



# ERM

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16 September 2025

HSR-Abramson 5-23

Remediation # 22544

Operator # 100322

This Monitoring Well Reinstallation Work Plan (herein after referred to as the “Work Plan”) has been prepared by Environmental Resources Management, Inc. (ERM) for the HSR-Abramson 5-23 spill/release site located in Greeley, Colorado. As of Q2 2024, all five onsite monitoring wells have been recorded as inaccessible or destroyed. ERM proposes to reinstall the monitoring well network and resume sampling activities by the end of Q4 2025.

## SITE HISTORY AND BACKGROUND

During wellhead cut and cap activities at the site on 5 May 2022, an 81-square-foot (sq ft) area was excavated to a depth of 6 feet below ground surface (bgs). Petroleum hydrocarbon staining and odor were observed on the excavation floor and south sidewall. Five soil confirmation samples (WH-FS-01 and WH-SS-01 through WH-SS-04) were collected from the bottom and sidewalls of the excavation and analyzed for the full list of Colorado’s Energy & Carbon Management Commission (ECMC) Table 915-1 parameters ([Figure 1](#)). Of the five soil samples collected, one soil sample (WH-FS-01) contained concentrations of naphthalene, arsenic, and barium that exceeded the ECMC Table 915-1 Protection of Groundwater Soil Screening Levels. The sample was collected from the center of the excavation area at a depth of 6 feet bgs.

On 29 November 2023, five flush-mounted groundwater monitoring wells (MW-01 through MW-05) were installed at the site, with soil samples collected from each monitoring well location at depths between 2.5 to 5 feet bgs to further delineate impacts. Three additional background samples were also collected at depths between 2.5 and 5 feet bgs. All soil concentrations were below ECMC Table 915-1 cleanup concentrations, except for pH ([Figure 1](#)). The pH at locations MW-01, MW-03, and MW-04 ranged between 8.32 and 8.45, respectively, which is above the range specified in Table 915-1 for soil suitability for reclamation (6 to 8.3) but lower than the pH of several background samples ([Figure 1](#)).

## MONITORING WELL NETWORK EVALUATION

Groundwater sampling of the monitoring well network was completed for Q4 2023 and Q1 2024 by Eagle Environmental. After Q1 2024, the wells were reported to be destroyed. ERM personnel inspected the site on 27 February 2025 and 12 May 2025, but were unable to locate the wells visually or with metal detectors. The available groundwater sampling data are provided on [Figure 2](#). During the 2023 / 2024 sampling events, groundwater was encountered at depths between

2.91 feet below top of casing (btoc) and 4.33 feet btoc. Groundwater flow is reportedly to the northwest at an approximate hydraulic gradient of 0.005 feet per foot.

ERM will install five monitoring wells (MW-01R through MW-05R) to replace destroyed wells MW-01 through MW-05 (Figure 3). The proposed replacement well locations are based on ECMC Rule 915.e.(3) and consistent with the current remediation strategy of monitored natural attenuation. Rationale for the proposed locations is as follows:

- MW-01R will be reinstalled in the vicinity of MW-01 to monitor potential impacts to groundwater adjacent to the former wellhead.
- MW-02R will be reinstalled in the vicinity of MW-02 to monitor concentration trends of total dissolved solids, which exceeded Table 915-1 limits in Q4 2023.
- MW-03R and MW-04R will be reinstalled in the vicinity of MW-03 and MW-04, respectively, to determine local background groundwater concentrations at the site.
- MW-05R will be installed near the northwest corner of the former wellhead excavation limits to monitor groundwater concentrations in the downgradient direction. This location will better align with downgradient groundwater flow compared to the original MW-05 location.

The original wells were all installed at a depth of 12.5 feet bgs. Based on available groundwater level information, it is anticipated that MW-01R through MW-05R will be reinstalled in accordance with the original well depths. However, this depth and the screened interval will be evaluated in the field based on the conditions encountered. Quarterly groundwater sampling will continue until four consecutive quarters of sampling and analysis are compliant with Table 915-1 cleanup concentrations.

Form 27 Document # 403919591 called for a confirmation soil sample from the proposed boring adjacent to the original MW-01 to confirm the absence of residual naphthalene concentrations in soil. However, soil sample WH-FW-01, which showed elevated naphthalene concentrations in May 2022, was collected below the water table. Naphthalene was not detected above laboratory reporting limits in groundwater samples collected from MW-01 for two quarters. Therefore, ERM will collect one additional soil sample from above the water table at location MW-01R to confirm if concentrations are less than Table 915-1 cleanup concentrations in unsaturated soil at this location.

