



Drift Creek Hydrological Monitoring & Analysis

Application for U.S. Bureau of Reclamation WaterSMART Applied Science Grant

Applicant: East Valley Water District

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1 Executive Summary

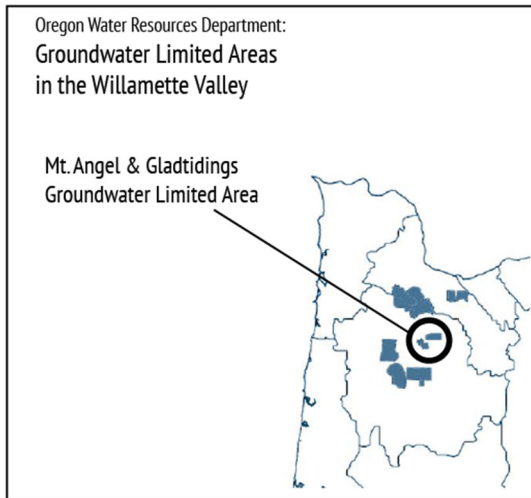
East Valley Water District (EVWD or District) is an irrigation district located near Silverton, Oregon without a water supply. The District serves over fifty family farms that are currently being served by conditional permits due to designations of Groundwater Limited Areas by the State of Oregon. Thus, EVWD and its predecessors have been studying alternative water sources working toward development of a sustainable and resistant water supply. This application, submitted October 17, 2023, seeks to continue hydrological and hydraulic monitoring of Drift Creek and nearby streams. That data will then be used to perform hydrologic and hydraulic studies to determine water supply parameters including proposed reservoir inflow, release requirements, irrigation needs, and alternative water supply methods to inform the District's development of water supply. This project directly informs and addresses a water management challenge and climate change resiliency effort to develop a sustainable water supply for a groundwater limited area and will add to the body of knowledge of stream flows in the Pudding River watershed. This application will cover data collection and hydrologic analysis activities through September 30, 2026.

2 Technical Project Description

2.1 Project Background and Water Supply Need

East Valley Water District (EVWD) was formed in 2002 to supply irrigation water to its members' lands and associated agricultural operations in Marion and Clackamas Counties in Oregon. Over 26,000 acres of EVWD's service area lie within two Groundwater Limited Areas (GLAs) designated for protection by Oregon Water Resources Department. Due to that designation, EVWD is required to develop a supplemental water supply in the very near future. If there is no action, over 36,000 high-value agricultural acres are at risk of experiencing severe water shortages. EVWD is currently planning to construct a water storage facility on Drift Creek to provide a sustainable water source for its patrons as well as provide environmental benefits in the Pudding River Watershed.

Marion County is the leading agricultural producer in the state of Oregon with over \$640 million in production every year. Marion County is consistently listed as one of the top ten highest producers of nursery products, Christmas trees, cane berries, and seed products in the United States. Members of EVWD are significant contributors to the agricultural economy in Marion County; and their high-value agricultural land will be left dry without an alternative water supply.



The northern Willamette Valley contains many sources of groundwater that are segregated within volcanic rock, isolating water supplies and making it difficult to replenish these groundwater reservoirs naturally. Conditions in the groundwater supply have caused declines in the availability of water in 12 areas in Oregon, and two of these areas are located within EVWD’s service area.

The Oregon Water Resources Department and their commission established these 12 Groundwater Limited Areas (GLA) in the northern Willamette Valley. EVWD is located within the Mt. Angel GLA (10,640 acres) and the Gladtidings GLA (16,000 acres.) Oregon Water Resources Department protects existing water rights in the GLAs by preventing excessive groundwater declines,

restoring aquifer (groundwater supply) stability, and preserving aquifers with limited storage capacity. The designation of the GLA requires EVWD to seek an alternate source of water in the immediate future.

