Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for Northwood Apartments Public Drinking Water System, Wasilla, Alaska PWSID# 220169.001

DRINKING WATER PROTECTION REPORT 1847

Alaska Department of Environmental Conservation

October, 2008

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The Drinking Water Protection (DWP) team 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 (ADEC), 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 DWP staff at #1-866/956-7656.

October, 2008

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Source Water Assessment for Northwood Apartments Source of Public Drinking Water, Wasilla, Alaska

Drinking Water Protection

Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The public water system for Northwood Apartments is a Community Water System (CWS) consisting of one well located at 2060 Lucille Street, Wasilla, Alaska. An assessment of the susceptibility of the wellhead and aquifer to contamination, and the vulnerability of the public water system to potential and existing contamination were evaluated as of March 2008. The wellhead 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 well. Identified potential and existing sources of contamination for the Northwood Apartments public drinking water system include residential septic systems, roads, residential areas, a car wash, a construction trade area and materials, heavy equipment rental/storage, a motor/motor vehicle repair shop, paint sales/service, injection wells (Class V) septic systems (drainfield disposal method), and stone and clay processing/manufacturing. These are considered sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals (VOCs), heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals (SOCs), and other organic chemicals (OOCs). Additionally, a presumably natural source of arsenic is also present.

Combining the natural susceptibility of the well with the six (6) contaminant risk categories, the public water system for Northwood Apartments received an overall vulnerability rating of **High** for bacteria and viruses**, Very High** for nitrates and/or nitrites, **High** for VOCs, **High** for heavy metals, cyanide, and other inorganic chemicals, **Medium** for SOCs, and **High** for OOCs.

Northwood Apartments PUBLIC DRINKING WATER SYSTEM

Northwood Apartments public water system is a Community water system (CWS). The system consists of one well located at 2060 Lucille Street, Wasilla, Alaska (See Map 1 of Appendix A). Wasilla is located north of Anchorage in the Matanuska-Susitna Borough which is in Southcentral Alaska (Please see the inset of Map 1 in Appendix A for location). The Borough's current population is approximately 80,088, and Wasilla's current population is approximately 7,028 (ADCCED 2008). Communities located within the Borough include: Big Lake, Buffalo Soapstone, Butte, Chase, Chickaloon, Farm Loop, Fishhook, Gateway, Glacier View, Houston, Knik River, Knik-Fairview, Lake Louise, Lakes, Lazy Mountain, Meadow Lakes, Palmer, Petersville, Point MacKenzie, Skwentna, Susitna, Sutton-Alpine, Talkeetna, Tanaina, Trapper Creek, Wasilla, Willow and Y (ADCCED 2008. The majority of homes use individual water wells and septic systems, although the City operates a piped water and sewer system (ADCCED 2008). Refuse collection is provided by a private company, for disposal in the Mat-Su Borough landfill. Residents also drop refuse at the Borough landfill in Palmer (ADCCED 2008).

A lake covered the Susitna River valley lowland during glacial times. The deposition of glacial silts and clays played an important part in the makeup of the soils of the area.

Most of the soils in the area provide good sources of sand, gravel and topsoil. The deposition of silt, clay and organic "muck" in old lakes and depressions means that some areas have soil conditions that vary over relatively short distances. The U.S. Soil Conservation Service has mapped seven soil associations in and around Wasilla.

The Homestead and Knik soil types predominate the Wasilla area, with smaller areas of Coal Creek, Jacobsen, Kalambach, Salamatof, and Slikok soil types. Northwood Apartments is located within the Kalambach Silt Loam soil type.

According to the most recent sanitary survey (1/24/2008) for this water system, the depth of the well is estimated at 119 feet below land surface (bls). Other wells in this area are screened in a combination of sand and gravel and the well log indicates that this well is also. The well does not appear to penetrate any confining layers and is assumed to be completed in an unconfined aquifer, or an aquifer that is not under hydrostatic pressure.