## MONITORING WELL INSTALLATION TASKS

### PRE-INSTALLATION ACTIVITIES

Prior to drilling activities, a Notice of Intent will be provided to the Colorado Division of Water Resources (DWR) no less than 72 hours prior to construction. A Well Construction and Yield Estimate Report (Form GWS-31) referencing the acknowledged monitoring hole notice number will be submitted within 60 days after constructing the hole.

ERM will complete utility clearance work in accordance with our subsurface clearance policy, and applicable regulations, which includes:

- Marking subsurface sampling locations in the field, contacting Colorado 811, and coordinating with Colorado 811 member companies to locate underground facilities in proximity to sampling locations at least 72 hours prior to initiating intrusive activities.
- Contracting with a private utility-locating company to locate underground facilities in proximity to sampling locations prior to initiating intrusive activities.
- Manually clearing, via hand auger, boring locations to a minimum depth of 5 feet bgs prior to the start of drilling. For borings within 10 feet of a utility, ERM will hand clear borings to at least 8 feet bgs, or to 2 ft below the utility depth, whichever is deeper.

## MONITORING WELL INSTALLATION AND DEVELOPMENT

The proposed monitoring wells will be installed by a State of Colorado-licensed driller using hollow stem or solid-stem auger drilling. The monitoring wells will be constructed according to the Colorado DWR Water Well Construction Rules (Figures 4, 5, & 6). Groundwater has been encountered between approximately 2.5 and 3.5 feet bgs in the areas where monitoring wells are proposed.

Soil borings will be advanced to a maximum total depth of approximately 15 feet bgs. Monitoring wells will then be constructed with 2-inch diameter, Schedule 40, polyvinyl chloride well screens and casings. It is anticipated that the wells will be completed with approximately 10 feet of 0.010-inch slotted screen, crossing the water table, with riser pipe installed above the well screen to the ground surface. The screened intervals may be adjusted in the field based on subsurface geology, evidence of contamination, and/or initial findings. The annular space in the wells will be backfilled with #10/20 filter pack sand, or similar, from the bottom of the borehole to approximately 1 foot above the top of the screen interval, with hydrated bentonite chips filling the remainder of the annular space. After discussion with the landowner the type of monitoring well construction will be chosen. Selecting between an above ground “stick-up” construction, a flush mounted construction, or a below surface level construction. The monitoring wells will be completed with a locking well cap, and a well vault set in cement.

Following completion, ERM will allow the grout to set before performing well development. The minimum setting time will be 6 hours for cement grout with accelerators and 24 hours for cement grout without accelerators. The wells will be developed by surging and bailing until the water is relatively clean and free of sediment.

## SURVEYING

The horizontal locations and elevations of the tops of the well casing will be surveyed using a hand-held Global Positioning System device (Eos Arrow 100 PLUS GNSS) with 30 centimeters estimated horizontal accuracy.

## DECONTAMINATION

ERM will decontaminate the reusable drilling, sampling, and monitoring equipment between drilling or sampling locations using either a steam cleaner or an Alconox/Liquinox® wash with a

potable water rinse. Staff will discard disposable drilling and sampling equipment after use and will not reuse the equipment between borings.

### MANAGEMENT OF INVESTIGATION DERIVED WASTE

Investigation-derived waste generated during field activities, including soil cuttings and decontamination fluids, will be containerized and temporarily stored at the Platteville yard. Investigation derived waste will be characterized by the Operator and disposed of offsite based on the waste sampling results in accordance with all federal, state, and local regulations.

### MONITORING WELL PERMITTING AND DECOMMISSIONING

A monitoring and observation hole must either be abandoned in accordance with DWR rules within 18 months of construction, or a well permit must be obtained. The current remedial strategy calls for four quarters of sampling before decommissioning all wells. If groundwater concentrations greater than Table 915-1 cleanup criteria are encountered, further sampling events will be required. In this case, the Operator will initiate the process of permitting the temporary wells to permanent well status 15 months after the Notice of Intent has been filed, by submitting a Monitoring and Observation Well Permit Application (Form FWS-46).

When the monitoring well is abandoned, the abandonment will be performed in accordance with the Colorado DWR Water Well Construction Rules (2 Code of Colorado Regulations 402-2), including submission of a Well Abandonment Report within 60 days after abandoning the well.

