

REMEDIAL ACTION STATUS REPORT

Hansville Landfill Site

Prepared for:
Kitsap County and Waste Management of Washington, Inc.

Project No. 160423 • June 28, 2022 AGENCY REVIEW DRAFT





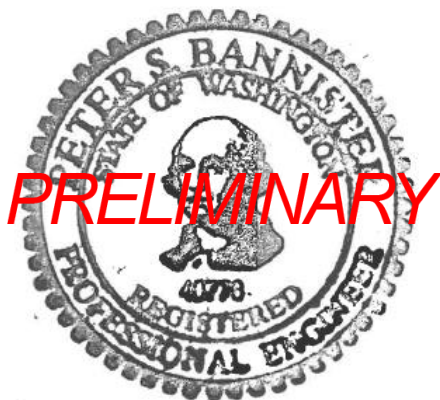
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Acronyms

Aspect	Aspect Consulting, LLC
bgs	below ground surface
CAP	Cleanup Action Plan
County	Kitsap County
CUL	Cleanup Level
Ecology	Washington Department of Ecology
KCSL	Kitsap County Sanitary Landfill
KPHD	Kitsap Public Health District
LFG	landfill gas
mg/L	milligrams per liter
µg/L	micrograms per liter
msl	mean sea level
MTCA	Model Toxics Control Act
RI/FS	Remedial Investigation/Feasibility Study
SCS	SCS Engineers
VOC	volatile organic compound
WMW	Waste Management of Washington, Inc.

1 Introduction

Aspect Consulting, LLC (Aspect) prepared this document to present a summary of Site conditions and monitoring data to support the Washington State Department of Ecology's (Ecology) second periodic review of the protectiveness of cleanup actions taken at the Hansville Landfill (Site), registered by Ecology as Facility Site ID 2605 and Cleanup Site ID 695. Aspect prepared this status update report on behalf of Kitsap County Public Works (County) and Waste Management of Washington Inc. (WMW) to meet requirements that the Site owner submit a "Remedial Action Summary Report" to Ecology prior to the agency initiating the periodic review.

Cleanup at the Site is being implemented under the Model Toxics Control Act (MTCA) regulations, Chapter 173-340 Washington Administrative Code (WAC). The Site was listed as a hazardous site in 1991. Initial remedial actions included closing the landfill in 1989, capping the landfill in 1990, expanding the monitoring network to include surface water in 1990, and installing active landfill gas (LFG) collection and treatment in 1991. A Consent Decree (No.:95 2 03005 1, recorded in October of 1995) established the County and Kitsap County Sanitary Landfill, Inc. as named Defendants.

Under the 1995 Consent Decree, a "Remedial Investigation" (Parametrix, 2007) and a "Feasibility Study" (Parametrix, 2009) were completed. The Amended Consent Decree (No.: 92-2-03005-1, recorded in August of 2011) established the County and WMW (successor to Kitsap County Sanitary Landfill, Inc.) as named Defendants. The "Cleanup Action Plan," included as Exhibit B to the 2011 Amended Consent Decree, established the Site cleanup standards and the selected cleanup action: natural attenuation of groundwater with enhanced monitoring and institutional controls. Since 2011, remedial actions have been implemented in accordance with the Cleanup Action Plan.

As stated in WAC 173-340-420, the purpose of the periodic review by Ecology is to assure human health and the environment are being protected at the Site according to criteria listed in *italics* below. A brief statement of Site conditions is provided following the criterion.

- a) *The effectiveness of ongoing or completed cleanup actions, including the effectiveness of engineered controls and institutional controls in limiting exposure to hazardous substances remaining at the Site.*

Decreasing concentrations of Site indicator hazardous substances in groundwater and surface water have demonstrated the effectiveness of ongoing and completed cleanup actions. Concentration trends are consistent with an estimated Site restoration timeframe by 2034.

- b) *New scientific information for individual hazardous substances of mixtures present at the Site.*

New information indicates that regional background arsenic concentration in groundwater is greater than the Site-specific cleanup level, and provides context

for recent increases in arsenic concentrations at two locations. New information on emerging contaminants has led Ecology to prepare a chemical action plan for PFAS (per- and polyfluoroalkyl substances).

- c) *New applicable state and federal laws for hazardous substances present at the Site.*

The calculated MTCA Method B formula value for manganese in groundwater was reduced by Ecology from 2.24 milligrams per liter (mg/L) to 0.75 mg/L in May 2019. However, this new state regulation does not affect the Site-specific restoration timeframe.

- d) *Current and projected Site and resource uses.*

Site and resource uses have not changed and are not projected to change.

- e) *The availability and practicability of more permanent remedies.*

More permanent remedies include transitioning from active to passive LFG collection and moving from flare to biofilter treatment of LFG.

- f) *The availability of improved analytical techniques to evaluate compliance with cleanup levels.*

Laboratory results are provided with reporting limits below the cleanup levels, and no new analytical techniques are considered necessary.

1.1 Report Organization

This report is organized to be consistent with Ecology's 2016 periodic review and clearly identify updates:

Section 2: Summary of Site Conditions. Reviews the operational history and physical setting before presenting key elements of previous site investigations, remedial actions, and compliance monitoring data through 2021. This section includes presentation of the Site indicator hazardous substances, cleanup levels (CULs), and points of compliance.

Section 3: Periodic Review. Addresses each of the six criteria that Ecology will evaluate in their period review.

Section 4: Conclusions. Summarizes the current protectiveness of the cleanup action at the Site, reviews key concentrations and trend analysis, and presents recommendations for improving the timeframe to meet remedial objectives at the Site.

2 Summary of Site Conditions

Site conditions and history are presented in the following subsections.

2.1 Site Location and Zoning Description

The closed Hansville Landfill is located approximately 5 miles south of the town of Hansville and located on an approximately 73-acre parcel (Kitsap County Parcel #: 092702-1-005-2007) within the northeast quarter of Section 9, Township 27 North, Range 2 East, in unincorporated Kitsap County, Washington. The Property street address is 7791 NE Ecology Road, Kingston, Washington, 98346. The eastern part of the Property has been used by Kitsap County Solid Waste as a recycling and garbage facility (RAGF) since 1989 when the Hansville Landfill was closed under WAC 173-304. A map of the Site vicinity is shown on Figure 1.

The Property itself is zoned Rural Protection (RP) and includes the former landfill area and undeveloped woodlands. The nearest permanent residence is located approximately 1,500 feet east of the solid waste disposal area of the landfill based on review of the County Assessor's parcel map in June 2021. Development and zoning of the adjacent parcels are listed in Table 1 below based on County Assessor records accessed in June 2021.

Table 1. Adjacent Property Use and Zoning

Adjacent Property Owner	Location relative to Site	Use	Zoning
Port Gamble S'Klallam Tribe	South and West	Residential and undeveloped	Tribal Land (T)
Pope Resources Inc	North	Vacant woodland	Rural wooded (RW)
Ecology Road Investments, LLC	East-Northeast	Olympics Organics compost facility	Light Industrial, rural employment center (REC)
Whitworth, Robert and Mikki	East	Whitworth Excavating, Inc	Light Industrial, (REC)
Ideal Storage Partners, LLC	East		Light Industrial, (REC)
A&A Tree Farms, Inc	East		Light Industrial, (REC)

Source: The Kitsap County Assessor's web-based Parcel Search database was reviewed in June 2021.

2.1.1 Definition of Site

MTCA defines a Site based on where contamination has come to be located. The Hansville Landfill Site subject to the Cleanup Action includes the Landfill Property and a portion of land west of the Property owned by the Port Gamble S'Klallam Tribe (Figure

1). The western extent of the Site was determined during the RI/FS (Parametrix, 2007; Parametrix, 2009), and established in the Cleanup Action Plan (Ecology, 2011). Institutional control boundaries include the restrictive environmental covenant for the Property (see Section 2.11), the Washington State well drilling restriction area (WAC 173-160-171), and the Tribal Protection Area prohibiting water supply from surface water and groundwater (upper aquifer) as shown on Figure 1.

2.2 Operational History

The Hansville Landfill operated as a municipal landfill from about 1962 to 1989. The RAGF began operation in 1989 when the Landfill was closed under Chapter 173-304 Washington Administrative Code (WAC). As shown on Figure 1, the closed landfill consists of three separate disposal areas or cells. These include the following:

1. 13-acre municipal solid waste disposal cell situated within the central portion of the property.
2. 4-acre demolition disposal cell situated on the northeast corner of the property, which accepted construction, demolition, and land clearing wastes (CDL).
3. 1/3-acre septage lagoon located immediately southwest of the demolition disposal area, which accepted residential septic tank waste until 1982. A second septage disposal area was also reportedly located near the northeast corner of the demolition disposal area.

2.3 Landfill Permitting

The Landfill is subject to a Solid Waste Landfill Post Closure Permit issued by the Kitsap Public Health Department (KPHD) in accordance Kitsap County Board of Health Ordinance 2010-1, “Solid Waste Regulations” (Chapter 173-304 WAC adopted by reference). The Post Closure permits have been granted approximately every 5 years, and list standard permit conditions, fees, and specific permit conditions. The permit requires that post-closure activities conducted at the closed landfill are to be consistent with all requirements under Chapter 173-304 WAC and the on-going cleanup conducted under MTCA as documented in the Consent Decree. The KPHD conducts quarterly inspections; inspection reports are included in annual reports (Aspect, 2022).

2.4 Site Physical Setting

A summary of the Site physical setting is provided for the following characteristics: topography, land cover, climate, and groundwater/surface water flow.

The Site is situated on the upper portions of several west-sloping drainages with perennial creeks that ultimately discharge into Port Gamble Bay (Figure 2). The topography of the Property ranges between 310 and 390 feet above mean sea level (msl), and the elevations of the surface water monitoring points range from 160 to 220 feet above msl.

The undisturbed portion of the Landfill Property is primarily wooded. The landfill cells and other disturbed areas have grass cover and are routinely mowed. The RAGF includes paved and gravel-covered areas.

2.4.1 Local Climate

The climate in the vicinity of the Site is characterized by wet winters, dry summers, and moderate temperatures. The “Remedial Investigation Report” (Parametrix, 2007) provides details of local precipitation and evapotranspiration. Potential effects of climate change (sea level rise, patterns of precipitation, etc.) are not expected to affect cleanup strategy or timeframe.

2.4.2 Groundwater and Surface Water Flow

A complex set of glacial and interglacial deposits make up the aquifer system. However, the extent of Site impacts has been limited to the unconfined aquifer, which is separated from the next lower confined aquifer by a thick sequence of fine-grained interglacial deposits called the Kitsap Formation. The stratigraphic units at the Site are summarized below, starting from ground surface:

- **Sand: Glacial Outwash/Vashon Drift.** This unit was encountered in all historical investigation borings from the ground surface to depths ranging from 62 to 142 feet below ground surface (bgs). The deposit consists primarily of poorly graded, fine- and medium-grained sand with trace amounts of silt and gravel. The material is dark yellowish brown to dark gray in color, dense to very dense, and dry to saturated. The RI identifies this sand unit as the upper aquifer. This unit has been interpreted as outwash associated within the Vashon Drift (USGS, 1965; Parametrix, 2007).
- **Transition Zone.** This zone was reported at three boring locations (MW-8, MW-9, and MW-14) and is approximately 15 feet thick. It consists of interbedded layers of sand, silty sand, and silt and does not appear to be aerially extensive.
- **Silt: Kitsap Formation.** This unit was reported in all historical investigation borings advanced through the upper aquifer. It occurs at depths ranging from approximately 66 feet bgs (at MW-9) to 163 feet bgs (at MW-14). The silt is dark gray, slightly too moderately plastic, very dense, and dry. This unit has been interpreted to be the Kitsap Formation (USGS, 1965; Parametrix, 2007).
- **Salmon Springs Drift.** The top of this unit is documented between elevations 90 and -80 feet msl (USGS, 1965; Parametrix, 2007) and was not encountered in historical investigation borings. It consists of undifferentiated coarse gravel and sand with local occurrences of glacial till. Groundwater reportedly occurs in multiple non-continuous layers. Collectively these water-bearing zones form the regional aquifer that is confined by the overlying Kitsap Formation.

Groundwater conditions have remained relatively consistent since the RI. The locations of historical and remaining groundwater monitoring wells and surface water stations are shown on Figure 2. The time-series graph (Figure 4) shows annual variability in observed groundwater levels have been muted compared to long-term changes related to drought and wet-climate cycles. Between 2011 and 2016, year-to-year groundwater levels were stable at a relative minimum. Starting in 2016, groundwater levels increased to a relative maximum in 2018 before starting to decline. These changes in groundwater levels have affected groundwater and surface water concentrations, as described in Section 2.8.

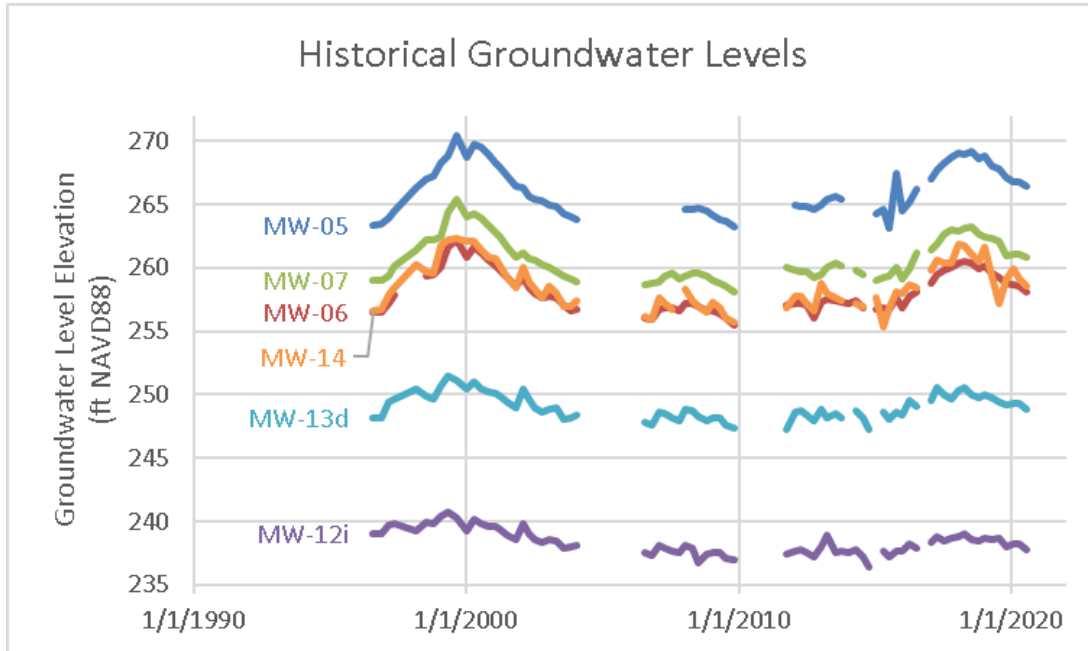


Figure 4. Long-Term Groundwater Level Elevations

East (upgradient) of the landfill, groundwater elevations at MW-5 have been between approximately 265 and 270 feet North American Vertical Datum of 1988 (NAVD88). The on-Property unconfined water table has been approximately 80 feet below ground surface based on observations at monitoring wells MW-6, MW-7, MW-14. To the west (downgradient) of the landfill, groundwater level elevations at MW-12I and MW-13D have been approximately 240 and 250 feet NAVD88, respectively, prior to discharging to surface water.

Groundwater in the unconfined aquifer flows west toward Port Gamble Bay at a velocity of between 140 and 700 feet per year (Parametrix, 2007) and discharges to a set of perennial streams where surface water compliance monitoring stations are located (Figure 2). As reported in the RI, the calculated travel time from MW-2 to SW-4 was 11 to 15 years, and the calculated travel time from MW-14 to SW-1 was 2 to 3 years.

2.5 Site Investigations

In 1991, Ecology performed a Site Hazard Assessment (SHA) under MTCA that resulted in an initial ranking of 3. This ranking was subsequently changed to a 1 (the highest rank on a scale of 1 to 5) in 1992, based on changes in the state ranking model.

In October 1995, Ecology signed a consent decree with the County and KCSL to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the Site. The RI was completed in 2007 and the FS was completed in 2009.

2.6 Cleanup Levels for Indicator Hazardous Substances

Site indicator hazardous substances include vinyl chloride, arsenic, and manganese in groundwater, and vinyl chloride and arsenic in surface water.

- Vinyl chloride is an industrial volatile organic compound. Vinyl chloride in municipal solid waste landfills comes from a wide range of sources including solvents, plastics, aerosol propellants, and refrigerants, for example. Reducing the amount of LFG in contact with groundwater is expected to reduce vinyl chloride concentrations.
- Arsenic and manganese occur naturally in aquifers and are mobilized (dissolved) through complex geochemical reactions. Small changes in pH and/or oxidation-reduction potential can affect dissolved arsenic concentrations. LFG in contact with groundwater affects aquifer pH and oxidation-reduction potential. Reducing the amount of LFG in contact with groundwater is expected to reduce dissolved arsenic and manganese concentrations.

Site specific cleanup levels were determined for indicator hazardous substances as summarized in the table below and have not changed since the 2011 Amended Consent Decree.

Table 2. Site Cleanup Levels from the 2011 Cleanup Action Plan

Indicator Hazardous Substance	Media	Site Cleanup Level (ug/L)	Origin of Cleanup Level
Vinyl Chloride	Groundwater	0.025	EPA Human Health 2004
Arsenic	Groundwater	5	Background
Manganese	Groundwater	2,240	Method B Formula Value
Vinyl Chloride	Surface Water	0.025	EPA Human Health 2004
Arsenic	Surface Water	5	Background

2.7 Points of Compliance

The following are the conditional points of compliance (CPOC) for the Hansville Site:

1. The Upper Aquifer at the Landfill Property boundary.
2. The Upper Aquifer downgradient of the Landfill Property boundary and upgradient of the creek headwaters on tribal property.
3. Groundwater discharge to surface water at the headwaters of Creek A, Creek B, and Middle Creek on tribal property.

