DEPARTMENT OF ECOLOGY
State of Washington

Periodic Review
Heglar Kronquist Site

Facility Site ID 645
Cleanup Site ID 1135

August 2020

First Periodic Review

Publication and Contact Information

This document is available in the Department of Ecology's Heglar Kronquist document repository[1].

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[1] https://apps.ecology.wa.gov/gsp/CleanupSiteDocuments.aspx?csid=1135

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Toxics Cleanup Program

Washington State Department of Ecology

Spokane, Washington

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Introduction

This report presents the Washington State Department of Ecology's (Ecology) first periodic review for the Heglar Kronquist Site (Site). This periodic review is required as part of the site cleanup process under the Model Toxics Control Act (MTCA), Ch. 70.105D Revised Code of Washington (RCW), implemented by Ecology. Periodic reviews evaluate post-cleanup site conditions and monitoring data to assure human health and the environment are being protected.

Remedial actions at the Site met the requirements of Consent Decree No. 13202067, filed in Spokane County Superior Court on June 6, 2013. Kaiser Aluminum Fabricated Products, LLC (formerly known as DCO Management, LLC and subsidiary of potential liable person [PLP], Kaiser Aluminum Corporation [Kaiser]) implemented the remedial actions. Remedial actions were implemented in 2014 in general accordance with the Site's October 2012 Final Cleanup Action Plan (CAP). These actions resulted in on-site covering of contaminated material; however, residual groundwater contamination remained. Groundwater and surface water monitoring has been ongoing since completion of the remedial action.

Summary of Site Conditions

Site description

The Site is located in Section 3, Township 26 North, Range 44 East, Willamette Meridian, in a rural area near Mead, Washington; near the intersection of Heglar and Kronquist Roads as shown in the Vicinity Map, Figure 1. Site features including the covered landfill, monitoring wells, and surface water sampling locations are shown on the Site Plan, Figure 2.

Geology

Topography rises steeply from the intermittent drainage along the western portion of the Site to the gently rolling highlands to the east. The Site is located on the eastern end of a landslide block with the landslide failure plane located to the immediate east of the landfill. Landslides within basalts of the Columbia River Basalt Group (CRBG) are common in the area and likely resulted from glacial flood events eroding sedimentary units underlying CRBG outcrops in the area.

The highlands east of the Site consist of loess (silt and clay deposits) of the Palouse Formation underlain by basalts of the CRBG. The Latah Formation consisting of interbedded siltstone, claystone, and sandstone underlies the CRBG. West and north of the landslide block are thinly covered granites and exposed granites. Farther to the west, along the major drainages, are granites covered by glacial deposits and in some places younger alluvium. Geologic units are shown on the Geologic Map, Figure 3.

Hydrogeology

Groundwater flow beneath the Site is complex due to the characteristics of the landslide deposits and regional geology. Groundwater beneath the Site generally occurs within landslide and alluvium deposits and within fractured basalt. A narrow, fine-grained linear zone that might act as a barrier to impacted groundwater beneath the landfill was observed during Remedial Investigation (RI) activities. The fine-grained linear zone is generally orientated north to northwest along the western boundary of the landfill and generally limits westward groundwater flow from the landfill. The approximate location of the fine-grained linear zone is shown on Figure 3. Based on groundwater elevations observed during RI activities and the orientation of the fine-grained linear zone, groundwater flow at the Site is described as follows:

- Flow from the landfill area northwestward toward MW-1.
- Flow around the north end of the fine-grained zone and then southwest through MW-3 area toward MW-2.
- Flow from the landfill area southward toward MW-4.

Groundwater flow pathways are further discussed and illustrated in the RI report.

Site history

The Site was originally developed as a county gravel pit in 1963. Gravel pit operations ceased in 1969. From 1969 to 1974, aluminum black dross (dross) was transported from the Kaiser Trentwood Plant in Spokane Valley for disposal in the abandoned pit. Dross disposal activities ceased in 1974 after elevated levels of chloride and sodium (constituents of dross) were detected in water samples collected from a shallow groundwater well and spring located near the Site.

In 1979, the U.S. Environmental Protection Agency (EPA) conducted water and air sampling to document impacts to groundwater, surface water (springs), and air from the dross. Impacts to groundwater included elevated concentrations of chloride and sodium. Elevated ammonia concentrations were measured in air (ammonia is a result of a reaction between dross and water). In 1979, Kaiser hired a consultant to assess the Site and provide recommendations for further action. As a result, Kaiser conducted the following actions in 1983 and 1984:

- Constructed a 2-foot thick clay cover with a vegetated topsoil surface
- Constructed drainage ditches
- Installed a passive gas venting system
- Constructed a fence to restrict access
- Conducted groundwater and surface water monitoring

Based on surface water (springs) collected down gradient from the Site, a 50 percent reduction of chloride concentrations was observed following cover construction; however, chloride concentrations still exceeded water standards.

Site investigation

In 2006, Ecology conducted a Site Hazard Assessment of the Site to determine its ranking relative to other contaminated sites in Washington. The Site ranked a 2 on a scale of 1 to 5; 1 represents the highest risk.

In 2008, Ecology named Kaiser a PLP for the Site under the authority of MTCA. Kaiser signed an Agreed Order with Ecology in 2009 to complete an RI and Feasibility Study (FS) under the requirements of Washington Administrative Code (WAC) 173-340. The RI was completed in 2011, and the FS was completed in 2012. The FS described the applicable cleanup requirements for the Site, proposed cleanup standards, identified and evaluated remedial action alternatives for the Site, and recommended remedial alternatives for the Site.

Aluminum black dross

During the RI, dross was encountered below the cover material to depths ranging from 5 to 43 feet. Dross encountered was generally dry with the exception of dross in one location where moisture was encountered, but at levels below saturation. Groundwater was not encountered in any dross borehole.

Groundwater and surface water

RI investigations show that shallow groundwater and surface water (springs) in the area are impacted by leaching caused by the infiltration of precipitation through the dross. Water samples collected during RI activities were submitted to an analytical laboratory for analyses of alkalinity, total dissolved solids (TDS), metals, ammonia, chloride, fluoride, orthophosphate, sulfate, nitrate, and nitrite. Chloride, nitrate, and TDS were the dross constituents that exceeded standards discussed below. Results for groundwater and surface water samples collected during RI activities are provided in the RI report.

Based on analytical results, chloride and nitrate concentrations were selected as indicators of landfill impacts to Site groundwater and surface water. Chloride is considered a good tracer because of its correlation with other dross constituents and because it does not readily adsorb in groundwater. Nitrate was also selected as an indicator; however, nitrate concentrations can be highly variable at the Site, and area-wide sources like cattle activity and fertilizers may also contribute to elevated nitrate concentrations.

The approximate extent of chloride or nitrate concentrations exceeding state standards in groundwater or surface water is shown in the RI report.

Summary of cleanup action

Ecology issued the final CAP in October 2012. The primary objectives of the cleanup action were to prevent the leaching of dross constituents to groundwater, prevent direct dermal contact, and prevent ingestion of shallow groundwater and surface/drainage water with dross constituents.

Cleanup standards

The two primary components of cleanup standards are cleanup levels and points of compliance.

Cleanup levels

The MTCA Method A tables do not provide cleanup levels for chloride and nitrate; therefore, Method B is the most appropriate based on a drinking water beneficial use. Method B cleanup levels shall be as stringent as all of the following:

- Applicable state and federal laws (federal maximum contaminant levels [MCLs], maximum contaminant level goals for non-carcinogens, state maximum contaminant goals).
- Protection of surface water beneficial uses unless it can be demonstrated the hazardous substances are not likely to reach surface water.
- Method B equations for hazardous substances for which sufficiently protective health-based criteria or standards have not been established under applicable state and federal laws.

The applicable Method B cleanup level for chloride is 250 milligrams per liter (mg/L) and is based on the federal and state drinking water secondary MCL based on taste and odor concerns.

Nitrate has an MCL of 10 mg/L; however, if the most stringent cleanup level is below the background concentration, the cleanup level is set at the background concentration. Based on background concentrations in nearby wells, the cleanup level for nitrate is 14 mg/L.

Cleanup decision

The selected cleanup actions identified in the CAP include the following:

- Cover Enhancement – The enhanced cover, as described in the FS Report, consists of a multi-layered cover that includes a less permeable layer (high-density polyethylene [HDPE]), a drainage layer, and 18 inches of top soil vegetated with natural grasses at the surface.
- Dispersion/Dilution in Groundwater – Following construction of the enhanced cover that would prevent infiltration of surface water and subsequent leaching of dross contaminants to groundwater, groundwater contaminants (chloride and nitrate) are expected to attenuate via dilution and dispersion to levels below the cleanup criteria.
- Compliance Monitoring –Groundwater monitoring will be performed on identified compliance monitoring wells to confirm the cleanup action is performing as expected and groundwater cleanup levels will or have been attained.
- Institutional Controls – Measures taken to limit or prohibit activities to assure the continued effectiveness of the cleanup action include fencing around the landfill property, restrictions to limit the use of the property via an environmental covenant recorded as part of the property deed, inspection and maintenance of the cover, signage, and financial assurance.