### CURRENT REMEDIATION STRATEGY AND PATH FORWARD

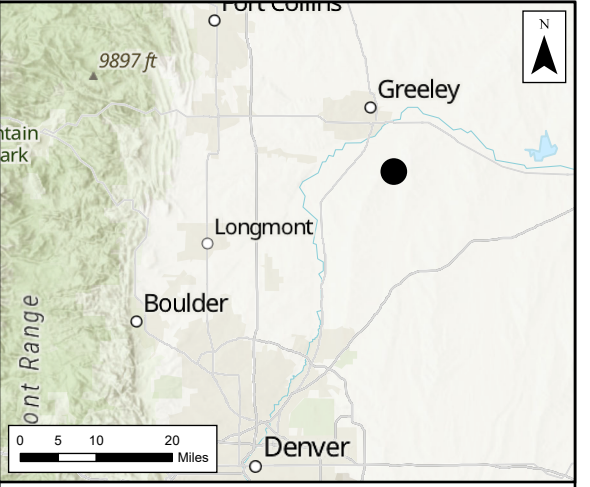
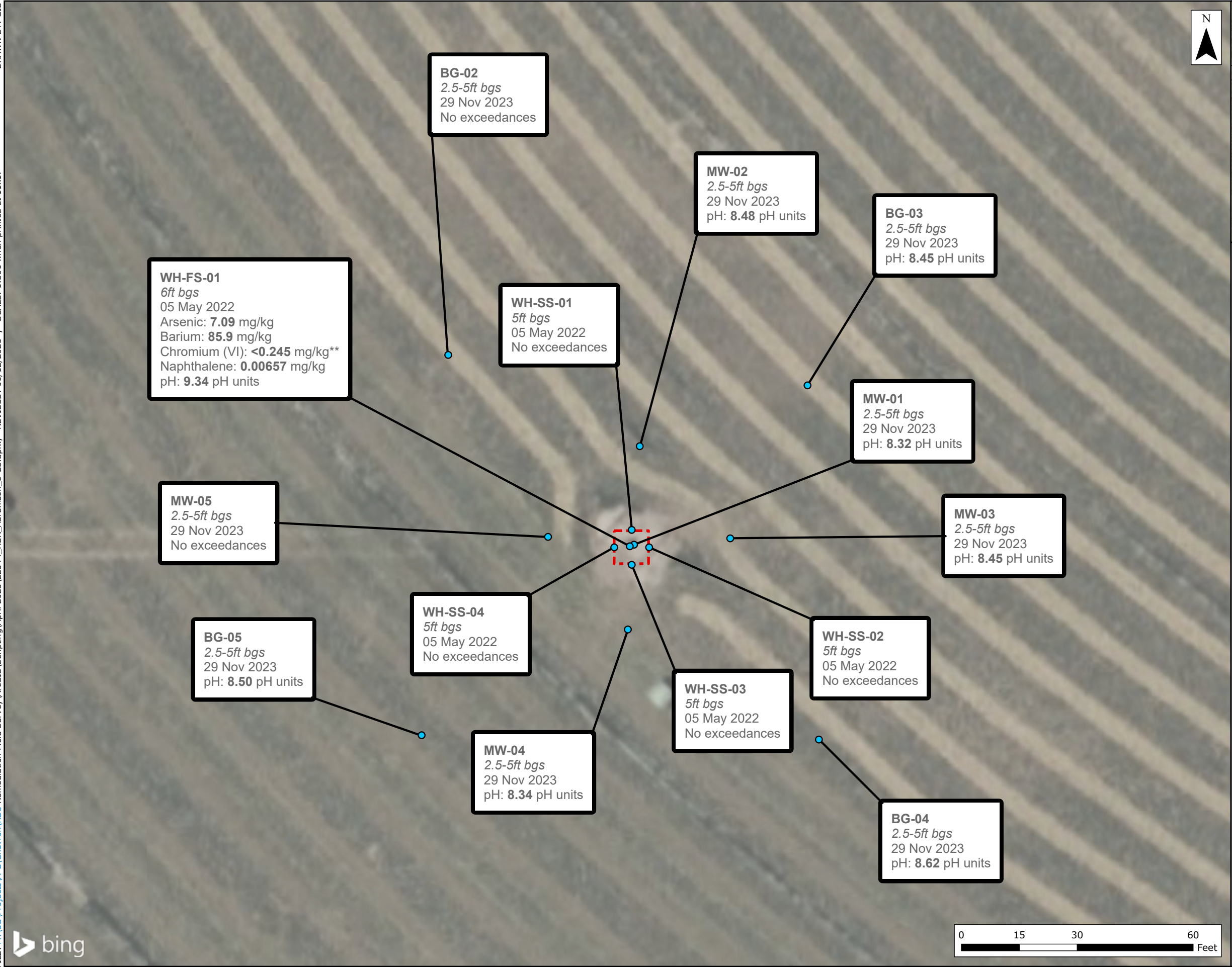
The monitoring well installation is planned for Q4 2025. Monitored natural attenuation is currently selected as the remediation strategy for this Site. The monitoring well network will continue to be sampled quarterly after well replacement for the full list of ECMC Table 915-1 organic and inorganic compounds until four consecutive quarters of sampling demonstrate compliance with Table 915-1 cleanup concentrations.