Surface water supply has been fully appropriated for the area within EVWD. Surface water is also regularly limited during the period of use for irrigation purposes. Some members have conditional temporary permits for water use; however, these are not long-term agreements and many of the temporary permits have been cancelled or will expire soon compounding the immediacy for the development of an alternative water supply.

EVWD and its membership have engaged regional and national experts for over the past two decades to determine the proper strategy and location for an alternative water supply development project. Through studies and consultation, a surface water storage reservoir on Drift Creek near Silverton, Oregon was deemed the most appropriate method to supply EVWD with an economical, sustainable, and safe water supply now and in the future. The proposed site is located approximately six miles southeast of Silverton in Marion County in the Victor Point area. The reservoir will store water during the winter months to be released during the irrigation season (July – September) and conveyed downstream to EVWD’s membership.

2.2 Project Description for Category A Applicant

East Valley Water District is an Irrigation District organized under Oregon Revised Statutes (ORS) 545.

The District installed a gage on Drift Creek near the proposed reservoir site in 2008 to measure flow and stage. Since its installation, EVWD has engaged regional experts to maintain, store, and analyze the data from the gage, as well as from a series of other nearby gages, to perform hydrologic study. This application would fund an update to that study from Water Year 2014 to Present.

In addition to the gage on Drift Creek, there are several other USGS gages that can be used for this investigation, including:

Agency	Site Number	Site Name, Drainage Area, Record Period
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USGS	14200300	Silver Creek At Silverton, OR F=47.9 sq. mi.
USGS	14200400	Little Abiqua Creek Near Scotts Mills, OR F=9.81 sq. mi.
USGS	14201000	Pudding River Near Mt. Angel, OR F=203 sq. mi.
USGS	14201300	Zollner Creek Near Mt. Angel, OR F=15.0 sq. mi.
USGS	14201340	Pudding River Near Woodburn, OR F=314 sq. mi.
USGS	14202000	Pudding River Near Aurora, OR F=479 sq. mi.,

The information collected from this analysis will be used to inform feasibility and alternatives evaluation in development of a water supply for the District.

2.3 Project Approach

The following is a list of tasks covered by this project. This approach was created by PBS Engineering and Environmental located in Portland, Oregon.

1. Operation and maintenance of the stream gage on Drift Creek.
2. Hydrologic Analysis of stream flow records October 2014 – Present to include:
 - a. Collect/retrieve stream flows and precipitation data for the October 2014 – September 2024 period;
 - b. Analyze stream flow data at Drift Creek and selected nearby streams for that 10-year period, with reference to runoff magnitude, timing and correlation between the various sites, based on daily, monthly and statistical frequency data;
 - c. Update regression equations for daily and monthly stream flows;
 - d. Review prediction capabilities of Upper Drift Creek stream flows using (1) regression equations linking daily flows of Pudding River at Aurora with daily flows of Drift Creek at Victor Road, and (2) a rainfall-runoff model using daily precipitation at Salem Airport to develop Upper Drift Creek daily stream flows;
 - e. Compare predicted vs. observed October 2014 – September 2024 using the regression equations based on October 2008 – September 2014;
 - f. Update ranking and hydrographs of representative low, average and high runoff years;
 - g. Update the statistical frequency curve for the October – April runoff volume;
 - h. Develop inflow data for the 2002 – 2024 period and perform daily time-step modeling of daily reservoir operation for that period, assuming different levels of irrigation withdrawal levels and different schedules; and
 - i. Prepare report on findings and recommendations for future actions.
3. Identification of further locations for additional gages or measurement.

2.3.1 Project Location

The Drift Creek gage is located on Drift Creek near Silverton, Marion County, Oregon. Drift Creek is a tributary of the Pudding River in the northern Willamette Valley. The below map (link to google earth

project map) shows the exact location of the stream gage. This gage is the approximate position of the toe of the proposed earthen dam.



The map also shows the position of other gages used for this hydrologic analysis.

