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# Source Water Assessment

A Hydrogeologic Susceptibility and  
Vulnerability Assessment for  
Birchwood Community Church  
Drinking Water System,  
Birchwood, Alaska

Birchwood Community Church #214219

DRINKING WATER PROTECTION PROGRAM REPORT # 207  
Alaska Department of Environmental Conservation

AUGUST 2002

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**Source Water Assessment for  
Birchwood Community Church  
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By Shannon & Wilson, Inc.

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The Drinking Water Protection 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. If you have any additional information that may affect the results of this assessment, please contact the Program Coordinator of DWPP, (907) 269-7521.

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# Source Water Assessment for Birchwood Community Church Source of Public Drinking Water, Birchwood, Alaska

By Shannon & Wilson, Inc.

## Drinking Water Protection Program Alaska Department of Environmental Conservation

### EXECUTIVE SUMMARY

The Birchwood Community Church is a Class B (transient/non-community) water system consisting of one well, located near the junction of Birchwood Loop Road and McKinley View Avenue in Birchwood, Alaska. Identified potential and current sources of contaminants for this public drinking water source include: large capacity and single family septic systems; residential areas; dirt/gravel and paved roads; medical facilities; motor vehicle repair shops; printers; automotive body shops; municipal/city parks; gasoline stations with repair shops; pet groomers; construction trade areas; landfills; metals mining; gasoline and diesel underground storage tanks; and contaminated sites. These identified potential and existing sources of contamination are considered sources of bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals. Overall, the public water sources for Birchwood Community Church received a vulnerability rating of **High** for volatile organic chemicals, **High** for bacteria and viruses, and **High** for nitrates and nitrites.

### INTRODUCTION

The Alaska Department of Environmental Conservation (ADEC) is completing source water assessments for all public drinking water sources in the State of Alaska. The purpose of this assessment is to provide owners and/or operators, communities, and local governments with information they can use to preserve the quality of Alaska's public drinking water supplies. The results of this source water assessment can be used to decide where voluntary protection efforts are needed and feasible, and also what efforts will be most effective in reducing contaminant risks to your water system. Shannon & Wilson has been contracted to perform these assessments under the supervision of ADEC.

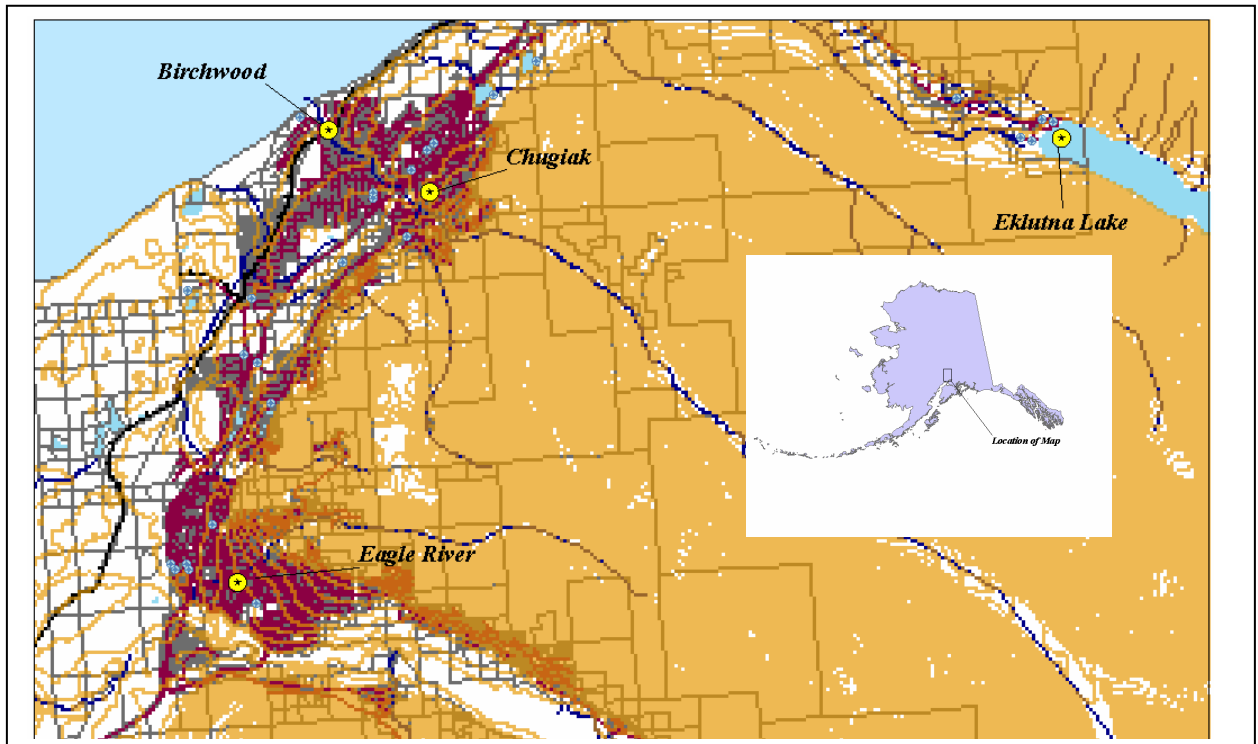


Figure 1. Index map showing the location of the Eagle River Valley and Surrounding Areas.

This source water assessment combines a review of the natural conditions at the site and the potential and existing contaminant risks. These are combined to determine the overall vulnerability of the drinking water source to contamination.

## **DESCRIPTION OF THE CHUGACH MOUNTAIN FRONT EAST OF ANCHORAGE**

### **Location**

Between the Chugach Mountain Front east of Anchorage and Knik Arm lie the communities of Eagle River, Chugiak, Peters Creek, and Eklutna. The Eagle River Valley is one of the largest valleys in the western Chugach Mountains. The area surrounding Eagle River is shown in Figure 1. Eagle River and the neighboring communities are located in the Municipality of Anchorage.

Glacial and alluvial forces have shaped the Eagle River Valley and Chugach Mountain front in this area. These forces have resulted in the U-shaped river valleys and moraine-mantled mountain flanks of the mountain front and lakes, streams and undulating ridges and hills of the glaciated lowlands extending to Knik Arm.

### **Precipitation**

Eagle River averages between 20 and 25 inches of precipitation per year, including about 68 inches of snowfall.

### **Topography and Drainage**

The area topography varies from sea level to about 400 feet in the area surrounding Knik Arm to several thousand feet on the surrounding ridges and mountain flanks.

### **Groundwater**

Although the quality can vary significantly in a short distance, groundwater supplies are generally abundant in the area, except for some reported well failures that have occurred within the city limits of Eagle River. Groundwater occurs within both confined and unconfined aquifers and from both unconsolidated and bedrock aquifers. Many homes and businesses in the area rely on individual wells for their water supply. Most of these wells are shallow with depths of less than 100 feet to 200 feet. Static water levels in many of these wells are less than 15 feet below the surface.

## **Geology and Soils**

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, oxbows and depressions means that some areas have soil conditions that vary over relatively short distances.

## **BIRCHWOOD COMMUNITY CHURCH PUBLIC DRINKING WATER SYSTEM**

Birchwood Community Church is a Class B (transient/non-community) water system. The system consists of one well near the junction of Birchwood Loop Road and McKinley View Avenue.

A well log for the Birchwood Community Church was not available for review. It is assumed that the Birchwood Community Church well was drilled in 1971 and has a total depth of approximately 220 feet below ground surface and was completed with 6-inch well casing. The most recent Sanitary Survey (11/15/93) indicates the well was installed with a cap providing a sanitary seal. A properly installed sanitary seal may provide protection against contaminants from entering the source waters at the well casing. The land surface is apparently sloped away from the well, and provides adequate surface water drainage. It is unknown if the well was grouted according to ADEC regulations. Proper grouting provides added protection against contaminants travelling along the well casing and into source waters.

This system operates year-round and serves 0 residents and more than 400 non-residents through one service connection.

## **BIRCHWOOD COMMUNITY CHURCH 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. Some areas are more likely to allow contamination to reach the well than others. 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 area that contributes water to the well, the groundwater recharge area. This area is designated as the Drinking Water Protection Area (DWPA). Because a release of contaminants within the DWPA are most likely to impact the drinking water well, this area will serve as the focus for voluntary protection efforts.

An analytical calculation was used to determine the size and shape of the DWPA. The input parameters describing the attributes of the aquifer in this calculation were adopted from the U.S. Geological Survey (*Patrick, Brabets, and Glass, 1989*), and State of Alaska Department of Water Resources. Additional methods were also used to take into account any uncertainties in groundwater flow and aquifer characteristics to arrive at a meaningful DWPA (Please refer to the Guidance Manual for Class B Public Water Systems for additional information).

The DWPA's established for wells by the ADEC are separated into four zones. These zones correspond to differences in the time-of-travel (TOT) of the water moving through the aquifer to the well. The TOT 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 four DWPA zones and the calculated TOT for each:

**Table 1. Definition of Zones**

<b>Zone</b>	<b>Definition</b>
A	¼ the distance for the 2 year TOT
B	Less than the 2 year TOT
C	Less than the 5 year TOT
D	Less than the 10 year TOT

As an example, water moving through the aquifer in Zone B will reach the well in less than 2 years from the time it crosses the outer limit of Zone B.

Zone A also incorporates the area downgradient from the well to take into account the area of the aquifer that is influenced by pumping of the well. Water within the aquifer in Zone A will reach the well in several hours to several months.

**INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES**

The Drinking Water Protection Program has completed an inventory of potential and existing sources of contamination within the Birchwood Community Church 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 Class B public water system assessments, three categories of drinking water contaminants were inventoried, they include:

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

Inventoried potential sources of contamination within Zones A through Zone D were associated with residential and light industrial type activities. The sources are summarized in the tables in Appendix B.

**RANKING OF CONTAMINANT RISKS**

Once the potential and existing sources of contamination have been identified, they are sorted and ranked 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. Further, contaminant risks are a function of the number and density of those types of contaminant sources as well as the proximity of those sources to the well.

**VULNERABILITY OF BIRCHWOOD COMMUNITY CHURCH DRINKING WATER SOURCE**

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

- Natural susceptibility; and
- Contaminant risks.

Each of the three categories of drinking water contaminants has been analyzed and an overall vulnerability score of 0 to 100 is ultimately assigned:

Natural Susceptibility (0 – 50 points)

+

Contaminant Risks (0 – 50 points)

=

Vulnerability of the Drinking Water Source to Contamination (0 – 100).

A score for the Natural Susceptibility is achieved by analyzing the properties of the well and the aquifer.

Susceptibility of the Wellhead (0 – 25 Points)

+

Susceptibility of the Aquifer (0 – 25 Points)

=

Natural Susceptibility (Susceptibility of the Well) (0 – 50 Points)

The well for Birchwood Community Church is assumed to be completed in an unconfined aquifer setting. Because an unconfined aquifer is recharged by surface water and precipitation that migrates downward from the surface, contaminants at the surface have the potential to adversely impact this aquifer. Table 2 shows the Overall Susceptibility score and rating for Birchwood Community Church.

**Table 2. Natural Susceptibility - Susceptibility of the Wellhead and Aquifer to Contamination**

	Score	Rating
Susceptibility of the Wellhead	5	Low
Susceptibility of the Aquifer	22	High
Natural Susceptibility	27	Medium

Contaminant risks to a drinking water source depend on the type, number or density, and distribution of contaminant sources. This data has been derived from an examination of existing or historical contamination that has been detected at the drinking water source through routine sampling. It also evaluates potential sources of contamination. Table 3 summarizes the Contaminant Risks for each category of drinking water contaminants.

**Table 3. Contaminant Risks**

Category	Score	Rating
Bacteria and Viruses	50	Very High
Nitrates and/or Nitrites	50	Very High
Volatile Organic Chemicals	42	Very High

Appendix D contains eight charts, which together form the ‘Vulnerability Analysis’ for a source water assessment for a public drinking water source. Chart 1 analyzes the ‘Susceptibility of the Wellhead’ to contamination by looking at the construction of the well and its surrounding area. Chart 2 analyzes the ‘Susceptibility of the Aquifer’ to contamination by looking at the naturally-occurring attributes of the water source and influences on the groundwater system that might lead to contamination. Chart 3 analyzes ‘Contaminant Risks’ for the drinking water source with respect to bacteria and viruses. The ‘Contaminant Risks’ portion of the analysis considers potential sources of contaminants as well as a review of contamination that has or may have occurred, but has not arrived or been detected at the well. Lastly, Chart 4 contains the ‘Vulnerability Analysis for Bacteria and Viruses.’ Charts 5 through 8 contain the Contaminant

Risks and Vulnerability Analyses for nitrates and nitrites and volatile organic chemicals, respectively.

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

**Table 4. Overall Vulnerability of Birchwood Community Church to Contamination by Category**

Category	Score	Rating
Bacteria and Viruses	75	High
Nitrates and Nitrites	75	High
Volatile Organic Chemicals	75	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.

The large capacity and single family septic systems, residential areas, dirt/gravel and paved roads, medical facilities, motor vehicle repair shops, printers, automotive body shops, municipal/city parks, gasoline stations with repair shops, pet groomers, construction trade areas, landfills, metals mining, gasoline and diesel underground storage tanks, and contaminated sites create a risk increase for bacteria and viruses, nitrates and nitrites, and volatile organic compounds.

Only a small amount of bacteria and viruses are required to endanger public health. Bacteria and viruses have not been detected during recent water sampling of the system at Birchwood Community Church.

