A Source Water Assessment (SWA) for

PWSID #220408 - VALLEY UTILITIES LLC –WL001, WL002, WL003, WL004, WL005, WL006, WL007

What is an SWA?

The Drinking Water Protection group of the Drinking Water Program is producing Source Water Assessments (SWAs) in compliance with the Safe Drinking Water Act (SDWA) Amendments of 1996. Each SWA includes:

- A delineation of the drinking water source area;
- Inventory of potential and existing sources of contamination;
- Risk ranking for the identified contaminants;
- Evaluation of the overall vulnerability to the PWS source.

What is a Protection Area?

The most probable area for contamination to reach the drinking water well is within the drinking water protection area (DWPA). The DWPA for a groundwater source is the area around the well (the area influenced by pumping) and also the area upgradient of the well, usually forming a parabola shape. Because releases of contaminants within the DWPA are most likely to impact the well, this area will serve as the focus for voluntary protection efforts.

The DWPAs established for wells by DEC are separated into 2 zones, limited by the watershed. The following is a summary of the two zones for wells and the estimated time-of-travel for each:

Zone	Definition
A	Several months time-of-travel
B	Less than the 2 year time-of-travel

Natural Susceptibility

Susceptibility of a groundwater source is a measure of a water supply's potential to become contaminated based on information gathered on the wellhead and the aquifer.

Table 1: Public Water System Source Information

PWS Name	**VALLEY UTILITIES LLC**			
PWSID Number	220408			
Federal Designation	Community water system (CWS)			
State Assigned ID	**WL001**	**WL002**	**WL003**	**WL004**
Facility Name	WELL #1	WELL #2	WELL #3	WELL #4
Source Type	Groundwater	Groundwater	Groundwater	Groundwater
Total Depth of Well (ft bls*)	66	73	75	74
Static Water Level (ft bls*)	50	49	50	49
Aquifer Type	Unconfined	Unconfined	Unconfined	Unconfined
Aquifer Formation	Gravel and clay	Clay, sand and gravel	Hard packed clay and gravel	Clay, sand, and Gravel
Description and Cumulative Thickness of Barrier (ft)	N/A	N/A	N/A	N/A
Date Well Completed	7/6/2010	6/28/2010	7/20/2010	6/15/2010

*"*ft bls*" = feet below land surface

State Assigned ID	**WL005**	**WL006**	**WL007**
Facility Name	WELL #5	WELL #6	WELL #7
Source Type	Groundwater	Groundwater	Groundwater
Total Depth of Well (ft bls*)	72	70	80.2
Static Water Level (ft bls*)	49	50	43
Aquifer Type	Unconfined	Unconfined	Unconfined
Aquifer Formation	Sand and Gravel	Sand and Gravel	Gravel
Description and Cumulative Thickness of Barrier (ft)	N/A	N/A	N/A
Date Well Completed	6/21/2010	8/6/2010	2/1/1999

*"*ft bls*" = feet below land surface

Executive Summary

The public water system (PWS) for VALLEY UTILITIES LLC is a Community water system (CWS) consisting of seven (7) active wells, at the time of this report, located in Wasilla, Alaska. This report is a combined assessment of wells WL001, WL002, WL003, WL004, WL005, WL006, and WL007. An assessment of the susceptibility of the wellheads and aquifer to contamination, and the vulnerability of the wells to potential and existing contamination were evaluated as of May 2016. Both WL001, WL002, WL003, WL004, WL005, WL006, and WL007 wellheads received a susceptibility rating of ***Low*** and the aquifer received a susceptibility rating of ***Very High***. Combining these two ratings produces a ***Medium*** rating for the natural susceptibility of the wells and aquifer. Identified potential and existing sources of contamination for VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007 include cropland, a Class V large-capacity septic system, a quarry, an airstrip, a vocational training facility, and gravel/dirt roads. These are considered sources one or more of the following six (6) contaminant risk categories: 1) bacteria and viruses; 2) nitrates and/or nitrites; 3) volatile organic chemicals (VOCs); 4) heavy metals, cyanide, and other inorganic chemicals (inorganic chemicals); 5) synthetic organic chemicals (SOCs); and 6) other organic chemicals (OOCs).