The KML File is embedded in this document here:



Drift Creek
Hydrological Monitors

2.4 Data Management Practices

The Drift Creek gage collects daily stage and streamflow readings year-round. Quarterly, that data is downloaded and saved into excel. That data is then input into industry standard runoff models that also take data from the surrounding stream gages for hydrologic analysis. Stage readings are also used for hydraulic analysis.

All data that was funded through public dollars is publicly available. All formats are compatible with industry standard Geographic Information System platforms.

3 Evaluation Criteria

3.1 E.1.1. Water Management Challenge

East Valley Water District is an irrigation district without a water source. The district was formed under ORS 545 in 2002 to develop a sustainable and resilient water source for 36,000 acres of high-value agricultural

land that are currently served by a patchwork of conditional and time-limited water rights. Nearly four decades ago, the Oregon Water Resources Department directed farmers in the vicinity of two Groundwater Limited Areas to find an alternative water source.

To that end, the district, and its preceding citizen organizations, have studied alternative water sources for multiple generations. The current proposal focuses on a surface reservoir on Drift Creek. However, the District is also committed to continuing study of alternative strategies including alternate groundwater and aquifer storage recovery, reclaimed water, importation of contracted water, and other surface storage facility locations.

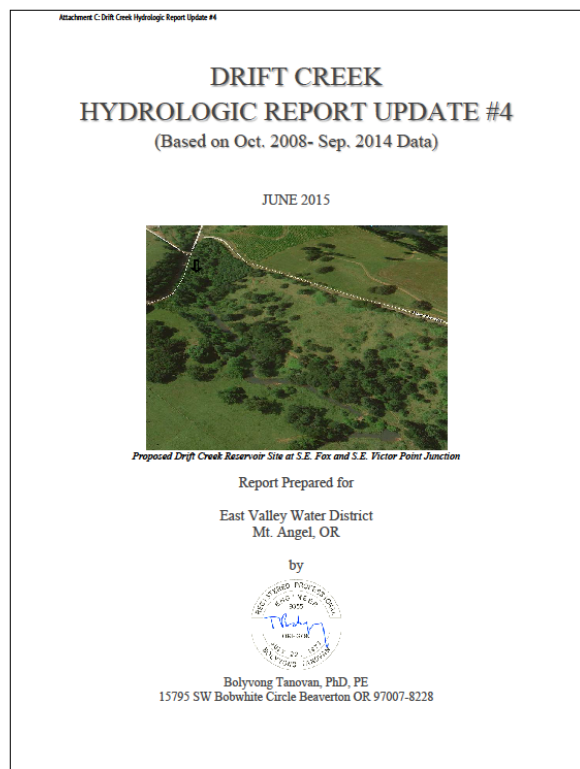
Critical to this water management challenge, is a continuing need for best available data to inform the feasibility and design of the proposed project as well as continued evaluation and consideration of alternative water supply strategies.

This application is to fund the continued collection and evaluation of streamflow data. This data will allow for better decision-making regarding water supply reliability, watershed health, evaluation of natural features to inform nature-based design elements of the proposed project, and better allow the District to make decisions that protect agriculture while also addressing the needs for environment.

3.2 E.1.2. Project Benefits

3.2.1 Project Need

This project will allow for the District to collect and use the best information available for hydrologic analysis to inform water management decisions as the District works to develop a sustainable and resilient water supply.



Embedded here (click to open) is the most recent hydrologic report update performed in 2015 based on data collected October 2008 through September 2014. The District would like to perform an updated analysis with the data collected since to make better, more informed, decisions on the proposed water supply development project as well as perform updated analysis on alternative strategies to serve the District patrons.

3.2.2 Tool and Method

This project continues previous efforts to perform hydrologic yield analysis to provide estimates of the October through April runoff volume that could be expected at the proposed project site. Before the installation of the Drift Creek gage, there was no observed stream flow data at Drift Creek. Thus, pre-2008 analysis uses and reviews existing hydro-meteorological records at nearby streams and development of synthesized mean monthly discharges at various probability levels of occurrence. Since 2008, the District has been able to use readings from the Drift Creek gage as well as Oregon Water Resources Department's water availability data, and irrigation and fisheries water rights listed for Drift Creek at the Mouth. Daily streamflows were able to be calculated for dry year, average year, and wet year at the proposed project site. Then, a reservoir routing model was developed to test the runoff storage and release on a daily time step during each year to meet the required senior water rights as well as all ecological flow triggers.