Nitrates and/or nitrites are found in natural background concentration at this site, as elsewhere throughout Alaska. Nitrate concentrations in uncontaminated groundwater are typically less than 2 milligrams per liter (mg/L) and are derived primarily from the decomposition of organic matter in soils, adopted from the U.S. Geological Survey (Wang, et al., 2000).

Sampling history for Birchwood Community Church well indicates that low concentrations of nitrates have been detected (see Chart 5 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D). The maximum reported existing nitrate concentration is approximately 6.600 mg/L or 66% of the Maximum Contaminant Level (MCL) of 10 mg/L. The MCL is the maximum level of contaminant that is allowed to exist in drinking water and still be consumed by humans without harmful health effects. Due to the high solubility and weak retention by soil, nitrates are very mobile, moving at

approximately the same rate as water. Though existing nitrate contamination was detected at the site, concentrations remain below the MCL.

## **SUMMARY**

A *Source Water Assessment* has been completed for the sources of public drinking water serving Birchwood Community Church. The overall vulnerability of this source to contamination is **High** for volatile organic chemicals, **High** for bacteria and viruses, and **High** for nitrates and nitrites. 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 Birchwood Community Church 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 Birchwood Community Church public drinking water source.



## REFERENCES CITED

Munter, J.A., and Allely, R. D., 1992, Water-Supply Aquifers at Eagle River, Alaska: State of Alaska Division of Geological & Geophysical Surveys Professional Report 108.

Patrick, L.D., Brabets, T.P., and Glass, R.L., 1989, Simulation of ground-water flow at Anchorage, Alaska: US Geological Survey Water-Resources Investigations Report 88-4139, 41p.

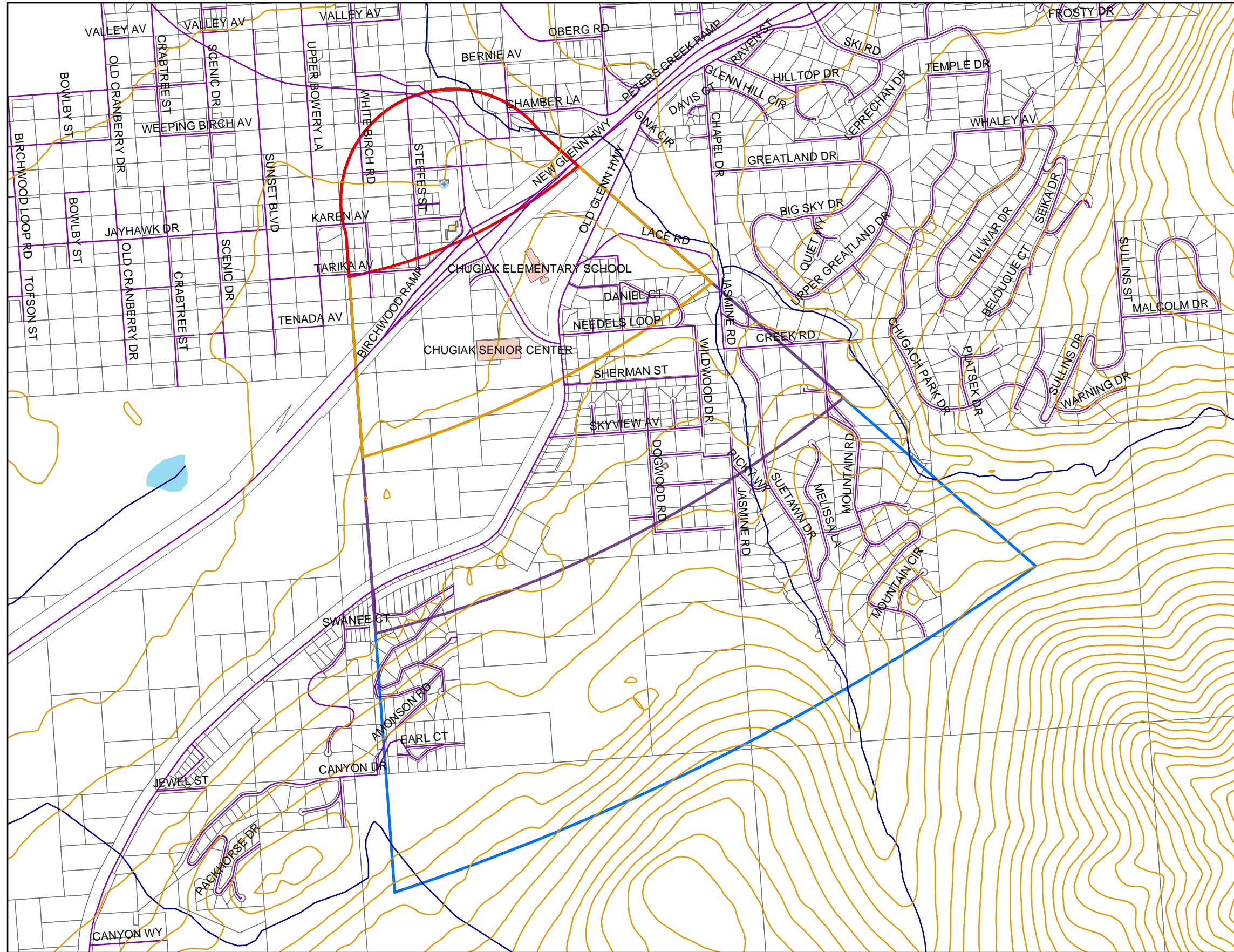
Wang, B., Strelakos, P.M., and Jokela, J.B., 2000, Nitrate source indicators in ground water of the scimitar subdivision, Peters Creek Area, Anchorage, Alaska: US Geological Survey Water-Resources Investigations Report 00-4137.

Weather Underground, June 18, 2002, Web extension to the *Western Regional Climate Center* [WWW document]. URL <http://www.wunderground.com>

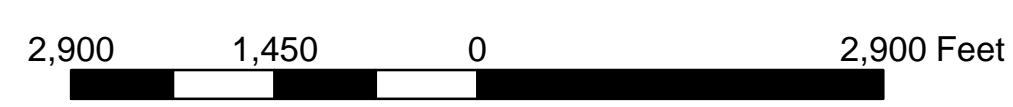
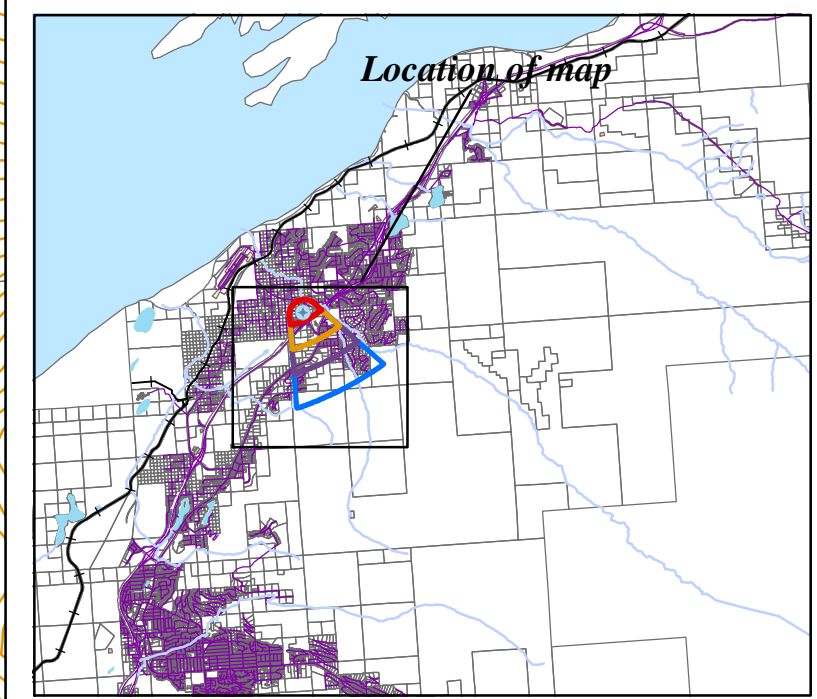
## **APPENDIX A**

### **Birchwood Community Church Drinking Water Protection Area (Map 1)**

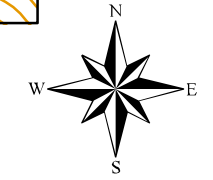
# Drinking Water Protection Areas for Birchwood Community Church



- Birchwood Community Church Well
- 25m Contours
- Railroads
- Streams
- Roads
- MOA Buildings
- MOA land parcels
- Cook Inlet
- Site Buildings
- Zone A Protection Area**
- Several Months Travel Time
- Zone B Protection Area**
- Less than 2-Years Travel Time
- Zone C Protection Area**
- Less than 5-Years Travel Time
- Zone D Protection Area**
- Less than 10-Years Travel Time



PWSID 214219.001



*Map 1*

## **APPENDIX B**

### **Contaminant Source Inventory and Risk Ranking for Birchwood Community Church (Tables 1-4)**

**Table 1****Contaminant Source Inventory for  
Birchwood Community Church****PWSID 214219.001**

<b>Contaminant Source Type</b>	<b>Contaminant Source ID</b>	<b>CS ID tag</b>	<b>Zone</b>	<b>Location</b>	<b>Map Number</b>	<b>Comments</b>
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	Steffes Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2	A	East of Steffes Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-3	A	Between Steffes and Birchwood Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4	A	Off Pilots Road	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-5	A	West off Steffes Street	3	
Residential Areas	R01	R1-1	A	Residences around McKinley View Avenue	2	72 Acres
Septic systems (serves one single-family home)	R02	R2-1-40	A	Around Birchwood Loop Road	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Birchwood Loop	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	New Glenn Highway	2	
Highways and roads, dirt/gravel	X24	X24-1	A	Steffes Street	2	
Highways and roads, dirt/gravel	X24	X24-2	A	McKinley View Avenue	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Jayhawk Drive	2	
Highways and roads, dirt/gravel	X24	X24-4	A	N. of Tarika Ave,	2	
Highways and roads, dirt/gravel	X24	X24-5	A	Stamer Street	2	
Highways and roads, dirt/gravel	X24	X24-6	A	Chamber Lane	2	
Highways and roads, dirt/gravel	X24	X24-7	A	NE. of Birchwood Community	2	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	A	North of Tarika Avenue	3	
Motor /motor vehicle repair shops	C31	C31-1	B	Corner of Old Glenn Highway, south of Birchwood Loop Road	3	
Printers, publishers, copiers	C37	C37-1	B	Corner of Old Glenn Highway and Birchwood Loop Road	3	
Body shops (automotive)	C05	C5-1	B	Corner of Old Glenn Highway and Birchwood Loop Road	3	

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-10	B	W. of Old Glenn Highway	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-11	B	South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-12	B	South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-13	B	South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-6	B	Off New Glenn Highway	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-7	B	Off Birchwood Ramp, east side	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-8	B	Chugiak Elementary School	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-9	B	S. of Lace Road	3	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	B	Corner of Old Glenn Highway and Birchwood Loop Road	3	
Residential Areas	R01	R1-2	B	Residences around Daniel Court and Needels Loop	2	26 Acres
Septic systems (serves one single-family home)	R02	R2-41-67	B		3	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Birchwood Ramp	2	
Highways and roads, dirt/gravel	X24	X24-10	B	S. of Lace Road	2	
Highways and roads, dirt/gravel	X24	X24-11	B	Needles Loop	2	
Highways and roads, dirt/gravel	X24	X24-12	B	S. of Needles Loop	2	
Highways and roads, dirt/gravel	X24	X24-8	B	W. of Chugiak Elementary School	2	
Highways and roads, dirt/gravel	X24	X24-9	B	Lace Road	2	
Municipal or city parks (with green areas)	X04	X4-1	B	Off Lace Road	3	
Municipal or city parks (with green areas)	X04	X4-2	B	Between New Glenn and Old Glenn Highways	3	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	B	Off Birchwood Loop Road	3	
Gasoline stations (with repair shop)	C16	C16-1	C	Off Old Glenn Highway, south of Skyview Avenue	3	

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Pet groomers	C34	C34-1	C	Off Old Glenn Highway, south of Sherman Street	3	
Construction trade areas and materials	C09	C9-1	C	Off Lipin Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-14	C	South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-15	C	Between Needels Loop and Sherman Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-16	C	Between Needels Loop and Sherman Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-17	C	Between Sherman and Skyview Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-18	C	East of Old Glenn Highway, south of Skyview Avenue	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-19	C	East of Old Glenn Highway, south of Skyview Avenue	3	
Landfills (municipal; Class III)	D51	D51-1	C	Between New Glenn and Old Glenn Highways	3	
Metals mining, open pit (active or inactive?)	E03	E3-1	C	Between Old Glenn Highway and Dogwood Road, south of Skyview Avenue	3	
Residential Areas	R01	R1-3	C	Residences around Old Glenn Highway and Jasmine Road	2	102 Acres
Septic systems (serves one single-family home)	R02	R2-68-160	C		3	
Tanks, gasoline (underground)	T12	T12-1	C	Off Old Glenn Highway, south of Skyview Avenue	3	
Tanks, diesel (underground)	T08	T8-1	C	Off Old Glenn Highway, south of Skyview Avenue	3	
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U4-1	C	Off Old Glenn Highway, south of Skyview Avenue	3	
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U4-2	C	Off Old Glenn Highway, south of Skyview Avenue	3	
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U4-3	C	Off Old Glenn Highway, south of Skyview Avenue	3	
Highways and roads, dirt/gravel	X24	X24-13	C	Wildwood Drive	2	
Highways and roads, dirt/gravel	X24	X24-14	C	Creek Way	2	
Highways and roads, dirt/gravel	X24	X24-15	C	Sherman Street	2	