Combining the natural susceptibility of the wells and aquifer with the six (6) contaminant risk categories, VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007 received an overall vulnerability rating of ***Medium*** for bacteria and viruses; ***High*** for nitrates and/or nitrites; ***High*** for VOCs; ***Medium*** for inorganic chemicals; and a ***High*** for SOCs and ***Medium*** for OOCs.

Introduction

Source Water Assessments (SWAs) are intended to provide PWS operators, owners, communities, and local governments with the best available information that may be used to protect the quality of their drinking water. The SWA for the VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007 is a tool to be used as the foundation or “stepping stone” to comprehensive management and protection of its groundwater resource. Protecting the quality of your drinking water is a sensible investment.

Drinking Water Protection Area

For groundwater sources, a combination of a numerical flow model and natural factors such as drainage divides, subsurface barriers, and manmade structures are used to determine the size and shape of the Drinking Water Protection Area (DWPA). The orientation of the DWPA is typically drawn using a groundwater surface, or a land surface, elevation map. Because of uncertainties and changing site conditions, a factor of safety is added in calculating the size of the DWPA. (See Map1 of the Appendices)

Natural Susceptibility (Wellhead and Aquifer)

The susceptibility of a wellhead to the introduction of contaminants to the drinking water is determined by, but not limited to, the following risk factors: presence of a sanitary seal, protection from flooding, drainage, and presence of adequate grouting.

The wellheads for the VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007 received a ***Low*** susceptibility rating. The most recent sanitary survey (completed August 2014) indicates that the wells are capped with a sanitary seal, the wells are not in a floodplain, the land surface is sloped to drain away from the wellheads, and that a subsurface grout seal was installed to the required depth. A sanitary seal prevents potential contaminants from entering the well while sloping of the land surface and grouting help to prevent potential contaminants from traveling

down the outside of the well casing, or through casing seams/cracks to the inside of the well casing, and into the well and/or aquifer.

The susceptibility of an aquifer to the introduction of contaminants is determined by, but not limited to, the following risk factors: whether the aquifer is confined or unconfined, whether the well is completed in unconsolidated or fractured bedrock, whether other nearby wells and bore holes are penetrating the aquifer and if applicable the characteristics of the confining layer(s).

The VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007 draw water from an unconfined aquifer completed in varying proportions of mainly sand and gravel. It received a ***Very High*** susceptibility rating primarily because of the many water wells located within the DWPA. An unconfined aquifer is generally less protected than a confined aquifer from the infiltration of surface water potentially carrying contaminants by migrating downward from the surface to the aquifer. Additionally, other wells that penetrate the confining layers create a potential pathway for surface water and contaminants to the aquifer.

The Natural Susceptibility of the wells and aquifer to contamination is ***Medium***. Table 2 summarizes the susceptibility ratings for the VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007.

Table 2: Susceptibility Ratings

Susceptibility of the wellheads	***Low***
+	
Susceptibility of the aquifer	***Very High***
=	
Natural susceptibility	***Medium***

Inventory of Potential and Existing Sources Contamination

The Drinking Water Protection (DWP) group has completed an inventory of potential and existing sources of contamination within the DWPA for the VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007. This inventory was completed through a search of agency records and other publicly available information. Potential sources of contamination include a wide range of categories and types. Potential drinking water contaminants are found within agricultural, residential, commercial, and industrial areas, but can also occur within areas that have little or no development. The identified potential sources of contamination are summarized in Table 3 and are portrayed in Map 2 of the Appendices.

