



# Environment and Natural Resources Trust Fund

2027 Request for Proposal

## General Information

**Proposal ID:** 2027-155

**Proposal Title:** Improving AQI Forecasting and Climate Resiliency with Sensors

## Project Manager Information

**Name:** Megan Kuhl-Stennes

**Organization:** Minnesota Pollution Control Agency

**Office Telephone:** (651) 757-2455

**Email:** megan.kuhlstennes@state.mn.us

## Project Basic Information

**Project Summary:** The MPCA would place air sensors in every Minnesota state park, evaluate the data to forecast the AQI more accurately, as well as providing real time data to recreators.

**ENRTF Funds Requested:** \$893,000

**Proposed Project Completion:** June 30, 2031

**LCCMR Funding Category:** Resiliency (A)

## Project Location

**What is the best scale for describing where your work will take place?**

Statewide

**What is the best scale to describe the area impacted by your work?**

Statewide

**When will the work impact occur?**

During the Project and In the Future

## Narrative

### **Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.**

Minnesota experienced hazardous air quality from wildfires in Canada in the past many years due to increased drought cycles and pest infestations connected to climate change. MPCA meteorologists have the capability to accurately forecast the air quality for these events using air sensors but are limited by lack of coverage across Minnesota. Additionally, when people are recreating in the Minnesota State Parks, they want to know more about how these air quality events may impact their health. The MPCA has several regulatory air monitoring sites across Minnesota, which provide regional-scale air quality information but have less utility in understanding the air quality in Minnesota's rural towns, cities, and parks. Additional valuable information can be gathered by air sensors that can tell us about air quality and can also provide insights into the impact of climate change on air quality across Minnesota. MPCA staff have used sensor data to track the increase in Air Quality Alerts in recent years. In 2023, the MPCA issued a record 53 Air Quality Alerts issued. In 2025, the MPCA issued an Air Quality Alert forecast for extended days of conditions defined as hazardous under EPA's Air Quality Index (AQI) for the first time ever.

### **What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.**

The Air Quality Index (AQI) was developed by the US EPA to provide a simple, uniform way to report daily air quality conditions. The MPCA produces daily air quality forecasts for fine particles and ground-level ozone. Air sensors are able to assist with this effort by giving real time information about pollutant levels. Their lower cost helps provide widespread coverage. State parks represent an opportunity to both increase sensor coverage to help with forecasting and provide local air quality information to Minnesotans visiting a park. To this end, we aim to place a sensor at every state park built on the successes of similar smaller-scale efforts with individual parks (Interstate, Afton, and Forestville/Mystery Cave State Parks). We will build on shared expertise of the MPCA and the DNR to deploy sensors, and transfer the knowledge gained from them to community (park visitors, all Minnesotans), as well as to the air quality forecasters and climate experts at both agencies.

Funding will allow for the purchase of physical sensors, backups to ensure they stay active, and staff time to analyze data and communicate insights gained from that data.

### **What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?**

This project would enhance natural resources by providing real-time information on air quality to visitors to state parks, allowing them to make informed decisions about their health when outdoors.

The MPCA would also have this information at points across Minnesota to better assess health impacts from air quality (including investigation if there are issues to uncover through additional analysis) as well as the impacts of climate change.

## Activities and Milestones

### Activity 1: Deploy air sensors

**Activity Budget:** \$198,000

**Activity Description:**

This activity includes communication with state parks to coordinate deployment of sensors, ensuring each sensor has proper equipment, signage, and a locked outlet box so the sensor is not unplugged accidentally. Sensors will be replaced as needed when they fail (usually after 2 years), or a higher-grade sensor will be deployed for additional investigation.

