A Source Water Assessment (SWA) for

PWSID #224646 - WASILLA WATER SYSTEM –Bumpus WL004 & WL005

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	**WASILLA WATER SYSTEM**	
PWSID Number	224646	
Federal Designation	Community water system (CWS)	
State Assigned ID	WL004	WL005
Facility Name	BUMPUS WELL #1	BUMPUS WELL #2
Source Type	Groundwater	Groundwater
Total Depth of Well (ft bls*)	165.5	169 (hole to 173)
Static Water Level (ft bls*)	64.18	70.3
Aquifer Type	Confined	Confined
Aquifer Formation	Gravel and sand	Gravel, silt, and sand
Description and Cumulative Thickness of Barrier (ft)	Silty clay and gravel (92)	Silty clay (61)
Date Well Completed	11/21/2002	7/14/2000

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

Executive Summary

The public water system (PWS) for WASILLA WATER SYSTEM is a Community water system (CWS) consisting of nine (9) wells (5 active wells and 4 inactive wells), at the time of this report, located in Wasilla, Alaska. This report is a combined assessment of wells WL004 (BUMPUS WELL #1) and WL005 (BUMPUS WELL #2). 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 January, 2013. Both WL004 and WL005 wellheads received a susceptibility rating of ***Low*** and the aquifer received a susceptibility rating of ***High***. Combining these two ratings produces a ***Low*** rating for the natural susceptibility of the wells and aquifer. Identified potential and existing sources of contamination for WASILLA WATER SYSTEM WL004 and WL005 include cropland, a livestock pasture, a gasoline station, a motor vehicle rental facility, Class V Large-Capacity Septic System Injection wells, Class V Motor Vehicle Waste Disposal Injection wells, scrap/salvage junk yards, residential areas, single-family septic systems, nonresidential heating oil tanks, an oil and gas exploration well, other public and private water wells, city parks, a runway, paved roads, 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, WASILLA WATER SYSTEM WL004 and WL005 received an overall vulnerability rating of ***High*** for bacteria and viruses; ***High*** for nitrates and/or nitrites; ***High*** for VOCs; ***High*** for inorganic chemicals; and a ***High*** for SOCs and ***High*** 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 WASILLA WATER SYSTEM WL004 and WL005 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 WASILLA WATER SYSTEM WL004 and WL005 received a ***Low*** susceptibility rating. The most recent sanitary survey (completed December 27, 2011) 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 WASILLA WATER SYSTEM WL004 and WL005 draw water from a confined aquifer completed in varying proportions of mainly sand and gravel. It received a ***High*** susceptibility rating primarily because of the many water wells located within the DWPA. A confined aquifer is generally more protected than an unconfined aquifer from the infiltration of surface water potentially carrying contaminants by migrating downward from the surface to the aquifer. However, 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 ***Low***. Table 2 summarizes the susceptibility ratings for the WASILLA WATER SYSTEM WL004 and WL005.

Table 2: Susceptibility Ratings

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

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 WASILLA WATER SYSTEM WL004 and WL005. 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	A	Cropland as identified using Google and Bing imagery.
Livestock pastures	A08	A	Cattle.
Motor vehicle rental facilities - cars, trucks, ATV's, snow machines (without service department)	C29	A	Alaska Limousine.
Residential Areas	R01	A	Approximated 101-150 acres based on MSB parcel info, Google imagery, and Bing imagery.
Septic systems (serves one single-family home)	R02	A	Approximately 94; Locations inferred based on MSB parcel info, Google imagery, and Bing imagery.
Mineral, oil, and gas exploration boreholes	W04	A	
Water supply wells	W09	A	Public water system PWSID 225074. http://dec.alaska.gov:8080/DWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=2480&tinwsys_st_code=AK&wsnumber=AK2225074
Water supply wells	W09	A	91 individual private water wells.
Water supply wells	W09	A	Private water well with water rights, LAS 11039. Http://dnr.alaska.gov/projects/las/Case_Abstract.cfm?Filetype=LAS&FileNumber=11039
Water supply wells	W09	A	Private water well with water rights, LAS 10315. http://dnr.alaska.gov/projects/las/Case_Abstract.cfm?Filetype=LAS&FileNumber=10315
Water supply wells	W09	A	Private water well with water rights, LAS 11036. http://dnr.alaska.gov/projects/las/Case_Abstract.cfm?Filetype=LAS&FileNumber=110

