

PERFORMANCE WORK STATEMENT (PWS)

for

EPA Region 1 Blanket Purchase Agreement, BPA-68HE0118A0001-0003

Period of Performance: June 11, 2018 – May 31, 2023

TITLE: PALMER RIVER SOURCE TRACKING, WATER QUALITY TRENDS SUMMARY, AND WATERSHED PLAN

July 11, 2018

I. OBJECTIVE

The objective of this Performance Work Statement (PWS) is to assist the U.S. Environmental Protection Agency (EPA) with: (1) developing recommendations for use of the PhyloChip¹ to maximize our ability to identify bacterial contamination sources with limited resources; (2) analyzing water quality trends in the Palmer River watershed using existing water quality data, geospatial information, and summary papers; (3) analysis of the impact that changing land use is expected to have in the Palmer River watershed and recommendations for reducing the impacts of land development on water quality.

II. BACKGROUND

The Palmer River's West and East Branches arise in northern Rehoboth, Massachusetts before converging and meandering south into Rhode Island and eventually meeting with the Barrington River to form the Warren River just before it enters Narragansett Bay. The Palmer River Watershed drains approximately 132 km² and is mainly forested, but with substantial agricultural and developed land uses. The Palmer, like many watersheds, faces ever increasing pressure of suburbanization – it has an approved TMDL for bacterial contamination due to threats to shellfish fisheries, and exhibits high levels of Total Suspended Solids (TSS), and nutrients (nitrogen and phosphorous)². Since 2012, investments have been made in improving the water quality of the Palmer River Watershed as a part of the National Water Quality Initiative (**NWQI**) through the installation of agricultural conservation practices.

Since its establishment as an NWQI watershed in 2012, the Massachusetts Department of Environmental Protection (**MassDEP**), the Rhode Island Department of Environmental Management (**RIDEM**), and the Environmental Protection Agency Region 1 (**EPA**) have worked jointly to take monthly water quality samples April-November each year at 12 fixed stations in the lower Palmer watershed. The stations were selected to represent areas of the watershed with numerous farms, and thus the potential for agricultural water quality impacts; where farms have been located, or where farmers are willing to employ agricultural conservation practices. The focus of these sampling events has been to collect information on enterococci, e-coli, TSS, total nitrogen (TN), nitrate + nitrite, phosphorous, and ortho-phosphorous.

¹ The PhyloChip is a rapid, high throughput, DNA microarray based on probing environmental samples for the 16S rRNA gene. The main benefits of using the PhyloChip over traditional culturing techniques are its speed, accuracy, and inclusivity of organisms that cannot survive culturing.

² Palmer TMDL: http://prj.geosyntec.com/prjMADEPWBP_Files/DocAddl/TMDL/palmer.pdf

The goal of the sampling program is to assess water quality trends over time in correlation with ongoing installation of agricultural conservation practices, and to ensure that practices are targeting the appropriate sources. Intermittent sampling in the watershed occurred in the 1990's and early 2000's, and MassDEP has conducted fecal contamination source tracking events in the 2010's. Beginning in 2017, samples were collected for RNA microarray analysis using PhyloChip. However, these samples are still frozen and awaiting analysis due to a lack of funding. In addition, some of the nutrient and bacterial data collected and analyzed over the past 15 years have not yet been evaluated to determine trends; nor has any PhyloChip data been used for source tracking analysis. Consequently, although preliminary data show improvements in water quality in the Palmer River Watershed, some level of effort is needed to better understand the status of water quality in the watershed.

The first part of this task order will involve selecting a subset of bacterial DNA samples from the 2017 sampling season to be processed via the PhyloChip to determine the source of, and areas impacted by, fecal contamination in the Palmer River; this 2017 subset will be selected based on a number of parameters, including watershed 'representativeness'. EPA anticipates Phylochip analysis will provide a better understanding of the impacts and continued necessity (or lack thereof) of installing additional agricultural conservation practices in the watershed. EPA expects this project will also serve as an opportunity to develop best practices for use of the PhyloChip for evaluating fecal contamination sources for other watersheds in the region. Accordingly, as a part of the sample selection process, the Contractor, working with the EPA Team, will document their selection rationale and develop best practice recommendations for using the PhyloChip in other areas with bacterial exceedances. The PhyloChip laboratory analysis will be conducted under a separate contract.