Table 3: Contaminant Source Inventory

Contaminant Source Type	Contaminant Source ID	Zone	Comments
Cropland	A02-01	A	Cropland
Airports	X14-01	A	Private Small airstrip
Highways and roads, dirt/gravel	X24-01	A	Assumed less than 20
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10-01	B	Goose Creek Injection well (location unverified)
Quarries	E10-01	B	(sand, gravel, rock, other?)
Highways and roads, dirt/gravel	X24-02	B	Assumed less than 50 (some paved)
Vocational training facilities	X45-01	B	Goose Creek Vocational Training

Contaminant Risks

Inventoried contaminant sources are sorted by the Drinking Water Protection (DWP) group according to the six (6) major categories of contaminants regulated for drinking water: 1) bacteria and viruses; 2) nitrates and/or nitrites; 3) volatile organic chemicals (VOCs); 4) heavy metals, cyanide, and other inorganic chemicals (inorganic chemicals); 5) synthetic organic chemicals (SOCs); and 6) other organic chemicals (OOCs). The contaminant sources are then given a ranking (within each category) according to the density of sources within the DWPA, the PWS sampling history, as well as the degree of risk posed to human health based on the volume, toxicity, persistence, and the mobility of the contaminants involved. The contaminant risk rankings are summarized in Table 4.

Table 4: Contaminant Risk Rankings

Contaminant Source Type	*Contaminant*	*Zone*	*Bacteria and Viruses*	*Nitrates*	*VOC*	*Inorganics/ Heavy Metals**	*SOC*	*OOC*
Cropland	A02-01	A	N/A	High	N/A	Medium	High	N/A
Airports	X14-01	A	N/A	Low	High	Low	Medium	Medium
Highways and roads, dirt/gravel	X24-01	A	Low	Low	Low	Low	N/A	Low
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10-01	B	High	High	Low	Low	Low	Low
Quarries	E10-01	B	N/A	Low	Low	N/A	N/A	Low
Highways and roads, dirt/gravel	X24-02	B	Low	Low	Low	Low	N/A	Low
Vocational training facilities	X45-01	B	N/A	N/A	N/A	Low	N/A	N/A
Contaminant Category Risk Ranking**			***High***	***Very High***	***Very High***	***Medium***	***Very High***	***Medium***

** Includes heavy metals, cyanide, and other inorganic chemicals.*
*** Scores based on additional factors, such as sampling history, and number/density of sources.*

The contaminant category risk ranking for Bacteria & Viruses is ***High***. This ranking is driven primarily by a Class V large-capacity septic system and roads located within the DWPA. A positive Total Coliform (which may include fecal coliform and *E. Coli*, but not a confirmation of the presence of either) has not been detected in recent years. Coliforms are naturally present in the environment, as well as feces; fecal coliforms and *E. Coli* only come from human and animal fecal waste. Total Coliforms is not a health threat in itself; it is used to indicate whether other potentially harmful bacteria may be present.

The contaminant category risk ranking for Nitrates and/or Nitrites is ***Very High***. This ranking is driven primarily by cropland, a Class V large-capacity septic systems, and roads located within the DWPA. Nitrates and/or nitrites have been detected in samples collected in recent years, with an apparent increasing trend; the most recent sample collected March 2016, showed a total nitrate-nitrite concentration of 7.55 milligrams per liter (mg/L), which is 75% of the maximum contaminant level (MCL) of 10 mg/L for nitrate. Sources of nitrate and/or nitrite may include runoff from fertilizer use, leaking from septic tanks, sewage, and/or erosion from natural deposits. A relatively low concentration and absence of a clear trend implies that the source is natural, rather than anthropogenic. Potential health effects include serious illness and, if untreated, death for infants below the age of six months; symptoms include a shortness of breath and blue-baby syndrome.

