

Original: October 15, 2025
Updated: January 26, 2026



VIA EMAIL: krecker@livgov.com
Mr. Brendan Fons
Mr. Ken Recker, P.E. – Chief Deputy
Livingston County Drain Commissioner
2300 E. Grand River Ave. #105
Howell, MI 48843

Re: Conway-Cohoctah Union Drain – Flow Monitoring Proposal

Dear Mr. Recker:

Accompanying this letter proposal is a spreadsheet with our costs for performing before-and-after flow monitoring associated with the Conway-Cohoctah Drain. It is our understanding that this flow monitoring will be used to determine to what extent a proposed solar farm will have an effect on flows (hydrology) in the Conway-Cohoctah Union Drain in Cohoctaw Township, Michigan. Approximately one year of flow monitoring in 2026 will be used to establish baseline data and the relationship between flows upstream and downstream of the proposed solar site. With the distance between the two proposed flow monitoring locations – upstream near the intersection of Mohrle and Fowlerville roads and at Ellis Road downstream of a little over 2 miles, there will likely be a small but potentially discernible “pick-up” in flows between the gages. We also believe there will be a pretty strong correlation between these flows. Measuring this relationship before and after the project is a reasonable way to look at the hydrologic impact of the proposed project to the Conway-Cohoctah Union Drain system.

We would also install two automated soil moisture sensors in different adjacent fields to the Drain for understanding of existing soil moisture conditions relative to the various rainfall events and conditions of the adjacent lands. We will also use existing LiDar data to analyze existing ground slope data adjacent to the Drain and use that in the analysis of pre v. post monitoring analysis. Both of this information will be used in the technical memo analysis.

We propose to install a staff gage in the drain at each of the above-referenced locations. These would include USGS staff gage plates legible from the bank, attached to a steel signpost driven a few feet into the drain bottom. These gages would require a scientific monitoring permit from EGLE before installation. In our experience, these permits are typically easy to obtain. We would measure flow at each gage per USGS protocol using a current velocity meter, taking measurements at pre-determined intervals across the entire channel and then summing up the incremental flows to get the total flow. With each flow measurement, we would also determine the stage at each gage. By plotting flow versus stage we can develop a stage-discharge curve that allows flows to be estimated with stage measurements only.

We have set this proposal and cost estimate up so that there are some optional methods for consideration that still both can achieve the same goal with the monitoring work. Option #1 would be reading the gauge levels manually after rain events to generate your data set. We would not set up transducers for Option #1 and this option would depend on LivCDC staff doing the majority of the measurements and readings after GEI collected and the stage-flow relationships are known at each location. Option #2A would be doing all the same work as Option #1, which has the necessary manual work for GEI to determine the stage-flow relationships, but instead of doing the readings manually throughout the remainder of Year 1 and all of Year 2, as in Option #1, Option #2A would involve installing 2 transducers at the beginning of Year 1 and they would supplement all manual readings and would be obtaining real-time information continuously, without needed manual assistance, other than to change the batteries every 3 months. Option #2B is simply

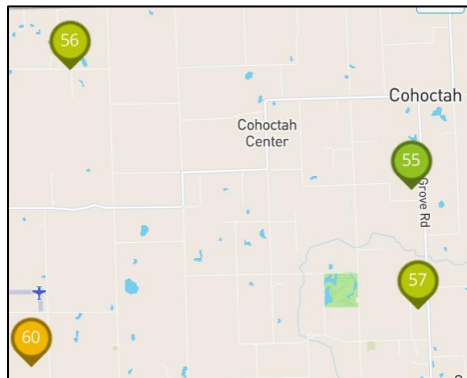
Option #2A, with LivCDC being responsible for changing out and charging the batteries every 3 months over the 2-yr period. Options #2A & #2B would generate significantly more data and would not require regular communication and coordination with GEI & LivCDC staff for getting manual gauge level readings when there's a storm event that may cause the water level to rise.

At a minimum, we believe that there should be at least six separate stage and flow measurements taken manually with a measuring meter at each gage to develop an initial stage-discharge relationship. We will also plan to train your staff so that data can be correlated for stage-flow relationships after various rain events (since you'll be located closer to the project area). The flows should be measured over as broad a span as possible. This would equate to a couple feet between the minimum and maximum flow measurements. For each flow the stage difference should be at least a couple tenths of a foot. Another way to say this is: one cannot measure a lot of similar flows and be able to correlate a particular stage with a particular flow. Several measurements with a wide distribution of flows typically results in a tighter relationship between stage and flow.

Once a reasonable relationship is established, measurements of stage should be sufficient to estimate flows at any given time. This can be done by manually reading the gage and then applying the relationship calculated from the stage-discharge curve. These measurements can be taken manually anytime. This data will then be used to correlate to installed pressure transducers at each staff gage location. We install them in a 2-inch diameter PVC stilling well that we attach to the sign post for each gage. These transducers can then capture data continuously for stage level at almost any desired time frequency for months at a time before the battery needs switching out. This is an option that is separately priced out as a rental cost for 2026 and 2027, as well as housing the batteries at your office and having your staff perform changing of these batteries.