The second part of this task order will seek a summary and trends analysis of existing water quality data. Existing data will be gathered and summarized with special attention being paid to long terms trends in the watershed. To provide context to the changes in water quality over time, the review will also include a Geographic Information Systems (GIS)-based analysis of land use changes. In addition, a summary of agricultural conservation practices and suburban best management practices (BMPs) in the watershed will be used to provide context to the changes in water quality over time.

The third part of this task order will be to develop an understanding of the potential impact of future land use in the watershed on water quality. The goal is to understand the impact of future development and recommend land use practices and/or regulatory approaches, best management practices and conservation practices intended to prevent anticipated urbanization from negating water quality improvements achieved by EPA and the states of Massachusetts and Rhode Island.

In sum, EPA is seeking a better understanding of the water quality trends in the watershed to: inform the impact of EPA and NRCS-funded conservation practices and BMPs in the watershed, guide future decisions on funding for conservation practices and BMPs and water quality monitoring, and understand potential land use impacts on water quality. The trends analysis and land use analysis contemplated herein will help to protect the existing water quality improvements by informing decisions made by EPA and its project partners, increasing collaboration among EPA, MassDEP, RIDEM, NRCS, and local communities, and enabling more strategic BMP funding and placement. Beyond the Palmer watershed, EPA sees this as an opportunity to create an analytical and decision framework for use of the PhyloChip by other watersheds in the Southeast New England Program (SNEP) region.

III. PERFORMANCE WORK STATEMENT

Task 0: Work Plan and Budget Development

The Contractor shall prepare a detailed work plan and budget response to the following work scope describing its proposed approach to completing all of the tasks in this PWS. Its response shall include a description of all assumptions and contingencies made by the Contractor, a proposed schedule including a list of deliverables with due dates and schedule for deliverables, an estimated budget, and special reporting requirements (if any). The Contractor's response will include a description of proposed staff and the number of hours and labor classifications proposed for each task.

Task 1: Project Management and Administration

This task includes subtasks related to administration, management, and coordination of the project.

EPA's Project Team will consist of:

- **Ian Dombroski**, EPA Region 1, Project Team Lead (Dombroski.ian@epa.gov; 617-918-1342)
- **Tim Bridges**, EPA New England Regional Laboratory, Project Technical Advisor (bridges.tim@epa.gov; 617-918-8603)
- **Jack Paar III**, EPA New England Regional Laboratory, PhyloChip Liaison (paar.jack@epa.gov; 617-918-8604)
- **Margherita Pryor**, EPA Region 1, Project Southeastern New England Program Liaison (pryor.margherita@epa.gov; 617-918-1597)
- **Caitlyn Whittle**, EPA Region 1, Narragansett Bay Estuary Program Coordinator (whittle.caitlyn@epa.gov; 617-918-1748)

The Project Team will be coordinating with multiple stakeholders, including but not limited to the Massachusetts Department of Environmental Protection (MassDEP), Rhode Island Department of Environmental Management (RIDEM), Natural Resource Conservation Service (NRCS), Massachusetts Association of Conservation Districts (MACD), Southeastern Regional Planning and Economic Development District (SRPEDD), United States Geologic Survey (USGS), local watershed groups, town officials, and additional partners where appropriate as determined by the Project Team Leader.

It is likely the Project Team Leader will convene a Technical Advisory Group to consist of qualified stakeholders to assist the Project Team. A primary responsibility of the Project Team Leader will be coordinating with all stakeholders. The Contractor shall provide assistance to the Project Team Leader as generally described herein.

All correspondence (emails, reports, etc.) shall be addressed to the members of the Project Team, but directed to the attention of the Project Team Leader; the Project Team Leader will be responsible for forwarding all correspondence to the Project Team. **Ray Cody** will serve as the Task Order Contracting Office Representative (TOCOR; formerly, Task Order Project Officer (TOPO)). **Karen Simpson** will serve as the Alternate TOCOR. The Contractor shall copy the TOCOR on all correspondence.

