of the 2011 PEA.

If federal funds are used to purchase an emergency generator, negligible criteria pollutant emissions would result from routine generator maintenance and testing operations, as well as emergency use of the generator in times of safe room use. However, the size of any generators installed would be relatively small and, therefore, would produce minor emissions even during emergency use. The operation of generators may be regulated in the particular state or region where the project would take place. A generator may qualify for emergency generator provisions depending on its usage or it may be exempt from permit requirements if its emissions are below the state's established emission threshold.

The maximum expected emissions from construction and operation of a safe room under Alternative 2 are presented in **Table 3**. Both the construction and operation of a safe room under Alternative 2 are expected to produce emissions well below *de minimis* thresholds under any attainment scenario. Therefore, no additional air quality analysis would be required for any Alternative 2 projects.

Table 3: Alternative 2 Maximum Criteria Pollutant Emissions (Tons per Year)

Phase	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_x*	*VOC*
Construction	0.371	0.058	0.143	0.004	0.001	0.023
Operation (Annual)	0.059	0.222	0.007	0.007	0.000	0.061

Source: (USEPA, 2024b)

FEMA will require grantees and sub-grantees to follow the best management practices (BMPs) in Section 7 of this SPEA to reduce impacts to air quality.

Type B

Air quality impacts associated with Type B projects would be similar to the impacts of Type A projects. While the construction of the safe room would be part of a larger action, the larger action would not be federalized. Inclusion of a safe room as part of a larger proposed structure would not amplify the overall impacts of constructing the larger structure.

Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint

Constructing a safe room connected to an existing building and beyond the original footprint would have minor effects on air quality. Short-term impacts to air quality would occur during facility construction activities. Particulate matter emissions from windblown dust would occur from land clearing and grading activities while bare soil is exposed, and from construction traffic on unpaved surfaces. Volatile organic compound (VOC) emissions would result from any asphalt paving activities at a site. Construction employee commuting; operation of diesel and gasoline fueled equipment (e.g., forklifts, cranes, backhoes); material, concrete, and asphalt delivery; and demolition and other debris hauling activities would each contribute to overall criteria pollutant emissions. Demolition of existing structures may occur. Older structures often contain hazardous materials such as lead-based paint or asbestos. Any activities associated with the demolition of facilities must be done in accordance with federal and state laws and regulations regarding the proper handling and disposal of hazardous materials to eliminate dispersion and human health exposure risk. Additional information on potential impacts from lead and asbestos is located in Section 5.7 of this SPEA, which has been incorporated by reference from Section 5.7 of the 2011 PEA.

If federal funds are used to purchase an emergency generator, negligible to minor criteria pollutant emissions would result from routine generator maintenance and testing operations, as well as emergency use of the generator in times of safe room use. However, the size of any generators installed would be modest and, therefore, would produce minor emissions even during emergency use. The operation of generators may be regulated in the particular state or region where the project would take place. A generator may qualify for emergency generator provisions depending on its usage or it may be exempt from permit requirements if its emissions are below the state's established emission threshold.

The maximum expected emissions from construction and operation of a safe room under Alternative 3 are presented in Table 4. Both the construction and operation of a safe room under Alternative 3 are expected to produce emissions well below *de minimis* thresholds under any attainment scenario. Therefore, no additional air quality analysis would be required for any Alternative 3 projects.

Table 4: Alternative 3 Maximum Criteria Pollutant Emissions (Tons per Year)

Phase	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_x*	*VOC*
Construction	10.441	4.928	1.176	0.258	0.034	1.118
Operation (Annual)	0.304	1.144	0.036	0.036	0.001	0.316

Source: (USEPA, 2024b)

FEMA will require grantees and sub-grantees to follow the BMPs in **Section 7** of this SPEA to reduce impacts to air quality.

Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas

Constructing a new stand-alone safe room in a previously disturbed area would have minor to moderate effects on air quality. Short-term impacts to air quality would occur during facility construction activities. Construction of Alternative 4 projects could result in greater criteria pollutant emissions than Alternative 2 or Alternative 3 because Alternative 4 facilities (including the safe room structure and parking) would typically be larger, involve more land disturbance, and require construction equipment to operate for longer durations. Alternative 4 facilities may also require construction of access roads. Particulate matter emissions from windblown dust would occur from land clearing and grading activities while bare soil is exposed, and from construction traffic on unpaved surfaces. VOC emissions would result from any asphalt paving activities at a site. Construction employee commuting; operation of diesel and gasoline fueled equipment (e.g., forklifts, cranes, backhoes); material, concrete, and asphalt delivery; and demolition and other debris hauling activities would each contribute to overall criteria pollutant emissions. Demolition of existing structures may occur. Older structures often contain hazardous materials such as lead-based paint or asbestos. Any activities associated with the demolition of facilities must be done in accordance with federal and state laws and regulations regarding the proper handling and disposal of hazardous materials to eliminate dispersion and human health exposure risk. Additional information on potential impacts from lead and asbestos is located in **Section 5.7** of this SPEA, which has been incorporated by reference from Section 5.7 of the 2011 PEA.

If federal funds are used to purchase an emergency generator, negligible to minor criteria pollutant emissions would result from routine generator maintenance and testing operations, as well as emergency use of the generator in times of safe room use. The typically larger size of these safe rooms compared to those under Alternative 2 and Alternative 3 would require commensurately larger capacity generators that emit more pollutants per hour of use. However, even with substantial continuous use during loss of power, operational emissions would fall below all *de minimis* thresholds. The operation of generators may be regulated in the particular state or region where the project would take place. A generator may qualify for emergency generator provisions depending on its usage or it may be exempt from permit requirements if its emissions are below the state's established emission threshold.

The maximum expected emissions from construction and operation of a safe room under Alternative 4 are presented in **Table 5**. Operation of a safe room constructed under Alternative 4 is expected to produce emissions well below *de minimis* thresholds under any attainment scenario. Construction of a safe room under Alternative 4 would also be expected to produce emissions well below *de minimis* thresholds under most attainment scenarios, in which case no further analysis would be necessary.

However, if an Alternative 4 project would be implemented in an area that is in extreme or severe nonattainment for O_3 (inside or outside of an Ozone Transport Region), a tiered NEPA analysis should be prepared that includes a project-specific, quantitative emissions analysis due to potentially elevated NO_x emissions (a regulated precursor to O_3 formation) during construction. If the supplemental analysis determines that NO_x emissions would not exceed the applicable *de minimis* threshold, no additional analysis is warranted. If NO_x emissions would exceed the applicable *de minimis* threshold, a General Conformity analysis must also be performed.

Table 5: Alternative 4 Maximum Criteria Pollutant Emissions (Tons per Year)

Phase	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_x*	*VOC*
Construction	33.906	32.905	7.612	1.596	0.139	5.287
Operation (Annual)	2.562	9.646	0.301	0.301	0.005	2.667

Source: (USEPA, 2024b)

FEMA will require grantees and sub-grantees to follow the BMPs in **Section 7** of this SPEA to reduce impacts to air quality.

Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas

Constructing a new stand-alone safe room in a previously undisturbed area would have minor to moderate effects on air quality. Short-term impacts to air quality would occur during facility construction activities. Criteria pollutant emissions from construction of Alternative 5 facilities would likely be greater than those resulting from construction of Alternative 4 facilities. Although the safe room facilities may be the same or similar in size, the undisturbed sites would require more vegetation clearing and grading activities. Additionally, because the facilities would be built in undisturbed areas, it is possible that longer access roads would be needed to access the facility, compared to other alternatives. However, Alternative 5 would not require demolition of existing facilities, as the site would be previously undisturbed.

Particulate matter emissions from windblown dust would occur from land clearing and grading activities while bare soil is exposed, and from construction traffic on unpaved surfaces. VOC emissions would result from any asphalt paving activities at a site. Construction employee commuting; operation of diesel and gasoline fueled equipment (e.g., forklifts, cranes, backhoes); material, concrete, and asphalt delivery; and debris hauling activities would each contribute to overall criteria pollutant emissions.

If federal funds are used to purchase an emergency generator, negligible to minor criteria pollutant emissions would result from routine generator maintenance and testing operations, as well as emergency use of the generator in times of safe room use. Facilities constructed under Alternative 5 would typically be the same or similar in size to those constructed under Alternative 4 and would have the same generator capacity requirements, and therefore would have the same typical emission rates. Even with substantial continuous use during loss of power, operational emissions would fall below all *de minimis* thresholds. The operation of generators may be regulated in the particular state or region where the project would take place. A generator may qualify for emergency generator provisions depending on its usage or it may be exempt from permit requirements if its emissions are below the state's established emission threshold.

The maximum expected emissions from construction and operation of a safe room under Alternative 5 are presented in **Table 6**. Operation of a safe room constructed under Alternative 5 is expected to produce emissions well below *de minimis* thresholds under any attainment scenario. Construction of a safe room under Alternative 5 would also be expected to produce emissions well below *de minimis* thresholds under most attainment scenarios, in which case no further analysis would be necessary.

However, if an Alternative 5 project would be implemented in an area that is in extreme or severe nonattainment for O_3 (inside or outside of an Ozone Transport Region), a tiered NEPA analysis should be prepared that includes a project-specific, quantitative emissions analysis due to potentially elevated NO_x emissions (a regulated precursor to O_3 formation) during construction. If the supplemental analysis determines that NO_x emissions would not exceed the applicable *de minimis* threshold, no additional analysis is warranted. If NO_x emissions would exceed the applicable *de minimis* threshold, a General Conformity analysis must also be performed.

Table 6: Alternative 5 Maximum Criteria Pollutant Emissions (Tons per Year)

Phase	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_x*	*VOC*
Construction	41.150	42.332	8.438	2.092	0.166	6.618
Operation (Annual)	2.562	9.646	0.301	0.301	0.005	2.667

Source: (USEPA, 2024b)

FEMA will require grantees and sub-grantees to follow the BMPs in **Section 7** of this SPEA to reduce impacts to air quality.

5.11. Climate Change

5.11.1. AFFECTED ENVIRONMENT

Climate change refers to a general transformation in the average climate conditions of the earth. The heating effect of greenhouse gas (GHGs) emissions in the atmosphere is considered the probable cause of the global warming observed over the last 50 years (74 FR 66496). GHGs occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels.

GHGs consist of water vapor, carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), ozone, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, and GHG concentrations in the atmosphere have increased substantially since 1750 as a result of human activities. Scientists have identified human activity that generates GHG emissions as a significant contributor to climate change.

Global warming and climate change can affect many aspects of the environment and are the result of aggregate GHG emissions globally. The USEPA has signed an endangerment finding regarding GHGs under Section 202(a) of the Clean Air Act (CAA), which finds that the current and projected concentrations of the six key well-mixed GHGs – CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride – in the atmosphere threaten the public health and welfare of current and future generations (74 FR 66496). However, CO_2, CH_4, and N_2O collectively account for approximately 97 percent of global GHG emissions (approximately 85.4 percent is CO_2) and are the primary GHGs emitted by burning fossil fuels in construction equipment, generators, and similar applications.

GHGs are regulated under Section 202 of the CAA. CO_2 is the primary GHG emitted during fossil fuel combustion, while smaller amounts of CH_4 and N_2O are also emitted. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. The CO_2-equivalent (CO_2e) rate is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emissions rate representing all GHGs. This EA considers CO_2e as the representative GHG emission.

EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*, requires an accounting of the full costs of GHG emissions from federal projects, as identified in terms of the "social cost of GHGs" (SC-GHG) for CO_2, CH_4, and N_2O. EO 14008, *Tackling the Climate Crisis at Home and Abroad*, further strengthens EO 13990 by implementing objectives, including requiring federal agencies to develop and implement Climate Action Plans (CAPs), to reduce GHG emissions and bolster resilience to the impacts of climate change. EO 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, transforms how the federal government builds, buys, and manages its assets and operations, by supporting the growth of America's clean energy and clean technology industries and accelerating progress toward achieving a net-zero, carbon pollution-free electricity sector by 2035. Specifically, it sets government-wide sustainability goals, which include 100 percent carbon pollution-free electricity by 2030.

In January 2023, the CEQ published, "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change." This guidance instructs federal agencies to consider in their NEPA reviews: (1) the potential effects of a proposed action on climate change, including by assessing both GHG emissions and reductions from the proposed action; and (2) the effects of climate change on a proposed action and its environmental impacts. It also recommends contextualizing GHG emissions using national and state baselines, and determining the SC-GHG from a proposed action where feasible as a means of comparing the GHG impacts of the alternatives (CEQ, 2023). The SC-GHG is an estimate of the monetized damages associated with incremental

increases in GHG emissions, such as reduced agricultural productivity, human health effects, property damage from increased flood risk, and the value of ecosystem services (Interagency Working Group on Social Cost of Greenhouse Gases, 2021).

Baseline GHG Emissions

Safe rooms could be constructed in any state or U.S. territory. **Table 7** depicts the annual GHG emissions for the nation, California, and the U.S. Virgin Islands based on the USEPA's 2020 National Emissions Inventory. California and the U.S. Virgin Islands are the highest and lowest emitting jurisdictions, respectively; thus, their annual GHG emissions provide the full range of potential baseline emissions against which the safe room projects could be compared.

Table 7: Annual GHG Emissions (MT) – National, State/Territory Upper and Lower Rates

Region	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
United States	2,064,403,624	1,373,134	25,402	2,109,583,123
California	250,738,115	298,140	2,394	259,720,358
U.S. Virgin Islands	429,400	38	5	431,678

Source: (USEPA, 2020)

Current and Forecast Climate Conditions

Climate conditions vary greatly across the nation and defining these conditions is beyond the scope of this SPEA. Similarly, anticipated climate changes vary from one area to another. For example, one area may experience increased frequency and severity of droughts, while another may experience increased frequency and severity of flooding, and others may experience both.

Climate Action Commitments

The DHS Climate Action Plan recognizes the effects of climate change on DHS's mission and aims to implement strategies to address the risks posed by climate change including incorporating climate adaptation planning and processes into DHS mission areas. Specifically, Priority Actions 2 and 3 involve incorporating climate adaptation strategies into critical infrastructure, national preparedness, and community grants and projects (DHS, 2021). Moreover, in FEMA's Strategic Plan 2022-2026, Goal 2 aims to guide federal, state, and local governments, Tribes, and private and non-profit sectors towards climate resilience through initiatives such as enhancing climate literacy within the emergency management sector, fostering national climate resilience, and facilitating risk-informed decision-making (FEMA, 2021d).

The Long-term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050 sets target benchmarks to achieve net-zero GHG emissions across the nation by no later than 2050 through emission-reducing investments such as carbon-free power generation, zero-emission vehicles, energy-efficient buildings, and expansion and protection of forest areas (DOS & EOP,

2021). Additional climate action commitments may also be in effect for more localized (e.g., local, state, or Tribal) jurisdictions in which safe room projects would occur.