The Northwood Apartments public water system serves approximately thirty (30) residents through one (1) approved service connection, per the latest sanitary survey (1/24/2008).

Northwood Apartments DRINKING WATER PROTECTION AREA

The pathways most likely for surface contamination to reach the groundwater are identified as the first step in determining a drinking water system's risk. 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 the 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 area are general for the Matanuska-Susitna lowlands and were obtained from various Alaska Department of Natural Resources (ADNR) reports, various United States Geological Survey (USGS) reports, area well logs, and the Groundwater textbook by Freeze and Cherry (1979).

The drinking water protection areas (DWPAs) 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 input parameters describing the attributes of the aquifer in this calculation were adopted from the State of Alaska Department of Water Resources (*Jokela et. al., 1991*).

The unconfined aquifer levels in the area of the Northwood Apartments water system are reported by the ADNR (Jokela et. al 1991) and the USGS (Moran and Solin 2006), and are primarily influenced by recharge from the Talkeetna Mountains. The protection areas were drawn based on these published water table contours. Groundwater in the unconfined aquifer of this area generally flows south.

Because of uncertainties and changing site conditions, a factor of safety is added to the drinking water protection area for the well.

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 DWPA for the Northwood Apartments found on Map 1 of Appendix A will serve as the focus for voluntary protection efforts.

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

Drinking Water Protection (DWP) has completed an inventory of potential and existing sources of contamination within the Northwood Apartments DWPA. 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 Community public water system assessments, the following six categories of drinking water contaminants were inventoried:

- Bacteria and viruses;
- Nitrates and/or nitrites;
- Volatile organic chemicals;
- Heavy metals, cyanide, and other inorganic chemicals;
- Synthetic organic chemicals; and
- Other organic chemicals.

No sources were identified, as portrayed on Map 2 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 each 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 combination of toxicity and volume associated with that source. Rankings include:

- Low
- Medium
- High
- Very High

The time-of-travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant.

Tables 2 through 7 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals and other organic chemical

VULNERABILITY OF Northwood Apartments PUBLIC DRINKING WATER SYSTEM

The vulnerability of public drinking water systems to regulated contaminants is determined by assessing the susceptibility of the wellhead, the susceptibility of the aquifer and the potential contaminant sources identified within the DWPA.

Drinking Water Protection staff developed a vulnerability assessment tool that assigns a vulnerability risk ranking based upon various factors associated with the well, aquifer and potential and existing contaminants identified within the DWPA.

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

The wellhead for the Northwood Apartments received a **Low** susceptibility rating. The most recent sanitary survey (completed 1/24/2008) indicates that the well is capped with a sanitary seal, the land surface is sloped away from the well, and the well is properly grouted. 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.

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 other wells and bore holes are penetrating the aquifer and, if applicable, and the characteristics of the confining layer.

The aquifer that the Northwood Apartments well is completed in received a **Very High** susceptibility rating. The aquifer is unconfined, shallow, and composed of loose, unconsolidated material (sand and gravel).

Table 2 summarizes the susceptibility scores and ratings for Wasilla - Ranch Subdivision Well #1.

Table 2. Susceptibility

	Rating
Susceptibility of the Wellhead	Low
Susceptibility of the Aquifer	Very high
Natural Susceptibility	Medium

The Contaminant Risk was 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.

Table 3 summarizes the Contaminant Risks for each category of drinking water contaminants.

Table 3. Contaminant Risks

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

Finally, an overall vulnerability is determined for each water system by combining each of the contaminant risk scores with the natural susceptibility score:

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

Table 4 contains the overall ratings for each of the six categories of drinking water contaminants.

Table 4. Overall Vulnerability

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

Bacteria and Viruses

The residential and waste disposal septic systems in the protection area represent the greatest risk for bacteria and viruses to the drinking water well.

Only a small amount of bacteria and viruses are required to endanger public health. Coliform bacteria are found naturally in the environment and although they aren't necessarily a health threat, it is an indicator of other potentially harmful bacteria in the water, more specifically, fecal coliform bacteria and E. coli which only come from human and animal fecal waste (EPA, 2002). Harmful bacteria can cause diarrhea, cramps, nausea, headaches, or other symptoms (EPA, 2002). No total coliform or fecal coliform have been detected for this well. 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 **High**.