CPOC #1 is established per WAC 173-340-720(8)(c). Points of Compliance #2 and #3 are off property conditional CPOCs, per WAC 173-340-720(8)(d)(ii). The Tribe has accepted the CPOCs.

The points of compliance identified for groundwater are monitoring wells MW-5, MW-6, MW-7, MW-12I, MW-13D, and MW-14; and for surface water are stations SW-1, SW-4, SW-6, and SW-7 (see locations shown on Figure 2).

2.8 Remedial Actions

Remedial actions included landfill closure and post-closure care completed under Chapter 173-304 WAC prior to 1991, interim actions completed under MTCA prior to 2011, and implementation of the 2011 CAP thereafter.

The remedial system is composed of landfill engineering controls including the following elements:

- Composite cover systems integrating a high-density polyethylene (HDPE) liner and surface water controls over three distinct disposal areas.
- LFG collection from a system of horizontal trenches, vertical wells, and conveyance piping to a flare compound for treating combustible LFG, and an associated liquid management system.
- Access controls (fencing and signage).

2.8.1 Cleanup Action

Seven alternatives were considered to meet state cleanup standards and were presented and evaluated in the FS (Parametrix, 2009). The alternative selected in the 2011 Cleanup Action Plan was natural attenuation of groundwater with enhanced monitoring and enhanced institutional controls. Natural attenuation occurs through biological and chemical process that reduce contaminant concentrations over time. The water quality monitoring program tracks the progress of natural attenuation.

The enhanced institutional controls include the environmental covenant for the Property, the State's water well drilling restriction area (WAC 173-160), and the Port Gamble S'Klallam Tribe's Protection Area. A Settlement Agreement (April 2007) between the Port Gamble S'Klallam Tribe and Kitsap County/WMW was developed pertaining to the tribal lands that adjoin the Property to the west and south.

2.8.2 Remedial System Improvements

The remedial system has been maintained to optimize landfill gas collection efficiency and minimize landfill gas migration. Remedial system maintenance activities have included the following improvements:

LFG wellhead upgrade. In July 2017, Kitsap County/WMW upgraded selected LFG extraction wellheads to allow flow measurement using orifice plates. This allowed for improved system performance assessment and optimization through valve adjustments at discrete locations across the wellfield.

Condensate management system upgrade. In December 2018, the condensate management system was modified to collect and store condensate within the flare compound rather than convey condensate to the sump east of the main landfill (see S-1¹ on Figure 3). The conveyance line leading from the flare compound to the condensate

¹ Also referred to as MH-1 in other Site documents.

sump was found to be collecting stormwater and was decommissioned along with the condensate sump S-1. The upgraded condensate management system transfers condensate from the header to an above-ground storage tank for bulk disposal. Details of the upgrade including as built drawing were presented in the 2018 “Annual Environmental Monitoring Report” (Aspect, 2019).

Perimeter gas well decommissioning. In October 2019, Aspect decommissioned the 10 perimeter LFG extraction wells after a period of monitoring to confirm they did not collect LFG. Leaking wellheads at perimeter LFG extraction wells reduced the overall performance of the LFG collection system. Details of the perimeter LFG extraction well decommissioning were presented in a Memorandum “Hansville Landfill – Minor Changes to Landfill Gas Collection” (Aspect, 2020).

LFG wellhead upgrade. In August 2021, Aspect upgraded the LFG wellheads to improve wellfield performance. Improvements consisted of installing valved monitoring ports to replace leaking monitoring ports and realigning plumbing at selected locations to prevent condensate traps and reduce vacuum leaks. These improvements were documented in the Third Quarter 2021 Environmental Monitoring Report (Aspect, 2021).

2.9 Environmental Monitoring through 2021

Environmental monitoring at the Landfill Site was initiated in 1982 under solid waste regulations (WAC 173-304). The RI report (Parametrix, 2009) published environmental monitoring data from 1990 through 2004. The FS report (Parametrix, 2011) published environmental monitoring data through 2005. Ecology’s Environmental Information Management (EIM) System includes environmental monitoring data from 2007 through 2021.

As specified in the compliance monitoring plan (SCS, 2011), the following water quality parameters have been analyzed quarterly for both groundwater and surface water: arsenic, manganese, chloride, ammonia, nitrate, nitrite, bicarbonate, carbonate, alkalinity, sulfate, TOC, orthophosphate, and vinyl chloride (by SIM). A full EPA method 8260 scan for VOCs has also been conducted annually during the first quarter monitoring event.

Observed water quality parameters are shown in time-series graphs in Appendix A. To summarize conditions, graphs show maximum or average annual concentrations. For context with applicable regulations, time-series graphs include Site-specific cleanup levels (CUL) or groundwater quality standards (GWQS) from Chapter 173-200 WAC.

2.9.1 Minor Modifications to the Compliance Monitoring Plan

Environmental monitoring has been conducted in accordance with the “Compliance Monitoring Plan” (SCS, 2011). Minor changes in operations were implemented to maintain or improve data quality objectives:

- Starting in 2017, Aspect collected surface water samples using a peristaltic pump to reduce turbidity in samples and to allow field filtering samples for dissolved metals analysis. Aspect collected groundwater samples using a peristaltic pump because existing sampling pumps provided insufficient pressure for field filtering samples.

- Starting in 2017, Aspect collected LFG monitoring data using a GEM-5000, an upgrade from the GEM-2000 referenced in the Compliance Monitoring Plan (SCS, 2011). Also, compliance monitoring probes were purged using a supplemental pump (SKC) to reduce the monitoring timeframe necessary to collect a representative soil gas sample.
- In March 2018, Aspect replaced all original groundwater sampling pumps (Grundfos Redi-Flo2 electric submersible) and dedicated tubing with new sampling pumps (QED Well Wizard bladder) and dedicated tubing.

2.9.2 Compliance with Cleanup Levels

In accordance with the Compliance Monitoring Plan, groundwater and surface water conditions have been compared with Site-specific cleanup levels during routine quarterly and annual monitoring and reporting. Excerpted tables and figures from the 2021 Annual Environmental Monitoring Report (Aspect, 2022) are provided in Appendix B as examples:

- Tables B-2 and B-3 summarize groundwater and surface water quality results highlighting exceedances of cleanup levels.
- Table C-1 provides results of statistical analysis for constituents that exceeded cleanup levels.
- To illustrate trends in concentrations, Figures C-1 and C-2 show observed quarterly concentrations for vinyl chloride and dissolved arsenic, respectively. Figure C-3 projects average concentrations for 10 years for those wells with cleanup level exceedances.

Compliance with cleanup levels is summarized by indicator hazardous substance below.

Vinyl Chloride: Since 2011, the vinyl chloride cleanup level has been met at groundwater monitoring wells MW-5, MW-7, and MW-13D and all surface water monitoring locations. Vinyl chloride concentrations at MW-12I and MW-14 have exceeded the cleanup level and show long-term decreases over time reflecting natural attenuation. See Appendix A showing maximum annual vinyl chloride concentrations for all compliance monitoring locations.

Dissolved Arsenic: Since 2011, the dissolved arsenic cleanup level has been met at groundwater monitoring wells MW-5, MW-6, MW-7, and MW-12I and surface water monitoring locations SW-1, SW-4, and SW-5. Dissolved arsenic concentrations in groundwater at MW-14 have exceeded the cleanup level since 2011 and show a long-term decrease over time reflecting natural attenuation. Within the last 5 years, dissolved arsenic concentrations in groundwater at MW-13D have increased above the cleanup level, and dissolved arsenic in surface water at SW-6 has exceeded the cleanup level during quarterly sampling events in the dry season during low flows (July and/or October). See Appendix A showing maximum annual dissolved arsenic concentrations for all compliance monitoring locations.

For context, Ecology recently reported that dissolved arsenic concentrations in groundwater across the Puget Sound lowland have a natural background of 8.0 micrograms per liter (µg/L), on average (Ecology, 2021). Nearby public water supplies

show an elevated mean background concentration of 10.4 µg/L. As discussed in Section 3.2.2, this new information does not necessarily warrant a change in the Site-specific cleanup level and should provide context for observed conditions at the Site.

Dissolved Manganese: Since 2011, the dissolved manganese cleanup level has been met at all groundwater monitoring locations. See Appendix A showing maximum annual dissolved manganese concentrations for all compliance monitoring locations.

The Method B non-cancer value for manganese was recently adjusted downward and may prompt a new Site-specific cleanup level. Observed concentrations at MW-14 would exceed this adjusted cleanup level.

2.10 Landfill Gas Compliance

As specified in the compliance monitoring plan (SCS, 2011), methane concentrations have been measured at probe locations near the property boundary to demonstrate compliance with solid waste regulations. Specifically, WAC 173-304 requires control of LFG migration to maintain methane concentrations below the lower explosive limit (5 percent by volume methane in air) at the property boundary. The points of compliance for landfill gas include gas probes GP-1, GP-2s, GP-2m, GP-2d, GP-3, GP-4, GP-5, GP-6, and GP-7 (see locations shown on Figure 3). Other LFG parameters measured include carbon dioxide, oxygen, static pressure, and water level.

Since 2011, observed methane concentrations at all compliance probes have remained below 1 percent by volume as shown below on Figure 5.

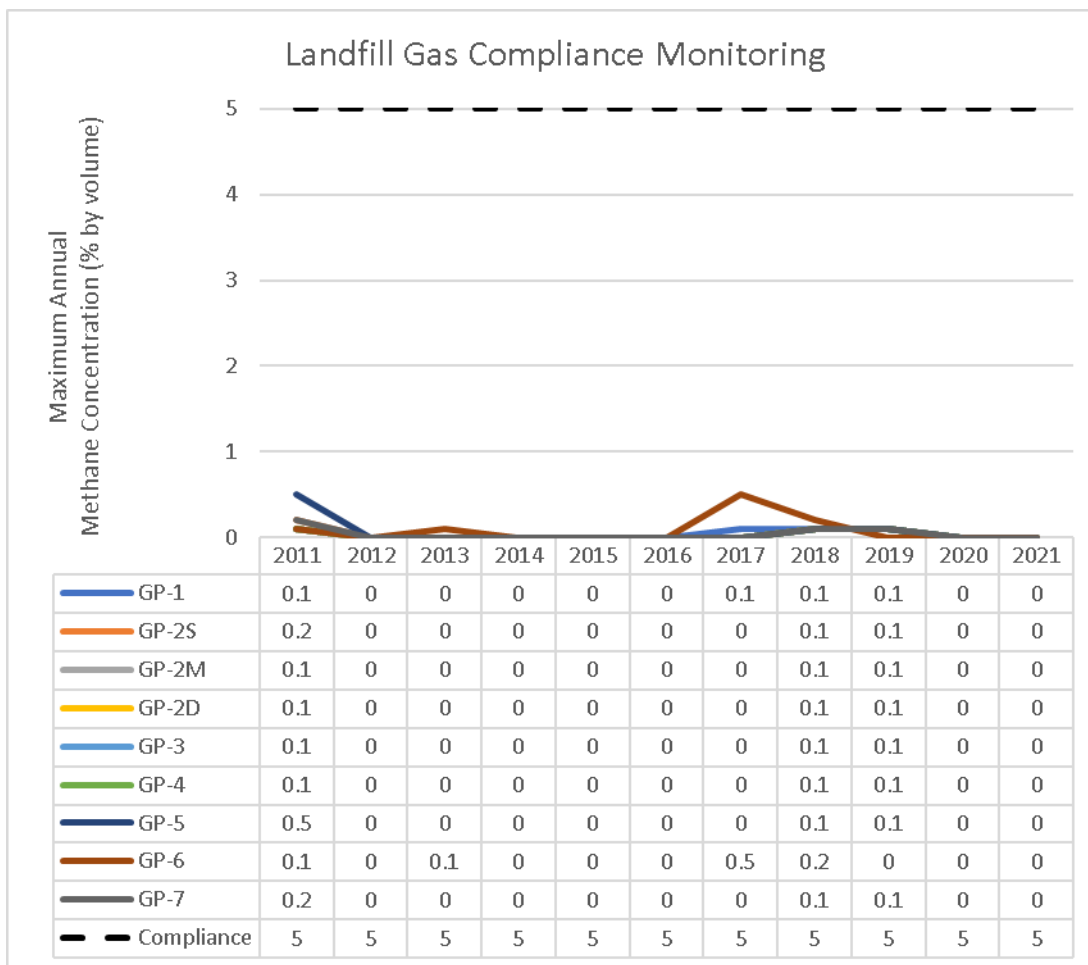


Figure 5. Landfill Gas Compliance Monitoring Results

2.10.1 Landfill Gas Collection System Monitoring

The performance of the LFG collection system has been monitored since 1995. Wellfield monitoring results are routinely reported (see Table A-1 in the Third Quarter 2021 Report (Aspect, 2021)).

Starting in 2014, the LFG collection system has been operated to maximize the total flow, resulting in non-combustible concentrations. Figure 6 shows stacked LFG concentrations observed at the blower inlet since 2011. The combustion limit for flares is approximately 25 percent methane and observed methane concentrations have generally been less than 5 percent by volume. Figure 7 shows the rate of LFG collection since 2011. The LFG collection system rates indicate LFG generation is dominated by carbon dioxide, rather than methane.

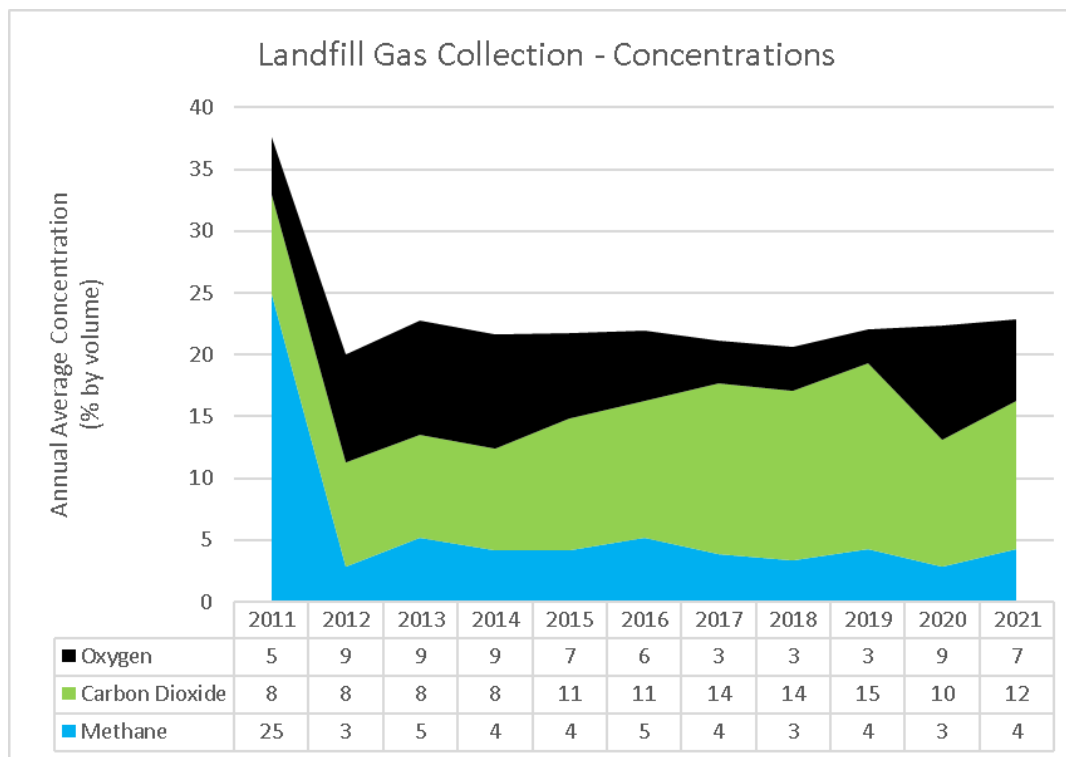


Figure 6. Long-term Landfill Gas Collection Concentrations

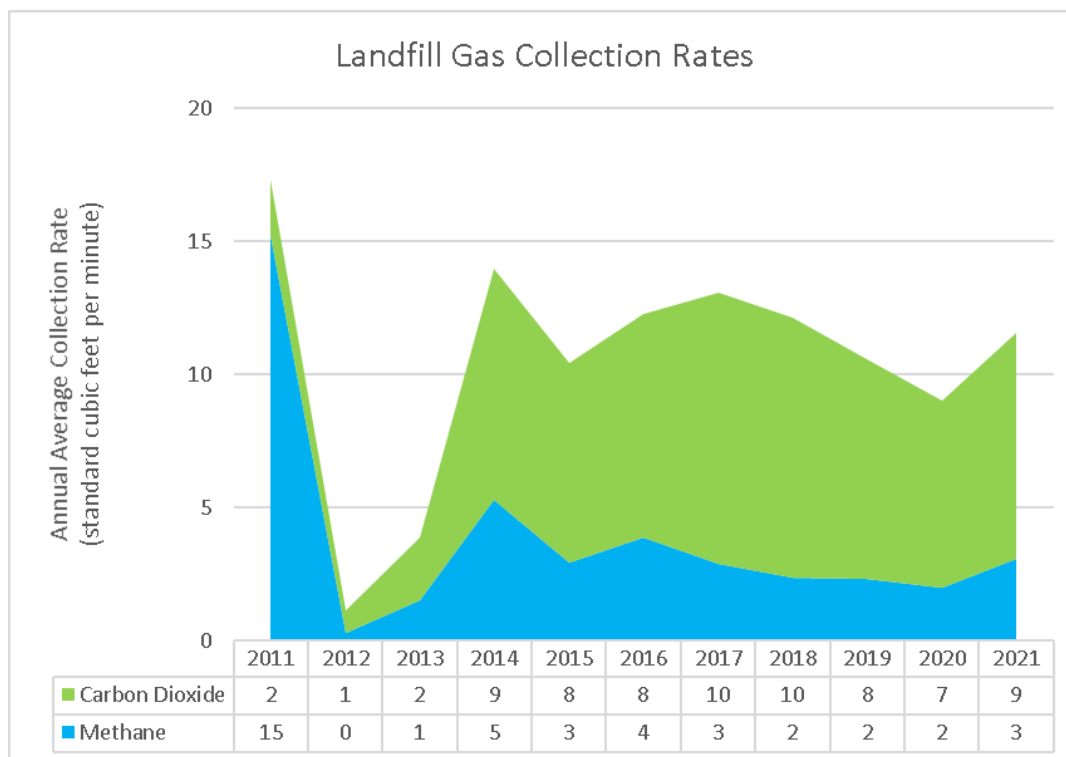


Figure 7. Long-term Landfill Gas Collection Rates

To support a voluntary treatment assessment, LFG was sampled at the blower outlet and analyzed for toxic air pollutants associated with landfills (Aspect, 2022). Because it is so small, the flare is exempt from source registration with Puget Sound Clean Air Agency (see PSCAA Regulation 1, Article 5, Section 5.03(a)(5)). The results of LFG sampling found venting LFG does not pose a threat to human health or the environment.