Site cleanup

The construction portion of the final CAP implemented in 2014 included a multi-layered cover over the landfill and repairing the existing passive gas venting system.

In accordance with the Compliance Monitoring Plan, groundwater and surface water monitoring is being conducted to determine compliance with cleanup levels. Compliance monitoring activities began in October 2015 and included collecting groundwater samples from Site monitoring wells MW-1 through MW-5 and MW-7 and collecting surface water samples (if available) from sample locations SW-1, SW-2, SW-3, and SW-5. Monitoring and surface water sampling locations are shown in Figure 2. Damage to monitoring well MW-6's well riser pipe was observed in 2015 and the well was subsequently abandoned in 2016. Therefore, MW-6 was not sampled during the review period.

Institutional controls including fencing around the landfill, gates, locks, and signage are inspected during Compliance Monitoring events to assure the continued effectiveness of the cleanup action. An environmental covenant has been recorded on the property to limit site use.

Periodic Review

Regulation

A periodic review of the cleanup action takes place at least every five years after the initiation of the cleanup action. A periodic review is required at sites where any of the following occur:

- Ecology conducts a cleanup action.
- Ecology approves a cleanup action under an order, agreed order, or consent decree.
- As resources permit, whenever Ecology issues a no further action opinion.

AND one of the following conditions exists:

- An institutional control and/or financial assurance is required as part of the cleanup action.
- The cleanup level is based on a practical quantitation limit as provided for under WAC 173-340-707.
- Modifications to the default equations or assumptions using site-specific information would significantly increase the concentration of hazardous substances remaining at the Site after cleanup or the uncertainty in the ecological evaluation or the reliability of the cleanup action is such that additional review is necessary to assure long-term protection of human health and the environment.

When conducting a periodic review of a cleanup action and evaluating whether human health and the environment are being protected, the factors the department shall consider include [WAC 173-340-420(4)]:

- The effectiveness of ongoing or completed cleanup actions.
- New scientific information for individual hazardous substances of mixtures present at the Site.
- New applicable state and federal laws for hazardous substances present at the Site.
- Current and projected Site use.
- Availability and practicability of higher preference technologies.
- The availability of improved analytical techniques to evaluate compliance with cleanup levels.

Basis

Because the Site underwent a cleanup action Ecology approved under a consent decree and institutional controls were required as part of the cleanup action, periodic reviews are required at a frequency of at least every five years.

This review is based on documents describing site conditions and the cleanup actions, and five years of compliance monitoring data documenting Site conditions and contaminant concentrations.

Effectiveness of ongoing or completed cleanup actions

Evaluating the cleanup action effectiveness involves verifying the status of engineered and institutional controls and assessing contaminant levels and trends. The Site's cleanup action is a presumptive remedy that involves an engineered landfill cover and gas collection system. The enhanced cover has been in place for five years. Kaiser's consultant evaluates the condition of engineered controls on a semi-annual basis through inspections of the cover and physical barriers including fencing and signage.

Any observations, such as damage to the passive gas venting system, erosional features, animal burrows, vegetative growth, or signs of vandalism, that may indicate a weakness or potential deficiency in the cover are monitored and/or repaired. These actions provide reasonable assurance that engineered controls are operational and effective.

Institutional controls in the form of deed restrictions are in place for the Site. These restrictions limit or prohibit any activity that will interfere with the integrity of the cover or may cause a release, require the maintenance of fences and locked gates, and require any future owners to comply with them. In addition, state law prevents the installation of any groundwater supply wells within 1,000 feet of the permitted landfill boundary as specified in WAC 173-160.

Analytical results

Cover performance can be measured by the concentrations and trends of contaminant (dross constituents) in groundwater and surface water (springs) downgradient of the Site. Six monitoring wells and four surface water sample locations, as shown on Figure 2, are used to track chloride and nitrate movement from the Site. A data review of the past five years from these monitoring events helps assess contaminant levels and trends.

Graphs showing chloride concentrations, nitrate concentrations, and groundwater elevations measured in Site monitoring wells are presented in figures 4 through 15. Graphs showing chloride and nitrate concentrations measured in surface water samples are presented in figures 16 through 18.

Chloride

Chloride concentrations detected in groundwater and surface water samples collected during the review period are summarized as follows:

- Chloride concentrations greater than cleanup level were detected in groundwater samples collected from MW-3 during the review period; however, concentrations were generally decreasing during the review period.
- Chloride concentrations greater than cleanup level were detected in groundwater samples collected from MW-1 during the April 2017 sampling event and were detected at concentrations less than cleanup level during all remaining sampling events.
- Chloride concentrations were detected at concentrations less than cleanup level in all groundwater samples collected from MW-2, MW-4, MW-5, and MW-7.
- Chloride concentrations were greater than cleanup level in surface water samples collected from SW-3 during the July 2017 and prior sampling events. Chloride

concentrations in SW-3 have been less than cleanup level following the July 2017 event and concentrations are decreasing.

- Chloride concentrations were less than cleanup level in surface water samples collected from SW-1 and SW-5.

Nitrate

Nitrate concentrations detected in groundwater and surface water samples collected during the review period are summarized as follows:

- Nitrate concentrations greater than cleanup level were consistently detected in groundwater samples collected from MW-1, MW-3, and MW-4. Nitrate concentrations were generally stable or slightly increasing in groundwater samples collected from MW-1 and MW-3 and decreasing in groundwater samples collected from MW-4.
- Nitrate concentrations were greater than cleanup level in groundwater collected from MW-2 during the October 2018, April 2019, and October 2019 sampling events and indicate an increasing trend during the review period.
- Nitrate concentrations were generally less than cleanup level in groundwater samples collected from MW-5 and MW-7.
- Nitrate concentrations were greater than cleanup level in surface water samples collected from SW-3 and less than cleanup level in surface water samples collected from SW-1 and SW-5.

Summary

Contaminant concentrations in Site monitoring wells and surface water samples were generally steady, or decreasing, during the review period with the exception of nitrate concentrations detected in MW-2. An increasing trend in nitrate concentrations was observed in MW-2 from the October 2018 to October 2019 monitoring events. The source of this increase in nitrate concentrations is uncertain; however, it may be the increasing trend in nitrates is due to agricultural processes on surrounding properties. Monitoring well MW-2 is located the furthest south of the covered landfill area, relative to other Site monitoring wells. Monitoring wells MW-3, MW-4, MW-5, and MW-7 are generally located between MW-2 and the covered landfill area; however, an increasing trend in nitrates has not been observed in these wells.

Groundwater elevations observed during the review period range from about 2,190 feet above median sea level (msl) in monitoring wells MW-4 and MW-5 to about 2,120 feet above msl in monitoring wells MW-1, MW-2, MW-3, and MW-7. Results of the RI and compliance monitoring indicate that the direction of groundwater flow is generally west to southwest of the covered landfill area with southward and northward flow components. However, groundwater elevations in MW-4 and MW-5 are generally about 70 feet higher than the remaining Site monitoring wells indicating either a steep hydraulic gradient immediately south to of the covered landfill area, or that monitoring wells MW-4 and MW-5 are screened in a different aquifer than the other Site monitoring wells.

Monitoring well MW-4 is located immediately south and at a similar elevation of the capped landfill area. Based on borings completed through the landfill area and discussed in the RI Report, the bottom of the dross is at an elevation of about 2,200 feet above msl. Because

MW-4 is located immediately south of the landfill and the groundwater elevations observed in MW-4 are proximate with the bottom of the dross landfill, the effectiveness of the enhanced cover is most likely best measured in MW-4. A significant decline in chloride concentrations was observed in MW-4 between the April 2011 (943 mg/L) and the October 2015 (97.2 mg/L) sampling events. Similarly, a significant decrease in nitrate concentrations between the April 2011 (76.3 mg/L) and October 2015 (38.3 mg/L) sampling events was observed in MW-4. Chloride and nitrate concentrations measured in MW-4 are shown in figures 10 and 11, respectively.

New scientific information for individual hazardous substances or mixtures present at the Site

No new scientific information affects the Site.

New applicable state and federal laws for hazardous substances present at the Site

No new federal or state laws exist that would apply to contaminants at the Site.

Current and projected Site and resource uses

The Site is located in a rural area and is zoned Small Tract Agricultural. Deed restrictions in place at the property limit the property's current and future use. These restrictions limit or prohibit any activity that will interfere with the cover integrity, or may cause a release. Current zoning designation and the presence of deed restrictions strongly support no change in future Site use. These mechanisms minimize the chance of a Site use that would diminish the remedial action's effectiveness or cause a release.

Availability and practicability of more permanent remedies

The cleanup action implemented a presumptive remedy for the Site. An evaluation of other remedial options for the Site was completed in the FS. Higher preference cleanup options such as source removal remain available, but are still not practicable.

Availability of improved analytical techniques to evaluate compliance with cleanup levels

For the established contaminants present at the Site, the techniques in use are EPA Method 300.0 for chloride, EPA Method 353.2 for nitrate and nitrite as nitrogen, EPA Method 6010C for dissolved sodium, and SM 2540C for TDS. These methods are widely accepted for the analysis of groundwater contaminants. There are no improved analytical techniques available.