The analysis uses the following steps:

- a. Collect/retrieve stream flows and precipitation data for the October 2014 – September 2024 period;
- b. Analyze stream flow data at Drift Creek and selected nearby streams for that 10-year period, with reference to runoff magnitude, timing and correlation between the various sites, based on daily, monthly and statistical frequency data;
- c. Update regression equations for daily and monthly stream flows;
- d. Review prediction capabilities of Upper Drift Creek stream flows using (1) regression equations linking daily flows of Pudding River at Aurora with daily flows of Drift Creek at Victor Road, and (2) a rainfall-runoff model using daily precipitation at Salem Airport to develop Upper Drift Creek daily stream flows;
- e. Compare predicted vs. observed October 2014 – September 2024 using the regression equations based on October 2008 – September 2014;
- f. Update ranking and hydrographs of representative low, average and high runoff years;
- g. Update the statistical frequency curve for the October – April runoff volume;
- h. Develop inflow data for the 2002 – 2024 period and perform daily time-step modeling of daily reservoir operation for that period, assuming different levels of irrigation withdrawal levels and different schedules; and
- i. Prepare report on findings and recommendations for future actions.

3.2.3 Project Benefits

This project has two main benefits (1) allows the District to make better, more informed, water management decisions related to the proposed water supply project and alternative evaluation; and (2) improve the body of data and information regarding streamflow in the Pudding River Watershed.

The model used for this analysis is a spreadsheet tool that provides daily, monthly, and water year analysis. This incorporates release criteria, evaporation losses, values for ecological and channel maintenance, and water use provisions. The evaluation of this data will allow the District to make better, more informed,

decisions about the proposed water supply project, operation, as well as continued analysis of alternative water supply methods.

If funded, the data and reports generated from this project will be publicly available both on the District's website as well as the state's website. This will improve the body of knowledge for the entire Pudding River watershed. Recently, several city and local government-owned gages have been taken out of use for various reasons, limiting the body of publicly available streamflow information. The District is committed to collecting, using, and disseminating the best available information for public use.

3.2.4 Complementing Other Efforts

The State of Oregon's Integrated Water Resources Strategy lists place-based planning as an important tenant of water management in the state. The approach encourages coordinated development and management of water, land and related resources to maximize and balance benefits to the environmental, economy, and social welfare. In 2015, the District led the charge to apply for a pilot project for place-based planning in the Pudding River watershed. While our region wasn't chosen for a pilot program, the pilot concluded in 2022 and we anticipate future grant opportunities to re-start place based planning efforts for our watershed. East Valley Water District plans to convene, or be a participant in, any place-based planning effort for the watershed in the future. This data and study will be able to inform decision making for that effort as well as support other organizations in their evaluations on stream flow in the watershed.

3.3 E.1.3. Project Implementation

This project includes two main tasks: (1) maintaining and collecting data from the Drift Creek Gage; and (2) performing the hydrologic analysis. This section describes the support for chosen methodology, general work plan, description of deliverables, and project team.

3.4 Support for Methodology

As described in sections 2.3 and 3.2.2, the project will use well established methods and relationships to take the stream gage data from the Drift Creek stage as well as other tributaries to perform hydrologic analysis. The stream gage on Drift Creek is visited quarterly by PBS Engineering Staff to ensure the gage is in working order and to download the gage data. That data is then uploaded into a spreadsheet tool. PBS staff then performs QA/QC of the data.

That data will then be analyzed for stream flow data at Drift Creek and selected nearby streams for that 10-year period, with reference to runoff magnitude, timing and correlation between the various sites, based on daily, monthly and statistical frequency data. Then, a hydrologist will update regression equations for daily and monthly stream flows.