2.11 Environmental Covenant

A restrictive (environmental) covenant (Covenant) was recorded with Kitsap County for the Property on August 22, 2011, and a copy is included in Appendix B. The Covenant outlines property restrictions including restrictions on groundwater access and any land use that might ‘interfere with the integrity of the Remedial Action and continued protection of human health’ or ‘may result in the release or exposure to the environment of a hazardous substance.’ The Covenant also includes details about Site access and communication with Ecology.

3 Periodic Review

As stated in WAC 173-340-420, the purpose of the periodic review by Ecology is to assure human health and the environment are being protected at the Site according to six criteria. This section provides details of observed Site conditions with respect to these criteria; some of the language is borrowed from the previous periodic report.

3.1 Effectiveness of Completed Cleanup Actions

Human health and the environment are being protected at the Site because of demonstrated effectiveness of completed cleanup actions, including the institutional controls and engineering controls in limiting exposure to hazardous substances remaining at the Site.

Administrative institutional control boundaries include restrictive environmental covenant for the Property (see Section 2.11), the Washington State well drilling restriction area (WAC 173-160-171) and the Tribal Protection Area prohibiting water supply from surface water and groundwater (upper aquifer) in the areas shown on Figure 1. The Covenant for the Property was recorded, is in place, and serves to ensure the long-term integrity of the remedy including that the contamination remaining is contained and controlled. This Covenant prohibits activities that will result in the release of contaminants at the Site without Ecology's approval and prohibits any use of the property that is inconsistent with the Covenant. Physical institutional controls (perimeter fencing and a locked access gate) restrict access to the Property.

Engineering controls were installed to contain contaminants and have been maintained. During routine quarterly inspections by the Kitsap Public Health Department, the surface cap was observed to be in good condition and institutional controls were providing planned protection. Environmental monitoring and engineering control maintenance have been conducted in accordance with the Compliance Monitoring Plan (SCS, 2018) using appropriate methods which protect worker health and safety as well as the public. These protocols prevent human exposure to remaining contamination via inhalation, ingestion, and direct contact with impacted groundwater or soils.

The effectiveness of the cleanup action and protective measures has been demonstrated by decreasing the nature and extent of indicator hazardous substances. The extent of groundwater affected by the landfill is well understood, and vinyl chloride and dissolved arsenic concentrations higher than Site cleanup levels are trending down due to natural attenuation. There are two compliance monitoring locations where exceedances of arsenic likely reflect background or an off-Property influence. Ongoing monitoring and institutional controls will be required until points of compliance are met throughout the Site.

3.2 New Scientific Information on Hazardous Substances

New scientific information is available for individual hazardous substances present at the Site providing context on cleanup levels and background concentrations. Emerging contaminants of concern are also addressed.

3.2.1 Cleanup Levels

Ecology's Cleanup Levels and Risk Calculation (CLARC) database is periodically updated to reflect new information on risk factors and subsequent changes in formula values. The current CLARC values are compared to Site-specific cleanup levels in the table below.

Table 3. Site-Specific Cleanup Levels

Chemical	Media	Site Cleanup Level (µg/L)	CLARC value (µg/L)
Vinyl Chloride	Groundwater	0.025	0.029 (Method B, cancer)
Arsenic	Groundwater	5	Background
Manganese	Groundwater	2,240	750 (Method B, non-cancer)
Vinyl Chloride	Surface Water	0.025	0.02 (Human Health, Fresh, 173-201A WAC)
Arsenic	Surface Water	5	Background

The differences between vinyl chloride cleanup levels and updated CLARC values are relatively small and do not materially affect Site restoration timeframes given observed conditions. The use of background concentrations to establish dissolved arsenic cleanup levels has not changed. However, new toxicity information on manganese resulted in an updated Method B formula cleanup level in groundwater of 750 µg/L. Based on this update, we recommend the Site cleanup level for manganese in groundwater be revised from 2,240 µg/L to 750 µg/L. This change in manganese cleanup level is not anticipated to extend the Site cleanup period, which is tied to achieving the arsenic cleanup level.

3.2.2 Background Concentrations

Arsenic is a naturally occurring element in sediments and is found at varying concentrations in groundwaters. Aspect reviewed regional and local background for comparison with Site conditions to support this remedial action status report.

In July 2021, Ecology published a draft report *Natural Background Groundwater Arsenic Concentrations in Washington State* (Publication No. 14-09-044). This information provides context for the variability and natural background level in the Puget Sound lowland basin. In summary, arsenic concentration in the Puget Sound Lowlands basin ranged from 0.8 to 76 µg/L with a mean of 5.4 µg/L. The calculated background arsenic concentration of 8.0 µg/L was based on 2,790 samples included in the study.

Aspect reviewed the Washington State Department of Health records for local public water supplies in the vicinity of the Hansville Landfill Site. Of the 16 separate water supply sources identified within approximately 5 miles of the Landfill, only three were

identified as producing water from the shallow aquifer. The reported arsenic concentrations ranged from 4.5 to 15.0 µg/L with a mean of 10.4 µg/L.

This information on regional and local background groundwater arsenic concentrations, along with Site-specific background observed at MW-5, should be considered when reviewing concentrations observed at compliance wells MW-13D and MW-14 and surface water station SW-6.

Figure 8 compares arsenic concentrations for regional, local, and Site conditions observed at selected monitoring locations. Error bars show the range in observed arsenic concentrations.

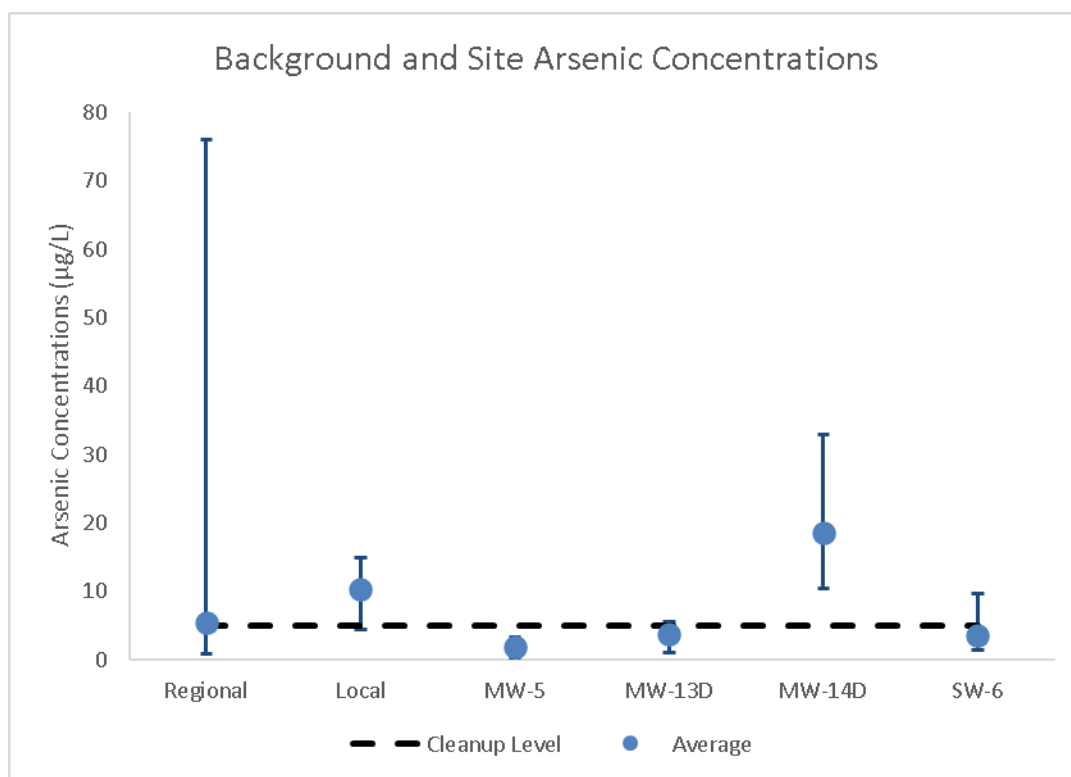


Figure 8. Comparison of Background and Site Arsenic Concentrations

3.2.3 Emerging Contaminants of Concern

In November 2021, Ecology released a chemical action plan for PFAS (per- and polyfluoroalkyl substances) (Publication 21-04-048). This plan addresses Ecology's approach to addressing this class of emerging contaminants including the scope, schedule, and costs for evaluating landfill PFAS emissions.

3.3 New Applicable State and Federal Laws

No new state or federal laws affecting the remedial action at the Site.

3.4 Current and Projected Site Use

The current and projected land use at the Property remains unchanged at this time.

3.5 Availability and Practicality of More Permanent Remedies or Higher Preference Technologies

In general, the remedies implemented at the Site remain the preferred technologies for the selected Alternative. Due to the low methane concentrations in collected LFG, biofilter technology is preferred to direct venting through the existing flare.

There is growing interest in reducing greenhouse gas emissions from closed landfills. Biofilter treatment systems have been used to convert methane in non-combustible LFG to carbon dioxide at ambient temperatures. Local examples of biofilter technology applications for treatment of LFG include the Cedar Falls Closed Landfill and the Enumclaw Closed Landfill in King County, and the Jefferson County Landfill in Port Townsend.

Biofilters are constructed of a piping manifold to vent actively or passively collected LFG through organic woody compost material and are sized according to the methane loading rate to provide sufficient residence time within the biofilter. Research and experience from similar landfills demonstrate that biofilters also provide effective odor control by reducing emissions of hydrogen sulfide and other trace gases.

3.6 Availability of Improved Analytical Techniques

No changes or improvements in analytical techniques were identified during the review period. Laboratory methods used historically have provided reporting limits at or below Site-specific cleanup levels.

4 Conclusions

This periodic review marks 10 years post-implementation of the remedy and approximately halfway through the 23-year projected cleanup timeframe presented in the 2011 Cleanup Action Plan.

The cleanup actions implemented have protected human health and the environment. The cleanup actions included containment with natural attenuation of groundwater with enhanced monitoring and enhanced institutional controls. Continued implementation of the Cleanup Action Plan is required because cleanup levels have not been met at all conditional points of compliance.

Compliance monitoring is routinely conducted to assess the effectiveness of the cleanup actions. Quarterly and annual reports routinely provide quantitative assessments in progress toward meeting Site-specific cleanup levels for groundwater, surface water, and LFG.

- Groundwater concentrations for indicator hazardous substances show limited and decreasing effects from the landfill. Vinyl chloride concentrations at three affected compliance wells are steadily decreasing and projected to meet cleanup levels by 2030. Dissolved arsenic and dissolved manganese concentrations at MW-14 are decreasing, but remain elevated. Dissolved arsenic concentrations at off-Property well MW-13D do not appear to be related to landfill effects.
- Surface water concentrations for indicator hazardous substances show little to no effect from the landfill. No vinyl chloride was detected in surface water during the last 5 years. Dissolved arsenic and manganese concentrations at SW-6 do not appear to be related to landfill effects.
- LFG concentrations show that little to no LFG is being generated. The LFG collection system has been operated to maximize groundwater protection and has yielded non-combustible gas. No LFG migration has been observed.

Recommended changes to the Compliance Monitoring Plan include the following:

- Update groundwater sampling procedures to reflect new dedicated pumps
- Update surface water sampling procedures to reflect use of peristaltic pump
- Update LFG monitoring procedures to reflect use of GEM-5000 device
- Update dissolved manganese site-specific cleanup level to new Method B non-cancer value of 750 µg/L.

Lastly, we recommend continued optimization of the LFG collection system, including replacing the existing flare system with a biofilter system to support non-combustion methane oxidation and to reduce greenhouse gas emissions.

4.1 Next Review

The next periodic review is anticipated to be in 2027, approximately 5 years from the date of the Ecology site visit for this periodic review. By that time, we anticipate showing substantial progress toward meeting Site cleanup levels.

5 References

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- Washington State Department of Ecology (Ecology), 2011, Cleanup Action Plan Hansville Landfill, Kitsap County, Washington, Ecology Facility Site Identification Number: 2605, June 2011.
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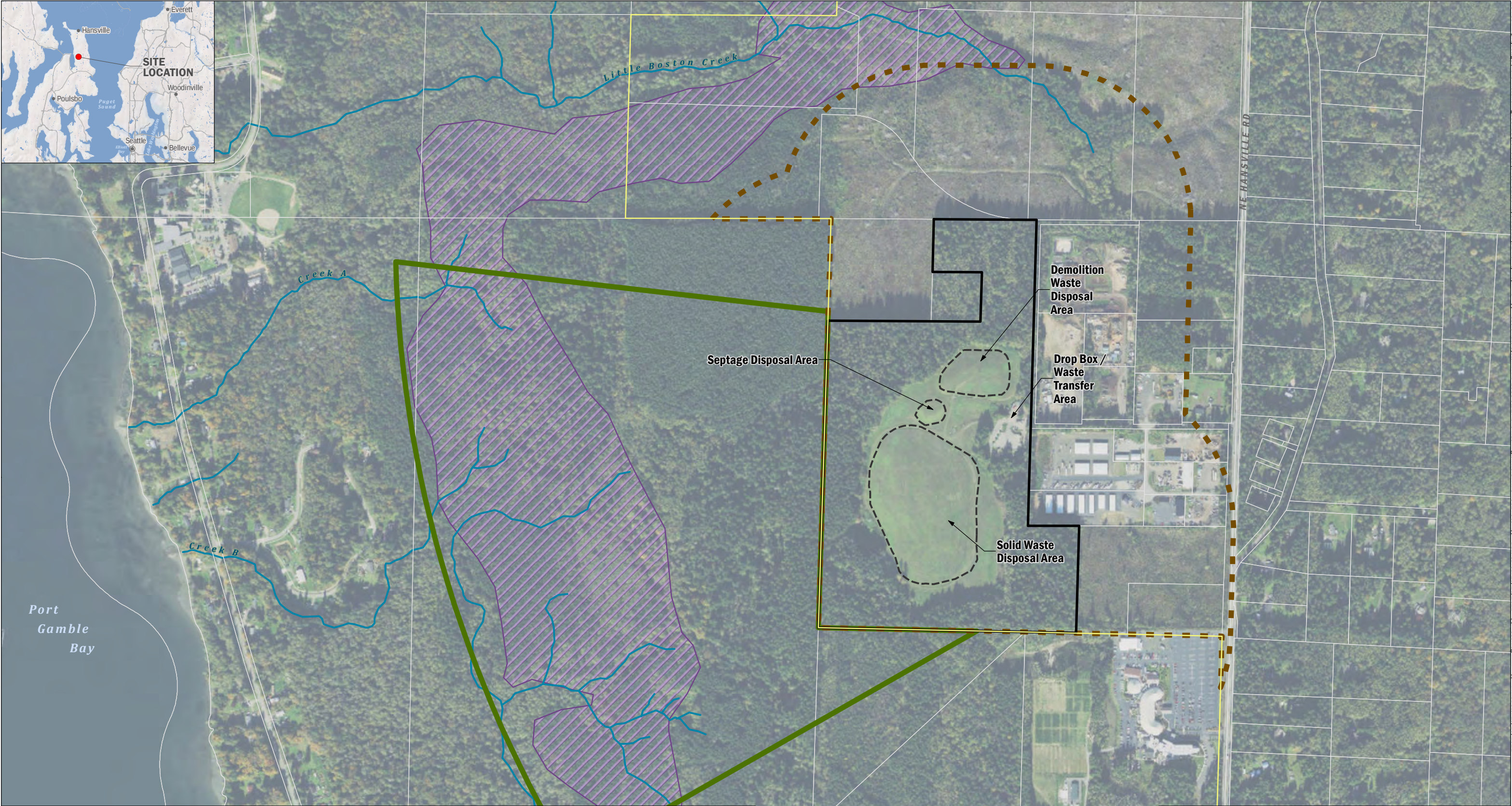
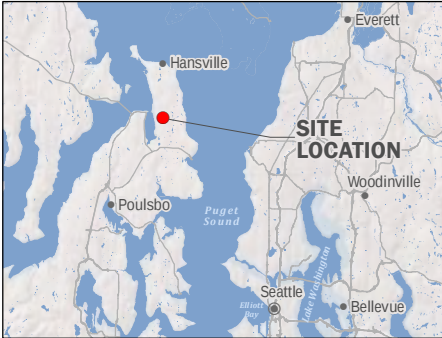
6 Limitations

Work for this project was performed for Kitsap County and Waste Management of Washington (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix C titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

FIGURES





Exterior Boundary of Port Gamble S'Klallam Tribal Land



State Well Drilling Restriction Area



Tribal Protection Area



Approximate Area of Groundwater Discharge from Upper Aquifer



Waste Disposal Area



Landfill Property Boundary



Tax Parcel



Stream



N

0

500

1,000

Feet

Note: Site features are approximate.