DATE  
25 July 2025

REFERENCE  
0736294

## FIGURES



**Legend**

- Previous Sample Locations
- ▭ Former Wellhead Excavation Limits

**Notes:**  
 Results are in milligrams per kilogram (mg/kg) unless otherwise noted.  
**Bold** values exceed ECMC Table 915-1, Protection of Groundwater SSL, only  
 \*\* Achievable practical quantitative limits for hexavalant Chromium (Cr VI) in soils is in the range of 0.1 to 1 mg/kg.

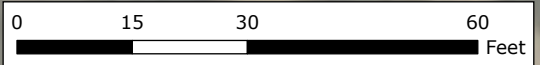
Previous samples collected by Eagle (05 May 2022 and 29 November 2023).

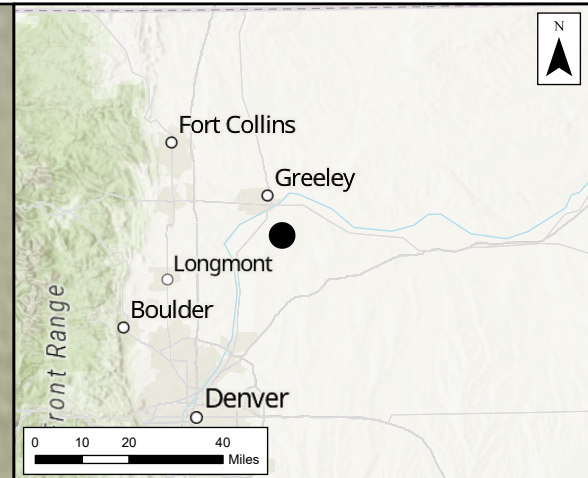
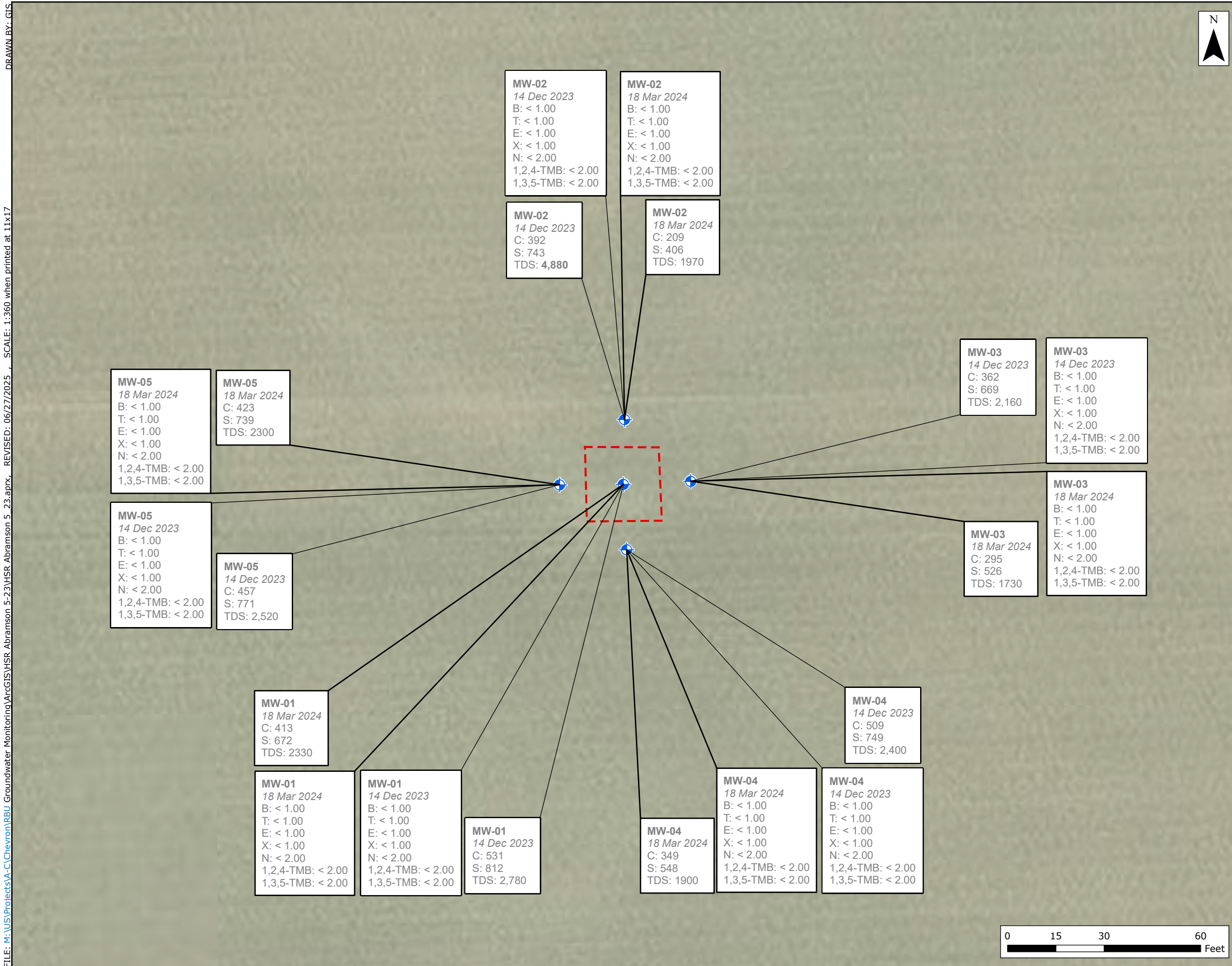
Analytical results below laboratory detection limits or within compliance of ECMC Table 915-1 not shown.