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24	X24-16	C	Skyview Avenue	2	
Highways and roads, dirt/gravel	X24	X24-17	C	N. of Skyview Ave	2	
Highways and roads, dirt/gravel	X24	X24-18	C	N. of Skyview Ave	2	
Highways and roads, dirt/gravel	X24	X24-19	C	Dogwood Road	2	
Highways and roads, dirt/gravel	X24	X24-20	C	N. of Skyview Ave	2	
Highways and roads, dirt/gravel	X24	X24-21	C	Dotberry Drive	2	
Highways and roads, dirt/gravel	X24	X24-22	C	Elder Drive	2	
Highways and roads, dirt/gravel	X24	X24-23	C	W. of Dogwood Rd.	2	
Highways and roads, dirt/gravel	X24	X24-24	C	E. of Swanee Ct.	2	
Highways and roads, dirt/gravel	X24	X24-25	C	Amonson Road	2	
Highways and roads, dirt/gravel	X24	X24-26	C	N. of Creek Road	2	
Highways and roads, dirt/gravel	X24	X24-27	C	Jasmine Road	2	
Highways and roads, dirt/gravel	X24	X24-28	C	Creek Road	2	
Highways and roads, dirt/gravel	X24	X24-29	C	Suetawn Drive	2	
Highways and roads, dirt/gravel	X24	X24-30	C	Mountain Road	2	
Highways and roads, dirt/gravel	X24	X24-31	C	S. of Creek Road	2	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-3	C	Off Old Glenn Highway, south of Skyview Avenue	3	



*Contaminant Source Inventory and Risk Ranking for*

*PWSID 214219.001*

*Table 2*

*Birchwood Community Church*

*Sources of Bacteria and Viruses*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	High		Steffes Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2	A	High		East of Steffes Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-3	A	High		Between Steffes and Birchwood Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4	A	High		Off Pilots Road	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-5	A	High		West off Steffes Street	3	
Residential Areas	R01	R1-1	A	Low		Residences around McKinley View Avenue	2	72 Acres
Septic systems (serves one single-family home)	R02	R2-1-40	A	Low		Around Birchwood Loop Road	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low		Birchwood Loop	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		New Glenn Highway	2	
Highways and roads, dirt/gravel	X24	X24-1	A	Low		Steffes Street	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Low		McKinley View Avenue	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Low		Jayhawk Drive	2	
Highways and roads, dirt/gravel	X24	X24-4	A	Low		N. of Tarika Ave,	2	
Highways and roads, dirt/gravel	X24	X24-5	A	Low		Stamer Street	2	
Highways and roads, dirt/gravel	X24	X24-6	A	Low		Chamber Lane	2	
Highways and roads, dirt/gravel	X24	X24-7	A	Low		NE. of Birchwood Community Church	2	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	A	Medium		North of Tarika Avenue	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-10	B	High		W. of Old Glenn Highway	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-11	B	High		South of Needels Loop	3	

*Contaminant Source Inventory and Risk Ranking for*

PWSID 214219.001

*Table 2 (continued)*

*Birchwood Community Church*

*Sources of Bacteria and Viruses*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-11	B	High		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-12	B	High		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-13	B	High		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-6	B	High		Off New Glenn Highway	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-7	B	High		Off Birchwood Ramp, east side	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-8	B	High		Chugiak Elementary School	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-9	B	High		S. of Lace Road	3	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	B	Low		Corner of Old Glenn Highway and Birchwood Loop Road	3	
Residential Areas	R01	R1-2	B	Low		Residences around Daniel Court and Needels Loop	2	26 Acres
Septic systems (serves one single-family home)	R02	R2-41-67	B	Low			3	
Septic systems (serves one single-family home)	R02	R2-41-67	B	High			3	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low		Birchwood Ramp	2	
Highways and roads, dirt/gravel	X24	X24-10	B	Low		S. of Lace Road	2	
Highways and roads, dirt/gravel	X24	X24-11	B	Low		Needles Loop	2	
Highways and roads, dirt/gravel	X24	X24-12	B	Low		S. of Needles Loop	2	
Highways and roads, dirt/gravel	X24	X24-8	B	Low		W. of Chugiak Elementary School	2	
Highways and roads, dirt/gravel	X24	X24-9	B	Low		Lace Road	2	
Municipal or city parks (with green areas)	X04	X4-1	B	Medium		Off Lace Road	3	

*Contaminant Source Inventory and Risk Ranking for*

*PWSID 214219.001*

*Birchwood Community Church*

*Sources of Bacteria and Viruses*

*Table 2 (continued)*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Municipal or city parks (with green areas)	X04	X4-2	B	Medium		Between New Glenn and Old Glenn Highways	3	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	B	Medium		Off Birchwood Loop Road	3	

*Contaminant Source Inventory and Risk Ranking for*

*PWSID 214219.001*

**Table 3**

*Birchwood Community Church*

*Sources of Nitrates/Nitrites*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	High		Steffes Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2	A	High		East of Steffes Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-3	A	High		Between Steffes and Birchwood Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4	A	High		Off Pilots Road	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-5	A	High		West off Steffes Street	3	
Residential Areas	R01	R1-1	A	Low		Residences around McKinley View Avenue	2	72 Acres
Septic systems (serves one single-family home)	R02	R2-1-40	A	Low		Around Birchwood Loop Road	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low		Birchwood Loop	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		New Glenn Highway	2	
Highways and roads, dirt/gravel	X24	X24-1	A	Low		Steffes Street	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Low		McKinley View Avenue	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Low		Jayhawk Drive	2	
Highways and roads, dirt/gravel	X24	X24-4	A	Low		N. of Tarika Ave,	2	
Highways and roads, dirt/gravel	X24	X24-5	A	Low		Stamer Street	2	
Highways and roads, dirt/gravel	X24	X24-6	A	Low		Chamber Lane	2	
Highways and roads, dirt/gravel	X24	X24-7	A	Low		NE. of Birchwood Community Church	2	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	A	Low		North of Tarika Avenue	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-10	B	High		W. of Old Glenn Highway	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-11	B	High		South of Needels Loop	3	

*Contaminant Source Inventory and Risk Ranking for*

PWSID 214219.001

*Table 3 (continued)*

*Birchwood Community Church*

*Sources of Nitrates/Nitrites*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-11	B	High		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-12	B	High		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-13	B	High		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-6	B	High		Off New Glenn Highway	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-7	B	High		Off Birchwood Ramp, east side	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-8	B	High		Chugiak Elementary School	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-9	B	High		S. of Lace Road	3	
Residential Areas	R01	R1-2	B	Low		Residences around Daniel Court and Needels Loop	2	26 Acres
Septic systems (serves one single-family home)	R02	R2-41-67	B	Low			3	
Septic systems (serves one single-family home)	R02	R2-41-67	B	High			3	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low		Birchwood Ramp	2	
Highways and roads, dirt/gravel	X24	X24-10	B	Low		S. of Lace Road	2	
Highways and roads, dirt/gravel	X24	X24-11	B	Low		Needles Loop	2	
Highways and roads, dirt/gravel	X24	X24-12	B	Low		S. of Needles Loop	2	
Highways and roads, dirt/gravel	X24	X24-8	B	Low		W. of Chugiak Elementary School	2	
Highways and roads, dirt/gravel	X24	X24-9	B	Low		Lace Road	2	
Municipal or city parks (with green areas)	X04	X4-1	B	Medium		Off Lace Road	3	
Municipal or city parks (with green areas)	X04	X4-2	B	Medium		Between New Glenn and Old Glenn Highways	3	

*Contaminant Source Inventory and Risk Ranking for*

PWSID 214219.001

Table 3 (continued)

*Birchwood Community Church*

*Sources of Nitrates/Nitrites*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	B	Low		Off Birchwood Loop Road	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-14	C	High		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-15	C	High		Between Needels Loop and Sherman Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-16	C	High		Between Needels Loop and Sherman Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-17	C	High		Between Sherman and Skyview Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-18	C	High		East of Old Glenn Highway, south of Skyview Avenue	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-19	C	High		East of Old Glenn Highway, south of Skyview Avenue	3	
Landfills (municipal; Class III)	D51	D51-1	C	Very High		Between New Glenn and Old Glenn Highways	3	
Metals mining, open pit (active or inactive?)	E03	E3-1	C	Low		Between Old Glenn Highway and Dogwood Road, south of Skyview Avenue	3	
Residential Areas	R01	R1-3	C	Low		Residences around Old Glenn Highway and Jasmine Road	2	102 Acres
Septic systems (serves one single-family home)	R02	R2-68-160	C	Low			3	
Highways and roads, dirt/gravel	X24	X24-13	C	Low		Wildwood Drive	2	
Highways and roads, dirt/gravel	X24	X24-14	C	Low		Creek Way	2	
Highways and roads, dirt/gravel	X24	X24-15	C	Low		Sherman Street	2	
Highways and roads, dirt/gravel	X24	X24-16	C	Low		Skyview Avenue	2	
Highways and roads, dirt/gravel	X24	X24-17	C	Low		N. of Skyview Ave	2	
Highways and roads, dirt/gravel	X24	X24-18	C	Low		N. of Skyview Ave	2	

*Contaminant Source Inventory and Risk Ranking for*

*PWSID 214219.001*

*Birchwood Community Church*

*Sources of Nitrates/Nitrites*

*Table 3 (continued)*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24	X24-19	C	Low		Dogwood Road	2	
Highways and roads, dirt/gravel	X24	X24-20	C	Low		N. of Skyview Ave	2	
Highways and roads, dirt/gravel	X24	X24-21	C	Low		Dotberry Drive	2	
Highways and roads, dirt/gravel	X24	X24-22	C	Low		Elder Drive	2	
Highways and roads, dirt/gravel	X24	X24-23	C	Low		W. of Dogwood Rd.	2	
Highways and roads, dirt/gravel	X24	X24-24	C	Low		E. of Swanee Ct.	2	
Highways and roads, dirt/gravel	X24	X24-25	C	Low		Amonson Road	2	
Highways and roads, dirt/gravel	X24	X24-26	C	Low		N. of Creek Road	2	
Highways and roads, dirt/gravel	X24	X24-27	C	Low		Jasmine Road	2	
Highways and roads, dirt/gravel	X24	X24-28	C	Low		Creek Road	2	
Highways and roads, dirt/gravel	X24	X24-29	C	Low		Suetawn Drive	2	
Highways and roads, dirt/gravel	X24	X24-30	C	Low		Mountain Road	2	
Highways and roads, dirt/gravel	X24	X24-31	C	Low		S. of Creek Road	2	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-3	C	Low		Off Old Glenn Highway, south of Skyview	3	

*Contaminant Source Inventory and Risk Ranking for*

*PWSID 214219.001*

**Table 4**

*Birchwood Community Church*

*Sources of Volatile Organic Chemicals*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1	A	Low		Steffes Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-2	A	Low		East of Steffes Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-3	A	Low		Between Steffes and Birchwood Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4	A	Low		Off Pilots Road	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-5	A	Low		West off Steffes Street	3	
Residential Areas	R01	R1-1	A	Low		Residences around McKinley View Avenue	2	72 Acres
Septic systems (serves one single-family home)	R02	R2-1-40	A	Low		Around Birchwood Loop Road	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low		Birchwood Loop	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		New Glenn Highway	2	
Highways and roads, dirt/gravel	X24	X24-1	A	Low		Steffes Street	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Low		McKinley View Avenue	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Low		Jayhawk Drive	2	
Highways and roads, dirt/gravel	X24	X24-4	A	Low		N. of Tarika Ave,	2	
Highways and roads, dirt/gravel	X24	X24-5	A	Low		Stamer Street	2	
Highways and roads, dirt/gravel	X24	X24-6	A	Low		Chamber Lane	2	
Highways and roads, dirt/gravel	X24	X24-7	A	Low		NE. of Birchwood Community Church	2	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	A	Low		North of Tarika Avenue	3	
Motor /motor vehicle repair shops	C31	C31-1	B	High		Corner of Old Glenn Highway, south of Birchwood Loop Road	3	



*Contaminant Source Inventory and Risk Ranking for*

PWSID 214219.001

*Table 4 (continued)*

*Birchwood Community Church*

*Sources of Volatile Organic Chemicals*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Motor /motor vehicle repair shops	C31	C31-1	B	Medium		Corner of Old Glenn Highway, south of Birchwood Loop Road	3	
Printers, publishers, copiers	C37	C37-1	B	High		Corner of Old Glenn Highway and Birchwood Loop Road	3	
Body shops (automotive)	C05	C5-1	B	Medium		Corner of Old Glenn Highway and Birchwood Loop Road	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-10	B	Low		W. of Old Glenn Highway	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-11	B	Low		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-11	B	Low		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-12	B	Low		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-13	B	Low		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-6	B	Low		Off New Glenn Highway	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-7	B	Low		Off Birchwood Ramp, east side	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-8	B	Low		Chugiak Elementary School	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-9	B	Low		S. of Lace Road	3	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	B	High		Corner of Old Glenn Highway and Birchwood Loop Road	3	
Residential Areas	R01	R1-2	B	Low		Residences around Daniel Court and Needels Loop	2	26 Acres
Septic systems (serves one single-family home)	R02	R2-41-67	B	Low			3	

