

## **Request for Renewal of Funding for Operation of the Tributary Loading Station on the Scioto River and Interpretation of Water Quality Data**

Submitted to  
Dr. Fang Cheng  
Department of Public Utilities  
Division of Sewerage and Drainage  
The City of Columbus, Ohio

by  
Laura T. Johnson, Ph.D., Director

February 8, 2022

**Period Covered by this Request: 1 January 2022 through 31 December 2026**

### **Work to be Accomplished:**

We request that the City of Columbus provide funds to support the operation of water quality monitoring stations on the Scioto River at Chillicothe, which would be conducted in collaboration with the Division of Sewerage and Drainage (DOSD). The water quality information produced by our operation of this station and our analysis of NPDES data in the Scioto watershed through our prior agreements has proven to be highly valuable to DOSD.

We request a total of \$45,000 for each year from 2022 – 2026. The specific budget estimates are shown in the proposed budget table on page 4 of this proposal. This level of funding will permit us to do the following:

- (1) Continue to produce water quality data through our intensive sampling protocol, analysis of suspended sediments and nutrients (including forms of phosphorus and nitrogen), computation and characterization of nutrient and suspended sediment concentrations and loads from the Scioto River to the Ohio River as calculated from the Chillicothe station;
- (2) Upload the Scioto River data to our public data download website (<https://ncwqr.org/monitoring/>) and interpret the data compared to all of the Ohio River and Lake Erie tributaries that comprise the Heidelberg Tributary Loading Program (HTLP);
- (3) Analyze dissolved organic carbon in a subset of samples collected at the Chillicothe station during both base flow and storm runoff events as coordinated with DOSD personnel;
- (4) Assist OEPA in calculations that compare point-source and nonpoint-source loads of total phosphorus and other nutrients of interest to DOSD upstream of the sampling station at Chillicothe.
- (5) Compare these data to loads measured at a new station starting in spring 2022 on the Upper Scioto River near Kenton, Ohio.

## Progress to Date:

During the five years of the prior agreement between City of Columbus and NCWQR (calendar years 2017-2021), we have accomplished the following:

(1) The suspended sediment and nutrient concentration data as well as annual loads generated for 2017 – 2020 have been uploaded onto the NCWQR [data download web site](#). Data for the 2021 water year will be posted to the site by May 2022. Note that a new data portal website was released in 2021 for the HTLP data. This website provides a customizable visualization of the data along with better tracking of data access.

(2) Dr. Nate Manning analyzed the Scioto River data from Piketon, Ohio to assess the influence of a greater watershed area that includes Paint Creek and Sand Creek on the mass balance that determines primary sources of phosphorus and nitrogen produced by the Ohio EPA. A report of those findings was sent to DOSD on May 21, 2021.

(3) Dr. Laura Johnson presented data from the Scioto River in Chillicothe to the Sustaining Scioto Board on April 29, 2020.

(4) Dr. Laura Johnson met with Ohio EPA to discuss the 2020 update to the [Nutrient Mass Balance Study](#) Report and reviewed the report prior to release.

## Rationale

Measurements of pollutant export from watersheds are used to compare the amounts of pollutants derived from diffuse *nonpoint* sources, such as agricultural and urban storm runoff, with contributions from *point* sources, such as publicly owned wastewater treatment plants and industrial facilities. The two City of Columbus wastewater treatment plants (Southerly and Jackson Pike) are the two largest point source dischargers into the Scioto River watershed. Accordingly, collecting pollutant monitoring data in the Scioto watershed to enable the comparison of Columbus discharges with other pollutant sources is of significant interest to the City. Detailed knowledge of concentrations and loads of nutrients and sediments exported through tributaries (e.g., the Scioto River) to downstream receiving waters such as the Ohio River and ultimately the Mississippi River to the Gulf of Mexico has added greatly to understanding the impacts of rural, largely agricultural land management practices on stream water quality. This information has also permitted detection of trends in water quality, especially changes in dissolved phosphorus loads. Dissolved phosphorus and inorganic forms of nitrogen greatly influence the development of harmful algal blooms (HABs) in receiving waters; for example the Ohio River, which recently experienced significant HABs. Forms of nitrogen along with phosphorus have a particularly large impact on the growth of algae and the yearly development of an oxygen-devoid “dead zone” in the Gulf of Mexico. Heidelberg’s data, as collected through the HTLP, enable direct assessment and evaluation of the watershed-scale effectiveness of BMP implementation programs aimed at nutrient load reductions from Ohio watersheds to receiving waters including the Ohio River. Scientists at numerous universities who are developing land use-water quality models for Lake Erie rely heavily on HTLP data to calibrate and validate their models. The availability of this Scioto River sampling data will likewise enable development of similar land use-water quality models for the Scioto River watershed.