The contaminant category risk ranking for VOCs is ***Very High***. This ranking is driven primarily by an airstrip, a Class V large-capacity septic system, a quarry, and roads located within the DWPA. VOCs have been detected in samples collected in recent years. Xylenes were detected in May 2012 at a concentration of 0.6 micrograms per liter (μg/L) (0% of the MCL of 10mg/L). Sources of xylenes may include discharge from petroleum factories; and discharge from chemical factories. Drinking water containing xylenes well in excess of the maximum contaminant level (MCL) for many years could cause damage to their nervous system.

The contaminant category risk ranking for Inorganic Chemicals is ***Medium***. This ranking is driven primarily by croplands, an airstrip, a Class V large-capacity septic system, a vocational training facility, and roads located within the DWPA. In November 2011 several inorganic chemicals were detected. Barium was detected at a concentration of 11.6 micrograms per liter (μg/L) (0.58% of the MCL of 2 *m*g/L). Sources of barium may include discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits. A potential health effect from long-term exposure above the MCL may include an increase in blood pressure. Chromium was detected at a concentration of 1.51 micrograms per liter (μg/L) (1.51% of the MCL of 0.1 *m*g/L). Sources of chromium may include discharge from steel and pulp mills; erosion of natural deposits. A potential health effect from long-term exposure above the MCL may include allergic dermatitis. Selenium was detected at a concentration of 0.753 micrograms per liter (μg/L) (1.51% of the MCL of 0.05 *m*g/L). Sources of selenium may include discharge from petroleum refineries; erosion of natural deposits; discharge from mines. A potential health effect from long-term exposure above the MCL may include hair or fingernail loss, numbness in fingers or toes, or circulatory problems.

The contaminant category risk ranking for SOCs is ***Very High***. This ranking is driven primarily by croplands, an airstrip, and roads located within the DWPA. This PWS has received an SOC Monitoring Waiver for compliance periods 2011-2013 and 2014-2016.

The contaminant category risk ranking for OOCs is ***Medium***. This ranking is driven primarily by an airstrip, a Class V large-capacity septic system, a quarry, and roads located within the DWPA. This PWS has received an SOC Monitoring Waiver for compliance periods 2011-2013 and 2014-2016.

Overall Vulnerability of the Drinking Water Source to Contamination

An overall vulnerability is determined by combining each of the contaminant category risk rankings with the natural susceptibility score:

Overall Vulnerability of the Drinking Water Source to Contamination = Natural Susceptibility + Contaminant Risks

Table 5 summarizes the overall vulnerability ratings for each of the six (6) contaminant categories.

Table 5: Overall Vulnerability

Category	*Rating*
Bacteria and Viruses	***Medium***
Nitrates and/or Nitrites	***High***
Volatile Organic Chemicals	***High***
Heavy Metals, Cyanide, and Other Inorganic Chemicals	***Medium***
Synthetic Organic Chemicals	***High***
Other Organic Chemicals	***Medium***

Using the Source Water Assessment

This assessment of contaminant risks and source vulnerability can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of the VALLEY UTILITIES LLC PWS to protect public health. Communities can use the Source Water Assessment (SWA) to create a drinking water protection plan to manage the identified potential and existing sources of regulated drinking water contaminants and to prevent or minimize new contaminant threats in the drinking water protection area.

The VALLEY UTILITIES LLC PWS can use a number of different drinking water protection methods to limit or prevent contamination of its drinking water source.

- *Non-Regulatory Options include:*
    - Public education about where drinking water comes from and the effects of contaminants is probably the most effective and least costly method of protection;
    - Household hazardous waste collection - household hazardous wastes are usually generated in small amounts but can have a big impact on the environment;
    - The source water assessment report is a tool that can be used to prioritize protection strategies identified in a drinking water protection plan;
    - Taking proactive measures towards proper waste storage and disposal can help eliminate the need to find an alternative drinking water source by preventing source water contamination;
    - Conservation easements - easements can assist in protecting the area by limiting development;
    - Make a written plan on what you will do if an accidental spill happens that could contaminate your source of drinking water; and
    - Local drinking water protection plan (an example or template is available from DEC).