ECMC Table 915-1 GSSLs Listed in mg/kg  
 Arsenic = 0.29  
 Barium = 82  
 Naphthalene = 0.0038  
 pH = 6-8.3 (Soil Suitability for Reclamation)

ECMC = Energy and Carbon Management Commission  
 ft bgs = feet below ground surface  
 GSSL = Groundwater Soil Screening Levels  
 RSSL = Residential Soil Screening Levels

**Figure 1**  
**Exceedances in Soil Samples**  
**HSR-Abramson #5-23**  
**REM# 22544**  
**Operator: 100322**  
 RBUR Remediation Field Survey  
 Chevron  
 Weld County, CO



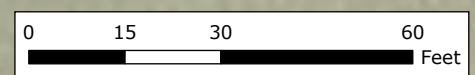


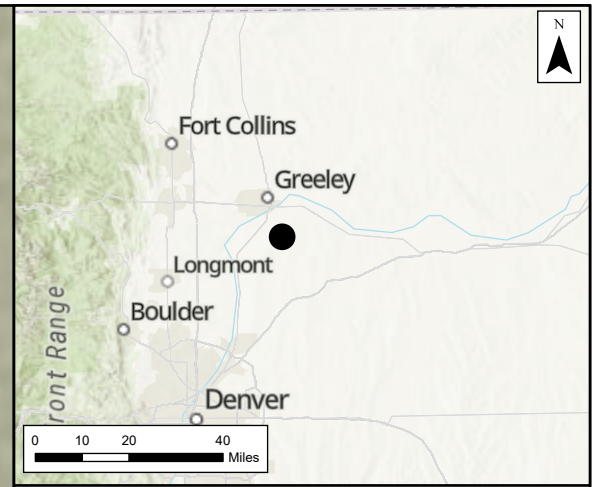
**Legend**

- Approximate Monitoring Well Location
- Approximate Wellhead Location






Notes:  
Values presented in **Bold** exceed the ECMC table 915-1 cleanup concentrations for that compound.  
< = detected below analyte reporting limit  
Inorganic parameter results are in milligrams per liter (mg/L)  
Chloride (limit = 636 mg/L)  
Sulfate (limit = 936 mg/L)  
TDS (limit = 3000)  
C = Chloride  
S = Sulfate  
TDS = Total Dissolved Solids  
Organic parameter results are in micrograms per liter (ug/L)  
Table 915-1 standards for inorganic analytes are established using local background concentrations. Inorganic concentrations at MW-03 and MW-04 were used in the determination of local background.  
Benzene (limit = 5 ug/L)  
Toluene (limit = 560 ug/L)  
Ethylbenzene (limit = 700 ug/L)  
Total Xylenes (limit = 1400 ug/L)  
Naphthalene (limit = 140 ug/L)  
B = Benzene  
E = Ethylbenzene  
N = Naphthalene  
T = Toluene  
X = Total Xylenes  
1,2,4-TMB = 1,2,4-Trimethylbenzene  
1,3,5-TMB = 1,3,5-Trimethylbenzene  
ECMC = Energy and Carbon Management Commission  
Previous soil sample values are presented in grey and were collected by the previous consultant.

