

---

# Source Water Assessment

## A Hydrogeologic Susceptibility and Vulnerability Assessment for White Pass R.V. Park Public Drinking Water System, Skagway, Alaska PWSID # 111555.001

DRINKING WATER PROTECTION REPORT 1604

Alaska Department of Environmental Conservation

December, 2008

# Source Water Assessment for White Pass R.V. Park Public Drinking Water System Skagway, Alaska PWSID# 111555.001

## DRINKING WATER PROTECTION REPORT 1604

The Drinking Water Protection (DWP) section of the Drinking Water Program is producing Source Water Assessments in compliance with the Safe Drinking Water Act Amendments of 1996. Each assessment includes a delineation of the source water area, an inventory of potential and existing contaminant sources that may impact the water, a risk ranking for each of these contaminants, and an evaluation of the potential vulnerability of these drinking water sources.

These assessments are intended to provide public water systems owners/operators, communities, and local governments with the best available information that may be used to protect the quality of their drinking water. The assessments combine information obtained from various sources, including the U.S. Environmental Protection Agency, Alaska Department of Environmental Conservation (DEC), public water system owners/operators, and other public information sources. The results of this assessment are subject to change if additional data becomes available. It is anticipated this assessment will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of public drinking water source. If you have any additional information that may affect the results of this assessment, please contact the DWP staff at the following number: 1-866-956-7656.

December, 2008

## CONTENTS

	Page		Page
Executive Summary.....	1	Vulnerability of White Pass R.V. Park Drinking Water	
White Pass R.V. Park Public Drinking Water System	1	System.....	2
White Pass R.V. Park Drinking Water Protection Area	1	References .....	5
Inventory of Potential and Existing Contaminant		Appendix A .....	7
Sources .....	2	Appendix B.....	9
Ranking of Contaminant Risks.....	2	Appendix C.....	11

## TABLES

Table 1. Definition of Zones.....	2
Table 2. Susceptibility .....	3
Table 3. Contaminant Risks.....	3
Table 4. Overall Vulnerability .....	3

## APPENDICES

APPENDIX	<p>A. White Pass R.V. Park Drinking Water Protection Area (Map A)</p> <p>B. Contaminant Source Inventory for White Pass R.V. Park (Table 1)  Contaminant Source Inventory and Risk Ranking for White Pass R.V. Park – Bacteria and Viruses (Table 2)  Contaminant Source Inventory and Risk Ranking for White Pass R.V. Park – Nitrates/Nitrites (Table 3)  Contaminant Source Inventory and Risk Ranking for White Pass R.V. Park – Volatile Organic Chemicals (Table 4)</p> <p>C. White Pass R.V. Park Drinking Water Protection Area and Potential and Existing Contaminant Sources (Map C)</p>
----------	--

# Source Water Assessment for White Pass R.V. Park Source of Public Drinking Water, Skagway, Alaska

---

## Drinking Water Protection Alaska Department of Environmental Conservation

### EXECUTIVE SUMMARY

The public water system for White Pass R.V. Park is a Class B (transient/non-community) water system consisting of one well on the Klondike Highway approximately 1 mile north of Skagway, Alaska. The wellhead received a susceptibility rating of **Medium** and the aquifer received a susceptibility rating of **High**. Combining these two ratings produces a **Medium** rating for the natural susceptibility of the well. Identified potential and current sources of contaminants for White Pass R.V. Park public drinking water source include: a campground, a park, and a road. These identified potential and existing sources of contamination are considered as sources of bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals. Overall, the public water sources for White Pass R.V. Park received a vulnerability rating of **Medium** for bacteria and viruses, **Medium** for nitrates and nitrites, and **Low** for the volatile organic chemical category. This assessment of contaminant risks can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of White Pass R.V. Park to protect public health.