Because the relationship between stage and flow can change as the channel changes shape over time, we also recommend that before monitoring flows for the post-construction condition, that the stage-discharge relationship be checked at both gages for when we would start monitoring of the 'after' condition. This would entail checking at least one flow measurement against the computed stage. If there is a significant difference in the stage-discharge relationship a whole new set of flows may need to be captured. We have not added that cost in here, but can if the need arises at the time of the flow checking for proposed. We do have time for one flow measurement to check the relationship before the post-construction monitoring.

We have not included any costs for rainfall monitoring. We believe any changes between the relationship of flows between gages, will be sufficient to discern a difference in the system. If you decide you want to analyze the relationship between flows and rainfall there are continuous recording rain gages near the site (see figure below) that are capturing data that is downloadable from Weather Underground (wunderground.com). We can always download that data and look at relationships that way as well. We have also included time to prepare a brief technical memorandum on our methods, assumptions, calculations and findings.



Nearby Weather Stations	
Howell (KMIHOWEL171)	55.9 °
Conway Township (KMIFOWLE21)	56.6 °
Hemingway Rd (KMIHOWEL38)	56.5 °
Fowlerville (KMIFOWLE14)	60.4 °
Dupont/Lapeer (KD95)	55.4 °

Weather

Underground weather gage locations (including continuously recorded precipitation) in the vicinity of the project area.

The totals for each of the three options are listed below and detailed in the attached cost summary:

TOTAL, Option #1 (manual readings only option):	\$17,280.00
TOTAL, Option #2A (both manual readings & transducers):	\$29,252.00
TOTAL, Option #2B (w/ LivCDC battery & data exch.):	\$24,740.00
TOTAL, Option #3: Additional Condition Analysis & Modeling:	\$31,934.00
TOTAL, ALL WORK & W/ ADDITIONAL ANALYSIS:	\$56,674.00

If you have any questions, please feel free to contact me at bcenci@geiconsultants.com or by phone at (517) 449-3478.

Sincerely,
GEI CONSULTANTS OF MICHIGAN, PC.

Brian Cenci, P.E.
Sr. Project Manager – County Drain & Water Resources

Scott Dierks, P.E.
Sr. Water Resources Engineer

Attachments (1): Flow Monitoring Proposal spreadsheet
(dated October 15, 2025 & updated January 26, 2026)

LivCDC, Conway-Cohoctah Drain: Flow Monitoring Proposal

Original: 10/15/25

Updated: 1/26/26

	Gr. 7/8, Sr. Engineer \$250.00	Gr. 5, Engineer \$168.00	Gr. 3, Prof. \$152.00	Expenses	Cummulative Hours	Calculated Fee	Subtotals	
Items of Work								Comments
Task 1. Gage and transducer install								
EGLE Scientific Instrumentation permit (for both gages)	1	3	6	\$500.00	10	\$2,166.00		includes \$500 permit fee
Fabricate and install two staff gage set-ups	2	8	6	\$240.00	16	\$2,996.00	\$5,162.00	\$240 gauage material
Install & operate Soil Moisture sensors (2 automatic gauges)	2	8	4	\$950.00	14	\$3,402.00	\$3,402.00	\$400/ea gauge
Option #2: Fabricate and install two staff gage set-ups & 2 transducers	1	10	10	\$320.00	21	\$3,770.00	\$7,172.00	\$320 gauge & transducer material
Task 2. Pre- and Post-Flow Monitoring								
Measure flow and stage for both gages - min. 6 separate flows	1	12	12	\$450.00	25	\$4,540.00		\$450 mileage
Develop stage-flow relationships for each gage	2	6	6		14	\$2,420.00		
Assist LivCDC measuring stage information manually and/or with transducers	2	6		\$150.00	8	\$1,658.00	\$8,830.00	
Existing site analysis (slopes, soil conditions) - continuous, 2 yrs	4	12	4	\$100.00	20	\$3,624.00	\$3,624.00	
Option #2: 2 Transducers on-site for 24 months (\$100 ea/mo)				\$4,800.00		\$4,800.00	\$4,800.00	Rental fee of \$100/mo/ea.
Download data and switch out batteries quarterly (LivCDC staff could do)		24		\$480.00	24	\$4,512.00	\$4,512.00	\$480 mileage, LivCDC could do
Task 3. Modeling								
Develop hydrologic and hydraulic SWMM model	4		80		84	\$13,160.00		
Calibrate SWMM model	4		20		24	\$4,040.00	\$17,200.00	
Task 4. Technical Memo								
Tech Memo	4	10	4		18	\$3,288.00	\$3,288.00	
Tech Memo w/ Soil, Slope conditions	6	8	32		46	\$7,708.00	\$7,708.00	
TOTALS	33	107	184	\$7,990.00	324			

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