**Revised – 1.18.24 Project Purpose and Scope Statement:**

The purpose of this project is to update the 2007 USGS SVRPA model to serve as a planning tool for enhanced wellhead water quality protection and provide the capability to forecast future water quantity demands from the aquifer and its exchange with surface water bodies that are associated with climate change and population growth. The 2007 USGS SVRPA model is a computer model of ground-water flow in the SVRP aquifer in Spokane County, Washington, and Bonner and Kootenai Counties, Idaho that was created in response to the concerns about the impacts of increased ground-water withdrawals resulting from recent and projected urban growth.

The 2007 USGS MODFLOW model is to be updated utilizing MODFLOW-USG, a three-dimensional numerical groundwater flow model to simulate groundwater flow in the SVRP aquifer. MODFLOW-USG is a widely accepted and publicly available software capable of simulating regional and local-scale groundwater flow and groundwater/surface water interactions using advanced techniques for creating flexible spatial grids, routing water in streams, and simulating the spatial and temporal variability in the exchanges of water between an aquifer system and surface water bodies that overlie or adjoin an aquifer system.

Project objectives will be met with the inclusion of the following parameters serving as updates to the 2007 USGS Model:

- An update to the 2007 USGS Model utilizing multiple layers to further refine wellhead capture zones to support enhanced wellhead protection activities. The updated multiple-layer model further supports wellhead and groundwater quality protection planning for municipal supply wells. The groundwater flow model produced under this project can be used to estimate the areal extent of groundwater capture zones to water supply wells for various durations of time. These “capture zones” can then be overlain with land uses in a GIS system to evaluate potential sources of contamination risk to the aquifer and specific groundwater supply wells. The purpose of the updated model is not intended for application to contaminant-transport issues such as the prediction of contaminant migration in the subsurface.
- Inclusion of additional model parameters for forecasting climate change and population growth scenarios for natural hydrologic conditions and groundwater-use conditions to simulate estimated components and rates of inflows to and outflows from the aquifer, including applying variations in regional climate to the natural stream inflows, subsurface inflows, and other groundwater recharge terms for the aquifer. The model parameters include inputs for seasonal patterns and magnitudes of current and forecasted municipal and agricultural water demands. The water demand scenarios ideally would support future water conservation programs and forecast future changes in temperatures as the length of the growing season could alter the monthly and seasonal distributions of demand. Model simulations could be specific to each water purveyor following the collection of additional data such as the planned depths of new wells and the development of formal water demand estimates that support water supply and capital improvement planning efforts. To factor climate change over a minimum 30-year period into the predictive simulations, climate scenarios can be obtained from multiple publicly available data sources.

- The 2007 USGS BiState model did not include Spirit and Hoodoo Valleys, as such the ground-water flow directions in Spirit and Hoodoo valleys and the degree of hydraulic connections

between those valleys and northern Rathdrum Prairie cannot be determined with certainty with the presently available data. Although the areal extent of the 2007 USGS BiState model differed slightly from the areal extent of the SVRP aquifer as defined by Kahle and others (2005), the USGS' modeling report did not redefine the aquifer boundary. Because of the paucity of data for the northern extreme of Rathdrum Prairie, the model did not include Spirit and Hoodoo Valleys. Therefore, as was the case with the 2007 model, the grid for the new updated model can be extended into these two valleys but remain inactivated during model calibration and use. Under this approach, rates of groundwater inflow from the Spirit and Hoodoo valleys can be specified in the model at the edge of the active grid, with the uncertainty in groundwater inflow rates treated by assuming different inflow values along the model boundary.

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