



SRPEDD
Southeastern Regional Planning
& Economic Development District

Climate Pollution Reduction Grants Program: Providence-Warwick MSA

Lead Entity:
Southeastern Regional Planning & Economic
Development District (SRPEDD)

Quality Assurance Project Plan

Prepared by SRPEDD

Original - October 16, 2023

Revision Date – December 11, 2023

1. Project Management (Group A)

1.1. Title and Approval Page

**Quality Assurance Project Plan for
Providence-Warwick MSA
Regional Climate Pollution Reduction Plan**

Grant Number: 00A01116

Prepared by:
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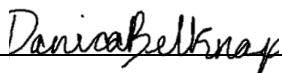
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Original - October 16, 2023
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Date: 12/11/2023



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Date: 12/11/2023



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USEPA Region 1 Quality Assurance Manager:
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Date:

QAPP Revision History

Revision No.	Description	Author	Date
0	Original Version	Helen Zincavage	10/16/23
1	Final Version for signature to reflect EPA review and satisfy comments from memo dated 11/2/2023	Helen Zincavage	11/13/23
2	Updated Version for review to incorporate methodology adjustment to include the MAPC GHGIT tool for certain sectoral evaluations as per the best methodological judgement of SRPEDD's GHG analyst Consultant's preferred approach. Also updated Project Manager from Helen Zincavage to Danica Belknap to reflect staff changes taking effect 12/28/23.	Helen Zincavage	12/11/23

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Abbreviations

CAA	Clean Air Act
CFR	Code of Federal Regulations
CCAP	Comprehensive Climate Action Plan
CPRG	Climate Pollution Reduction Grant
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Reporting Program (40 CFR Part 98)
ICR	Information Collection Request
NEI	EPA's National Emissions Inventory
OAR	EPA Office of Air and Radiation
PCAP	Priority Climate Action Plan
PM	Project Manager
PO	EPA Project Officer for Grant
POP	Period of Performance
POR	EPA Project Officer's Representative
PWP	Project Work Plan
QA	Quality Assurance
QAM	Quality Assurance Manager

QAMD	Quality Assurance Manager Delegate
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCC	Quality Control Coordinator
LGGIT	Community - GHG Inventory Tool (provided by the EPA)
TL	Task Leader
SRPEDD	Southeastern Regional Planning and Economic Development District
UMass	University of Massachusetts - Dartmouth
RIDEM	Rhode Island Department of Environmental Management
MOVES	Motor Vehicle Emissions Simulator
SIT	State Inventory Tool
NEPOOL-GIS	New England Power Pool Generation Information System
FLIGHT	Facility Level Information on GreenHouse gases Tool
RIE4C	Rhode Island Executive Climate Change Coordinating Council
MAPC GHGIT	Metropolitan Area Planning Council Greenhouse Gas Inventory Tool

1.3. Distribution List

This section presents the primary staff who will be working on the project. These staff will be identifying existing¹ data resources for evaluation and potential use under the project or serving in project-specific roles for implementing the Quality Assurance Project Plan (QAPP). The listing in **Table 1.1** includes staff responsible for implementing independent internal quality management steps and staff serving in external oversight roles.

SRPEDD has completed a procurement round and contracted with EA Engineering as our GHG Analyst contractor for the purpose of accomplishing technical CPRG required project tasks related to GHG inventories, projections, target development, and GHG measure quantification. The key EA project staff are listed in Table 1.1. below. One additional staff member is anticipated to be hired as a SRPEDD support staff member. This position is the only one that remains “TBD.” Immediately upon hire of this SRPEDD employee, we will issue a revision to this QAPP with the identity of the individual included.

This QAPP and, as applicable, all major deliverables relying on existing data will be distributed to the staff presented in **Table 1.1**. Additionally, this QAPP will be provided to any unlisted staff who are assigned to perform work under this project. A secured copy of this QAPP will be maintained in the project files under the //SRPEDD/CPRG – Documents/02_Quality Management/QAPP/QAPP_Active Version directory.

Table 1.1 QAPP Distribution List

Name	Organization	Role
Emma Stogsdill	US EPA, Region 1	EPA Project Officer (PO)
Nora Conlon	US EPA, Region 1	EPA Quality Assurance Manager or Delegate
Jeffrey Walker, AICP	SRPEDD	Grantee Sr. Approver, Executive Director, Quality Assurance Oversight
Danica Belknap	SRPEDD	Grantee PM, Manager of Environmental Programs
SRPEDD Staff Support	SRPEDD, new hire TBD	Grantee Technical Staff 1, Principal Resilience Planner
Kathryn Wassel	University of Massachusetts, Dartmouth	Technical Staff, Assistant Teaching Professor
John Kumm, P.E., BCEE, CC-P, CEM, LEED AP	EA Engineering (project Consultant)	Consultant (EA Engineering) PM
Christopher Anderson, PhD	EA Engineering	Consultant Project Technical Lead, Tasks 1, 2, 3, 4, and 5 Leader
Frank Barranco, PhD, PE, PG, CMQ/OE	EA Engineering	Consultant Quality Assurance Manager (QAM)
Brian Lesinski, EMS-LA	EA Engineering	Consultant Quality Control Coordinator
Nicholas Dobberpuhl, P.E.	EA Engineering	Consultant Technical Staff, Environmental Scientist

¹ The term “existing data” is defined by the EPA’s *Environmental Information Quality Policy* ([CIO 2105.3](#)) as “... data that have been collected, derived, stored, or reported in the past or by other parties (for a different purpose and/or using different methods and quality criteria). Sometimes referred to as data from other sources.” The term “secondary data” may also be used to describe “existing data” in historical EPA quality-related documents.

Regina Cagle Irr, P.E.	EA Engineering	Consultant Tasks 3 and 4.4 Technical Staff
Mark Arndt	EA Engineering	Consultant Tasks 1 and 4.1 Technical Staff
Alison Barton	EA Engineering	Consultant Tasks 2 and 4.1 Technical Staff
Melvin Stroble, Sr., REM	EA Engineering	Consultant Tasks 2 and 4.1 Technical Staff
Kelly Whalen, P.E.	EA Engineering	Consultant Task 4.5 Technical Staff
Christopher Small, P.E.	EA Engineering	Consultant Technical Support Staff
Jonathan Alvarez, CPG	EA Engineering	Consultant Tasks 4.2 and 5 Technical Staff
Sal DeCarli, CE	EA Engineering	Consultant Tasks 4.2 and 5 Technical Staff

1.4. Project/Task Organization

The primary personnel responsible for implementation of this project are the SRPEDD Project Manager (PM), Quality Assurance Manager (QAM), and Task Leaders (TLs). Their duties are outlined briefly in this section. The project QAM is independent of the unit generating the data.

Danica Belknap is the SRPEDD PM and will provide senior-level oversight as needed. The PM is responsible for SRPEDD's technical and financial performance as well as maintaining communications with the EPA to ensure mutual understanding of grant requirements, EPA expectations, and conformity with EPA quality procedures; managing oversight and conduct of project activities including allocation of resources to specific tasks; ensuring that quality procedures are incorporated into all aspects of the project; developing, conducting, and/or overseeing QA plans as necessary; ensuring that any corrective actions are implemented; operating project activities within the documented and approved Quality Assurance Project Plan; and ensuring that all products delivered to the EPA are of specified type, quantity, and quality.

The SRPEDD PM and Consultant PM will assign a TL for each technical task with instructions to complete a baseline emissions inventory for the sector(s) under the task, to contribute to the development of options for potential emission reductions, to quantify options (developed and selected by SRPEDD, UMass and stakeholder communities) for potential emissions reductions with estimated reductions per option, and to develop uncertainty estimates for each reduction estimate. **Table 1.1** presents the TLs for each technical task. Each TL is responsible for the day-to-day technical activities under their assigned task, including planning, reporting, and controlling of technical and financial resources allocated to the task by the PM. Accordingly, each TL is primarily responsible for implementing the Quality Program and this QAPP on task-level assignments.

Task-level management system. For each of the major deliverables under each task, the assigned TL will review all QA-related plans and reports and is responsible for transmitting them to the QA Manager, Frank Barranco, (or delegate) for review and approval. Each TL is responsible for ensuring that quality procedures are implemented at the task level and for maintaining the official, approved, task-level QAPP content. Each TL will discuss any concerns about quality or any proposed revisions to task-level QAPP content with the QA Manager (or delegate) to identify, resolve, or preclude problems or to amend task-level plans, if necessary. In addition, each TL will work with the SRPEDD PM and the QA Manager to identify and implement quality improvements. The SRPEDD PM is responsible for ensuring the consistency of similar or related QA measures across tasks, and the TLs are responsible for overseeing task-level work performed by technical staff and providing assurance that all required QA/QC procedures are being implemented.

Project-level management system. Tasks are expected to proceed concurrently, in parallel. The PM will maintain close communications with each TL and ensure any difficulties encountered or proposed changes at the task level are reviewed for implications on other similar or related tasks. The PM is also responsible for communicating progress or difficulties encountered (across all tasks) to the EPA PO or POR, who provides the EPA's primary oversight function for this project at EPA OAR/ EPA Region 1 and is responsible for review and approval of this QAPP and any future revisions. The PM (with support from TLs and assigned SRPEDD technical staff) will be responsible for consulting with the EPA PO or POR, on planning, scheduling, and implementing the QA/QC for all project deliverables and obtaining required EPA approvals.

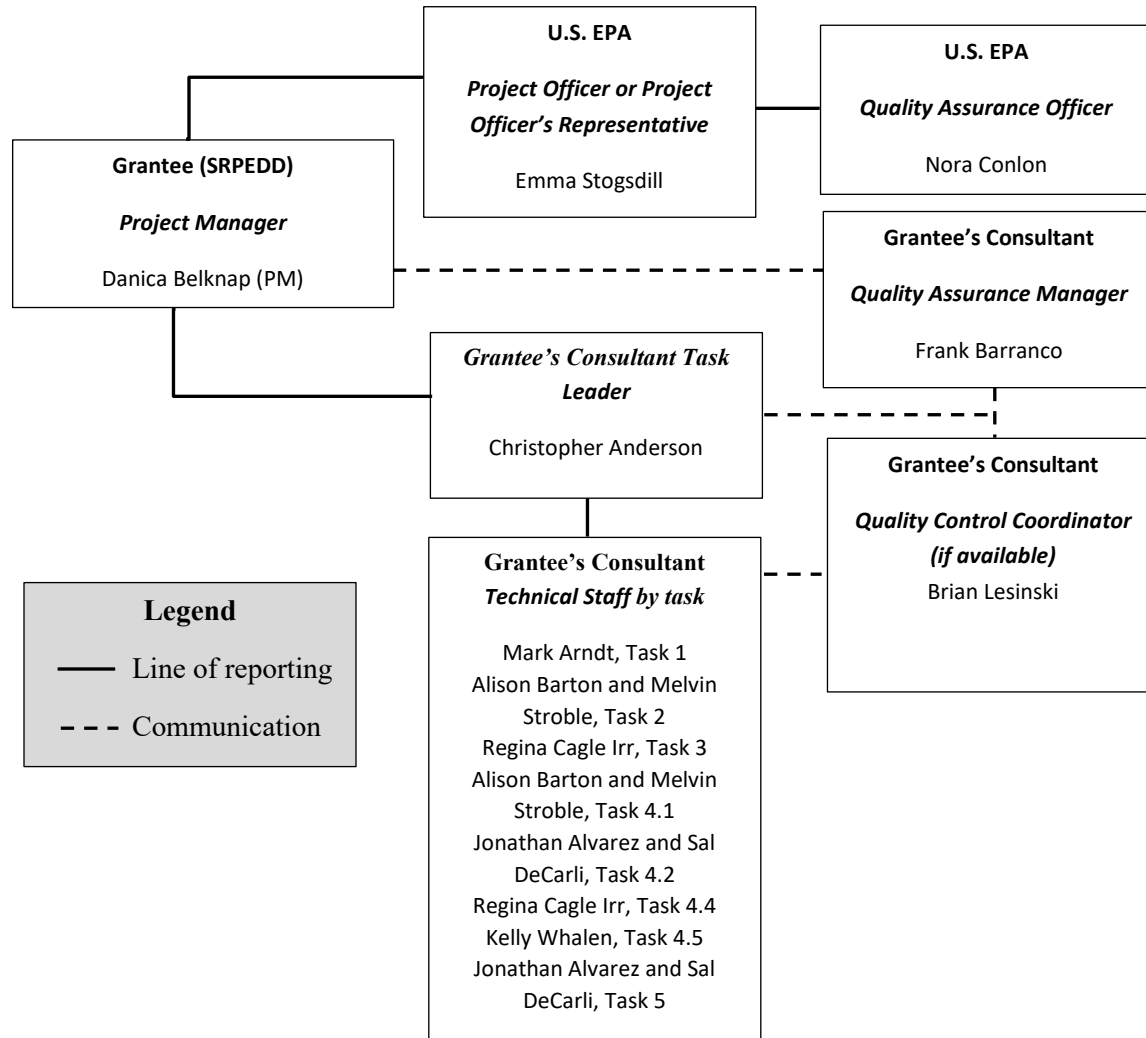
The QA Manager, Frank Barranco of EA Engineering, is responsible for overseeing the quality system, monitoring and facilitating QA activities on tasks, and generally helping the SRPEDD PM and TLs understand and comply with EPA QA requirements. The QAM will not be involved in data collection or analyses. In selecting a consultant team, SRPEDD will ensure that the QAM is in a separate office or division from the technical consultants that are involved in data collection or analyses for the CPRG. At the request of the SRPEDD PM, the QAM is responsible for conducting periodic independent audits of this project's QA program. The QAM will produce written documentation of the audit results and recommendations.

