



## **Proposal to Provide Stream Flow Monitoring for the City of Molalla on Trout Creek at SE Dickie Prairie Road for 1 Year (7/1/21 to 6/30/22)**

**April 20, 2021**

### **Background**

This proposal was prepared by River Measurement, a division of WEST Consultants, Inc. (WEST) for the City of Molalla (City). A description of work is provided below, as well as the cost to operate and maintain one continuous record stream gaging station on Trout Creek. The City of Molalla is required to monitor stream flow on Trout Creek pursuant to water rights transfer 6319 issued by Oregon Water Resources Department (OWRD). In August of 2019, WEST installed a gaging station on Trout Creek at SE Dickie Prairie Road to monitor streamflow. See Appendix 1: Installation Summary. The gaging station measures water levels every 15 minutes and transmits the data via Iridium Satellite to Sutron's Hydromet Cloud website. WEST has developed a stage-discharge rating curve from flow measurements that is used to calculate 15-minute discharge values from the stage data measured at the gage. The provisional data is available in near real-time 24 hours a day, 7 days a week.

### **Operation and Maintenance**

In order to meet the OWRD requirements of the water rights transfer, flow (discharge) must be computed at the gaging station every 15 minutes throughout the year. Operating and maintaining stream gaging stations requires both field and office work. A field visit will be made to the gaging station approximately once every eight weeks, and more often if needed, to define rating curves or repair equipment. A typical site visit includes servicing the equipment, downloading information from the data logger, and conducting a discharge measurement. In the office, following each site visit, the stage data and discharge measurements are input into specialized software (Aquarius by Aquatic Informatics) that adheres to USGS protocol. This software is used to manage and verify raw data, apply corrections, generate stage-discharge rating curves, and compute a continuous record of stream discharge based on stage data recorded at the site. Aquarius is the same software used nationwide by USGS.

High flow measurements will be collected with an Acoustic Doppler Current Profiler (ADCP) or conventional current meter equipment from the bridge. High flow measurements are needed to define the upper end of the stage-discharge rating; however, low flows, especially those below 10 cfs, will be targeted for this gaging station. Ongoing discharge measurements must be made at a range of flows to check for any changes to the base rating. Often, there are small changes to the rating, called shift curves, which are used to correct the discharge record.

Ongoing discharge measurements are necessary to ensure that accurate discharge data is being computed at the site. Changes to the base rating will be updated in Hydromet Cloud so that future discharge data is calculated accurately. Alarms can be set up on the Hydromet website to alert users via email when low/high water levels (flows) are present. The computed data is provisional data until it receives a thorough review following the end of each water year (Oct. 1 to Sept. 30). After the review, and the data is categorized as final, it will be sent to the City. WEST will also provide provisional data during the year as requested by the City and OWRD.

During the Operation and Maintenance Year (7/1/21 to 6/30/22) WEST will:

- Conduct at least 7 site visits to maintain equipment and download data from the data logger.
- Collect at least 6 discharge measurements, with extra measurements as needed to define high flows or backwater conditions from obstructions in the channel.
- Review data and update provisional stage and discharge records after each site visit.
- Maintain stage-discharge rating.
- Respond to City requests for provisional stage and discharge data prior to the end of the water year.
- Provide the City with raw water temperature data (measured by the submersible pressure sensor) when requested, and if desired by the City

Following data review at the end of each water year, WEST will provide the following deliverables to the City:

- EXCEL table of stage and discharge for the entire year at 15-minute intervals.
- EXCEL table of mean daily discharge.
- Mean daily discharge table with statistics.
- Discharge measurement summary.
- Station analysis document describing performance of gaging station and explanation of methods used to compute the stage and discharge data.
- Plots and tables documenting stage-discharge ratings used during the year.
- Hydrograph of mean daily discharge for entire year.
- Results of gaging station levels surveyed during the year, if any.

The total for **Operation and Maintenance** for one year is **\$15,195**. See **Appendix 2: Detailed Costs**.

