Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001) Public Drinking Water System, Goodnews Bay, Alaska PWSID# 270257.002

DRINKING WATER PROTECTION REPORT 1859

Alaska Department of Environmental Conservation

February, 2011

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The Drinking Water Protection (DWP) group within 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.

February, 2011

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Drinking Water Protection

Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The public water system for GOODNEWS BAY is a Community Water System (CWS) consisting of one active surface water intake, GOODNEWS BAY RESERVOIR (IN001). The intake (IN001) is located on Village Creek, in Goodnews Bay, Alaska. The watershed contributing to the reservoir intake (IN001) is approximately 0.4 square miles in size and received a susceptibility rating of **Very High**. *A rating of high to very high is typical for all systems with surface water intakes*. Identified potential and existing sources of contamination for the GOODNEWS BAY public drinking water system includes a rock quarry, road, and several recreational vehicle/foot trails. 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).

The following six (6) contaminant risk categories were evaluated and the public water system was assigned an overall vulnerability rating for each category. GOODNEWS BAY public water system received an overall vulnerability rating of **Medium** for bacteria and viruses**, Medium** for nitrates and/or nitrites, **Medium** for VOCs, **Medium** for heavy metals, cyanide, and other inorganic chemicals, **Medium** for SOCs, and **Medium** for OOCs.

This assessment 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 GOODNEWS BAY public water system owner(s) and operator(s) to protect public health.

GOODNEWS BAY PUBLIC DRINKING WATER SYSTEM

GOODNEWS BAY public water system is a Community water system. The system consists of one active surface water intake (IN001) located on Village Creek, in Goodnews Bay, Alaska (See Map 1 of Appendix A). Goodnews Bay is located on the north shore of Goodnews Bay at the mouth of Goodnews River, 116 air miles south of Bethel, 110 miles northwest of Dillingham, and 400 miles west of Anchorage (Please see the inset of Map 1 in Appendix A for location). The population of Goodnews Bay is approximately 237 (2009 DCCED Certified Population).

The most recent sanitary survey (11/26/2008) for this water system was completed prior to the new surface water intake. The GOODNEWS BAY RESERVOIR surface water intake (IN001) received Construction Approval from DEC on 10/11/2008, and an Interim Approval to Operate from DEC on 10/23/2009, which expired 1/24/2010. A Final Approval to Operate had not yet been issued by DEC at the time of this report. It was assumed for the purposes of this assessment that the Interim Approval to Operate was issued on the premise that the water intake was properly constructed.

The GOODNEWS BAY public water system serves approximately two-hundred and fifty (250) residents through seventy-five (75) approved service connections.

GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001) DRINKING WATER PROTECTION AREA

The pathways most likely for surface contamination to reach the water intake areas are identified as the first step in determining a drinking water system's risk. These are initially determined by looking at the drainage area contributing overland water flow to a surface water source intake. The entire drainage area is also known as the drinking water protection area (DWPA).

The DWPA established for surface water sources by the DEC is usually separated into three zones, limited by the watershed boundary. These zones correspond to the overland-flow distance that water travels to get to the source. The DEC Drinking Water Protection Technical Advisory Committee developed guidelines for derivation of these zones in 1998. The following is a summary of the three protection area zones:

Table 1. Definition of Zones

Zone	Definition
A	Areas within 1000-ft of lakes or streams
B	Areas within 1-mile of lakes or streams
C	The watershed boundary

The DWPA for the GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001) is found on Map 1 of Appendix A and 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 GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001) DWPA. This inventory was completed through a search of agency records and other publicly available information. Potential sources of contamination to the drinking water source 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 (6) categories of drinking water contaminants were inventoried:

- 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).

Sources identified within the GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001) DWPA are displayed 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; and
- Very High.

The time-of-travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant. Bacteria and Viruses are only inventoried in Zone A because of their short life span. Only "Very High" and "High" rankings are inventoried within Zones B due to the probability of contaminant dilution by the time the contaminants reach the water intake.

Tables 2 through 7 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to each of the six (6) contaminant categories: 1) bacteria and viruses; 2) nitrates and/or nitrites; 3) VOCs; 4) heavy metals, cyanide and other inorganic chemicals; 5) SOCs; and, 6) OOCs.