Provisions for Deliverables are generally set forth in the GSA Contract and/or the BPA. To the extent the following is not inconsistent with either, EPA intends to provide any and all formal reports produced under this contract for public dissemination, in whole or in derivative documents, as appropriate. The

Contractor shall always provide draft versions of any spreadsheets, calculations or reports. EPA and its stakeholders may review and comment on draft deliverables / submittals. If so, then the Contractor shall incorporate any such comments into a final version(s). For communiques and reports, the Contractor shall use standard computer software (e.g., Adobe Acrobat, MS Word, MS Excel, MS PowerPoint). All other software (e.g., computer models) must utilize publicly-available non-proprietary code. In addition, software application files, if delivered to the Government, must conform with Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794(d)).² Refer to <http://www.section508.gov/>.

Provisions for invoicing are also generally set forth in the GSA Contract and/or the BPA. To the extent the following is not inconsistent with either, then to ensure timely administration, invoices shall be submitted promptly within the first week of each calendar month. Invoices shall be directed to the COR. The COR will distribute as appropriate to the Project Team Leader and/or the Project Team for review and consideration, as appropriate. Invoices shall, among other things, summarize the Contractor's work for the billing month, project anticipated work for the next billing period(s), identify and anticipate any problems that may impact the project or its schedule, and specify and identify the billable hours and other direct costs on a Task and Subtask basis. In its response to this PWS, the Contractor may add one or more specific Subtasks or line items under this Task for its general administration of the project.

Subtask 1A: Kickoff Conference Call

The Contractor shall initiate a project kick-off call with the Project Team. For this call, EPA will make available any additional technical references or other supplemental data or information that may assist the Contractor.

A week following this call, the Contractor shall summarize its understanding of the project kick-off call (e.g. action items; scheduling adjustments) and transmit these by email to the EPA Project Team Leader for distribution to the Project Team.

Subtask 1A Deliverables:

- Kickoff call within three (3) weeks of Task Order issuance.
- Kickoff meeting summary (including action items, scheduling adjustments, etc.) within one (1) week of the kickoff meeting.

Subtask 1B: Conference Calls, Meetings and Project Team Support

Following the Kickoff call, the Contractor shall provide for monthly conference calls (as needed) to keep the Project Team updated as to the status of the project. These calls may utilize EPA's teleconferencing facilities and EPA can provide teleconferencing details to the Project Team in advance of each call.

The Contractor shall briefly summarize its understanding of each conference call (e.g., action items, scheduling adjustments) and transmit these by email to the Project Team Leader for distribution to the Project Team.

It is possible that the calls could generate a need to respond to or otherwise address comments from the Project Team and/or Technical Advisory Group. It is presumed that some if not all comments would

² In 1998, Congress amended the Rehabilitation Act of 1973 to require Federal agencies to make their electronic and information technology (EIT) accessible to people with disabilities. The law applies to all Federal agencies when they develop, procure, maintain, or use electronic and information technology. Under Section 508, agencies must give disabled employees and members of the public access to information that is comparable to access available to others.

provide technical direction but it may be necessary for the Project Team Leader to respond in a formal manner. In such cases, the Contractor will provision to provide a reasonable LOE to assist the Project Team Leader and the Project Team to develop formal responses to comments that may be received from the Technical Advisory Group and/or other Stakeholders.

Subtask 1B Deliverables:

- Monthly Conference Calls (as needed)
- Monthly Conference Call Summaries (as needed)
- Project Team Support for Stakeholder Outreach

Task 2: Development of Quality Assurance Project Plan (QAPP)

Although this Task Order does not currently entail the collection of empirical data, because the project entails the assessment and manipulation of existing ambient water quality data, geospatial information, and the laboratory analysis of previously collected water quality samples, for this Task, the Contractor shall develop a Quality Assurance Project Plan (QAPP) for the project which will require submittal to the TOCOR and Project Team Leader, and eventually to EPA's Regional Quality Assurance Unit (QAU) for approval.

EPA believes an existing QAPP may be used in part to develop a QAPP for this Project. This QAPP is entitled "July 25, 2016, Quality Assurance Project Plan (QAPP), 2016 US EPA Workforce Development Fund PhyloChip Microbial Source Tracking (MST) Project, RFA 16126, US EPA Office of Environmental Measurement and Evaluation, North Chelmsford, MA & OECA", and is [attached as Appendix A](#).