### WHITE PASS R.V. PARK PUBLIC DRINKING WATER SYSTEM

White Pass R.V. Park public water system is a Class B (transient/non-community) water system. The system consists of one well on the east side of the Klondike Highway approximately 1 mile north of Skagway, Alaska (See Map A of Appendix A). Skagway is located at the head of Taiya Inlet, about 90 miles northeast of Juneau.

Within Skagway, water is drawn from three wells and piped throughout the town. Most homes are fully plumbed and sewage undergoes primary treatment before being pumped into the ocean. A few homes use wells and septic systems. Refuse is transported to the city incinerator and then to an ash fill facility. Power is provided throughout the community by Alaska Power and Telephone Company (ADEC, 2008).

According to the well log, the well extends over 100 feet below the ground surface and is completed in an unconfined aquifer. This system operates from April to October and serves approximately 30 non-residents through 24 service connections.

### WHITE PASS R.V. PARK DRINKING WATER PROTECTION AREA

In order to evaluate whether a drinking water source is at risk, we must first evaluate what are the most likely pathways for surface contamination to reach the groundwater. These areas are determined by looking at the characteristics of the soil, groundwater, aquifer, and well.

The most probable area for contamination to reach the drinking water well is the drinking water protection area. The drinking water protection area is the area circling 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 protection area are most likely to impact the well, this area will serve as the focus for voluntary protection efforts.

There are many different methods for calculating the size of protection areas. Drinking Water Protection (DWP) uses a combination of two simple groundwater flow equations, the Thiem and uniform flow equations for all groundwater wells screened in unconsolidated material. The orientation of the protection zone is then drawn using a water table elevation map (if available) or a land surface elevation map of the area. The protection zone calculated by DWP is an estimate using the available information and resources, and may differ slightly from the actual capture zone. Because of uncertainties and changing site conditions, a factor of safety is added to the protection zone to form the drinking water protection area for the well.

The parameters used to calculate the shape of this protection zone are general for the whole alluvial plain and were obtained from various United States Geological Survey (USGS) reports, area well logs, and the Groundwater textbook by Freeze and Cherry (Freeze and Cherry, 1979).

The protection areas established for wells by the DEC are usually separated into two zones, limited by the

watershed. These zones correspond to differences in the time-of-travel (TOT) of the water moving through the aquifer to the well. An analytical calculation was used to determine the size and shape of the protection area.

The time-of-travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant. The following is a summary of the two protection area zones for wells and the calculated time-of-travel for each:

**Table 1. Definition of Zones**

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

The drinking water protection area for White Pass R.V. Park was determined using an analytical calculation and includes Zones A and B (See Map A of Appendix A).

## INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

DWP has completed an inventory of potential and existing sources of contamination within the White Pass R.V. Park drinking water protection area. This inventory was completed through a search of agency records and other publicly available information. Potential sources of contamination to the drinking water aquifer 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.

For the basis of all Class B public water system assessments, the following three categories of drinking water contaminants were inventoried:

- Bacteria and viruses;
- Nitrates and/or nitrites;
- Volatile organic chemicals

The sources are displayed on Map C of Appendix C and summarized in Table 1 of Appendix B.

## RANKING OF CONTAMINANT RISKS

Once the potential and existing sources of contamination have been identified, they are assigned a ranking according to what type and level of risk they represent. Ranking of contaminant risks for a “potential” or “existing” source of contamination is a function of toxicity and volumes of specific contaminants associated with that source. Rankings include:

- Low;
- Medium;
- High; and
- Very High.

Tables 2 through 4 in Appendix B contain the ranking of potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals.

## VULNERABILITY OF WHITE PASS R.V. PARK DRINKING WATER SYSTEM

Vulnerability of a drinking water source to contamination is a combination of two factors:

- Natural Susceptibility; and
- Contaminant Risks.

A score for the Natural Susceptibility of the well is reached by considering the properties of the well and the aquifer.