**Figure 2**  
**Groundwater Analytical Map**  
HSR-Abramson #5-23  
Site Rem #22544  
Operator #100322  
40.299621°N, 104.637453°W





**Legend**

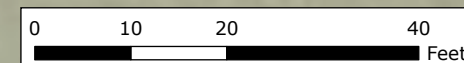
-  Proposed Replacement Monitoring Well Location
-  Decommissioned Monitoring Well Location
-  Approximate Groundwater Flow Direction
-  Groundwater Elevation Contour (ft)
-  Approximate Wellhead Location

Notes:  
 Table 915-1 standards for inorganic analytes are established using background concentrations. Inorganic concentrations at MW-03R and MW-04R will be used to establish background concentrations.

Groundwater flow direction was determined from groundwater elevations taken on 18 March 2024.

Groundwater elevations were calculated based on the measured depth to groundwater and the top of casing elevations reported previously by others (Eagle Environmental Consulting, Inc.).

**Figure 3**  
**Proposed Replacement**  
**Monitoring Well Locations**  
 HSR-Abramson #5-23  
 Site Rem #22544  
 Operator #100322  
 40.299621°N, 104.637453°W

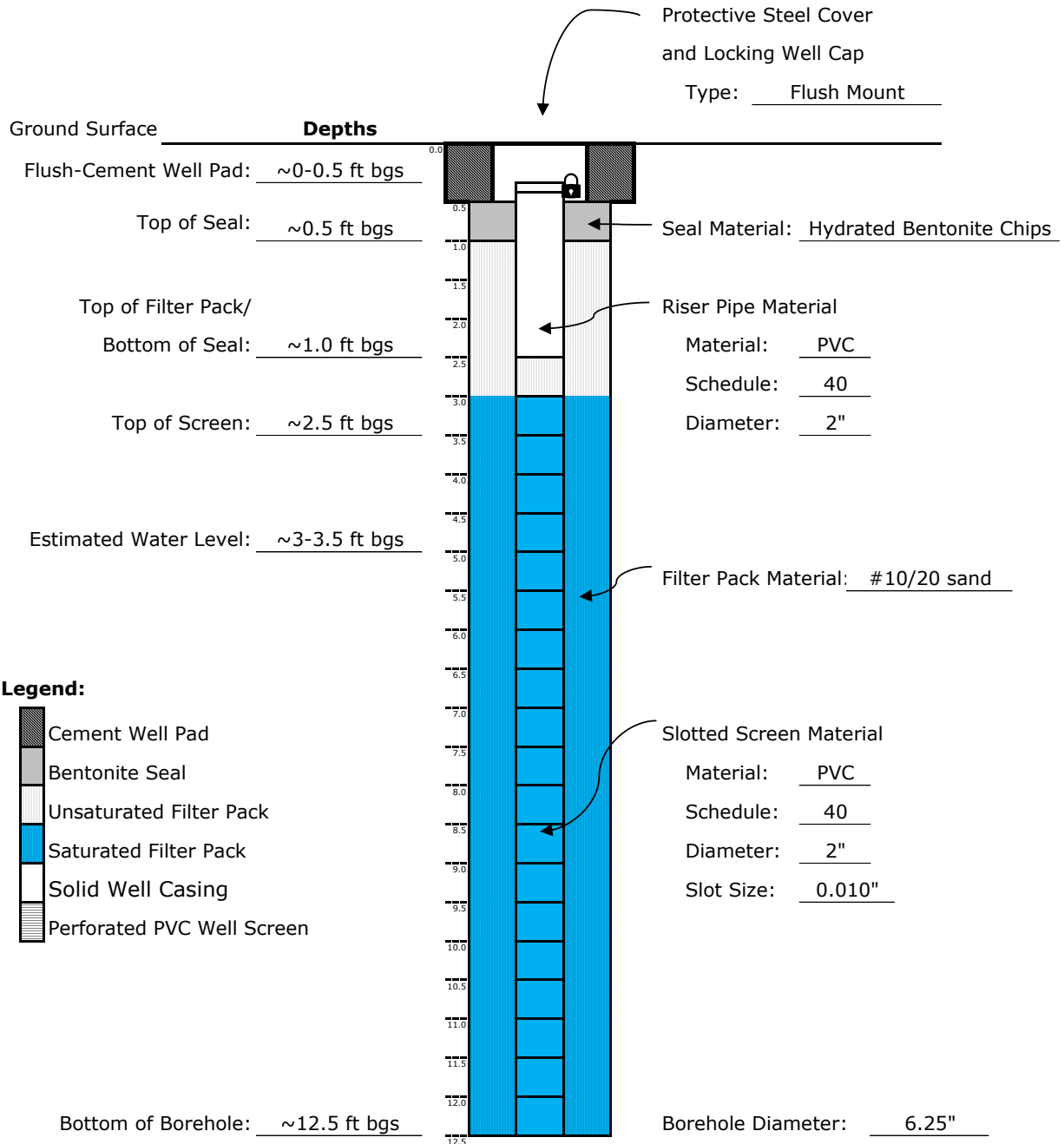




**Figure 4**

**Well Construction Diagram**

Well Identification: **MW-EXAMPLE**



**Notes:**

- Measurements on diagram are estimated values based on site conditions
- Filter pack will be installed to approximately 1.5 ft above the top of the screened interval.