5.11.2. ENVIRONMENTAL CONSEQUENCES

GHG emissions estimates were developed for Alternatives 2, 3, 4, and 5 based on the same representative build scenarios for each alternative used for the air quality analyses (see **Section 5.10.2** and **Appendix B**). Emissions are presented in terms of metric tons (MT) of CO_2, CH_4, and CO_2-equivalent (CO_2e).[9]

The U.S. Interagency Working Group on Social Cost of Greenhouse Gases *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990*, provides the SC-GHG per ton of CO_2, CH_4, and N_2O in 2020 US dollars under three different discount rates and in five-year increments (Interagency Working Group on Social Cost of Greenhouse Gases, 2021). The incremental increase in GHG emissions is expected to exact increasing social costs over time. A range of SC-GHG is provided for the construction and operation phases for Alternatives 2, 3, 4, and 5 in the following sections, using each of the three discount rates and for every five years from 2025 through 2050. For example, a safe room project that is constructed in 2030 would have construction-related social costs based on the 2030 SC-GHG values. Then, operation of federally funded emergency generators for that safe room would accrue annual SC-GHG, based on the SC-GHG values in each subsequent year (e.g., 2035, 2040).

Finally, GHG emissions for construction and operation of safe rooms under each alternative are presented in terms of the equivalent number of gasoline-powered passenger vehicles driven per year, and the equivalent number of homes' electricity use for one year. These equivalencies are derived from USEPA's *Greenhouse Gas Equivalencies Calculator* tool (USEPA, 2024a).

Alternative 1: No Action

No GHG emissions or climate impacts would occur under the no action alternative. Similarly, no new actions to achieve DHS or FEMA community climate resilience goals would occur under the no action alternative. Communities would remain vulnerable to extreme wind events since they would not be able to seek shelter in a safe room and may face increasingly more severe impacts as a result of climate change.

[9] The MOVES model does not provide emission rates for N_2O from on-road and nonroad vehicles and equipment. Similarly, USEPA's AP-42 publication for emissions from stationary sources does not provide N_2O emissions from generators. N_2O emissions for each alternative are considered negligible (USEPA, 1996).

Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility

Type A

GHG Emissions

Retrofitting or renovation activities would result in negligible GHG emissions due to the limited size of projects included in this category. Short-term GHG emissions would occur during facility renovation activities. Construction employee commuting, operation of diesel and gasoline fueled equipment (e.g., forklifts), material delivery, and demolition debris hauling activities would each contribute to overall GHG emissions.

If federal funds are used to purchase an emergency generator, negligible GHG emissions would result from routine generator maintenance and testing operations, as well as emergency use of the generator in times of safe room use. However, the size of any generators installed would be relatively small and, therefore, would produce minor GHG emissions even during emergency use.

GHG emissions, in absolute terms and as a percentage of state/territorial baseline emissions, for maximum expected GHG emissions per project implemented under Alternative 2, are presented in **Table 8.** Associated SC-GHG estimates are presented in **Table 9**.

Table 8: Alternative 2 Maximum GHG Emissions (MT) and Comparison to Baselines

Emissions	***CO_2***	***CH_4***	***CO_2e***
Construction	50.85	0.001	50.87
Operation (Annual)	10.34	0.005	10.49
Percent of Baseline GHG Emissions	***CO_2***	***CH_4***	***CO_2e***
Construction – National	0.00000246%	0.00000004%	0.00000241%
Construction – California	0.00002028%	0.00000020%	0.00001958%
Construction – U.S. Virgin Islands	0.01184166%	0.00157950%	0.01178311%
Operation – National	0.00000050%	0.00000040%	0.00000050%
Operation – California	0.00000412%	0.00000184%	0.00000404%
Operation – U.S. Virgin Islands	0.00240822%	0.01424344%	0.00243106%

Sources: (USEPA, 2024b; USEPA, 2020)

Table 9: Alternative 2 Maximum SC-GHG, 2020 U.S. Dollars

Discount Rate	*GHG*	*2025*	*2030*	*2035*	*2040*	*2045*	*2050*
Construction							
5%	CO2	$864	$966	$1,119	$1,271	$1,424	$1,627
	CH4	$0	$1	$1	$1	$1	$1
	Total	**$865**	**$967**	**$1,119**	**$1,272**	**$1,425**	**$1,628**
3%	CO2	$2,847	$3,153	$3,407	$3,712	$4,017	$4,322
	CH4	$1	$1	$1	$2	$2	$2
	Total	**$2,849**	**$3,154**	**$3,408**	**$3,713**	**$4,019**	**$4,324**
2.5%	CO2	$4,220	$4,525	$4,881	$5,237	$5,593	$5,898
	CH4	$1	$2	$2	$2	$2	$2
	Total	**$4,222**	**$4,527**	**$4,883**	**$5,239**	**$5,595**	**$5,901**
Operation							
5%	CO_2	$176	$196	$227	$259	$290	$331
	CH_4	$4	$5	$6	$7	$8	$9
	Total	**$180**	**$202**	**$234**	**$266**	**$298**	**$340**
3%	CO_2	$579	$641	$693	$755	$817	$879
	CH_4	$9	$11	$12	$14	$15	$17
	Total	**$588**	**$652**	**$705**	**$769**	**$832**	**$896**
2.5%	CO_2	$858	$920	$993	$1,065	$1,137	$1,200
	CH_4	$12	$14	$15	$17	$19	$21
	Total	**$870**	**$934**	**$1,008**	**$1,082**	**$1,157**	**$1,220**

Sources: (USEPA, 2024b; Interagency Working Group on Social Cost of Greenhouse Gases, 2021)

The maximum anticipated SC-GHG for construction of a safe room under Alternative 2 is expected to range from $967 (5 percent discount rate) to $1,628 (2.5 percent discount rate) if constructed in 2025, and $4,222 to $5,901, respectively, if constructed in 2050. The maximum anticipated SC-GHG from operation of a safe room constructed under Alternative 2 is expected to range from $180 (5 percent discount rate) to $870 (2.5 percent discount rate) annually if operated in 2025, and $340 to $1,220, respectively, if operated in 2050.

Maximum anticipated CO_2e emissions from construction of a safe room under Alternative 2 would be the equivalent CO_2e emissions from approximately 12.1 gasoline-powered passenger vehicles driven for one year or approximately 6.6 homes' energy use for one year. Maximum anticipated CO_2e emissions from operation of a safe room under Alternative 2 would be the equivalent CO_2e emissions from approximately 2.5 gasoline-powered passenger vehicles driven for one year or approximately 1.4 homes' energy use for one year.

Climate Change Effects

Potential climate impacts to these projects would vary between locations. Safe rooms would be designed to avoid, mitigate, and/or be more resilient to climate effects. Project designs for safe rooms would include a case-by-case assessment of the potential climate change impacts likely to affect the functionality and operation of the proposed facility within its specific setting. This will be accomplished by accessing USEPA's *Climate Change Impacts by State* fact sheets (USEPA, 2017) or the National Oceanic and Atmospheric Administration's *Climate Data Online* search tool (NOAA, 2024).

Additionally, safe rooms by their nature are intended and designed to enhance community resilience against extreme wind events (tornadoes and hurricanes) that have increased, and are expected to continue to increase, in frequency and severity due to climate change, thereby providing beneficial effects to the communities in which are implemented. To the extent practicable and insofar as is compatible with the purpose and need of projects addressed in this SPEA, FEMA will require that grantees and sub-grantees follow the BMPs provided in Section 7 of this SPEA to account for climate change effects.

Consistency with Climate Action Commitments

Constructing safe rooms directly aligns with DHS Climate Action Plan Priority Actions 2 and 3, as well as Goal 2 of the 2022-2026 FEMA Strategic Plan by incorporating climate resiliency and adaptation into facility construction, and national preparedness and community grant activities. These features would likely also align with any applicable climate action commitments enacted by the jurisdiction(s) in which the proposed action would be implemented.

Type B

GHG emissions and climate impacts associated with Type B projects are similar to the impacts of Type A projects. While the construction of the safe room would be part of a larger action, the larger action would not be federalized. Inclusion of a safe room as part of a larger proposed structure would not amplify the overall impacts of constructing the larger structure.

Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint

GHG Emissions

Constructing a safe room connected to an existing building and beyond the original footprint would result in minor GHG emissions. Short-term GHG emissions would occur during facility construction activities. Construction employee commuting; operation of diesel and gasoline fueled equipment (e.g., forklifts, cranes, backhoes); material, concrete, and asphalt delivery; and demolition and other debris hauling activities would each contribute to overall GHG emissions.

If federal funds are used to purchase an emergency generator, minor GHG emissions would result from routine generator maintenance and testing operations, as well as emergency use of the generator in times of safe room use. However, the size of any generators installed would be modest, and therefore, would produce minor GHG emissions even during emergency use.

GHG emissions, in absolute terms and as a percentage of state/territorial baseline emissions, for maximum expected GHG emissions per project implemented under Alternative 3 are presented in **Table 10.** Associated SC-GHG estimates are presented in **Table 11**.

Table 10: Alternative 3 Maximum GHG Emissions (MT) and Comparison to Baselines

Emissions	***CO_2***	***CH_4***	***CO_2e***
Construction	3,194.85	0.032	3,195.76
Operation (Annual)	53.30	0.028	54.09
Percent of Baseline GHG Emissions	***CO_2***	***CH_4***	***CO_2e***
Construction – National	0.00015476%	0.00000236%	0.00015149%
Construction – California	0.00127418%	0.00001085%	0.00123046%
Construction – U.S. Virgin Islands	0.74402639%	0.08408082%	0.74030963%
Operation – National	0.00000258%	0.00000206%	0.00000256%
Operation – California	0.00002126%	0.00000948%	0.00002083%
Operation – U.S. Virgin Islands	0.01241186%	0.07341019%	0.01252960%

Sources: (USEPA, 2024b; USEPA, 2020)

Table 11: Alternative 3 Maximum SC-GHG, 2020 U.S. Dollars

Discount Rate	*GHG*	*2025*	*2030*	*2035*	*2040*	*2045*	*2050*
Construction							
5%	CO_2	$54,312	$60,702	$70,287	$79,871	$89,456	$102,235
	CH_4	$26	$30	$36	$42	$49	$55
	Total	**$54,338**	**$60,733**	**$70,322**	**$79,913**	**$89,504**	**$102,290**
3%	CO_2	$178,912	$198,081	$214,055	$233,224	$252,393	$271,562
	CH_4	$55	$65	$71	$81	$91	$100
	Total	**$178,967**	**$198,145**	**$214,126**	**$233,305**	**$252,484**	**$271,663**
2.5%	CO_2	265,173	$284,342	$306,706	329,070	351,434	370,603
	CH_4	$71	$81	$91	$100	$113	$123
	Total	**265,244**	**$284,423**	**$306,796**	**$329,170**	**$351,547**	**$370,726**
Operation							
5%	CO_2	$906	$1,013	$1,173	$1,332	$1,492	$1,705
	CH_4	$23	$27	$31	$37	$42	$48
	Total	**$929**	**$1,039**	**$1,204**	**$1,369**	**$1,535**	**$1,754**
3%	CO_2	$2,985	$3,304	$3,571	$3,891	$4,210	$4,530
	CH_4	$48	$57	$62	$71	$79	$88
	Total	**$3,033**	**$3,361**	**$3,633**	**$3,961**	**$4,290**	**$4,618**
2.5%	CO_2	$4,424	$4,743	$5,116	$5,490	$5,863	$6,182
	CH_4	$62	$71	$79	$88	$99	$107
	Total	**$4,486**	**$4,814**	**$5,196**	**$5,577**	**$5,961**	**$6,290**

Sources: (USEPA, 2024b; Interagency Working Group on Social Cost of Greenhouse Gases, 2021)

The maximum anticipated SC-GHG for construction of a safe room under Alternative 3 is expected to range from $54,338 (5 percent discount rate) to $265,244 (2.5 percent discount rate) if constructed in 2025, and $271,562 to $370,726, respectively, if constructed in 2050. The maximum anticipated SC-GHG from operation of a safe room constructed under Alternative 3 is expected to range from $929 (5 percent discount rate) to $4,486 (2.5 percent discount rate) annually if operated in 2025, and $1,754 to $6,290, respectively, if operated in 2050.

Maximum anticipated CO_2e emissions from construction of a safe room under Alternative 3 would be the equivalent CO_2e emissions from approximately 761 gasoline-powered passenger vehicles driven for one year or approximately 417 homes' energy use for one year. Maximum anticipated CO_2e emissions from operation of a safe room constructed under Alternative 3 would be the equivalent CO_2e emissions from approximately 12.9 gasoline-powered passenger vehicles driven for one year or approximately 7.1 homes' energy use for one year.

Climate Change Effects

Potential climate impacts on Alternative 3 projects would be the same as on Alternative 2 projects but would vary between locations. Safe rooms would be designed to avoid, mitigate, and/or be more resilient to climate effects, based on a case-by-case assessment of the potential climate change impacts likely to affect the functionality and operation of the proposed facility within its specific setting. This will be accomplished by accessing USEPA's *Climate Change Impacts by State* fact sheets (USEPA, 2017) or the National Oceanic and Atmospheric Administration's *Climate Data Online* search tool (NOAA, 2024).

Additionally, safe rooms by their nature are intended and designed to enhance community resilience against extreme wind events (tornadoes and hurricanes) that have increased, and are expected to continue to increase, in frequency and severity due to climate change, thereby providing beneficial effects to the communities in which they are implemented. To the extent practicable and insofar as is compatible with the purpose and need of projects addressed in this SPEA, FEMA will require that grantees and sub-grantees follow the BMPs provided in **Section 7** of this SPEA to account for climate change effects.

Consistency with Climate Action Commitments

Constructing safe rooms directly aligns with DHS Climate Action Plan Priority Actions 2 and 3, as well as Goal 2 of the 2022-2026 FEMA Strategic Plan by incorporating climate resiliency and adaptation into facility construction, and national preparedness and community grant activities. These features would likely also align with any applicable climate action commitments enacted by the jurisdiction(s) in which the proposed action would be implemented.

Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas

GHG Emissions

Constructing a new stand-alone safe room in a previously disturbed area would produce minor to moderate GHG emissions. Short-term GHG emissions would occur during facility construction activities. Construction of Alternative 4 projects could result in greater GHG emissions than Alternative 2 or Alternative 3 because Alternative 4 facilities (including the safe room structure and parking) would typically be larger, involve more land disturbance, and require construction equipment to operate for longer durations. Alternative 4 facilities may also require construction of access roads. Construction employee commuting; operation of diesel and gasoline fueled equipment

(e.g., forklifts, cranes, backhoes); material, concrete, and asphalt delivery; and demolition and other debris hauling activities would each contribute to overall GHG emissions.

If federal funds are used to purchase an emergency generator, minor GHG emissions would result from routine generator maintenance and testing operations, as well as emergency use of the generator in times of safe room use. The typically larger size of these safe rooms compared to those under Alternative 2 and Alternative 3 would require commensurately larger capacity generators that emit more GHGs per hour of use.

GHG emissions, in absolute terms and as a percentage of state/territorial baseline emissions, for maximum expected GHG emissions per project implemented under Alternative 4 are presented in **Table 12.** Associated SC-GHG estimates are presented in **Table 13**.

The maximum anticipated SC-GHG for construction of a safe room under Alternative 4 is expected to range from $288,349 (5 percent discount rate) to $1,407,535 (2.5 percent discount rate) if constructed in 2025, and $542,806 to $1,967,278, respectively, if constructed in 2050. The maximum anticipated SC-GHG from operation of a safe room constructed under Alternative 4 is expected to range from $7,830 (5 percent discount rate) to $37,822 (2.5 percent discount rate) annually if operated in 2025, and $14,380 to $53,033, respectively, if operated in 2050.