Susceptibility of the Wellhead (0-25 Points)

+

Susceptibility of the Aquifer (0-25 Points)

=

Natural Susceptibility of the Well (0-50 Points)

A ranking is assigned for the Natural Susceptibility according to the point score:

Natural Susceptibility Ratings	
40-50 pts	Very High
30 to < 40 pts	High
20 to < 30 pts	Medium
< 20 pts	Low

Factors contributing to the susceptibility of the wellhead are: whether the sanitary seal is in place, protection from flooding, and if the well casing is properly grouted.

The wellhead for the White Pass R.V. Park received a **Medium** susceptibility rating. The most recent sanitary survey (2/23/2004) indicates the well is capped with a sanitary seal, the land surface is sloped away from the well, and the well is grouted. A sanitary seal prevents potential contaminant 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. However, the well is located in a suspected floodplain.

Factors contributing to the susceptibility of the aquifer are: whether the aquifer is confined or unconfined, whether the well is completed in unconsolidated or

fractured bedrock, whether wells and bore holes are penetrating the aquifer and, if applicable, the confining layer.

The aquifer for the White Pass R.V. Park system is unconfined and consists of mostly sand and gravel. The aquifer received a **High** susceptibility rating. The highly transmissive aquifer material and the moderately high water table in the area (23 feet bgs) allow contaminants to travel downward from the surface to the aquifer with precipitation and surface water runoff.

Table 2 summarizes the Susceptibility scores and ratings for the White Pass R.V. Park system.

**Table 2. Susceptibility**

	Score	Rating
Susceptibility of the Wellhead	10	Medium
Susceptibility of the Aquifer	16	High
Natural Susceptibility	26	Medium

Contaminant risks are derived from an evaluation of the routine sampling results of the water system and the presence of potential sources of contamination. Contaminant risks to a drinking water source depend on the type and distribution of contaminant sources. Flow charts are used to assign a point score, and ratings are assigned in the same way as for the natural susceptibility:

Contaminant Risk Ratings	
40-50 pts	Very High
30 to < 40 pts	High
20 to < 30 pts	Medium
< 20 pts	Low

Table 3 summarizes the Contaminant Risks for each category of drinking water contaminants for the White Pass R.V. Park system.

**Table 3. Contaminant Risks**

Category	Score	Rating
Bacteria and Viruses	25	Medium
Nitrates and/or Nitrites	28	Medium
Volatile Organic Chemicals	12	Low

Finally, an overall vulnerability score is assigned for each water system by combining each of the

contaminant risk scores with the natural susceptibility score:

$$\begin{array}{r}
 \text{Natural Susceptibility (0-50 Points)} \\
 + \\
 \text{Contaminant Risks (0-50 Points)} \\
 = \\
 \text{Vulnerability of the Drinking Water Source to} \\
 \text{Contamination (0-100 Points)}
 \end{array}$$

Again, rankings are assigned according to a point score:

Overall Vulnerability Ratings	
80-100 pts	Very High
60 to < 80 pts	High
40 to < 60 pts	Medium
< 40 pts	Low

Table 4 contains the overall vulnerability scores (0-100) and ratings for each of the three categories of drinking water contaminants for the White Pass R.V. Park system. Note: scores are rounded off to the nearest five.

**Table 4. Overall Vulnerability**

Category	Score	Rating
Bacteria and Viruses	50	Medium
Nitrates and/or Nitrites	55	Medium
Volatile Organic Chemicals	35	Low

#### Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Medium** with the park, road, and campground contributing to the risk to the drinking water well

Coliforms (a bacteria) are found naturally in the environment and although they aren't necessarily a health threat, they are an indicator of other potentially harmful bacteria in the water, more specifically, fecal coliforms and E. coli, which only come from human and animal fecal waste. Harmful bacteria can cause diarrhea, cramps, nausea, headaches, or other symptoms (EPA, 2008).