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Vicinity Map

Five-Year Status Report

Hansville Landfill

Kitsap County, Washington

Aspect

CONSULTING

OCT-2021

PROJECT NO.
160423

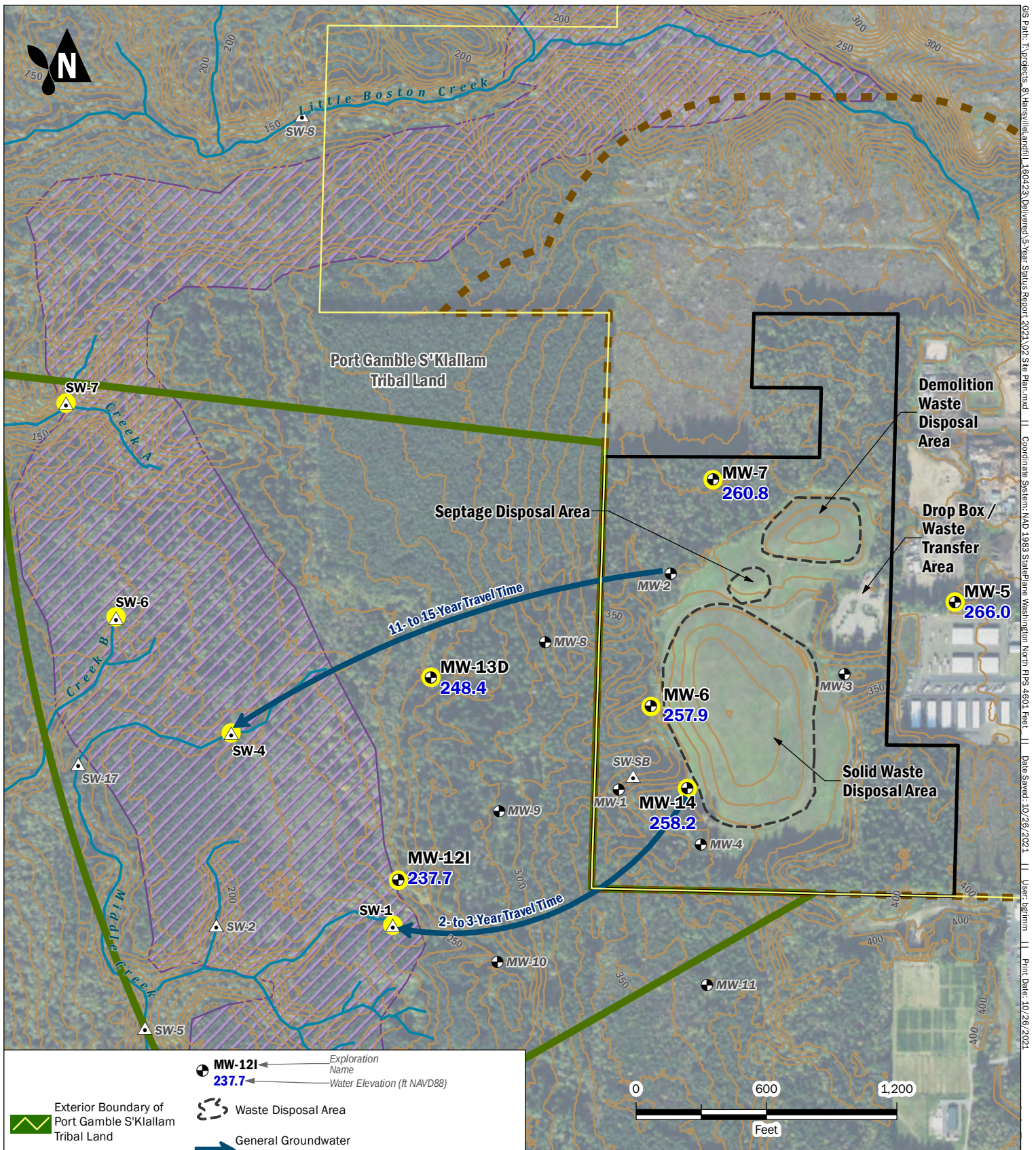
BY:
MLK / WEG

REVISED BY:
MLK / PSB / WEG

FIGURE NO.

1

GIS Path: \\projects_8\HansvilleLandfill_160423\Delivered\5-Year Status Report 2021\03 Vicinity Map.mxd | Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet | Date Saved: 10/26/2021 | User: bgrimm | Print Date: 10/26/2021



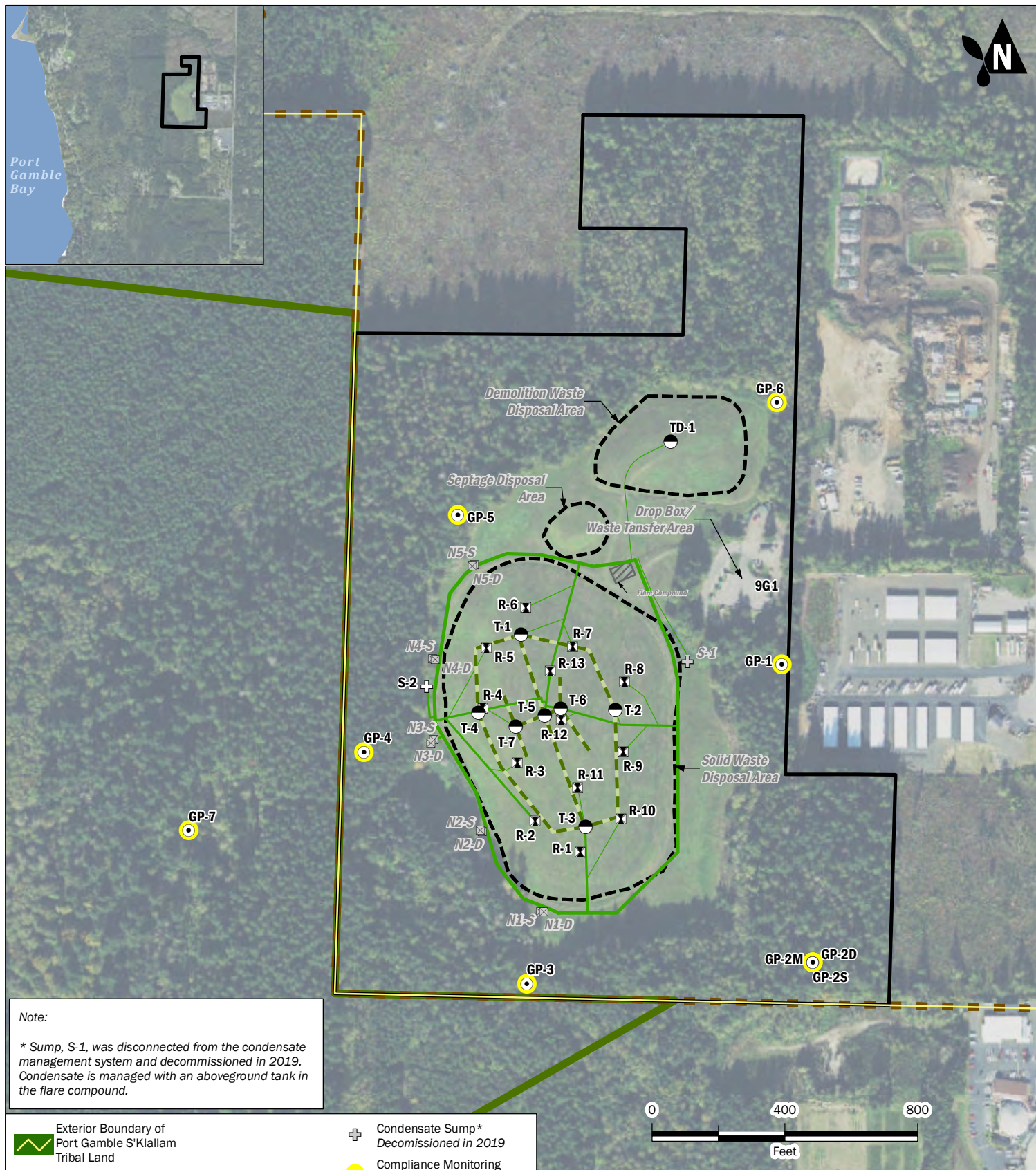
Note: Vertical datum is NAVD88. Approximate area of groundwater discharge from upper aquifer delineation from Remedial Investigation Report (Parametrix, 2006).

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Site Plan

Five-Year Status Report
Hansville Landfill
Kitsap County, Washington

	OCT-2021	BY: MLK / WEG	FIGURE NO. 2
	PROJECT NO. 160423	REVISED BY: PSB / WEG	



Exterior Boundary of Port Gamble S'Klallam Tribal Land State Well Drilling Restriction Area Tribal Protection Area Exploration Gas Monitoring Probe Gas Extraction Well (in Refuse Completion) Gas Extraction Well (Native Soil Completion) Disconnected in October 2019 Trench Completion Condensate Sump	Condensate Sump* Decommissioned in 2019 Compliance Monitoring Location Waste Disposal Area Landfill Gas System LFG Pipe - 2" LFG Pipe - 4" LFG Pipe - 6" Trench Landfill Property Boundary
---	---

Landfill Gas System

Five-Year Status Report
Hansville Landfill
Kitsap County, Washington

	OCT-2021	BY: MLK / RAP	FIGURE NO. 3
	PROJECT NO. 160423	REVISED BY: TDR / MLK / PSB / WEG	

APPENDIX A

Time-Series Graphs of Water Quality Parameters

Order of Graphs:

Indicator Hazardous Substances:

Vinyl Chloride

Arsenic

Manganese

WAC 173-304 Parameters:

Temperature

Conductivity

pH

Chloride

Nitrate as N

Nitrite as N

Ammonia as N

Sulfate

Total Organic Carbon

Site-Specific Analytes:

Alkalinity, Bicarbonate as CaCO₃

Alkalinity, Carbonate as CaCO₃

Alkalinity, Total as CaCO₃

Ortho-Phosphorus as P

Dissolved Gases:

Dissolved Oxygen

Dissolved Carbon Dioxide (Calculated)

Notes:

"CUL" represents the Site-specific cleanup level

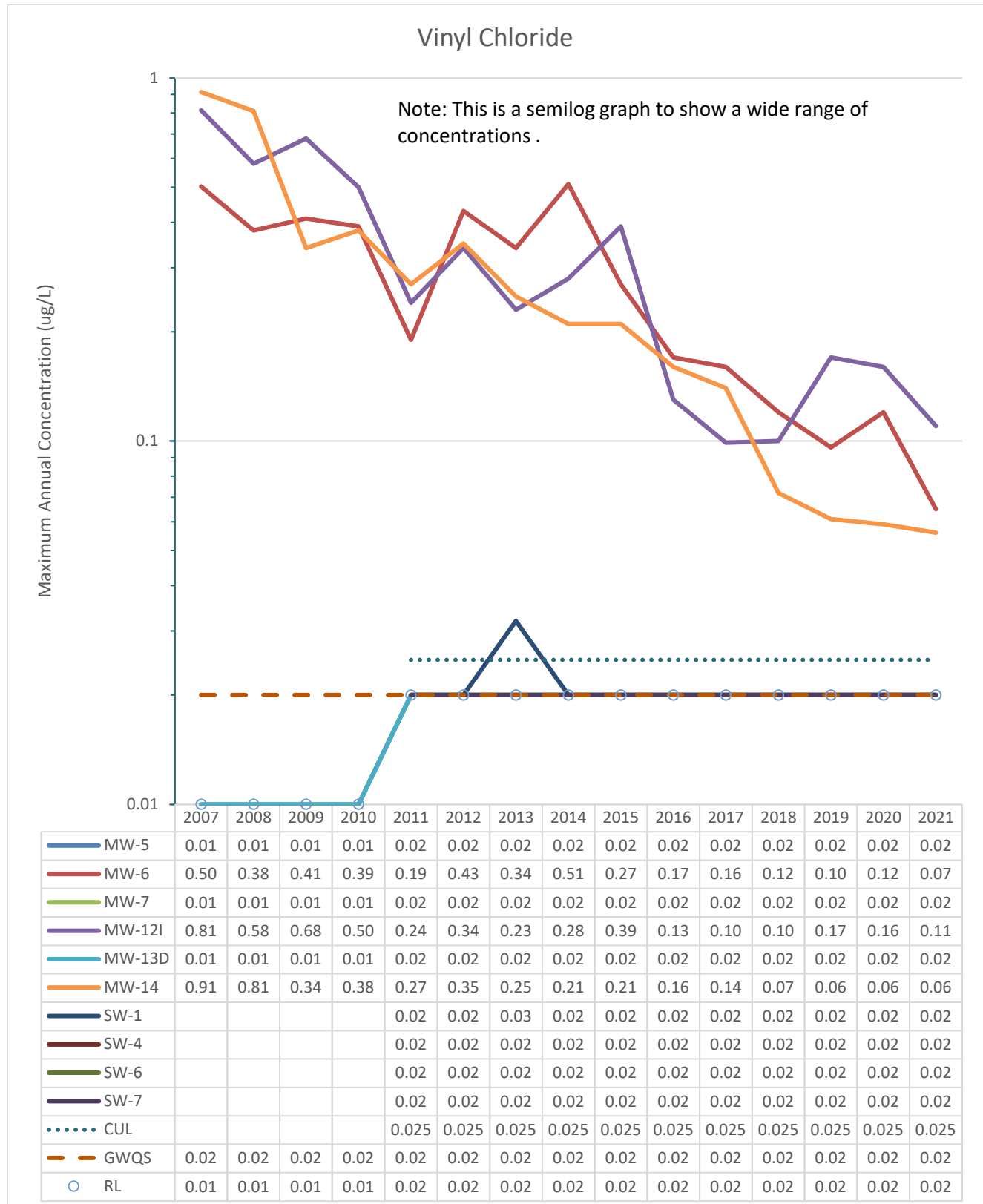
"GWQS" represents the groundwater quality standard from WAC 173-200

"RL" represents the reporting limit

Appendix A: Timeseries Graphs of Water Quality Parameters

5-year Status Update Report

Hansville Landfill Site



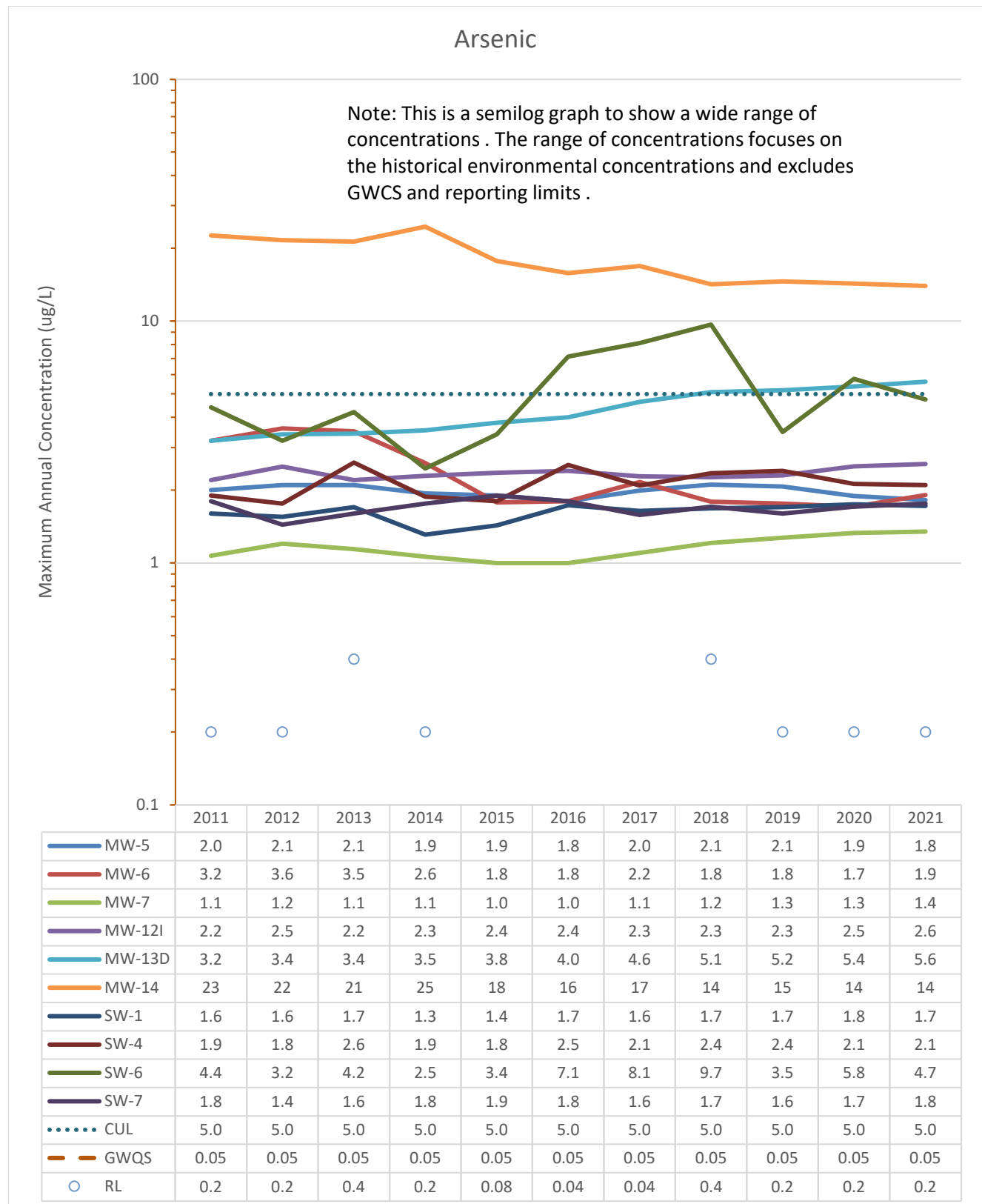
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Appendix A

Appendix A: Timeseries Graphs of Water Quality Parameters
5-year Status Update Report
Hansville Landfill Site