Maximum anticipated CO_2e emissions from construction of a safe room under Alternative 4 would be the equivalent CO_2e emissions from approximately 4,036 gasoline-powered passenger vehicles driven for one year or approximately 2,211 homes' energy use for one year. Maximum anticipated CO_2e emissions from operation of a safe room constructed under Alternative 4 would be the equivalent CO_2e emissions from approximately 109 gasoline-powered passenger vehicles driven for one year or approximately 60 homes' energy use for one year.

Table 12: Alternative 4 Maximum GHG Emissions (MT) and Comparison to Baselines

Emissions	*CO_2*	*CH_4*	*CO_2e*
Construction	16,953.83	0.167	16,958.50
Operation (Annual)	449.38	0.238	456.05
Percent of Baseline GHG Emissions	*CO_2*	*CH_4*	*CO_2e*
Construction – National	0.00082125%	0.00001215%	0.00080388%
Construction – California	0.00676157%	0.00005597%	0.00652952%
Construction – U.S. Virgin Islands	3.94825862%	0.43362789%	3.92850391%
Operation – National	0.00002177%	0.00001735%	0.00002162%
Operation – California	0.00017922%	0.00007990%	0.00017559%
Operation – U.S. Virgin Islands	0.10465265%	0.61897017%	0.10564541%

Sources: (USEPA, 2024b; USEPA, 2020)

Table 13: Alternative 4 Maximum SC-GHG, 2020 U.S. Dollars

Discount Rate	*GHG*	*2025*	*2030*	*2035*	*2040*	*2045*	*2050*
Construction							
5%	CO_2	$288,215	$322,123	$372,984	$423,846	$474,707	$542,523
	CH_4	$134	$157	$184	$217	$250	$284
	Total	**$288,349**	**$322,280**	**$373,168**	**$424,063**	**$474,958**	**$542,806**
3%	CO_2	$949,415	$1,051,137	$1,135,907	$1,237,630	$1,339,353	$1,441,076
	CH_4	$284	$334	$367	$417	$467	$517
	Total	**$949,698**	**$1,051,471**	**$1,136,274**	**$1,238,047**	**$1,339,820**	**$1,441,593**
2.5%	CO_2	$1,407,168	$1,508,891	$1,627,568	$1,746,245	$1,864,921	$1,966,644
	CH_4	$367	$417	$467	$517	$584	$634
	Total	**$1,407,535**	**$1,509,308**	**$1,628,035**	**$1,746,762**	**$1,865,505**	**$1,967,278**
Operation							
5%	CO_2	$7,639	$8,538	$9,886	$11,234	$12,583	$14,380
	CH_4	$191	$224	$262	$310	$357	$405
	Total	**$7,830**	**$8,762**	**$10,148**	**$11,544**	**$12,940**	**$14,785**
3%	CO_2	$25,165	$27,861	$30,108	$32,805	$35,501	$38,197
	CH_4	$405	$476	$524	$596	$667	$738
	Total	**$25,570**	**$28,338**	**$30,632**	**$33,400**	**$36,168**	**$38,936**
2.5%	CO_2	$37,298	$39,995	$43,140	$46,286	$49,432	$52,128
	CH_4	$524	$596	$667	$738	$834	$905
	Total	**$37,822**	**$40,590**	**$43,807**	**$47,024**	**$50,265**	**$53,033**

Sources: (USEPA, 2024b; Interagency Working Group on Social Cost of Greenhouse Gases, 2021)

Climate Change Effects

Potential climate impacts on Alternative 4 projects would be the same as on Alternative 2 projects but would vary between locations. Safe rooms would be designed to avoid, mitigate, and/or be more resilient to climate effects, based on a case-by-case assessment of the potential climate change impacts likely to affect the functionality and operation of the proposed facility within its specific setting. This will be accomplished by accessing USEPA's *Climate Change Impacts by State* fact

sheets (USEPA, 2017) or the National Oceanic and Atmospheric Administration's *Climate Data Online* search tool (NOAA, 2024).

Additionally, safe rooms by their nature are intended and designed to enhance community resilience against extreme wind events (tornadoes and hurricanes) that have increased, and are expected to continue to increase, in frequency and severity due to climate change, thereby providing beneficial effects to the communities in which they are implemented. To the extent practicable and insofar as is compatible with the purpose and need of projects addressed in this SPEA, FEMA will require that grantees and sub-grantees follow the BMPs provided in **Section 7** of this SPEA to account for climate change effects.

Consistency with Climate Action Commitments

Constructing safe rooms directly aligns with DHS Climate Action Plan Priority Actions 2 and 3, as well as Goal 2 of the 2022-2026 FEMA Strategic Plan, by incorporating climate resiliency and adaptation into facility construction, and national preparedness and community grant activities. These features would likely also align with any applicable climate action commitments enacted by the jurisdiction(s) in which the proposed action would be implemented.

Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas

GHG Emissions

Constructing a new stand-alone safe room in a previously undisturbed area would produce minor to moderate GHG emissions. Short-term GHG emissions would occur during facility construction activities. GHG emissions from construction of Alternative 5 facilities are likely to be greater than those resulting from Alternative 4 facilities construction because although the safe room facilities may be the same or similar in size, the undisturbed sites require more vegetation clearing and grading activities. Additionally, because the facilities would be built in undisturbed areas, it is possible that longer access roads would be needed to access the facility, compared to other alternatives. However, Alternative 5 would not require demolition of existing facilities, as the site would be previously undisturbed.

Construction employee commuting; operation of diesel and gasoline fueled equipment (e.g., forklifts, cranes, backhoes); material, concrete, and asphalt delivery; and debris hauling activities would each contribute to overall GHG emissions.

If federal funds are used to purchase an emergency generator, minor GHG emissions would result from routine generator maintenance and testing operations, as well as emergency use of the generator in times of safe room use. Facilities constructed under Alternative 5 would typically be the same or similar in size to those constructed under Alternative 4 and would have the same capacity requirements, and therefore would have the same typical GHG emission rates.

GHG emissions, in absolute terms and as a percentage of state/territorial baseline emissions, for maximum expected GHG emissions per project implemented under Alternative 5 are presented in **Table 14.** Associated SC-GHG estimates are presented in **Table 15**.

The maximum anticipated SC-GHG for construction of a safe room under Alternative 5 is expected to range from $347,107 (5 percent discount rate) to $1,694,328 (2.5 percent discount rate) if constructed in 2025, and $653,420 to $2,368,134, respectively, if constructed in 2050. The maximum anticipated SC-GHG from operation of a safe room constructed under Alternative 5 is expected to range from $7,639 (5 percent discount rate) to $37,822 (2.5 percent discount rate) annually if operated in 2025, and $14,380 to $53,033, respectively, if operated in 2050.

Maximum anticipated CO_2e emissions from construction a safe room under Alternative 5 would be the equivalent CO_2e emissions from approximately 4,859 gasoline-powered passenger vehicles driven for one year or approximately 2,662 homes' energy use for one year. Maximum anticipated CO_2e emissions from operations would be the equivalent CO_2e emissions from approximately 109 gasoline-powered passenger vehicles driven for one year or approximately 60 homes' energy use for one year.

Table 14: Alternative 5 Maximum GHG Emissions (MT) and Comparison to Baselines

Emissions	*CO_2*	*CH_4*	*CO_2e*
Construction	20,407.83	0.217	20,413.91
Operation (Annual)	449.38	0.238	456.05
Percent of Baseline GHG Emissions	*CO_2*	*CH_4*	*CO_2e*
Construction – National	0.00098856%	0.00001583%	0.00096768%
Construction – California	0.00813910%	0.00007292%	0.00785996%
Construction – U.S. Virgin Islands	4.75263583%	0.56489244%	4.72896363%
Operation – National	0.00002177%	0.00001735%	0.00002162%
Operation – California	0.00017922%	0.00007990%	0.00017559%
Operation – U.S. Virgin Islands	0.10465265%	0.61897017%	0.10564541%

Sources: (USEPA, 2024b; USEPA, 2020)

Table 15: Alternative 5 Maximum SC-GHG, 2020 U.S. Dollars

Discount Rate	*GHG*	*2025*	*2030*	*2035*	*2040*	*2045*	*2050*
Construction							
5%	CO_2	$346,933	$387,749	$448,972	$510,196	$571,419	$653,050
	CH_4	$174	$204	$239	$283	$326	$370
	Total	**$347,107**	**$387,953**	**$449,211**	**$510,478**	**$571,745**	**$653,420**
3%	CO_2	$1,142,838	$1,265,285	$1,367,324	$1,489,771	$1,612,218	$1,734,665
	CH_4	$370	$435	$478	$543	$609	$674
	Total	**$1,143,208**	**$1,265,720**	**$1,367,803**	**$1,490,315**	**$1,612,827**	**$1,735,339**
2.5%	CO_2	$1,693,850	$1,816,297	$1,959,151	$2,102,006	$2,244,861	$2,367,308
	CH_4	$478	$543	$609	$674	$761	$826
	Total	**$1,694,328**	**$1,816,840**	**$1,959,760**	**$2,102,680**	**$2,245,622**	**$2,368,134**
Operation							
5%	CO_2	$7,639	$8,538	$9,886	$11,234	$12,583	$14,380
	CH_4	$191	$224	$262	$310	$357	$405
	Total	**$7,830**	**$8,762**	**$10,148**	**$11,544**	**$12,940**	**$14,785**
3%	CO_2	$25,165	$27,861	$30,108	$32,805	$35,501	$38,197
	CH_4	$405	$476	$524	$596	$667	$738
	Total	**$25,570**	**$28,338**	**$30,632**	**$33,400**	**$36,168**	**$38,936**
2.5%	CO_2	$37,298	$39,995	$43,140	$46,286	$49,432	$52,128
	CH_4	$524	$596	$667	$738	$834	$905
	Total	**$37,822**	**$40,590**	**$43,807**	**$47,024**	**$50,265**	**$53,033**

Sources: (USEPA, 2024b; Interagency Working Group on Social Cost of Greenhouse Gases, 2021)

Climate Change Effects

Potential climate impacts on Alternative 5 projects would be the same as on Alternative 2 projects but would vary between locations. Safe rooms would be designed to avoid, mitigate, and/or be more resilient to climate effects, based on a case-by-case assessment of the potential climate change impacts likely to affect the functionality and operation of the proposed facility within its specific setting. This will be accomplished by accessing USEPA's *Climate Change Impacts by State* fact

sheets (USEPA, 2017) or the National Oceanic and Atmospheric Administration's *Climate Data Online* search tool (NOAA, 2024).

Additionally, safe rooms by their nature are intended and designed to enhance community resilience against extreme wind events (tornadoes and hurricanes) that have increased, and are expected to continue to increase, in frequency and severity due to climate change, thereby providing beneficial effects to the communities in which they are implemented. To the extent practicable and insofar as is compatible with the purpose and need of projects addressed in this SPEA, FEMA will require that grantees and sub-grantees follow the BMPs provided in **Section 7** of this SPEA to account for climate change effects.

Consistency with Climate Action Commitments

Constructing safe rooms directly aligns with DHS Climate Action Plan Priority Actions 2 and 3, as well as Goal 2 of the 2022-2026 FEMA Strategic Plan, by incorporating climate resiliency and adaptation into facility construction, and national preparedness and community grant activities. These features would likely also align with any applicable climate action commitments enacted by the jurisdiction(s) in which the proposed action would be implemented.

5.12. Noise

5.12.1. AFFECTED ENVIRONMENT

The affected environment for noise as described in Section 5.11.1 of the 2011 PEA is incorporated here by reference. No updates are required.

5.12.2. ENVIRONMENTAL CONSEQUENCES

The environmental consequences for Alternatives 1, 2, 3, 4, and 5 as described in Section 5.11.2 of the 2011 PEA are incorporated here by reference. No updates are required.

5.13. Summary of Impacts and Thresholds for Tiered Analysis

Table 6 in the 2011 PEA provided a summary of anticipated impacts to each resource area discussed in Section 5 under each of the five alternatives. A revised version of the summary of impacts (formerly Table 6) is provided below **Table 16**, and includes updates to the anticipated impacts to each resource area, based on updates to the environmental consequences contained within this SPEA. For resources where the environmental consequences have not changed, the impact determinations are incorporated by reference from the 2011 PEA and are copied into **Table 16** of this SPEA.

Table 1 of the 2011 PEA established the criteria for determining if a proposed action was covered under the associated FONSI. **Table 17** updates the thresholds for preparing additional analysis tiered from this SPEA for specific safe room projects. These thresholds are based on the anticipated impacts to each resource area under each of the alternatives. Expected impacts that exceed the

scope of the alternatives described in **Section 5** would require supplemental analysis. In particular, and as noted in **Sections 4.4**, **4.5**, and **5**, safe room projects that entail greater than 8 acres of ground disturbance are outside the scope of the analyzed alternatives in this SPEA and would require a project-specific tiered NEPA analysis.

Table 16: Summary of Impacts

Area of Evaluation	*Alternative 1: No Action*	*Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility*	*Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint*	*Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas*	*Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas*
Land Use	No effect.	No effect.	No, negligible, or minor effects on land use. Grantee/sub-grantee must consult with a state's coastal management program if the action is located within a state-designated coastal zone.	No or negligible effect. If action will convert prime or unique farmland, FEMA will conduct the required assessment and consult with NRCS when necessary. Grantee/sub-grantee must consult with a state's coastal management program if the action is located within a state-designated coastal zone.	No, negligible, minor, or moderate effects on land use when less than eight acres is disturbed. Grantee/sub-grantee must consult with a state's coastal management program if the action is located within a state-designated coastal zone.

Area of Evaluation	*Alternative 1: No Action*	*Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility*	*Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint*	*Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas*	*Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas*
Geology, Soils, and Seismicity	No effect.	No or negligible effects on soils. Activities in areas characterized by susceptibility to seismic, volcanic activity, tsunamis, landslides, mudslides, structural instability, excessive erodibility, or steep slopes may be moderately affected.	Negligible to minor effects on soils. Activities in areas characterized by susceptibility to seismic, volcanic activity, tsunamis, landslides, mudslides, structural instability, excessive erodibility, or steep slopes may be moderately affected.	Negligible to minor effects on soils. Activities in areas characterized by susceptibility to seismic, volcanic activity, tsunamis, landslides, mudslides, structural instability, excessive erodibility, or steep slopes may be moderately affected.	Minor to moderate effects on soils when less than 8 acres is disturbed. Activities in areas characterized by susceptibility to seismic, volcanic activity, tsunamis, landslides, mudslides, structural instability, excessive erodibility, or steep slopes may be moderately affected.
Water Resources	No effect.	No effect.	Negligible to minor temporary effects based on ground-disturbing activities.	Negligible to moderate temporary effects based on ground disturbing activities.	Moderate temporary effects based on ground disturbing activities.