For each task under this project, the QAM is supported by the QC Coordinator, who will assist in the implementation of the quality system. The QAM will work closely with the PM and QC Coordinator to improve any deficiencies noted during audits.

The QC Coordinator, Brian Lesinski of EA Engineering, is responsible for assisting the PM and TLs in planning, documenting, and implementing the QA requirements for this project. Working with the PM, and in consultation with the QAM, they will ensure that process- and project-specific QA documents are developed; that required or recommended protocols are followed; that data are reduced, validated, and reported according to specific criteria; and that QC assessments are performed. The QC Coordinator will communicate with the PM and the QAM, as needed, on quality issues.

In addition, QC functions will be carried out by other technical staff and will be carefully monitored by the PM, who will work with the QA Manager to oversee this plan and implement quality improvements. For work done under this project, technical staff may include persons with expertise in the local residential, commercial, and industrial activities. Technical staff may also include persons with expertise in air pollution engineering, technical reviewers, database specialists, quality auditors, and technical editors. The PM will ensure that technical staff do not review work in a QA capacity for which they were a primary or contributing author. **Exhibit 1** presents the organizational chart for the project.

Exhibit 1. Project Organization²



² Under the EPA's QAPP standard (CIO 2105-S-02.0, section 3) the organization chart must also identify any contractor relationships relevant to environmental data operations.

⁴ In collaboration with EPA CPRG program officers and other Massachusetts-based regional lead entities for CPRG, we note that the boundaries of the prescribed “Providence-Warwick MSA” have been amended to reflect a target area that includes the entirety of the SRPEDD jurisdictional region, with SRPEDD serving as the MSA grant lead entity. A map of the target planning area in SRPEDD’s EPA-approved CPRG work program can be found at: <https://srpedd.org/cprg/>

The GHG inventory may utilize the EPA’s Local – GHG Inventory Tool (LGGIT),⁵ facility-specific GHG data published by the EPA in the Facility Level Information on Greenhouse gases Tool (FLIGHT),⁶ data reported to the EPA’s Greenhouse Gas Reporting Program (GHGRP),⁷ EPA’s National Emissions Inventory (NEI),⁸ DOE’s State and Local Planning for Energy (SLOPE) Platform,⁹ the Global Protocol for Community-Scale (GPC) Greenhouse Gas Inventories,¹⁰ the Local Government Operations (LGO) Protocol,¹¹ and/or 3rd party data or tools, together with any independent, sector-specific estimates prepared by SRPEDD. The FLIGHT and GHGRP datasets can be downloaded and filtered by state, city, county, and/or zip code. Any independent local or MSA estimates or ratios (e.g., electricity usage per customer by customer class) will be compared to corresponding federal, state, or local estimates for validation, as available. Significant differences between primary estimates and validation estimates will be evaluated and discussed in the inventory report with the underlying data and methodologies used for the estimates.

As applicable, the local inventory will include the following sources and gases (divided into the Residential, Commercial/Institutional, Industrial, and Energy Generation sectors):

LGGIT Source Categories

1. Mobile Combustion
2. Stationary Combustion
3. Electricity Consumption
4. Solid Waste
5. Urban Forestry
6. Agriculture & Land Management
7. Water Use
8. Waste Generation
9. Wastewater Treatment

Greenhouse Gases (across all sectors)

carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), fluorinated gases (F-gases) including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆)

The EPA LGGIT has two modules: the Local Government Operations Module is specific to municipal governments and evaluating GHG emissions by their departments, and the Community Module, which could also include local government information. The LGGIT User Guides state the two modules are companion tools, and any totals estimated in the Government Operations Module can be included in the Community Module. For example, a county could use the Community Module and incorporate data from the Government Operations Modules completed by the cities within the county. Grantees using both modules should conduct a quality check to ensure that emissions do not get double-counted. This template is based on the Community Module.

An alternative inventory tool for Massachusetts local greenhouse gas emissions inventory is the Metropolitan Area Planning Council Greenhouse Gas Inventory Tool (MAPC GHGIT)¹². This tool

⁵ <https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool>

⁶ Facility Level Information on Greenhouse gases Tool (FLIGHT) at <https://ghgdata.epa.gov/>

⁷ <https://www.epa.gov/ghgreporting/data-sets>

⁸ <https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-ne>

⁹ <https://www.energy.gov/scep/slsc/state-and-local-planning-energy-slope-platform>

¹⁰ <https://ghgprotocol.org/ghg-protocol-cities>

¹¹ https://ww2.arb.ca.gov/sites/default/files/classic/cc/protocols/lgo_protocol_v1_1_2010-05-03.pdf

¹² <https://www.mapc.org/resource-library/community-ghg-inventory-resources/>

includes data links and calculations at finer granularity than EPA LGGIT, enabling town-level inventory for regional aggregation.

1.5.1. Rationale for Selection of Sectors

For each sector included in the local inventory, **Table 1.2** briefly describes why the sector was included in the inventory and the relative significance of the sector in terms of the magnitude of air emissions from existing inventories, the associated geographic distribution of the sources, and recent trends in readily available activity data for the source category.

Table 1.2 Rationale for Sector Selection

Sectors Included in Inventory	Rationale for Including in GHG Inventory
Mobile combustion	Transportation activities were the largest source (29 percent) of total U.S. greenhouse gas emissions in 2021. From 1990 to 2021, transportation CO ₂ emissions from fossil fuel combustion increased by 19 percent. Transportation activities occur in all communities.
Electricity consumption	The electric power sector accounted for 25 percent of total U.S. greenhouse gas emissions in 2021. Power generation and/or consumption occurs among all communities.
Urban forestry ¹³	This sector includes fluxes of carbon from activities such as converting forests to agricultural use and practices that remove CO ₂ from the atmosphere and store it in long-term carbon sinks like forests. In 2021, the net CO ₂ removed from the atmosphere by natural and working lands was 12% of total U.S. greenhouse gas emissions. Between 1990 and 2021, total carbon sequestration in this sector decreased by 14%, primarily due to a decrease in the rate of net carbon accumulation in forests, as well as an increase in CO ₂ emissions from urbanization.
Agriculture & land management	Agriculture accounted for about 10 percent of U.S. greenhouse gas emissions in 2021, and agricultural soil management was the largest source of N ₂ O emissions. Enteric fermentation was the largest source of CH ₄ emissions.
Stationary combustion (including for commercial and residential heating)	In 2021, the commercial and residential sectors accounted for 7 and 6 percent of total U.S. greenhouse gas emissions, respectively. Emissions from the commercial and residential sectors have increased since 1990. Total residential and commercial greenhouse gas emissions, including direct and indirect emissions, in 2021 have increased by 2% since 1990. In 2021, an increase in heating degree days (0.5 percent) increased energy demand for heating in the residential and commercial sectors, however, a 1.8 percent decrease in cooling degree days compared to 2020 reduced demand for air conditioning in the residential and commercial sectors.
Solid waste and waste generation	This sector includes landfills, composting, and anaerobic digestion. Landfills were the third largest source of anthropogenic methane emissions in 2021, and landfills accounted for 1.9 percent of total U.S. greenhouse gas emissions.
Wastewater treatment	Wastewater treatment, both domestic and industrial, was the third largest anthropogenic source of N ₂ O emissions in 2021, accounting for 5.2 percent of national N ₂ O emissions

¹³ Under international GHG inventory protocols this category is called “Land use, land-use change, and forestry.”

	and 0.3 percent of total U.S. greenhouse gas emissions. Emissions from wastewater treatment increased by 6.1 MMT CO ₂ e (41.6 percent) since 1990 as a result of growing U.S. population and protein consumption.
Water	This sector includes indirect emissions associated with the electricity used to deliver water to local communities.

1.5.2. Decisions to be Made

The EPA's recommended tool for local GHG inventories (the LGGIT) covers categories of GHG emissions by source category (e.g., mobile combustion, stationary combustion, electricity consumption, solid waste, etc.). The LGGIT provides many default values to facilitate developing local estimates using methods consistent with the Global Protocol for Community-Scale GHG Emissions.¹⁴ To date, a regional GHG inventory has never been undertaken for the Massachusetts-based geography of the Providence-Warwick MSA (i.e., the SRPEDD jurisdictional region). However, the State of Rhode Island has conducted annual GHG inventory accounting, the most recent of which was completed in December 2022, for the year 2019.¹⁵ There are primary decisions to be made under each task of this project for each source category, and each Task Leader will be charged with the following decisions:

1. Determine (for each major activity) if the LGGIT estimate, a different federal estimate or tool, or a non-federal estimate or tool should be used for the local GHG baseline estimate.
 - a. In making this determination, consider the approach used by the State of Rhode Island, and how that methodology or a similar method could be used for the Massachusetts-based MSA geography, so that these geographies are additive and avoid the performance of work for the State of Rhode Island that is duplicative, and avoid results for the State of Rhode Island within the MSA-level study that would be inconsistent with the State of Rhode Island's own State-based estimations.
2. Determine the best options for quantifying the reduction of emissions of air pollution that will support local decision makers in selecting priority and comprehensive GHG reduction measures that achieve the following Congressional objectives under the Inflation Reduction Act:
 - a. Reduce climate pollution while supporting creation of good jobs and lowering energy costs for families.
 - b. Accelerate work addressing environmental injustice and empowering community driven solutions in overburdened neighborhoods.
 - c. Deliver cleaner air by reducing harmful air pollution in places where people live, work, play, and go to school.
3. Develop an estimate or a range of estimates for reductions achievable under each option.
4. Estimate the uncertainty of the emissions reduction estimate(s) or ranges under each option.

1.5.3. Actions to be Taken, Action Limits, and Expected Outcomes

Initially, local estimates will be derived using the LGGIT tool and/or a methodology consistent with that of the State of Rhode Island for each source category. Subsequently, SRPEDD may elect to

¹⁴ https://ghgprotocol.org/sites/default/files/standards/GPC_Full_MASTER_RW_v7.pdf

¹⁵ General webpage on RI GHG Emissions reporting at: <https://dem.ri.gov/environmental-protection-bureau/air-resources/greenhouse-gas-emissions-inventory>, with the 2019 GHG Inventory Report available at: <https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-12/ridem-ghg-inventory-2019.pdf>

supplement estimates derived using the LGGIT and/or a methodology consistent with that of the State of Rhode Island with estimates for each source category from existing local inventories, existing local activity data, or from other EPA or state resources. Calculated estimates derived from local activity data will be compared to federal datasets and/or downscaled state estimates for validation. The rationale for including any emissions estimates that show significant discrepancies from state or federal estimates will be documented in the community's GHG inventory report along with the underlying data and calculation methodology.