Conclusions

The cleanup action completed at the Heglar Kronquist Site continues to be protective of human health and the environment. The cover enhancement appears to have limited the pathway for dross contaminants to leach from the landfill by reducing or eliminating infiltration, and thereby reducing the risk of groundwater and surface water contamination. However, chloride concentrations greater than cleanup levels remain in monitoring well MW-3 and nitrate concentrations greater than Site cleanup levels remain in monitoring wells MW-1 through MW-4, and surface water sample SW-3. Chloride and nitrate concentrations are generally decreasing over time in Site monitoring wells and surface water sample locations. The current compliance monitoring schedule is to sample Site monitoring wells MW-1 through MW-5 and MW-7 and surface water sample locations SW-1, SW-3, and SW-5 on a semi-annual schedule.

The existence of institutional controls in the form of deed restrictions confirms Site uses will remain consistent with the presence of contamination. Further periodic reviews will be required as long as institutional controls are in place at the Site, in accordance with WAC 173-340-420(7).

Based on this periodic review, Ecology has determined that no additional cleanup actions are required at the Site. Kaiser will continue to be responsible for monitoring and inspections at the Site to assure that the integrity of the remedy is maintained.

The next review for the Site will be scheduled five years from the date of this periodic review. In the event that additional cleanup actions or institutional controls are required, the next periodic review will be scheduled five years from the completion of those activities.

References Cited

Exponent, Inc., 2011, *Final Remedial Investigation Report*, *Heglar Kronquist Landfill*.

Washington State Department of Ecology, 2012, *Final Cleanup Action Plan, Heglar Kronquist Site*.

Washington State Department of Ecology, 2013, *Model Toxics Cleanup Act Regulation Chapter 173-340 WAC*.