The QAPP will require approval prior to, or as near to initiation of project activities as possible. Consequently, the Contractor shall begin consideration and development of the QAPP upon initiation of the project or as soon thereafter as possible but before QA/QC work-related actions. The QAPP shall be provided to the EPA Project Team Leader and the TOCOR in draft within two (2) months of the Project Kickoff Meeting. The EPA Project Team Leader and TOCOR will then coordinate review from the Project Team (as appropriate). Any comments developed from the review will be incorporated by the Contractor into a final QAPP for submittal by the EPA Project Team Leader to the QAU.

Pertinent EPA Region-specific QAPP guidance and models (i.e., templates) include:

- **General:** EPA Guidance for Quality Assurance Project Plans (EPA QA/G-5), December 2002, EPA/240/R-02/009,
- **Modeling (e.g., TMDL):** EPA New England Draft Generic Modeling Quality Assurance Project Plan and Quality Assurance Checklist
- **Use of Secondary Data:** EPA New England QAPP Guidance for Projects Using Secondary Data
- **Data Review:**
 - EPA New England Environmental Data Review Program Guidance (2013)
 - EPA New England Environmental Data Review Supplement

Task 2 Deliverables

- Draft QAPP for submittal to EPA Region 1 QAU (2 months after Kickoff Meeting)
- Incorporation of modifications to QAPP to support approval of QAPP by QAU

Task 3: Source Tracking Sample Selection; Recommendations for Future Use (PhyloChip)

Task 3A. Source Tracking Sample Selection and Lab Analysis by PhyloChip

For this task, the Contractor shall select a subset of the 2017 Palmer Watershed samples³ for analysis of sources of fecal contamination using the PhyloChip⁴. For seven (7) months in 2017 (April – October), water quality samples were collected at 12 stations monthly. Due to budgetary constraints, only a subset of the 2017 samples will be analyzed. EPA’s goal is to identify a subset of these samples that represent the watershed both spatially and temporally.

For this subset, the Contractor shall select thirty (30) of the 2017 samples for analysis based on representativeness of the watershed and sampling season, with priority for sampling stations with higher bacterial sample counts.

For this Project, representativeness is defined as the degree to which the subset reflects the characteristics of the larger 2017 set of data. A representative subset would include stations that encompass the full scope of the sampling area, represent each tributary, and provide a picture of how the watershed changed during each sampling event between April and October.

The Contractor shall present this subset to EPA for approval. Once approved, the selected subset of samples will be analyzed using the PhyloChip. The Contractor will not need to physically handle or transport samples. The samples are currently being held at EPA’s Chelmsford lab. The Chelmsford Lab will coordinate for laboratory analysis of the samples, including shipping, chain of custody, and reporting. Once the Chelmsford lab and the Project Team receive the results of the lab analyses, EPA will forward the results to the Contractor.

Task 3B. Best Practice Recommendations for PhyloChip

After the Contractor and EPA receive the laboratory results of PhyloChip analysis of the 2017 sample subset, the Contractor shall write a brief memorandum detailing the selection process used in Task 3A above. This memorandum should be developed to serve as a best practice resource for the use of PhyloChip in other watersheds, including recommendations for future sampling plans that best represent watershed issues and the most effective use of the PhyloChip in identifying sources of fecal contamination.

For information that could be used in the ‘background’ section of the Best Practices Memo, or for the Contractor to familiarize itself with the PhyloChip, information and relevant publications can be found here: <https://ipo.lbl.gov/lbni2229/>

Task 3 Deliverables:

- Preliminary sub-set of samples for EPA approval
- Finalized subset of 2017 samples
- Memo identifying the proposed subset of 2017 samples, detailed methodology for subset selection, and recommendations/template for future use of the PhyloChip.

³ Previously collected by EPA, RIDEM, & MassDEP (April – October 2017)

⁴ Lawrence Berkeley National Laboratory

Task 4: Water Quality Trends Summary Memo

For this task, the Contractor shall assemble available information on the Palmer River Watershed (including, water quality data, installed agricultural conservation practices and suburban BMPs, and geospatial information on land use) and develop a Water Quality Trends Summary Memo.