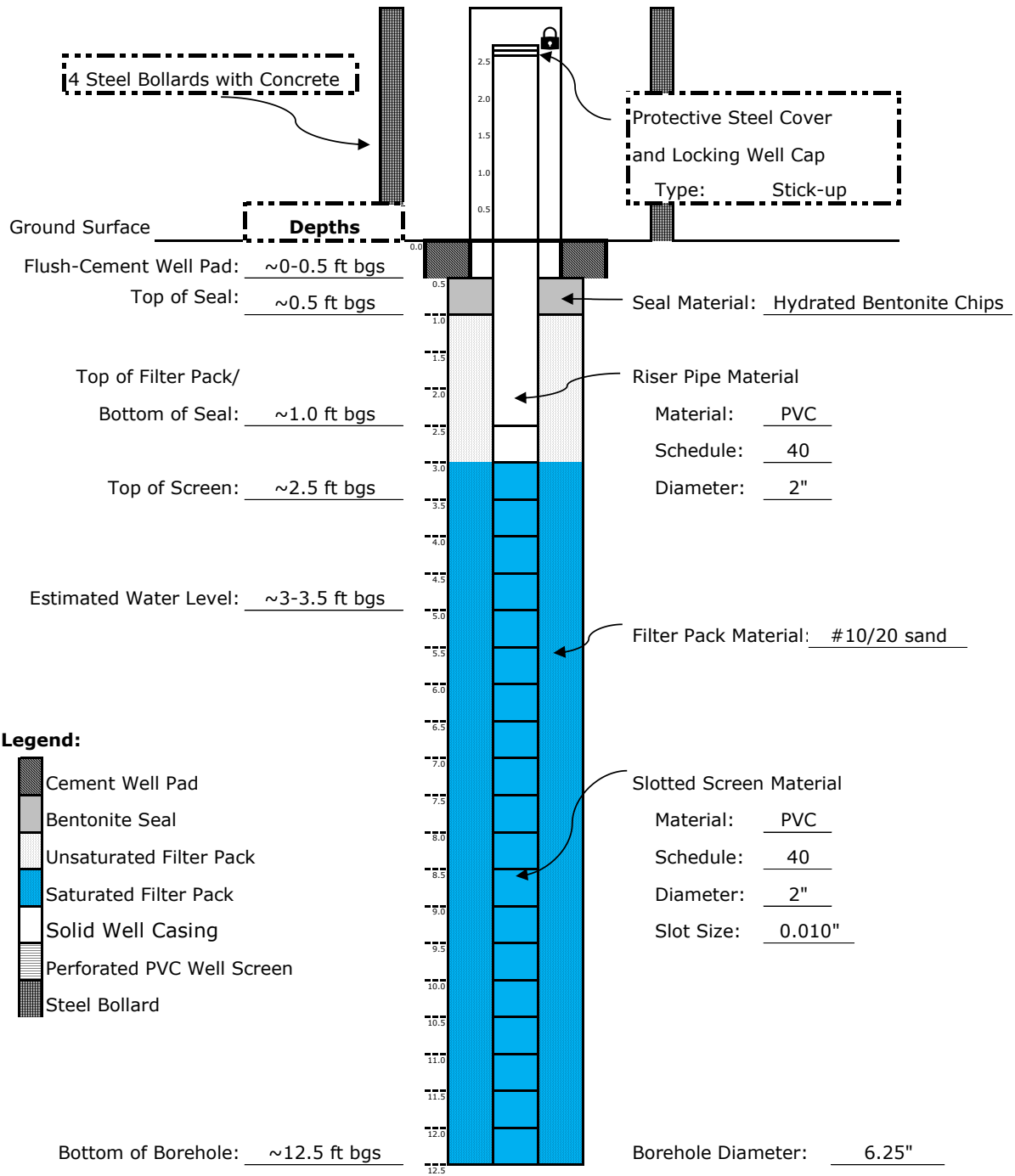


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### Figure 5

## Well Construction Diagram

Well Identification: **MW-EXAMPLE**



**Notes:**

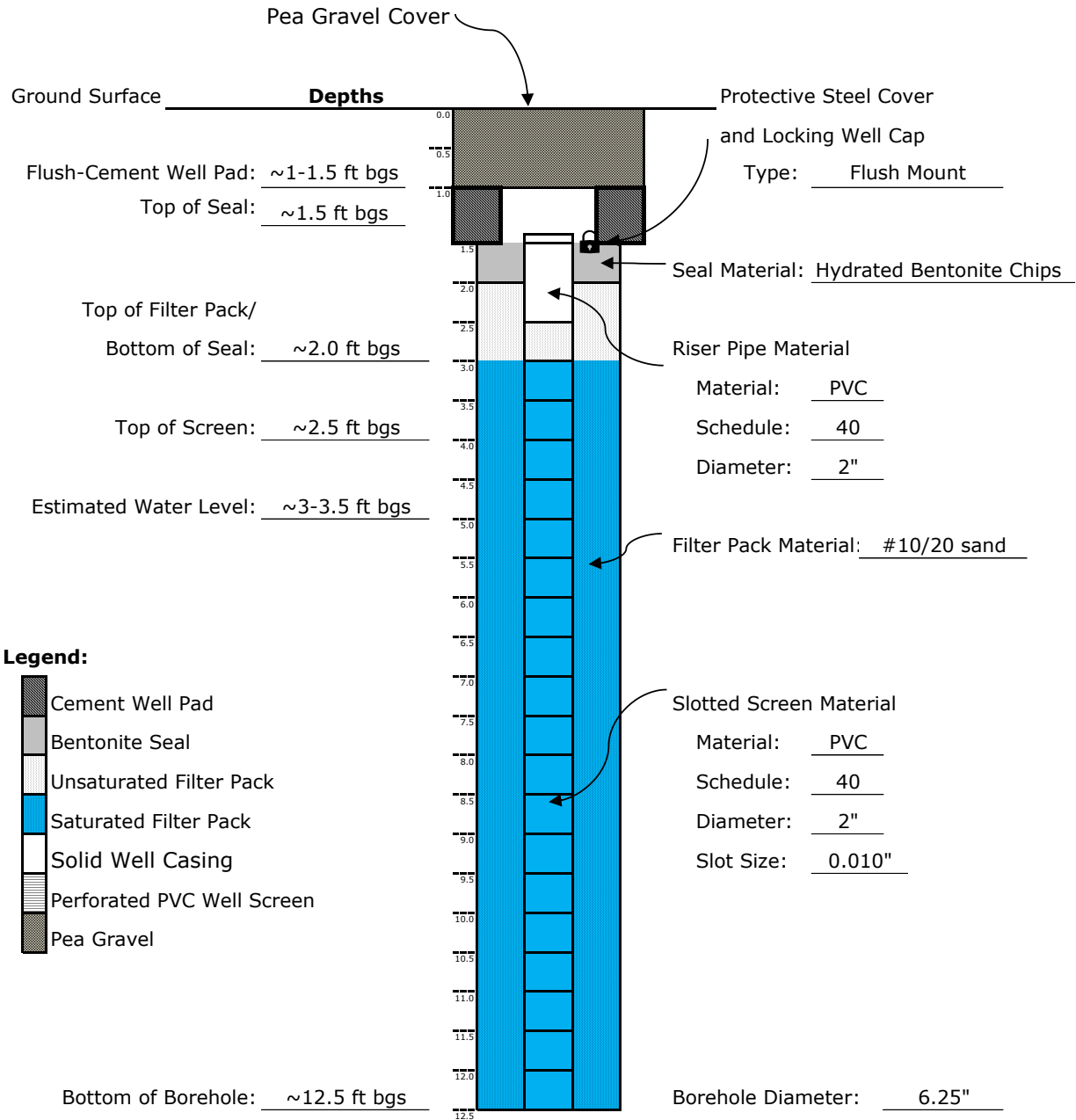
- Measurements on diagram are estimated values based on site conditions
- Filter pack will be installed to approximately 1.5 ft above the top of the screened interval.



# Figure 6

## Well Construction Diagram

Well Identification: **MW-EXAMPLE**



**Notes:**

- Measurements on diagram are estimated values based on site conditions
- Filter pack will be installed to approximately 1.5 ft above the top of the screened interval.