Nitrates and Nitrites

The residential and waste disposal septic systems in the protection area represent the greatest risk for nitrates and nitrites to this source of public drinking water.

Nitrates are very mobile, moving at approximately the same rate as water. Nitrates have not been detected within source waters.

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 **High**.

Volatile Organic Chemicals

A car wash (with enginge or undercarriage cleaning), heavy equipment rental/storage, motor/motor vehicle repair shop(s), and paint sales/service shop represent the greatest risk for volatile organic chemicals (VOCs) to the well.

VOCs have not been detected within source waters. 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 **High**.

Heavy Metals, Cyanide, and Other Inorganic Chemicals

A car wash (with enginge or undercarriage cleaning), motor/motor vehicle repair shop(s), and stone and clay processing/manufacturing in the protection area and natural sources represent the greatest risk for inorganic chemicals to the well.

Heavy metals and other inorganic chemicals have been analyzed for back to 2007. Barium, chromium, and selenium were detected well below their respective maximum contaminant levels (MCLs). Arsenic was also detected several times, and each time at around 11% of the MCL. Arsenic has no man-made source in this area and is presumed to be naturally occurring.

After combining the contaminant risk for heavy metals, cyanide and other inorganic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **Medium**.

Synthetic Organic Chemicals

The residential and waste disposal septic systems represent the greatest risk for synthetic organic chemicals (SOCs) to the well.

SOCs have not been analyzed for this well. After combining the contaminant risk for SOCs with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **Medium**.

Other Organic Chemicals

A car wash (with enginge or undercarriage cleaning), heavy equipment rental/storage, and motor/motor vehicle repair shop(s) represent the greatest risk for other organic chemicals (OOCs) to the well.

OOCs have not been analyzed for this well. After combining the contaminant risk for OOCs with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **Medium**.

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 Northwood Apartments 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 the Northwood Apartments drinking water source.

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APPENDIX A

Northwood Apartments
Drinking Water Protection Area Location Map
(Map 1)

Map 1- NORTHWOOD APARTMENTS

PWSID: 220169.001

Alaska DEC

0 500 1,000 2,000 Feet

1 inch equals 500 feet

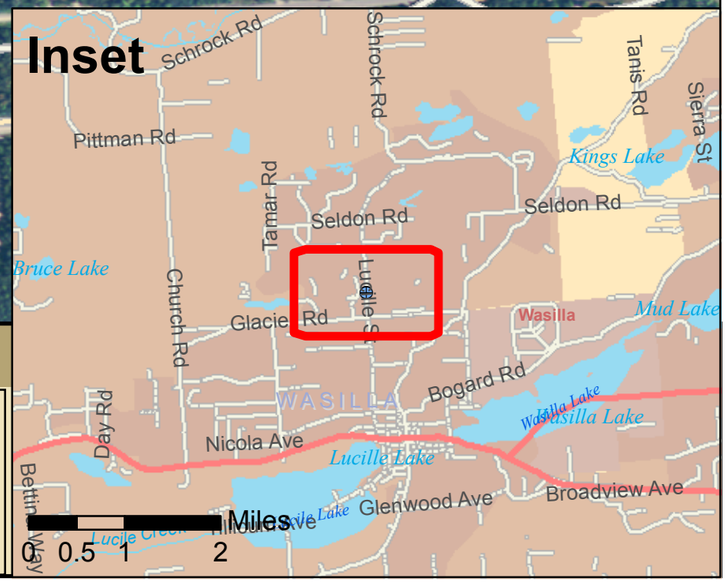
Data Sources:
Boroughs: Roads and parcels
(error in source data; used aerial imagery for accuracy)
Public Water Systems: DEC
Potential Sources of Contamination: DEC
Map Date: October 3, 2008