Much of the water quality (**WQ**) data for the Palmer River watershed is available at RIDEM and MassDEP. EPA, RIDEM, and MassDEP have collected WQ samples throughout the Palmer Watershed over the last 30 years, but the most recent sampling has focused on select portions of the watershed discharging to Clear Run, Rocky Run, Torrey Creek, and the Palmer River Main Stem below Shad Factory Pond (these areas were selected for sampling because they were determined to be most impaired). RIDEM and MassDEP nutrient and bacterial data are currently in excel format. This data will be obtained via email. The Contractor should work with MassDEP and RIDEM to obtain the data. MassDEP is working on getting these data into a publicly available database, but are unsure whether that will be accomplished soon enough for this Project. Temperature and salinity data will need to be transcribed by the Contractor from logbooks. These logbooks will be provided by EPA. In addition, the Contractor shall contact key stakeholders in the watershed that might have additional or supplemental data. EPA will provide an initial listing of stakeholders, but the Contractor shall survey other possible sources of data, including sources which may provide land use change geospatial data.

An initial listing of contacts where additional data may be obtained is as follows:

- Thomas Akin (NRCS) - thomas.akin@ma.usda.gov
- Jennifer Sheppard (MassDEP)- jennifer.sheppard@state.ma.us
- Heidi Travers (RIDEM) - heidi.travers@dem.ri.gov
- Jason Sorenson (USGS) - jsorenso@usgs.gov
- Malcolm Harper (Mass State) - malcolm.harper@state.ma.us
- Iain Ward (Consultant for NRCS) - iain@neconsultingservices.com
- Tim Bridges, EPA New England Regional Laboratory, bridges.tim@epa.gov

Using the WQ data obtained from RIDEM, MassDEP and other stakeholders, the Contractor shall then develop a draft summary memo evaluating the WQ data with special attention to long term and short-term trends, particularly in the areas of Clear Run, Rocky Run, Torrey Creek, and the Palmer River Main Stem below Shad Factory Pond (although WQ data from the whole of the watershed should be incorporated as background information). In addition, this WQ Trends Summary Memo should consider GIS data for the watershed, existing conservation practices, BMPs, and the PhyloChip information developed in Task 3. Although all pertinent WQ data should be considered for evaluation, the focus of this Task should be mainly on bacteria and nutrient WQ data.

This Memo will be provided in draft for EPA review and comment. The Contractor shall finalize the Memo once EPA has provided its comments on the draft.

The WQ Trends Summary Memo shall contain:

- A list of available water quality data, BMP information, conservation practice information, and land use GIS data used in the analysis (including sources);
- A written and visual summary of the available WQ data;
- A written and visual summary of land use change in the watershed (using GIS data);
- A summary of BMP and agricultural conservation practice activity in the watershed;

- An analysis of WQ trends in the watershed (long term and short term);
- An interpretation of WQ trends given information about land use, conservation practices, BMPs, etc.;
- An assessment of the 'state of the watershed'. This should include an assessment of where WQ is good/improving and poor/declining, what practices seem to be aiding WQ improvements, and indicators of WQ; and
- An assessment of the success of current agricultural conservation practices and BMPs.

Task 4 Deliverables:

- Draft Water Quality Trends Summary Memorandum
- Final Water Quality Trends Summary Memorandum

Task 5: Stakeholder Workshop

The Contractor shall identify stakeholders and use the Task 4 Water Quality Trends Summary Memo to plan for and conduct a stakeholder workshop. At this workshop, stakeholders will be asked to discuss their priorities and concerns for the watershed in the context of what has been learned from the Water Quality Trends Analysis. The objective of this workshop will be to discuss community land use goals and identify potential actions to achieve such goals in order to inform decisions on future land use. Information obtained from this workshop should be incorporated into Task 6 Land Use and Regulatory Analysis and Recommendations. For this workshop, it will be important for the Contractor to highlight the use of the PhyloChip to increase public awareness of the PhyloChip. If PhyloChip data from the watershed are available at the time, they should be highlighted as well. The Contractor should provide a brief memorandum summarizing the results of the workshop for use in Task 6.