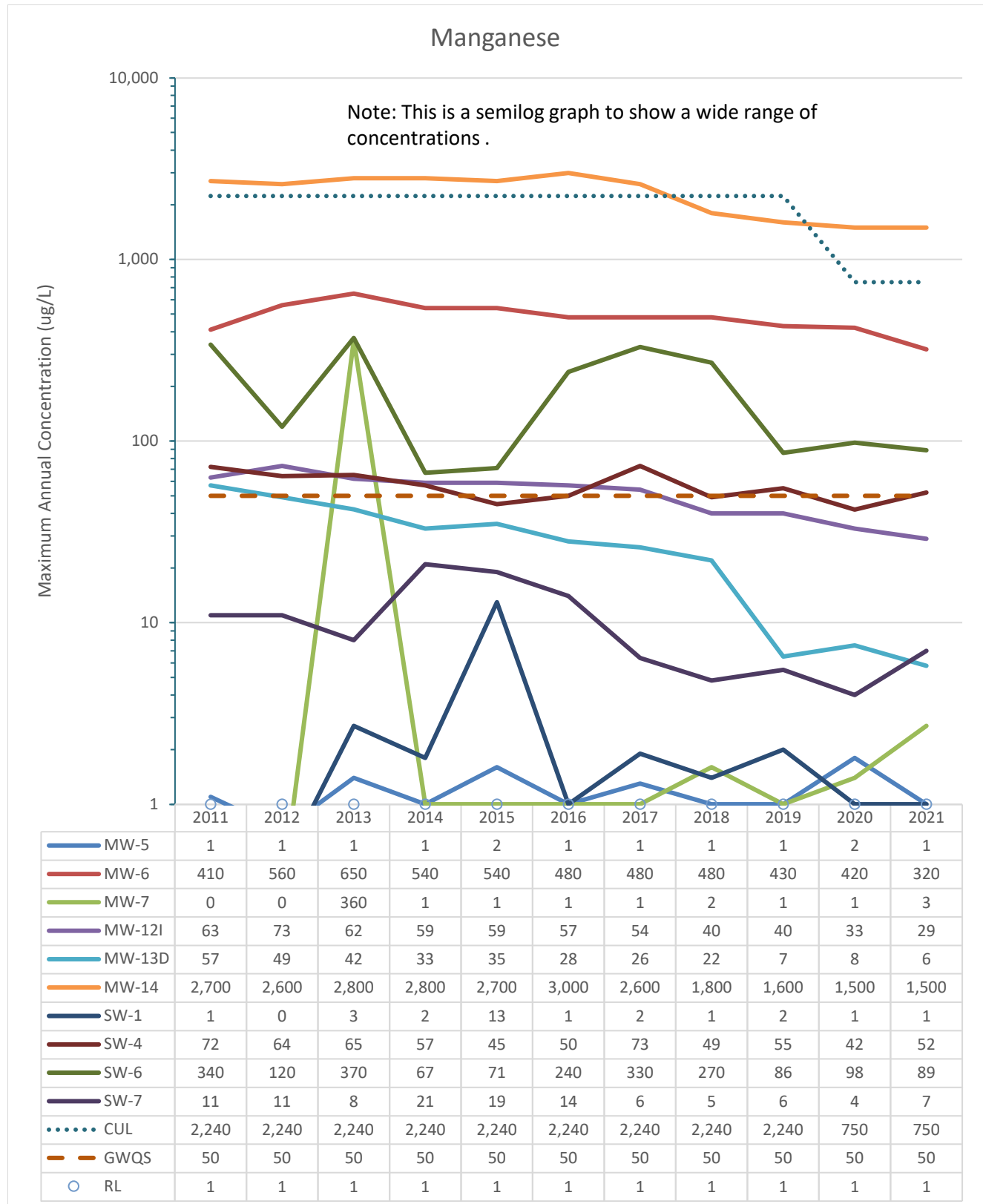
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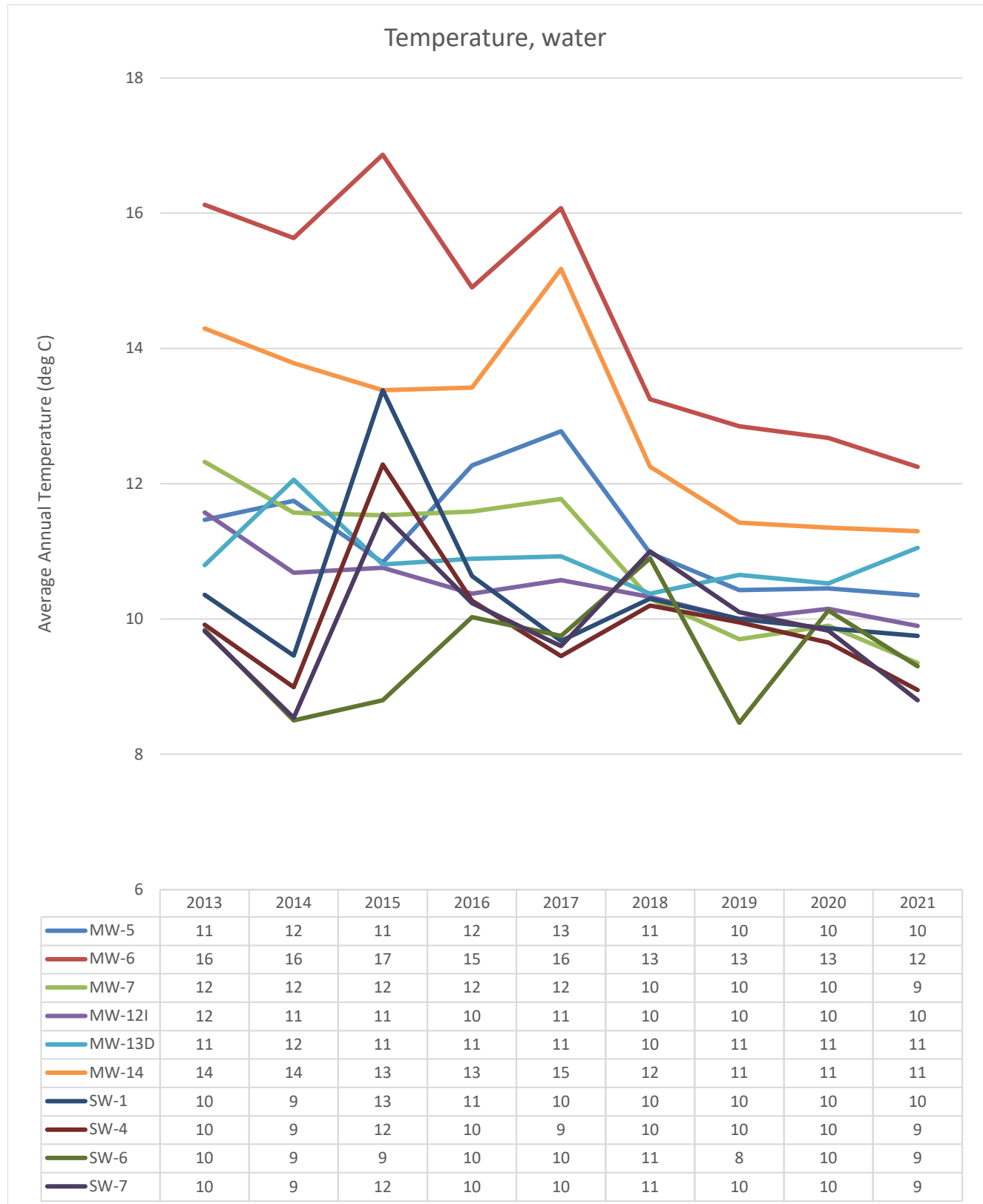
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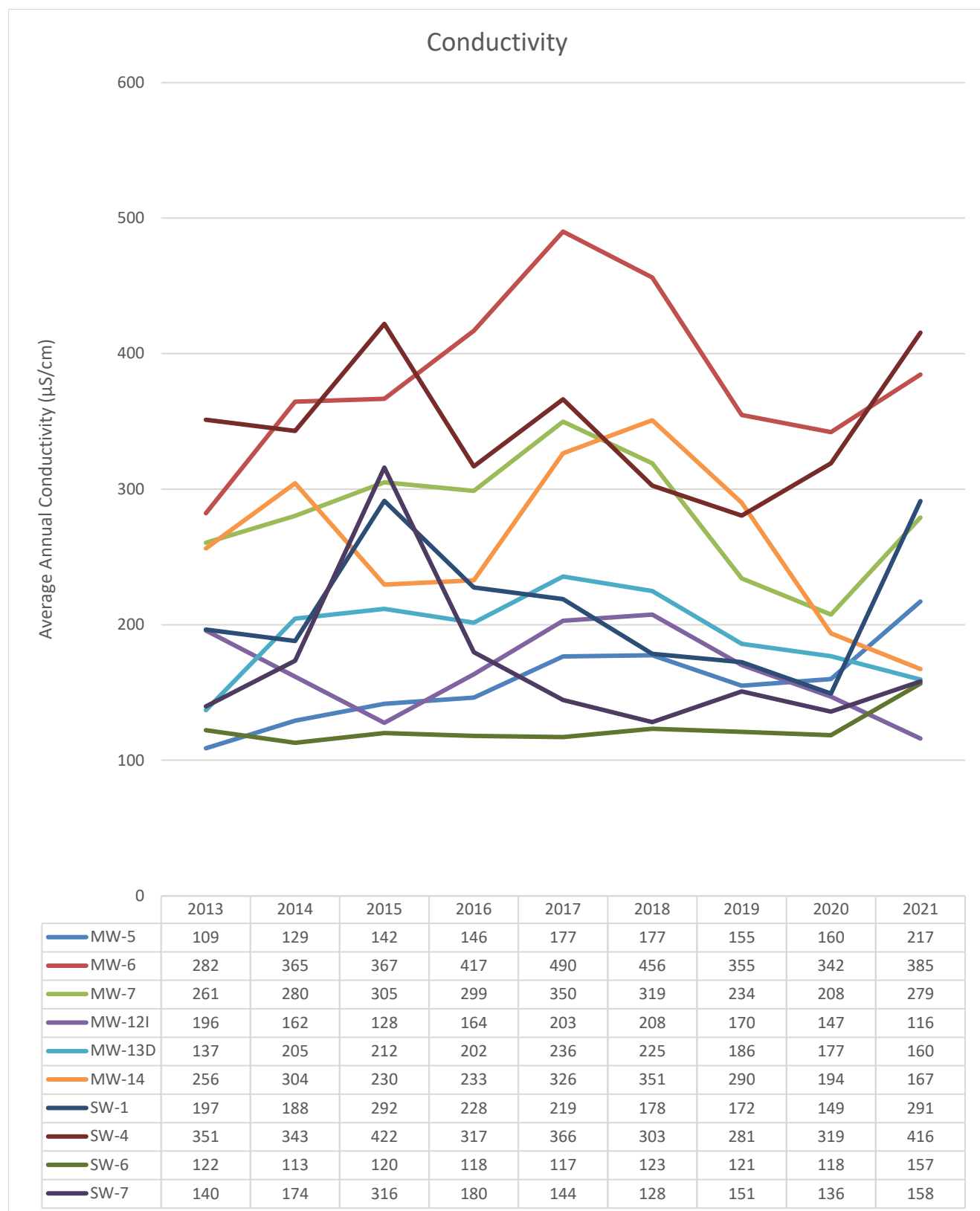
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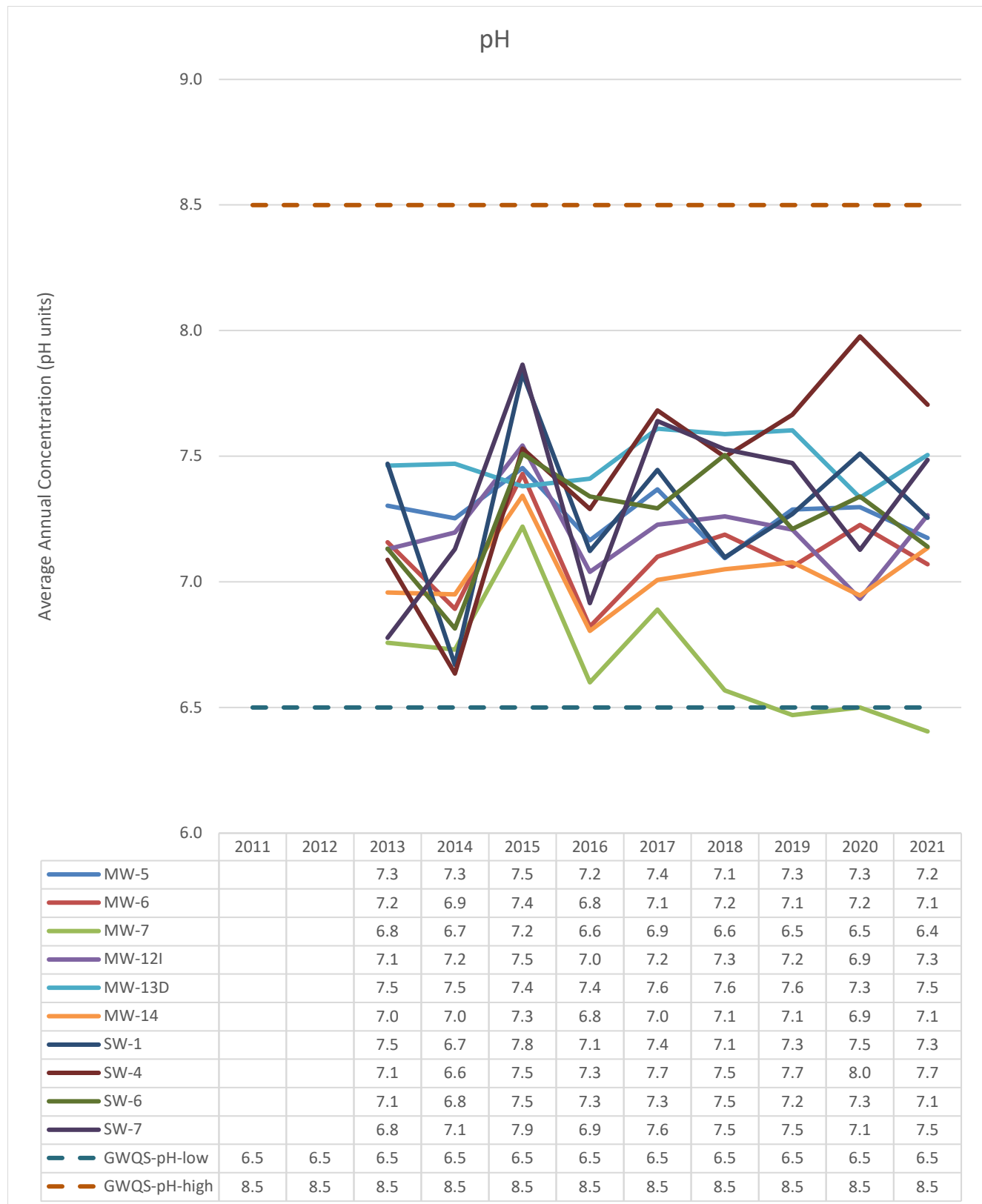
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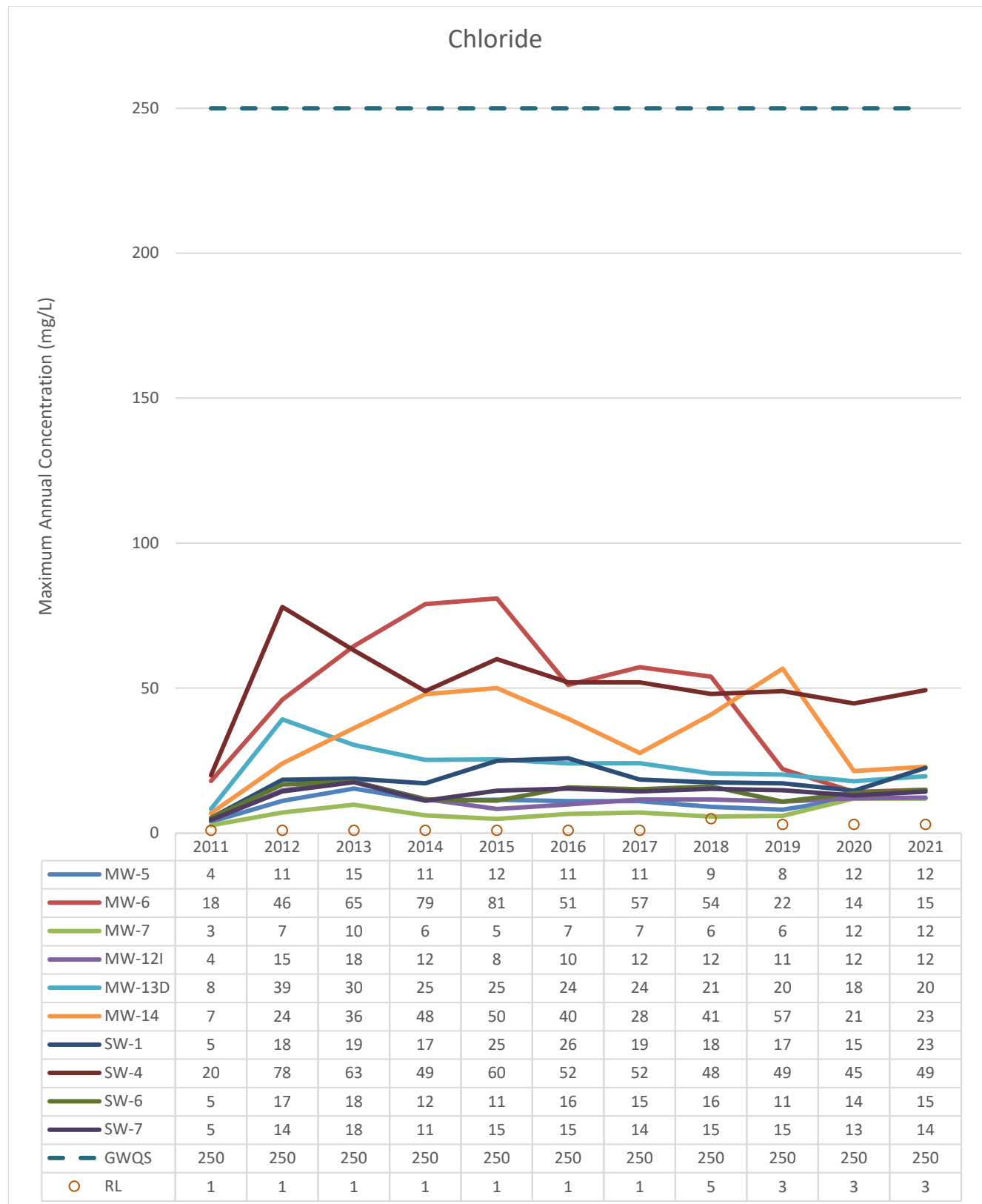
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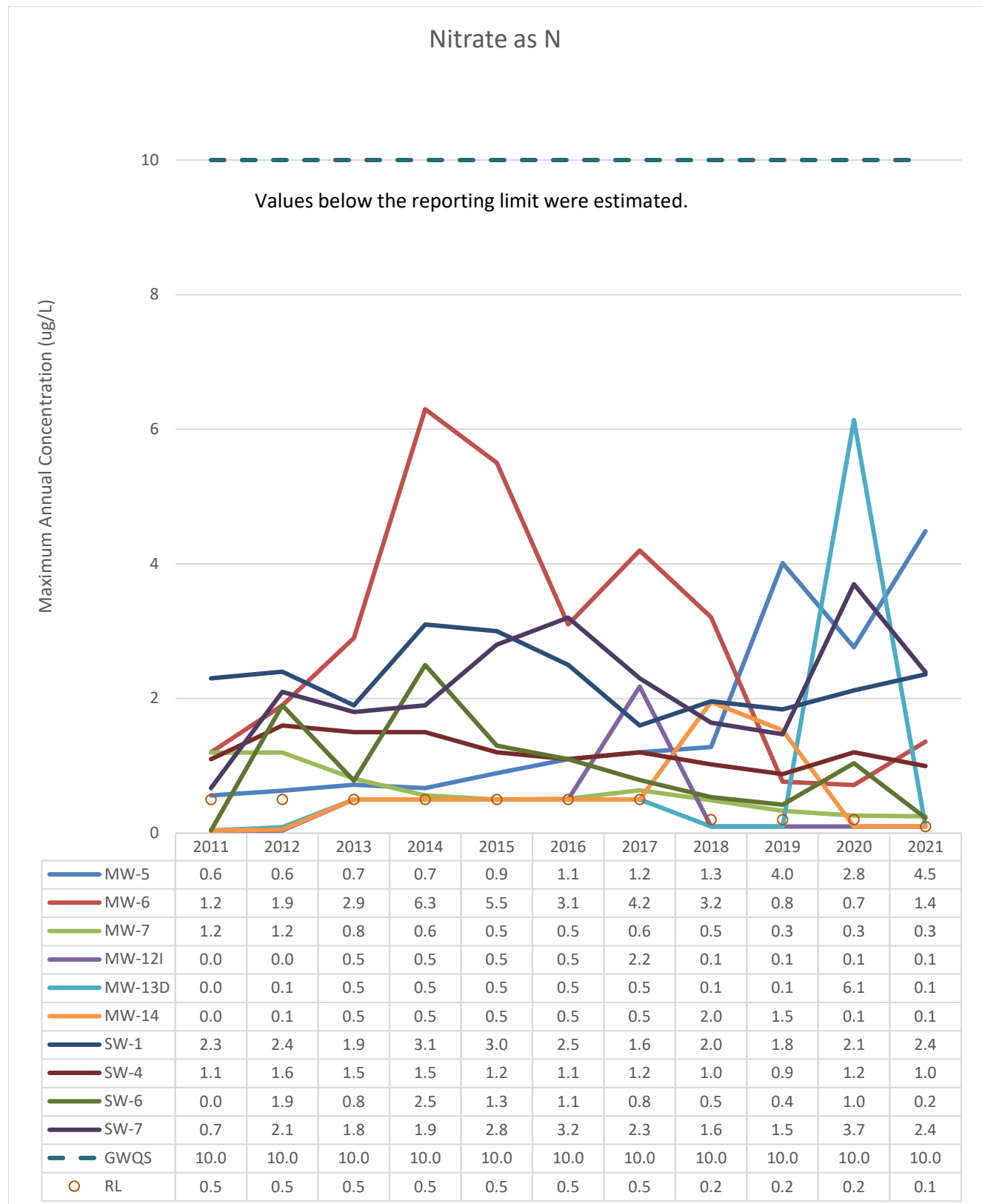