Identified Public Water Sources

- Class A (Federal Classification: Community (C), or Non-Transient Non-Community (NTNC))
- Class B (Federal Classification: Non-Community (NC), or Transient Non-Community (TNC))

Drinking Water Protection Areas

- Zone A (Several Months Time of Travel)
- Zone B (2 Year Time of Travel)



APPENDIX B

Contaminant Source Inventory and
Risk Ranking for **Northwood Apartments**
(Tables 1-7)

Table 1

Contaminant Source Inventory for ***NORTHWOOD APARTMENTS***

PWSID 220169.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Heavy equipment rental/storage	C18	C18-1	A	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2-12	A	2	
Residential Areas	R01	R01-1	A	2	Approximately 209 acres.
Septic systems (serves one single-family home)	R02	R02-1-65	A	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	2	One (1) medium class road; Twelve (12) minor class roads. Source: Mat-Su Borough.
Car washes with engine or undercarriage cleaning	C08	C08-1	B	2	
Construction trade areas and materials	C09	C09-1	B	2	
Heavy equipment rental/storage	C18	C18-2	B	2	
Motor /motor vehicle repair shops	C31	C31-1	B	2	
Paint sales /service	C32	C32-1	B	2	
Stone and clay processing/manufacturing	I43	I43-1	B	2	
Residential Areas	R01	R01-2	B	2	Approximately 1,000 acres.
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	2	One (1) major class road. Source: Mat-Su Borough.
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	2	Three (3) medium class roads; Eighty-one (81) minor roads. Source: Mat-Su Borough.

Table 2

Contaminant Source Inventory and Risk Ranking for NORTHWOOD APARTMENTS Sources of Bacteria and Viruses

PWSID 220169.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	High	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2-12	A	High	2	
Residential Areas	R01	R01-1	A	Low	2	Approximately 209 acres.
Septic systems (serves one single-family home)	R02	R02-1-65	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	One (1) medium class road; Twelve (12) minor class roads. Source: Mat-Su Borough.
Residential Areas	R01	R01-2	B	Low	2	Approximately 1,000 acres.
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	One (1) major class road. Source: Mat-Su Borough.
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	2	Three (3) medium class roads; Eighty-one (81) minor roads. Source: Mat-Su Borough.

Table 3

Contaminant Source Inventory and Risk Ranking for NORTHWOOD APARTMENTS Sources of Nitrates/Nitrites

PWSID 220169.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	High	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2-12	A	High	2	
Residential Areas	R01	R01-1	A	Low	2	Approximately 209 acres.
Septic systems (serves one single-family home)	R02	R02-1-65	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	One (1) medium class road; Twelve (12) minor class roads. Source: Mat-Su Borough.
Residential Areas	R01	R01-2	B	Low	2	Approximately 1,000 acres.
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	One (1) major class road. Source: Mat-Su Borough.
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	2	Three (3) medium class roads; Eighty-one (81) minor roads. Source: Mat-Su Borough.

Table 4

Contaminant Source Inventory and Risk Ranking for NORTHWOOD APARTMENTS Sources of Volatile Organic Chemicals

PWSID 220169.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Heavy equipment rental/storage	C18	C18-1	A	Medium	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	Low	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2-12	A	Low	2	
Residential Areas	R01	R01-1	A	Low	2	Approximately 209 acres.
Septic systems (serves one single-family home)	R02	R02-1-65	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	One (1) medium class road; Twelve (12) minor class roads. Source: Mat-Su Borough.
Car washes with engine or undercarriage cleaning	C08	C08-1	B	High	2	
Construction trade areas and materials	C09	C09-1	B	Low	2	
Heavy equipment rental/storage	C18	C18-2	B	Medium	2	
Motor /motor vehicle repair shops	C31	C31-1	B	Medium	2	
Paint sales /service	C32	C32-1	B	Medium	2	
Residential Areas	R01	R01-2	B	Low	2	Approximately 1,000 acres.
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	One (1) major class road. Source: Mat-Su Borough.
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	2	Three (3) medium class roads; Eighty-one (81) minor roads. Source: Mat-Su Borough.