Figures

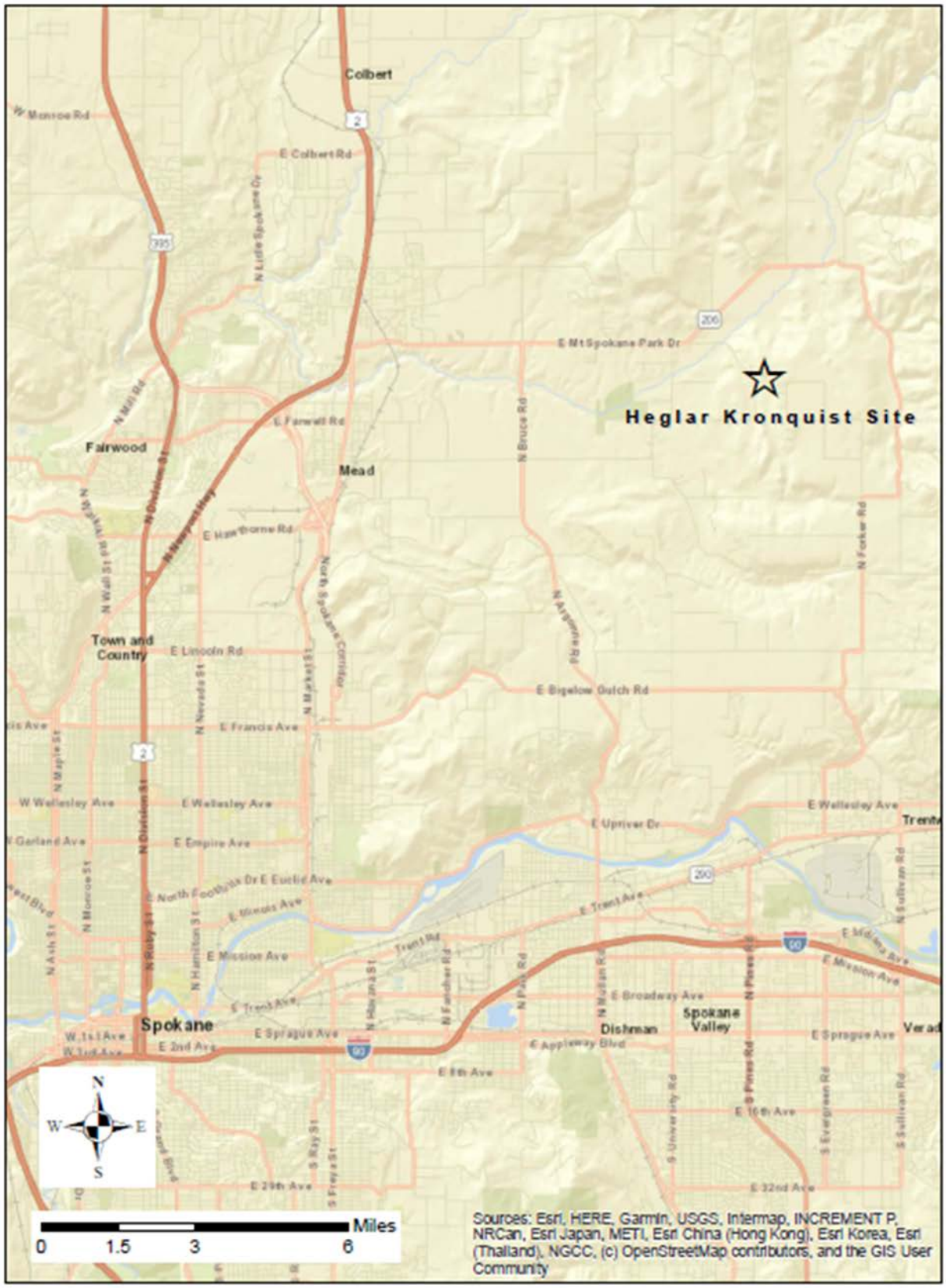

Figure 1: Heglar Kronquist Site Location

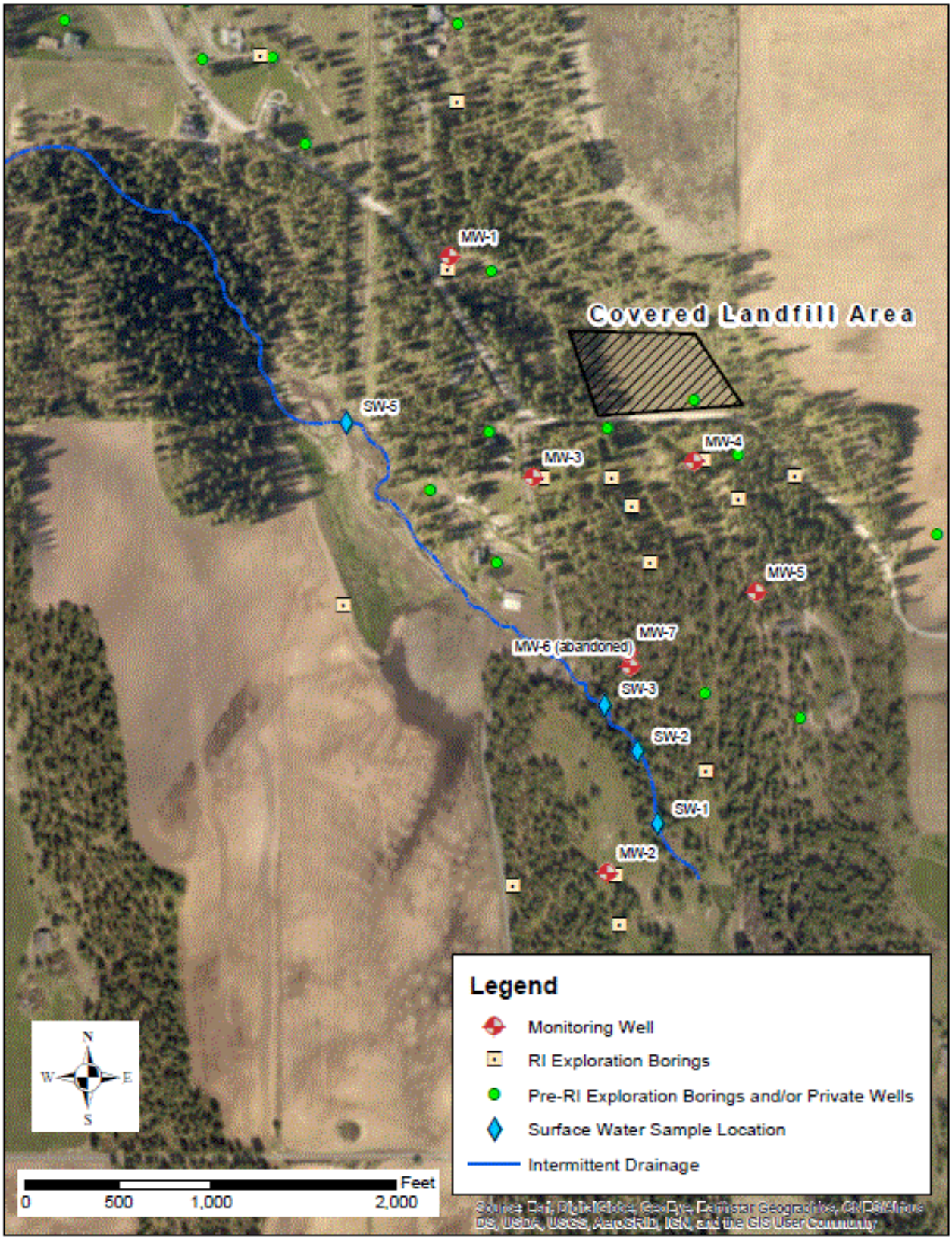

Figure 2: Detailed Site Plan

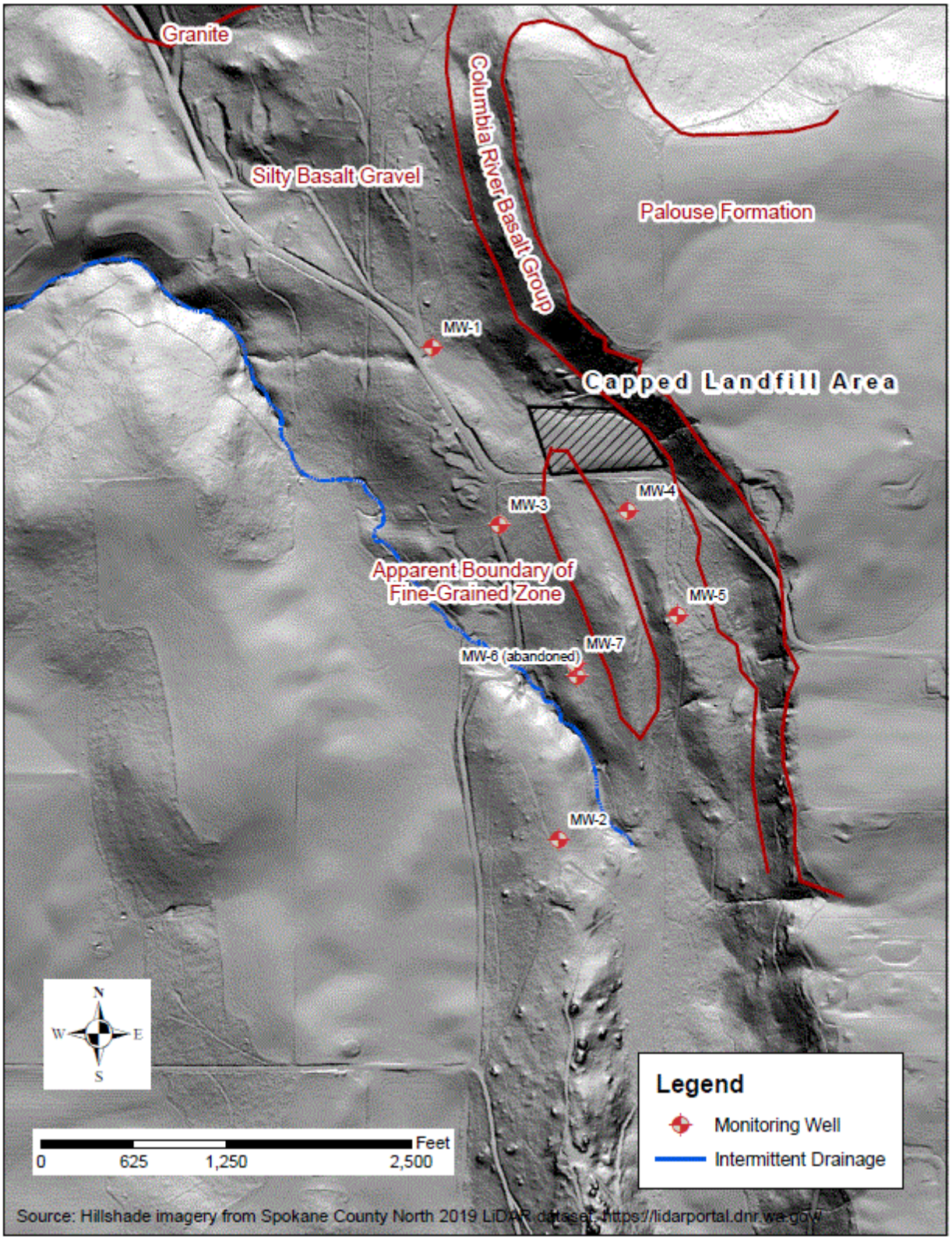

Figure 3: Geologic Map

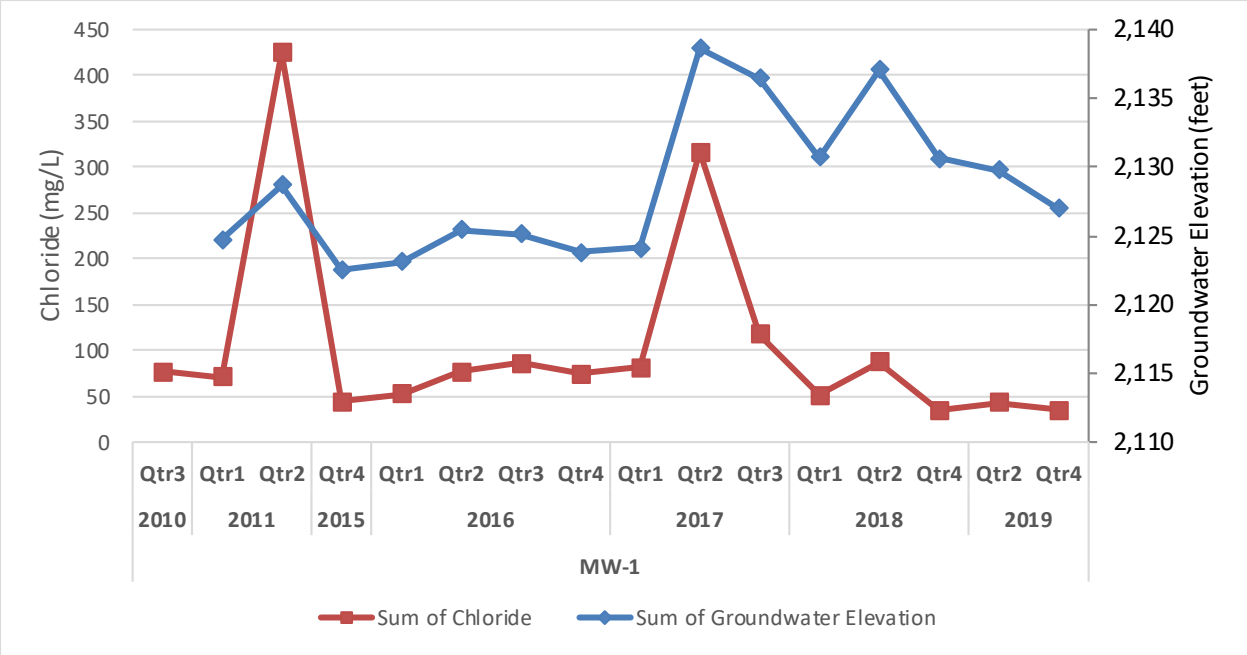

Figure 4: MW-1 Chloride Concentrations