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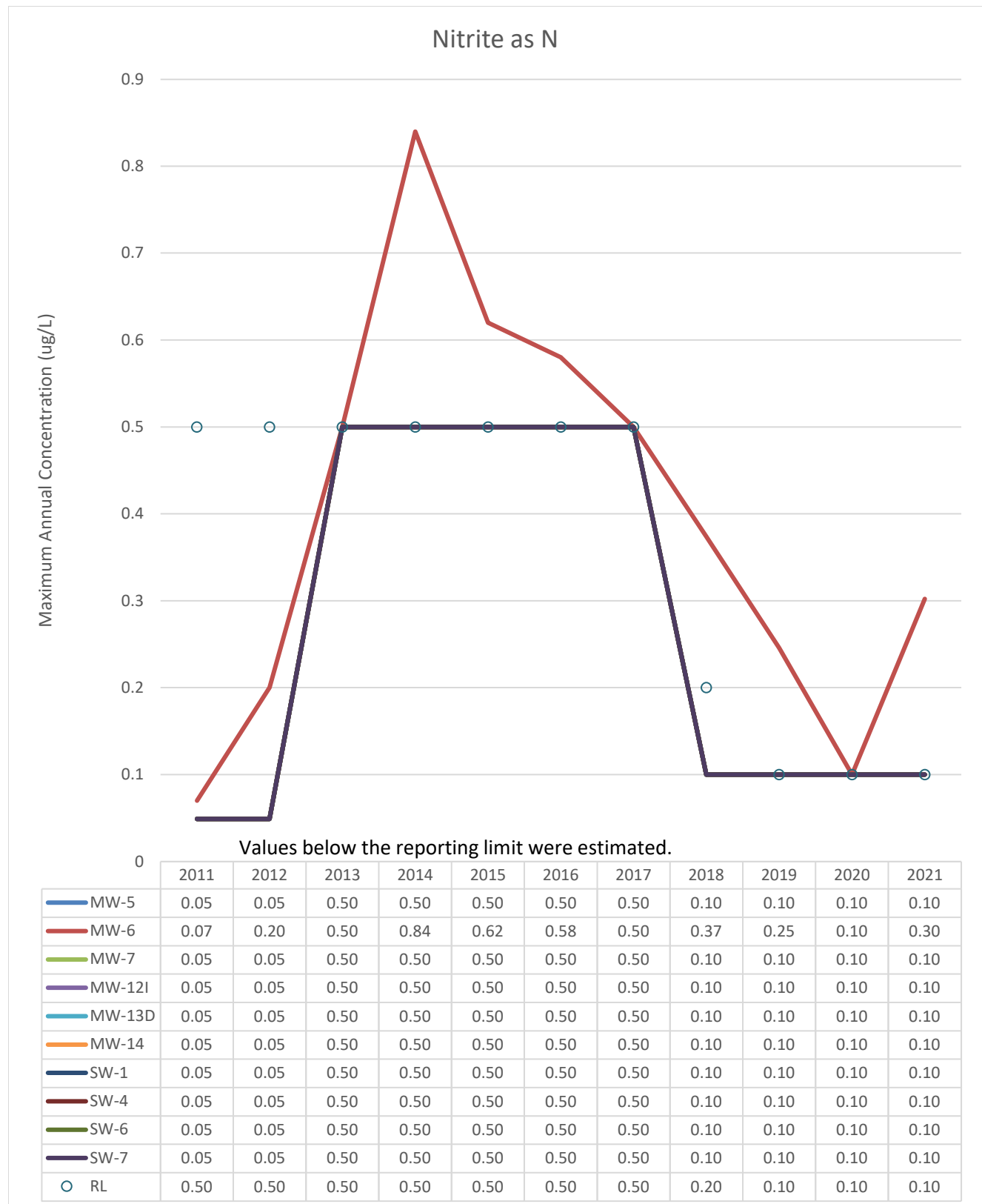
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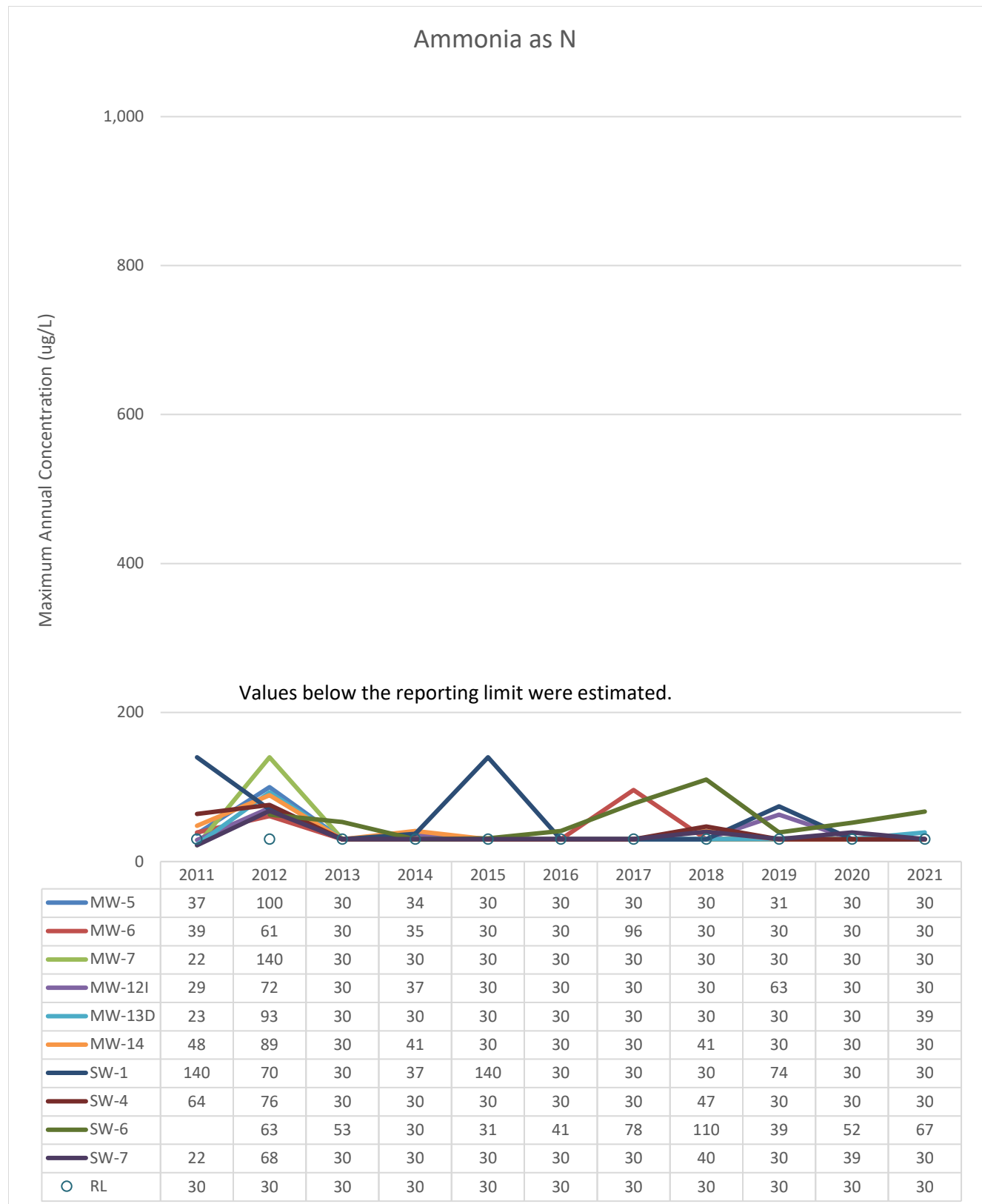
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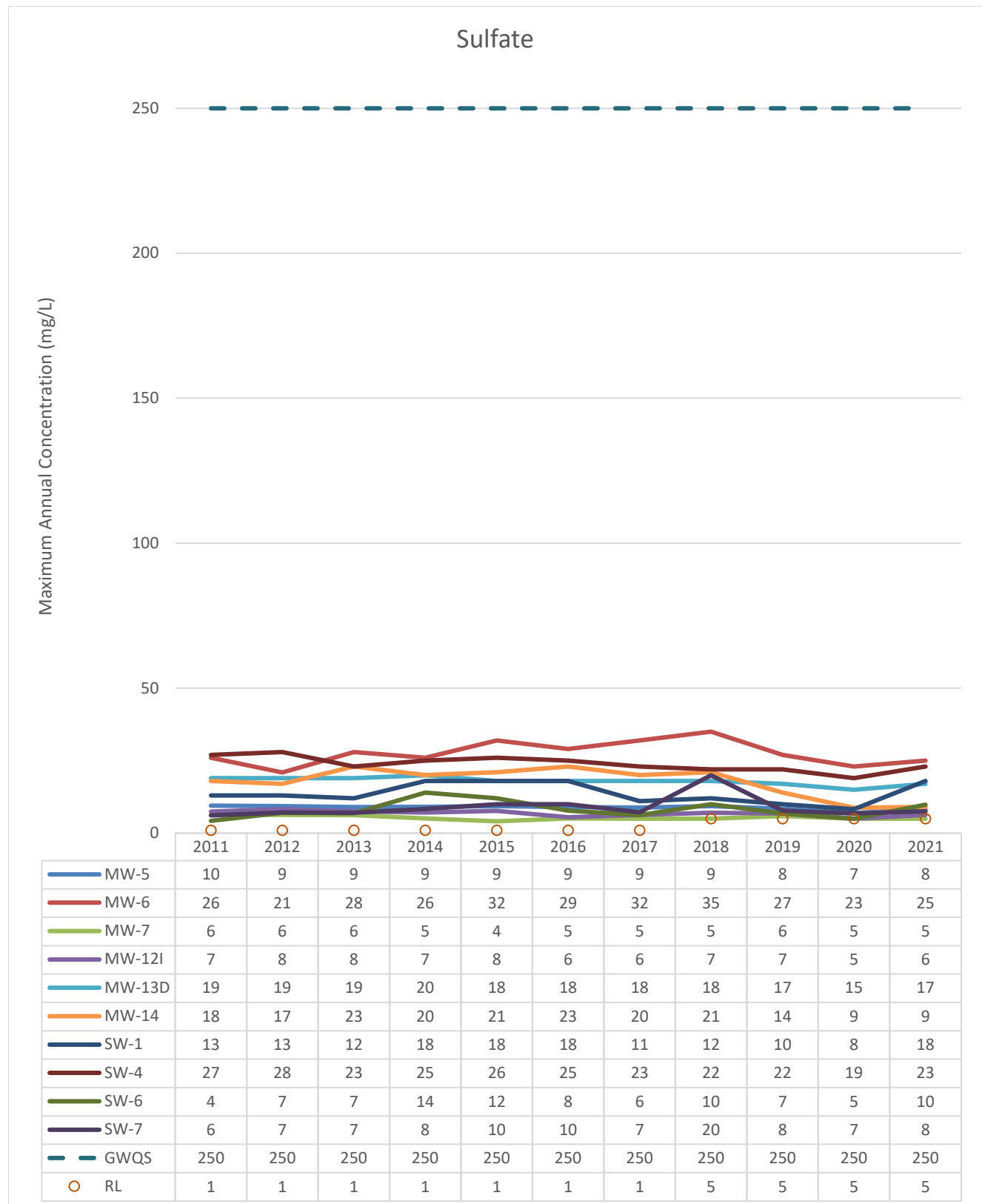
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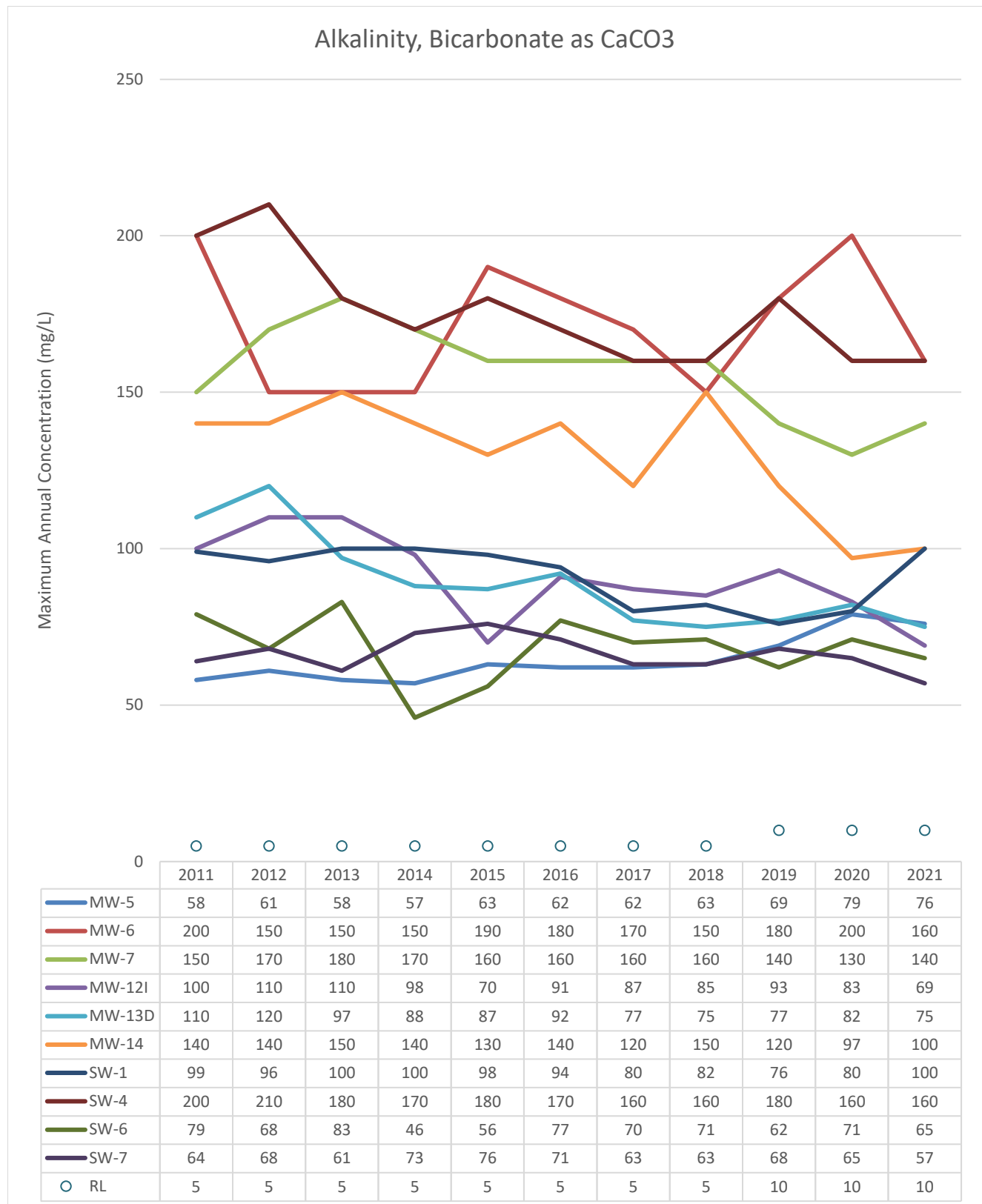
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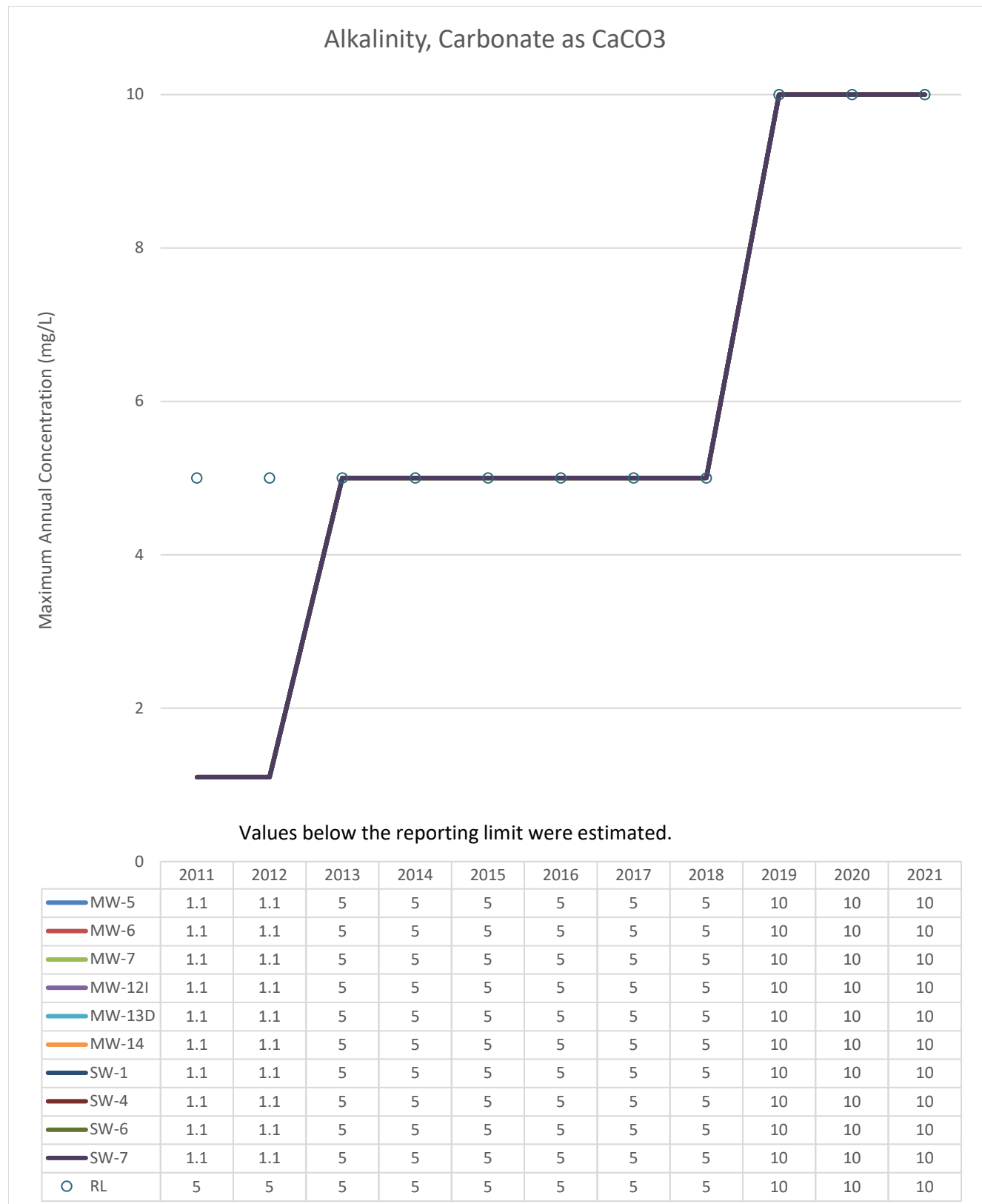