When identifying the best options for reducing air pollution, each TL will consider the activities affecting the largest numbers of families, business establishments, recreation areas, and schools. Options may include potential reductions in task-level activities impacting nonattainment areas and impacting residential, commercial, and school districts near the largest sources of air pollution. SRPEDD expects that each task will produce up to 8 options for sector-specific emissions reduction projects for further consideration by management and policymakers.

1.5.4. Reason for Project

The baseline GHG inventory and options analyses developed under this local community project will be utilized by SRPEDD and for planning purposes to support Providence-Warwick MSA's development of the following three CPRG planning deliverables:

- Providence-Warwick MSA's **Priority Climate Action Plan (PCAP)**, which is due March 1, 2024. This plan will include near-term, implementation-ready, priority GHG reduction measures and is a prerequisite for any implementation grant.
- Providence-Warwick MSA's **Comprehensive Climate Action Plan (CCAP)**, which is due in 2025 (later for tribes and territories). This plan will review all sectors that are significant GHG sources or sinks, and include both near- and long-term GHG emission reduction goals and strategies.
- Providence-Warwick MSA's **Status Report** on progress towards goal, which is due in 2027 (not applicable to tribes or territories). This progress report will include updated analyses, plans, and next steps for key metrics.

This QAPP describes in detail the necessary QA and QC requirements and technical activities that will be implemented to ensure the baseline GHG inventory and the sector-specific emissions reduction options are reliable for the PCAP and CCAP. As necessary, revisions to the QA and QC requirements defined in this QAPP will be updated in the 2027 Status Report.

1.5.5. Relevant Clean Air Act Mandates and Authorizations

The inventory produced under this project will support the deliverables required under EPA's Climate Pollution Reduction Planning Grants. The inventory will be used to evaluate opportunities for reducing GHG emissions from all major-emitting sources including both mobile source categories and stationary source categories. This project will include the fundamental research necessary to evaluate and plan new programs (and amendments to existing Clean Air Act [CAA] programs) for reducing emissions from fossil fuel combustion activities. Many activities in the GHG inventory (and subsequent emissions reductions options analyses) include major sources of criteria and toxic pollutants. Accordingly, the purpose of this project (to evaluate and plan for reductions in GHG emissions, including reductions from usage or production of fossil fuels) is also consistent with the following statutory mandates and authorizations under Clean Air Act Title I:

- **§ 7403. Research, investigation, training, and other activities**

*(a) Research and development program for prevention and control of air pollution
The Administrator shall establish a national research and development program for the prevention and control of air pollution*

- (1) conduct, and promote the coordination and acceleration of, research, investigations ... and studies related to the causes ... extent, prevention, and control of air pollution;*
- (2) encourage, cooperate with, and render technical services and provide financial assistance to air pollution control agencies and other appropriate public or private agencies, institutions, and organizations, and individuals in the conduct of such activities*

*(b) Authorized activities of Administrator in establishing research and development program
In carrying out the provisions of [paragraph (a)] the Administrator is authorized to–*

- (1) collect and make available, through publications and other appropriate means, the results of and other information, including appropriate recommendations by him in connection therewith, pertaining to such research and other activities;*
- (2) make grants to air pollution control agencies ... for purposes ... in subsection (a)(1)*

- **§ 7404. Research related to fuels and vehicles**

(a) Research programs; grants;

The Administrator shall give special emphasis to research and development into new and improved methods, having industry-wide application, for the prevention and control of air pollution and control of air pollution resulting from the combustion of fuels... he shall–

- (1) conduct and accelerate research programs directed toward development of improved , cost-effective techniques for–*
 - (A) control of combustion byproducts of fuels,*
 - (B) improving efficiency of fuels combustion so as to decrease atmospheric emissions*

- **§ 7405. Grants for support of air pollution planning and control programs**

(a) Amounts; limitations; assurances of plan development capability.

(1)(A) The Administrator may make grants to air pollution control agencies ... in an amount up to three-fifths of the cost of implementing programs for the prevention and control of air pollution For the purpose of this section, “implementing” means any activity related to the planning, developing, establishing, carrying out, improving, or maintaining of such programs....

(C) With respect to any air quality control region or portion thereof for which there is an applicable implementation plan under section 7410 ... grants under subparagraph (A) may be made only to air pollution control agencies which have substantial responsibilities for carrying out such applicable implementation plan.

1.5.6. Information Provided by the EPA under § 7403(b)(1)

Under authority of CAA § 7403(b)(1) the EPA has provided the following resources to ensure reliable air emissions inventories are produced to support plans for reducing emissions.

- [Agency-wide Quality Program Documents](#)
- Quality Assurance-specific Directives
 - [CIO 2105.3](#) – Environmental Information Quality Policy, April 10, 2023
 - [CIO 2105-P-01.3](#) – Environmental Information Quality Procedure, March 7, 2023
 - [CIO 2105-S-02.0](#) – EPA’s Environmental Information QA Project Plan (QAPP) Standard
 - EPA Regional Sites for Quality Management Plans and Guidance:
 - [Region 1](#) |
- QA Guidance
 - [EPA QA/G-4](#) – Guidance on Systematic Planning Using Data Quality Objectives Process

- [EPA QA/G-5](#) – *Guidance for Quality Assurance Project Plans*

SRPEDD will utilize these resources, as applicable, to ensure evaluation of existing data and utilization of those data are consistent with the EPA’s relevant directives and guidance.

1.6. Project / Task Description

An example schedule of deliverables for the technical tasks (Tasks 1-5) for GHG inventory QAPPs is presented in **Tables 2.1** through **2.5**. The work to be performed under this project involves preparing a local GHG emissions inventory for Providence-Warwick MSA. The organization of the work is based on the use of the EPA's Local – GHG Inventory Tool (LGGIT)¹⁶ under the following sector-specific tasks:

Task 1: Local inventory of mobile combustion GHG emissions.

Task 2: Local inventory of electric power consumption (indirect) GHG emissions.

Task 3: Local inventory of solid waste GHG emissions.

Task 4: Local inventory of GHG emissions from other sectors.

- 4.1 Stationary combustion
- 4.2 Agriculture and land management
- 4.4 Waste generation
- 4.5 Water
- 4.6 Wastewater treatment

Task 5: Local inventory of urban forestry resources.

For each sector-specific task, **Tables 2.1–2.5** provide planned activities and a schedule of deliverables for use by communities preparing GHG inventories. Before following the tasks described in Tables 2.1-2.5, SRPEDD will make a preliminary decision about which tool (LGGIT vs RIDEM methodology) to use for each task for each state (MA and RI). The table in Appendix D provides an example of how SRPEDD will track and document rationale for these decisions.

The EPA's LGGIT, other resources, and answers to frequently asked questions are also located on the [Local GHG Inventory Tool Page](#) Greenhouse Gas Data and Resources webpage.¹⁷ The LGGIT User's Guides provide a summary of required data inputs for each module (Table 1 of each LGGIT User's Guide).

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	Schedule
Task 1. Mobile Combustion (Transportation)	
<u>GHG Inventory Tool Decision:</u> The TL and assigned staff will review the data requirements for the relevant modules in the LGGIT, RIDEM GHG, and MAPC GHGIT methodology and determine which tool is appropriate to use for the municipalities in each state (MA and RI). The TL will document the decision and the rationale in a table such as the example in Appendix D. The TL will then assign staff to complete the following tasks according to the decision made in this step.	Within 120 days of QAPP approval by EPA.

¹⁶ <https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool>.

¹⁷ Ibid.

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	Schedule
Task 1. Mobile Combustion (Transportation)	
<u>LGGIT Tasks:</u> - The PM or TL will assign staff to download the EPA’s Local – GHG Inventory Tool (LGGIT) Community Module at https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool and use that tool to estimate emissions from mobile combustion sources. - Staff will read the [Introduction] worksheet and the [Read Me] worksheet to become familiar with the organization of the tool and the tool’s terminology. Staff will become familiar with Rows 42 through 59 of the [Read Me] sheet that reflect a brief summary of the steps necessary to complete the calculations for each sector. Additionally, staff can reference the LGGIT User’s Guide for the Community Module that is included within the downloaded zip file. - Staff will complete the four (4) initial setup steps on the [Control Sheet]. - Staff will review Chapter 7 - Transportation in the GPC GHG Emissions Inventories, and/or Chapter 7 - Vehicle Fleet in the LGO Protocol. Staff will obtain from a state or local motor vehicle agency, the most recent listing of vehicles registered at addresses located in the local community or MSA including (as available) year-manufactured, make, model, body style, fuel, and description. - In the LGGIT: Community Module [community_ghg_inventorytool.xlsm], staff will use the [Mobile-Entry] sheet to load the community’s or MSA’s population of fossil-fueled motor vehicles. Staff will prepare an aggregated listing (i.e., listing of sets of vehicles with counts by vehicle type, model, year, and fuel) for all of registered vehicles and an estimate of the average fuel consumed for each set of similar vehicles. - The PM, TL, or QAM will assign a staff member who did not support steps 2-6 of this task to complete a QC review. Staff will independently review the original source data for all inputs and supporting calculations used to populate the [Mobile-Detail Calcs] sheet. Staff will also complete an independent review of all inputs to the LGGIT and complete independent calculations for at least 2 types of vehicles (as directed by the PM or TL) on the [Mobile-Detail Calcs] sheet. The assigned QC staff member will also be directed to compare the LGGIT-based estimate to the estimate published in the EPA’s National Emissions Inventory (NEI) and available using the <i>Data Queries</i> tool at https://www.epa.gov/air-emissions-inventories/2020-nei-supporting-data-and-summaries. This NEI query tool provides national, state, county, and tribal emissions estimates for mobile sources. <u>RIDEM Methodology Tasks:</u> - The PM or TL will assign staff to download RIDEM’s 2019 Rhode Island Greenhouse Gas Emissions Inventory at https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-12/ridem-ghg-inventory-2019.pdf and use that report to understand the state-level data	

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	Schedule
Task 1. Mobile Combustion (Transportation)	
sources or federal tools apart from LGGIT used to estimate emissions from mobile combustion sources for the State or Rhode Island. - Staff will read the Background section of the report to become familiar with the generalized approach to the State of Rhode Island’s GHG inventory methodology and rationale. Staff will become familiar with the Transportation Sector section of the report, which discuss the methods that were used to quantify transportation emissions (MOVES, SIT, state-level datasets).¹⁸ Additional methodology details are available in the Rhode Island 2022 Climate Update, Greenhouse Gas Emissions Inventory Process, Methodology, and Tools section, available at https://climatechange.ri.gov/act-climate/2025-climate-update. - Staff will make a determination as to the ability to utilize the RIDEM methodology for consistency across the entire MSA region, inclusive of federal and state-level data equivalents that may be available for the Massachusetts-based geography, or where departures or use of LGGIT are warranted given improved data quality or availability. - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the RIDEM methodology. <u>MAPC GHGIT Tasks:</u> - The PM or TL will assign staff to download MAPC’s Greenhouse Gas Inventory Tool (MAPC GHGIT) at https://www.mapc.org/resource-library/community-ghg-inventory-resources/ and use that tool to estimate emissions from mobile combustion sources. - Staff will read the [Introduction] worksheet and the Step-by-Step GHG Inventory Guide at https://www.mapc.org/wp-content/uploads/2020/03/04102020_MAPC-Step-by-Step-GHG-Inventory-Guide.pdf to become familiar with the organization of the tool and the tool’s terminology. Staff will become familiar with pages 21-23 of the Guide and the Transportation section of the [Inputs] worksheet. - Staff will follow the instructions on the [Inputs] worksheet to access input data and populate the template with required data and optional data, as applicable. - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the MAPC GHGIT methodology.	

¹⁸ Additional methodology details are available in the Rhode Island 2022 Climate Update, Greenhouse Gas Emissions Inventory Process, Methodology, and Tools section, available at <https://climatechange.ri.gov/act-climate/2025-climate-update>.