VULNERABILITY OF GOODNEWS BAY PUBLIC DRINKING WATER SYSTEM

The vulnerability of the public drinking water system to regulated contaminants is determined by assessing the susceptibility of the surface water source and the risks associated with potential and existing contaminant sources identified within the DWPA.

The susceptibility of the surface water source is reached by considering the properties of the water intake and the surrounding area.

Susceptibility of the surface water source (always considered to be "high")

+

Adequate Construction of the Intake

+

Runoff Potential within Zone B

+

Dilution Capacity of the Surface Water

=

Natural Susceptibility

Table 2. Susceptibility of the Surface Water Source

	Rating
Natural Susceptibility	Very High

The Contaminant Risk was derived from an evaluation of the routine sampling results of the water system and the presence of potential and existing sources of contamination within the DWPA. Contaminant risks to a drinking water source depend on the type, number or density, 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	Low
Nitrates and/or Nitrites	Low
Volatile Organic Chemicals	Low
Heavy Metals, Cyanide, and Other Inorganic Chemicals	Low
Synthetic Organic Chemicals	Low
Other Organic Chemicals	Low

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
=
Overall 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	Medium
Nitrates and Nitrites	Medium
Volatile Organic Chemicals	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	Medium
Synthetic Organic Chemicals	Medium
Other Organic Chemicals	Medium

Bacteria and Viruses

The roads and trails within the drinking water protection area represent the greatest risk for bacteria and viruses to this public drinking water source.

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

Nitrates and Nitrites

The rock quarry, roads, and trails within the drinking water protection area represent the greatest risk for nitrates and nitrites to this public drinking water source.

Nitrates are very mobile, moving at approximately the same rate as water. Nitrates have been detected for this source, but well below the maximum contaminant level (MCL) of 10 mg/L. The most recent detect was from the sample collected on 11/17/2010, at 0.225 mg/L. There is no indication from the sampling history that this is a result of something other than background contamination from natural sources.

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

Volatile Organic Chemicals

The rock quarry, roads, and trails within the drinking water protection area represent the greatest risk for volatile organic chemicals (VOCs) to this public drinking water source.

No VOCs have been detected for this source. After combining the contaminant risk for VOCs with the natural susceptibility of the source, the overall vulnerability of the source to contamination is **Medium**.

Heavy Metals, Cyanide, and Other Inorganic Chemicals

The roads and trails within the drinking water protection area and natural sources represent the greatest risk for inorganic chemicals to this public drinking water source.

Heavy Metals, Cyanide, and Other Inorganic Chemicals have been detected for this source, but well below the maximum contaminant level (MCL). The most recent detect was for Barium at 46.1 µg/L (2.3% MCL), from the sample collected on 9/30/2009. There is no indication from the sampling history that this is a result of something other than background contamination from natural sources.

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

Synthetic Organic Chemicals

No potential or existing sources of synthetic organic chemicals (SOCs) were identified within the drinking water protection area for this public drinking water source.

No sample results have been reported for SOCs. This system received an SOC Monitoring Waiver for the 2008-2010 Compliance Period. After combining the contaminant risk for SOCs with the natural susceptibility of the source, the overall vulnerability of the source to contamination is **Medium**.

Other Organic Chemicals

The rock quarry and roads within the drinking water protection area represent the greatest risk for other organic chemicals (OOCs) to this public drinking water source.

No sample results have been reported for OOCs. This system received an SOC Monitoring Waiver for the 2008-2010 Compliance Period, which includes a waiver for OOCs. After combining the contaminant risk for OOCs with the natural susceptibility of the source, the overall vulnerability of the source 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 GOODNEWS BAY public drinking water system 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 GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001) public drinking water source.