Only a small amount of bacteria and viruses are required to endanger public health. Positive samples increase the overall vulnerability of the drinking water source, indicating that the source is susceptible to bacteria and virus contamination. Bacteria and viruses were not detected during recent water sampling of the

system at White Pass R.V. Park (data reviewed in April, 2008).

After combining the contaminant risk for bacteria and viruses with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **Medium**.

#### **Nitrates and Nitrites**

The contaminant risk for nitrates and nitrites is **Medium** with the park, road, and campground contributing to the risk to this source of public drinking water.

The sampling history for the White Pass R.V. Park well indicates that nitrates have been detected in the water, but only in very low concentrations (the highest detected level within the last 5 years of sampling was 0.504 mg/l on 8/21/2003, data was reviewed in April, 2008).

After combining the contaminant risk for nitrates and nitrites with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **Medium**.

#### **Volatile Organic Chemicals**

The contaminant risk for volatile organic chemicals is **Low** with the road and campground contributing to the risk to the drinking water well.

Volatile organic chemicals have not been detected in recent samples from this system (data was reviewed in April, 2008).

After combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **Low**.

#### **Using the Source Water Assessment**

This assessment of contaminant risks can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of White Pass R.V. Park to protect public health. It is anticipated that Source Water Assessments will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of White Pass R.V. Park drinking water source.

## **REFERENCES**

Alaska Department of Community and Economic Development (ADCED), Accessed 2008 [WWW document].

URL: [http://www.commerce.state.ak.us/dca/commdb/CF\\_COMDB.htm](http://www.commerce.state.ak.us/dca/commdb/CF_COMDB.htm)

Freeze, R.A. and Cherry, J.A., 1979. Groundwater. Prentice-Hall, Englewood Cliffs, NJ.

United States Environmental Protection Agency (EPA), Accessed 2008 [WWW document]. URL:

<http://www.epa.gov/safewater/contaminants/index.html>.