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Water supply wells	W09	A	Private water well with water rights, ADL 200165. http://dnr.alaska.gov/projects/las/Case_Abstract.cfm?Filetype=ADL&FileNumber=200165
Water supply wells	W09	A	Private water well with water rights, LAS 3952. http://dnr.alaska.gov/projects/las/Case_Abstract.cfm?Filetype=LAS&FileNumber=3952
Municipal or city parks (with green areas)	X04	A	Bumpus Soccer Field.
Municipal or city parks (with green areas)	X04	A	Bumpus ball fields.
Highways and roads, paved (cement or asphalt)	X20	A	N Ashford Blvd; N Church Rd; W Mystery Ave; W Spruce Ave.
Highways and roads, dirt/gravel	X24	A	W Dorothea Cir; W Glacier Ave; N Moraine Cir; N Recluse Cir; W Ridgewood Rd; N Silver Pond Cir; N Tulip Cir.
Gasoline stations (without repair shop)	C15	B	Tesoro
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	B	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	B	
Scrap, salvage, or junk yards	D59	B	
Scrap, salvage, or junk yards	D59	B	
Residential Areas	R01	B	Approximated 251-300 acres based on MSB parcel info, Google imagery, and Bing imagery.
Septic systems (serves one single-family home)	R02	B	Approximately 224; Locations inferred based on MSB parcel info, Google imagery, and Bing imagery.
Tanks, heating oil, nonresidential (aboveground)	T14	B	Valley Country Store.
Water supply wells	W09	B	223 individual private water wells.
Water supply wells	W09	B	Private water well with water rights, ADL 209177. http://dnr.alaska.gov/projects/las/Case_Abstract.cfm?Filetype=ADL&FileNumber=209177
Water supply wells	W09	B	Proposed community public water system - BIRCHVIEW TWNHM CONDOS (no PWSID).
Water supply wells	W09	B	Non-transient non-community (NTNC) public water system (PWS) PWSID 220404 VALLEY COUNTRY STORE 2 (WL001). http://dec.alaska.gov:8080/DWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=4979&tinwsys_st_code=AK&wsnumber=AK2220404
Airports	X14	B	Private gravel runway.
Highways and roads, paved (cement or asphalt)	X20	B	Carlsbad Pl; Church Rd; Church Ridge Dr; Daisy Petal Cir; Destiny Cir; Discovery Loop; Fortune Cir; Heather Mae Cir; Inspiration Cir; Inspiration Loop; Intuition Cir; Intuition Dr; Jacquelyn Cir; Jenny Anne Pl; Leah Cir; Ryahs Way; Seldon Rd;
Highways and roads, dirt/gravel	X24	B	W Gail Dr; W June Bug Ave; W Laverne Ave; W MollyBrianne Cir; N Robinette St;

			W Tiller Ave;