Then, the team will review prediction capabilities of Upper Drift Creek stream flows using (1) regression equations linking daily flows of Pudding River at Aurora with daily flows of Drift Creek at Victor Road, and (2) a rainfall-runoff model using daily precipitation at Salem Airport to develop Upper Drift Creek daily stream flows. The next step is to compare predicted vs. observed October 2014 – September 2024 using the regression equations based on October 2008 – September 2014.

Finally, the analysis will give the District information ranking the hydrographs of low, average and high runoff years. This will give the District better information on potential management – especially as recent

years have been drier than the historical dataset. Then, the hydrologist will update the statistical frequency curve for the October – April runoff volume and develop inflow data for the 2002 – 2024 period and perform daily time-step modeling of daily reservoir operation for that period, assuming different levels of irrigation withdrawal levels and different schedules.

That information will be consolidated into a report of findings and recommendations for future actions. This report will be publicly available along with the data.

This methodology is industry standard for hydrologic analysis. The work will be reviewed both internally by PBS Engineering as well as external review with the Project Engineer and other regional experts.

3.5 Project Work Plan

Task One: Maintaining and Collecting Data from Drift Creek Gage

Start date: April 2024 | *End date:* September 2026

Task Description: Hydrologist will visit the gage site quarterly to perform general maintenance (including battery replacement, debris removal, and general inspections) and download gage data into spreadsheet tool that calculates stage data to discharge conversions. Hydrologist will QA/QC data and perform any corrections required. Data will be made available to District and Public within 5 days of collection

Milestones: Quarterly data dissemination each year in March, June, September, and December.

Total cost: \$8,000

Deliverable: Gage data in spreadsheet format.

Key Resources: PBS Engineering staff hydrologist

Task Two: Hydrologic Analysis and Report

Start date: October 2024 | *End date:* September 2026

Task Description: Hydrologist will perform the necessary analysis outlined in sections 2.3 and 3.2.2 using water year data from 2015 through 2024. Report will be reviewed by the project engineer, Kevin Crew, P.E., of Black Rock Consulting, and environmental permitting lead Terry Buchholz, P.E., C.WRE with Integrated Water Solutions.

Milestones: Draft Report 1 (WY2015-2024) due December 2024, Review process due January 2025, Final Report due March 1, 2025; Draft Update (WY2025) due December 2025, Review process due January 2026, Final Report due March 1, 2026

Total cost: \$40,000

Deliverables: Report 1 analyzing WY 2015 – 2024; Update Memorandum including WY 2025.

Key Resources: PBS Engineering staff hydrologist; Senior Water Resources Engineer/Hydrologist, Project Engineer, and Environmental Permitting Lead

3.6 Project Team Qualifications

The PBS Water Resources team has experience building, updating, and running reservoir models to study a range of complex, multi-reservoir operational strategies across a variety of hydrologic conditions, including both typical and realistic extreme operating scenarios. We have also utilized model results to inform high-

profile and litigious policy and operational changes. This experience includes extending reservoir models' inputs to incorporate recent observed data and performing hydrologic updates including gap filling of missing stream gauge data, removing unrealistic data, replacing unrealistic data, and creating synthetic realistic extreme data. We also have experience in the creation and updating of technical reports on observed data analyses and modeled results.

3.7 E.1.4. Dissemination of Results

The reports and data because of this project and public funding will be publicly available on the District's website as well as on the Oregon Water Resources Department website [if it is funded through the Water Project Feasibility Grant program.]

Additionally, the District is committed to providing this data to all parties interested in place-based planning initiatives in the Pudding River Watershed and Willamette Valley. The District continues to seek out efforts and is also committed to participating in any such effort.

The District will also share this information with nearby irrigation districts if it will be helpful for their water management activities.