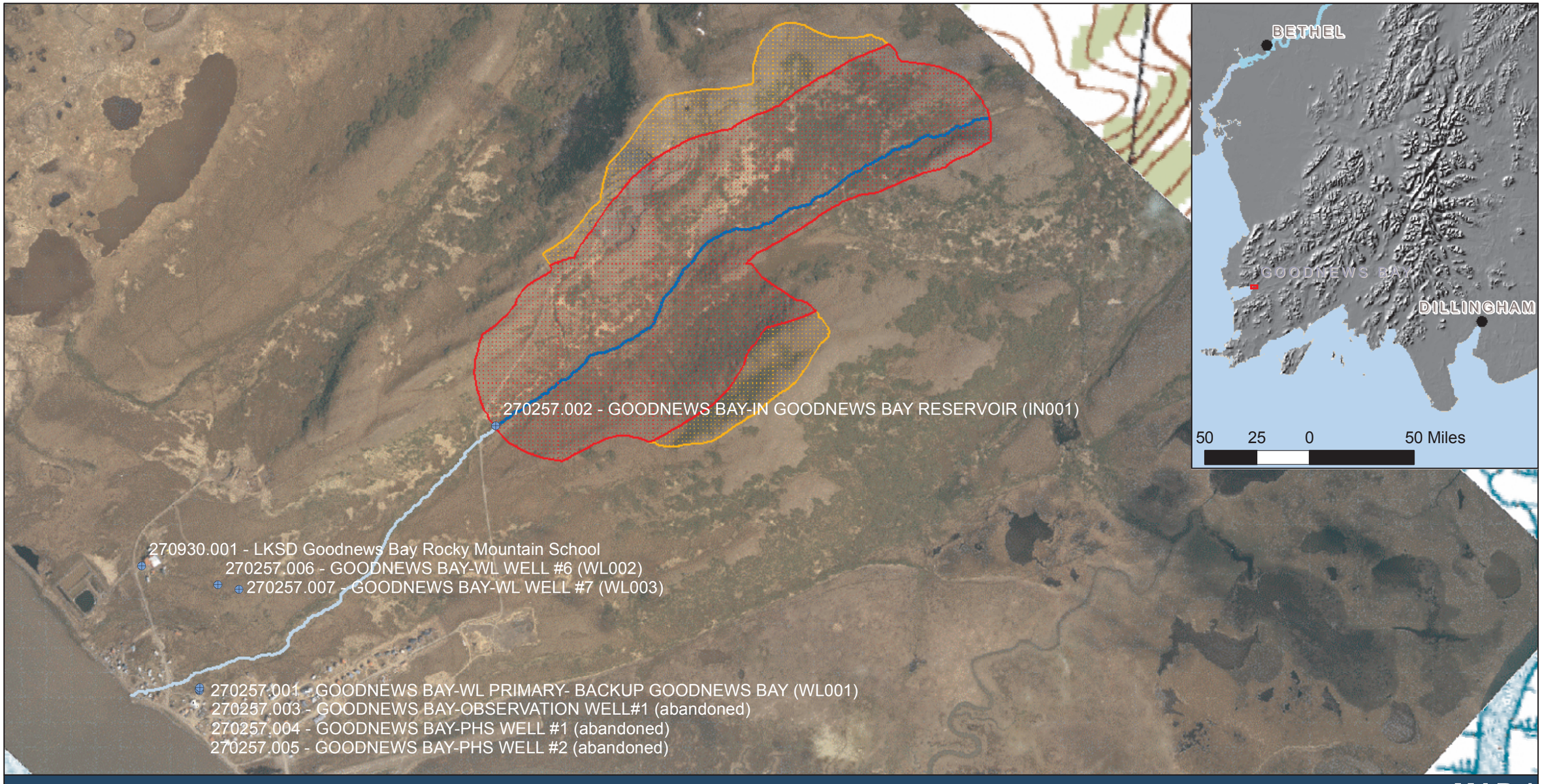
REFERENCES

Alaska Department of Commerce, Community and Economic Development (DCCED), 2011 [WWW document]. URL http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.cfm.

United States Environmental Protection Agency (EPA), 2008 [WWW document]. URL http://www.epa.gov/safewater/contaminants/index.html.

APPENDIX A

GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001)
Drinking Water Protection Area Location Map
(Map 1)



PWSID 270257.002: GOODNEWS BAY - IN GOODNEWS BAY RESERVOIR on VILLAGE CREEK

MAP 1

1,000 500 0 1,000 Feet

1 inch = 1,000 feet

N W E S

Created December 13th, 2010
Created By: Charley Palmer, DEC/EH-Drinking Water Protection
Data Sources:
1) Topographic Basemap - AlaskaMapped WMS/BDL
2) Aerial Imagery - DCRA/DCCED 2005 2-ft Community Photos