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 Source ID	Zone	Bacteria & Viruses	Nitrates and/or Nitrites	VOCs	Inorganic Chemicals*	SOCs	OOCs
Cropland	A02	A	N/A	High	N/A	Medium	High	N/A
Livestock pastures	A08	A	Medium	Medium	N/A	N/A	Low	N/A
Motor vehicle rental facilities - cars, trucks, ATV's, snow machines (without service department)	C29	A	N/A	N/A	Low	Low	N/A	Low
Residential Areas	R01	A	Low	Low	Low	Low	Low	Low
Septic systems (serves one single-family home)	R02	A	Low	Low	Low	Low	Low	Low
Mineral, oil, and gas exploration boreholes	W04	A	N/A	N/A	Low	Medium	N/A	Low
Municipal or city parks (with green areas)	X04	A	Medium	Medium	N/A	Low	Low	N/A
Highways and roads, paved (cement or asphalt)	X20	A	Low	Low	Low	Low	N/A	Low
Highways and roads, dirt/gravel	X24	A	Low	Low	Low	Low	N/A	Low
Gasoline stations (without repair shop)	C15	B	N/A	N/A	High	Low	N/A	Low
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	B	High	High	Low	Low	Low	Low
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	B	Low	N/A	High	High	Low	Medium
Scrap, salvage, or junk yards	D59	B	N/A	N/A	Low	High	Medium	High
Residential Areas	R01	B	Low	Low	Low	Low	Low	Low
Septic systems (serves one single-family home)	R02	B	Low	Low	Low	Low	Low	Low

Tanks, heating oil, nonresidential (aboveground)	T14	B	N/A	N/A	Low	Low	N/A	N/A
Airports	X14	B	N/A	Low	High	Low	Medium	Medium
Highways and roads, paved (cement or asphalt)	X20	B	Low	Low	Low	Low	N/A	Low
Highways and roads, dirt/gravel	X24	B	Low	Low	Low	Low	N/A	Low
Contaminant Category Risk Ranking			***Very High***	***Very High***	***Very High***	***Very High***	***Very High***	***Very High***

** 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 ***Very High***. This ranking is driven primarily by several large-capacity septic systems, city parks, a livestock pasture, and the density of residential septic systems, roads, and residential areas 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, several large-capacity septic systems, city parks, a livestock pasture, and the density of residential septic systems, roads, and residential areas located within the DWPA. Nitrates and/or nitrites have been detected in samples collected in recent years, but an increasing or decreasing trend is not apparent; the most recent sample collected May 2012, showed a total nitrate-nitrite concentration of 0.1 milligrams per liter (mg/L), which is 1% 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 a gasoline station, Class V Motor Vehicle Waste Disposal Injection wells, a runway, several large-capacity septic systems, and the density of residential septic systems, roads, and residential areas located within the DWPA. VOCs have not been detected in samples collected in recent years. Sources of VOCs may be either natural or anthropogenic. Potential health effects are typically compounding long-term, and not acute.

The contaminant category risk ranking for Inorganic Chemicals is ***Very High***. This ranking is driven primarily by Class V Motor Vehicle Waste Disposal Injection wells, junk yards (scrap or salvage), croplands, an oil & gas exploration well, and the density of residential septic systems, roads, and residential areas located within the DWPA. Arsenic was detected at a concentration of 4.35 micrograms per liter (μg/L) (44% of the MCL of 10μg/L) July 2010. Sources of arsenic may include erosion of natural deposits, runoff from orchards, and/or runoff from glass & electronics production wastes. A potential health effect from long-term exposure above the MCL may include skin damage or problems with circulatory systems, and an increased risk of cancer.

The contaminant category risk ranking for SOCs ***Very High***. This ranking is driven primarily by croplands, junk yards (scrap or salvage), a runway, and the density of residential septic systems, and residential areas located within the DWPA. This PWS has received an SOC Monitoring Waiver for compliance periods 2011-2013, 2008-2010, and 2005-2007.

The contaminant category risk ranking for OOCs ***Very High***. This ranking is driven primarily by Class V Motor Vehicle Waste Disposal Injection wells, junk yards (scrap or salvage), a runway, and the density of residential septic systems, roads, and residential areas located within the DWPA. This PWS has received an SOC Monitoring Waiver for compliance periods 2011-2013, 2008-2010, and 2005-2007.

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	***High***
Nitrates and/or Nitrites	***High***
Volatile Organic Chemicals	***High***
Heavy Metals, Cyanide, and Other Inorganic Chemicals	***High***
Synthetic Organic Chemicals	***High***
Other Organic Chemicals	***High***

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 WASILLA WATER SYSTEM 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 WASILLA WATER SYSTEM 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 WASILLA WATER SYSTEM WL004 and WL005. 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.