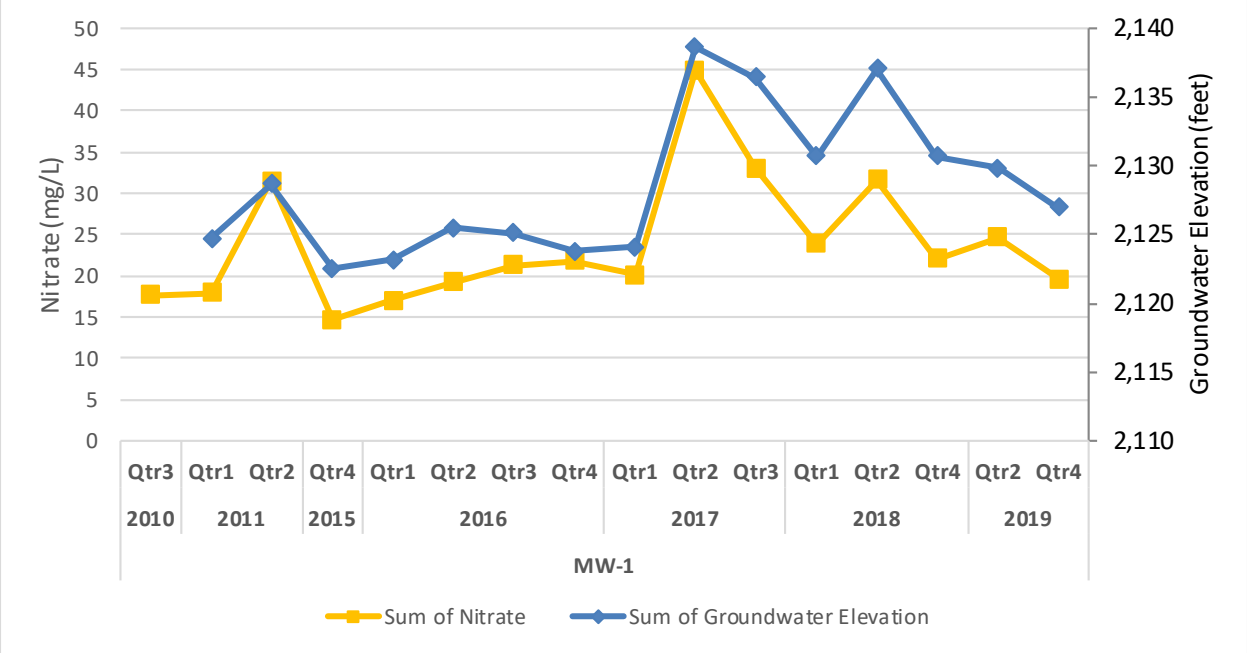

Figure 5: MW-1 Nitrate Concentrations

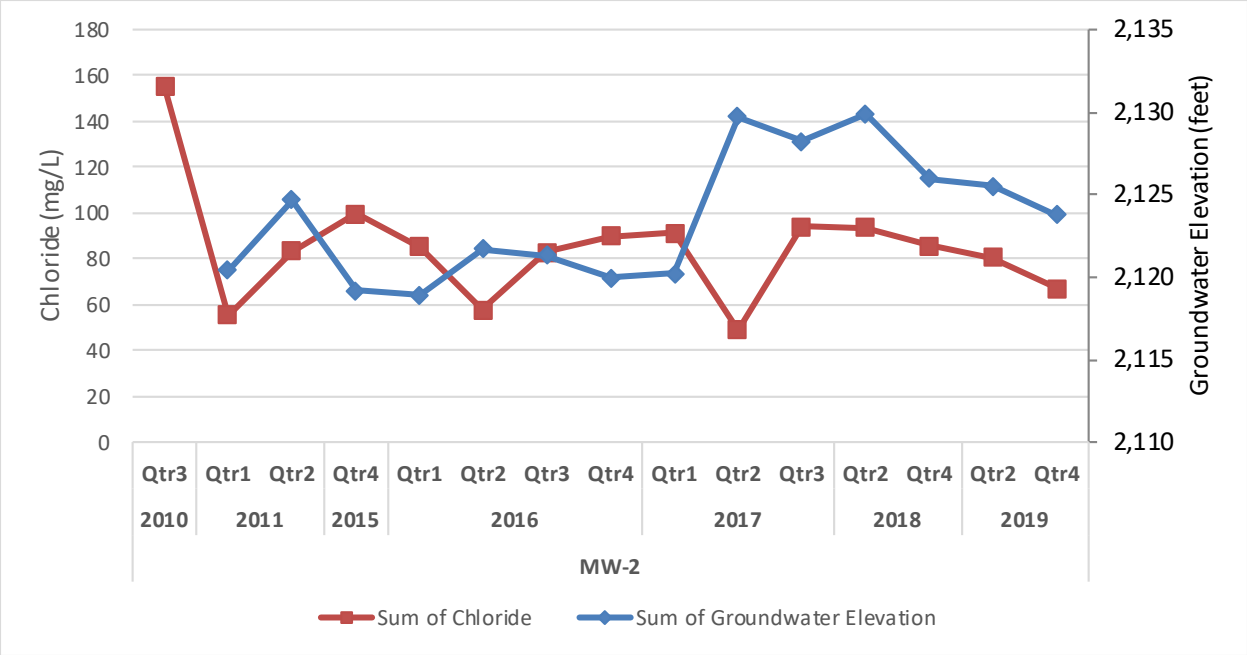

Figure 6: MW-2 Chloride Concentrations

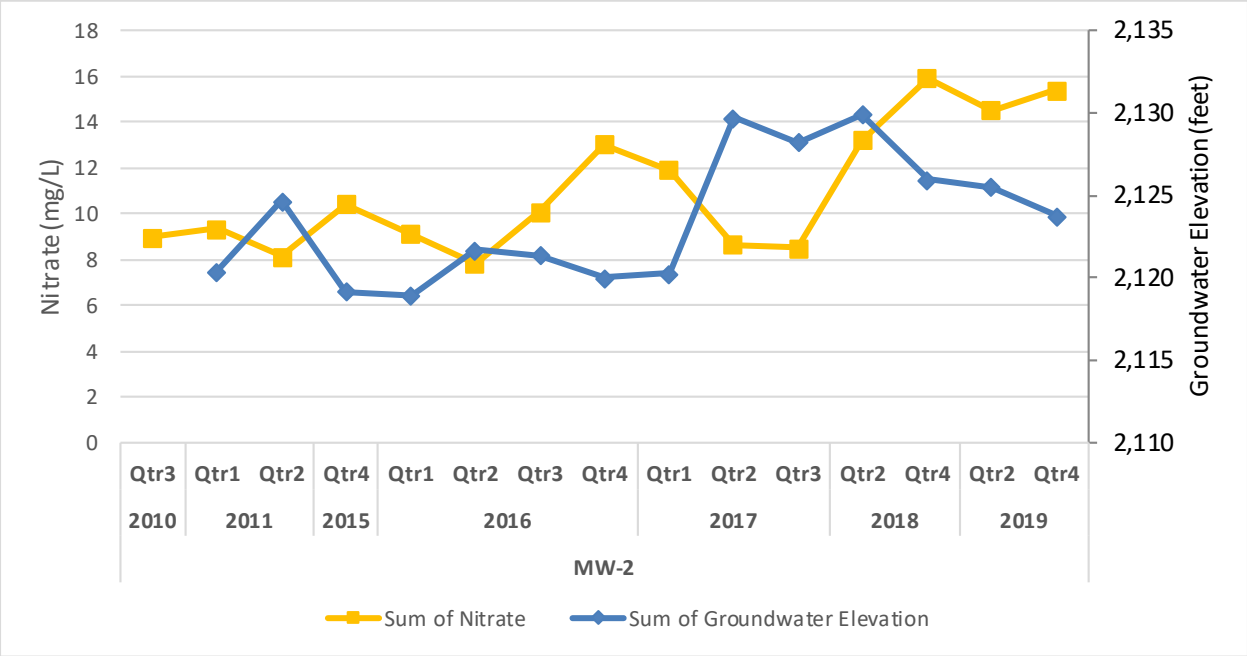

Figure 7: MW-2 Nitrate Concentrations

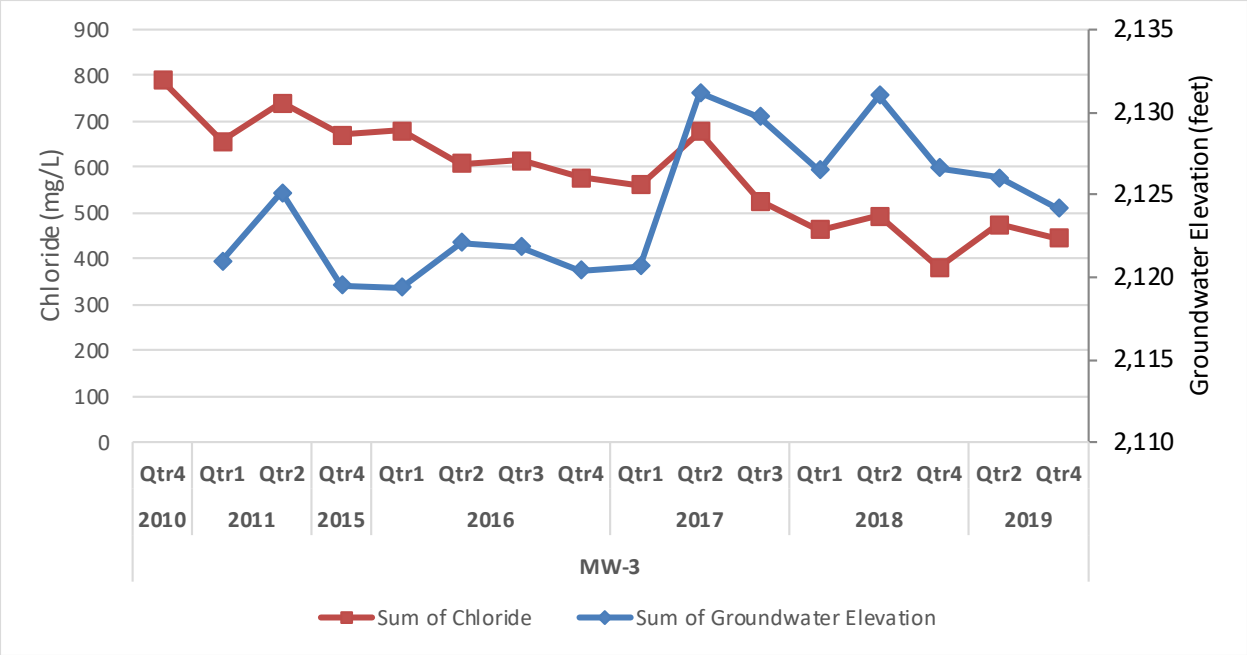