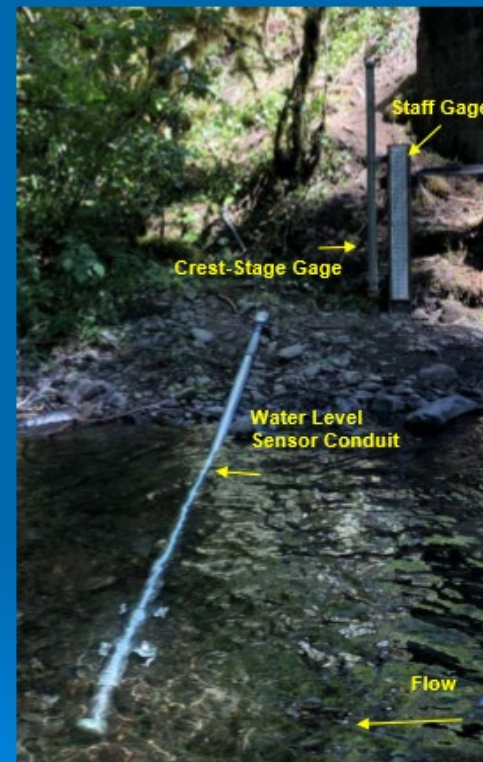
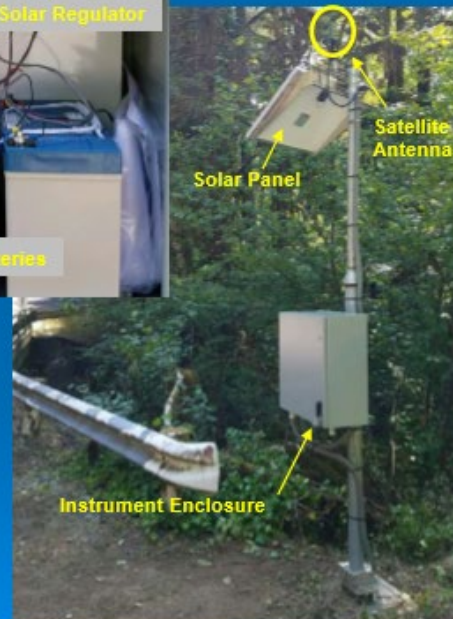
## Exclusions

WEST will obtain written approval from the City before proceeding with repairs or replacement of gaging station components that either fail, are vandalized, or are damaged by floods, fires, etc. Additional funds will need to be approved by the City for any repair costs or additional work.

## Appendix 1: Installation Summary.



### Trout Creek at S. Dickey Prairie Rd.





<b>Appendix 2: Detailed Cost.</b>					
<b>Task 1: Operation and Maintenance for 1 Year. Includes 6 Discharge Measurements, Rating Development, Computed Discharge, and 1 Emergency Trip. Operation from 7/1/21 to 6/30/22.</b>					
<b>Direct Costs</b>	<b>Description</b>	<b>Unit Price</b>	<b>Quantity</b>	<b>Total Cost</b>	<b>Notes</b>
Mileage	Mileage - from office to site	\$0.560	770	\$431.20	110 miles per trip. 3 hr roundtrip
9400-0403	Website. Hydromet Cloud Per-Station Annual Fee	\$395.00	1	\$395.00	Sutron. Yearly fee
	Iridium Modem Monthly Data Plan (30kb/month)	\$62.00	12	\$744.00	Sutron. Yearly fee
Misc.	Batteries, dessicant, small repairs.	\$500.00	1	\$500.00	Only used if needed.
	<b>Total Cost for instrumentation and materials:</b>			<b>\$2,070.20</b>	
<b>Services</b>	<b>Description</b>	<b>Hourly Rate</b>	<b>Hours</b>	<b>Total Cost</b>	<b>Notes</b>
Labor	Senior Hydrologist- Project management. Review data and report at end of water year.	\$155.00	15	\$2,325.00	
	Hydrologist - Service gaging station, check batteries, dessicant, compare staff gage and EDL readings, check & clean CSG, download data, make 6 discharge measurements, back up data in WEST time series software, apply corrections as needed. Provide provisional discharge on Hydromet Cloud. Target flows at 4 cfs. Produce report at end of water year with finalized stage and discharge records. Develop and maintain rating. Provide provisional data to client as requested. Troubleshoot gaging station and telemetry as needed				
Labor		\$120.00	90	\$10,800.00	
	<b>Total Cost for labor:</b>			<b>\$13,125.00</b>	
				<b>Total for Task 1:</b>	<b>\$15,195.20</b>