- *Regulatory Options include:*

- Source protection regulations prohibiting the presence or use of all or specific chemicals within the drinking water protection area;
- Zoning ordinances to control development within the different protection areas around the source;
- Subdivision ordinance; and
- Operating standards for industrial and other activities within the different protection areas around the source.

Source Water Assessments can be updated to reflect any changes in the vulnerability and/or susceptibility of the VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007. The data that is used to generate the SWA is updated on an on-going basis as identified in the field or if changes are identified and brought to the attention of the Drinking Water Program.

Where to go from here?

The SWA is a comprehensive evaluation of the potential risk of contamination to the PWS and the source(s) of drinking water used by the system. Identifying potential sources of contamination and the vulnerability of the PWS is an important first step in protecting the drinking water source from contamination. However, in order to prevent contamination from occurring, action must be taken by the PWS owner and/or operator. The SWA can be used by the PWS to educate the local community and to prioritize community-driven protection strategies. Inviting community members, council members, and local government officials to help develop a drinking water protection plan is one essential component towards successful drinking water protection efforts. For questions regarding, or assistance to begin, the process of developing a drinking water protection plan, please contact the Drinking Water Protection group toll-free at #1-866-956-7656 (within Alaska only), or direct at #907-269-7656.

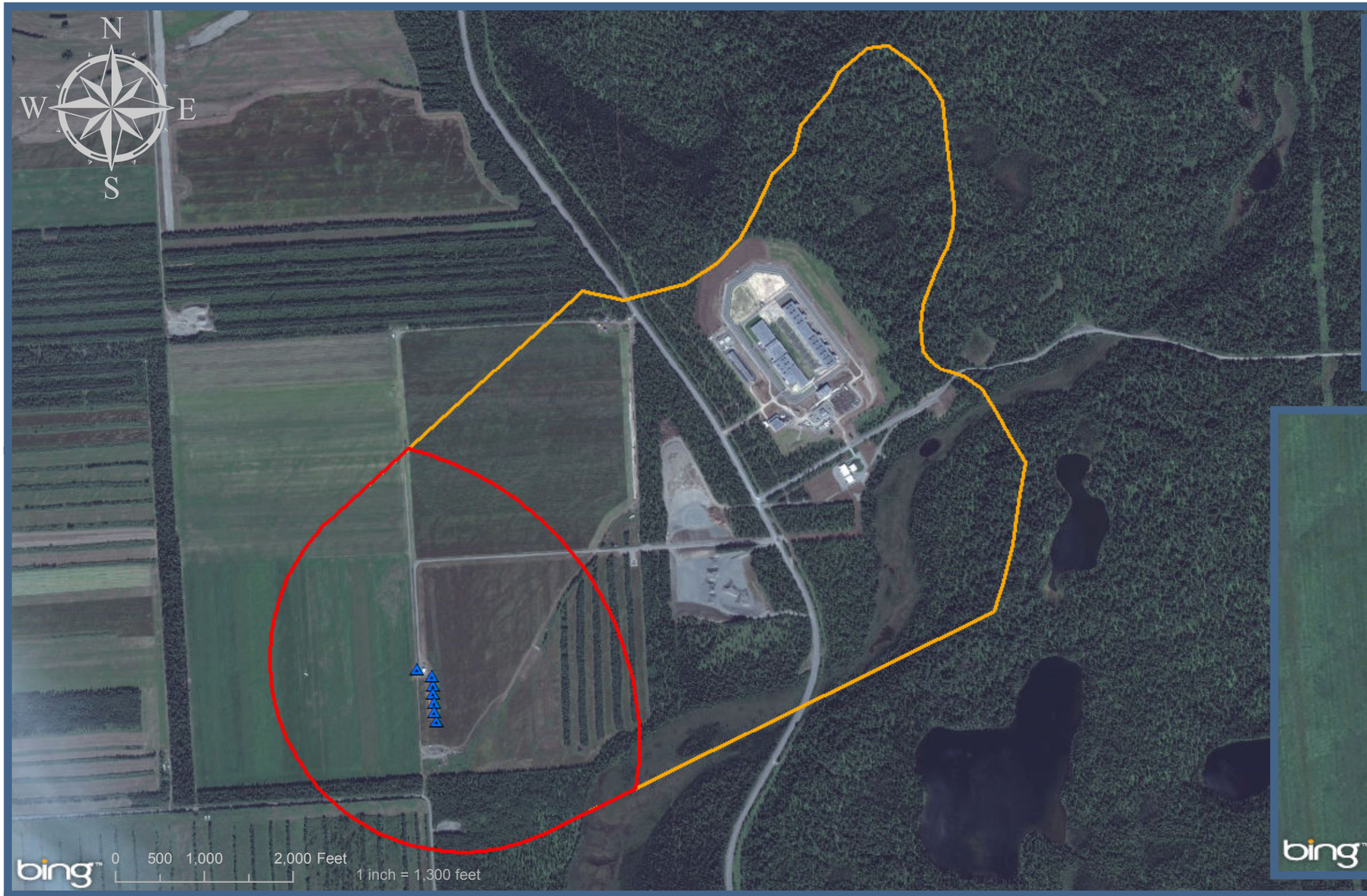
Other Resources

The Drinking Water Protection group, the Environmental Protection Agency (EPA), and local organizations are available to help you build on this SWA report as you continue to improve drinking water protection in your community.

- DEC, Drinking Water Protection - http://dec.alaska.gov/eh/dw/DWP/DWP_main.html
- EPA, Drinking Water Protection - http://cfpub.epa.gov/safewater/sourcewater/index.cfm
- Groundwater Foundation - http://www.groundwater.org
- Groundwater Protection Council- http://www.gwpc.org
- National Ground Water Association: http://www.ngwa.org/Pages/default.aspx

Appendices

- VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007 Drinking Water Protection Area Location Map (Map 1);
- VALLEY UTILITIES LLC WL001, WL002, WL003, WL004, WL005, WL006, and WL007 Drinking Water Protection Area with Potential and Existing Contaminant Sources (Map 2);
- Example Best Management Strategies for Potential Contaminants Identified within a Drinking Water Protection Area.