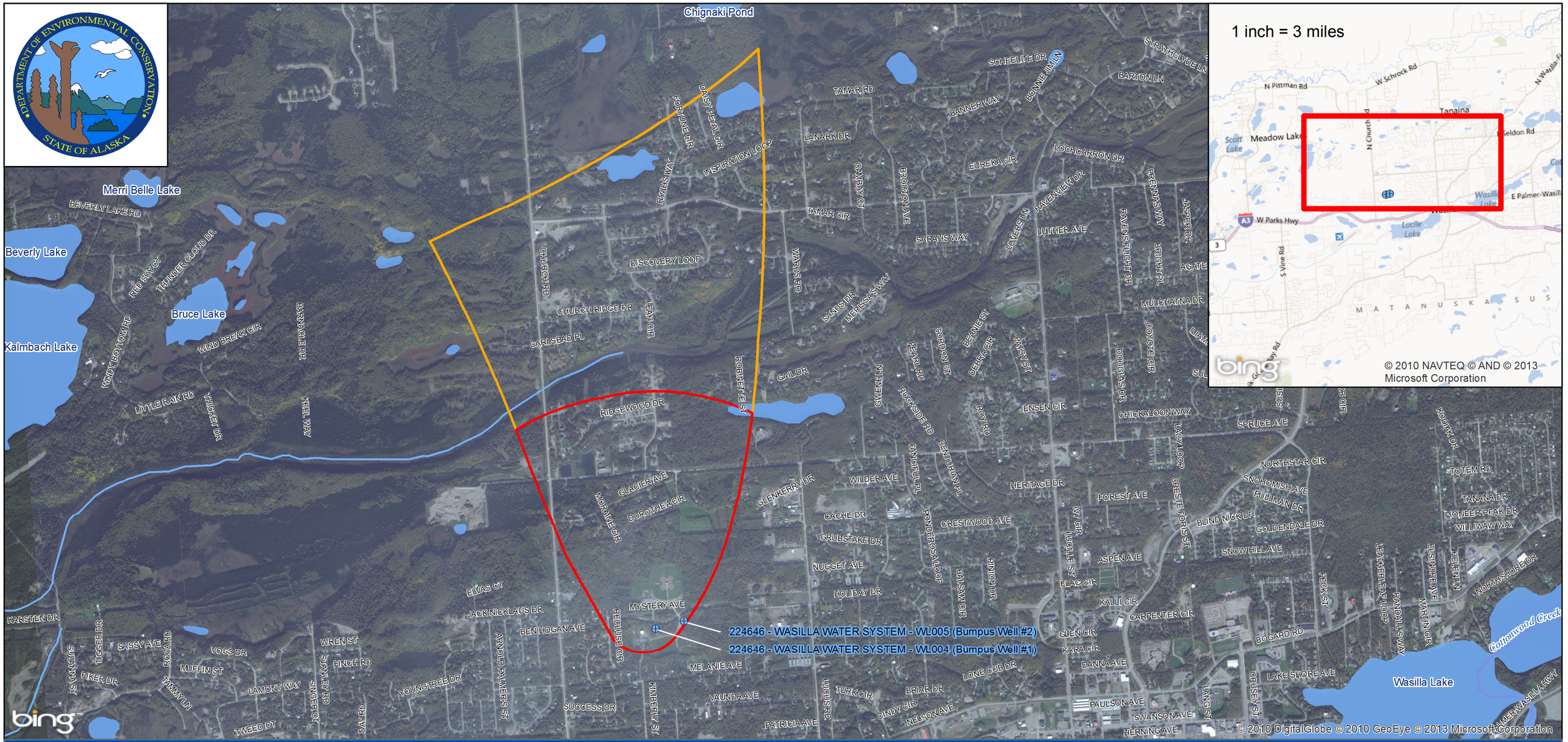
Other Resources

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

- WASILLA WATER SYSTEM WL004 and WL005 Drinking Water Protection Area Location Map (Map 1);
- WASILLA WATER SYSTEM WL004 and WL005 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.