Area of Evaluation	*Alternative 1: No Action*	*Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility*	*Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint*	*Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas*	*Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas*
Floodplains	No effect.	Activities not located in floodplain would have no effect on and would not be affected by the floodplain. Impacts of safe rooms in the floodplain would be determined through the 8-step decision-making process and are expected to be minor to moderate. Construction may trigger FFRMS Policy requirements.	Activities not located in floodplain would have no effect on and would not be affected by the floodplain. Impacts of safe rooms in the floodplain would be determined through the 8-step decision-making process and are expected to be minor to moderate. Construction may trigger FFRMS Policy requirements.	Activities not located in floodplain would have no effect on and would not be affected by the floodplain. Impacts of safe rooms in the floodplain would be determined through the 8-step decision-making process and are expected to be minor to moderate. Construction would trigger FFRMS Policy requirements.	Activities not located in floodplain would have no effect on and would not be affected by the floodplain. Impacts of safe rooms in the floodplain would be determined through the 8-step decision-making process and are expected to be minor to moderate. Construction would trigger FFRMS Policy requirements.

Area of Evaluation	*Alternative 1: No Action*	*Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility*	*Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint*	*Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas*	*Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas*
Wetlands	No effect.	No effect.	If proposed action is not located in or adjacent to wetland, there will be no effect. Impacts of safe rooms located in or adversely affecting wetlands would be determined through the 8-step decision-making process but would not be significant if the project is covered by an NWP or RGP.	If proposed action is not located in or adjacent to wetland, there will be no effect. Impacts of safe rooms located in or adversely affecting wetlands would be determined through the 8-step decision-making process but would not be significant if the project is covered by an NWP or RGP.	If proposed action is not located in or adjacent to wetland, there will be no effect. Impacts of safe rooms located in or adversely affecting wetlands would be determined through the 8-step decision-making process but would not be significant if the project is covered by an NWP or RGP.

Area of Evaluation	*Alternative 1: No Action*	*Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility*	*Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint*	*Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas*	*Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas*
Biological Resources	No effect.	No effect.	No to moderate effects on vegetation, fish and wildlife depending on whether these resources are present. If FEMA can issue "No Effect" or "May Affect, Not Likely to Adversely Affect" determination, with USFWS concurrence then action is expected to have no effect to moderate effects on listed species and critical habitat.	No to moderate effects on vegetation, fish and wildlife depending on whether these resources are present. If FEMA can issue "No Effect" or "May Affect, Not Likely to Adversely Affect" determination, with USFWS concurrence then action is expected to have no effect to moderate effects on listed species and critical habitat.	Minor to moderate effects on vegetation, fish and wildlife depending on whether these resources are present. If FEMA can issue "No Effect" or "May Affect, Not Likely to Adversely Affect" determination, with USFWS concurrence then action is expected to have no effect to moderate effects on listed species and critical habitat.

Area of Evaluation	*Alternative 1: No Action*	*Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility*	*Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint*	*Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas*	*Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas*
Human Health and Safety	Moderate effect to human health and safety. Public exposed to risk of extreme wind events.	Long-term beneficial impact by reducing risk of extreme wind events. Construction activities could present moderate safety risks to those performing the activities. Moderate effects could also result from exposure to asbestos and lead based paint.	Long-term beneficial impact by reducing risk of extreme wind events. Construction activities could present moderate safety risks to those performing the activities. Moderate effects could also result from exposure to asbestos and lead based paint.	Long-term beneficial impact by reducing risk of extreme wind events. Construction activities could present moderate safety risks to those performing the activities. Potential for moderate impacts from hazardous materials exposure, depending on site specifics.	Long-term beneficial impact by reducing risk of extreme wind events. Construction activities could present moderate safety risks to those performing the activities. Potential for moderate impacts from hazardous materials exposure, depending on site specifics.
Environmental Justice	May have disproportionate and adverse effects on communities with environmental justice concerns. Populations may be disproportionately exposed to extreme wind events and hazards.	No disproportionate and adverse effects on communities with environmental justice concerns. All populations would benefit from the protections provided by the safe room.	No disproportionate and adverse effects on communities with environmental justice concerns. All populations would benefit from the protections provided by the safe room.	No disproportionate and adverse effects on communities with environmental justice concerns. All populations would benefit from the protections provided by the safe room.	No disproportionate and adverse effects communities with environmental justice concerns. All populations would benefit from the protections provided by the safe room.

Area of Evaluation	*Alternative 1: No Action*	*Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility*	*Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint*	*Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas*	*Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas*
Historic Properties	No effect.	Depending on specific site, may have no effect, no adverse effect, or adverse effect to archeological sites or other historic properties.	Depending on specific site, may have no effect, no adverse effect, or adverse effect to archeological sites or other historic properties.	Depending on specific site, may have no effect, no adverse effect, or adverse effect to archeological sites or other historic properties.	Depending on specific site, may have no effect, no adverse effect, or adverse effect to archeological sites or other historic properties.
Air Quality	No effect.	Negligible to minor effects on air quality during retrofit and renovation. Negligible to minor criteria pollutant emissions from emergency generators.	Minor effects on air quality during construction. Negligible to minor criteria pollutant emissions from emergency generators.	Minor to moderate effects on air quality during construction. Negligible to minor criteria pollutant emissions from emergency generators. Impacts from safe room construction in an extreme or severe nonattainment area for O_3 would be determined through quantitative emissions analysis for NO_x emissions.	Minor to moderate effects on air quality during construction. Negligible to minor criteria pollutant emissions from emergency generators. Impacts from safe room construction in an extreme or severe nonattainment area for O_3 would be determined through quantitative emissions analysis for NO_x emissions.

Area of Evaluation	*Alternative 1: No Action*	*Alternative 2: Retrofit or Renovation of an Existing or Proposed Facility*	*Alternative 3: Safe Room Connected to an Existing Building and Beyond Original Footprint*	*Alternative 4: New Stand-Alone Construction in Previously Disturbed Areas*	*Alternative 5: New Stand-Alone Construction in Previously Undisturbed Areas*
Climate Change	No effect.	Negligible GHG emissions during retrofit and renovation. Negligible GHG emissions from emergency generators. Beneficial effects from enhancing community resiliency to extreme wind events that are expected to worsen as a result of climate change.	Minor GHG emissions during construction. Minor GHG emissions from emergency generators. Beneficial effects from enhancing community resiliency to extreme wind events that are expected to worsen as a result of climate change.	Minor to moderate GHG emissions during construction. Minor GHG emissions from emergency generators. Beneficial effects from enhancing community resiliency to extreme wind events that are expected to worsen as a result of climate change.	Minor to moderate GHG emissions during construction. Minor GHG emissions from emergency generators. Beneficial effects from enhancing community resiliency to extreme wind events that are expected to worsen as a result of climate change.
Noise	No effect.	Negligible to minor effects during construction.	Minor to moderate effects during construction.	Minor to moderate effects during construction.	Minor to moderate effects during construction.

Table 17: Thresholds for Preparing Tiered Site-Specific NEPA Analyses for Safe Rooms

Area of Evaluation	*Action Covered by this SPEA*	*Tiered Site-Specific NEPA Analysis Required*
Land Use	The proposed action would have no, negligible, or minor impacts to land use and would be consistent with surrounding or planned land uses, or if inconsistent can be rendered consistent through a construction permit and/or zoning variance issued by the local land use agency. AND The proposed action in a coastal zone would be consistent with respective state Coastal Zone Management plans and receives a consistency determination, where applicable. AND Project will not be in a Coastal Barrier Resources System unit. AND The project would be consistent with the FPPA.	The proposed action would impact more than 8 acres of land. OR The proposed action would not be consistent with surrounding land uses and would lead to a change in the surrounding land uses in the short- and long-term. OR The Proposed action is within a Coastal Barrier Resources System unit and would require consultation with USFWS based on the exceptions outlined in the Coastal Barrier Resources Act and associated regulations. OR The proposed action would convert prime and unique farmland to non-agricultural use and could not be mitigated through consultation with the NRCS.
Geology, Soils, and Seismicity	The proposed action would have no, negligible, or minor impacts to geology, soils, and seismicity. Projects proposed in areas characterized by susceptibility to seismic, volcanic, tsunamis, landslide or mudslide activity, structural instability, excessive erodibility, or steep slopes would be implemented in accordance with FEMA P-361, FEMA P-646, local building codes, regulatory permit conditions, and appropriate ICC seismic design and construction standards.	The proposed action would disturb more than 8 acres of soil. OR The proposed action would result in effects to geological or soil resources that exceed short-term effects and cannot be mitigated to a minor or moderate impact through regulatory permit conditions and/or resource agency consultation.

Area of Evaluation	*Action Covered by this SPEA*	*Tiered Site-Specific NEPA Analysis Required*
Water Resources	The proposed action would have no, negligible, minor, or moderate impacts to water quality based on ground disturbance that are mitigated by regulatory permit conditions and resource agency consultation. OR The proposed action is in compliance with all applicable permit conditions, notifications, and reporting requirements for a National Pollutant Discharge Elimination System permit and Nationwide or Regional General Permits issued under Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act, and any other applicable state-issued permits. AND Project does not adversely affect a wild or scenic river or sole source aquifer.	The proposed action would require a CWA Section 404 Individual Permit from the USACE and/or Individual Water Quality Certification from the state. OR The proposed action results in an adverse impact to a wild or scenic river or sole source aquifer that could not be mitigated through agency consultation.
Floodplains	Residential or community safe room is located outside of the floodplain (which may be the 1%, 0.2%, or FFRMS floodplain depending on the action and applicable policy requirements). OR Residential or community safe room is located in a floodplain and the 8-step process has been completed by application of the class review found in this PEA or in a project-specific 8-step. Minimization requirements can be applied to minimize flood risk to the safe room.	Not applicable. If the 8-step process is unable to satisfactorily resolve a proposed action in accordance with 44 CFR Part 9, the project would likely be non-compliant and ineligible for FEMA funding.

Area of Evaluation	*Action Covered by this SPEA*	*Tiered Site-Specific NEPA Analysis Required*
Wetlands	The proposed action is not located in wetlands. OR If located in or impacting wetlands, FEMA completes the 8-step decision-making process in accordance with 44 CFR Part 9. OR The proposed action may adversely affect jurisdictional wetlands under the CWA but would be covered under an NWP or RGP issued by the USACE or a delegated state regulatory authority.	The proposed action is located in or would adversely affect jurisdictional wetlands under the CWA and is not covered under an NWP or RGP issued by the USACE. AND The proposed action would require a CWA Section 404 Individual Permit from the USACE and/or Individual Permit from the state.

Area of Evaluation	*Action Covered by this SPEA*	*Tiered Site-Specific NEPA Analysis Required*
Biological Resources	The proposed action would have no effect on threatened or endangered species or critical habitat for those species. OR The proposed action results in effects to listed species or critical habitat that are mitigated through informal consultation with UFWS or NMFS. FEMA can make a "May Affect, Not Likely to Adversely Affect" determination with concurrence from USFWS or NMFS. AND If applicable, the proposed action includes any USFWS mitigation measures reduce the level of effects to species and habitats protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act and avoid the "take" of these species. AND The proposed action follows applicable implementing regulations, EO 13751, and best management practices to discourage the spread of invasive species.	The proposed action results in effects to listed species that requires formal USFWS or NMFS consultation and results in a "May Affect, Likely to Adversely Affect" determination, and formal consultation with USFWS or NMFS is required. OR The proposed action results in the loss or adverse modification of designated critical habitat for listed species. OR The proposed action is determined to likely result in the "take" of protected species under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. OR The proposed action would not comply with applicable permit conditions regarding the spread of invasive species.
Human Health and Safety	The proposed action does not result in regulatory violations related to the handling, storage, use or disposal of hazardous materials, or in unsafe site conditions for workers or the public. Hazardous or toxic materials and/or wastes, including asbestos and lead-based paint, and exposure to such materials, resulting from the proposed action would be safely and adequately managed in accordance with all applicable regulations and policies. AND The proposed action site is free from contamination and safety hazards that would elevate risk to human health.	The proposed action would result in a net increase in the amount of hazardous or toxic materials and/or wastes to be handled, stored, used, or disposed of, leading to probable hazardous materials regulatory violation(s) or an exceedance of available waste disposal capacity. OR The proposed action site includes unmitigated contamination that would elevate risk to human health to unacceptable levels or result in unsafe site conditions.

Area of Evaluation	*Action Covered by this SPEA*	*Tiered Site-Specific NEPA Analysis Required*
Environmental Justice	The proposed action will not result in disproportionate and adverse environmental or human health effects to communities with environmental justice concerns.	The proposed action would result in disproportionate and adverse environmental and human health effects on communities with environmental justice concerns.
Historic Properties	The proposed action results in FEMA making a determination of "No Potential to Affect Historic Properties," or with concurrence from SHPO/THPO, "No Historic Properties Affected" or "No Adverse Effect" to historic properties. OR The proposed action meets Programmatic Allowance(s) in accordance with an executed statewide or Tribal-specific Programmatic Agreement.	The proposed action results in FEMA makings an "Adverse Effect" determination with concurrence from SHPO/THPO requiring resolution through avoidance, minimization, and/or mitigation measures.
Air Quality	For nonattainment or maintenance areas, the proposed action results in emissions for NAAQS that would be less than *de minimis* thresholds as defined in **Table 3**. OR For attainment areas, the proposed action results in emissions that would not cause air quality in that area to go out of attainment for any NAAQS.	For nonattainment or maintenance aeras, the proposed action results in emissions for NAAQS that would exceed *de minimis* thresholds as defined in **Table 3**. OR For attainment areas, the proposed action results in emissions that would cause air quality in an area, or adjacent area, to be out of attainment for any NAAQS.
Climate Change	The proposed action results in GHG emissions that are consistent with the representative build scenarios presented in this SPEA.	The proposed action results in GHG emissions that exceed the representative build scenarios presented in this SPEA. OR The proposed action includes construction of a new safe room located at a site facing known and unmitigated climate change threats or vulnerabilities so severe that climate impacts are likely to affect the functionality and operation of the proposed facility.

Area of Evaluation	*Action Covered by this SPEA*	*Tiered Site-Specific NEPA Analysis Required*
Noise	Noise levels resulting from the proposed action would not exceed typical noise levels expected from construction equipment or generators. Noise generated by construction and operation of the facility would be temporary or short-term in nature.	Noise levels would exceed typical noise levels expected from construction equipment and generators on a permanent basis or for a prolonged period of time, resulting in an unmitigated and long-term violation of a noise ordinance.

This page intentionally left blank.

6. Cumulative Impacts

The definition of "cumulative impacts" provided in Section 6 of the 2011 PEA has since been revised and is no longer applicable. CEQ regulations provide an updated definition of cumulative effects: "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.1(g)(4)).

6.1. Alternative 1: No Action

The cumulative effects analysis for Alternative 1 as described in Section 6.1 of the 2011 PEA is incorporated here by reference.

6.2. Alternatives 2, 3, 4, and 5

FEMA's experience is that safe room projects would have minimal adverse cumulative impacts given the relatively small amount of land that would be physically affected by the proposed projects. These facilities are constructed in localized areas near the population at risk, and the construction impacts are typically short-term and temporary. However, site and project-specific information will be needed for all projects to appropriately take into consideration the potential for cumulative impacts on the various resource areas discussed in this SPEA.