Figure 8: MW-3 Chloride Concentrations

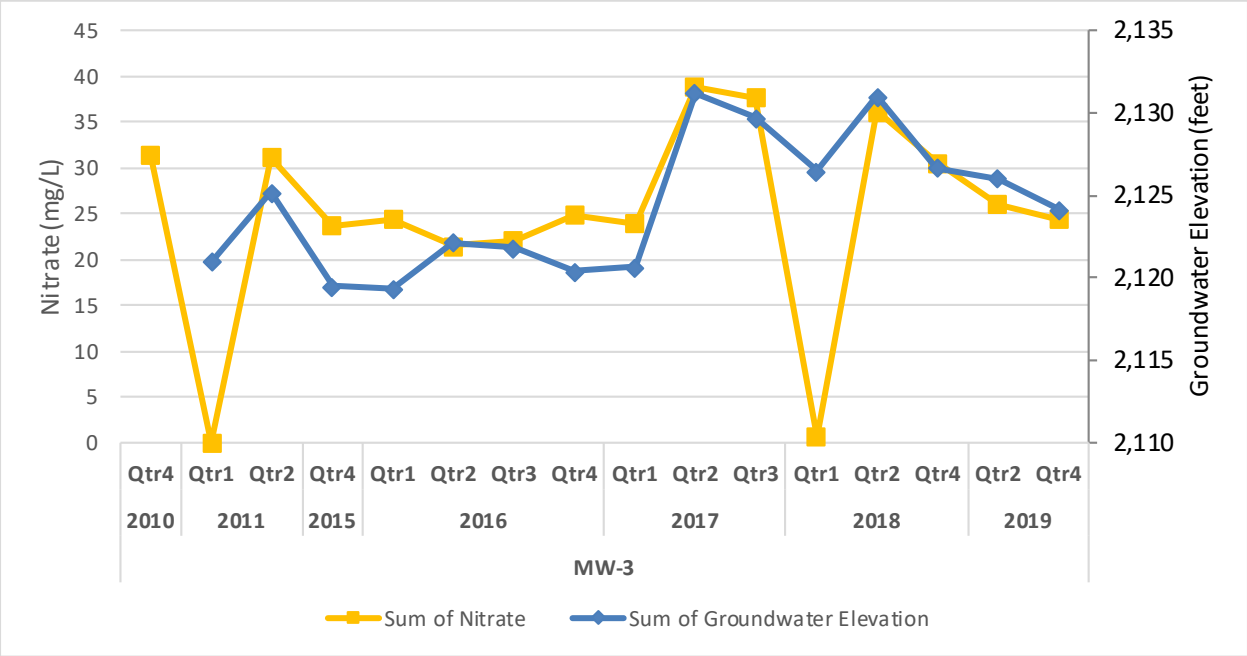

Figure 9: MW-3 Nitrate Concentrations

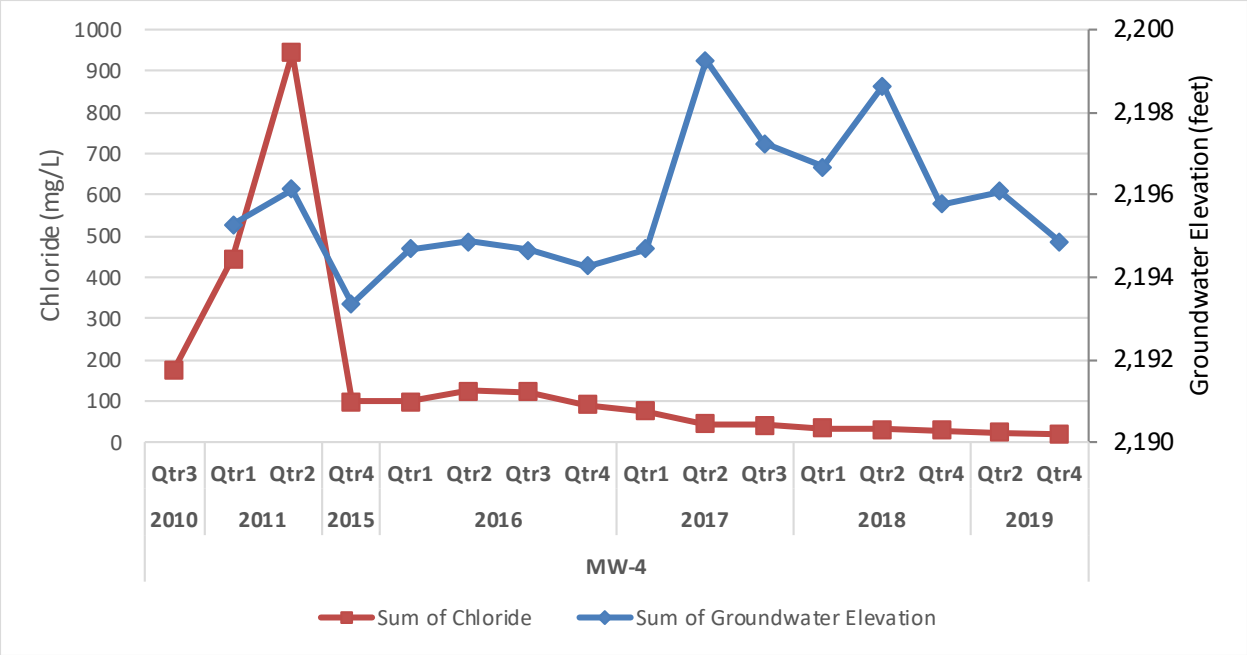

Figure 10: MW-4 Chloride Concentrations

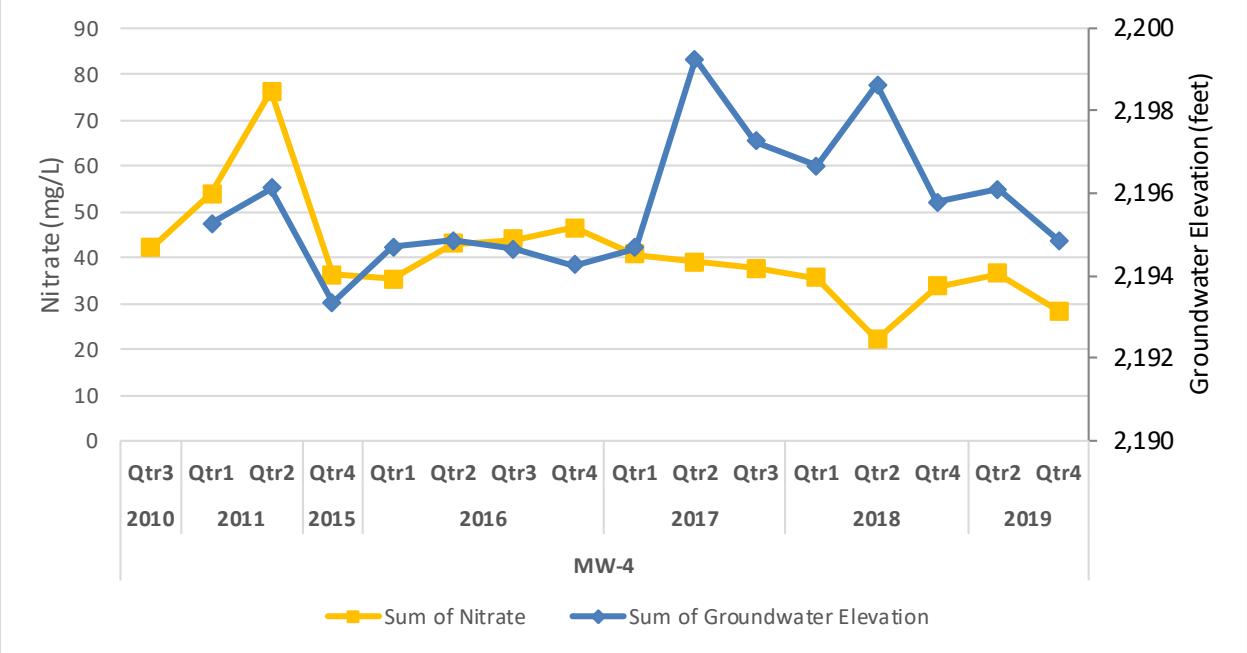

Figure 11: MW-4 Nitrate Concentrations