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	Schedule
Task 1. Mobile Combustion (Transportation)	
<u>Post-GHG Inventory Tasks</u> - In the GHG inventory report or in a separate report based on the GHG inventory, SRPEDD will include a listing of options for emissions reductions from this sector that may include one or more of the following components or other components (that are not listed below) that assigned staff may identify during preparation of the inventory in the future during implementation of this task: - The specific source categories and activities affected by the proposed option. - The quantity of GHG emissions reduced by the options with an associated uncertainty estimate. - The quantity of criteria emissions reduced by the options with an associated uncertainty estimate. - The quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. - The number of people living in any nonattainment areas where the option would reduce emissions (regardless of the specific pollutant triggering nonattainment). - A description of any benefits that the option will impart to communities with known environmental injustice issues such as close proximity to major transportation corridors.	

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables	Schedule
Task 2. Electric Power Consumption	
<u>GHG Inventory Tool Decision:</u> The TL and assigned staff will review the data requirements for the relevant modules in the LGGIT, RIDEM GHG, and MAPC GHGIT methodology and determine which tool is appropriate to use for the municipalities in each state (MA and RI). The TL will document the decision and the rationale in a table such as the example in Appendix D. The TL will then assign staff to complete the following tasks according to the decision made in this step.	Within 120 days of QAPP approval by EPA.

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables			Schedule								
Task 2. Electric Power Consumption											
LGGIT Tasks:											
• The PM or TL will assign a staff member to use the EPA’s LGGIT tool [community_ghg_inventorytool.xlsm] and to verify that the four (4) initial steps required on the [Control Sheet] have been completed. • Staff will review Chapter 6.5 - Calculating Emissions from Grid-Supplied Energy Consumption in the GPC GHG Emissions Inventories, and/or Chapter 6.2 - Electricity Use in the LGO Protocol. • Staff will obtain total electricity consumption data for the community or MSA from one or more of the following local, state, or federal resources to be used for the baseline estimate or QC validation of the baseline estimate: a. Summaries of metered consumption obtained from the local electric utilities that serve the community or MSA by customer class. b. EIA Form 861 data published by the DOE and available at https://www.eia.gov/electricity/data/eia861/. c. The State and Local Planning for Energy (SLOPE) model datasets available at https://maps.nrel.gov/slope/about. Note these data are published as electricity usage in the units of MMBtu/year for the entire county. Estimates are provided for residential, commercial, and institutional customer classes. These data will be converted to kilowatt-hours per year prior to entry into the LGGIT tool. The projections available in this tool (for future years) may also be used for estimating emissions reductions associated with options listed for the electric utility sector. • Staff will use the [Electricity-Entry] sheet of the EPA’s LGGIT tool. Staff will read the explanation of the <i>Data Entry & Calculations</i> starting in cell A3. Staff will enter the data for each chosen entity. These entities may be of any scale as chosen by the grantee (e.g., the entire community by sector; individual building, such as a commercial or institutional facility; or a set of similar facilities (e.g., a group of similar residential units). For groups of similar units, when entering the <i>Unit Description</i> in cell C10 of the [Electricity-Entry] sheet, staff will include in the description the number of units that were included when the <i>electricity purchased (kWh)</i> value was summed or otherwise calculated for entry into cell C16. Staff will document in the inventory each calculation with associated units of measure for each record added on the [Electricity-Entry] sheet in a manner similar to the following example:											
<table><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>Count of Units in Set</td><td>Set Description</td><td>Avg. Annual kWh Used (per Unit)</td></tr></table>	A	B	C	Count of Units in Set	Set Description	Avg. Annual kWh Used (per Unit)		<table><tr><th>D</th></tr><tr><td>Annual Usage (All Units)</td></tr></table>	D	Annual Usage (All Units)	
A	B	C									
Count of Units in Set	Set Description	Avg. Annual kWh Used (per Unit)									
D											
Annual Usage (All Units)											

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables				Schedule
Task 2. Electric Power Consumption				
1000	Single-family home	750 kWh (Single-family home) (1 Year)	=	750,000 kWh Year
Staff will document the source of the MW-hr usage per customer entered in column C. - Staff will determine if EIA Form 861 at https://www.eia.gov/electricity/data/eia861/ includes one of the following types of data that may be useful for estimating or validating the usage per customer entered in column C of step 2: - The community's or MSA's total electricity usage. (See <i>Attachment 1</i> for some of the service territories included under EIA Form 861), - The service territory or territories that include the community or MSA. (See the EIA Form 861 file entitled [Service_Territory_2020.xlsx] for a listing of the utilities that serve each county in the United States, - A service territory adjacent to the community or MSA with similar usage patterns that may be comparable to the community's or MSA's estimate, or - Make a determination that there are no data under EIA Form 861 that are relevant to estimating or validating local usage per customer in column C of step 2. - If the community locates EIA 861 electricity data relevant to estimating or validating local usage, staff will include in the inventory the following values from EIA Form 861 to reflect electricity usage per customer most similar to local usage:				
EIA 861 Column Name		EIA Form 861 Value		
Year of Data				
Utility Name				
Utility Number				
State				
BA Code				
Residential Sales (MW-hrs)				
Residential Customers				
Commercial Sales (MW-hrs)				
Commercial Customers				
Industrial Sales (MW-hrs)				
Industrial Customers				
Transportation Sales (MW-hrs)				

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables		Schedule
Task 2. Electric Power Consumption		
Transportation Customers <u>RIDEM Methodology Tasks:</u> - The PM or TL will assign staff to download RIDEM’s 2019 Rhode Island Greenhouse Gas Emissions Inventory at https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-12/ridem-ghg-inventory-2019.pdf and use that report to understand the state-level data sources or federal tools apart from LGGIT used to estimate emissions from electric power consumption sources for the State or Rhode Island. - Staff will read the Background section of the report to become familiar with the generalized approach to the State of Rhode Island’s GHG inventory methodology and rationale. Staff will become familiar with the Electricity Sector section of the report, which discuss the methods that were used to quantify electricity usage emissions (an RI-based equivalency of MassDEP’s estimation method of GHG emissions from electricity consumption, data from NEPOOL-GIS, etc.).¹⁹ - Staff will make a determination as to the ability to utilize the RIDEM methodology for consistency across the entire MSA region, inclusive of federal and state-level data equivalents that may be available for the Massachusetts-based geography, or where departures or use of LGGIT are warranted given improved data quality or availability. - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the RIDEM methodology. <u>MAPC GHGIT Tasks:</u> - The PM or TL will assign staff to use MAPC’s Greenhouse Gas Inventory Tool (MPAC GHGIT), which was downloaded in Task 1, to estimate emissions from electric power consumption. - Staff will read the [Introduction] worksheet and the Step-by-Step GHG Inventory Guide at https://www.mapc.org/wp-content/uploads/2020/03/04102020_MAPC-Step-by-Step-GHG-Inventory-Guide.pdf to become familiar with the organization of the tool and the tool’s terminology. Staff will become familiar with pages 14-17 of the Guide and the Electricity section of the [Inputs] worksheet.		

¹⁹ Additional methodology details are available in the Rhode Island 2022 Climate Update, Greenhouse Gas Emissions Inventory Process, Methodology, and Tools section, available at <https://climatechange.ri.gov/act-climate/2025-climate-update>.

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables	Schedule
Task 2. Electric Power Consumption	
- Staff will follow the instructions on the [Inputs] worksheet to access input data and populate the template with required data and optional data, as applicable. - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the MAPC GHGIT methodology. <u>Post-GHG Inventory Tasks:</u> - In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. Quantity of GHG emissions reduced by the options with an associated uncertainty estimate. c. Quantity of criteria emissions reduced by the options with an associated uncertainty estimate. d. Quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. Number of people living in any nonattainment areas where option would reduce emissions (regardless of pollutant triggering nonattainment). f. Description of any benefits that the option will impart to communities with known environmental injustice issues such as close proximity of the community to an affected source under the option that emits toxic air pollutants.	

Table 2.3 Technical Task Descriptions for Task 3.

Tasks and Deliverables	Schedule
Task 3. Solid Waste (Landfills)	
<u>GHG Inventory Tool Decision:</u> - The TL and assigned staff will review the data requirements for the relevant modules in the LGGIT, RIDEM GHG, and MAPC GHGIT methodology and determine which tool is appropriate to use for the municipalities in each state (MA and RI). The TL will document the decision and the rationale in a table such as the example in Appendix D. The TL will then assign staff to complete the following tasks according to the decision made in this step. <u>LGGIT Tasks:</u> - The PM or TL will assign technical staff to develop estimates for this source using the LGGIT's [Solid Waste_Control] and [Solid Waste-Entry] worksheets. (The [Solid Waste-Entry] worksheet only provides locations to enter data after the [Solid Waste-Control] worksheet is populated.) - Staff will review Chapter 8 - Waste in the GPC GHG Emissions Inventories, and/or Chapter 9 - Solid Waste Facilities in the LGO Protocol. - On the LGGIT's [Solid Waste_Control] worksheet, staff will enter the total number of landfills in the community, the landfill name, whether or not the landfill has a landfill gas (LFG) collection system, and if the LFG collection system is partial or comprehensive (definitions are provided). - On the [Solid Waste_Entry] sheet, staff will enter the following data per landfill type: a. For landfills without a LFG collection system, staff will obtain and enter the annual quantities of waste deposited into the landfill for the life of the landfill, and the opening and closing years of the landfill. The instructions then provide the option to click on a link that takes you to the LGO Protocol Landfill Emissions Tool, where this data is entered. b. For landfills with a comprehensive LFG collection system, staff will obtain and enter the annual amount of landfill gas collected. c. For landfills with a partial LFG collection system, staff will obtain and enter the annual amount of landfill gas collected and the ratio of uncollected surface area over the collected surface area. <u>RIDEM Methodology Tasks:</u> - The PM or TL will assign staff to download RIDEM's 2019 Rhode Island Greenhouse Gas Emissions Inventory at https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-12/ridem-ghg-inventory-2019.pdf and use that report to understand the state-level data sources or federal tools apart from LGGIT used to estimate emissions from solid waste sources for the State or Rhode Island.	Within 120 days of QAPP approval by EPA.

Table 2.3 Technical Task Descriptions for Task 3.

Tasks and Deliverables	Schedule
Task 3. Solid Waste (Landfills)	
- Staff will read the Background section of the report to become familiar with the generalized approach to the State of Rhode Island’s GHG inventory methodology and rationale, which discuss the methods that were used to quantify solid waste emissions (FLIGHT).²⁰ - Staff will make a determination as to the ability to utilize the RIDEM methodology for consistency across the entire MSA region, inclusive of federal and state-level data equivalents that may be available for the Massachusetts-based geography, or where departures or use of LGGIT are warranted given improved data quality or availability. - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the RIDEM methodology. <u>MAPC GHGIT Tasks:</u> - The PM or TL will assign technical staff to develop estimates for this source using the Waste Data section of the MAPC GHGIT [Inputs] worksheet. - Staff will read the [Introduction] worksheet and the Step-by-Step GHG Inventory Guide at https://www.mapc.org/wp-content/uploads/2020/03/04102020_MAPC-Step-by-Step-GHG-Inventory-Guide.pdf to become familiar with the organization of the tool and the tool’s terminology. Staff will become familiar with pages 24-27 of the Guide and the Waste Data section of the [Inputs] worksheet. - Staff will follow the instructions on the [Inputs] worksheet to access input data and populate the template with required data and optional data, as applicable. - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the MAPC GHGIT methodology. <u>Post-GHG Inventory Tasks:</u> - In the inventory report or in a separate report based on the inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the options with an associated uncertainty estimate.	

²⁰ Additional methodology details are available in the Rhode Island 2022 Climate Update, Greenhouse Gas Emissions Inventory Process, Methodology, and Tools section, available at <https://climatechange.ri.gov/act-climate/2025-climate-update>.

Table 2.3 Technical Task Descriptions for Task 3.