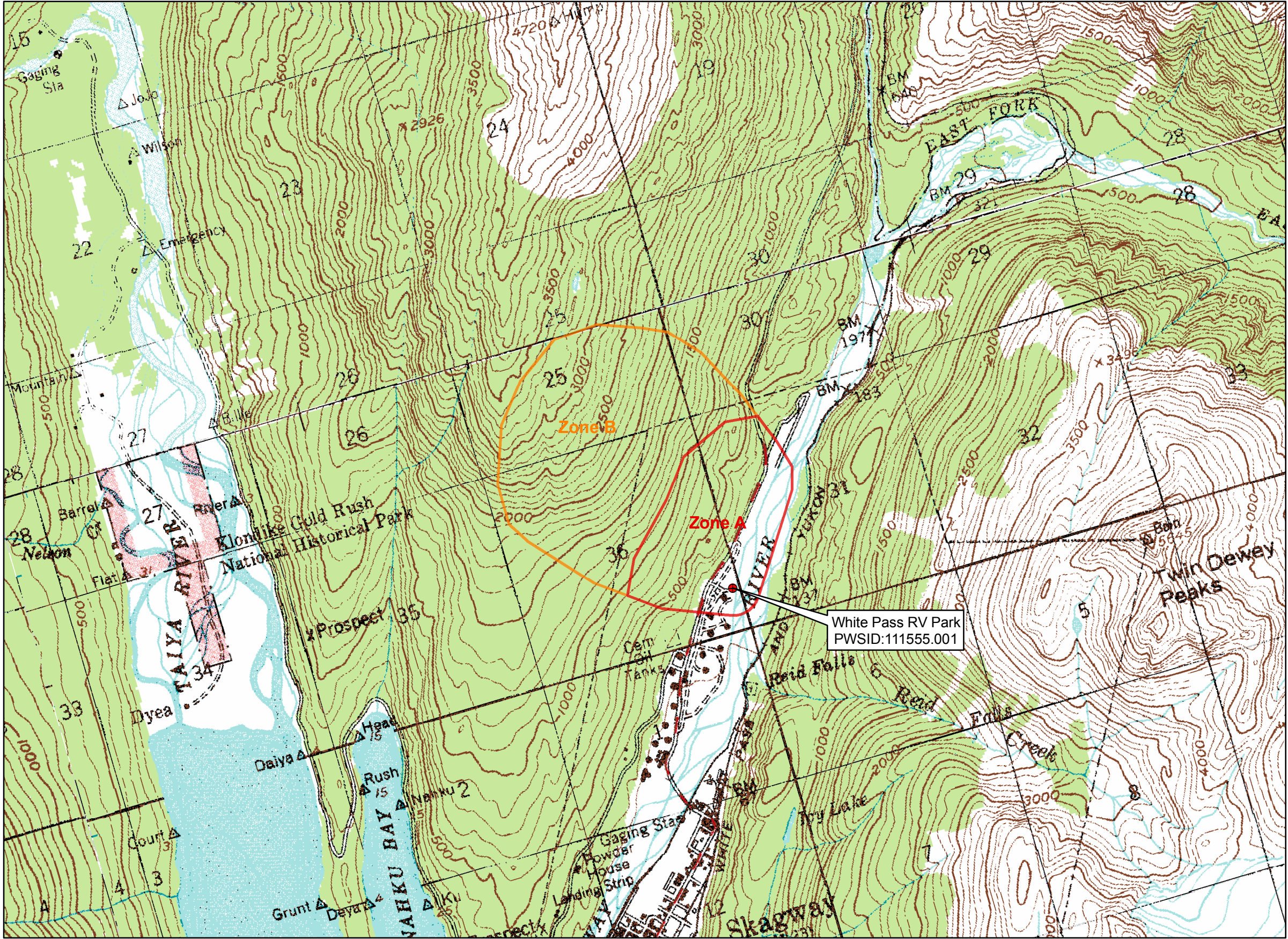


## **APPENDIX A**

### **White Pass R.V. Park Drinking Water Protection Area Location Map (Map A)**



Public Water Well System for PWS #111555.001 White Pass RV Park



Legend

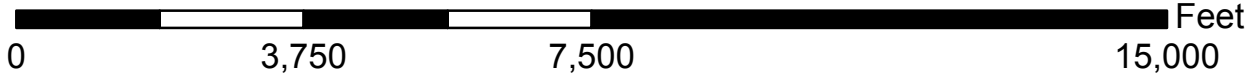
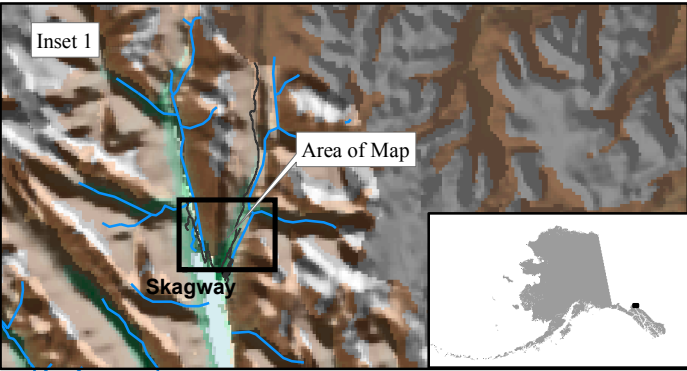
- Class B Public Water System
- Groundwater Protection Zones**
- Zone A Protection Area - Several Months Travel Time
- Zone B Protection Area - 2 Years Travel Time

Data Sources:  
Contaminant Sources, Public Water System Wells, Alaska  
Department of Environmental Conservation (ADEC)

All other data:  
United States Geological Survey (USGS)

Drinking Water Protection Areas based on "Alaska Drinking  
Water Protection Program - Guidance Manual for Class B  
Public Water Systems" published by ADEC

URS Corporation does not guarantee the accuracy or  
validity of the data provided.