The Contractor should plan and lead the workshop. EPA can assist the contractor in identifying participants if necessary. The workshop should be held in Summer 2019. If possible, the Contractor should try to hold the workshop in or near the town of Rehoboth, MA at a town hall or public library.

Task 5 Deliverables:

- Stakeholder Workshop to be held in Summer 2019
- Stakeholder Workshop Notes/ Goals & Action Plan

Task 6: Land Use and Regulatory Analysis and Recommendations

EPA, RIDEM, MassDEP and key stakeholders are interested in an improved understanding of the WQ trends in the watershed in order to:

- inform the assessment of the impact of EPA and NRCS funded agricultural conservation practices and BMPs in the watershed,
- guide future decisions on funding for conservation practices and BMPs, and
- direct future WQ monitoring efforts.

The goal of this task is to move toward improved and sustained water quality trends in the watershed through informed land use development; increase collaboration between EPA, MassDEP, RIDEM, NRCS, and local communities; provide strategic BMP/conservation practices funding and placement; and protect

water quality investments. Contractors should use existing land-use data and tools available through MassDEP’s NPS programs watershed-based planning tool.

This task will involve reviewing existing regulatory structure of the Palmer watershed such as town ordinances, bylaws and planning documents to assess their adequacy for protecting water resources while allowing for future development. Based on the analysis, the Contractor will develop a brief letter report including recommendations for land use practices and/or regulatory amendments (if any), and recommendations for installation of best management practices and conservation practices. The Contractor shall present its findings at a meeting to EPA and project partners. These recommendations will be included in a final version of the brief letter report.

Task 6 Deliverables:

- Draft Land Use and Regulatory Analysis and Recommendations Summary for the Palmer River Watershed
- Meeting to Present Recommendations to EPA and Project Partners
- Final Land Use and Regulatory Analysis Recommendations Summary for the Palmer River Watershed

IV. SCHEDULE AND DELIVERABLES

The schedule outlined below in Table 1 is based on the presumption that the work will occur over a period of approximately one (1) year following award of the Project. EPA understands and presumes the Contractor may likely propose a different schedule based on its understanding of the work scope, but one that is nonetheless consistent with completion in Fall 2019 and within one year of award of the Project.

Table 1. Schedule and Deliverables

Task	Deliverable	Date Due to EPA
Task 0: Work Plan and Budget Development	Work Plan and Budget	Within 30 Days of Receipt of Task Order (TO)
	Progress and Financial Reports	Monthly
Task 1: Project Management and Administration	ongoing	ongoing
Subtask 1A; Kick-off Call	Kick-off meeting between EPA and Contractor	Within 1 Month of TO Issuance
	Meeting Summary	Within 1 Week of Kick-off Call
Subtask 1B: Conference Calls, Meetings, and Project Team Support	Conference Calls	Monthly
	Project Team Support	As Needed Provision
Task 2: QAPP	Draft QAPP	Within One (1) Month of Subtask 1A Kick-off Call
	Project Team Support for Development of Final QAPP Submittal to QAU.	As Needed Support
Task 3: Source Tracking Sample Selection and	Proposed Sub-Set of Samples	Within one (1) month of QAPP development

Recommendations for Future Use (PhyloChip)	Final Sub-Set of Samples	Within one (1) week of receiving feedback on proposed sub-set
	Final Memorandum Document	Within three (3) months of QAPP development
Task 4: Water Quality Trends Summary	Summary and Trends Analysis Memorandum	Within six (6) months of QAPP development
Task 5: Stakeholder Workshop	Stakeholder Workshop	Spring 2019
	Stakeholder Workshop Notes and Action Plan	Within 3 weeks of completion of the workshop
Task 6: Land Use and Regulatory Analysis and Recommendations	Land Use and Regulatory Analysis, and Recommendations Summary for the Palmer River Watershed. Meeting to Present Analysis and Recommendations to EPA and Project Partners	Within ten (10) months of TO Issuance

V. ATTACHMENTS

Appendix A: July 25, 2016, Quality Assurance Project Plan (QAPP), 2016 US EPA Workforce Development Fund PhyloChip Microbial Source Tracking (MST) Project, RFA 16126, US EPA Office of Environmental Measurement and Evaluation, North Chelmsford, MA & OECA