Table 5

Contaminant Source Inventory and Risk Ranking for NORTHWOOD APARTMENTS

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 220169.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Heavy equipment rental/storage	C18	C18-1	A	Low	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	Low	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2-12	A	Low	2	
Residential Areas	R01	R01-1	A	Low	2	Approximately 209 acres.
Septic systems (serves one single-family home)	R02	R02-1-65	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	One (1) medium class road; Twelve (12) minor class roads. Source: Mat-Su Borough.
Car washes with engine or undercarriage cleaning	C08	C08-1	B	Medium	2	
Construction trade areas and materials	C09	C09-1	B	Low	2	
Heavy equipment rental/storage	C18	C18-2	B	Low	2	
Motor /motor vehicle repair shops	C31	C31-1	B	Medium	2	
Paint sales /service	C32	C32-1	B	Low	2	
Stone and clay processing/manufacturing	I43	I43-1	B	Medium	2	
Residential Areas	R01	R01-2	B	Low	2	Approximately 1,000 acres.
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	One (1) major class road. Source: Mat-Su Borough.
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	2	Three (3) medium class roads; Eighty-one (81) minor roads. Source: Mat-Su Borough.

Table 6

Contaminant Source Inventory and Risk Ranking for NORTHWOOD APARTMENTS Sources of Synthetic Organic Chemicals

PWSID 220169.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	Low	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2-12	A	Low	2	
Residential Areas	R01	R01-1	A	Low	2	Approximately 209 acres.
Septic systems (serves one single-family home)	R02	R02-1-65	A	Low	2	
Paint sales /service	C32	C32-1	B	Low	2	
Residential Areas	R01	R01-2	B	Low	2	Approximately 1,000 acres.

Table 7

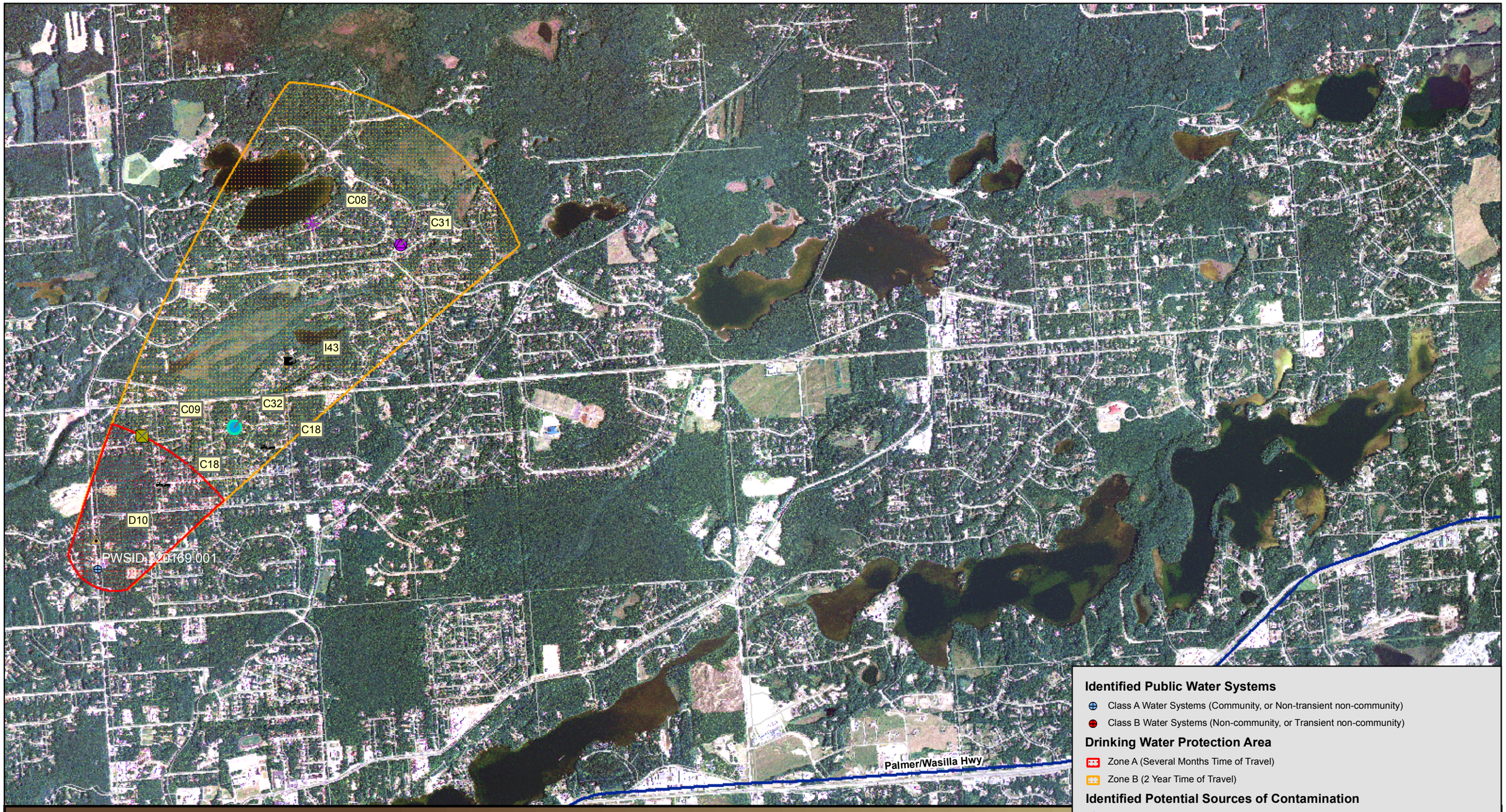
Contaminant Source Inventory and Risk Ranking for NORTHWOOD APARTMENTS Sources of Other Organic Chemicals