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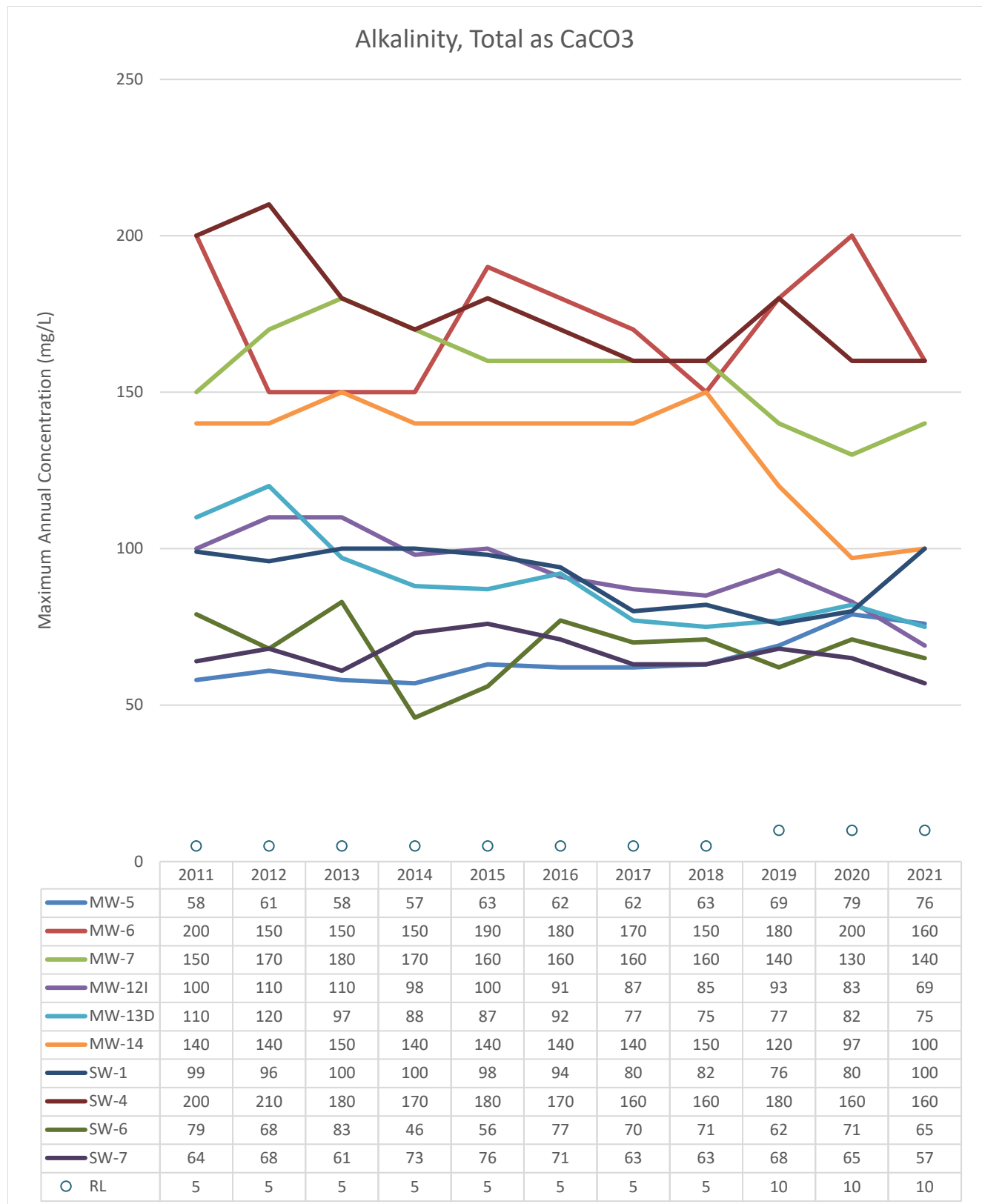
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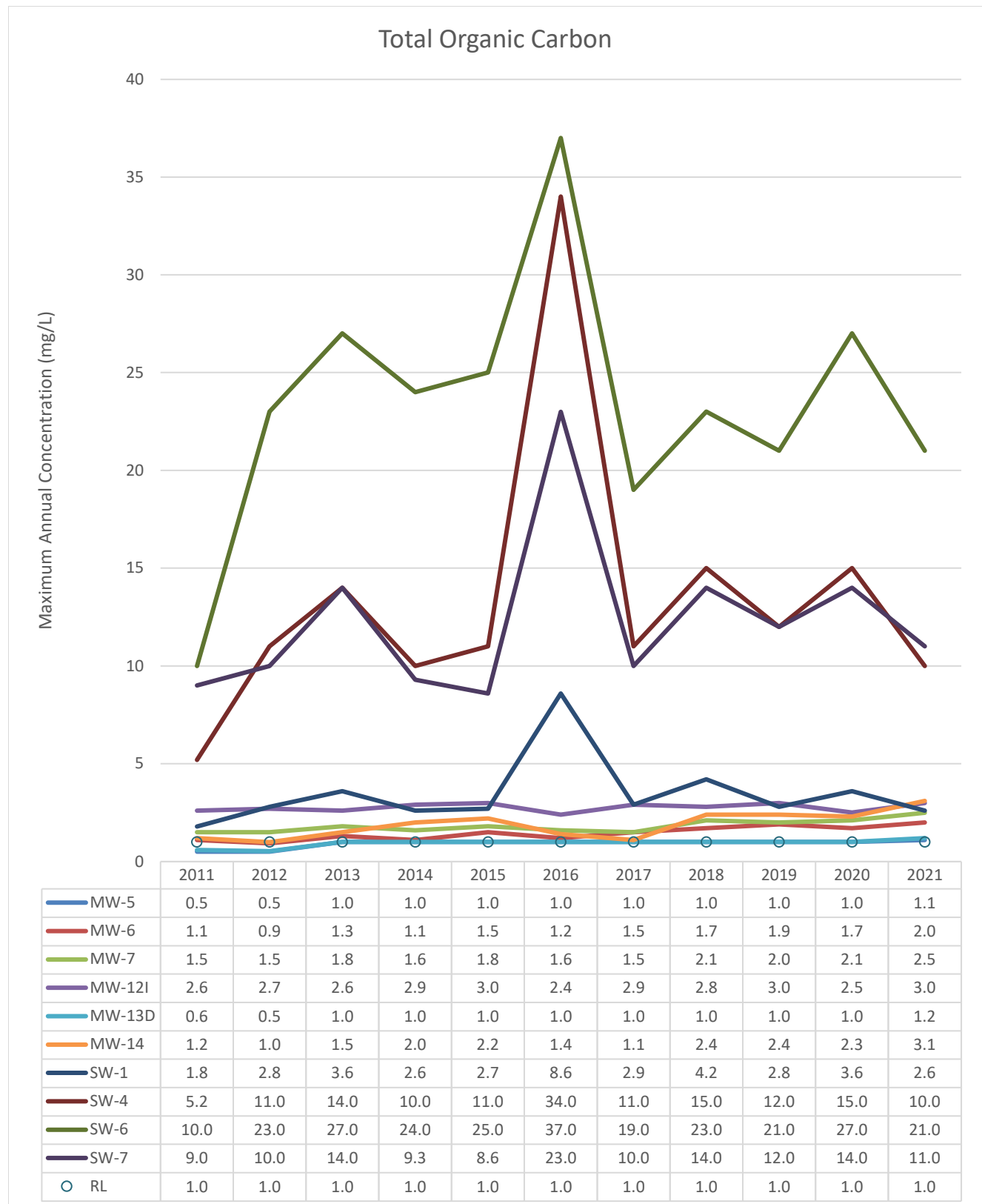
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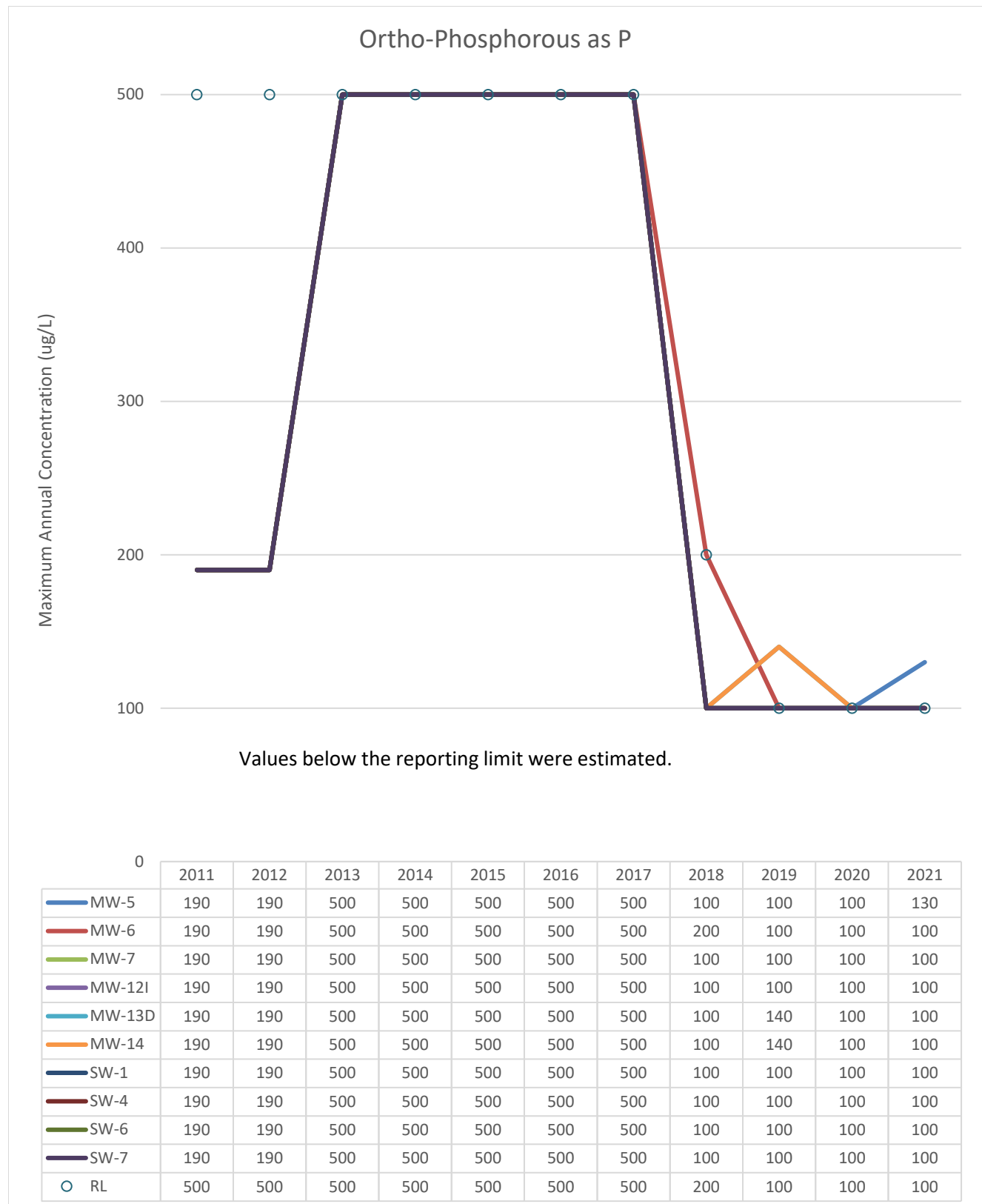
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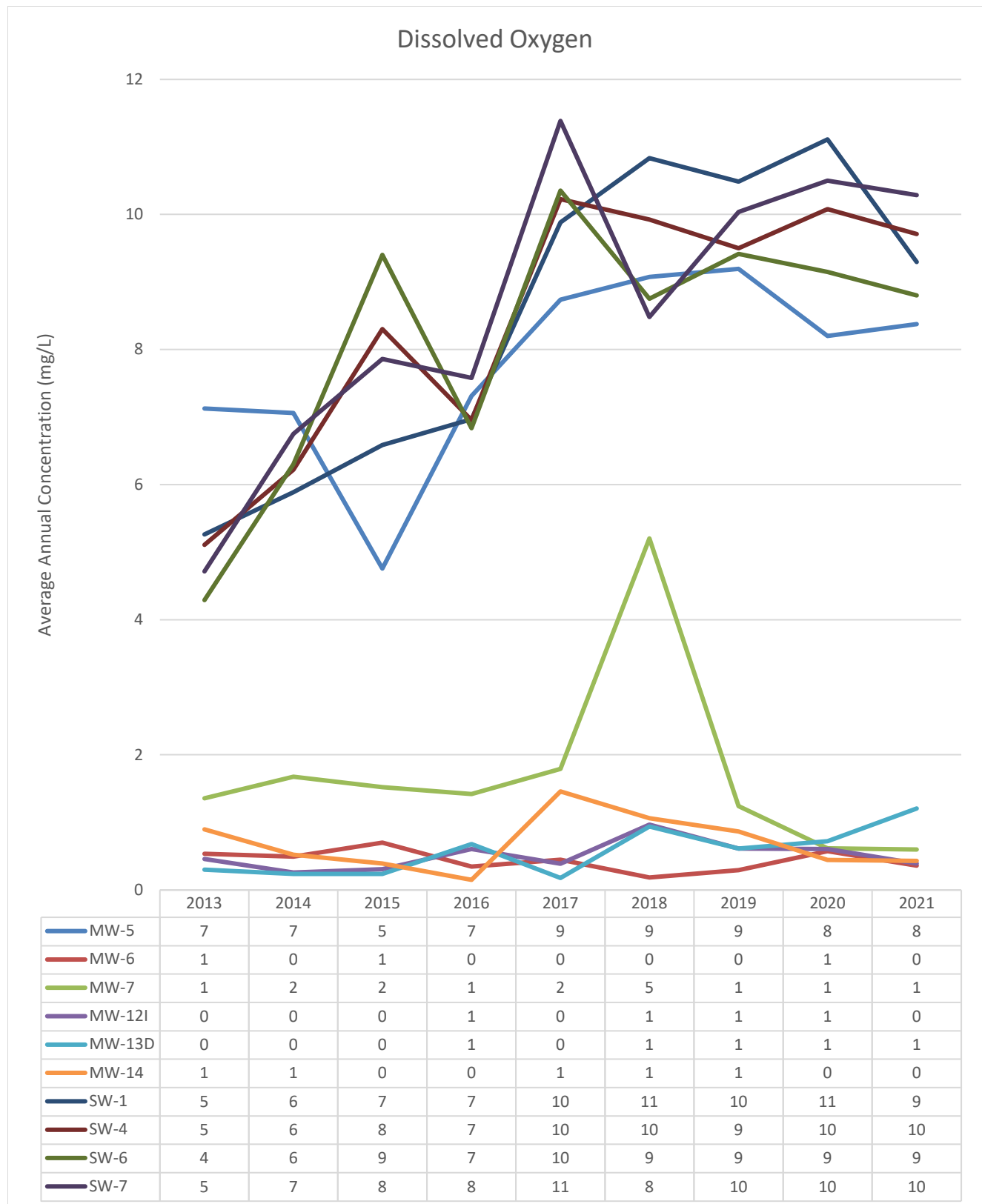
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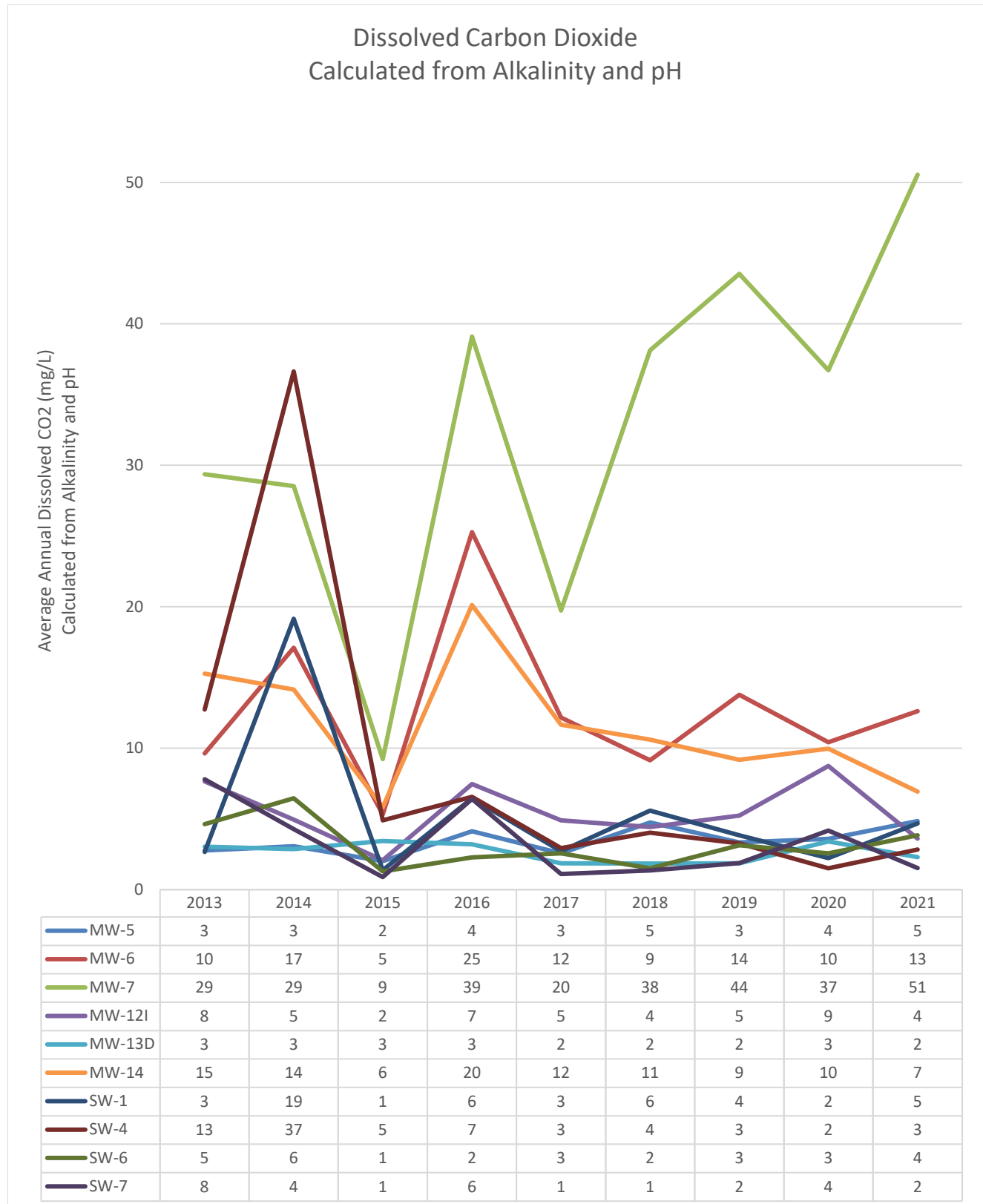
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Appendix A