FEMA will take cumulative impacts into account when evaluating whether the particular action fits within this SPEA. FEMA will prepare a REC for each individual or group of actions and will take into account the unique project and site conditions. In doing this evaluation, FEMA will take a hard look at cumulative impacts when the safe room project is likely to produce moderate effects (as defined in **Section 5** and summarized in **Table 16**) on a particular resource or area of concern. In some circumstances, this evaluation may indicate the need for the preparation of a tiered NEPA analysis even when the tiered analysis is not triggered by the thresholds established in **Table 17**. An example of this situation could be the development of a program by a grantee to site safe rooms in particular geographic areas (i.e., in close proximity to one another).

FEMA will also take a hard look at cumulative impacts whenever a tiered NEPA analysis is triggered under this SPEA in accordance with the thresholds established in **Table 17**.

Once FEMA determines a tiered NEPA analysis is required for a proposed safe room, FEMA will assess the potential impacts for the specific activity to impact environmental or human resources. Subsequently, FEMA would conduct a cumulative assessment to consider other past, present, and reasonably foreseeable projects that could overlap (in time or affected resources) with the FEMA action.

Additionally, FEMA should consider potential cumulative impacts of environmental and other burdens on communities with environmental justice concerns when evaluating whether a particular action fits within this SPEA. With respect to climate change, safe room projects would produce minor to moderate GHG emissions, which would contribute to adverse cumulative effects in conjunction with other projects involving construction or use of generators. However, safe room projects would be designed to help communities adapt to climate change by providing shelter during extreme wind events.

Since grant funding provided under the PA program would be dedicated to safe room construction as part of recovery efforts following a disaster, these safe room projects have a greater potential of contributing to cumulative effects. Due to the various other types of emergency and permanent work that can receive PA grant funding after a disaster, it is likely that safe room construction activities would be occurring at the same time as other recovery efforts (such as rebuilding other destroyed buildings on nearby properties). However, due to the small-scale and temporary nature of construction for safe room projects receiving PA funding, any cumulative impacts that may occur largely would be anticipated to be minor, although some moderate impacts may occur.

7. Best Management Practices

Introductory text in Section 7 of the 2011 PEA is incorporated here by reference, which states FEMA's intent to implement measures to mitigate and minimize potential impacts to the human environment, to the extent practicable. However, this section replaces use of the term "mitigation measures" with "best management practices" to differentiate between existing measures required by law, regulation, or policies that are ongoing, and regularly occurring practices, and project-specific mitigation measures that are specifically proposed to avoid, minimize, rectify, reduce, or compensate for project-specific impacts of the proposed action identified during the environmental review. A complete list of BMPs for this SPEA is provided in **Table 18**, including measures incorporated by reference from the 2011 PEA and new measures added to this SPEA. Grantees and sub-grantees should establish an inspection and maintenance approach to ensure these measures are being implemented and are working adequately.

Table 18: List of BMPs for All Resource Areas Evaluated in the SPEA

Area of Evaluation	*Best Management Practices*
Land Use	▪ Coordinate land use changes with local governments. ▪ Obtain and adhere to applicable construction and zoning permits. ▪ Avoid taking actions that modify existing land use patterns. ▪ Avoid undertaking projects on important farmlands.
Geology, Soils, and Seismicity	▪ Avoid siting in areas susceptible to seismic, volcanic, tsunami, landslide or mudslide activity, structural instability, excessive erodibility, or steep slopes. ▪ Enclose or water down exposed dirt storage piles. ▪ Maintain topsoil wherever possible. ▪ Protect slopes by using measures such as erosion control blankets, bonded fiber matrices, turn reinforcement mats, silt fences (for moderate slopes), etc. ▪ Retain sediment on-site and control dewatering practices by using sediment traps or basins for large areas (>1 acre) when appropriate. ▪ Establish stabilized construction entrances/exits (e.g., using large, crushed rocks, stone pads, steel wash racks, hose-down systems, pads). ▪ Minimize the impacts of equipment staging areas.
Water Resources	▪ Control stormwater flowing to and through the project site. ▪ Protect storm drain inlets until site is stabilized. ▪ Install silt fencing or other sediment control measures along waterways to minimize erosion and sedimentation in surface waters.

Area of Evaluation	*Best Management Practices*
Floodplains	▪ Avoid, minimize, rectify, or reduce safe room projects undertaken in the floodplain. ▪ Determine and implement appropriate flood resilience design requirements, including those identified in 44 CFR § 9.11 and the FFRMS policy. ▪ When there is no alternative to locating projects in the floodplain, minimize impacts to the natural and beneficial values of floodplains. ▪ Whenever possible, incorporate nature-based solutions to minimize impacts to the floodplain, reduce flood risk, enhance resilience, and provide other ecological benefits. ▪ Adhere to the applicable requirements in FEMA P-320 and FEMA P-361 for minimizing impacts to the floodplain and the impacts from floods to safe rooms.
Wetlands	▪ Avoid, minimize, rectify, or reduce safe room projects undertaken in wetlands.
Biological Resources	▪ Minimize the disturbed area and preserve vegetation to the maximum extent possible. ▪ Revegetate disturbed areas following construction with locally acquired sources of native seeds and plants in a manner that returns the site to its pre-construction condition or better. Any seeding carried out during the revegetation program is completed with commercially available seeds certified to be free of noxious weed seeds and other invasive species. If the application of a chemical is required to control an invasive exotic plant species, the chemical is applied by a certified pesticide or herbicide applicator per labeled directions and in compliance with all federal, state, and local laws and regulations. ▪ Avoid engaging in construction activities within 660 feet of a bald or golden eagle nest during nesting and fledging, as nesting eagles are quite sensitive to human activities during these times.
Human Health and Safety	▪ Ensure adequate maintenance of equipment, including proper engine maintenance, adequate tire inflation, and proper maintenance of pollution control devices. ▪ Implement plans to eliminate and minimize oil or fuel spills from construction equipment.
Environmental Justice	▪ None
Historic Properties	▪ Avoid sites on or near known archaeological sites. ▪ Coordinate with appropriate historic preservation agencies where historic properties are present or likely.

Area of Evaluation	*Best Management Practices*
Air Quality	▪ Coordinate with state environmental quality agency to determine applicable requirements for using emergency generators. ▪ Keep fuel-burning equipment running times to a minimum and ensure engines are properly maintained. ▪ Control particulate matter emissions from unpaved surfaces by routine application of water to these surfaces during construction, until the site is constructed, paved, or re-vegetated. ▪ Water down construction site two to three times per day if dust emissions become a problem. ▪ Reduce construction equipment idling to the maximum extent practicable.
Climate Change	▪ Incorporate or implement provisions of EO 14057 in safe room design, procurement, and operations. ▪ Adopt other feasible measures under the USEPA Guidance Potential for Reducing Greenhouse Gas Emissions in the Construction Sector.[1]
Noise	▪ Limit construction activities, including operation of heavy machinery, to normal business hours (Monday-Friday 7 a.m. to 5 p.m.). ▪ Ensure equipment at the project sites uses the manufacturer's standard noise control devices (i.e., mufflers, baffling, and/or engine enclosures).

Notes: 1. USEPA's guidance on Potential for Reducing Greenhouse Gas Emissions in the Construction Sector is available at this link: https://archive.epa.gov/sectors/web/pdf/construction-sector-report.pdf

Glossary of Terms

0.2% Annual Chance Floodplain – The area subject to flooding by the 0.2% annual chance flood (also known as the 500-year floodplain).

1% Annual Chance Floodplain – The area subject to flooding by the 1% annual chance flood (also known as the 100-year floodplain or base floodplain).

Base Flood Elevation – The elevation to which floodwater is anticipated to rise during the 1% annual chance flood (also known as the base or 100-year flood). The terms "base flood elevation," "1% annual chance flood elevation," and "100-year flood elevation" are synonymous and are used interchangeably.

Best Management Practices (for water resources) – Effective, practical, structural or nonstructural methods, schedules of activities, or prohibitions of practices which prevent or reduce the movement of sediment, nutrients, pesticides and other pollutants from the land to surface or ground water, or which otherwise protect water quality.

Coastal High Hazard Area – An area of flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

Construction – The preparation of previously disturbed or undisturbed land and the building or assembly of new buildings, structures, infrastructure, and other real property on that land. The preparation of land includes removal of vegetation; site clearing, grading, and grubbing; excavation, etc. This definition does not include activities prior to construction, such as design, siting of buildings, or specification of materials, nor does it include the operation of a facility following construction. New construction is defined separately in 44 CFR § 9.4 for actions that are in or affect floodplains or wetlands:

> (a) For floodplains, new construction is the construction of a new structure or facility or the replacement of a structure or facility which has been totally destroyed; and
>
> (b) For wetlands, new construction in wetlands includes training, dredging, channelizing, filling, diking, impounding, and related activities, and the permanent installation of temporary housing units.

Critical Action – As defined under 44 CFR Part 9, an activity for which even a slight chance of flooding is too great. Critical actions include, but are not limited to, those which create or extend the useful life of structures or facilities:

> (1) Such as those which produce, use or store highly volatile, flammable, explosive, toxic or water-reactive materials;

(2) Such as hospitals and nursing homes, and housing for the elderly, which are likely to contain occupants who may not be sufficiently mobile to avoid the loss of life or injury during flood and storm events;

(3) Such as emergency operation centers, or data storage centers which contain records or services that may become lost or inoperative during flood and storm events; and

(4) Such as generating plants, and other principal points of utility lines.

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

Disproportionate and Adverse – Describes situations of concern where there exists substantially higher and more adverse health and environmental effects on communities with environmental justice concerns or indigenous peoples than the effects experienced by the general population or appropriate comparison groups that are not communities with environmental justice concerns.

Environmental Justice – The just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, tribal affiliation, or disability, in agency decision-making and other federal activities that affect human health and the environment so that people: (i) are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and (ii) have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn grow, worship, and engage in cultural and subsistence practices.

Equity – The consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

Federal Flood Risk Management Standard (FFRMS) – The federal flood risk management standard to be incorporated into existing processes used to implement EO 11988, as amended.

Federal Flood Risk Management Standard (FFRMS) Floodplain -- The floodplain established using one of the approaches described in 44 CFR § 9.7(c).

Floodway – The portion of the floodplain which is effective in carrying flow, within which this carrying capacity must be preserved and where the flood hazard is generally highest, i.e., where water depths

and velocities are the greatest. It is that area which provides for the discharge of the base flood so the cumulative increase in water surface elevation is no more than one foot.

Ground Disturbance – any work or activity that results in a disturbance of the earth, including excavating, digging, trenching, plowing, drilling, tunneling, backfilling, blasting, topsoil stripping, land leveling, peat removing, quarrying, clearing, and grading.

Historic Property – Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register of Historic Places, including artifacts, records, and material remains related to such a property or resource. Historic properties are significant at the national, tribal, regional, state, territory, or local level in American history, architecture, archaeology, engineering, or culture.

Modification – Changes to an existing building or structure resulting from the addition or removal of architectural elements, equipment, utilities, etc.

Social Cost of Greenhouse Gases (SC-GHG) – The monetary value of the net harm to society associated with adding a small amount of a GHG to the atmosphere in a given year. In principle, it includes the value of all climate change impacts, including (but not limited to) changes in net agricultural productivity, human health effects, property damage from increased flood risk, natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services.

Special Flood Hazard Area – A FEMA-designated floodplain within a community that is subject to a 1% or greater chance of flooding in any given year (see also "*1% Annual Chance Floodplain*").

This page intentionally left blank.

References

74 FR 66496. (2009, December 15). *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act.* Retrieved from https://www.govinfo.gov/content/pkg/FR-2009-12-15/pdf/E9-29537.pdf

CEQ. (2023). *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change.* Retrieved from https://www.energy.gov/sites/default/files/2023-01/2023-01-CEQ%20interim%20guidance%20on%20GHG%20emissions%20and%20climate%20change.pdf

DHS. (2021). *Climate Action Plan: Integrating Climate Adaptation into the Department to strengthen mission operations and infrastructure.*

DOS & EOP. (2021). *The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050.* Retrieved from https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf

FEMA. (2011). *Final Programmatic Environmental Assessment Hazard Mitigation Safe Room Construction.*

FEMA. (2019). *FEMA P-646: Guidelines for Design of Structures for Vertical Evacuation from Tsunamis.* Third Edition. Retrieved from https://www.fema.gov/sites/default/files/2020-08/fema_earthquakes_guidelines-for-design-of-structures-for-vertical-evacuation-from-tsunamis-fema-p-646.pdf

FEMA. (2020a). *FEMA P-2082-1: NEHRP Recommended Seismic Provisions for New Buildings and Other Structures.* Volume I: Part 1 Provisions, Part 2 Commentary. Retrieved from https://www.fema.gov/sites/default/files/2020-10/fema_2020-nehrp-provisions_part-1-and-part-2.pdf

FEMA. (2020b). *FEMA P-2082-2: NEHRP Recommended Sesimic Provisions for New Buildings and Other Structures.* Volume II: Part 3 Resource Papers. Retrieved from https://www.fema.gov/sites/default/files/2020-10/fema_2020-nehrp-provisions_part-3.pdf

FEMA. (2020c). *Public Assistance Program and Policy Guide.* Version 4. Retrieved from https://www.fema.gov/sites/default/files/documents/fema_pappg-v4-updated-links_policy_6-1-2020.pdf

FEMA. (2021a). *FEMA P-320. Taking Shelter from the Storm: Building of Installing a Safe Room for Your Home.* Fifth Edition.

FEMA. (2021b). *FEMA P-361. Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms.* Fourth Edition.

FEMA. (2021c). *Highlights of ICC 500-2020: ICC/NSSA Standard for the Design and Construction of Storm Shelters.* Retrieved from https://www.fema.gov/sites/default/files/documents/fema_ICC-500-2020-highlights_publication_082021.pdf

FEMA. (2021d). *2022-2026 FEMA Strategic Plan: Building the FEMA our Nation Needs and Deserves.*

FEMA. (2023a). *Climate Essentials for Emergency Managers.*

FEMA. (2023b). *E.O. 12898 Environmental Justice: Interim Guidance for FEMA EHP Reviewers (September 2023).*

FEMA. (2023c). *FEMA Public Assistance: Safe Rooms and Storm Shelters.*

FEMA. (2023d). *Hazard Mitigation Assistance Program and Policy Guide.* Version 1.1. Retrieved from https://www.fema.gov/sites/default/files/documents/fema_hma_guide_08232023_v1.pdf

General Power. (2024). Retrieved from How to Calculate What Size Generator You Need: https://www.genpowerusa.com/blog/how-to-calculate-commercial-generator-size

ICC. (2020). *ICC 500 ICC/NSSA Standard for the Design and Construction of Storm Shelters.* Retrieved from https://codes.iccsafe.org/content/ICC5002020P1/icc-nssa-standard-for-the-design-and-construction-of-storm-shelters

Interagency Working Group on Social Cost of Greenhouse Gases. (2021). *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates Under Executive Order 13990.* Retrieved from https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf?source=email

IPCC. (2014). *Intergovernmental Panel on Climate Change AR5 Synthesis Report: Climate Change 2014.* Retrieved from https://www.ipcc.ch/report/ar5/syr/

NOAA. (2024). *Climate Data Online*. Retrieved from https://www.ncdc.noaa.gov/cdo-web/

Thompson, P. G. (2005). Examination of the Multiplier Used to Estimate PM2.5 Fugitive Dust Emissions from PM10. *US EPA 14th Internal Emissions Inventory Conference.* Las Vegas, NV.