## **APPENDIX B**

### **Contaminant Source Inventory and Risk Ranking for White Pass R.V. Park (Tables 1-4)**

*Table 1*

*Contaminant Source Inventory for  
White Pass RV Park*

*PWSID 111555.001*

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Map Number</i>	<i>Comments</i>
Municipal or city parks (with green areas)	X04	X04	A	C	
Highways and roads, paved (cement or asphalt)	X20	X20	A	C	1 Road
Campgrounds and RV Parks	X35	X35	A	C	

**Table 2**

*Contaminant Source Inventory and Risk Ranking for  
White Pass RV Park  
Sources of Bacteria and Viruses*

**PWSID 111555.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Municipal or city parks (with green areas)	X04	X04	A	Medium	C	
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 Road
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 Road
Campgrounds and RV Parks	X35	X35	A	Low	C	
Campgrounds and RV Parks	X35	X35	A	Low	C	

**Table 3**

*Contaminant Source Inventory and Risk Ranking for  
White Pass RV Park  
Sources of Nitrates/Nitrites*

*PWSID 111555.001*

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Municipal or city parks (with green areas)	X04	X04	A	Medium	C	
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 Road
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 Road
Campgrounds and RV Parks	X35	X35	A	Low	C	
Campgrounds and RV Parks	X35	X35	A	Low	C	

**Table 4**

*Contaminant Source Inventory and Risk Ranking for  
White Pass RV Park  
Sources of Volatile Organic Chemicals*

*PWSID 111555.001*

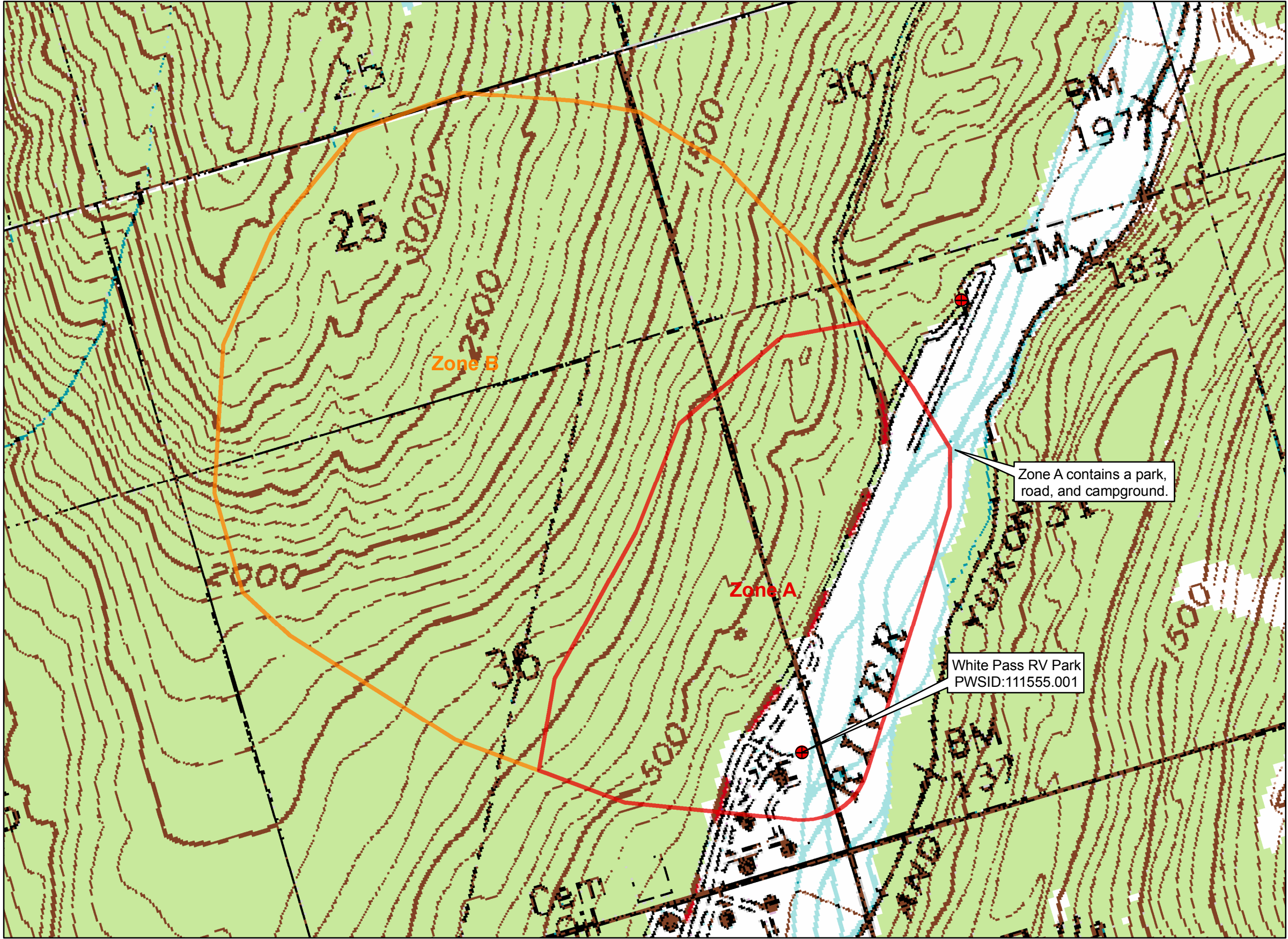
<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 Road
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 Road
Campgrounds and RV Parks	X35	X35	A	Low	C	
Campgrounds and RV Parks	X35	X35	A	Low	C	