Source Water Assessment Report

Map 1 - *Contaminant Source Inventory*

PWSID 220408: Valley Utilities LLc

WL001, WL002, WL003, WL004, WL005, WL006, WL007

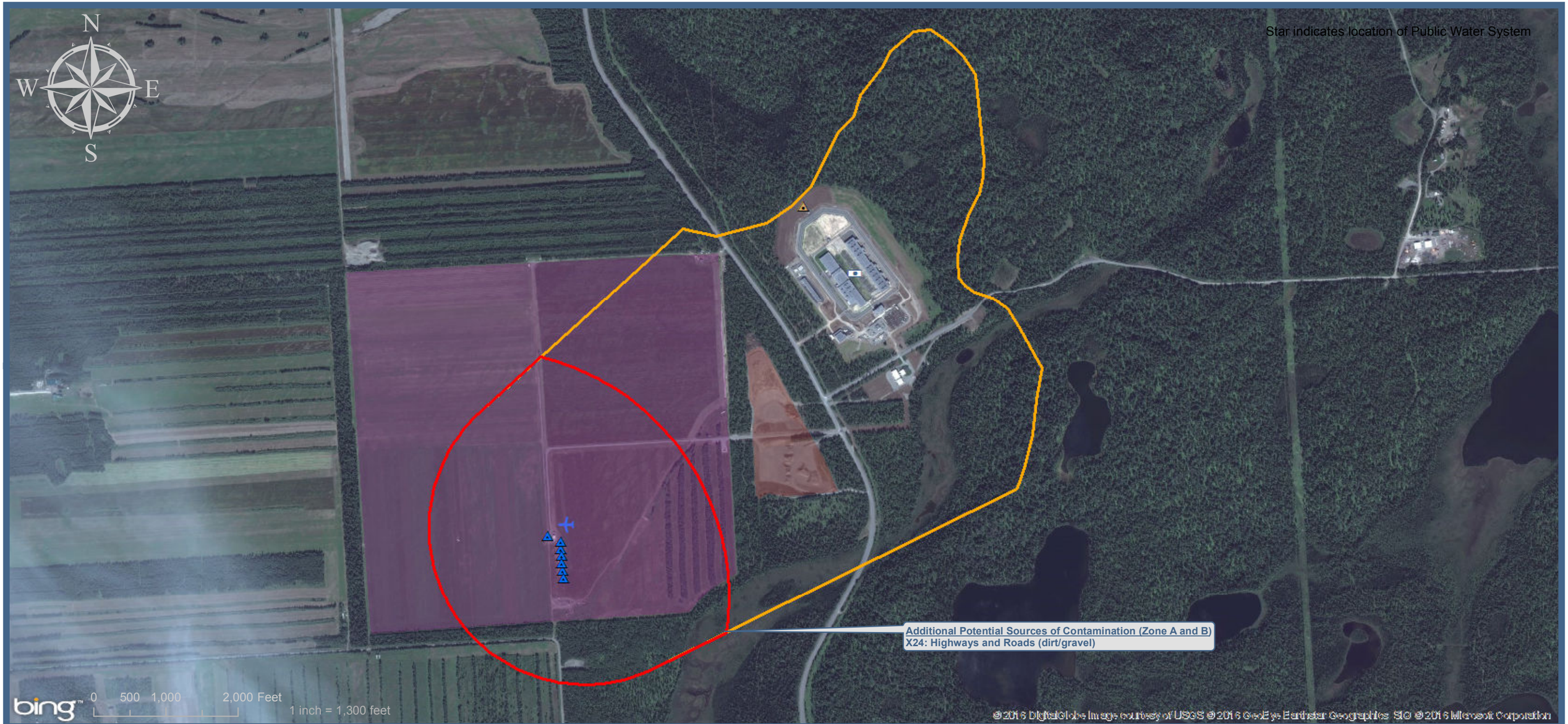
DW Regulated Public Water System Sources

- Community Water System (Active)
- NonCommunity Water System (Active)
- NonPublic Water System (Active)
- NonTransient/NonCommunity Water System (Active)

- Zone A (GW-Several Months Time of Travel or SW-1000ft buffer
- Zone B (GW-2 Yr Time of Travel or SW-1 mile buffer)

Data sources: Alaska DEC: Public Water System sources and Drinking Water Protection Areas; Alaska Mapped Best Data Layer Web Map Service: Aerial imagery.

Date Saved: 1/13/2016; Author: rmbaril



Source Water Assessment Report

Map 2 - *Contaminant Source Inventory*

PWSID 220408: Valley Utilities LLC

WL001, WL002, WL003, WL004, WL005, WL006, WL007

DW Regulated Public Water System Sources

- Community Water System (Active)
- NonCommunity Water System (Active)
- NonPublic Water System (Active)
- NonTransient/NonCommunity Water System (Active)
- Zone A (GW-Several Months Time of Travel or SW-1000ft buffer
- Zone B (GW-2 Yr Time of Travel or SW-1 mile buffer)

Identified Existing and Potential Sources of Contamination

- Vocational training facilities (X45)
- Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) (D10)
- Airports (X14)
- A02 - Cropland
- E10 - Quarries (sand, gravel, rock, other?)

Data sources: Alaska DEC: Public Water System sources and Drinking Water Protection Areas; Alaska Mapped Best Data Layer Web Map Service: Aerial imagery.

Date Saved: 5/17/2016; Author: rmbaril