January 16, 2017

Ms. Beth Adler
Technical Program Manager
Des Plaines River Watershed Workgroup
Lake County, Illinois

Re: 2017 Flow Monitoring in the Des Plaines River Watershed
Burns & McDonnell Project Number 89796

Dear Ms. Adler:

Burns & McDonnell is pleased to provide this revised cost proposal for continuing technical services to support the Des Plaines River Watershed Workgroup (DRWW) Flow Monitoring Project (Project). The proposed services will extend our current scope through October 15, 2017, and include collecting, managing, and analyzing stream flow data as described in the approved Quality Assurance/Quality Control Plan (QAPP) for this Project. This revised proposal incorporates comments received from DRWW in a letter dated January 6, 2017. An outline of our proposed scope of services, assumptions, and fee is provided below.

Scope of Services

The scope of work included in this proposal has been developed as an extension of the 2016 flow monitoring activities and all work will be compliant with the approved QAPP. Burns & McDonnell will complete the following tasks:

1. **Stream stage and flow monitoring (four additional monitoring events)**
   Stream flow will be measured at each of the 15 stream data logger monitoring locations identified in the QAPP and as established during the 2016 flow monitoring program. Flow measurements will be conducted during four additional events targeting a range of flow conditions available prior to September 15, 2017. Stage data from the stream data loggers currently deployed at each of the 15 monitoring locations will be downloaded and inspected during each of these flow monitoring events to secure the data and to confirm equipment is in good working condition. We budgeted two days for two scientists to complete each of the four flow monitoring events.

   There will be a total of six monitoring events conducted in 2017, two events carried over from the 2016 contract, and four events under this proposed contract extension. The stage-discharge relationship will be developed at the end of the monitoring period and presented in the final report.

2. **Compilation and analysis of gage station data**
   Burns & McDonnell will continue to compile stage and discharge data for the six U.S. Geological Survey (USGS) gage stations identified in the QAPP. Data compilation will occur throughout 2017 and the stage-discharge relationship will be developed at the end of the

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monitoring period and presented in the final report. If the stage-discharge relationship for the period of interest has already been completed by USGS, a data request will be made directly to USGS and the results will be incorporated into the final report.

3. Reporting

Data recording and reporting will follow the procedures as described in the approved QAPP for this Project. Burns & McDonnell will prepare and submit monthly electronic reports to the DRWW administrative agent by the 10th of each month, consisting of a description of project activities and any data deliverables completed during the monthly reporting period. A draft report will be submitted to DRWW by September 15, 2017, consisting of analytical results, analytical methods, a description of any observations that may have affected data quality, and recommendations for future monitoring efforts. A final report will be submitted by October 15, 2017.

4. Additional Barometric Pressure Data

Per the request of DRWW, an additional atmospheric pressure data logger will be installed so that there is one barometric pressure data logger for every five miles. The current configuration consists of one barometric pressure data logger covering all 15 stream data loggers, a maximum distance of less than 13 miles. The manufacture recommends the barometric pressure data logger be no greater than 20 miles to accurately account for barometric pressure conditions and compensate stream data logger data.

To accomplish this, two additional barometric pressure data loggers will be required. The 2016 contract included budget to purchase two barometric pressure data loggers. One barometric pressure data logger was purchased and installed at the Lake County Central permitting Facility. Therefore, budget is available from the 2016 contract to purchase one barometric pressure data logger. The cost of the third Solinst Barologger Edge is approximately $400 and the proposed fee has been revised to reflect this addition.

The request for the additional barometric pressure data logger was requested in the January 6, 2017 DRWW letter in regards to meeting an accuracy goal for stream stage data. The request as written in the letter is provided below and our response follows:

At the DRWW monitoring committee meeting on 12/15/16 a USGS representative suggested 2 protocol changes which are deviations from the QAPP in order to meet the accuracy goal of 0.1 that is stated in the QAPP:

1) *Use barometric pressure data, 1 every 5 miles, as opposed to 1 every 20 miles.*
2) *Modify procedure for water depth measurement. Install a bar, surveyed in, at each logger location and measure from that fixed location to top of surface water, as opposed to measuring from the bottom of the stream bank to the surface.*

Please add these changes to the proposal and replacement pages for the QAPP.

For clarification, data accuracy is described in Section A.7.3 of the approved QAPP. The stream stage data loggers have a reported accuracy rating of 0.1 percent full scale (range of data logger = 0 to 15 feet). The accuracy of the stream stage data would be ±0.1 percent of the stage reading (e.g., a stage reading of 15 feet could be any value between 15.015 feet and 14.985 feet). The project precision limits are described in QAPP Section A.7.2. The precision limit for reporting stream stage data for this project is 0.1 feet. Despite the manufacturer's reported accuracy, our data will be reported to the 0.1-foot level.

In regards to the requested QAPP change #1 noted above: Deployment of atmospheric pressure data loggers at a density of 1 per 5 square miles exceeds the suggested density of 1 per 20 square miles by the manufacturer. Burns & McDonnell will deploy two additional atmospheric data loggers per DRWW request. The addition of an atmospheric pressure data logger should not require a modification to the QAPP.

In regards to the requested QAPP change #2 noted above: Our stream survey conducted during the installation of the data loggers captured elevations of the stream channel, stream banks, and the rebar used for data logger deployment. The elevation of the top of the surveyed rebar will be used as a local benchmark for measurements. Incorporation of change #2 as written would require a significant change in scope. We do not propose to modify the procedures for spot checking stage data as described in the QAPP Section A.7.3. A wading rod will be used to measure depth of stream data logger to water surface. That measurement will be compared to the stream data logger depth value corresponding to the time the wading rod measurement was made.

Assumptions

- Burns & McDonnell is not responsible for lost or damaged data loggers or for required data logger repair and/or maintenance costs, if needed
- Electronic data deliverables will be provided in Microsoft Excel format
- Monthly progress updates will be sent via e-mail to the DRWW Administrative Agent
- All field work will take place during wadeable river conditions to preserve the safety of field personnel. Wadeable conditions are defined as a condition where an individual can safely collect data while walking across the bed of the river.
- No changes will be required to the QAPP. Any changes and subsequent coordination of approval of the QAPP will require additional modification to this scope of services.

Fee

Burns & McDonnell proposes to perform the above proposed scope of services for a not to exceed, time and materials fee of $34,900 under the terms and conditions of the existing Technical Services Agreement between DRWW and Burns & McDonnell executed on January 13, 2016. The proposed scope of services will be performed from February 1, 2017, through October 15, 2017. The deliverables for this scope of work include four additional field monitoring events, compilation and analysis of select USGS gage station data, monthly updates via email, development of the stage-discharge relationship, a draft report submitted by September 15, 2017, and a final letter report provided in electronic format by October 15, 2017.

Thank you for the opportunity to provide continued assistance on this Project. If you have any questions or require additional information, please contact Brian O'Neill, Project Manager, at 630.515.4652 or via email at bjoneill@burnsmcd.com

Sincerely,

Brian O'Neill, AICP
Aquatic Ecologist