## **APPENDIX C**

### **White Pass R.V. Park Drinking Water Protection Area and Potential and Existing Contaminant Sources (Map C)**



Public Water Well System for PWS #111555.001 White Pass RV Park  
Showing Potential and Existing Sources of Contamination



Legend

● Class B Public Water System

Groundwater Protection Zones

Zone A Protection Area - Several Months Travel Time

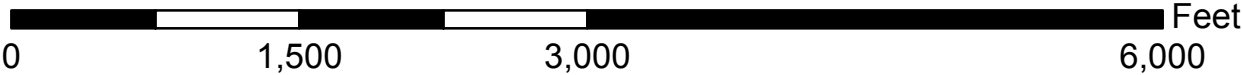
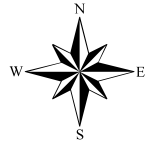
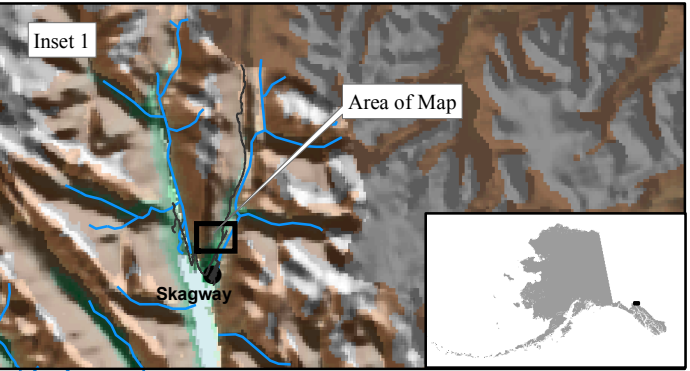
Zone B Protection Area - 2 Years Travel Time

Data Sources:  
Contaminant Sources, Public Water Systems: Alaska  
Department of Environmental Conservation (ADEC)

All other data:  
United States Geological Survey (USGS)

Drinking Water Protection Areas based on "Alaska Drinking  
Water Protection Program - Guidance Manual for Class B  
Public Water Systems" published by ADEC

URS Corporation does not guarantee the accuracy or  
validity of the data provided.



White Pass RV Park  
PWS 111555.001

Appendix C Map C