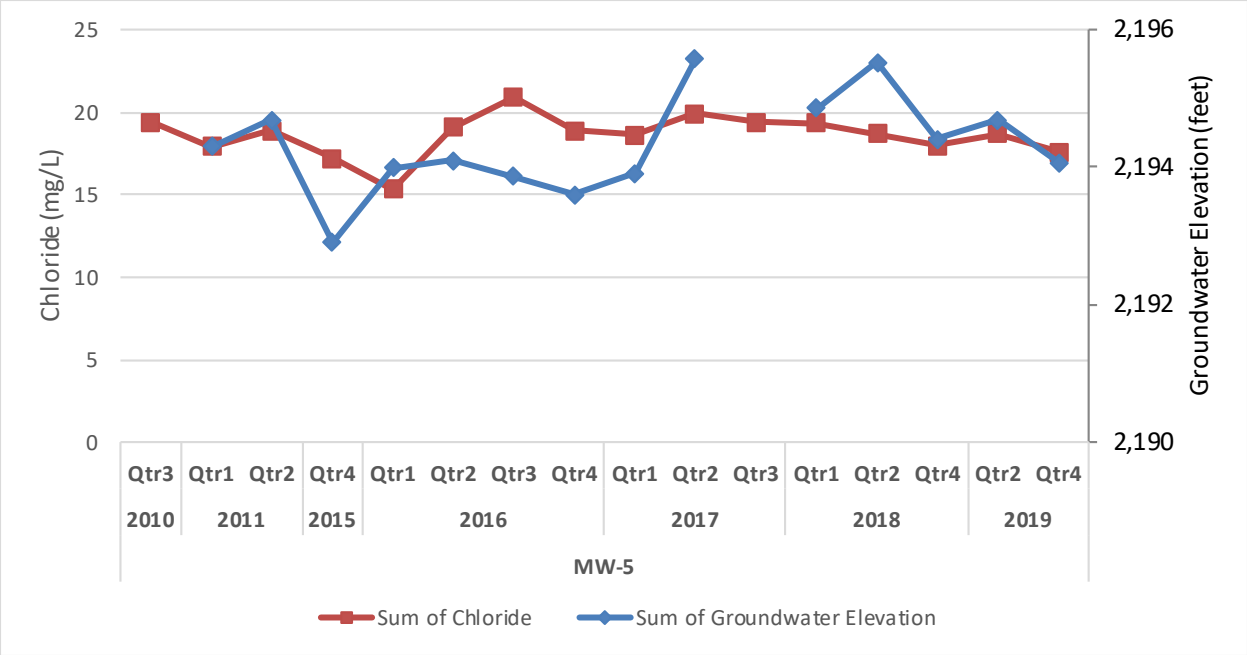

Figure 12: MW-5 Chloride Concentrations

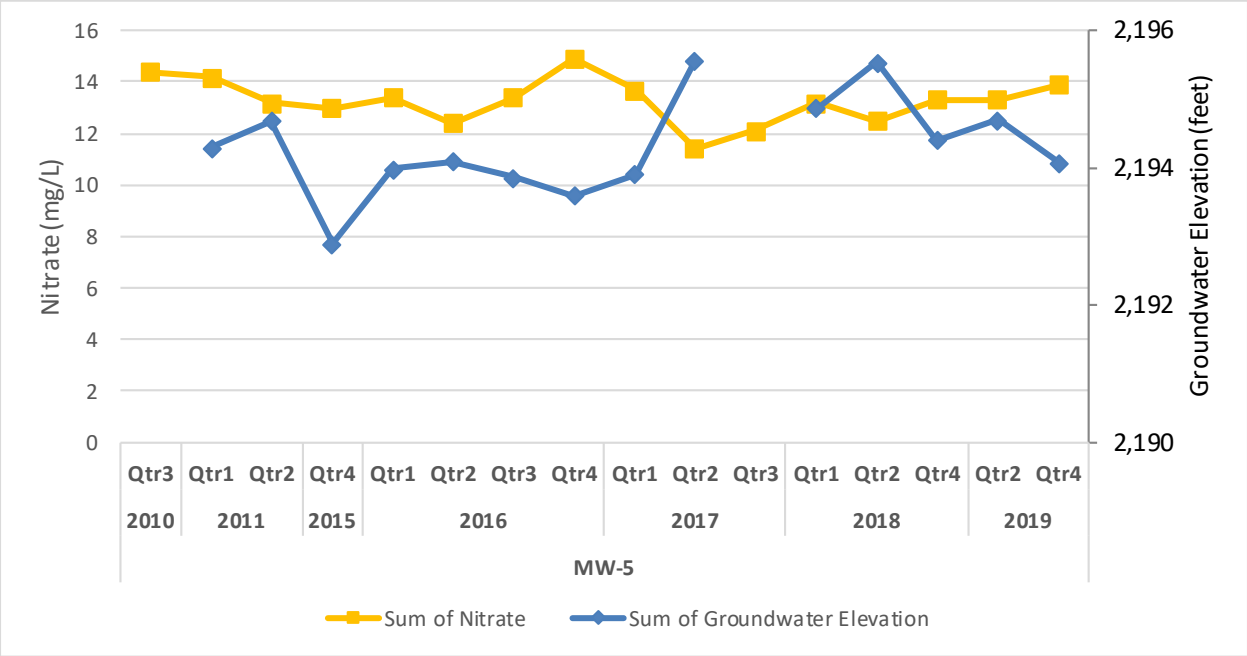

Figure 13: MW-5 Nitrate Concentrations

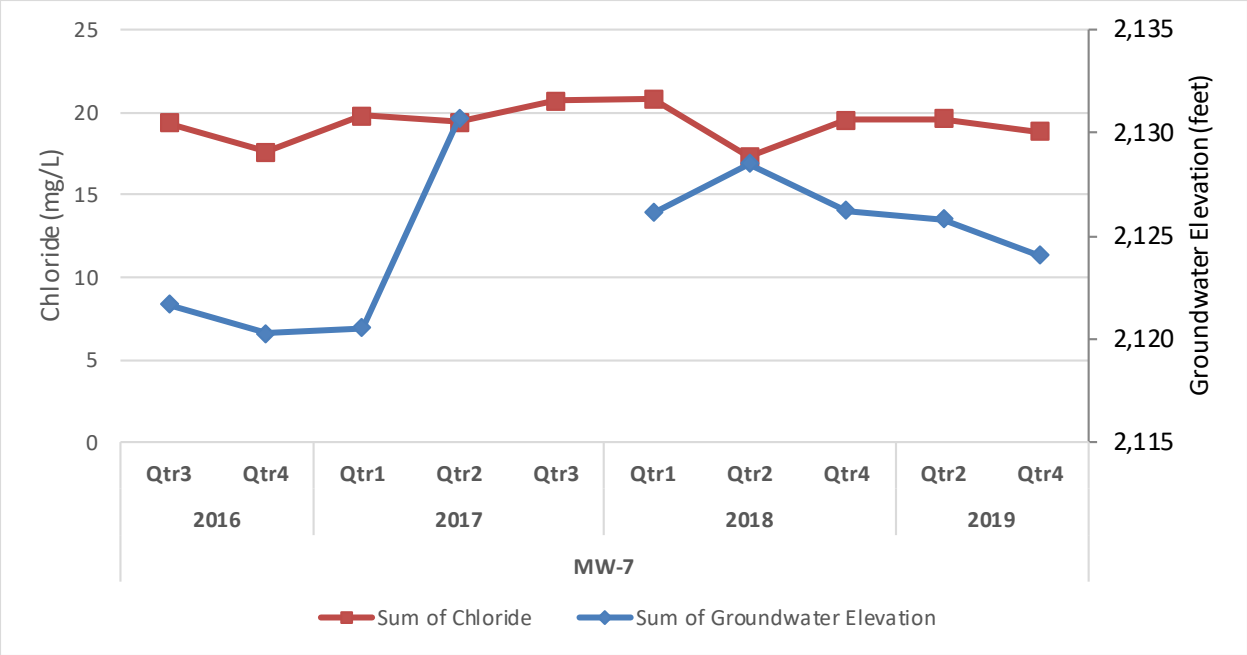

Figure 14: MW-7 Chloride Concentrations

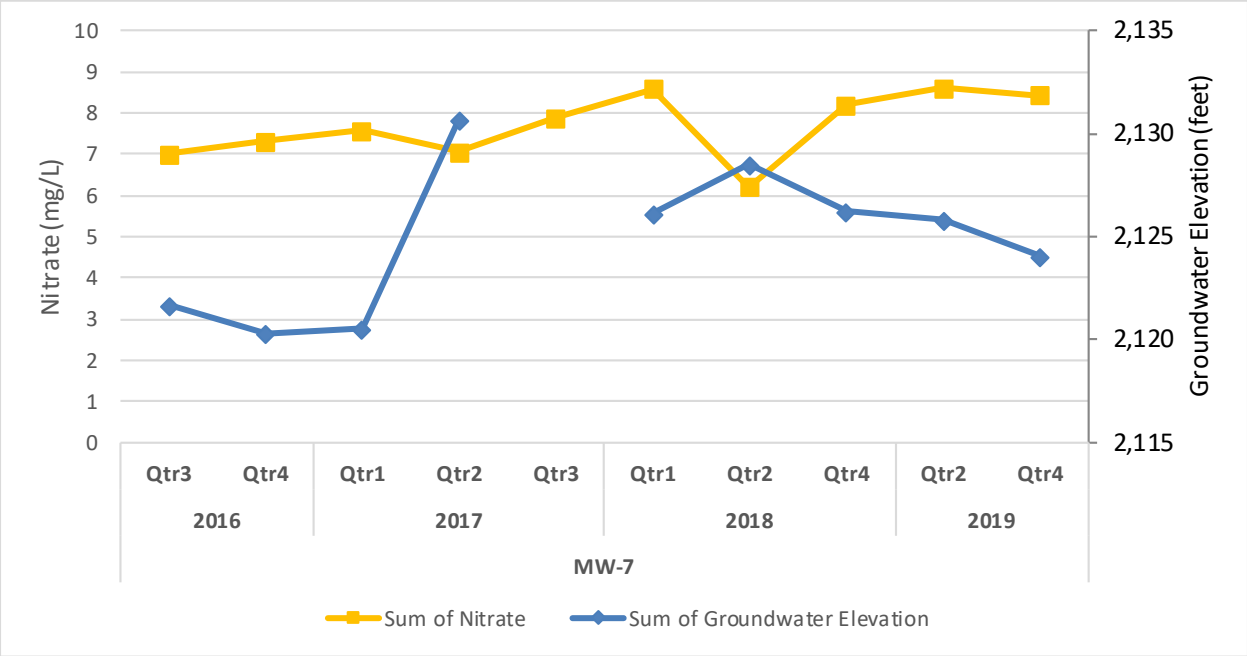

