

# Lewis & Clark County Water Quality Protection District

## 2020 Tenmile Creek Groundwater Monitoring Plan



Prepared by:

Peter Schade, Hydrologist  
Lewis & Clark County Water Quality Protection District  
March 2020

## **1.0 Introduction**

Several creeks flow through the Helena Valley before emptying into Lake Helena: Prickly Pear Creek, Tenmile Creek, Sevenmile Creek, and Silver Creek. In the spring and early summer of 2018, high spring runoff flows, fed by heavy late-winter snowpack and spring rains caused Tenmile Creek to jump its banks, resulting in surface flooding, and subsequent high groundwater levels along the Tenmile Creek flood corridor. Residents in this area contended with both overland flooding of homes and property as well as basement flooding caused by rapidly rising, and lingering shallow groundwater.

This monitoring plan documents the Water Quality Protection District's (WQPD) plan to collect groundwater information to better understand the mechanisms influencing groundwater movement through the Tenmile Creek flood zone during flooding events. Data may be used to better inform residents regarding the timing, areal extent, and residence time of springtime groundwater levels within the Tenmile Creek flood zone. This plan is effective for the 2020 season and may be updated as needs warrant.

### **1.1 Project Area and Physical Setting**

The Lake Helena watershed is located in west-central Montana in Lewis & Clark and Jefferson counties. Helena, Montana's capitol city, lies near the center of the watershed. The Lake Helena watershed is part of the Upper Missouri Watershed (USGS 8-digit hydrologic cataloging unit number 10030101). Primary streams in the Project Area include Prickly Pear Creek, Tenmile Creek, Sevenmile Creek and Silver Creek. The primary discharge point for both streams and groundwater is Lake Helena.

The Project Area includes the lower segments of Tenmile Creek, Silver Creek and adjacent alluvial fan terrains within the southwestern portion of the Helena Valley (Figure 1). Upon entering the Helena Valley downstream of its confluence with Sevenmile Creek, Tenmile Creek flows through residential and agricultural lands in the Helena Valley before its confluence with Prickly Pear Creek. The Project Area consists of an alluvial fan complex with Tenmile Creek, Prickly Pear Creek, and Silver Creek forming individual coalescing alluvial fan systems. When streamflow in Tenmile Creek exceeds bankfull flow, overbank flows access normally dry alluvial fan channels and distribute flood water through a series of northeast trending alluvial flow paths. These overflow channels and paths are well-defined, and are activated periodically during spring runoff events, most recently during high flow events of 2011 and 2018. A variety of roads, culverts, ditches and other developed infrastructure retain and redirect these flows as they move through residential areas resulting in a variety of flood-related impacts to residential neighborhoods within the Project Area.

### **1.2 Project Goals and Objectives**

The primary goal of this monitoring plan is to measure and track groundwater levels in and adjacent to the Tenmile Creek and Silver Creek flood zones. This is achieved by monitoring static water levels in residential and dedicated monitoring wells within the project area. Tracking water levels is an important component to understanding how the groundwater system responds to flooding, and the timing and extent of groundwater table rise and fall in and adjacent to the flood zone. Providing groundwater data and information will inform residents, institutions and local governments regarding resource management and community planning efforts.

## 2.0 Study Design

Field monitoring consists of measuring water levels in 20 wells within the Tenmile Creek and Silver Creek flood zones and adjacent areas (Table 1, Figure 1). Monitoring locations include 12 residential wells and 8 dedicated monitoring wells, four of which were drilled in May of 2019. Water levels are measured with an electric sounding tape, following procedures outlined in Cunningham and Schalk (2011). Water levels are measured monthly at each monitoring location from July through March, and weekly from April through June. In addition to manual water level measurements, data loggers are installed in the four newly-drilled monitoring wells (GWIC ID 302696, 302701, 302706, 302709), and measure water levels continually at hourly intervals throughout the year.

In addition to GW level measurements, photographs are taken during times of surface flooding to identify surface flow paths, surface pooling of flood waters, and effects of mitigation efforts by Lewis & Clark County and local residents.

Map ID**	GWIC ID	Latitude	Longitude	Well Address	Ground Elevation (ft)	Well Depth (ft)
1	293450	46.630038	-112.043559	287 Ohana Ct	3746.4	60
2	61215	46.645904	-112.037226	546 Mill Rd	3774.4	42
3	302696	46.644423	-112.031875	Motsiff / McHugh*	3770.3	25
4	61368	46.644188	-112.028648	775 Motsiff Rd	3766.5	NA
5	256510	46.640981	-112.026216	964 Cheryl Rd	3770.6	58
6	892195	46.645859	-112.015984	Mill Rd*	3774.4	23
7	61260	46.649587	-112.028470	5260 Kerr Dr	3756.3	43
8	278709	46.653312	-112.028317	5502 Kerr Dr	3746.7	43
9	302701	46.653157	-112.020893	Forestvale / N Montana*	3739.4	28
10	61189	46.654177	-112.022008	5560 N Montana Ave	3739.0	52
11	255363	46.658243	-112.015939	Rossiter School*	3724.3	25
12	300744	46.662269	-112.015803	6170 Goodwin Dr	3717.2	21
13	65043	46.663597	-112.025927	940 Vallejo Dr	3724.4	47
14	65088	46.666124	-112.019456	1208 Hilmen Rd	3713.8	52
15	302706	46.666063	-112.013411	Hilmen Rd*	3708.1	17
16	302709	46.680431	-112.030891	Rinay Rd*	3731.5	20
17	197571	46.690000	-112.051484	7125 Sagebrush Rd	3793.7	130
18	258300	46.688540	-112.054076	7085 Green Meadow Dr	3798.5	140
19	191555	46.675316	-112.042587	Applegate Dr/Norris Rd*	3736.7	29
20	257063	46.675243	-112.042603	Applegate Dr/Norris Rd*	3737.4	60