US Global Change Research Program. (2023). Overview: Understanding Risks, Impacts, and Responses. In *Fifth National Climate Assessment.* Retrieved from https://nca2023.globalchange.gov/downloads/NCA5_Ch1_Overview.pdf

USACE. (2021). *Summary of the 2021 Nationwide Permits.* Retrieved from https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/19757

USACE. (2022). *Nationwide Permit Reissuance.* Retrieved from https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/19764

USEPA. (1979). AP 42, Fifth Edition, Volume I Chapter 4.5 Asphalt Paving Operations. In *AP-42: Compilation of Air Emissions Factors from Stationary Sources.*

USEPA. (1992). *Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures.* OAQPS, EPA.

USEPA. (1995). AP 42, Fifth Edition, Volume I Chapter 13: Miscellaneous Sources. In *AP-42: Compilation of Air Emissions Factors from Stationary Sources.*

USEPA. (1996). AP 42, Fifth Edition, Volume I, Chapter 3.4 Large Stationary Diesel and All Stationary Dual-Fuel Engines. In *AP-42: Compilation of Air Emissions Factors from Stationary Sources.*

USEPA. (2001). EIIP, Volume III: Chapter 17, Asphalt Paving. In *Air Emissions Inventory Improvement Program.*

USEPA. (2017). *Climate Change Impacts by State*. Retrieved from Climate Change Impacts: https://19january2017snapshot.epa.gov/climate-impacts/climate-change-impacts-state_.html

USEPA. (2020). *2020 National Emissions Inventory (NEI) Data Retrieval Tool*. Retrieved August 14, 2023, from Air Emissions Inventories: https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data

USEPA. (2023, June 29). *De Minimis Table*s. Retrieved from General Conformity: https://www.epa.gov/general-conformity/de-minimis-tables

USEPA. (2024a). *Greenhouse Gas Equivalencies Calculator*. Retrieved from https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

USEPA. (2024b). *MOVES4: Latest Version of MOtor Vehicle Emission Simulator (MOVES)*. Retrieved from https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves

USEPA. (2024c). *NAAQS Table*. Retrieved March 18, 2024, from https://www.epa.gov/criteria-air-pollutants/naaqs-table

This page intentionally left blank.

List of Preparers

Jessica Eleff, Federal Flood Risk Management Standard Senior Specialist, FEMA, Office of Environmental Planning & Historic Preservation

Kristin Lehman, Senior NEPA Specialist, FEMA Office of Environmental Planning & Historic Preservation

Larissa Hyatt, Water Resources Specialist, FEMA, Office of Environmental Planning & Historic Preservation

Luke Dodds, Federal Flood Risk Management Standard Specialist, FEMA, Office of Environmental Planning & Historic Preservation

Jennifer Warf, NEPA Specialist and Program Manager, AECOM

Michael Busam, Environmental Planner, AECOM

Natalie Kisak, Environmental Planner, AECOM

Sam Hartsfield, Environmental Planner, AECOM

This page intentionally left blank.

Appendix A: Record of Environmental Consideration

This page intentionally left blank.

Disaster/Emergency/Program/Project Title: DR-XXXX-XX
Grantee:
Subgrantee:

Record of Environmental Consideration

See FEMA Directive 108-1 and FEMA Instruction 108-1-1.

Project Name/Number: DR-XXXX-XX

Project Location:

Project Description:

National Environmental Policy Act (NEPA) Determination

☐ Statutorily excluded from NEPA review. **(Review Concluded)**
☐ Categorical Exclusion - Category Type Single Project
  ☐ No Extraordinary Circumstances exist.
    Are project conditions required? ☐ Yes (see section V) ☐ No **(Review Concluded)**
  ☐ Extraordinary Circumstances exist (See Section IV).
    ☐ Extraordinary Circumstances mitigated. (See Section IV comments)
      Are project conditions required? ☐ Yes (see section V) ☐ No **(Review Concluded)**
    ☐ Environmental Assessment required. See FONSI for determination, conditions and approval.
☐ Environmental Assessment required. See FONSI for determination, conditions and approval.

Comments:

Reviewer and Approvals

FEMA Environmental Reviewer
Name:

Signature_____ Date _____
FEMA Historic Preservation Reviewer
Name:

Signature_____ Date _____

FEMA Environmental Officer Reviewer or delegated approving official
Name:

Signature_____ Date _____

I. Compliance Review for Environmental Laws (other than NEPA)

• A. National Historic Preservation Act

☐ Not type of activity with potential to affect historic properties. **(Review Concluded)**
☐ Applicable executed Programmatic Agreement (insert date) Otherwise, conduct standard Section 106 review.
☐ Activity meets Programmatic Allowance # _____
Are project conditions required? ☐ Yes (see section V) ☐ No **(Review Concluded)**

HISTORIC BUILDINGS AND STRUCTURES

☐ No historic properties 50 years or older in project area. **(Review Concluded)**
☐ Building or structure 50 years or older in project area and activity not exempt from review.
☐ Determination of No Historic Properties Affected (FEMA finding/SHPO/THPO concurrence on file)
Are project conditions required? ☐ Yes (see section V) ☐ No **(Review Concluded)**
☐ Determination of Historic Properties Affected (FEMA finding/SHPO/THPO concurrence on file)
☐ Property a National Historic Landmark and National Park Service was provided early notification during the consultation process. If not, explain in comments
☐ No Adverse Effect Determination (FEMA finding/SHPO/THPO concurrence on file).
Are project conditions required? ☐ Yes (see section V) ☐ No **(Review Concluded)**
☐ Adverse Effect Determination (FEMA finding/SHPO/THPO concurrence on file)
☐ Resolution of Adverse Effect completed. (MOA on file)
Are project conditions required ☐ Yes (see section V) ☐ No **(Review Concluded)**

ARCHEOLOGICAL RESOURCES

☐ Project affects only previously disturbed ground. **(Review Concluded)**
☐ Project affects undisturbed ground.
☐ Project area has no potential for presence of archeological resources
☐ Determination of no historic properties affected (FEMA finding/SHPO/THPO concurrence or consultation on file). **(Review Concluded)**
☐ Project area has potential for presence of archeological resources
☐ Determination of no historic properties affected (FEMA finding/SHPO/THPO concurrence on file)
Are project conditions required? ☐ Yes (see section V) ☐ No **(Review Concluded)**
☐ Determination of historic properties affected
☐NR eligible resources not present (FEMA finding/SHPO/THPO concurrence on file). Are project conditions required ☐Yes (see section V) ☐No (**Review Concluded**)☐ NR eligible resources present in project area. (FEMA finding/ SHPO/THPO concurrence on file)
☐ No Adverse Effect Determination. (FEMA finding/ SHPO/THPO concurrence on file)
Are project conditions required? ☐ Yes (see section V) ☐ No **(Review Concluded)**

☐ Adverse Effect Determination. (FEMA finding/ SHPO/THPO concurrence on file)
☐ Resolution of Adverse Effect completed. (MOA on file)
Are project conditions required? ☐ Yes (see section V)
☐ No **(Review Concluded)**

Comments:
Conditions:
Correspondence/Consultation/References:

B. Endangered Species Act

☐ No listed species and/or designated critical habitat present in the action area. **(Review Concluded)**
☐ Listed species and/or designated critical habitat present in the action area.
☐ No effect to species or designated critical habitat**.** (See comments for justification) **(Review Concluded)**
☐ May affect, but not likely to adversely affect species or designated critical habitat (FEMA determination/USFWS/NMFS concurrence on file) **(Review Concluded)**
☐ Likely to adversely affect species or designated critical habitat
☐ Formal consultation concluded. (Biological Assessment and Biological Opinion on file)
Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments:
Conditions:
Correspondence/Consultation/References:

C. Coastal Barrier Resources Act

☐ Project is not located in Coastal Barriers Resource System or Otherwise Protected Area.
☐ Project does not affect a coastal barrier within the COBRA System (regardless of in or out) **(Review Concluded)**
☐ Project is located in a coastal barrier system and/or affects a coastal barrier. (FEMA determination/USFWS consultation on file)
☐ Proposed action an exception under Section 3505.a.6? **(Review Concluded)**
☐ Proposed action not excepted under Section 3505.a.6.
Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments:
Conditions:
Correspondence/Consultation/References:

D. Clean Water Act

☐ Project site located outside of and would not affect any waters of the U.S. **(Review Concluded)**
☐ Project site located in or would affect waters, including wetlands, of the U.S.
☐ Project exempted as in-kind replacement or other exemption. **(Review Concluded)**
☐ Project requires Section 404/401/10 permit, including qualification under Nationwide Permits.

Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments: *Conditions:* *Correspondence/Consultation/References:*

E. Coastal Zone Management Act

☐ Project is not located in a coastal zone area – **(Review concluded)**
☐ Project is located in a coastal zone area:
- ☐ State administering agency does not require consistency review. **(Review Concluded)**.
- ☐ State administering agency requires consistency review.
  Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments: *Conditions:* *Correspondence/Consultation/References:*

F. Fish and Wildlife Coordination Act

☐ Not applicable for financial assistance**. (Review Concluded)**

G. Clean Air Act

☐ Project will not result in permanent air emissions. **(Review Concluded)**
☐ Project is located in an attainment area. **(Review Concluded)**
☐ Project is located in a non-attainment area.
- ☐ Coordination required with applicable state administering agency.
  Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments: *Conditions:* *Correspondence/Consultation/References:*

H. Farmland Protection Policy Act

☐ Project does not affect prime or unique farmland. **(Review Concluded)**
☐ Project causes unnecessary or irreversible conversion of prime or unique farmland.
- ☐ Coordination with Natural Resource Conservation Commission required.
  - ☐ Farmland Conversion Impact Rating, Form AD-1006, completed.
    Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments: *Conditions:* *Correspondence/Consultation/References:*

I. Migratory Bird Treaty Act

☐ Project not located within a flyway zone. **(Review Concluded)**
☐ Project located within a flyway zone.
- ☐ Project does not have potential to take migratory birds. **(Review Concluded)**
- ☐ Project has potential to take migratory birds.
  - ☐ Contact made with USFWS
    Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments: *Conditions:* *Correspondence/Consultation/References:*

J. Magnuson-Stevens Fishery Conservation and Management Act

☐ Project not located in or near Essential Fish Habitat. **(Review Concluded)**
☐ Project located in or near Essential Fish Habitat.
- ☐ Project does not adversely affect Essential Fish Habitat. **(Review Concluded)**
- ☐ Project adversely affects Essential Fish Habitat (FEMA determination/USFWS/NMFS concurrence on file)
  - ☐ NOAA Fisheries provided no recommendation(s) **(Review Concluded).**
  - ☐ NOAA Fisheries provided recommendation(s)
    - ☐ Written reply to NOAA Fisheries recommendations completed.
      Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments: *Conditions:* *Correspondence/Consultation/References:*

K. Wild and Scenic Rivers Act

☐ Project is not along and does not affect Wild or Scenic River. **(Review Concluded)**
☐ Project is along or affects Wild or Scenic River
- ☐ Project adversely affects WSR as determined by NPS/USFS. **FEMA cannot fund the action**. (NPS/USFS/USFWS/BLM consultation on file)
- ☐ Project does not adversely affect WSR. (NPS/USFS/USFWS/BLM consultation on file)
  Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments: *Conditions:* *Correspondence/Consultation/References:*

• L. Other Relevant Laws and Environmental Regulations

Identify other relevant law(s) or regulation(s), resolution, and any consultation/references.

II. Compliance Review for Executive Orders

A. E.O. 11988 - Floodplains

☐ Outside Floodplain and No Effect on Floodplains/Flood levels - **(Review Concluded)**
☐ Located in Floodplain or Effects on Floodplains/Flood levels
- ☐ No adverse effect on floodplain or can be adversely affected by the floodplain. **(Review Concluded)**,
- ☐ Beneficial Effect on Floodplain Occupancy/Values **(Review Concluded).**
- ☐ Possible adverse effects associated with investment in floodplain, occupancy or modification of floodplain environment
  - ☐ 8 Step Process Complete - documentation on file **(Review Concluded)**

Comments:
Conditions:
Correspondence/Consultation/References:

B. E.O. 11990 - Wetlands

☐ Outside Wetland and No Effect on Wetland(s) - **(Review Concluded)**
☐ Located in Wetland or effects Wetland(s)
- ☐ Beneficial Effect on Wetland - **(Review Concluded)**
- ☐ Possible adverse effect associated with constructing in or near wetland
  - ☐ Review completed as part of floodplain review
  - ☐ 8 Step Process Complete - documentation on file **(Review Concluded)**

Comments:
Conditions:
Correspondence/Consultation/References:

C. E.O. 12898 - Environmental Justice for Low Income and Minority Populations

☐ No Low income or minority population in, near or affected by the project - **(Review Concluded)**
☐ Low income or minority population in or near project area
- ☐ No disproportionately high and adverse impact on low income or minority population- **(Review Concluded)**
- ☐ Disproportionately high or adverse effects on low income or minority population
  Are project conditions required? ☐ YES (see section V) ☐ NO **(Review Concluded)**

Comments:
Conditions:
Correspondence/Consultation/References:

III. Other Environmental Issues

Identify other potential environmental concerns in the comment box not clearly falling under a law or executive order (see environmental concerns scoping checklist for guidance).

Comments: *Conditions:* *Correspondence/Consultation/References:*

IV. Extraordinary Circumstances

Based on the review of compliance with other environmental laws and Executive Orders, and in consideration of other environmental factors, review the project for extraordinary circumstances.

* A "Yes" under any circumstance may require an Environmental Assessment (EA). If the circumstance can be mitigated, please explain in comments. If no, leave blank.

Yes

- ☐ (i) A potentially significant effect on public health or safety;
- ☐ (ii) A potentially significant effect on species or habitats protected by the ESA, Marine Mammal Protection Act, Migratory Bird Treaty Act, Magnuson-Stevens Fishery Conservation and Management Act, or other law protecting a species or habitat;
- ☐ (iii) A potentially significant effect on historic properties (i.e., districts, sites, buildings, structures, or objects) that are listed in or eligible for listing in the National Register of Historic Places, affects traditional cultural properties or sacred sites, or leads to the loss or destruction of a significant scientific, cultural, or historical resource;
- ☐ (iv) A potentially significant effect on an environmentally sensitive area;
- ☐ (v) A potential or threatened violation of a Federal, State, or local law or requirement imposed to protect the environment. Some examples of other requirements to consider are: a local noise control ordinance; the requirement to conform to an applicable State Implementation Plan for air quality standards; Federal, Tribal, State, or local requirements to control hazardous or toxic substances; and environmental permits;
- ☐ (vi) An effect on the quality of the human environment that is likely to be highly controversial in terms of
scientific validity, likely to be highly uncertain, or likely to involve unique or unknown environmental risks. This also includes effects that may result from the use of new technology or unproven technology. Controversy over, including public opposition to, a proposed action absent any demonstrable potential for significant environmental impacts does not itself constitute an extraordinary circumstance;
- ☐ (vii) Extent to which a precedent is established for future actions with significant effects;
- ☐ (viii) Significantly greater scope or size than normally experienced for this particular category of action;
- ☐ (ix) Potential for significant degradation of already existing poor environmental conditions. Also, initiation of a potentially significant environmental degrading influence, activity, or effect in areas not already significantly modified from their natural condition;
- ☐ (x) Whether the action is related to other actions with individually insignificant, but cumulatively significant impacts.