*Contaminant Source Inventory and Risk Ranking for*

PWSID 214219.001

*Table 4 (continued)*

*Birchwood Community Church*

*Sources of Volatile Organic Chemicals*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-41-67	B	Low			3	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low		Birchwood Ramp	2	
Highways and roads, dirt/gravel	X24	X24-10	B	Low		S. of Lace Road	2	
Highways and roads, dirt/gravel	X24	X24-11	B	Low		Needles Loop	2	
Highways and roads, dirt/gravel	X24	X24-12	B	Low		S. of Needles Loop	2	
Highways and roads, dirt/gravel	X24	X24-8	B	Low		W. of Chugiak Elementary School	2	
Highways and roads, dirt/gravel	X24	X24-9	B	Low		Lace Road	2	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	B	Low		Off Birchwood Loop Road	3	
Gasoline stations (with repair shop)	C16	C16-1	C	High		Off Old Glenn Highway, south of Skyview	3	
Pet groomers	C34	C34-1	C	Low		Off Old Glenn Highway, south of Sherman	3	
Construction trade areas and materials	C09	C9-1	C	Low		Off Lipin Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-14	C	Low		South of Needels Loop	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-15	C	Low		Between Needels Loop and Sherman Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-16	C	Low		Between Needels Loop and Sherman Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-17	C	Low		Between Sherman and Skyview Street	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-18	C	Low		East of Old Glenn Highway, south of Skyview Avenue	3	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-19	C	Low		East of Old Glenn Highway, south of Skyview Avenue	3	
Landfills (municipal; Class III)	D51	D51-1	C	High		Between New Glenn and Old Glenn Highways	3	

*Contaminant Source Inventory and Risk Ranking for*

PWSID 214219.001

*Table 4 (continued)*

*Birchwood Community Church*

*Sources of Volatile Organic Chemicals*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Metals mining, open pit (active or inactive?)	E03	E3-1	C	Medium		Between Old Glenn Highway and Dogwood Road, south of Skyview Avenue	3	
Residential Areas	R01	R1-3	C	Low		Residences around Old Glenn Highway and Jasmine Road	2	102 Acres
Septic systems (serves one single-family home)	R02	R2-68-160	C	Low			3	
Tanks, gasoline (underground)	T12	T12-1	C	High		Off Old Glenn Highway, south of Skyview	3	
Tanks, diesel (underground)	T08	T8-1	C	High		Off Old Glenn Highway, south of Skyview	3	
Highways and roads, dirt/gravel	X24	X24-13	C	Low		Wildwood Drive	2	
Highways and roads, dirt/gravel	X24	X24-14	C	Low		Creek Way	2	
Highways and roads, dirt/gravel	X24	X24-15	C	Low		Sherman Street	2	
Highways and roads, dirt/gravel	X24	X24-16	C	Low		Skyview Avenue	2	
Highways and roads, dirt/gravel	X24	X24-17	C	Low		N. of Skyview Ave	2	
Highways and roads, dirt/gravel	X24	X24-18	C	Low		N. of Skyview Ave	2	
Highways and roads, dirt/gravel	X24	X24-19	C	Low		Dogwood Road	2	
Highways and roads, dirt/gravel	X24	X24-20	C	Low		N. of Skyview Ave	2	
Highways and roads, dirt/gravel	X24	X24-21	C	Low		Dotberry Drive	2	
Highways and roads, dirt/gravel	X24	X24-22	C	Low		Elder Drive	2	
Highways and roads, dirt/gravel	X24	X24-23	C	Low		W. of Dogwood Rd.	2	
Highways and roads, dirt/gravel	X24	X24-24	C	Low		E. of Swanee Ct.	2	
Highways and roads, dirt/gravel	X24	X24-25	C	Low		Amonson Road	2	
Highways and roads, dirt/gravel	X24	X24-26	C	Low		N. of Creek Road	2	
Highways and roads, dirt/gravel	X24	X24-27	C	Low		Jasmine Road	2	

*Contaminant Source Inventory and Risk Ranking for*

*PWSID 214219.001*

*Birchwood Community Church*

*Sources of Volatile Organic Chemicals*

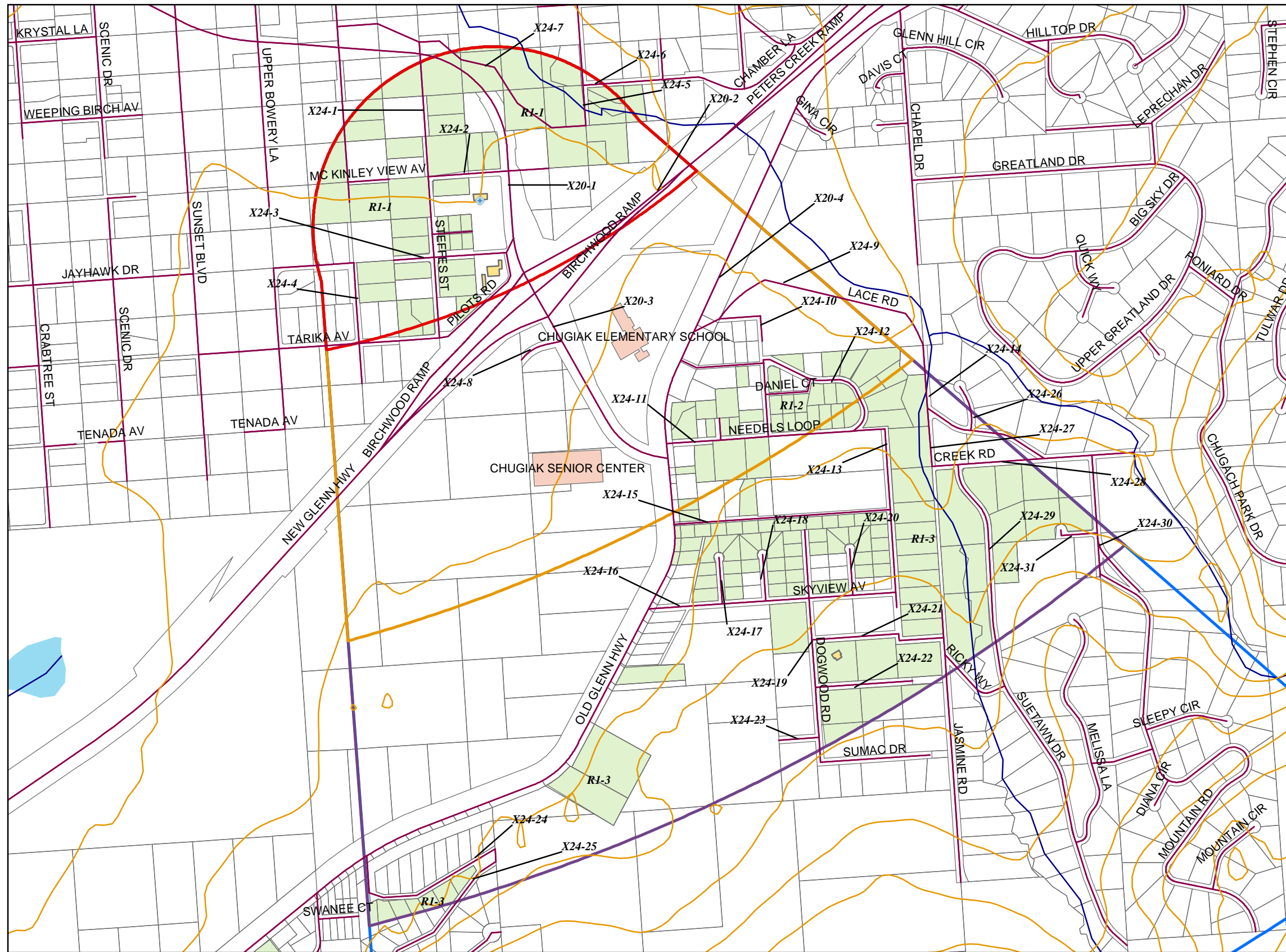
*Table 4 (continued)*

<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>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24	X24-28	C	Low		Creek Road	2	
Highways and roads, dirt/gravel	X24	X24-29	C	Low		Suetawn Drive	2	
Highways and roads, dirt/gravel	X24	X24-30	C	Low		Mountain Road	2	
Highways and roads, dirt/gravel	X24	X24-31	C	Low		S. of Creek Road	2	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-3	C	Low		Off Old Glenn Highway, south of Skyview	3	

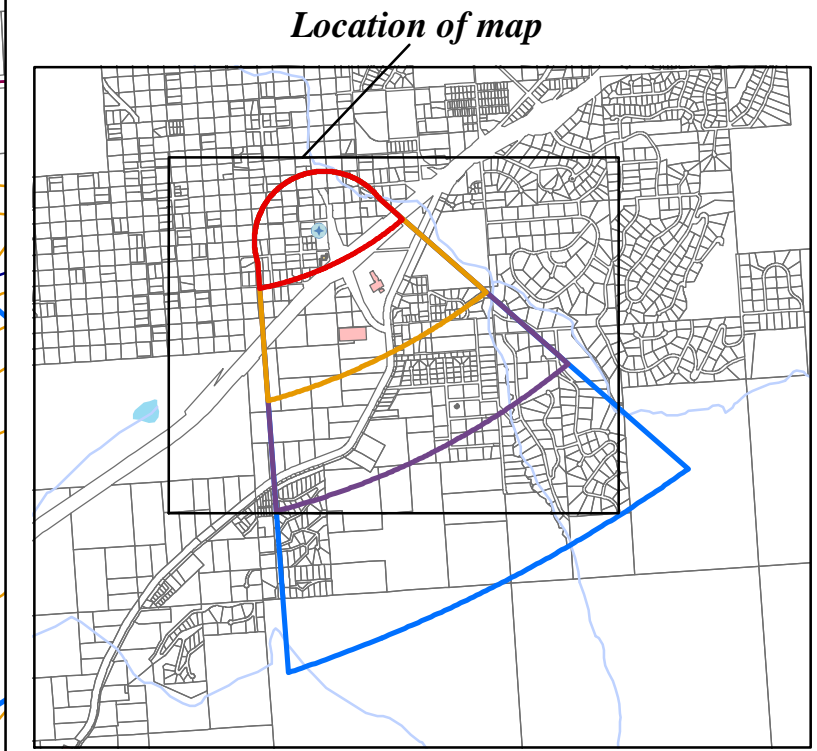
## **APPENDIX C**

### **Birchwood Community Church Drinking Water Protection Area and Potential and Existing Contaminant Sources (Maps 2-3)**

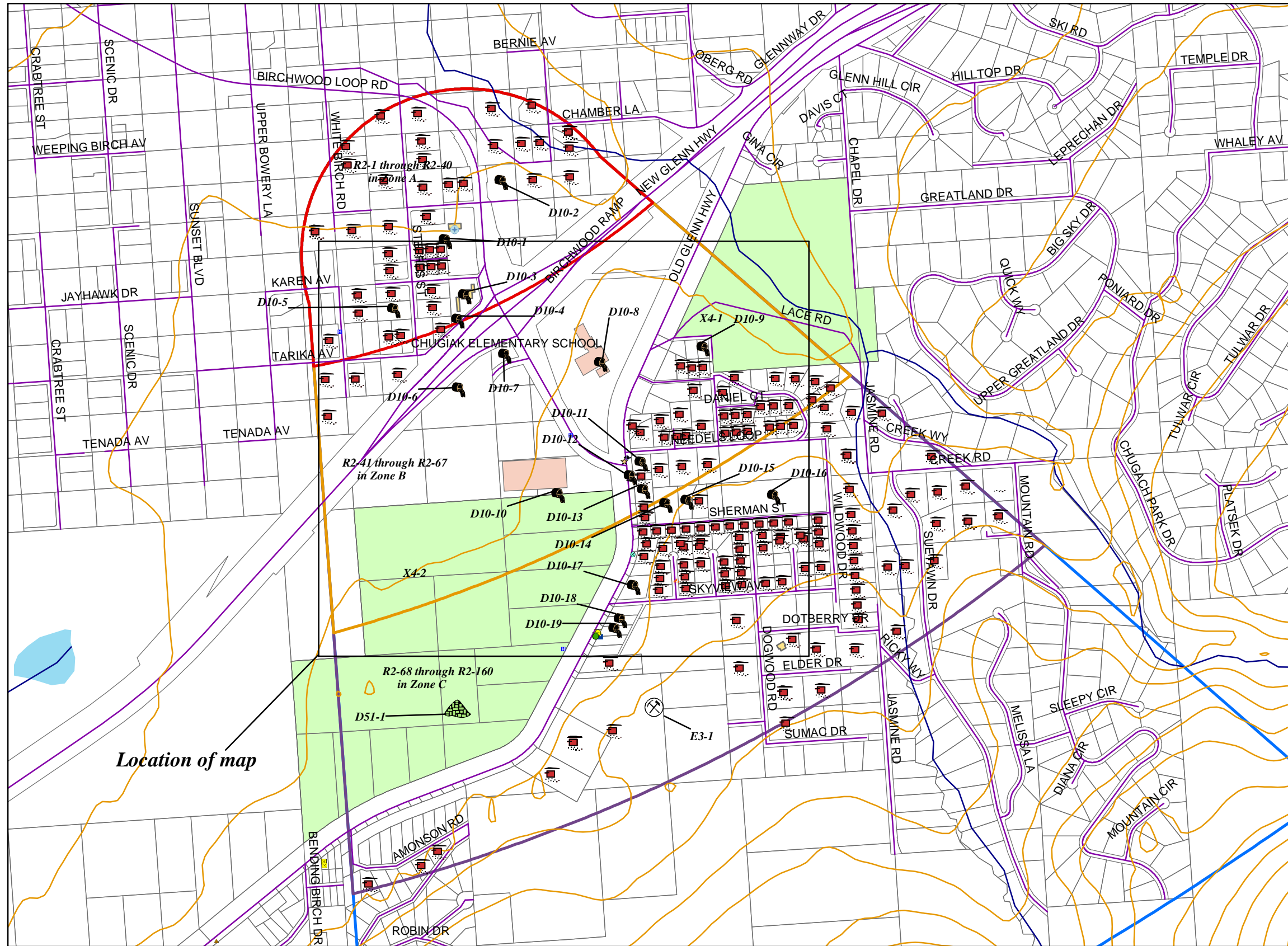
# Drinking Water Protection Areas for Birchwood Community Church and Potential and Existing Sources of Contamination