Tasks and Deliverables	Schedule
Task 3. Solid Waste (Landfills)	
c. The quantity of criteria emissions reduced by the options with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. The number of people living in any nonattainment areas where the option would reduce emissions (regardless of the specific pollutant triggering nonattainment). f. A description of any benefits that the option will impart to communities with known environmental injustice issues such as close proximity of the community to an affected source under the option that emits toxic air pollutants.	

Table 2.4 Technical Task Descriptions for Task 4.

Tasks and Deliverables	Schedule								
Task 4. Inventory of GHG Emissions for Other Sources									
<u>GHG Inventory Tool Decision:</u> - The TL and assigned staff will review the data requirements for the relevant modules in the LGGIT, RIDEM GHG, and MAPC GHGIT methodology and determine which tool is appropriate to use for the municipalities in each state (MA and RI). The TL will document the decision and the rationale in a table such as the example in Appendix D. The TL will then assign staff to complete the following tasks according to the decision made in this step. <u>LGGIT Tasks</u> - The PM or TL will assign the primary technical staff member(s) to use the EPA's LGGIT tool and the following worksheets to develop the primary estimates for other sectors. <table border="1"> <thead> <tr> <th>Other Sources</th><th>LGGIT Worksheet(s)</th></tr> </thead> <tbody> <tr> <td>Stationary combustion</td><td>[Stationary-Entry] [Stationary-Data] [Stationary-Calcs]</td></tr> <tr> <td>Agriculture & land management</td><td>[Agriculture & Land Management]</td></tr> <tr> <td>Water</td><td>[Water]</td></tr> </tbody> </table>	Other Sources	LGGIT Worksheet(s)	Stationary combustion	[Stationary-Entry] [Stationary-Data] [Stationary-Calcs]	Agriculture & land management	[Agriculture & Land Management]	Water	[Water]	Within 120 days of QAPP approval by EPA.
Other Sources	LGGIT Worksheet(s)								
Stationary combustion	[Stationary-Entry] [Stationary-Data] [Stationary-Calcs]								
Agriculture & land management	[Agriculture & Land Management]								
Water	[Water]								

Table 2.4 Technical Task Descriptions for Task 4.

Tasks and Deliverables		Schedule
Task 4. Inventory of GHG Emissions for Other Sources		
Wastewater treatment	[Wastewater-Control] [Wastewater-Entry] [Wastewater-Calcs]	
Waste generation (disposal external to community's geopolitical boundary)	[Waste Production]	
- After the primary LGGIT calculations are complete, the PM, TL or QAM will assign a QC staff member to complete the following steps: - Review the original source(s) of data for all inputs to the LGGIT tool. - Validate that values from original source(s) were correctly entered into the primary LGGIT tool. - Populate a blank version of the LGGIT tool with the inputs in a QC version. - Compare the outputs of the primary version of the LGGIT versus the QC version of the LGGIT. - Compare source listing LGGIT's [Summary-Emissions] sheet to previous inventories published by community or by neighboring or similar communities to determine if any major sources of GHGs were omitted from the inventory. - Document findings and submit findings to the PM, TL and QAM for resolution. - Document steps taken to resolve any findings.		
<u>RIDEM Methodology Tasks:</u>		
- The PM or TL will assign staff to download RIDEM's 2019 Rhode Island Greenhouse Gas Emissions Inventory at https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-12/ridem-ghg-inventory-2019.pdf and use that report to understand the state-level data sources or federal tools apart from LGGIT used to estimate emissions from other sources for the State or Rhode Island. - Staff will read the Background and Residential Heating Sector sections of the report to become familiar with the generalized approach to the State of Rhode Island's GHG inventory methodology and rationale, which discuss the methods that were used to quantify other sources of emissions (SIT, etc.).²¹ - Staff will make a determination as to the ability to utilize the RIDEM methodology for consistency across the entire MSA region, inclusive of federal and state-level data		

²¹ Additional methodology details are available in the Rhode Island 2022 Climate Update, Greenhouse Gas Emissions Inventory Process, Methodology, and Tools section, available at <https://climatechange.ri.gov/act-climate/2025-climate-update>.

Table 2.4 Technical Task Descriptions for Task 4.

Tasks and Deliverables	Schedule										
Task 4. Inventory of GHG Emissions for Other Sources											
equivalents that may be available for the Massachusetts-based geography, or where departures or use of LGGIT are warranted given improved data quality or availability. - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the RIDEM methodology. <u>MAPC GHGIT Tasks:</u> - The PM or TL will assign technical staff to develop estimates for other sources using the following MAPC GHGIT [Inputs] worksheet. <table border="1"> <thead> <tr> <th>Other Sources</th><th>GHGIT Worksheet(s) Section(s)</th></tr> </thead> <tbody> <tr> <td>Stationary combustion</td><td>[Inputs] Heating Oil [Inputs] Electricity and Natural Gas</td></tr> <tr> <td>Wastewater treatment</td><td>[Inputs] Waste</td></tr> <tr> <td>Waste generation (disposal external to community's geopolitical boundary)</td><td>[Inputs] Waste</td></tr> <tr> <td></td><td></td></tr> </tbody> </table> - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the MAPC GHGIT methodology. <u>Post-GHG Inventory Tasks:</u> - In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the options with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the options with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. The number of people living in any nonattainment areas where the option would reduce emissions (regardless of the specific pollutant triggering nonattainment). f. A description of any benefits that the option will impart to communities with known environmental injustice issues such as close proximity of the community	Other Sources	GHGIT Worksheet(s) Section(s)	Stationary combustion	[Inputs] Heating Oil [Inputs] Electricity and Natural Gas	Wastewater treatment	[Inputs] Waste	Waste generation (disposal external to community's geopolitical boundary)	[Inputs] Waste			
Other Sources	GHGIT Worksheet(s) Section(s)										
Stationary combustion	[Inputs] Heating Oil [Inputs] Electricity and Natural Gas										
Wastewater treatment	[Inputs] Waste										
Waste generation (disposal external to community's geopolitical boundary)	[Inputs] Waste										

Table 2.4 Technical Task Descriptions for Task 4.

Tasks and Deliverables	Schedule
Task 4. Inventory of GHG Emissions for Other Sources	
to an affected source under the option that emits toxic air pollutants.	

Table 2.5 Technical Task Descriptions for Task 5.

Tasks and Deliverables	Schedule				
Task 5. Urban Forestry (Natural Working Lands and Forestry)					
<u>GHG Inventory Tool Decision:</u> - The TL and assigned staff will review the data requirements for the relevant modules in the LGGIT and RIDEM GHG methodology and determine which tool is appropriate to use for the municipalities in each state (MA and RI). The TL will document the decision and the rationale in a table such as the example in Appendix D. The TL will then assign staff to complete the following tasks according to the decision made in this step. <u>LGGIT Tasks:</u> - The PM or TL will assign technical staff to develop estimates for this sector using the LGGIT's [Urban_Forestry] worksheet. - In order to estimate the areas of land with similar percentages of tree cover, staff will use a web-based mapping application to develop a listing of tree-covered tracts of land (i.e., polygons) with the following attributes: a. Identifier describing area (e.g., Area 1 between Crooked Creek and boundary). b. Sector (residential, commercial/institutional, industrial, energy generation) c. Total area in square kilometers (km²). d. Percentage of area with tree cover based on local estimate. - For each sector, staff will calculate weighted percentage tree cover using Equation 1. Equation 1 for weighted percentage of tree cover for a sector: $\frac{\sum_{i=1}^{i=30} (km^2 \text{ of area } i)(\% \text{ tree cover of area } i)}{\sum_{i=1}^{i=30} (km^2 i)}$ Where: <table> <tr> <td>$i = 1 \text{ to } 30$</td><td>Designates 30 tree covered areas in a sector on local lands.</td></tr> <tr> <td>km² of area i</td><td>The measured area (in square kilometers) of area i.</td></tr> </table>	$i = 1 \text{ to } 30$	Designates 30 tree covered areas in a sector on local lands.	km ² of area i	The measured area (in square kilometers) of area i .	Within 120 days of QAPP approval by EPA.
$i = 1 \text{ to } 30$	Designates 30 tree covered areas in a sector on local lands.				
km ² of area i	The measured area (in square kilometers) of area i .				

Table 2.5 Technical Task Descriptions for Task 5.

Tasks and Deliverables		Schedule
Task 5. Urban Forestry (Natural Working Lands and Forestry)		
% tree cover of area i	The estimated percentage of tree cover for area i .	
$\sum_{i=1}^{i=30} (km^2 i)$	The denominator is the total combined area of all 30 areas within the sector.	
- For each sector on the LGGIT’s [Urban Forestry] worksheet staff will enter total area for the sector in column C rows 11 through 14 and enter weighted % tree cover in Column D. - For the two sectors with the largest areas of tree cover, the QAM will assign a QC staff member who did not support steps 1 through 4, to develop independent estimates and to complete the following QC steps: - Review the original source(s) of data for all inputs to the primary LGGIT tool. - Validate correct entry of values from original source(s) into the primary LGGIT. - Populate a blank version of the LGGIT tool with the inputs in a QC version. - Compare the primary outputs of the LGGIT versus the QC version of the LGGIT. - Compare the listing of resources by sector on the LGGIT’s [Summary-Emissions] sheet to previous inventories published by the locality or by neighboring or similar localities to identify any major discrepancies. - Document findings and submit findings to the PM, TL, and QAM for resolution. - Document steps taken to resolve any findings.		
<u>RIDEM Methodology Tasks:</u> - The PM or TL will assign staff to download RIDEM’s 2019 Rhode Island Greenhous Gas Emissions Inventory at https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-12/ridem-ghg-inventory-2019.pdf and use that report to understand the state-level data sources or federal tools apart from LGGIT used to estimate emissions sinks from forests the State or Rhode Island. - Staff will read the Background and Land Use, Land Use Change, and Forestry sections of the report to become familiar with the generalized approach to the State of Rhode Island’s GHG inventory methodology and rationale, which discuss the methods that were used to quantify other sources of emissions (state land cover datasets, etc.).²² - Staff will make a determination as to the ability to utilize the RIDEM methodology for consistency across the entire MSA region, inclusive of federal and state-level data		

²² Additional methodology details are available in the Rhode Island 2022 Climate Update, Greenhouse Gas Emissions Inventory Process, Methodology, and Tools section, available at <https://climatechange.ri.gov/act-climate/2025-climate-update>.

Table 2.5 Technical Task Descriptions for Task 5.

Tasks and Deliverables	Schedule
Task 5. Urban Forestry (Natural Working Lands and Forestry) equivalents that may be available for the Massachusetts-based geography, or where departures or use of LGGIT are warranted given improved data quality or availability. - The PM, TL, or QAM will assign a staff member who did not support data gathering and analysis elements of this task to complete a QC review. Staff will independently review all inputs to the RIDEM methodology. <u>Post-GHG Inventory Tasks:</u> - In the inventory report or in a separate report based on the inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. Specific source categories and activities affected by the proposed option. b. Quantity of GHG emissions reduced by option with uncertainty estimate. c. Quantity of criteria emissions reduced or mitigated (such as by adsorption of PM2.5 on leaf surfaces) by the option with an associated uncertainty estimate. d. The number of people living in any nonattainment areas where the option would reduce emissions or improve air quality conditions by providing shade to urban heat islands (regardless of the specific pollutant triggering nonattainment). e. A description of any benefits that the option will impart to communities with known environmental injustice issues such as providing windbreaks to communities in close proximity to sources of nuisance dust (e.g., dirt roads used for mining operations). f. The number of schools, miles of roadways, or public traffic counts at major commuting destinations that would be positively affected by options that include planting of trees or other vegetation.	

1.7. Quality Objectives / Criteria

The primary objectives for this project are to develop reliable inventories for each of the GHG-emitting sectors in Providence-Warwick MSA and to identify options for reducing emissions from those sectors. Accordingly, all quality objectives and criteria are aligned with these objectives. The quality system used for this project is the joint responsibility of the SRPEDD PM, Task Leaders, and QA Manager. As discussed in section 1.4, an organizationally independent QA Manager, Frank Barranco, will maintain oversight of all required measures in this QAPP. QC functions will be carried out by the Quality Control Coordinator, Brian Lesinski, and technical staff and will be carefully monitored by the responsible Task Leaders, who will work with the QA Manager to identify and implement quality improvements. All activities under this project will conform to this QAPP.