## Work Plan

Our work plan for 2022-2026 is as follows:

1. We will maintain one refrigerated automated ISCO sampler inside the monitoring building at Chillicothe. The sampler will collect one discrete sample every eight hours year-round. Samples will be shipped to us by our cooperator at the Ross County Soil and Water Conservation District weekly (except the week of Thanksgiving and the last week in December). Heidelberg technicians will visit the site as needed, usually one to two times a year, to perform required maintenance and repairs. We have an excellent rapport with the Ross SWCD, and they occasionally volunteer in ensuring that the station is operational and has minimal “down time”.
2. As we have done since 1996, we will analyze approximately 400 ( $\pm$  about 50) samples each year for the Chillicothe station, the exact number dependent on the number and duration of storm runoff events during the year. We analyzed 457 samples in FY 2021 and 510 samples in FY 2019. We will analyze daily samples and additional samples as needed to accurately characterize storm runoff loads of the analyzed compounds. All analyses conform to methods specified in our U.S. EPA-approved QAPP and are certified by Ohio EPA at level 3J. We will analyze all water samples for specific conductance and the concentrations of total phosphorus, dissolved (soluble) reactive phosphorus, nitrate nitrogen, nitrite nitrogen, total Kjeldahl nitrogen, ammonia, chloride, sulfate, dissolved silica, and total suspended solids.
3. We will continue to upload our concentration data and the corresponding flow data (provided by USGS) for each analyzed sample on our tributary data download website on a quarterly basis following QA/QC analysis, and we will make the data available more frequently upon special request. Within 6 months after the end of each water year, we will calculate the annual loads, unit area loads, flow-weighted mean concentrations and time-weighted mean concentrations for each parameter. We will provide an interpretive summary of those results, with comparison to other stations in the HTLP upon request.
4. We have a new monitoring station starting this spring 2022 on the Upper Scioto River near Kenton, Ohio led by American Farmland Trust and funded by the EPA. We expect to provide comparisons to that data set in the future and will provide updates as the work continues.
5. We will continue to collaborate with Ohio EPA and DOSD personnel in analyzing NPDES data and developing appropriate summaries and interpretive reports of the information.
6. As an optional service, if authorized by the DOSD project manager, we will analyze a subset of samples for analysis of dissolved organic carbon using a newly acquired Shimadzu TOC-LCSH. Dissolved organic carbon (DOC) is a common constituent in wastewater, but also in nonpoint sources during storm events. Because most wastewater treatment plants actively reduce or remove organic contaminants, understanding the dynamics of DOC concentrations will help confirm the effectiveness of these efforts as well as help discern the point vs nonpoint source contributions of DOC to the Scioto River.

## Budget

The operational costs to monitor water quality at the Chillicothe station per year for five years are shown below. Also included are the estimated costs for analysis of dissolved organic carbon. The details are as follows:

<b>Heidelberg Proposed Budget</b>		
	Annually	2022-2026 Total
<b>Station Operation- Chillicothe</b>	\$ 40,000	\$ 200,000
<b>Optional services</b>		
Other chemical analysis	\$ 5,000	\$ 25,000
<b>Total Request to City of Columbus, not to exceed</b>	\$ 45,000	\$ 225,000

## Budget Notes

1. The costs quoted in station operation do not include any part of USGS program costs. The USGS operates and maintains the hydrological instrumentation that measures river stage and discharge. NCWQR does pay all electrical bills for the station, currently approximately \$100 per month.
2. For the total request, we have quoted a “not to exceed” total dollar amount, as the number of samples to be analyzed is not exactly known at this time.

We look forward to further collaboration with you as we continue to address important water quality issues in the Scioto River.



---

Laura T. Johnson  
Director