APPENDIX B

Restrictive Environmental Covenant

After Recording Return to:
John Keeling
Department of Ecology
Northwest Regional Office
3190 160th SE, Bellevue WA

PUBLIC WORKS KITSAP COUNTY 201108220304
Covenants Rec Fee: \$ 69.00
08/22/2011 03:04 PM Page: 1 of 8
Walter Washington, Kitsap Co Auditor


Restrictive (Environmental) Covenant

Grantor: Kitsap County

Grantee: State of Washington, Department of Ecology

Legal:

Section 09 Township 27N Range 2E

E1/2 NE1/4 NW1/4 NE1/4 & NW1/4 NE1/4 NW1/4 NE1/4 & S1/2 NW1/4 NE1/4 & N1/2

SW1/4 NE1/4 & SW1/4 NE1/4 EXC N1/2 & W1/2 SW1/4 SE1/4 NE1/4 PER VOL 149/423

Tax Parcel Nos.: 092702-1-005-2007

Grantor, Kitsap County, hereby binds Grantor, its successors and assigns to the land use restrictions identified herein and grants such other rights under this environmental covenant (hereafter "Covenant") made this 11th day of July 2011 in favour of the State of Washington Department of Ecology (Ecology). Ecology shall have full right of enforcement of the rights conveyed under this Covenant pursuant to the Model Toxics Control Act, RCW 70.105D.030(1)(g), and the Uniform Environmental Covenants Act, 2007 Wash. Laws ch. 104, sec. 12.

This Declaration of Covenant is made pursuant to RCW 70.105D.030(1)(f) and (g) and WAC 173-340-440 by Kitsap County its successors and assigns, and the State of Washington Department of Ecology, its successors and assigns (hereafter "Ecology").

A remedial action (hereafter "Remedial Action") occurred at the property that is the subject of this Covenant. The Remedial Action conducted at the property is described in the following document:

Cleanup Action Plan Hansville Landfill Kitsap County, Washington, dated June, 2011.
This document is on file at Ecology's Northwest Regional Office.

This Covenant is required because the Remedial Action resulted in residual concentrations of vinyl chloride which exceed the Model Toxics Control Act Method B Cleanup Level(s) for groundwater established under WAC 173-340-720(4) and the Site Cleanup Levels for arsenic and vinyl chloride specified in Consent Decree No. 95-2-3005-1 and because a conditional point of compliance has been established for groundwater

The undersigned, Kitsap County, is the fee owner of real property (hereafter "Property") in the County of Kitsap, State of Washington that is subject to this Covenant. The Property is legally described as follows:

Section 09 Township 27N Range 2E
E1/2 NE1/4 NW1/4 NE1/4 & NW1/4 NE1/4 NW1/4 NE1/4 & S1/2 NW1/4 NE1/4 &
N1/2 SW1/4 NE1/4 & SW1/4 NE1/4 EXC N1/2 & W1/2 SW1/4 SE1/4 NE1/4 PER
VOL 149/423

Kitsap County makes the following declaration as to limitations, restrictions, and uses to which the Property may be put and specifies that such declarations shall constitute covenants to run with the land, as provided by law and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property (hereafter "Owner").

Section 1. No groundwater may be taken from the property for domestic, agricultural, or industrial use except for collection of samples from monitoring wells or maintenance activities or as otherwise provided for in the Consent Decree and Cleanup Action Plan.

The Property contains three former landfill units with engineered caps. The Owner shall not alter, modify, or remove any existing cap in any manner that may result in the release or exposure to the environment contamination or create a new exposure pathway without prior written approval from Ecology.

Section 2. Any activity on the Property that may interfere with the integrity of the Remedial Action and continued protection of human health and the environment is prohibited.

Section 3. Any activity on the Property that may result in the release or exposure to the environment of a hazardous substance that remains on the Property as part of the Remedial

Action, or create a new exposure pathway, is prohibited without prior written approval from Ecology.

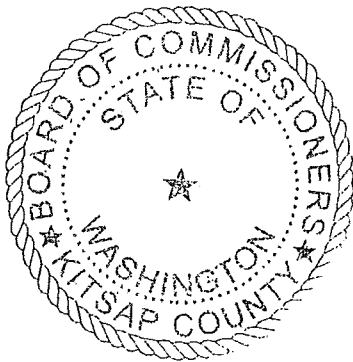
Section 4. The Owner of the property must give thirty (30) day advance written notice to Ecology of the Owner's intent to convey any interest in the Property. No conveyance of title, easement, lease, or other interest in the Property shall be consummated by the Owner without adequate and complete provision for continued monitoring, operation, and maintenance of the Remedial Action.

Section 5. The Owner must restrict leases to uses and activities consistent with the Covenant and notify all lessees of the restrictions on the use of the Property.

Section 6. The Owner must notify and obtain approval from Ecology prior to any use of the Property that is inconsistent with the terms of this Covenant. Ecology may approve any inconsistent use only after public notice and comment.

Section 7. The Owner shall allow authorized representatives of Ecology the right to enter the Property at reasonable times for the purpose of evaluating the Remedial Action; to take samples, to inspect remedial actions conducted at the property, to determine compliance with this Covenant, and to inspect records that are related to the Remedial Action.

Section 8. The Owner of the Property reserves the right under WAC 173-340-440 to record an instrument that provides that this Covenant shall no longer limit use of the Property or be of any further force or effect. However, such an instrument may be recorded only if Ecology, after public notice and opportunity for comment, concurs.



ATTEST:

Dana Daniels
Dana Daniels, Clerk of the Board

BOARD OF COUNTY COMMISSIONERS
KITSAP COUNTY, WASHINGTON

Charlotte Garrido
CHARLOTTE GARRIDO, Chair

Robert Gelder
ROBERT GELDER, Commissioner

Josh Brown
JOSH BROWN, Commissioner

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

[Name of Person Acknowledging Receipt]
[Title]

Dated: _____

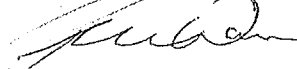
Restrictive (Environmental) Covenant

Section 09 Township 27N Range 2E

E1/2 NE1/4 NW1/4 NE1/4 & NW1/4 NE1/4 NW1/4 NE1/4 & S1/2 NW1/4 NE1/4 & N1/2
SW1/4 NE1/4 & SW1/4 NE1/4 EXC N1/2 & W1/2 SW1/4 SE1/4 NE1/4 PER VOL 149/423

Tax Parcel Nos.: 092702-1-005-2007

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY GRANTEE



Robert Warren

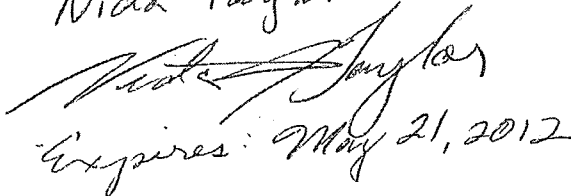
Dated: 8/17/11

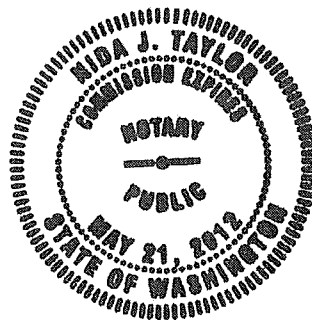
[INDIVIDUAL ACKNOWLEDGEMENT]

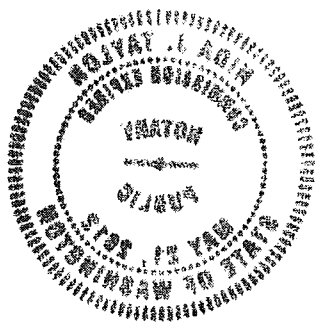
STATE OF Washington
COUNTY OF King

On this 17 day of August, 2011, I certify that Bob Warren
personally appeared before me, and acknowledge that he is the individual
described herein and who executed the within and foregoing instrument and
signed the same as his free and voluntary act and deed for the used and purposes
therein mentioned.

Nida Taylor


Expires: May 21, 2012





[INDIVIDUAL ACKNOWLEDGMENT]

STATE OF _____
COUNTY OF _____

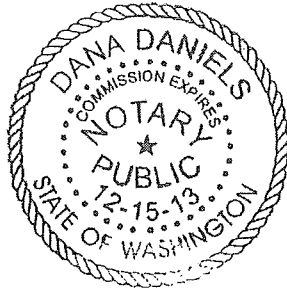
On this _____ day of _____, 20____, I certify that _____
personally appeared before me, and acknowledged that he/she is the individual described
herein and who executed the within and foregoing instrument and signed the same at his/her
free and voluntary act and deed for the uses and purposes therein mentioned.

Notary Public in and for the State of
Washington, residing at _____
My appointment expires _____

[CORPORATE ACKNOWLEDGMENT]

STATE OF Washington
COUNTY OF Kitsap

On this 11th day of July, 2011, I certify that the Kitsap County Board of
personally appeared before me, acknowledged that he/she is the Commissioners of Commissioners
the corporation that executed the within and foregoing instrument, and signed said instrument
by free and voluntary act and deed of said corporation, for the uses and purposes therein
mentioned, and on oath stated that he/she was authorized to execute said instrument for said
corporation.



Dana Daniels
Notary Public in and for the State of
Washington, residing at
Port Orchard
My appointment
expires 12-15-2013.

[REPRESENTATIVE ACKNOWLEDGEMENT]

STATE OF _____
COUNTY OF _____

On this _____ day of _____, 20____, I certify that _____
_____ personally appeared before me, acknowledged that he/she signed this instrument, on
oath stated that he/she was authorized to execute this instrument, and acknowledged it as the

_____ [type of authority] of _____ [name of
party being represented] to be the free and voluntary act and deed of such party for the uses
and purposes mentioned in the instrument.

Notary Public in and for the State of
Washington, residing at _____.
My appointment expires _____.

Exhibit A
Legal Description

Section 09 Township 27N Range 2E

E1/2 NE1/4 NW1/4 NE1/4 & NW1/4 NE1/4 NW1/4 NE1/4 & S1/2 NW1/4 NE1/4 & N1/2
SW1/4 NE1/4 & SW1/4 NE1/4 EXC N1/2 & W1/2 SW1/4 SE1/4 NE1/4 PER VOL
149/423

APPENDIX C

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND USE GUIDELINES

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting, LLC (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and recognized standards of professionals in the same locality and involving similar conditions.

Services for Specific Purposes, Persons and Projects

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the subject property. The report is not intended to make any representation concerning title or ownership to the subject property. If real property records were reviewed, they were reviewed for the sole purpose of determining the subject property's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the subject property, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and subject property. This report should not be applied for any purpose or project except the purpose described in the Agreement.

This Report Is Project-Specific

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

Environmental Regulations Are Not Static

Some hazardous substances or petroleum products may be present near the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time (for example, Phase I ESA reports are applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Phase I ESAs – Uncertainty Remains After Completion

Aspect has performed the services in general accordance with the scope and limitations of our Agreement and the current version of the “Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process”, ASTM E1527, and U.S. Environmental Protection Agency (EPA)'s Federal Standard 40 CFR Part 312 "Innocent Landowners, Standards for Conducting All Appropriate Inquiries".

No ESA can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with subject property. Performance of an ESA study is intended to reduce, but not eliminate, uncertainty regarding the potential for environmental conditions affecting the subject property. There is always a potential that areas with contamination that were not identified during this ESA exist at the subject property or in the study area. Further evaluation of such potential would require additional research, subsurface exploration, sampling and/or testing.

Historical Information Provided by Others

Aspect has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data does not provide definitive information with regard to all past uses, operations or incidents affecting the subject property or adjacent properties. Aspect makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others.

Exclusion of Mold, Fungus, Radon, Lead, and HBM

Aspect's services do not include the investigation, detection, prevention or assessment of the presence of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detection, assessment, prevention or abatement of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Aspect's services also do not include the investigation or assessment of hazardous building materials (HBM) such as asbestos, polychlorinated biphenyls (PCBs) in light ballasts, lead based paint, asbestos-containing building materials, urea-formaldehyde insulation in on-site structures or debris or any other HBMs. Aspect's services do not include an evaluation of radon or lead in drinking water, unless specifically requested.