\*Dedicated monitoring well

\*\* Map ID corresponds to labeled wells in Figure 2

### 3.0 Project Team and Data Management

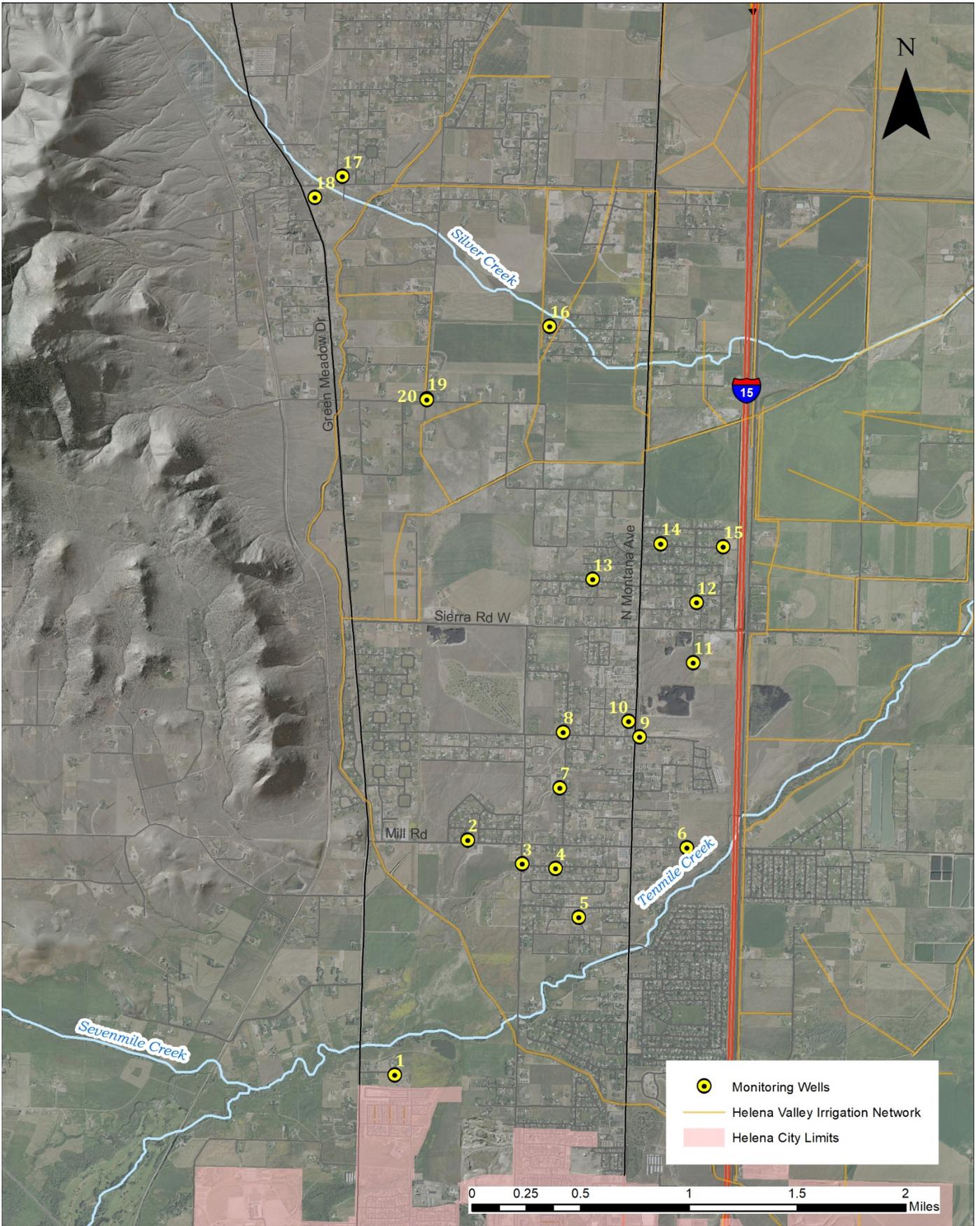
#### 3.1 Project Team and Responsibilities

Person	Role	Affiliation	Responsibilities
Peter Schade	Project Coordinator	WQPD	<ul style="list-style-type: none"><li>• Project Planning &amp; Coordination</li><li>• Data Collection</li><li>• Data Reporting</li><li>• Outreach</li></ul>
James Sweirc	Technical Support	WQPD	<ul style="list-style-type: none"><li>• Technical Assistance</li><li>• Data Collection</li></ul>
Jennifer McBroom	Technical Support	WQPD	<ul style="list-style-type: none"><li>• Data Collection</li><li>• Outreach</li></ul>
Valerie Stacey	Technical Support	WQPD	<ul style="list-style-type: none"><li>• Data Collection</li><li>• Data Reporting</li><li>• Outreach</li></ul>

#### 3.2 Data Management and Reporting

Data collected will be managed by the Lewis & Clark County Water Quality Protection District, and maintained in spreadsheets, hardcopy field sheets and .pdf files. Additionally, water level data is uploaded to the Groundwater Information Center (GWIC) database managed by the Montana Bureaus of Mines and Geology, and available for public consumption. All data is available to the public, government agencies and non-government organizations by written request. There are no statutory reporting requirements for this data.

Data is made available to the public through an ESRI on-line mapping application (ESRI Story Map) that links well monitoring locations in the Tenmile Creek flood zone to water-level data collected by WQPD and contained in the GWIC database. This Story Map can be accessed at <https://arcg.is/1qO1Pf>.



**Figure 1: Groundwater Level Monitoring Locations within the Project Area**