Figure 15: MW-7 Nitrate Concentrations

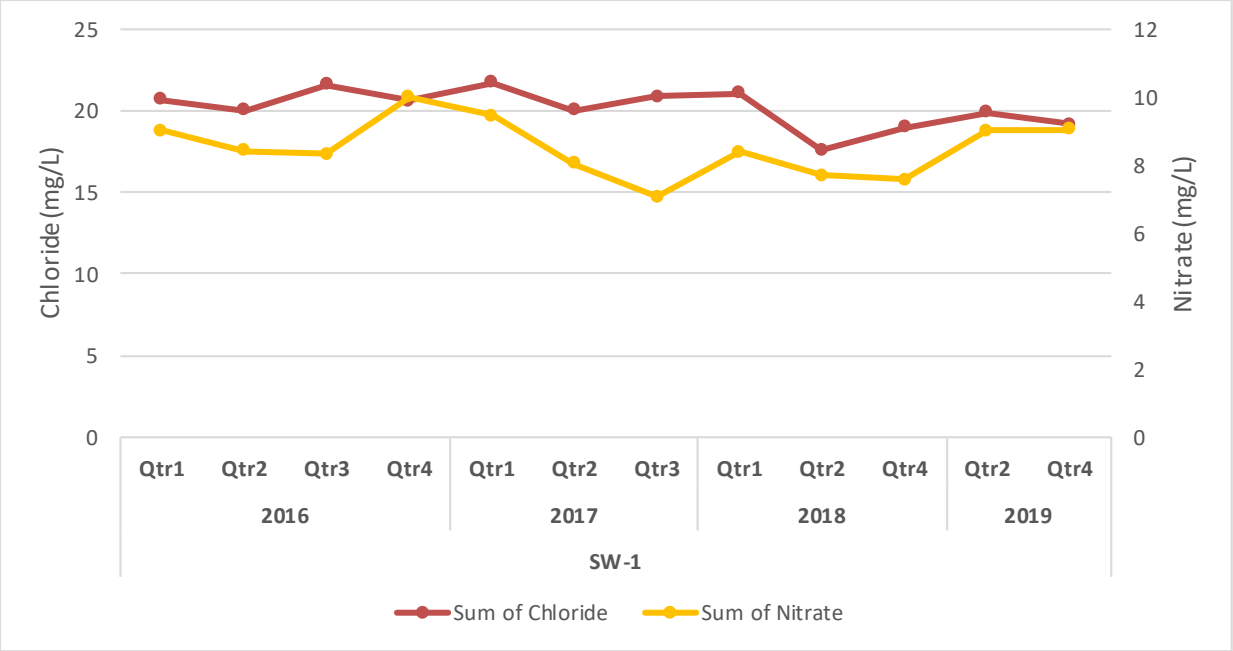

Figure 16: SW-1 Contaminant Concentrations

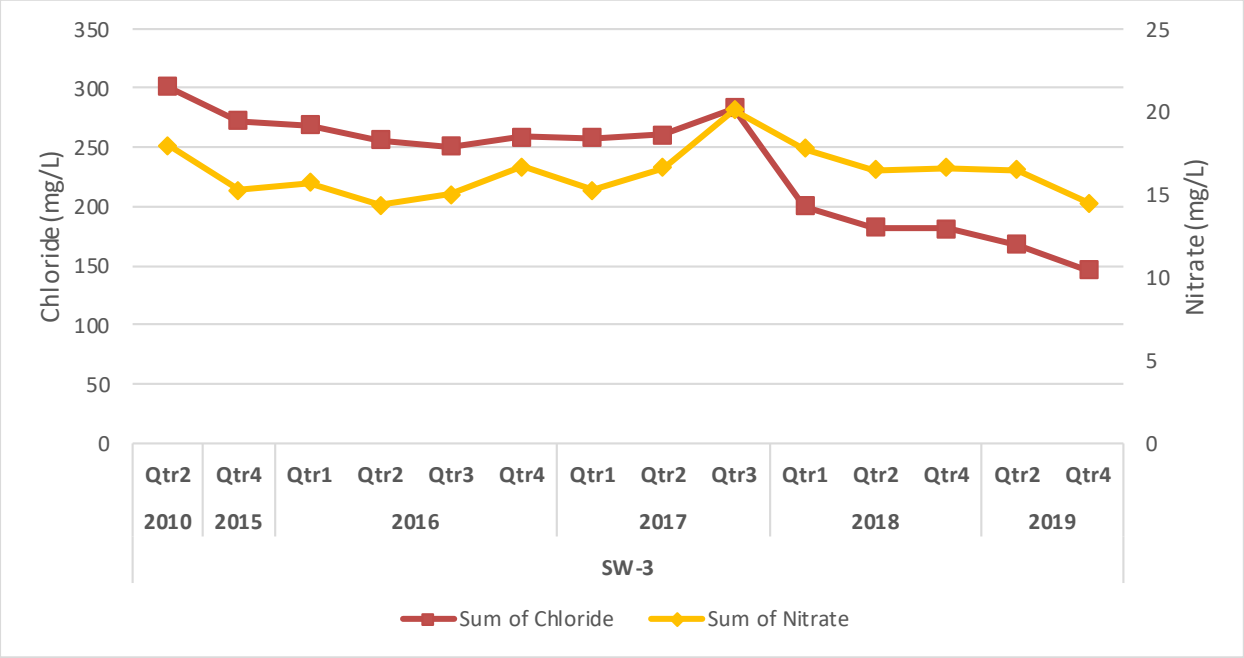

Figure 17: SW-3 Contaminant Concentrations

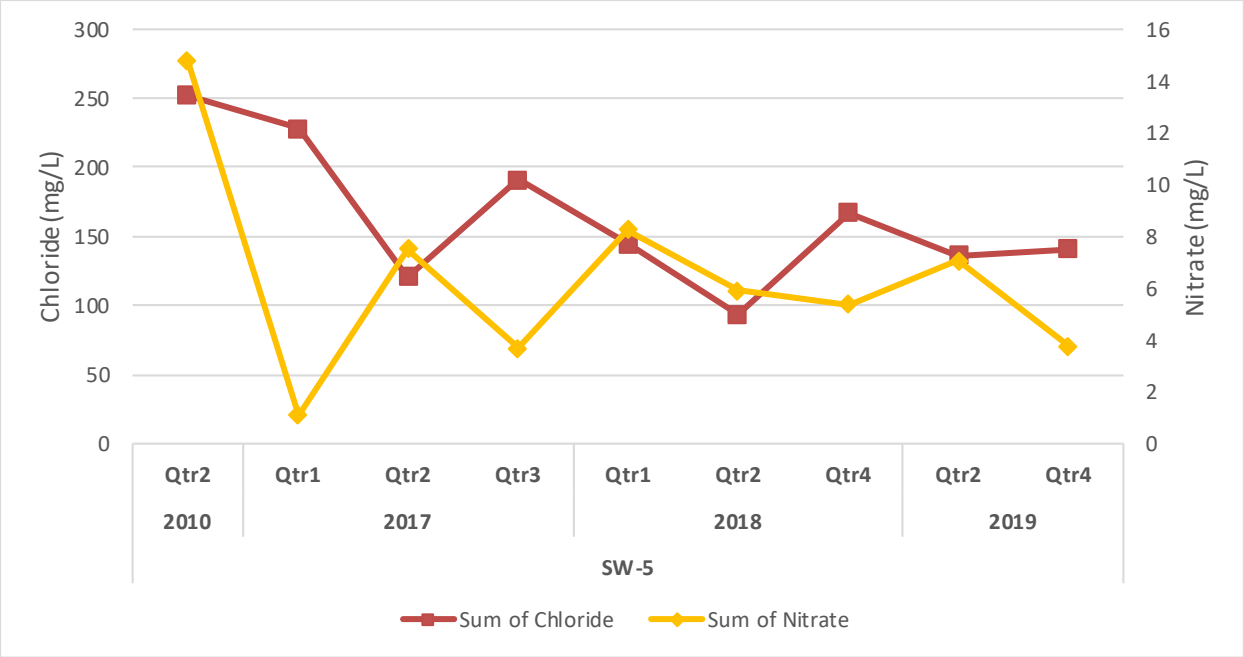

Figure 18: SW-5 Contaminant Concentrations