DWPP-Public Water Systems	Drinking Water Protection Areas	Source
Class A Water Systems (C/NTNC)	Zone A: Up to 1,000 feet shoreline buffer	Segment above PWS intake.
Class B Water Systems (TNC)	Zone B: Up to 1 mile shoreline buffer	Segment below PWS intake.
Class C Water Systems (State Regulated)		

Alaska Department of Environmental Conservation

APPENDIX B

Contaminant Source Inventory and Risk Ranking for GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001) (Tables 1-7)

Table 1 *Contaminant Source Inventory for* ***PWSID 270257.002***

GOODNEWS BAY-VILLAGE CREEK RESERVOIR

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Quarries (sand, gravel, rock, other?)	E10	E10-1	A	2	Active. Evidence of runoff through quarry observed upon field visit August 2010 - spring appears at foot of boulder pile, runs across road, and dissapears into road bed.
Highways and roads, dirt/gravel	X24	X24-1	A	2	Road to quarry.
RV and dogsled trails	X33	X33-1	A	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.
RV and dogsled trails	X33	X33-2	B	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.

Table 2

Contaminant Source Inventory and Risk Ranking for GOODNEWS BAY-VILLAGE CREEK RESERVOIR Sources of Bacteria and Viruses

PWSID 270257.002

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Road to quarry.
RV and dogsled trails	X33	X33-1	A	Low	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.
RV and dogsled trails	X33	X33-2	B	Low	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.

Table 3

Contaminant Source Inventory and Risk Ranking for GOODNEWS BAY-VILLAGE CREEK RESERVOIR

Sources of Nitrates/Nitrites

PWSID 270257.002

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Quarries (sand, gravel, rock, other?)	E10	E10-1	A	Low	2	Active. Evidence of runoff through quarry observed upon field visit August 2010 - spring appears at foot of boulder pile, runs across road, and dissapears into road bed.
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Road to quarry.
RV and dogsled trails	X33	X33-1	A	Low	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.
RV and dogsled trails	X33	X33-2	B	Low	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.

Table 4

Contaminant Source Inventory and Risk Ranking for GOODNEWS BAY-VILLAGE CREEK RESERVOIR Sources of Volatile Organic Chemicals

PWSID 270257.002

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Quarries (sand, gravel, rock, other?)	E10	E10-1	A	Low	2	Active. Evidence of runoff through quarry observed upon field visit August 2010 - spring appears at foot of boulder pile, runs across road, and dissapears into road bed.
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Road to quarry.
RV and dogsled trails	X33	X33-1	A	Low	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.
RV and dogsled trails	X33	X33-2	B	Low	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.

Table 5

Contaminant Source Inventory and Risk Ranking for GOODNEWS BAY-VILLAGE CREEK RESERVOIR Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 270257.002

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Road to quarry.
RV and dogsled trails	X33	X33-1	A	Low	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.
RV and dogsled trails	X33	X33-2	B	Low	2	Observed upon August 2010 field visit that trails seemed to be well-defined and not meander through tundra.

Low

Table 6

Contaminant Source Inventory and Risk Ranking for GOODNEWS BAY-VILLAGE CREEK RESERVOIR Sources of Synthetic Organic Chemicals

PWSID 270257.002

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
None identiied.						

Table 7

Contaminant Source Inventory and Risk Ranking for GOODNEWS BAY-VILLAGE CREEK RESERVOIR