3.8 E.1.5. Presidential and Department of Interior Priorities

3.8.1 Climate Change: increase resilience to the impacts of climate change

In the past decade, the Willamette Valley has experienced dryer than usual water years coupled with hotter than usual air temperature. The Oregon State Institute for Natural Resources Willamette Envision model indicates that over the next seventy years, the Willamette River Basin will be 1° C (2° F) to 7° C (13° F) hotter than today. Most of the climate scenarios investigated show a general trend of wetter winters and drier summers with higher temperatures year-round. Due to the rising temperatures, the precipitation is likely to fall as rain instead of snow. This decreased snowpack results in a fundamental hydrologic change throughout the basin.

The anticipated change in precipitation and temperature will exacerbate irrigation and water management issues in the spring and summer. The District is committed to providing a climate resilient and sustainable water supply for its patrons. However, this work requires gathering the best available information as the climate is changing. Funding this project to collect and analyze hydrologic information on Drift Creek will capture the most recent ten years of data that could indicate and inform better climate resistant solutions for agriculture that also provide resilient solutions for ecosystems and habitat.

4 Project Budget

This section includes a project budget as well as a summary of all funding sources:

4.1 Project Budget

Below is the project budget by task:

OVERALL PROJECT BUDGET Line Items	Cash Match Funds	Water SMART Grant Funds	Total Cost
Task One: Gage Maintenance		7,000	7,000
Task One: Data Download and QA/QC		1,000	1,000
Task Two: Hydrology Analysis and Report Documentation	24,000	12,000	36,000
Task Two: Project Engineer Review		4,000	4,000
TOTAL:	24,000	24,000	48,000

4.2 Table One Summary of Non-Federal and Federal Funding Sources

Funding Sources	Amount
<i>Non-Federal Entities</i>	
1. Oregon Water Resources Department Water Project Feasibility Grant	\$24,000
<i>Non-Federal Subtotal:</i>	\$24,000
REQUESTED RECLAMATION FUNDING	\$24,000

5 Environmental and Cultural Resource Considerations

- Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.
 - This project does not include any construction activities. There will not be any impacts to surrounding environment
- Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?
 - This project study area includes ESA-listed cutthroat trout. However, they will not be affected by any activities associated with the proposed project.
- Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as “Waters of the United States”? If so, please describe and estimate any impacts the proposed project may have.
 - The District prepared a wetland delineation report for the proposed reservoir site that found 9.799 acres of wetland – however none are impacted by this proposed study project.
- When was the water delivery system constructed?
 - East Valley Water District does not have a water delivery system.

- Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.
 - No.
- Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.
 - No.
- Are there any known archeological sites in the proposed project area?
 - No.
- Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?
 - No.
- Will the proposed project limit access to, and ceremonial use of, Indian sacred sites or result in other impacts on tribal lands?
 - No.
- Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?
 - No.

5.1 National Environmental Policy Act

This project does not require any additional environmental or statutory compliance including any additional activities to comply with the National Environmental Policy Act.

5.2 National Historic Preservation Act

This project does not require any additional environmental or statutory compliance including any additional activities to comply with the National Historic Preservation Act.

5.3 Endangered Species Act

This project does not require any additional environmental or statutory compliance including any additional activities to comply with the Endangered Species Act.

5.4 Required Permits or Approvals

East Valley Water District maintains a permit with Marion County for work in the public right-of-way to access the stream gage. No other permits or approvals are required for this work.

6 Overlap or Duplication of Effort Statement

East Valley Water District is not aware of, nor anticipates, any overlap between the proposed project and any other active or anticipated proposal or project in terms of activities, costs, or commitment of key personnel.

7 Conflict of Interest Disclosure Statement

East Valley Water District does not have any actual or potential conflict of interest at the time of submission of this application.

8 Restrictions on Lobbying

No funds under this grant or cooperative agreement will be used for lobbying activities.

9 Uniform Audit Reporting Statement

East Valley Water District was not required to submit a single audit report for the most recently closed fiscal year because \$0 in federal award funds were expended.