Comments:

V. Environmental Review Project Conditions

General comments:

Project Conditions:

Standard Conditions:

1. Any change to the approved scope of work will require re-evaluation for compliance with NEPA and other Laws and Executive Orders.

2. This review does not address all federal, state, and local requirements. Acceptance of federal funding requires recipient to comply with all federal, state, and local laws. Failure to obtain all appropriate federal, state, and local environmental permits and clearances may jeopardize federal funding.

3. If ground disturbing activities occur during construction, applicant will monitor ground disturbance and if any potential archeological resources are discovered, will immediately cease construction in that area and notify the State and FEMA.

Monitoring Requirements:

Appendix B: Air Quality and Greenhouse Gas Analysis: Methodology and Assumptions

This appendix details assumptions, input data, and other technical information used in the analysis of air quality and greenhouse gas (GHG) impacts associated with the Safe Rooms Supplemental Programmatic Environmental Assessment.

Project Size Assumptions

To calculate potential criteria pollutant and GHG emissions for Alternatives 2, 3, 4, and 5, representative safe room projects were developed for each alternative. These build scenarios entailed the largest projects, with the greatest disturbance and construction equipment and emergency generator operations, likely to be required for each alternative. These assumptions were used to estimate construction equipment operation rates, debris hauling and material delivery rates, and construction employee commuting rates for inputs to the emissions inventory. Safe rooms for Alternatives 4 and 5 were sized to represent community safe rooms intended to serve up to 9,600 people each, with 20 square feet per safe room occupant, plus an additional 15% to accommodate equipment, furniture, and other interior components (FEMA, 2021b). Table B-1 summarizes emissions inventory sizing assumptions for each action alternative.

Table B-1: Safe Room Sizing Assumptions for Emissions Inventory

Component	Alternative 2	*Alternative 3*	*Alternative 4*	Alternative 5
Renovation Demolition	196 SF total footprint. Assumes demolition of up to four walls, 196 SF of concrete foundation, 196 SF of roofing, columns and beams, glazing, doors.	None	None	None
Renovation Construction	196 SF total footprint. Assumes reconstruction/ renovation of up to four walls, 196 SF of concrete foundation, 196 SF of roofing, columns and beams, glazing, doors.	None	None	None
Existing Structure Demolition	None	21,780 SF (0.5 acre)	21,780 SF (0.5 acre)	None
Staging Area	None	21,780 SF (0.5 acre)	21,780 SF (0.5 acre)	21,780 SF (0.5 acre)

Component	Alternative 2	*Alternative 3*	*Alternative 4*	Alternative 5
Clearing and Grubbing	None	43,560 SF (1 acre)	370,260 SF (8.5 acres) - includes staging area	370,260 SF (8.5 acres) - includes staging area
Grading	None	65,340 (1.5 acre) - includes staging area	370,260 SF (8.5 acres) - includes staging area	370,260 SF (8.5 acres) - includes staging area
New Structure Construction	None	21,780 SF (0.5 acre) safe room, 20-foot long 10-foot by 10-foot tunnel	220,800 SF (5.07 acres)	220,800 SF (5.07 acres)
New Parking Construction	None	10,890 SF (0.25 acre)	69,696 SF (1.6 acres)	6,9696 SF (1.6 acres)
New Access Road Construction	None	4,356 SF (0.1 acre)	21,780 SF (0.5 acre)	32,670 SF (0.75 acre)
Utilities Installation	None	150 LF	400 LF	1,000 LF
Fencing Installation	None	835 LF	2,361 LF	2,361 LF
Total Debris Hauling	99 CY	15,598 CY	59,459 CY	135,133 CY
Total Material Delivery	99 CY	3,670 CY	34,163 CY	35,305 CY
Generator Size	51.96 kW	267.8 KW	2,258 kW	2,258 kW

Notes: SF = square feet, CY = cubic yards, LF = linear feet, kW = kilowatt

Construction Emissions Inventory

Construction period emission inventories of criteria pollutants and their precursors and GHGs were prepared for Alternatives 2, 3, 4, and 5. The inventories include annual emissions from the following construction emissions sources: off-road equipment, on-road vehicles, and fugitive sources including asphalt paving and dust generation from site-wide construction activities. Tons per year of criteria pollutant emissions from off-road equipment and on-road vehicles were computed using **Equation 1** and **Equation 2**, respectively. Metric tons per year of GHG emissions from off-road equipment and on-road vehicles were computed using **Equation 3** and **Equation 4**, respectively.

Annual hours of off-road equipment operation and on-road annual vehicle miles of travel (AVMT) were derived using an engineering estimate of probable materials quantities developed for safe rooms and associated facilities constructed under Alternatives 2, 3, 4, and 5, as summarized in

Table B-1. This information was used to develop estimates of the number and types of equipment to be used on each type of safe room, and assuming each type of project would be completed in a single calendar year. Annual construction equipment and vehicle activity is summarized on Tables B-2 and B-3, respectively.

Equation 1:

$$\text{Emissions}_{(\text{tpy})} = \sum_{v=i}^{n} \text{EF}_v \times \text{HP}_v \times \frac{\text{hours}}{\text{year}} \div 2{,}000 \div 453.59$$

Where:

$\text{Emissions}_{(\text{tpy})}$ = annual emissions (tons per year)

EF_v = emissions rate for equipment v(i)…v(n) (grams per horsepower-hour of operation)

HP_v = rated horsepower for equipment v(i)…v(n)

2,000 = pounds per ton

453.59 = grams per pound

Equation 2:

$$\text{Emissions}_{(\text{tpy})} = \sum_{v=i}^{n} \text{EF}_v \times \frac{\text{miles}}{\text{day}} \times \frac{\text{days}}{\text{year}} \div 2{,}000 \div 453.59$$

Where:

$\text{Emissions}_{(\text{tpy})}$ = annual emissions (tons per year)

EF_v = emissions rate for vehicle v(i)…v(n) (grams per mile)

2,000 = pounds per ton

453.59 = grams per pound

Equation 3:

$$\text{Emissions}_{(\text{metric tpy})} = \sum_{v=i}^{n} \text{EF}_v \times \text{HP}_v \times \frac{\text{hours}}{\text{year}} \div 1{,}000{,}000$$

Where:

$\text{Emissions}_{(\text{metric tpy})}$ = annual emissions (metric tons per year)

EF_v = emissions rate for equipment v(i)…v(n) (grams per horsepower-hour of operation)

HP_v = rated horsepower for equipment v(i)…v(n)

1,000,000 grams = 1 metric ton

Equation 4:

$$\text{Emissions}_{(\text{metric tpy})} = \sum_{v=i}^{n} \text{EF}_v \times \frac{\text{miles}}{\text{day}} \times \frac{\text{days}}{\text{year}} \div 1{,}000{,}000$$

Where:

$\text{Emissions}_{(\text{metric tpy})}$ = annual emissions (metric tons per year)

EF_v = emissions rate for vehicle v(i)...v(n) (grams per mile)

1,000,000 grams = 1 metric ton

Table B-2: Estimated Annual Construction Activity (Operating Hours)

Off-Road Equipment	*Fuel*	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*
40 Ton Crane	Diesel	4.7	-	-	-
90 Ton Crane	Diesel	-	234.5	2,355.9	2,355.9
Asphalt Paver	Diesel	-	2.1	12.7	14.2
Backhoe	Diesel	6.3	237.8	2,370.3	2,391.9
Bob Cat	Diesel	4.7	679.5	1,411.3	888.6
Bulldozer	Diesel	-	261.4	1,481.0	2,962.1
Chain Saw	Gasoline	-	265.5	1,506.2	2,990.3
Chipper/Stump Grinder	Diesel	-	4.2	25.2	28.2
Compacting Equipment	Gasoline	-	156.8	888.6	1,777.2
Concrete Pump	Gasoline	-	8.8	88.3	88.3
Concrete Ready Mix Trucks	Gasoline	1.2	200.4	1,330.2	1,330.2
Concrete Truck	Diesel	-	65.9	439.8	462.3
Curb/Gutter Paver	Diesel	-	9.0	53.4	60.9
Dozer	Diesel	-	59.8	353.9	389.2
Dump Truck	Diesel	4.7	644.8	1,175.0	688.0
Dump Truck (12 cy)	Diesel	-	84.6	4,201.5	4,260.7
Excavator	Diesel	-	33.6	202.5	221.0
Excavator with Bucket	Diesel	2.7	261.4	261.4	-
Excavator with Hoe Ram	Diesel	0.3	-	-	-

Off-Road Equipment	*Fuel*	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*
Flat Bed or Dump Trucks	Diesel	-	522.7	2,962.1	5,924.2
Flatbed Truck	Diesel	-	25.9	209.1	234.0
Fork Truck	Diesel	32.2	2,491.8	25,032.6	25,043.4
Forktruck (Hoist)	Diesel	-	522.7	2,962.1	2,962.1
Front Loader	Diesel	-	261.4	1,481.0	2,962.1
Generator	Gasoline	-	219.8	2,208.0	2,208.0
Generator Sets	Gasoline	2.4	261.4	261.4	-
Grader	Diesel	-	1.9	10.6	11.8
Grub the site down 2'-0	Diesel	-	261.4	1,481.0	2,962.1
High Lift	Diesel	2.4	87.9	883.2	883.2
Hydroseeder	Gasoline	-	0.4	9.7	10.8
Loader	Diesel	-	46.6	315.7	331.0
Log Chipper	Diesel	-	261.4	1,481.0	2,962.1
Man Lift	Diesel	-	2,198.0	22,080.0	22,080.0
Man Lift (Fascia Construction)	Diesel	2.4	17.6	176.6	176.6
Material Deliveries	Diesel	0.2	44.0	441.6	441.6
Mulcher	Diesel	-	261.4	1,481.0	2,962.1
Off-Road Truck	Diesel	-	0.4	9.7	10.8
Other General Equipment	Gasoline		137.8	742.6	793.3
Pickup Truck	Diesel	3.2	511.2	1,452.9	1,234.8
Pumps	Gasoline	-	6.0	34.0	34.0
Roller	Diesel	-	311.2	1,779.7	1,809.7
Scraper	Diesel	-	11.3	67.7	75.8
Seed Truck Spreader	Gasoline	-	104.5	592.4	592.4
Skid Steer Loader	Diesel	-	55.2	245.6	247.1
Small Dozer	Diesel	-	156.8	888.6	1,777.2

Off-Road Equipment	*Fuel*	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*
Surfacing Equipment (Grooving)	Gasoline	-	2.7	16.3	18.2
Survey Crew Trucks	Diesel	0.2	65.3	370.3	370.3
Ten Wheelers	Diesel	-	261.4	1,481.0	2,962.1
Tool Truck	Diesel	6.4	396.7	3,989.8	3,989.8
Tractor	Diesel	-	522.7	2,962.1	5,924.2
Tractor Trailer- Material Delivery	Diesel	3.4	1,129.1	9,044.3	9,049.7
Tractor Trailer- Steel Deliveries	Diesel	0.3	29.3	293.7	293.7
Tractor Trailer with Boom Hoist- Delivery	Diesel	-	156.8	888.6	888.6
Tractor Trailers Temp Fac.	Diesel	0.1	26.1	148.1	148.1
Tractors/Loader/Backhoe	Diesel	-	95.7	491.3	509.6
Trowel Machine	Gasoline	-	8.8	88.3	88.3
Vibratory Compactor	Gasoline	-	30.0	183.6	198.6
Water Truck	Diesel	-	690.0	870.0	885.0

Table B-3: Estimated Annual Construction On-road Vehicle Activity (AVMT)

On-road Vehicles	*Fuel*	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*
Heavy Duty Diesel Vehicles	Diesel	994	77,074	374,482	672,304
Light Duty Gasoline Trucks	Gasoline	57,175	977,875	1,190,375	1,220,188
Light Duty Gasoline Vehicles	Gasoline	57,175	977,875	1,190,375	1,220,188

Equipment and vehicle emissions rates were generated using the current version of the U.S. Environmental Protection Agency's (USEPA) Motor Vehicle Emissions Simulator (MOVES4). MOVES4

was invoked at the project-level using national-level input databases for 2025. Input databases were adapted from USEPA's most recent National Emissions Inventory.

Emissions rates for on-road vehicles were generated for five mile-per-hour (mph) increments ranging from 5 to 65 mph. For the purposes of emissions calculations, it was assumed that all on-road vehicles would travel at an average speed of 35 miles per hour. **Tables B-4** and **B-5** specify the annual off-road equipment and on-road vehicle emissions rates applied in the analysis.

Equation 5 was used to estimate dust emissions from site-wide construction activities (particulate matter less than or equal to 10 microns in diameter [PM_{10}] and particulate matter less than or equal to 2.5 microns in diameter [$PM_{2.5}$]), adapted from USEPA's AP-42 methodology (USEPA, 1995). USEPA studies have concluded that 10 percent of the dust emissions in the PM_{10} or less size fractions are $PM_{2.5}$ (Thompson, 2005). Therefore, uncontrolled PM_{10} dust emissions were factored by 0.10 to derive the $PM_{2.5}$ component. Further, dust suppression and erosion control Best Management Practices (BMPs) during construction, such as site watering and track-out prevention measures, would ensure that PM impacts from construction activities are minimized. According to USEPA, adherence to these BMPs can result in a dust control efficiency of 75 percent, which was applied to the calculation to represent controlled PM emissions (USEPA, 1992).

Estimation of annual evaporative VOC emissions from asphalt curing is based upon the USEPA methods outlined in AP-42 (USEPA, 1979) as well as the Emissions Inventory Improvement Program (USEPA, 2001). **Equation 6** outlines this method. Because the asphalt characterization is not known, it was assumed that 35 percent of liquefied asphalt is diluent that can evaporate as VOC, 95 percent of this diluent would evaporate during asphalt curing, and the density of the diluent is 1.98 pounds per liter of diluent applied.