Map 1 - WASILLA WATER SYSTEM - Bumpus Wells
WL004 (Bumpus Well #1) & WL005 (Bumpus Well #2)

PWSID 224646 (WL004)
PWSID 224646 (WL005)

N
W E
S

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

Public Water Systems

- Community Water System (Formerly Class A)
- NonTransient/NonCommunity (Formerly Class A)
- NonCommunity (Formerly Class B)
- NonPublic (Class C-State Regulated)

Drinking Water Protection Areas

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

Data sources:

Public Water System Sources and Drinking Water Protection Areas: State of Alaska Department of Environmental Conservation (DEC) - Drinking Water Program.
Water bodies: U.S. Geological Survey National Hydrography Dataset (NHD).

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Identified Potential Sources of Contamination

- Cropland (A02)
- Livestock pastures (A08)
- Motor vehicle rental facilities (without service department)C29
- Mineral, Oil and Gas Exploration borehgoles (W04)
- Municipal or city parks (with green areas) (X04)
- Government vehicle maintenance facilities (X19)
- Gasoline stations (without repair shop) (C15)
- Motor /motor vehicle repair shops (C31)
- Scrap, salvage, or junk yards (D59)
- Tanks, heating oil, nonresidential (aboveground) (T14)
- Water supply wells (W09)
- Airports (X14)

Inferred Sewer and Septic Systems

- Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) (D10)
- Injection wells (Class V) Motor Vehicle Waste Disposal Well (D42)
- Residential Septics (R02)

Identified Wells with Water Rights

- Water supply wells (W09)

Additional in Zone A
R01: Residential areas (approximately 101-150 acres)
R02: Residential septic systems (approximately 94)
W09: Private water wells (approximately 91)
X20: Highways and roads, paved (approximately 4)
X24: Highways and roads, dirt/gravel (approximately 8)

Additional in Zone B
R01: Residential areas (approximately 251-300 acres)
R02: Residential septic systems (approximately 224)
W09: Private water wells (approximately 223)
X20: Highways and roads, paved (approximately 4)
X24: Highways and roads, dirt/gravel (approximately 8)

224646 - WASILLA WATER SYSTEM - WL005 (Bumpus Well #2)
224646 - WASILLA WATER SYSTEM - WL004 (Bumpus Well #1)

Map 2 - WASILLA WATER SYSTEM - Bumpus Wells
WL004 (Bumpus Well #1) & WL005 (Bumpus Well #2)

PWSID 224646 (WL004)
PWSID 224646 (WL005)

1 inch = 1,083.33 feet
0 500 1,000 2,000 Feet

Public Water Systems

- Community Water System (Formerly Class A)
- NonTransient/NonCommunity (Formerly Class A)
- NonCommunity (Formerly Class B)
- NonPublic (Class C-State Regulated)

Drinking Water Protection Areas

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

Data sources:

Public Water System Sources and Drinking Water Protection Areas: State of Alaska Department of Environmental Conservation (DEC) - Drinking Water Program.
Water bodies: U.S. Geological Survey National Hydrography Dataset (NHD).