- + Birchwood Community Church Well
- ~ 25m Contours
- roads
- Railroads
- Streams
- Roads
- MOA Buildings
- MOA land parcels
- Cook Inlet
- Residential Areas (R1)
- MOA Airports
- Site Buildings
- Zone A Protection Area**
- Several Months Travel Time
- Zone B Protection Area**
- Less than 2-Years Travel Time
- Zone C Protection Area**
- Less than 5-Years Travel Time
- Zone D Protection Area**
- Less than 10-Years Travel Time

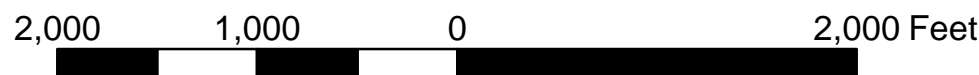


# Drinking Water Protection Areas for Birchwood Community Church and Potential and Existing Sources of Contamination

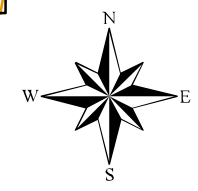
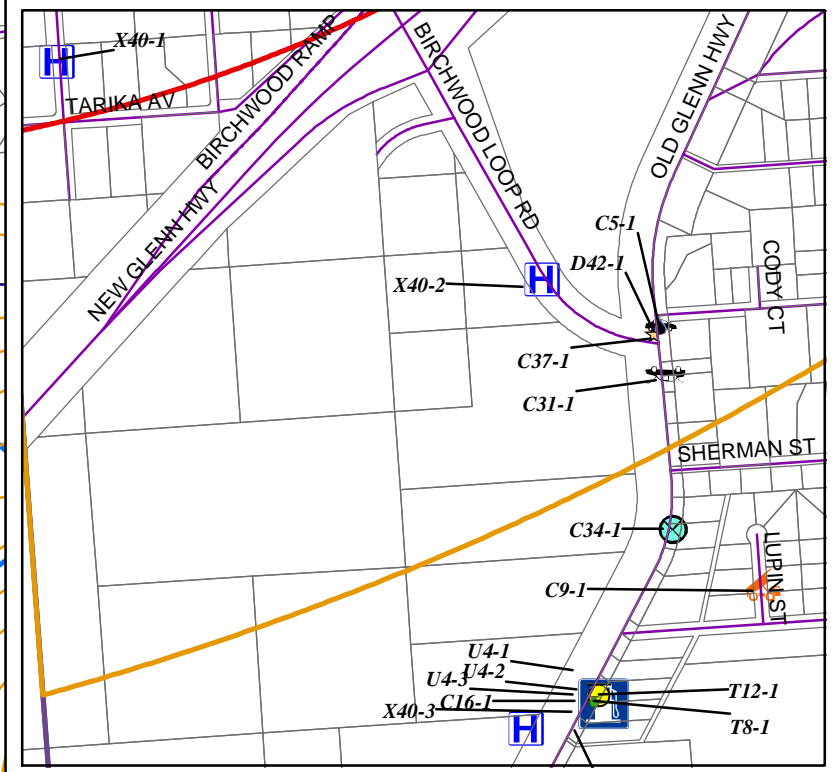


- Birchwood Community Church Well
- Large Capacity Septic Systems (D10)
- Single Family Septic Systems (R2)
- Peters Creek Landfill (D51)
- Metals Mining, Open Pit (E3)
- Body shops (automotive)
- Construction trade areas and materials (C9)
- Contaminated sites, DEC recognized, non-Superfund, non-RCRA
- Gasoline stations (with repair shop)
- Injection wells (Class V) Motor Vehicle Waste Disposal Well
- Leather processing
- Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes) (X40)
- Motor / motor vehicle repair shops
- Pet groomers (C34)
- Printers, publishers, copiers
- Tanks, diesel (underground)
- Tanks, gasoline (underground)
- 25m Contours
- Railroads
- Streams
- Roads
- MOA Buildings
- MOA land parcels
- Cook Inlet
- Parks (X4)
- MOA Airports
- Site Buildings
- Zone A Protection Area**
- Several Months Travel Time
- Zone B Protection Area**
- Less than 2-Years Travel Time
- Zone C Protection Area**
- Less than 5-Years Travel Time
- Zone D Protection Area**
- Less than 10-Years Travel Time