1.7.1. Data Quality, Management, and Analyses

For this project, SRPEDD will use a variety of QC techniques and criteria to ensure the quality of data and analyses. Data of known and documented quality are essential components for the success of the project, as these data will be used to inform the decision-making process for the PCAP and CCAP as discussed in Section 1.5.4. The table in **Appendix A** lists by task the specific QC techniques and criteria that are part of this QAPP.

The data quality objectives and criteria for this project are accuracy, precision, bias, completeness, representativeness, and comparability. *Accuracy* is a measure of the overall agreement of a measurement to a known value. It includes a combination of random error (precision) and systematic error (bias). *Precision* is a measure of how reproducible a measurement is or how close a calculated estimate is to the actual value. *Bias* is a systematic error in the method of measurement or calculation. If the calculated value is consistently high or consistently low, the value is said to be biased. Our goal is to ensure that information and data generated and collected are as accurate, precise, and unbiased as possible within project constraints. It is not anticipated that this project will include primary data collection. Generally, existing data and tools provided by the EPA and other qualified sources will be used for project tasks. A subject matter specialist familiar with technical reporting standards will be used to QA all data utilized for developing the local GHG inventory. SRPEDD will verify the accuracy of all data by checking for logical consistency among datasets. All existing environmental data shall meet the applicable criteria defined in CFR and associated guidance, such as the validation templates provided in the [EPA QA Handbook Volume II](#).

Uncertainty can be evaluated using a few different approaches. The most useful uncertainty analysis is quantitative and is based on statistical characteristics of the data such as the variance and bias of estimates. In a sensitivity analysis, the effect of a single variable on the resulting emissions estimate generated by a model (or calculation) is evaluated by varying its value while holding all other variables constant. Sensitivity analyses will help focus on the data that have the greatest impact on the output data. Additional statistical tests may be utilized depending on the need for more or less rigorous tools and on the specific project activity being evaluated.

When available, data originally gathered using published methods whose applicability, sensitivity, accuracy, and precision have been fully assessed, such as EPA reference methods, will be preferred and considered to be of acceptable quality. Project decisions may be adversely impacted if, for example, existing data were used in a manner inconsistent with the originator's purpose. Metadata can be described as the amount and quality of information known about one or more facets of the data or a dataset. It can be used to summarize basic information about the data (e.g., how, why, and when the existing data were collected), which can make working with specific data or datasets easier and provides the user with more confidence. Metadata are valuable when evaluating existing data, as well as when planning for collection

primary data that may be required in the future. However, the effort needed to locate and obtain original source materials can be costly. Accordingly, a graded approach to planning will be applied and ongoing discussions with the EPA will be held to determine what magnitude and rigor of QA effort are appropriate and affordable for the project.

For the data analysis completed under this project, analytical methods will be reviewed to ensure the approach is appropriate and calculations are accurate. Spreadsheets will be used to store data and complete necessary analyses. Design of spreadsheets will be configured for the intended use. All data and methodologies specific to each analysis will be defined and documented. Tables and fields will be clearly and unambiguously named. Spreadsheets will be checked to ensure algorithms call data correctly and units of measure are internally consistent. Hand-entered or electronically transferred data will be checked to ensure the data are accurately transcribed and transferred.

The draft inventory will be evaluated for GHG-emitting-sector and geographic completeness. SRPEDD will utilize the framework of sectors in the EPA's LGGIT tool, previous local and state inventories (including the State of Rhode Island DEM GHG inventory), or previous inventories completed by similar communities to ensure that the inventory prepared under this project includes all major GHG-emitting sectors. To ensure the inventory is geographically complete, the draft inventory will also be submitted for review by staff who are familiar with all activities subject to local or federal standards issued under Title I of the CAA to ensure that all major-emitting, local activities are included in the inventory.

Representativeness is a qualitative term that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. SRPEDD will use the most complete and accurate information available to compile representative data for the community's GHG-emitting activities.

Data comparability is a qualitative term that expresses the measure of confidence that one dataset can be compared to another and can be combined for the decision(s) to be made. SRPEDD and/or its consultant team will compare datasets when available from different sources to check for the quality of the data. This QA step will also ensure that any highly correlated datasets or indicators are identified. Supporting data, such as information on reference methods used and complete test reports, are important to ensure the comparability of emissions data.

1.7.2. Document Preparation

All documents produced under this project will undergo internal QC review, as well as technical review and an editorial review, prior to submission to the EPA PO. QC will be performed by an engineer, scientist, or economist, as appropriate, with sufficient knowledge. The technical reviewer will review the document for accuracy and integrity of the technical methodologies, analyses, and conclusions.

An editorial review of all final documents will be performed. Editors will verify clarity, spelling, and grammatical correctness, and ensure documents are free of typographical errors. Editors will verify that references are cited correctly. This will include a comparison against the original documents.

The *QC Documentation Form (Appendix B)* will be used to track the approval process. The form must be completed and signed for all document deliverables. The signatures required include those of the TL and technical and editorial reviewers. Completion of this form certifies that technical review, editorial review, and all required QC procedures have been completed to the satisfaction of the TL and QAM or QCC. Copies of these signed forms will be maintained in the project files.

1.8. Special Training / Certifications

All SRPEDD staff and consultants assigned to work on this project shall have appropriate technical and QA training to properly perform their assignments. SRPEDD staff and consultants serving in the QAM role under this project will have completed a training course on QA/QC activities similar to the course available at <https://www.epa.gov/quality/training-courses-quality-assurance-and-quality-control-activities>. The PM and all TLs under this project will have completed an online training course on air emissions inventories on the Air Knowledge website at <https://airknowledge.gov/EMIS-SI.html>.

If training is required for new staff or for particular segments of the GHG inventory, the PM in coordination with the associated TL will identify available training resources for the inventory segment and incorporate the required training into the project schedule.

1.9. Documents and Records

SRPEDD will document in electronic form (and/or hard copy) QC activities for this project. The TL is responsible for ensuring that copies of all completed QC forms, along with other QA records (including this QAPP), will be maintained in the project files. Project files will be retained by SRPEDD for at least seven years after the completion of the CCAP. The types of documentation that will be prepared for this project include:

- Planning documentation (e.g., QAPP)
- Implementation documentation (i.e., Review/Approval Forms and QC records)
- Assessment documentation (i.e., audit reports and independent calculations).

Detailed documentation of QC activities for a specific task or subtask will be maintained using the *QC Documentation Form* shown in **Appendix B**. This form will document the completion of the QC techniques planned for use on this project as listed in the table in **Appendix A**. One or more completed versions of these forms, as necessary, will be maintained in the project files. The types of documents and activities for which QC will be conducted and documented may include raw data, data from other sources such as data bases or literature, data entry into the LGGIT tool or other federal and state tools, calculations necessary to transform raw data into forms required for LGGIT entry, and comparisons of primary estimates with QC estimates.

Technical reviews will be used along with other technical assessments (i.e., QC checks) and QA audits to corroborate the scientific defensibility of any data analyses. A technical review (i.e., internal senior review) is a documented critical review of a specific technical work product. It is conducted by subject matter experts who are collectively equivalent (or senior) in technical expertise to those who performed the work. Given the nature of the deliverables under this project, a technical review is an in-depth assessment of the assumptions, calculations, extrapolations, alternative interpretations, and conclusions in technical work products. Technical review of proposed methods and associated data will be documented in the *QC Documentation Form* shown in **Appendix B**. The form will include the reviewer's charge, comments, and corrective actions taken.

Additionally, SRPEDD has developed and instituted document control mechanisms for the review, revision, and distribution of QAPPs. Each QAPP has a signed approval form, title page, table of contents, and an EPA-approved document control format (see header at top of the page). The distribution list for this QAPP was presented in **Table 1.1**. During the course of the project, any revision to the QAPP will be circulated to everyone on the distribution list, as well as to any additional staff supporting this project. Any revision to the QAPP will be documented in a QAPP addendum, approved by the same signatories to this QAPP, and circulated to everyone on the distribution list by the SRPEDD PM.

At this time, SRPEDD does not believe the project will collect or handle personally identifiable information (PII) subject to the Privacy Act of 1974. However, if during the course of this project technical staff determine that PII is required to support project objectives, SRPEDD will meet all requirements of the Privacy Act of 1974. **Appendix C** indicates the status of our determination regarding applicability of the Privacy Act of 1974 under this project.

2. Existing Data Acquisition and Management Protocols (Group B)

2.1. Sampling Process Design

2.1.1. Need and Intended Use of Data Used

As indicated in **Tables 2.1 – 2.5**, a wide range of data for a diverse set of GHG-emitting activities is necessary to prepare a local inventory. Existing data resource may include sector-specific or facility-specific GHG emissions estimates, emissions factors, or activity data for use with emissions factors. The experimental design for this inventory project relies on the EPA’s LGGIT tool and methods and datasets employed by RIDEM, together with independent estimates prepared by SRPEDD assigned QC staff. Existing data resources (including but not limited to data from previously completed inventories) will be utilized to develop GHG emissions estimates that are comparable to the LGGIT estimates. Subsequently, estimates for each source category will be compared to available federal or state data by assigned QC staff.

2.1.2. Identification of Data Sources and Acquisition

The following data sources will be evaluated for use under each task to develop estimates for the major-emitting sectors in Providence-Warwick MSA or for use in validation of estimates:

- Task 1:
 - Vehicle registration data from the Massachusetts Registry or Motor Vehicles and the Rhode Island Division of Motor Vehicles.
 - State or federal averages on vehicle miles traveled and miles per gallon from the U.S. Department of Transportation.
 - National Emissions Inventory (NEI) county-level estimates for mobile sources.
- Task 2:
 - U.S. Department of Energy’s (DOE’s) SLOPE Platform which reports county-level electricity usage in million British thermal units.
 - DOE’s EIA Form 861 which reports sub-county-level usage in MWh and customer counts as reported by the different distribution utilities operating within each county.
 - Electricity consumption by customer class obtained directly from NEPOOL-GIS and/or the utilities that serve the municipalities in the planning area.
 - Town-level electricity consumption as reported to Mass Save program (<https://www.masssave.com/>).
 - Emission factors for retail utility or municipal utility from State of Massachusetts Department of Environmental Protection.
 - Town-level community aggregate electricity purchase data (<https://masscea.com>).
- Task 3:
 - Number of community landfills and information on landfill gas (LFG) collection systems, as applicable, from the Massachusetts Department of Environmental Protection and the Rhode Island Department of Environmental Management.
 - Landfill emissions data reported to the EPA’s GHGRP.
- Task 4:
 - Data published by the EPA under the Greenhouse Gas Reporting Program for fossil fuel consumption by customer class from the utilities that serve the municipalities in the planning area.
 - County-level natural gas consumption data from DOE’s SLOPE Platform;

- Wastewater management data from local water utility(ies).
 - Town-level natural gas consumption as reported to Mass Save program (<https://www.masssave.com/>).
 - Town-level building census available from State of Massachusetts Executive Office of Labor and Workforce Development (<https://lmi.dua.eol.mass.gov/lmi/EmploymentAndWages>) to estimate fuel oil use.
- Task 5:
 - Area calculations from web-based map applications.
 - Tree cover estimates from local surveys or forestry databases.

2.2. Quality Control

All data operations conducted for this project will involve existing, non-direct measurement data. All data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use. In addition to reviewing and assessing the data collected, all data entered into spreadsheets and all calculations completed for analyses will be reviewed by a senior technical QC reviewer. The QC reviewer will evaluate the approach to ensure the methods are appropriate and have been applied correctly to the analysis. The QC reviewer will also confirm all data were entered correctly and that calculations are complete and accurate. Calculations will be checked by repeating each calculation, independently, and comparing the results of the two calculations. Any data entry and calculation errors will be identified and corrected. Data tables prepared for the draft and final reports will be checked against the spreadsheets used to store the data and complete the analysis.