Equation 5:**

$$PM_{10(tpy)} = EF_{TSP} \times \frac{days}{year} \times \frac{acres}{day} \times 0.45 \div 2{,}000$$

Where:

$PM_{10(tpy)}$ = annual PM10 dust emissions (tons per year)

EF_{TSP} = total suspended particulate (TSP) emissions rate (80 pounds per acre-day)

0.45 = estimated ratio of PM_{10} to TSP

2,000 = pounds per ton

**Represents uncontrolled emissions of PM_{10}. Controlled emissions are derived by applying a 75% control factor.

$PM_{2.5} = PM_{10} \times 0.10$

Equation 6:

$VOC_{(tpy)} = A \times AR \times VD \times EF \times D \div 2{,}000$

Where:

$VOC_{(tpy)}$ = annual VOC paving emissions (tons per year)

A = area of pavement in square meters(m^2)

AR = asphalt application rate (0.679 liter/m^2)

VD = volume fraction of diluent (0.35)

AF = mass fraction of diluent which evaporates as VOC (0.95)

D = solvent density (1.98 pounds/liter)

2,000 = pounds per ton

Table B-4: 2025 Off-road Emission Rates (grams per horsepower-hour at operating load)

Equipment	*Fuel Type*	*Load*	*Horse-power*	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_2*	*VOC*	*CO_2*	*CH_4*
40 Ton Crane	Diesel	0.43	882.8	0.2898	2.9689	0.0611	0.0593	0.0038	0.1000	530.754	0.004
90 Ton Crane	Diesel	0.43	882.8	0.2898	2.9689	0.0611	0.0593	0.0038	0.1000	530.754	0.004
Asphalt Paver	Diesel	0.59	62.96	0.3107	2.5981	0.0297	0.0288	0.0040	0.0627	595.964	0.010
Backhoe	Diesel	0.21	87.17	2.2629	2.4875	0.3689	0.3578	0.0051	0.4501	694.697	0.013
Bob Cat	Diesel	0.21	87.17	2.2629	2.4875	0.3689	0.3578	0.0051	0.4501	694.697	0.013
Bulldozer	Diesel	0.59	923	0.2455	2.5280	0.0479	0.0464	0.0037	0.0647	536.647	0.005
Chain Saw	Gasoline	0.7	3.916	266.0291	1.5283	9.7482	8.9684	0.0041	73.0342	685.999	1.188
Chipper/Stump Grinder	Diesel	0.43	84.47	1.2584	2.8075	0.2319	0.2249	0.0045	0.2455	589.660	0.010
Compacting Equipment	Gasoline	0.55	12.67	269.6998	1.7246	0.1145	0.1054	0.0064	5.2130	1046.734	0.659
Concrete Pump	Gasoline	0.69	4.631	202.4617	2.1587	0.3478	0.3199	0.0075	9.8909	1228.008	0.927
Concrete Ready Mix Trucks	Gasoline	0.59	8.373	268.7474	1.7121	0.1110	0.1021	0.0064	6.4108	1047.145	0.645
Concrete Truck	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Curb/Gutter Paver	Diesel	0.59	62.96	0.3107	2.5981	0.0297	0.0288	0.0040	0.0627	595.964	0.010
Dozer	Diesel	0.59	923	0.2455	2.5280	0.0479	0.0464	0.0037	0.0647	536.647	0.005
Dump Truck	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001

Equipment	*Fuel Type*	*Load*	*Horse-power*	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_2*	*VOC*	*CO_2*	*CH_4*
Dump Truck (12 cy)	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Excavator	Diesel	0.59	61.3	0.2436	2.5704	0.0237	0.0230	0.0040	0.0564	595.982	0.009
Excavator with Bucket	Diesel	0.59	61.3	0.2436	2.5704	0.0237	0.0230	0.0040	0.0564	595.982	0.009
Excavator with Hoe Ram	Diesel	0.59	61.3	0.2436	2.5704	0.0237	0.0230	0.0040	0.0564	595.982	0.009
Flat Bed or Dump Trucks	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Flatbed Truck	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Fork Truck	Diesel	0.59	61.74	0.1889	2.5450	0.0178	0.0173	0.0039	0.0506	595.999	0.009
Forktruck (Hoist)	Diesel	0.59	61.74	0.1889	2.5450	0.0178	0.0173	0.0039	0.0506	595.999	0.009
Front Loader	Diesel	0.21	87.17	2.2629	2.4875	0.3689	0.3578	0.0051	0.4501	694.697	0.013
Generator	Gasoline	0.68	8.816	269.1831	1.7140	0.1128	0.1038	0.0064	6.5429	1046.939	0.651
Generator Sets	Gasoline	0.68	8.816	269.1831	1.7140	0.1128	0.1038	0.0064	6.5429	1046.939	0.651
Grader	Diesel	0.59	84.21	0.1744	0.9833	0.0327	0.0317	0.0040	0.0151	596.113	0.001
Grub the site down 2'-0	Diesel	0.21	87.17	2.2629	2.4875	0.3689	0.3578	0.0051	0.4501	694.697	0.013
High Lift	Diesel	0.21	60.46	2.1652	3.6746	0.2941	0.2853	0.0052	0.4556	694.674	0.020
Hydroseeder	Gasoline	0.6	5.217	200.5491	2.0870	0.3167	0.2914	0.0075	7.0096	1229.491	0.869
Loader	Diesel	0.21	87.17	2.2629	2.4875	0.3689	0.3578	0.0051	0.4501	694.697	0.013

Equipment	*Fuel Type*	*Load*	*Horse-power*	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_2*	*VOC*	*CO_2*	*CH_4*
Log Chipper	Diesel	0.43	84.47	1.2584	2.8075	0.2319	0.2249	0.0045	0.2455	589.660	0.010
Man Lift	Diesel	0.21	60.46	2.1652	3.6746	0.2941	0.2853	0.0052	0.4556	694.674	0.020
Man Lift (Fascia Construction)	Diesel	0.21	60.46	2.1652	3.6746	0.2941	0.2853	0.0052	0.4556	694.674	0.020
Material Deliveries	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Mulcher	Diesel	0.43	84.47	1.2584	2.8075	0.2319	0.2249	0.0045	0.2455	589.660	0.010
Off-Road Truck	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Other General Equipment	Gasoline	0.54	4.289	206.8822	2.3243	0.4195	0.3859	0.0074	9.3807	1224.580	1.062
Pickup Truck	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Pumps	Gasoline	0.69	4.631	202.4617	2.1587	0.3478	0.3199	0.0075	9.8909	1228.008	0.927
Roller	Diesel	0.59	84.76	0.3589	1.1266	0.0594	0.0576	0.0040	0.0266	596.081	0.002
Scraper	Diesel	0.59	66	0.2847	2.5884	0.0280	0.0271	0.0040	0.0608	595.970	0.010
Seed Truck Spreader	Gasoline	0.69	4.631	202.4617	2.1587	0.3478	0.3199	0.0075	9.8909	1228.008	0.927
Skid Steer Loader	Diesel	0.21	57.67	5.0818	5.1846	0.8483	0.8228	0.0057	1.0813	692.855	0.027
Small Dozer	Diesel	0.59	923	0.2455	2.5280	0.0479	0.0464	0.0037	0.0647	536.647	0.005
Surfacing Equipment (Grooving)	Gasoline	0.49	8.918	272.6173	1.7846	0.1240	0.1141	0.0064	5.5242	1045.571	0.705

Equipment	*Fuel Type*	*Load*	*Horse-power*	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_2*	*VOC*	*CO_2*	*CH_4*
Survey Crew Trucks	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Ten Wheelers	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Tool Truck	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Tractor	Diesel	0.21	87.17	2.2629	2.4875	0.3689	0.3578	0.0051	0.4501	694.697	0.013
Tractor Trailer-Material Delivery	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Tractor Trailer-Steel Deliveries	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Tractor Trailer with Boom Hoist-Delivery	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Tractor Trailers Temp Fac.	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001
Tractors/Loader /Backhoe	Diesel	0.21	87.17	2.2629	2.4875	0.3689	0.3578	0.0051	0.4501	694.697	0.013
Trowel Machine	Gasoline	0.49	8.918	272.6173	1.7846	0.1240	0.1141	0.0064	5.5242	1045.571	0.705
Vibratory Compactor	Gasoline	0.55	12.67	269.6998	1.7246	0.1145	0.1054	0.0064	5.2130	1046.734	0.659
Water Truck	Diesel	0.59	688.1	0.0516	0.1614	0.0101	0.0098	0.0036	0.0119	536.794	0.001

Source: (USEPA, 2024b)

Notes: CO = carbon monoxide; NO_x = oxides of nitrogen; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; SO_2 = sulfur dioxide; CO_2 = carbon dioxide; CH_4 = methane

Table B-5: 2025 On-road Vehicle Emission Rates (grams per vehicle mile traveled)

Equipment	*Fuel Type*	*CO*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_2*	*VOC*	*CO_2*	*CH_4*
Heavy Duty Diesel Vehicles	Diesel	0.9012	2.0735	0.2666	0.1272	0.0093	0.2407	1105.7448	0.0543
Light Duty Gasoline Trucks	Gasoline	2.2555	0.1320	0.0437	0.0087	0.0058	0.1403	284.2923	0.0031
Light Duty Gasoline Vehicles	Gasoline	3.3278	0.2582	0.0483	0.0100	0.0076	0.1774	372.1378	0.0046

Source: (USEPA, 2024b)

Notes: CO = carbon monoxide; NO_x = oxides of nitrogen; PM_{10} = particulate matter less than or equal to 10 microns diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns diameter; SO_2 = sulfur dioxide; CO_2 = carbon dioxide; CH_4 = methane

Operations Emissions Inventory

Annual criteria pollutant and GHG emissions resulting from operation of emergency generators were estimated using **Equation 7** and **Equation 8**, respectively. Generator size for typical safe room sizes under Alternatives 2, 3, 4, and 5 was determined using a base generating capacity of 50 kilowatts, plus 10 watts per square foot of structure (General Power, 2024). Annual generator usage is assumed to include 0.5 hour per month of routine maintenance and testing operation (6 annual hours), as well as 10 days per year of 24-hour operation during power loss events (240 annual hours). Facility and generator sizing details and anticipated annual generator usage are shown in **Table B-6**. Emission rates for criteria pollutants and GHGs derived from USEPA's AP-42 are shown in **Table B-7**.

Table B-6: 2025 Facility and Generator Size and Usage

Component	*Alternative 2*	*Alternative 3*	*Alternative 4*	Alternative 5
Safe Room Size (square feet)	196	21,780	220,800	220,800
Base Generator Capacity (kW)	50	50	50	50
Scaled Generator Capacity (kW)	51.96	267.8	2,258	2,258
Annual Operating Hours	246	246	246	246
Annual kW-hours	12,782	65,879	555,468	555,468
Annual Horsepower-hours	17,141	88,345	744,895	744,895

Notes: 1 kW-hour = 1.34102209 horsepower-hours

Table B-7: Emergency Generator Emission Rates

Emission Rates (pounds per horsepower-hour)							
CO	***NO_x***	***PM_{10}***	***$PM_{2.5}$***	***SO_x***	***VOC***	***CO_2***	***CH_4***
0.00688	0.0259	0.000809	0.000809	0.0000125	0.00716	1.33	0.000705

Source: (USEPA, 1996)

Notes: CO = carbon monoxide; NO_x = oxides of nitrogen; PM_{10} = particulate matter less than or equal to 10 microns diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns diameter; SO_2 = sulfur dioxide; CO_2 = carbon dioxide; CH_4 = methane

Equation 7:

$$\text{Emissions}_{(\text{tpy})} = \sum_{v=i}^{n} \text{EF}_g \times \frac{\text{horsepower-hours}}{\text{year}} \div 2{,}000$$

Where:

$\text{Emissions}_{(\text{tpy})}$ = annual emissions (tons per year)

EF_g = emissions rate for generator (pounds per horsepower-hour)

2,000 = pounds per ton

Equation 8:

$$\text{Emissions}_{(\text{metric tpy})} = \sum_{v=i}^{n} EF_g \times HP_v \times \frac{\text{horsepower-hours}}{\text{year}} \div 2{,}000 \times 0.907185$$

Where:

$\text{Emissions}_{(\text{metric tpy})}$ = annual emissions (metric tons per year)

EF_g = emissions rate for generator (pounds per horsepower-hour)

2,000 = pounds per ton

1 ton = 0.907185 metric ton

Greenhouse Gas Baselines

Annual GHG emission rates for each U.S. State, U.S. Territory, and the nation are presented in **Table B-8**. Rates are provided in annual metric tons of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and carbon dioxide equivalent (CO_2e). CO_2e is estimated by applying the global warming potential (GWP) of each GHG to that GHG's annual emissions. The GWP for CO_2 is 1, the GWP for CH_4 is 28, and the GWP for N_2O is 265 (IPCC, 2014).

Table B-8: State, Territory, and National Annual GHG Emissions (MT per year) in 2020

Geography	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Alabama	44,800,996	25,502	561	45,663,638
Alaska	20,059,044	98,083	65	22,822,584
Arizona	47,076,672	28,045	654	48,035,245
Arkansas	27,635,516	22,746	266	28,343,019
California	250,738,115	298,140	2,394	259,720,358
Colorado	45,046,722	84,085	491	47,531,182
Connecticut	15,489,951	1,302	237	15,589,294
Delaware	4,967,642	665	70	5,004,887
District Of Columbia	1,788,843	279	29	1,804,242
Florida	134,426,250	61,432	1,370	136,509,273
Georgia	78,476,091	21,970	1,025	79,362,978
Hawaii	5,380,361	1,202	99	5,440,165
Idaho	19,111,679	33,518	190	20,100,565
Illinois	59,864,744	7,898	845	60,309,861
Indiana	48,159,049	4,413	616	48,445,739

Geography	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Iowa	23,279,747	5,177	317	23,508,824
Kansas	23,079,285	9,595	298	23,427,038
Kentucky	28,838,903	5,719	402	29,105,494
Louisiana	35,105,176	18,747	362	35,725,961
Maine	8,008,769	1,125	95	8,065,478
Maryland	27,402,247	2,672	386	27,579,461
Massachusetts	28,031,017	2,392	393	28,202,181
Michigan	47,007,431	4,939	681	47,326,292
Minnesota	35,095,762	6,076	440	35,382,377
Mississippi	26,098,446	11,804	270	26,500,451
Missouri	49,837,425	21,602	610	50,603,971
Montana	13,687,764	18,252	198	14,251,189
Nebraska	17,910,025	5,991	254	18,145,086
Nevada	17,223,770	4,692	220	17,413,326
New Hampshire	6,879,621	831	113	6,932,893
New Jersey	36,453,342	4,744	490	36,715,890
New Mexico	19,402,099	8,216	234	19,694,155
New York	61,766,756	6,996	831	62,182,954
North Carolina	55,957,183	8,593	1,017	56,467,350
North Dakota	10,738,090	2,296	94	10,827,391
Ohio	63,240,422	6,317	902	63,656,248
Oklahoma	36,732,566	26,967	447	37,606,051
Oregon	88,692,703	325,073	571	97,946,007
Pennsylvania	55,669,758	6,757	1,104	56,151,586
Puerto Rico	7,928,573	871	104	7,980,454
Rhode Island	4,045,025	410	67	4,074,259
South Carolina	33,976,420	12,443	488	34,454,071

Geography	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
South Dakota	8,657,289	4,134	101	8,799,814
Tennessee	47,689,567	8,218	643	48,089,975
Texas	172,854,957	56,263	1,928	174,941,187
Utah	22,564,790	23,697	263	23,298,074
Vermont	3,856,220	402	47	3,879,796
Virgin Islands	429,400	38	5	431,678
Virginia	43,729,477	7,772	680	44,127,421
Washington	40,423,763	27,982	711	41,395,588
West Virginia	9,990,392	2,262	140	10,090,818
Wisconsin	36,762,210	4,405	477	37,011,885
Wyoming	12,335,558	19,383	110	12,907,420
United States	2,064,403,624	1,373,134	25,403	2,109,583,123

Source: (USEPA, 2020)