Location of map



PWSID 214219.001



Map 3

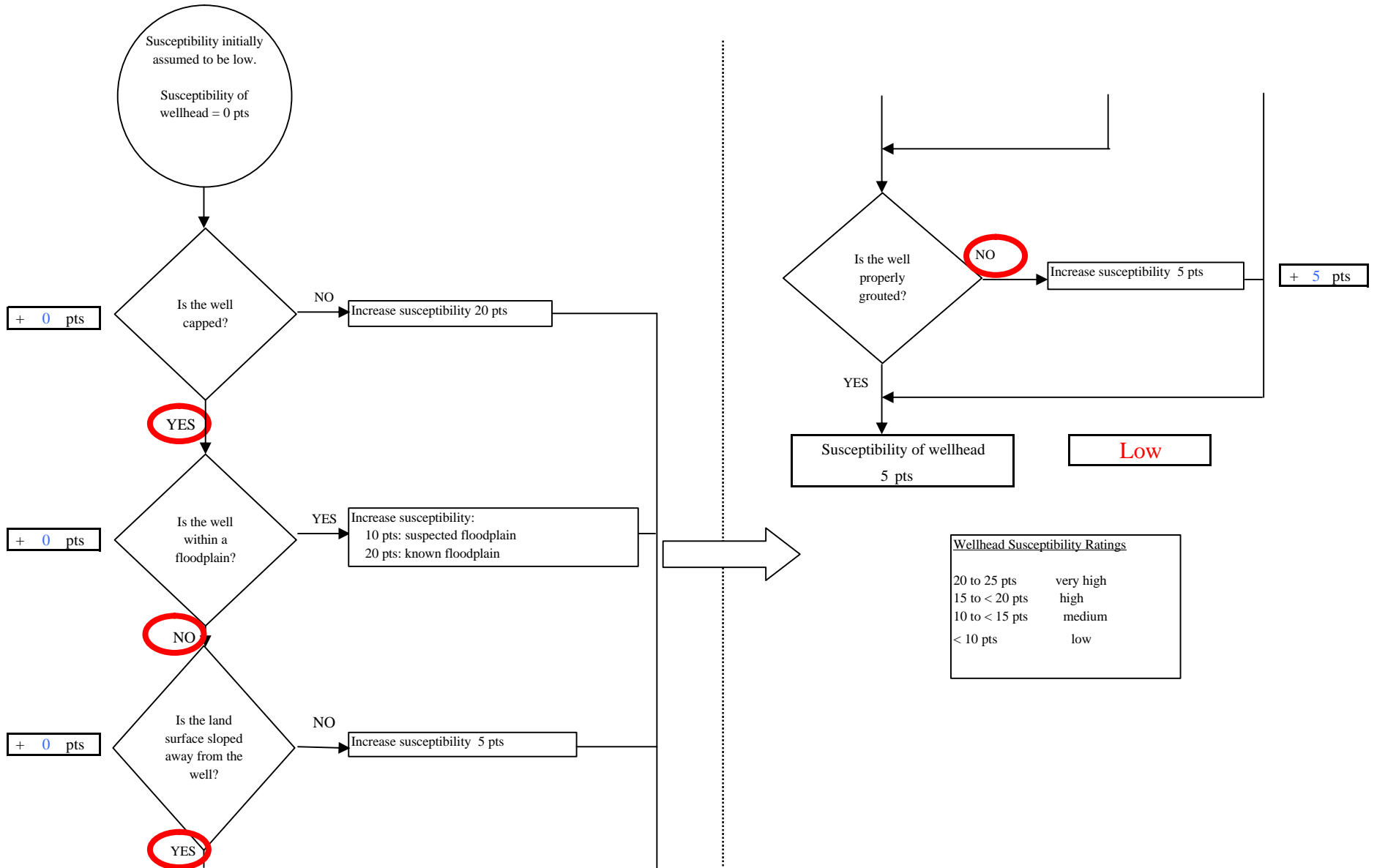
## **APPENDIX D**

### **Vulnerability Analysis for Birchwood Community Church Public Drinking Water Source**

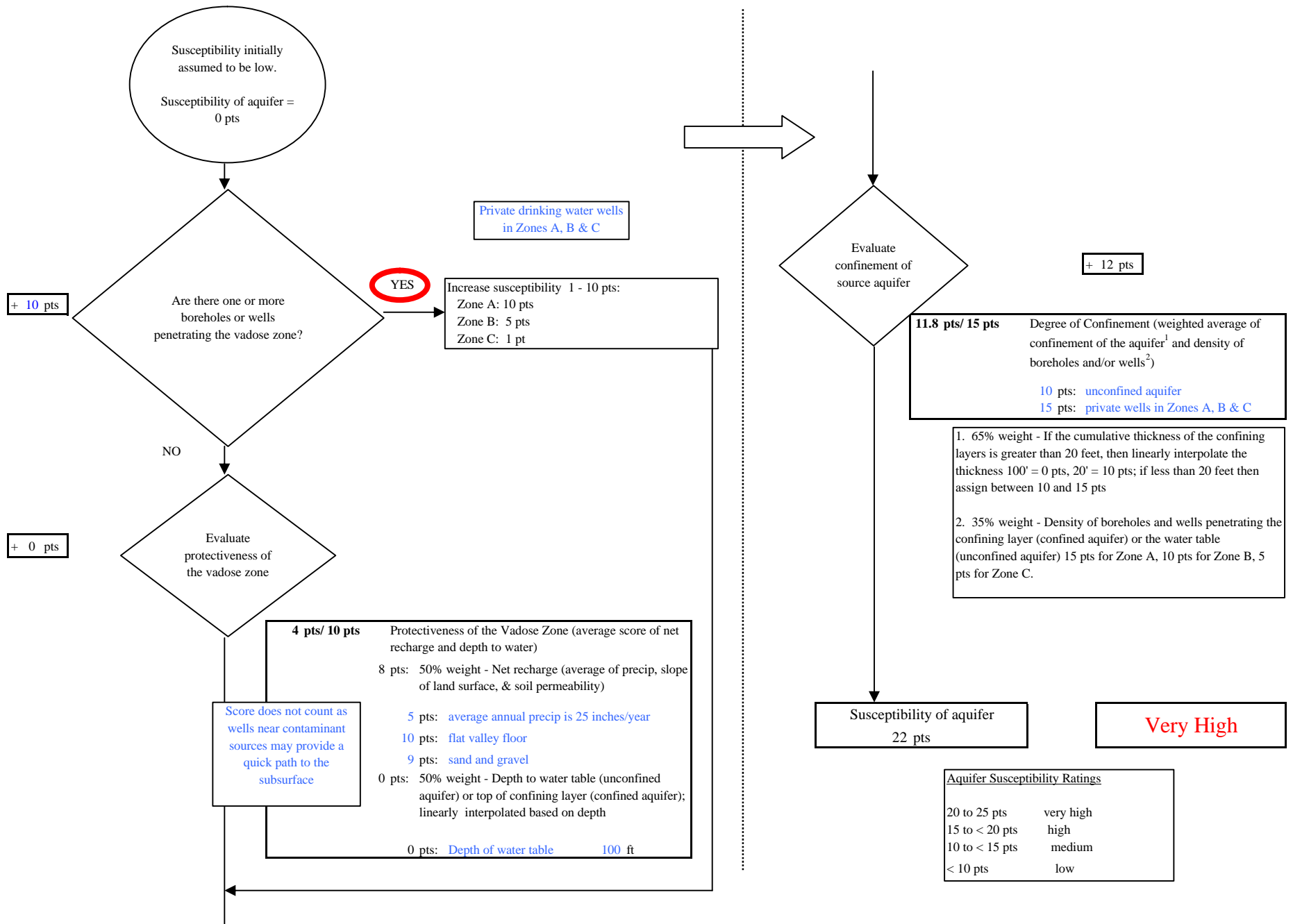
**(Charts 1-8)**



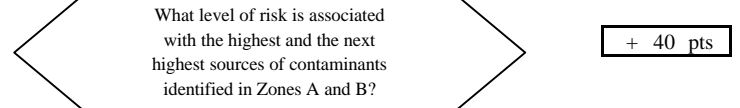
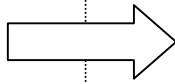
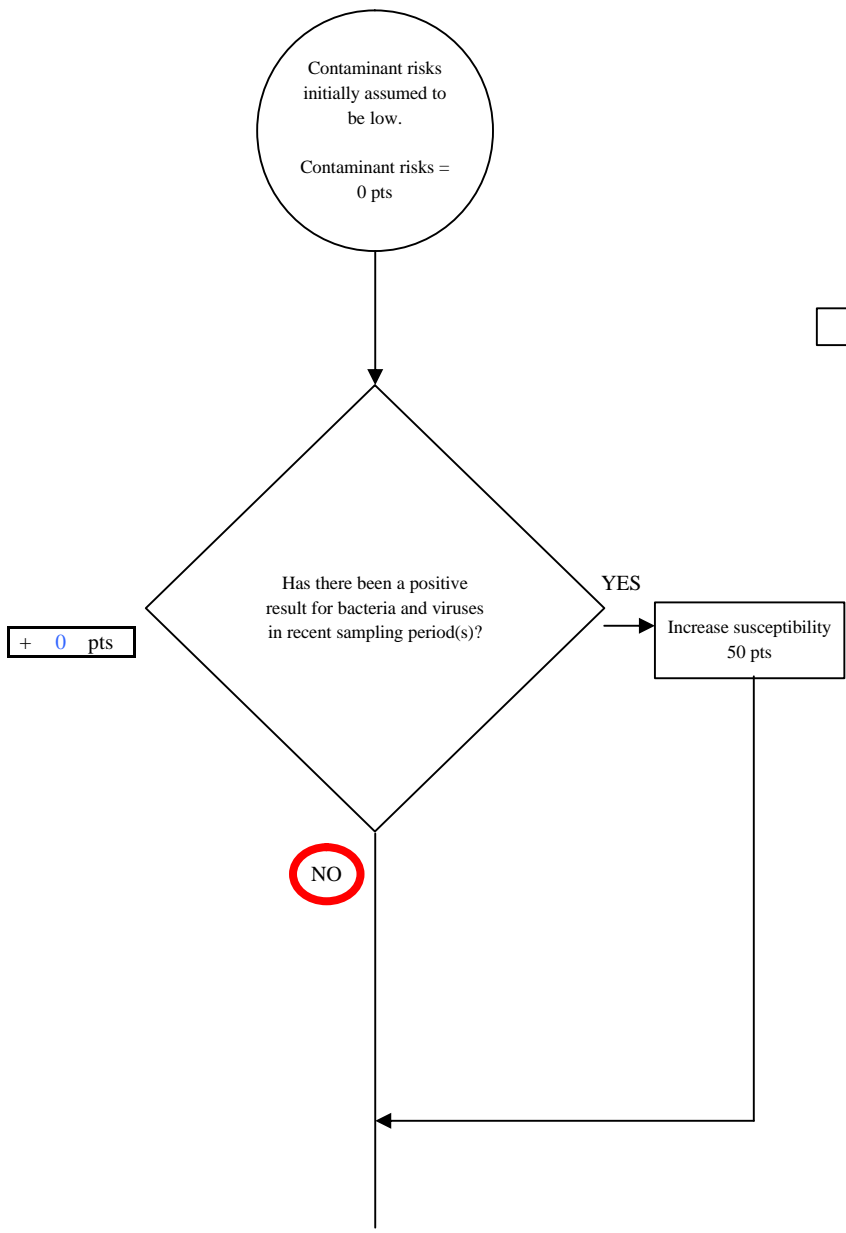
**Chart 1. Susceptibility of the Wellhead - Birchwood Community Church**



**Chart 2. Susceptibility of the Aquifer - Birchwood Community Church**



**Chart 3. Contaminant Risks for Birchwood Community Church - Bacteria & Viruses**



**Risk Rankings for Contaminant Sources Identified in Zones A and B**

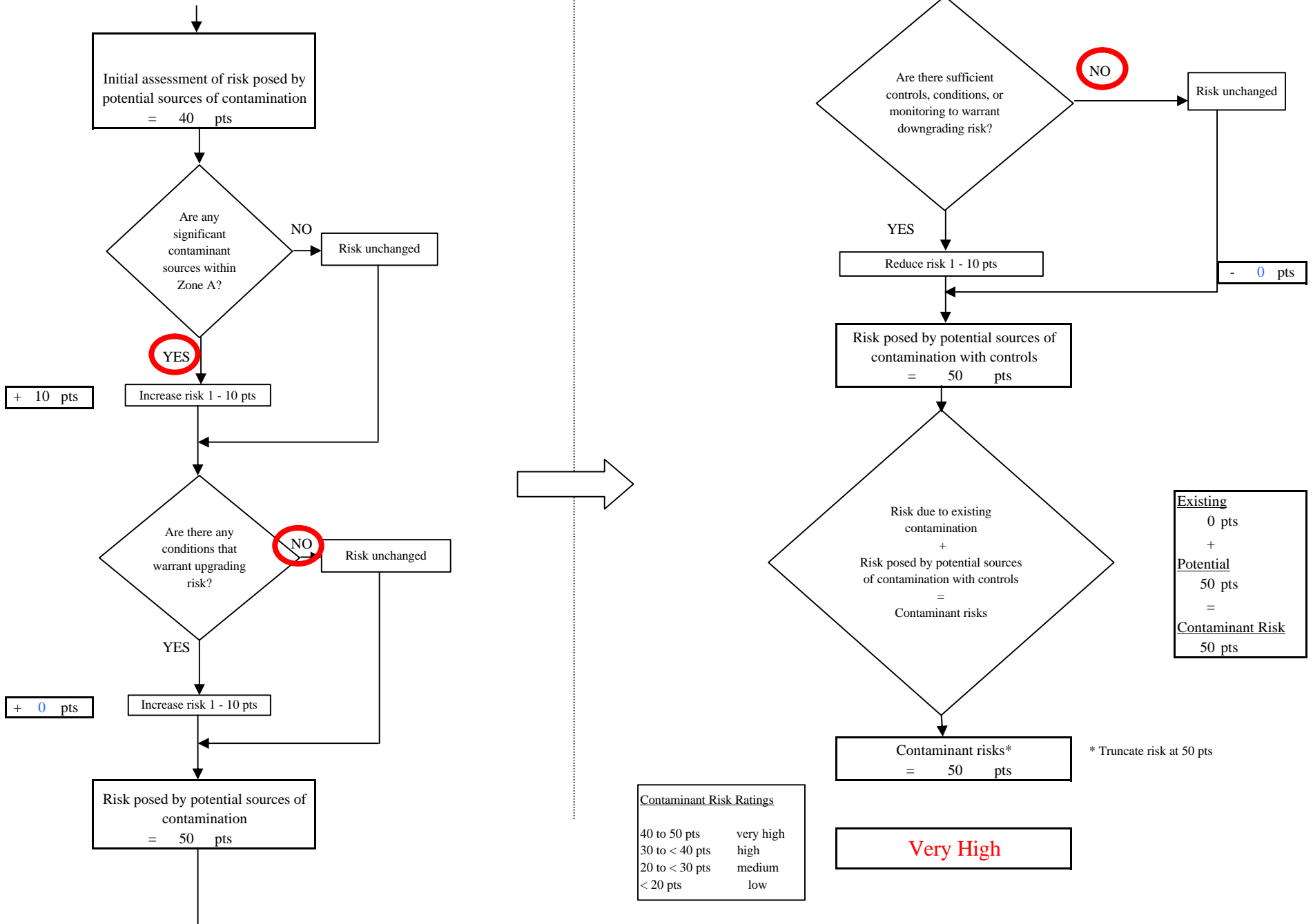
	Zone A	Zone B	Total
Very High(s)	0	0	0
High(s)	5	10	15
Medium(s)	1	3	4
Low(s)	3	4	7

	LOW 10 pts	MEDIUM 20 pts	HIGH 30 pts	VERY HIGH 40 pts
LOW	<sup>3</sup> 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

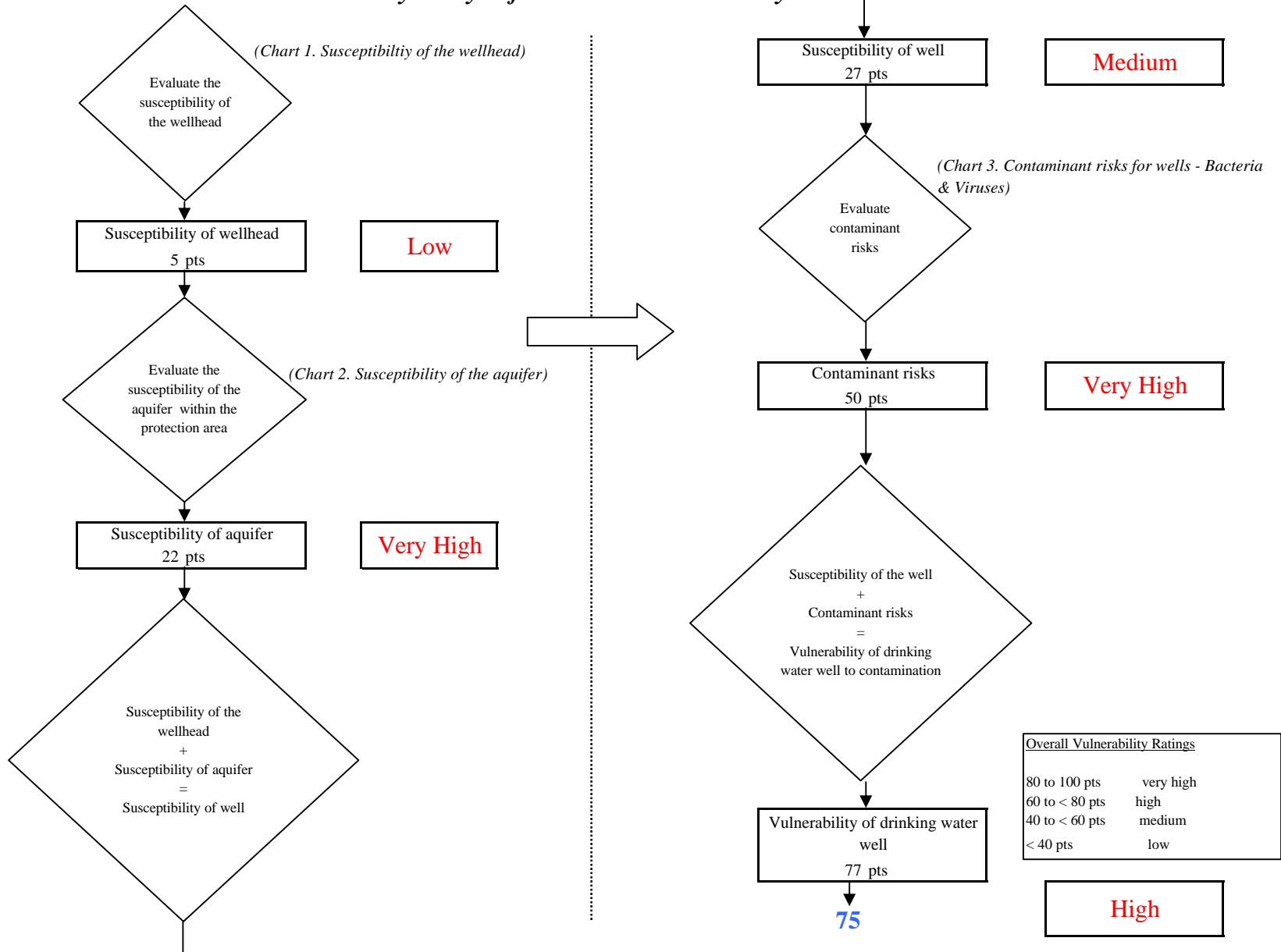
Matrix Score 40

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.