**Activity Milestones:**

Description	Approximate Completion Date
Initial sensor deployment to all state parks and recreation areas	August 31, 2028
Maintain sensors through ongoing troubleshooting and deploying substitute sensors.	June 30, 2031
Deploy higher grade sensors if needed for higher resolution investigation	June 30, 2031

### Activity 2: Sensor data analysis and air quality forecasting

**Activity Budget:** \$695,000

**Activity Description:**

Air sensors put out a large amount of data. This data needs to have some quality assurance applied, uploaded into a database, and ensure public has access to the data. Additionally, MPCA meteorologists use these data to forecast the Air Quality Index. Sometimes, analysis of the data requires further investigation because there may be health implications that are unknown, and placement of a higher resolution sensor will assist with this investigation. This analysis would enable investigations and these higher-grade sensor placements.

**Activity Milestones:**

Description	Approximate Completion Date
Hire data analyst to complete this work	September 30, 2027
All sensor data is available to all Minnesotans for near real-time use.	August 31, 2029
Data is analyzed.	June 30, 2031
For data (not associated with wildfires) with health implications, MPCA applies sensor data review process	June 30, 2031

## Dissemination

**Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.**

These efforts will be shared in real time with park attendees. Forecasting of the AQI will be shared through current and any new channels established for AQI. Additional presentations on the outcomes will likely be to EPA Sensor Conference, Air Sensor International Conference, and the like.

## Long-Term Implementation and Funding

**Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?**

Results will be improved ongoing air quality forecasting from the MPCA, shared information on real-time air quality at relevant parks from the DNR, and an improved understanding of the effects of climate change on the air quality in Minnesota. No funding outside of this project will be required.

When the sensors fail after the end of the project, MPCA will provide the staff time to assist in removing the equipment at MPCA's cost.

## Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Groundwater Contamination Mapping Project - Phase II	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03f	\$800,000
Replacing Failing Septic Systems to Protect Groundwater	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 10h	\$2,000,000
Pig's Eye Landfill Task Force	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 10j	\$800,000
Economic Analysis Guide for Minnesota Climate Investments	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 07f	\$54,000
Pollinator Habitat Creation at Minnesota Closed Landfills	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 08o	\$1,508,000
Determining Ambient Background PFAS Concentrations in Minnesota Soils	M.L. 2024, , Chp. 83, Art. , Sec. 2, Subd. 03g	\$621,000
Get the Lead Out: Lead-Free Fishing Tackle Education	M.L. 2024, , Chp. 83, Art. , Sec. 2, Subd. 05e	\$254,000
Pine Needles Reveal Past and Present Airborne PFAS	M.L. 2025, First Special Session, Chp. 1, Art. 2, Sec. 2, Subd. 07c	\$550,000

## Project Manager and Organization Qualifications

**Project Manager Name:** Megan Kuhl-Stennes

**Job Title:** Air Policy Planner

**Provide description of the project manager's qualifications to manage the proposed project.**

Megan has managed the Air Sensor program since 2022. Megan has helped develop air sensor projects and communicate to the public about them. After the 2023 legislative session appropriated \$5,000,000 for Community Air Monitoring pilot grants, Megan helped develop the request for proposals and is ensuring the projects receiving the money are helping communicate to Minnesotans about the projects and what it says about the air in their neighborhoods. Megan and MPCA staff have helped others in local government, tribes, and community members

develop and implement sensor projects across the state of Minnesota. This project grows on these past efforts to continue the work to a wider area of the state.

**Organization:** Minnesota Pollution Control Agency

**Organization Description:**

The Minnesota Pollution Control Agency (MPCA) is committed to ensuring that every Minnesotan has healthy air, sustainable lands, clean water, and a better climate. Through the authority of state and federal statutes and guidelines, the MPCA focuses on preventing and reducing the pollution of air, land, and water, and leads Minnesota's efforts to protect against the devastating effects of climate change. We work with regulated parties, businesses, governments, organizations, and 11 Tribal Nations in Minnesota to develop innovative, community-centered approaches that protect our natural resources, improve human health, and foster strong economic growth.

## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
Sensor Data Analyst		This position would review sensor data, ensure placement on publicly available website/database, apply quality control and quality assurance, analyze data to evaluate for normal or anomalous data, and place higher-grade sensor. This position would be doing the majority of the work for this project for the duration of the project.			34%	4		\$680,000
							<b>Sub Total</b>	<b>\$680,000</b>
<b>Contracts and Services</b>								
Delivery service	Service Contract	shipping equipment to the parks				0		\$3,000
Minnesota IT Services	Service Contract	Sensor database upgrades				0		\$10,000
cell phone company	Service Contract	wifi hotspot contracts				0		\$5,000
							<b>Sub Total</b>	<b>\$18,000</b>
<b>Equipment, Tools, and Supplies</b>								
	Equipment	Purple Air sensors, 130-150	this equipment will do the main work of measuring fine particle concentrations. Purple Air sensors meet the needs of the project by being already connected into the AirSeRV database and accurately delivers pollutant information.					\$60,000
	Tools and Supplies	extension cords ~50	ensuring appropriate placement of equipment is plugged in					\$2,500
	Tools and Supplies	outlet locks ~73	ensure devices are plugged in and not accidentally unplugged					\$4,000
	Equipment	replacement sensors ~73	this would replace the optical counter if that fails before the end of the life of the sensor					\$7,500

	Equipment	outdoor-rated power cords ~80	the equipment needs special power cords to last in the outdoor elements					\$4,000
	Tools and Supplies	shipping supplies (e.g. boxes, packing material)	MPCA will purchase the equipment and send it out to the individual parks					\$1,000
	Tools and Supplies	wifi hotspots (10-20)	generate a Wi-Fi signal for the sensor to connect to if there is not Wi-Fi at the park					\$9,000
							<b>Sub Total</b>	<b>\$88,000</b>
<b>Capital Equipment</b>								
		higher grade air sensors, 8-10	finer resolution or measures more pollutants than low-cost air sensors	X				\$100,000
							<b>Sub Total</b>	<b>\$100,000</b>
<b>Acquisitions and Stewardship</b>								
							<b>Sub Total</b>	-
<b>Travel In Minnesota</b>								
	Miles/ Meals/ Lodging	1 person traveling to various state parks, 6 overnight stays with meals, IRS rate for mileage (up to 900 miles per trip)	Mileage to visit various state parks (some are very far from the St. Paul office), an overnight stay with each visit and Lunch, dinner, breakfast and lunch for each trip.					\$5,000
							<b>Sub Total</b>	<b>\$5,000</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	-
<b>Printing and Publication</b>								
	Printing	signage for parks and rec areas	explaining equipment, what it does, how to find information, etc.					\$2,000
							<b>Sub Total</b>	<b>\$2,000</b>
<b>Other Expenses</b>								

							<b>Sub Total</b>	-
							<b>Grand Total</b>	<b>\$893,000</b>

## Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
<b>Capital Equipment</b>		higher grade air sensors, 8-10	<p>This equipment is the same as the other equipment purchased, just higher grade to offer more resolution or detection of more pollutants. Each piece of equipment ranges from \$7000-\$13000, thus it is over the \$5000 per piece of equipment and qualifies for the Capital Equipment expense category.</p> <p><b>Additional Explanation :</b> These sensors will be placed across Minnesota based on analysis from low-cost air sensor data. These will be utilized for further investigation throughout their useful life for air quality investigations related to this project.</p>

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

**Total Project Cost: \$893,000**

**This amount accurately reflects total project cost?**

Yes

## Attachments

### Required Attachments

#### *Visual Component*

File: [79546209-708.pdf](#)

#### *Alternate Text for Visual Component*

Current MPCA air sensors and future coverage provided by placing air sensors at Minnesota State Parks and Recreation Areas...

### Supplemental Attachments

#### *Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other*

Title	File
Letter of support from MN Dept of Health	<a href="#">939678a2-5f8.pdf</a>

## Administrative Use

**Does your project include restoration or acquisition of land rights?**

No

**Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?**

Yes, I understand the Commissioner's Plan applies.

**Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?**

No

**Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?**

N/A

**Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?**

N/A

**Does your project include original, hypothesis-driven research?**

No

**Does the organization have a fiscal agent for this project?**

No

**Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?**

No

**Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?**

No

**Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:**

Sonja Davidson, Minnesota Department of Natural Resources

**Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements**

Yes, I understand