Where calculations are required to assess the data/datasets, QC calculations will be performed using computer spreadsheets and calculators to reduce typographical or translation errors—mathematical/statistical calculations are performed using spreadsheets or software programs with predefined formulas and functions. SRPEDD will ensure that any manipulations performed on the data/dataset were done correctly. Such calculations could involve statistical checks to look for data outliers. One approach, for example, that may be used to identify outliers or unusual data points is sorting a datasheet for one or more data variables. This approach is a simple but effective way to highlight unusually high or low values. Graphing data using boxplots, histograms, and scatterplots is another method that may be used to identify gaps in the data (missing data), outliers, or unusual data points. Another approach that may be used is the use of Z-scores, which can quantify the unusualness of an observation when data follow a normal distribution. A Z-score for a particular value indicates the number of standard deviations above and below the mean that the value falls. For example, a Z-score of 2 indicates that an observation is two standard deviations above the average while a Z-score of -2 indicates the value is two standard deviations below the mean. A Z-score of zero represents a value that equals the mean. As appropriate, we will also use hypothesis tests to find outliers, or an interquartile range (IQR) to calculate boundaries for what constitutes minor and major outliers. The methods used will be driven by the scale and type of data. SRPEDD will determine outlier detection methods to be used based on the initial review of the data. Identified outliers will be highlighted to the PM, TL, QAM, or delegate with options for treatment.

2.3. Non-direct Measurements for GHG Inventory and Options Identification

All data operations conducted on this project will involve existing, non-direct measurement data. All existing data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use.

Consistent with the EPA's QA requirements, this QAPP describes the procedures that will be used to ensure the selection of appropriate data and information to support the goals and objectives of this project. Specific elements addressed by this QAPP include:

- Identifying the sources of existing data,
- Presenting the hierarchy for data selection,
- Describing the review process and data quality criteria,
- Discussing quality checks and procedures should errors be identified, and
- Explaining how data will be managed, analyzed, and interpreted.

Data presented in the GHG inventory will be traced to its source (e.g., database input and output). Key resources include data collected by the EPA (e.g., GHGRP data), data from EPA-approved data sources (e.g., Department of Energy and other federal data sources), and data from Massachusetts and

Rhode Island state and local agencies. These sources may include primary literature (i.e., peer-reviewed journal articles and reports) or databases. We may also use approved existing sources (e.g., handbooks, databases). Original sources for all information and data contained in the document will be included in a list of references with appropriate citations. When peer-reviewed literature or EPA-approved data sources cannot be used, we will document any significant limitations to the data sources used.

We will document information regarding each dataset and our rationale/selection criteria for selecting the data sources used in the inventory. The TL will be responsible for overseeing and confirming the selection of the data for the project tasks.

Table 3.1 provides a hierarchy for data quality when identifying and reviewing available sources of data and information. When evaluating data resources, efforts will be made to identify and select data sources that most closely conform to the highest ranked criteria. Data quality metrics and documentation may not be provided by each source, and as necessary, we may consult with subject matter experts from permitted facilities or trade associations operating in the Providence-Warwick MSA to qualify data for use to meet project objectives.

Any available data quality information will be reviewed by SRPEDD and project advisors to ensure that the data represent full-scale designs and commercial processes, and that they are applicable to economic and regulatory conditions in the United States. SRPEDD will document data sources used and any significant limitations of utilized data or information to ensure that the data are appropriate for their intended use. An internal technical reviewer will review the approach for selecting and compiling data; the review will include examination of the data sources and the intended use of the data. The specific QC techniques used will depend on the technical activity or analysis to which they are applied. The SRPEDD TL is responsible for verifying the usability of data and related information.

Table 3.1 Existing Data Quality Ranking Hierarchy

Quality Rank	Source Type
Highest	Federal, state, and local government agencies
Second	Consultant reports for state and local government agencies
Third	NGO studies; peer-reviewed journal articles; trade journal articles; conference proceedings
Fourth	Conference proceedings and other trade literature: non-peer-reviewed
Fifth	Individual estimates (e.g., via personal communication with vendors)

SRPEDD will work with EPA to ensure that all data used for the project are appropriate for their intended use. The main criteria that will be used in the selection of the data are the vintage and quality of the data (based on peer review). The quality of the data will consider the credibility of the source, and the QA documentation provided by the data source. Senior technical staff will also evaluate the availability of alternative datasets, suitability of the selected data for the intended purpose, and agreement with LGGIT estimates.

SRPEDD will use the Secondary Data Quality Ranking Hierarchy when identifying and reviewing available sources of data and information. The source types in **Table 3.1** appear in the order in which they are likely to meet the data quality criteria. For example, federal government data are more

likely to be from a credible source, thoroughly reviewed, suitable, available, and representative, and any exceptions to these data criteria are likely to be noted in the government data, providing transparency. Data from individuals are expected to be less reliable, not peer reviewed, and may not be suitable or representative of local activities.

If it is determined that data meeting the fourth (i.e., conference proceedings and other trade literature: non-peer-reviewed) or fifth (i.e., individual estimates such as personal communications with vendors) level compose the best or only available data source, the TL will include in the inventory a description of these data with associated limitations for review and approval by the PM and QAM.

These measures of data quality will be used to judge if the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will include in the inventory a discussion for review and approval by the PM and QAM explaining how emissions estimates that relied on such data compare to LGGIT estimates.

We will also consider, for example, the age (i.e., date of the source dataset) and the representativeness of the data and will include in the inventory report for review and approval by the PM and QAM any quality concerns or uncertainties introduced with use of these data, such as data gaps or inconsistencies with other sources. Any data source utilized that is older than 10 years will specifically be flagged in the inventory report.

Representativeness will be evaluated by determining that the emissions or activity data are descriptive of conditions in the United States, that the data are current, and that the data are descriptive of similar processes within Providence-Warwick MSA. Any incomplete datasets will be identified, and deficiencies will be evaluated to determine if data are missing or confusing and if they meet secondary-use quality objectives.

Key screening criteria will be used to screen the sources identified. The TL will provide oversight to the screening process to ensure sources collected are the most relevant and meet quality requirements. Available data and information from the selected sources will be compiled and relevant summary information will be extracted out of the information sources to develop the required output for each of the project tasks.

2.3.1. Criteria for Accepting Existing Data for Intended Use

The criteria for determining if the data are acceptable for use in developing the local inventory will be based on the following:

- Data Source – Was the data originated by a credible source that is generally accepted as the experts or authority in the relevant field?
- Transparency – Are the data collection, cleaning, and calculation methods and assumptions clearly documented?
- Data Completeness – Is the data reasonably complete? If the data isn't complete, are there explanations for why, and can reasonable assumptions be made to fill in data gaps?

All data sources will be reviewed by experts and/or staff familiar with each data type to ensure the data aligns with expectations and are within reasonable ranges.

2.3.2. Criteria for Options Identification

Review of activities under each task and identification of options for emissions reductions to be considered by policymakers will be based on the following criteria:

1. Quantity of reductions in emissions of climate pollution under the option.
2. Number of jobs likely to be created by the option.
3. Environmental justice benefits of the project including the number of people living in overburdened neighborhoods that will benefit from the option.
4. Quantity of reductions in criteria and toxic air pollutants that can be achieved by option.
5. Number of people living, working, recreating, and going to school in the area(s) benefiting from the option.

2.4. Data Management

Data management procedures include file storage and file transfer. All project and data files will be stored on SRPEDD project servers. Files will be organized and maintained by the TL in folders by project, task, and function, including a system of file labeling to ensure version control. Any files containing confidential business information will be stored on secure computers. The TL will make sure that staff are trained and adhere to the project file organization and version control labeling to ensure that files are placed in consistent locations. All files will be backed up each night to avoid loss of data. Data are stored in various formats that correspond to the software being used. As necessary, data will be transferred using various techniques, including email, File Transfer Protocol, or shared drives. Typically, records will be archived once the project is completed. Record retention times will be based on contractual and statutory requirements or will follow SRPEDD practices for storing materials of up to seven years after the end of the period of performance (POP). Multiple project staff are granted access rights to the archived file system for each project. Records may be retrieved from archived file system by the TL, PM, or other project staff with access during the records retention period. As soon as allowed by applicable regulations or the grant agreement, records will be destroyed according to SRPEDD policies and procedures. For any sensitive information that is gathered under the project, SRPEDD's policy is consistent with EPA-recommended methods of destruction, which include degaussing, reformatting, or secure deletion of electronic records; physical destruction of electronic media; recycling; shredding; incineration; and pulping. Should the grant specify some other manner of disposition (e.g., transfer to the client), SRPEDD will comply with that directive. As noted above, SRPEDD has developed a file naming convention/nomenclature for electronic file tracking and record keeping. Foremost, all files must be given a short but descriptive name. For those records and files gathered or provided to SRPEDD, the filename may include the identification of "original" in its filename.

Similarly, files that have undergone a review by an independent, qualified person will include, at the end of the filename, the initials of the reviewer or the suffix "rev" (in lieu of initials) if more than one reviewer reviewed the file, along with the date reviewed and version number, as a way to track which staff person(s) reviewed the file and when. Filenames of draft versions will follow an incremental, decimal numbering system. More specifically, each successive draft of a document is numbered sequentially from version 0.1, 0.2, 0.3... until a final version is complete. Final versions will be indicated by whole numbers (e.g., version 1.0). Final versions of documents that undergo revisions will be labeled version X.1 for the first set of revisions. While the document is under review, subsequent draft versions will increase incrementally (e.g., 1.2, 1.3, 1.4) until a revised final version is complete (e.g., version 2.0).

In the event data retrieval is requested and to prevent loss of data, all draft and final file versions will be retained electronically—that is, superseded versions will not be deleted.

Note that changes made to deliverables will be documented using the software's *track changes* feature, which allows a user to track and view all changes that are made to the document version. All deliverable reviews will be documented in a QC Documentation Form (see **Appendix B**) for the project. This form will be maintained in the project files.

For this project, it is not anticipated that any special hardware or software will be used. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work (described in **Tables 2.1 – 2.5**) for this project.

3. Assessment and Oversight (Group C)

SRPEDD is committed to preparing a comprehensive and reliable inventory of GHG emissions for Providence-Warwick MSA. Under this project our senior management team has dedicated the necessary resources to ensure we deliver an inventory that can be relied upon for future policy decisions. Accordingly, under this project, we will concurrently implement existing quality management systems that SRPEDD has previously utilized for submissions to the EPA under Title I of the Act where task-level deliverables will be subjected to required, regular reviews (e.g., quarterly) to ensure that technical, financial, and schedule requirements of this project are consistent with the EPA PO's and QAM's expectations for handling and producing deliverables that reflect high-quality environment data. This section discusses Elements C1 (assessments and response actions) and C2 (reporting) applicable to this project.

3.1. Assessments and Response Actions

The QA program includes periodic review of data files and draft deliverables. The essential steps in the QA program are as follows:

1. Identify and define the problem
2. Assign responsibility for investigating the problem
3. Investigate and determine the cause of the problem
4. Assign and accept responsibility for implementing appropriate corrective actions
5. Establish the effectiveness of and implement the corrective action
6. Verify that the corrective action has eliminated the problem.

The TL will provide day-to-day oversight of the quality system. Periodic project file reviews will be carried out by the QA Manager, at least once per year to verify that required records, documentation, and technical review information are maintained in the files. The QAM will ensure that problems found during the review are brought to the attention of the TL and are corrected immediately. All nonconforming data will be noted, and corrective measures to bring nonconforming data into conformance will be recorded.

The TLs and QA Manager are responsible for determining if the quality system established for the project is appropriate and functioning in a manner that ensures the integrity of all work products. All technical staff have roles and will participate in the corrective action process. Corrective actions for errors found during QC checks will be determined by the TL and, if necessary, with direction from the QA Manager or PM, as appropriate. The originator of the work will make the corrections and will note on the QC form that the errors were corrected. A reviewer or TL, not involved in the creation of the work, will review the corrections to ensure the errors were corrected. Any problems noted during audits will be reviewed and corrected by the QA Manager and discussed with the TL as needed. Depending on the severity of the deficiency, the TL may consult the QA Manager and stop work until the cited deficiency is resolved. Deficiencies identified and their resolution will be documented in monthly project reports, as applicable. The QA Manager and TL will comply and respond to all internal and EPA audits on the project, as needed. The QA Manager will produce a report outlining any corrective actions taken.