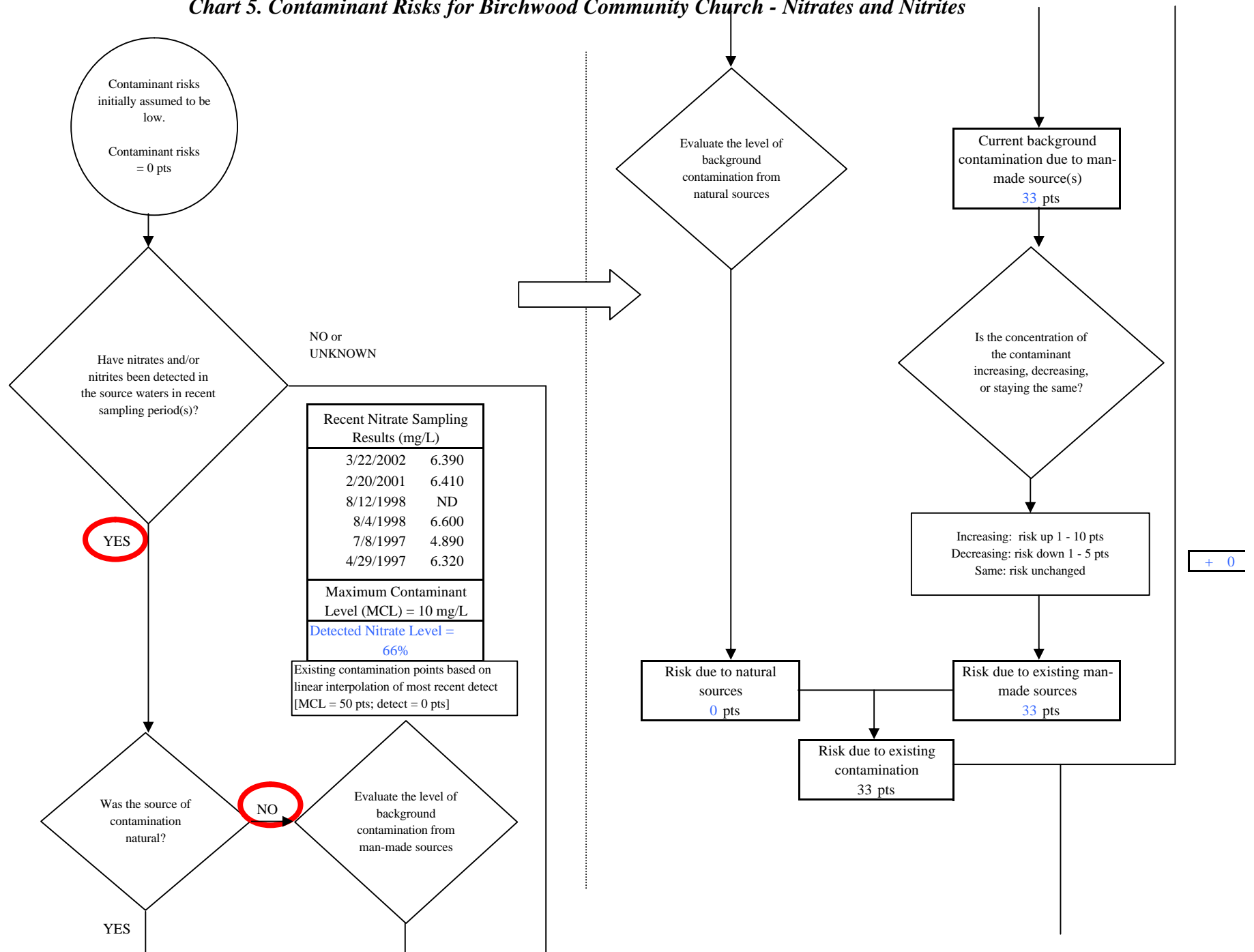
**Chart 3. Contaminant Risks for Birchwood Community Church - Bacteria & Viruses**



**Chart 4. Vulnerability Analysis for Birchwood Community Church - Bacteria & Viruses**



**Chart 5. Contaminant Risks for Birchwood Community Church - Nitrates and Nitrites**



**Chart 5. Contaminant Risks for Birchwood Community Church - Nitrates and Nitrites**

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

+ 50 pts

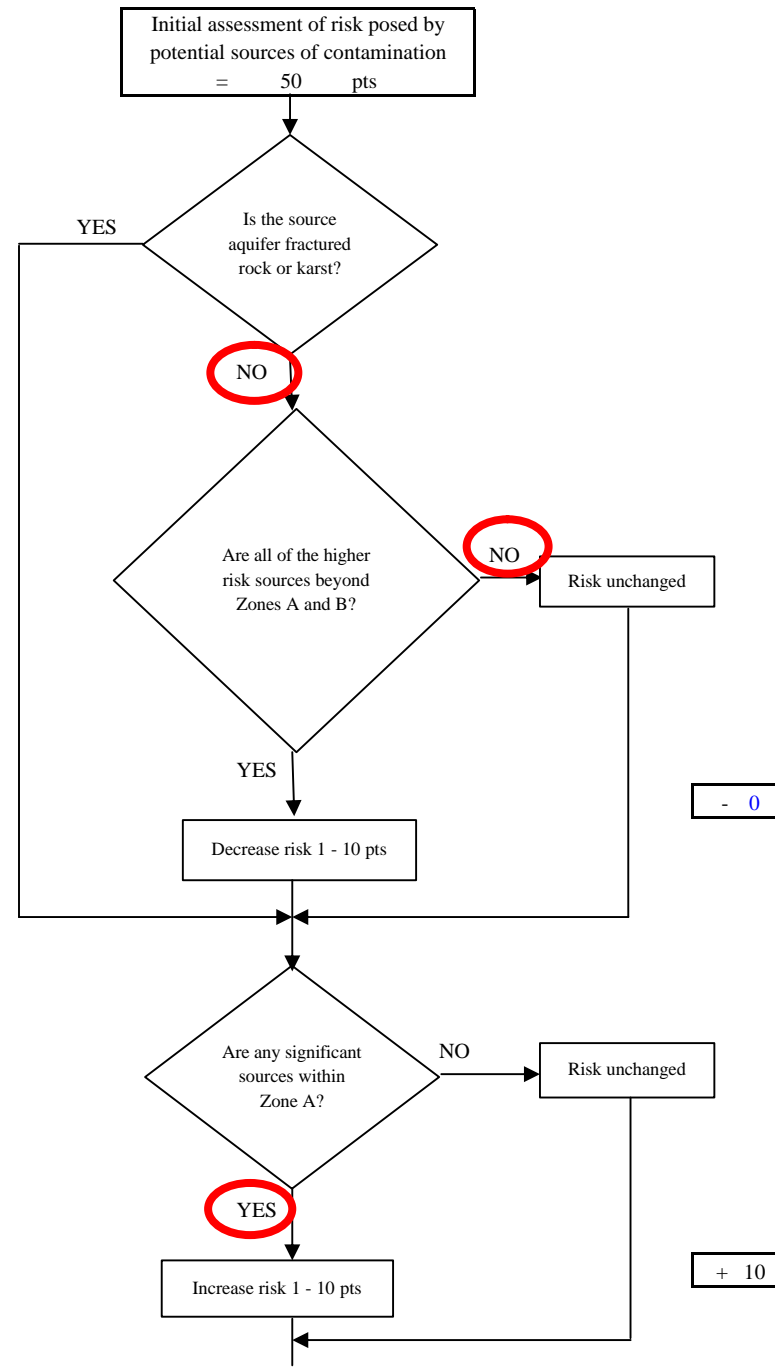
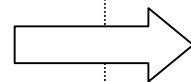
Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	1	1
High(s)	5	16	21
Medium(s)	0	2	2
Low(s)	3	23	26

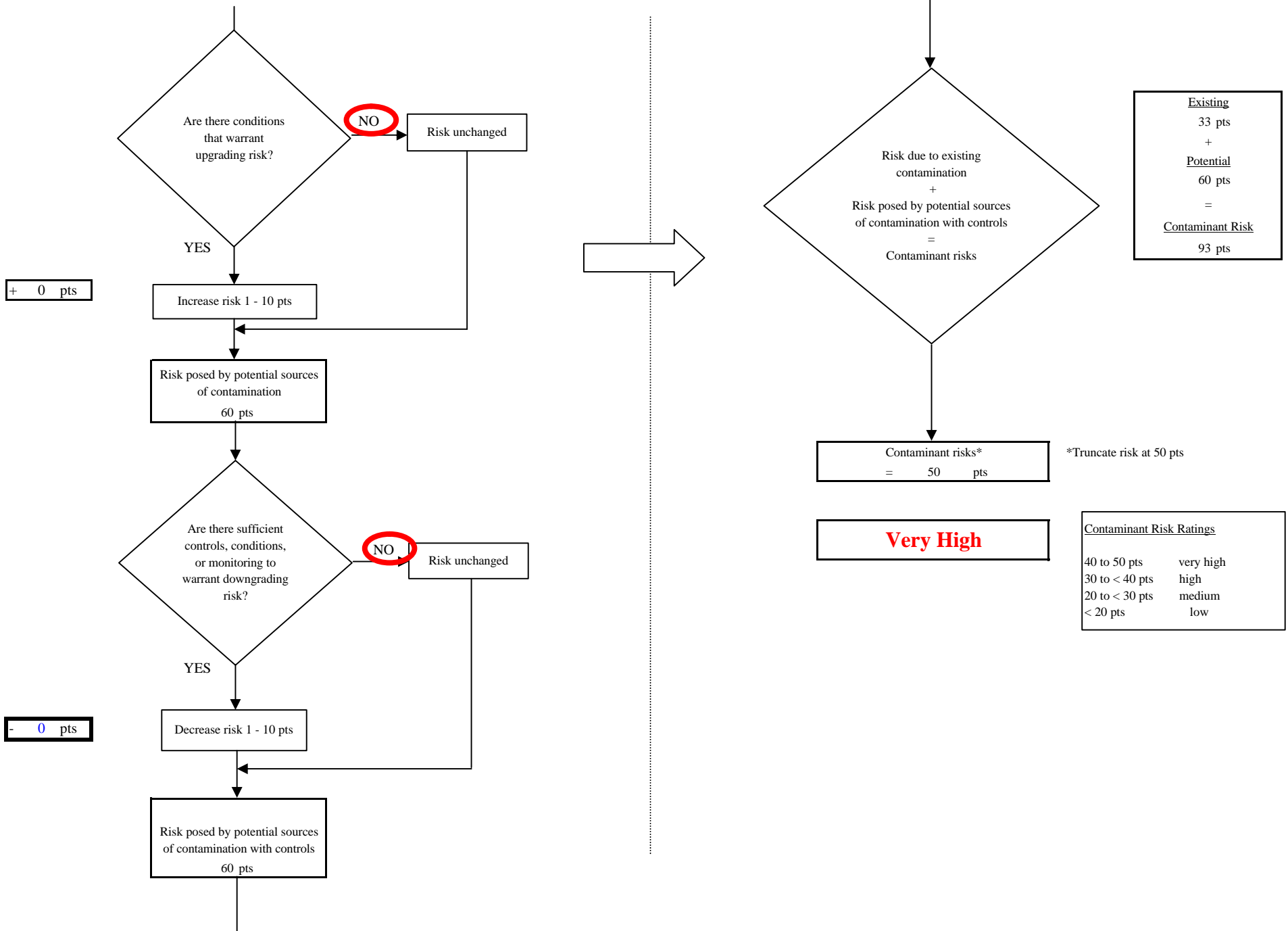
	LOW 10 pts	MEDIUM 20 pts	HIGH 30 pts	VERY HIGH 40 pts
<b>LOW</b>	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
<b>MEDIUM</b>	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
<b>HIGH</b>	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
<b>VERY HIGH</b>	----	----	----	≥ 1 source + 10 pts

Matrix Score      50

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.