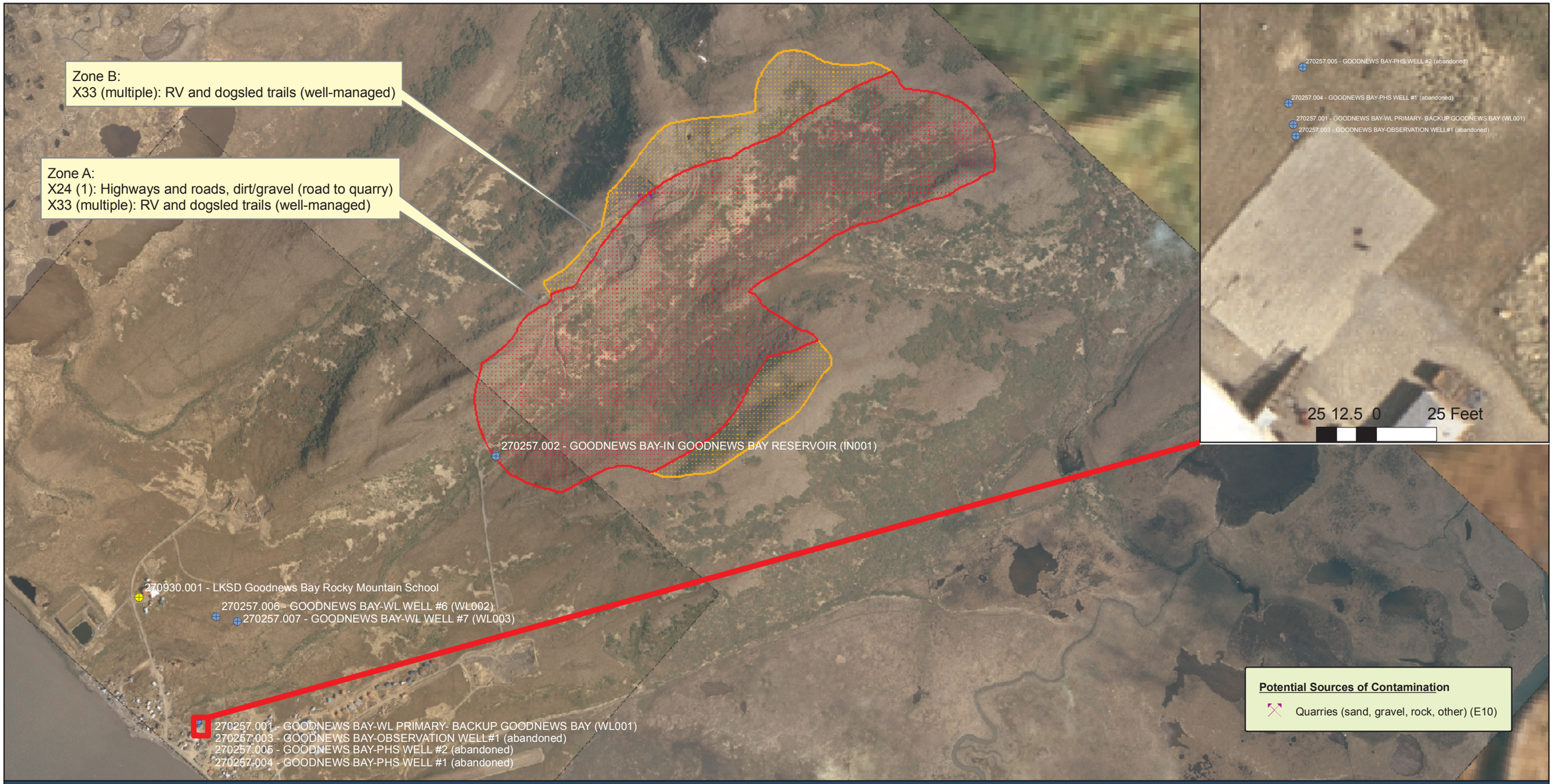
Sources of Other Organic Chemicals

PWSID 270257.002

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Quarries (sand, gravel, rock, other?)	E10	E10-1	A	Low	2	Active. Evidence of runoff through quarry observed upon field visit August 2010 - spring appears at foot of boulder pile, runs across road, and dissapears into road bed.
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Road to quarry.

APPENDIX C

GOODNEWS BAY - GOODNEWS BAY RESERVOIR (IN001)
Drinking Water Protection Area
with Potential and Existing Contaminant Sources
(Map 2)



PWSID 270257.002: GOODNEWS BAY-IN GOODNEWS BAY RESERVOIR on Village Creek

MAP 2

1,000 500 0 1,000 Feet

1 inch = 1,000 feet

Created February 3rd, 2011
Created By: Charley Palmer, DEC/EH-Drinking Water Protection
Data Sources:
1) Low-resolution base imagery - AlaskaMapped WMS/BDL
2) Higher-resolution photo-imagery - DCRA/DCCED 2005 2-foot Community Photos

Public Water Systems

- Community water system (CWS)
- Non-transient non-community water system (NTNCWS)
- Transient non-community water system (TNCWS)
- State-regulated Class C water system

Drinking Water Protection Areas

- Zone A: Up to 1,000-ft buffer from shoreline of source
- Zone B: Up to 1-mi buffer from shoreline of source

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