PWSID 220169.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Heavy equipment rental/storage	C18	C18-1	A	Medium	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	Low	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2-12	A	Low	2	
Residential Areas	R01	R01-1	A	Low	2	Approximately 209 acres.
Septic systems (serves one single-family home)	R02	R02-1-65	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	One (1) medium class road; Twelve (12) minor class roads. Source: Mat-Su Borough.
Car washes with engine or undercarriage cleaning	C08	C08-1	B	Medium	2	
Construction trade areas and materials	C09	C09-1	B	Low	2	
Heavy equipment rental/storage	C18	C18-2	B	Medium	2	
Motor /motor vehicle repair shops	C31	C31-1	B	Medium	2	
Residential Areas	R01	R01-2	B	Low	2	Approximately 1,000 acres.
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	One (1) major class road. Source: Mat-Su Borough.
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	2	Three (3) medium class roads; Eighty-one (81) minor roads. Source: Mat-Su Borough.

APPENDIX C

Northwood Apartments
Drinking Water Protection Area
with Potential and Existing Contaminant Sources
(Map 2)



Map 2- NORTHWOOD APARTMENTS

PWSID: 220169.001

Alaska DEC

Miles

0 1

1 inch equals 2,333 feet

N W E S

Data Sources:
Boroughs: Roads and parcels (slight shift in data)
Public Water Systems: DEC
Potential Sources of Contamination: DEC
Map Date: October 8, 2008

Identified Public Water Systems

- Class A Water Systems (Community, or Non-transient non-community)
- Class B Water Systems (Non-community, or Transient non-community)

Drinking Water Protection Area

- Zone A (Several Months Time of Travel)
- Zone B (2 Year Time of Travel)

Identified Potential Sources of Contamination

- Car washes with engine or undercarriage cleaning (C08)
- Construction trade areas and materials (C09)
- Heavy equipment rental/storage (C18)
- Motor /motor vehicle repair shops (C31)
- Paint sales /service (C32)
- Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) (D10)
- Stone and clay processing/manufacturing (I43)