3.2. Reports to Management

The periodic progress reports (to the EPA PO) required in the grant agreement will be reviewed by the PM and the PM's manager, Jeffrey Walker, to ensure the project is meeting milestones and that the resources committed to the project are sufficient to meet project objectives. These periodic progress reports will describe the status of the project, accomplishments during the reporting period, activities planned for the next period, and any special problems or events including any QA/QC issues. Reports to the EPA will be drafted by the TL or other project staff familiar with project activities during the reporting period.

Any QC issues impacting the quality of a deliverable, the project budget, or schedule will be identified and promptly discussed with the assigned TL and the PM or QAM as appropriate. All significant findings will be included in monthly reports with the methods used to resolve the specific QC issue or the recommendations for resolution for consideration by the EPA's PO or designee.

Based on the technical work completed during the reporting period, progress reports will be reviewed internally by an independent, qualified technical person (equivalent or senior to the TL), prior to submitting to the PM. The PM will conduct a final review of the report before transmitting the progress report to the EPA PO, and the PM's manager will be cc'd on all progress reports

4. Data Validation and Usability (Group D)

4.1. Data Review, Verification, Validation

All work conducted under this project will be subject to technical and editorial review. When existing data for the same GHG-emitting activity are available from multiple sources, the background information documents will be reviewed for all sources to determine the dataset that is the most representative of local operations. Additionally, the inventory report will include the vintage of the existing data resource and preference will be given to the most recent dataset that is representative of similar GHG-emitting local activities. Reviews will be conducted by an independent, qualified person—or a person not directly involved in the production of the deliverable. The term “validation” refers to whether the data meet the QAPP-defined user requirements while the term “verification” refers to whether conclusions can be correctly drawn from the data. The quality of data used and generated for the project will be reviewed and verified at multiple levels by the project team. This review will be conducted by the SRPEDD TL or a senior technical reviewer with specific, applicable expertise. All original and modified data files will be reviewed for input, handling, and calculation errors. Additionally, all units of measure will be checked for consistency. Any potential issues identified through this review process will be evaluated and, if necessary, data will be corrected, and analysis will be revised as necessary, using corrected data. These corrections will be documented in project records. These measures of data quality will be used to judge whether the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will document these findings in the inventory along with corrective actions or use of alternative data sources.

4.2. Verification and Validation Methods

As a standard operating procedure, all data (retrieved and generated) will be verified and validated through a review of data files by an independent, qualified technical staff member (i.e., someone other than the document originator), and ultimately, the TL. A checklist of QC activities for deliverables under this project is provided as **Appendix A**. Forms for documenting QC activities and review of deliverables are included in **Appendix B**. Documentation of calculations will be included in spreadsheet work products and in supporting memoranda, as appropriate.

The TL is responsible for day-to-day technical activities of tasks, including planning, data gathering, documentation, reporting, and controlling technical and financial resources. The TL is the primary person responsible for quality of work on tasks under this project and will approve all-related plans and reports. These reports will be transmitted by the TL to the QAM for final review and approval.

Source data will be verified and validated through a review of data files by the technical staff, and ultimately the TL. Reviews of analyses will include a thorough evaluation of content and calculated values. All original and modified data files will be reviewed for input, handling, and calculation errors. Additionally, all measurement units will be checked for consistency. Any potential issues identified through this review process will be evaluated, errors corrected, and analysis repeated using the corrected data. All corrections will be documented in project records.

Source data will be verified and validated through a review of data files by the technical staff, and ultimately the TL. Typical data verification reviews can include checks of the following:

- Data sources are clearly documented,
- Calculations are appropriately documented,

- All relevant assumptions are clearly documented,
- Conclusions are relevant and supported by results,
- Text is well-written and easy to understand.

The documented review process will be stored with deliverables for the project. For the narrative describing the methodologies used for the inventory, all comments on drafts will be clearly and concisely summarized including a description of how substantive issues raised by commenters were resolved.

As discussed in Section 1.7, QC objectives include verification that data in database tables are stored and transferred correctly, algorithms call data correctly, units are internally consistent, and reports pull the required data. These data management issues will be addressed as part of the QC checks of data acquisition and document preparation.

For this project, it is not anticipated that any special data validation software will be required. However, where calculations are required to assess the data/datasets, calculations will be performed using computer spreadsheets (like Excel spreadsheets with predefined functions, or formulas) and calculators to reduce typographical or translation errors. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work as described in Section 1.6 for this project.

4.3. Reconciliation with User Requirements

All data (retrieved and generated) and deliverables in this project will be analyzed and reconciled with project data quality requirements. To ensure deliverables meet user requirements, the TL or senior technical lead will review all data and deliverables throughout the project to ensure that the data, methodologies, and tools used meet data quality objectives, are clearly conveyed, and represent sound and established science.

SRPEDD will review each project with the EPA at the planning stage to ensure the approach is fundamentally sound and will meet the project objectives. The TL or senior technical lead will evaluate data continuously during the life term of the project to ensure they are of sufficient quality and quantity to meet the project goals. Prior to submission of draft and final products, the TL or senior technical lead will make a final assessment to determine if the objectives have been fulfilled in a technically sound manner. Assumptions made in preparing project analyses will be clearly specified in the inventory.

As discussed in Section 1.7.1, uncertainty can be evaluated using a few different approaches. The most useful uncertainty analysis is quantitative and is based on statistical characteristics of the data such as the variance and bias of estimates. In a sensitivity analysis, the effect of a single variable on the resulting emissions estimate generated by a model (or calculation) is evaluated by varying its value while holding all other variables constant. Sensitivity analyses will help focus on the data that have the greatest impact on the output data. Additional statistical tests may be utilized depending on the need for more or less rigorous tools and on the specific inventory activity being evaluated.

5. References

- EPA, Chief Information Officer's Policy Directive on Information Technology / Information Management available at [EPA IT/IM Directive: Environmental Information Quality Policy, Directive # CIO 2105.3](#)
- EPA, *Chief Information Officer's Policy Directive on Information Technology / Information Management: Quality Assurance Project Plan (QAPP) Standard*, Directive # CIO 2105-S-02.0. Available at <https://www.epa.gov/irmpoli8/quality-assurance-project-plan-qapp-standard>. Accessed on 7/24/2023.
- EPA, EPA-454/B-17-001, *Quality Assurance Handbook for Air Pollution Measurement Systems, Ambient Air Quality Monitoring Program, Volume II*. Available at <https://www3.epa.gov/ttnamti1/files/ambient/pm25/qa/Final%20Handbook%20Document%2017.pdf>. Accessed on 6/23/2023.
- EPA, Fact Sheet: Areas where differences between state GHG inventories and the EPA's Inventory of U.S. GHG Emissions and Sinks by State: 1990-2020 estimates may occur. Available at <https://www.epa.gov/system/files/documents/2022-03/fact-sheet-differences-epa-and-offical-state-ghgi.pdf>. Accessed on 6/23/2023.
- EPA, US GHG Inventory by State. Available at <https://www.epa.gov/ghgemissions/state-ghg-emissions-and-removals>. Accessed on 6/23/2023.
- EPA, GHG Reporting Program Facility-level Local Information. Available at <https://ghgdata.epa.gov/ghgp/main.do>. Accessed on 7/18/2023.
- EPA, Data reported to EPA's Greenhouse Gas Reporting Program (GHGRP) at <https://www.epa.gov/ghgreporting/data-sets>
- EPA, National Inventory at <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021>
- EPA, Publications, Tools, and Data for State, Local, and Tribal Governments at <https://www.epa.gov/statelocalenergy/publications-tools-and-data-state-local-and-tribal-governments>. Accessed on 7/27/2023.
- EPA, Fuel heating values and CO2 emission factors at [eCFR :: 40 CFR Part 98 -- Mandatory Greenhouse Gas Reporting](#)
- EPA, Global warming potentials at <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-A?toc=1>
- RIDEM, *2019 Rhode Island Greenhouse Gas Emissions Inventory*. Available at <https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-12/ridem-ghg-inventory-2019.pdf>. Accessed on 10/15/2023.
- RIE4C, *Rhode Island 2022 Climate Update*. Available at <https://climatechange.ri.gov/act-climate/2025-climate-update>. Accessed on 10/15/2023.
- USDA, Forest Service at <https://www.fs.usda.gov/research/treesearch/62418>

US DOT, Federal Highway Administration Transportation Statistics
at <https://www.fhwa.dot.gov/policyinformation/statistics/2021/vm1.cfm>

Appendix A: Example Check Lists of Quality Control Activities for Deliverables

Deliverables	Quality Control Procedures
Local inventory of GHG emissions with documentation of the following QC activities: (1) narrative report describing data sources and QC measures for data acquisition steps, (2) description of methodology and QC measures for validated proper implementation of methodology, and (3) documentation of QAPP implementation. (4) listing of emissions reductions options are present with documentation of rationale for each option.	1. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate. 2. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate) 3. Editor review—writing is clear, free of grammatical and typographical errors.

Appendix B: Example QC Documentation Form

SRPEDD														
Documentation of QA Review and Approval of Electronic Deliverables														
Approvals on this form verify that all technical and editorial reviews have been completed and the deliverables meets the criteria for scientific defensibility, technical, and editorial accuracy, and presentation clarity as outlined in the Quality Assurance (QA) Project Plan, QA Narrative, Quality Measurement Plan, and/or according to direction for the EPA PO.														
Client: EPA Region 1														
Grant Number: 00A01116														
EPA Project Officer: Emma Stogsdill														
Project Number: 800000														
Project Name: Providence-Warwick MSA CPRG														
Grantee Org. Project Manager: Danica Belknap														
QA Form Details														
Item Number	File Name	Deliverable Description	Date Sent to Client	Deliverable		Document Originator	QA Review Information				QA Review Information			
	(Copy the name of the file reviewed)			Draft	Final		(Review Type)	(Reviewer Name)	(Date Review was Performed)	(Brief Summary of Review Findings and Other Notes)	(Have all Findings Been Resolved?)	(Originator Signature)	(Reviewer Signature)	File Location <i>Copy Long Folder Path Name</i>
01				☐	☐		Technical				☐ Yes			
02				☐	☐		Technical				☐ Yes			
03				☐	☐		Technical				☐ Yes			
04				☐	☐		Technical				☐ Yes			

Appendix C: Compliance with Requirements Under the Privacy Act of 1974

Important Note about Personally Identifiable Information (PII)

The Privacy Act of 1974 (5 U.S.C. § 552a) mandates how federal agencies maintain records about individuals. Per OMB Circular A-130, Personally Identifiable Information (PII) is "information that can be used to distinguish or trace an individual's identity, either alone or when combined with other information that is linked or linkable to a specific individual."

EPA systems/applications that collect PII must comply with EPA's Privacy Policy and procedures to guard against unauthorized disclosure or misuse of PII in all forms. For more information click [here](#). If PII are collected, then the QAPP will describe how the PII are managed and controlled.

Personally identifiable information (PII):

Please verify one of the following two options by checking the corresponding box:

1. This project **will not** collect Personally Identifiable Information (PII) ☒.
2. This project **will** collect Personally Identifiable Information (PII): ☐

This QAPP will comply with 5 U.S.C. § 552a and EPA's Privacy Policy

Appendix D: Example Decision Tracker for GHG Inventory Tool by Sector and State

Task	Sector	MA			RI			Rationale
		EPA LGGIT	RI DEM	MAPC GHGIT	EPA LGGIT	RI DEM	MAPC GHGIT	
1	Mobile Combustion							
2	Electric Power Consumption							
3	Solid Waste							
4.1	Stationary Combustion							
4.2	Agriculture and Land Management							
4.3	Waste Generation							
4.4	Water							
4.5	Wastewater Treatment							
5	Urban Forestry							