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Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies (BMP's)	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's
General BMP's for all Activities				
Avoid the activity or reduce its occurrence.	All	All	All	All
Move the activity indoors.	All	All	All	All
Use less material.	All	All	All	All
Use least toxic material available.	All	All	All	All
Create and maintain vegetative areas near activities.	All	All	All	All
Locate activities as far as possible from surface drainage paths.	All	All	All	All
Keep storm drain systems clean.	All	All	All	All
Reduce, reuse and recycle as much as possible.	All	All	All	All
Be an advocate for stormwater pollution prevention.	All	All	All	All
Report Violators.	All	All	All	All
Cleaning, Washing and Industrial Activities				
Cleaning and washing of tools, engines and manufacturing equipment .	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Illicit connections to stormwater drains should be eliminated.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Employees should be educated.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
All wastewater should be dishcharged to a holding tank, process treatment system, or sanitary sewer. Never discharge to septic system or stormwater drains.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If soaps and detergents are used, use least toxic chemical capable of doing the job. Use non-phosphate detergents, if possible.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Limit the amount of water used for washing activities to limit the potential runoff of carrying pollutants beyond the designated wash pad or capture system.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Recycle wash water for subsequent washings.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Implement one of following stormwater treatment BMP's:	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Oil water separator.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Wet vault for settling.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Infiltration Basin.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Filtration for media designed for pollutant present.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Catch basin with a filter insert for pressure washing.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Paved wash area should be swept daily.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Greasy buildup on cooking equipment must be removed and properly disposed of prior to washing to reduce the amount of material that can contaminate runoff.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Use a tub or similar device to contain washwater.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If activity can not be moved indoors or contained by a tub, the washing area must drain to a sanitary sewer, holding tank or process treatment system and provisions should be made to prevent stormwater run-off onto the washing area.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If a holding tank is used, the contents must be pumped and disposed of appropriately.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
A cover should be placed over wash area to prevent rain from falling on dirty equipment and producing contaminated runoff.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Take vehicles to commercial car wash.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Designated wash areas must be marked well, with signs indicated where and how washing should occur. Any inlets to sanitary sewer or storm drain should be marked "No Dumping".	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Clean catch basins regularly.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Consider washing vehicles less frequently.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If pressure washing waste water doesn't collect in a centralized area, such as an area that is very flat, or you are on a grassed area, a tarp should be placed under the washing area to collect paint chips and other debris that may be loosened by the spray.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Pressure washing of boats should occur where runoff control can be achieved.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous

Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies (BMP's)	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's
Spread filter fabric under object being washed.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Spill cleanup material should be stocked near liquid transfer area and employees should be trained in emergency spill response procedures and correct use of spill clean up materials.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If a sump or holding tank is used for spill containment, its contents should be pumped out and disposed of appropriately.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Drip pans should be provided underneath hose and pipe connections and other leak prone areas during liquid transfer operations. Drip pans should be cleaned regularly and stored nearby transfer area.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
A trained employee should be present during loading and unloading of materials.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Use a temporary storm drain cover during transfer of materials.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Pumps and hoses used for liquid transfer should be in good condition.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Cover transfer area with roof to avoid rain contact.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
A designated area for liquid transfer could be paved and sloped to a sump or holding tank to facilitate capture.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If a liquid transfer area can not be paved, then a containment/run-on structure such as a curb, dike or berm should be provided.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Implement an inventory control system to track purchase and consumption of liquids.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If paving the fuel transfer area, use Portland Cement because asphalt deteriorates.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Do not hose down maintenance repair areas. Instead sweep weekly to collect dirt and use absorbent pads to collect spills.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If transfer occurs at temporary site, a tarp, cloth or drip pan should be used.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Drain all fluids from wrecked vehicles and remove coolants.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Sweep all driveways and gutters that show an accumulation of materials.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
A catch basin insert filter should be used during rainy weather.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Painting, finishing and coating materials should be stored in areas protected from the rain .	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Never clean brushes, equipment into storm drain, gutters, ditch, stream or other water body.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Properly dispose of hazardous wastes.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Wood treatment should not occur during rain or when rain is expected.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Keep treated wood away from surface drainage areas.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Agricultural Activities				
Maintain ground cover.	Agricultural Sources (A01-A10)			
Practice conservation tillage.	Agricultural Sources (A01-A10)			
Practice conservation coverage.	Agricultural Sources (A01-A10)			
Utilize contour farming.	Agricultural Sources (A01-A10)			
Plant critical areas.	Agricultural Sources (A01-A10)			
Plant and maintain vegetative buffers and filter strips.	Agricultural Sources (A01-A10)			
Practice conservation irrigation.	Agricultural Sources (A01-A10)			
Use integrated pest management activities.	Agricultural Sources (A01-A10)			
If possible crops should be planted away from surface drainages.	Agricultural Sources (A01-A10)			
Contact NRCS for developing fertilization schedules.	Agricultural Sources (A01-A10)			
Proper pesticide application should be followed.	Agricultural Sources (A01-A10)			
Never apply pesticides, herbicides, fungicides when rain is expected.	Agricultural Sources (A01-A10)			
Do not apply chemicals when it is windy.	Agricultural Sources (A01-A10)			
Use manual pest control procedures.	Agricultural Sources (A01-A10)			
Pesticide application should not occur within 200 of surface water.	Agricultural Sources (A01-A10)			
Store pesticide, herbicides and fungicides in protected areas.	Agricultural Sources (A01-A10)			
Compost material should be kept away from surface drainage.	Agricultural Sources (A01-A10)			

Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies (BMP's)	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's
Fuel Storage				
Replace leaking and deteriorating tanks with good tanks.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Tanks should have overflow detection.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Spilled liquids should be collected and disposed appropriately.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Use double walled tanks.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Do not store containers in direct contact with the ground.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Use funnels to pour fuel.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Demolitions				
Schedule demolitions to take part in dry part of year.				
Light spraying of water can control some of the dust.				
Logging				
Preserve vegetation along streams.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Logging road should have crushed rock or spall apron construction.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Avoid logging on steep slopes.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Drainage ditches and culverts should direct runoff into vegetated areas or stormwater treatment systems.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Mining/Natural Resource Extraction:				
If the material is appropriate, use excavated spoil material to form compacted beams along the down slope sides to contain runoff.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Semi-permanent stockpiles should be seeded to promote vegetation growth to limit erosion from stockpiles.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Use detention ponds to promote settling of suspended solids or infiltration basins to filter suspended solids, to clean up runoff before it leaves the site.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Use anchorage tarps to cover stockpiles at small-scale mining operations.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
		Miscellaneous		
Residential BMP's				
Wash your car directly over your lawn or make sure wash water drains to a vegetative area. This allows the water and soap to soak into the ground instead of running off into a local water body.	Residential Sources (R01-R09)	Miscellaneous		
Select soap without phosphates.	Residential Sources (R01-R09)	Miscellaneous		
Sweep driveways and street gutters before washing vehicle to clean up dirt, leaves, trash and other materials that may flow to the storm drain along with your wash water.	Residential Sources (R01-R09)	Miscellaneous		
Commercial products are available that allow you to clean a vehicle without water.	Residential Sources (R01-R09)	Miscellaneous		
Use a nozzle on your hose to save water.	Residential Sources (R01-R09)	Miscellaneous		
Do not wash your car is rain is expected.	Residential Sources (R01-R09)	Miscellaneous		
Consider not washing your car at home.	Residential Sources (R01-R09)	Miscellaneous		
Recycle all oils, antifreeze, solvents and batteries.	Residential Sources (R01-R09)	Miscellaneous		
Never dump new or used automotive fluids or solvents on the ground, in a storm drain or street gutter, or in a water body. Eventually, it will make its way to local surface waters or groundwater.	Residential Sources (R01-R09)	Miscellaneous		
Do not mix wastes. The chlorinated solvents in some carburetor cleaners can contaminate a huge tank of used oil, rendering it unsuitable for recycling. Keep wastes in separate containers and properly labeled.	Residential Sources (R01-R09)	Miscellaneous		
To dispose of oil filters, punch a hole in the top and let drain for 24 hours. This is where a large funnel in the tip of your oil storage container will come in handy. After draining, wrap in 2 layers of plastic and dispose of in your regular garbage or recycle by taking it to the household hazardous waste line.	Residential Sources (R01-R09)	Miscellaneous		
Use care in draining and collecting antifreeze.	Residential Sources (R01-R09)	Miscellaneous		
Perform your service activities on concrete or asphalt.	Residential Sources (R01-R09)	Miscellaneous		
If doing body work outside, be sure to use a tarp to catch material resulting from grinding, sanding and painting. Double bag wastes.	Residential Sources (R01-R09)	Miscellaneous		
Follow manufacturer's directions when applying fertilizers.	Residential Sources (R01-R09)	Miscellaneous		
Consider planting a vegetative buffer zone.	Residential Sources (R01-R09)	Miscellaneous		

Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies (BMP's)	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's
Store all fertilizers and pesticides in covered location.	Residential Sources (R01-R09)	Miscellaneous		
Compost yard clippings.	Residential Sources (R01-R09)	Miscellaneous		
Pull weeds instead of spraying.	Residential Sources (R01-R09)	Miscellaneous		
Work fertilizers into the soil.	Residential Sources (R01-R09)	Miscellaneous		
Dispose of hazardous material and their containers properly.	Residential Sources (R01-R09)	Miscellaneous		
Store hazardous material off of the ground and away from children.		Miscellaneous		
Use ground cloths and drip pans when working outdoors with hazardous materials.	Residential Sources (R01-R09)	Miscellaneous		
Let latex paints dry before placing in garbage.	Residential Sources (R01-R09)	Miscellaneous		
Use less toxic products whenever possible.	Residential Sources (R01-R09)	Miscellaneous		
Follow manufacturer's directions in the use of all materials.	Residential Sources (R01-R09)	Miscellaneous		
When hazardous material are used, place inside a tub or bucket to minimize spills.	Residential Sources (R01-R09)	Miscellaneous		
Properly maintain septic systems.	Residential Sources (R01-R09)	Miscellaneous		
Monitor septic systems for signs of failure: odors, surface sewage or green areas.	Residential Sources (R01-R09)	Miscellaneous		
Pump septic systems out every two to five years depending on hydraulic loading.	Residential Sources (R01-R09)	Miscellaneous		
Garbage disposal increase the need for increase pumping of solids.	Residential Sources (R01-R09)	Miscellaneous		
Household chemicals such as solvents, drain cleaners, oils, pants, pharmaceuticals, and pesticides can interfere with the proper operation of septic systems.	Residential Sources (R01-R09)	Miscellaneous		
Vehicles and heavy equipment should be kept off the drainfield.	Residential Sources (R01-R09)	Miscellaneous		
Trees should not be planted in drainfield.	Residential Sources (R01-R09)	Miscellaneous		
Clean up your dog poop and horse manure.				
Wells and Boreholes				
Identify abandoned wells and boreholes and properly decommission.	Wells and Boreholes (W01-W09)	Miscellaneous		
Assure that all wells and boreholes are properly grouted and are securely sealed.	Wells and Boreholes (W01-W09)	Miscellaneous		
Assure that all wells and boreholes are properly constructed.	Wells and Boreholes (W01-W09)	Miscellaneous		
Educate community about the implications of abandoned wells.	Wells and Boreholes (W01-W09)	Miscellaneous		
Natural Products Processing/Storage				
Storage of soil, wood chips, saw dust, gravel, sand, salt should be covered.	Natural Products Processing/Storage (N01-N10)	Miscellaneous		
Store solid and food wasted in containers and check for leaks.	Natural Products Processing/Storage (N01-N10)	Miscellaneous		
Restrict animal access to stream or lakes by fences.	Natural Products Processing/Storage (N01-N10)	Miscellaneous		
Military Activities				
Assure all Military activities follow State and Federal guidelines.	Military Activities			
Uncontrolled Sites				
Assure all Military activities follow State and Federal guidelines.	Uncontrolled Sites			
Educate community about the implications of the uncontrolled sites.	Uncontrolled Sites			