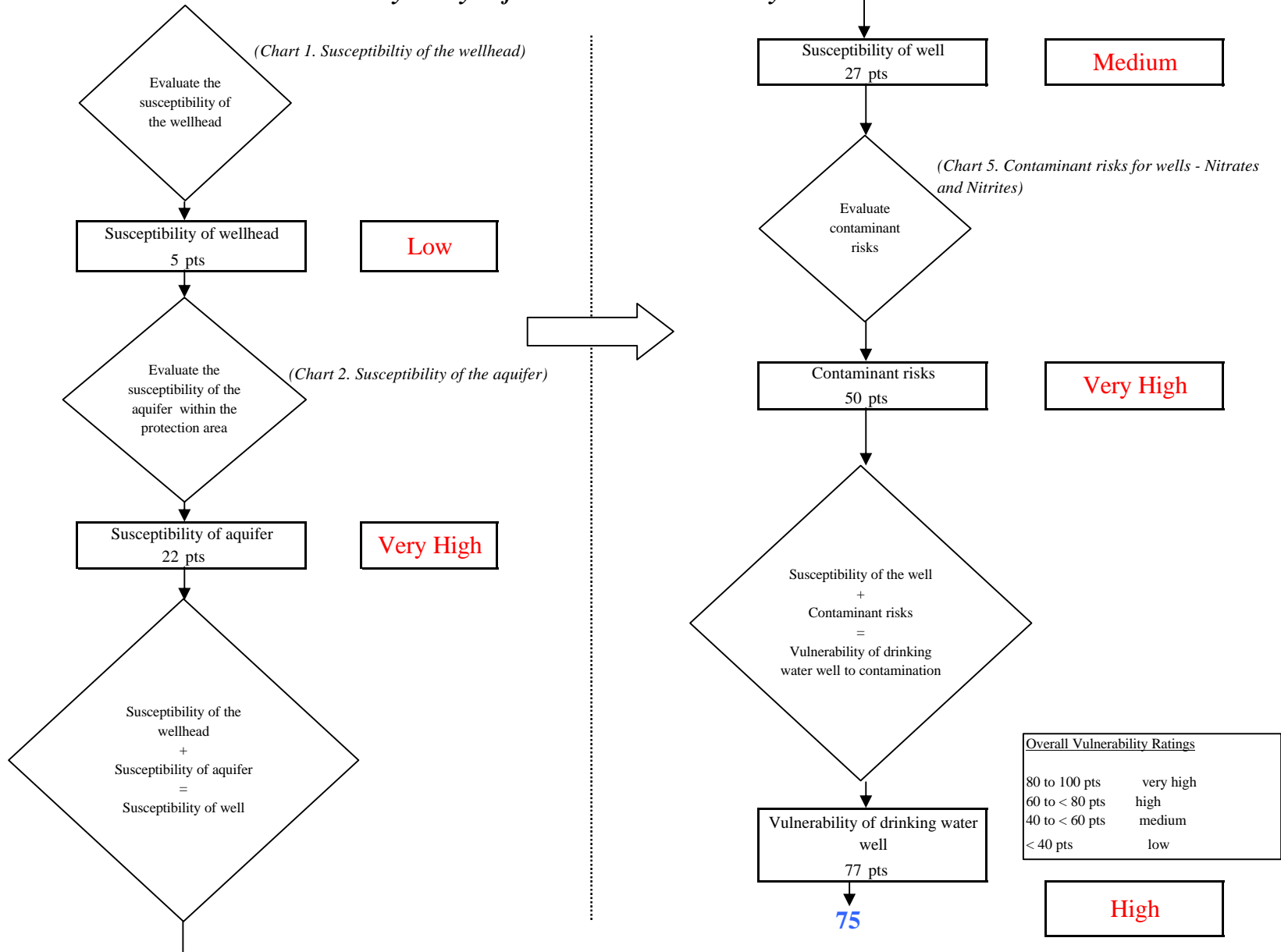


**Chart 5. Contaminant Risks for Birchwood Community Church - Nitrates and Nitrites**

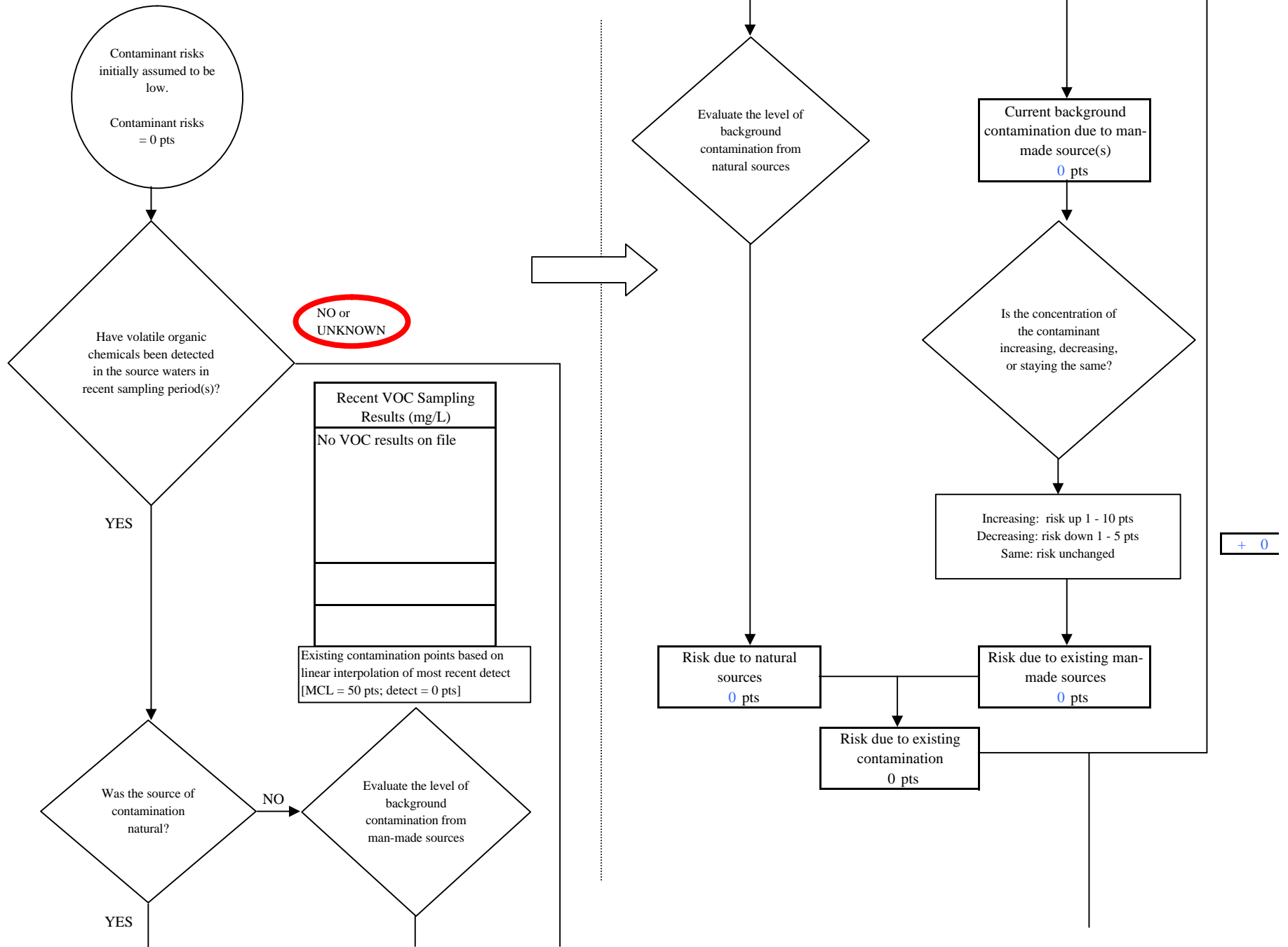




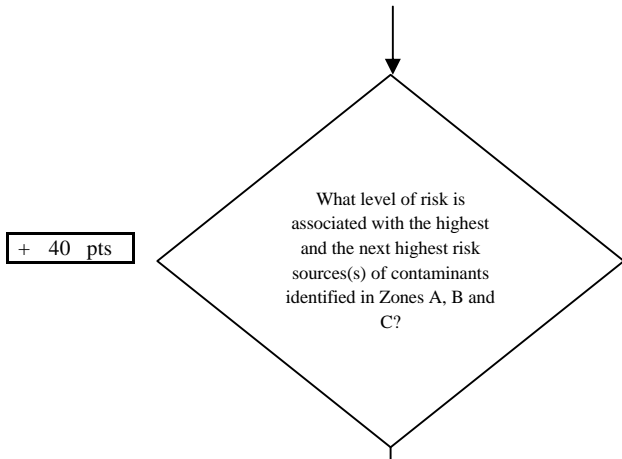
**Chart 6. Vulnerability Analysis for Birchwood Community Church - Nitrates and Nitrites**



**Chart 7. Contaminant Risks for Birchwood Community Church - Volatile Organic Chemicals**



**Chart 7. Contaminant Risks for Birchwood Community Church - Volatile Organic Chemicals**

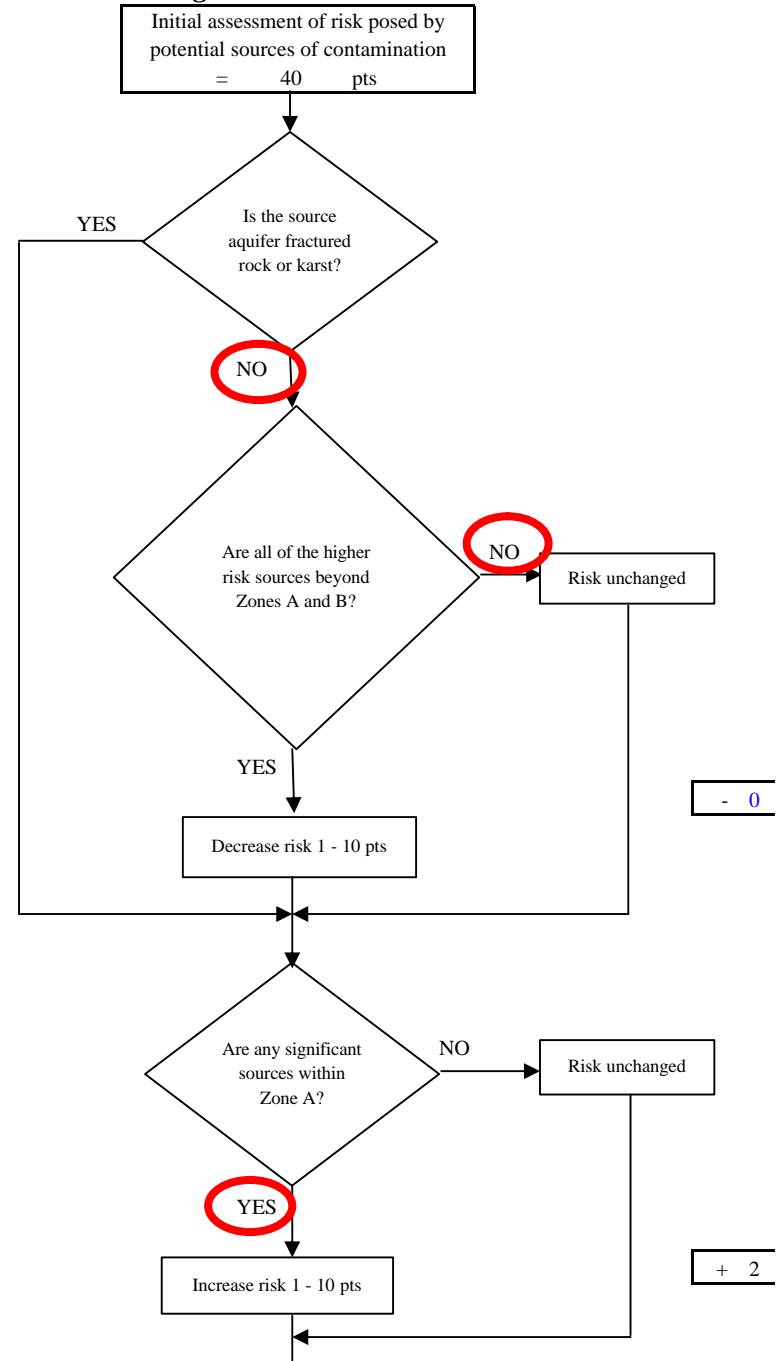
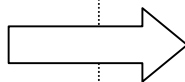


Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	0	0
High(s)	0	7	7
Medium(s)	0	3	3
Low(s)	9	24	33

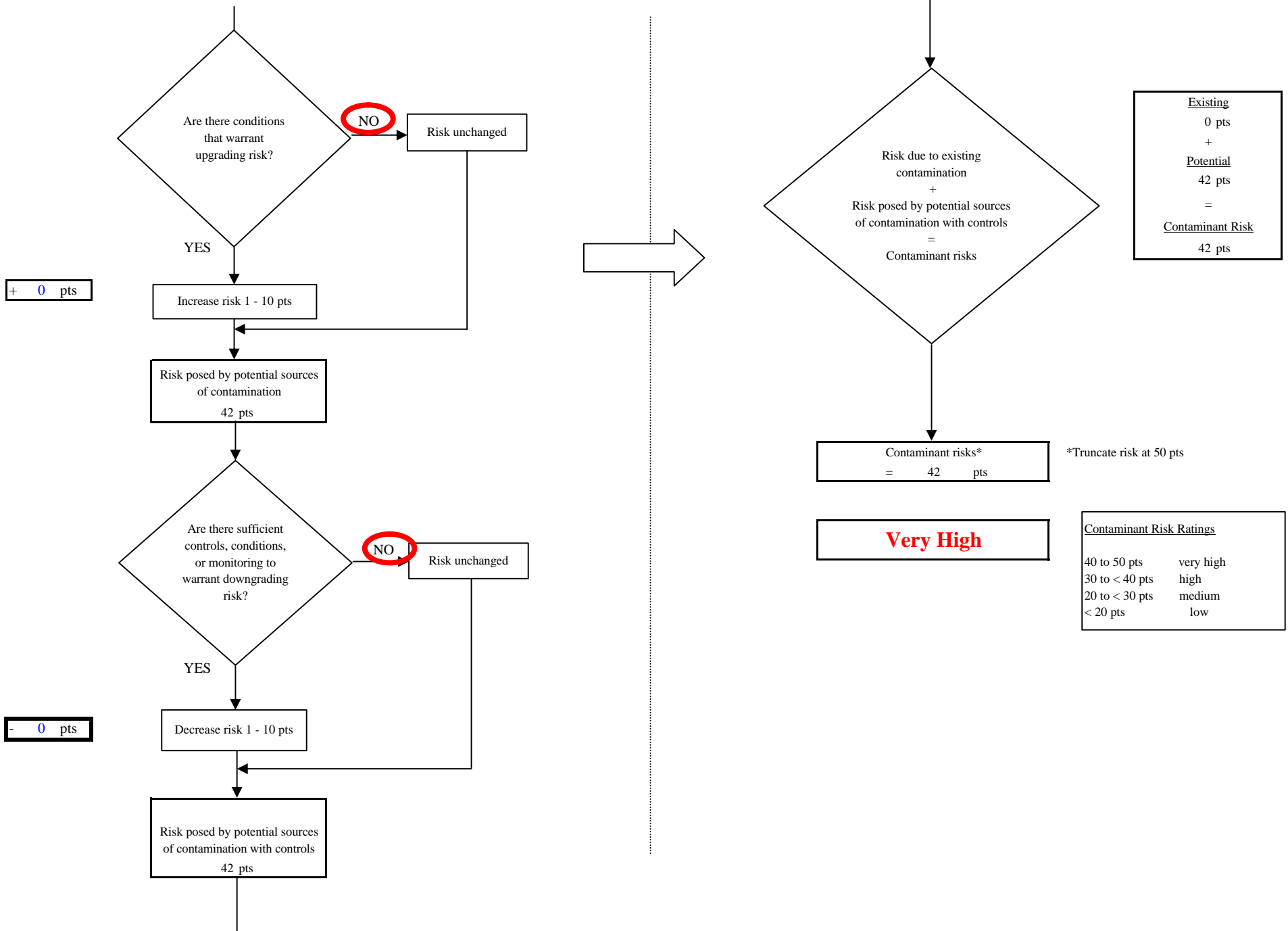
	LOW 10 pts	MEDIUM 20 pts	HIGH 30 pts	VERY HIGH 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 40

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.



**Chart 7. Contaminant Risks for Birchwood Community Church - Volatile Organic Chemicals**



**Chart 8. Vulnerability Analysis for Birchwood Community Church - Volatile Organic Chemicals**

