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# Source Water Assessment

## A Hydrogeologic Susceptibility and Vulnerability Assessment for Glacier View Elementary School Palmer Area, Alaska PWSID 227092

April 2004

DRINKING WATER PROTECTION PROGRAM REPORT Report 1500  
Alaska Department of Environmental Conservation

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The Drinking Water Protection Program (DWPP) 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 the Program Coordinator of DWPP, (907) 269-7521.

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# Source Water Assessment for Glacier View Elementary School Palmer Area, Alaska

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## Drinking Water Protection Program Alaska Department of Environmental Conservation

### EXECUTIVE SUMMARY

This source water assessment provides an evaluation of the vulnerability to potential contamination of the public water system serving Glacier View Elementary School. This Class A (non-transient non-community) water system consists of one well located along the Glenn Highway east of Palmer, Alaska near the Matanuska Glacier. The well received a natural susceptibility rating of **Low**. This rating is a combination of a susceptibility rating of **Low** for the actual wellhead and a **Medium** rating for the aquifer in which the well is drawing water from. Identified potential and current sources of contamination for the Glacier View Elementary School public water system include: the Glenn Highway and fuel storage tanks. These are considered as sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals. Combining the natural susceptibility of the well with the contaminant risk, the public water system for Glacier View Elementary School received an overall vulnerability rating of **Medium** for volatile organic chemicals, and a **Low** for bacteria and viruses, nitrates and/or nitrites, heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals.

### GLACIER VIEW ELEMENTARY SCHOOL PUBLIC DRINKING WATER SYSTEM

The Glacier View Elementary public water system is a Class A (non-transient non-community) water system. Its well is located along the Glenn Highway east of Palmer, Alaska near the Matanuska Glacier (T17N, R1W, Section 1) (See Map 1 of Appendix A). Glacier View Elementary is not located near an established town but is located within the Matanuska-Susitna Borough which is located in south-central Alaska (Please see the inset of Map 1 in Appendix A for location). The Borough's current population is almost 70,000 (ADCED, 2002). 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.

Residents of in the area of Glacier View Elementary School or individual water wells and septic systems or outhouses. Residents use heating oil (typically stored in both above and below ground 275 to 500-gallon tanks) or wood to heat homes and buildings (ADCED, 2002).

The Glacier View Elementary School well lies in the broad alluvial plain of the Matanuska River at an elevation of approximately 1800 feet above sea level.

According to the well log, the depth of the well is 90 feet below the ground surface and is screened in gravels. Discontinuous permafrost (perennially frozen areas) may also be present in the alluvial plain. Areas with discontinuous permafrost may locally affect the ground water flow directions. Both the Matanuska River and surface infiltration contribute water to this alluvial aquifer.

The Glacier View Elementary School public drinking water system serves approximately 82 non-residents through one service connection.

### GLACIER VIEW ELEMENTARY SCHOOL 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 wells is the area that contributes water to the well, the groundwater capture zone. The groundwater capture zone is located in the area circling the well (the area influenced by pumping) and also the area of the water table upgradient of the well, usually forming a parabola shape.

There are many different ways of calculating the size of capture zones. This assessment 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 capture zone is then drawn using a water table elevation map (if available) or a land surface elevation map of the area. The capture zone calculated in this assessment is only a best guess using the information

and resources available to us, and may differ slightly from the actual capture zone.

The parameters used to calculate the shape of this capture zone are general for the whole alluvial plain and were obtained from area well logs in the area and the Groundwater textbook by Freeze and Cherry (Freeze and Cherry, 1979).

Only limited information is available for the aquifer Glacier View Elementary School’s public water system well draws its water from. The orientation of the capture zone was drawn based on the assumption that groundwater flow direction is generally the same direction as the topography.

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

The protection areas established for wells are usually separated into four zones, limited by the watershed. These zones correspond to times-of-travel (TOT) of the water moving through the aquifer to the well (plus the factor of safety).

The following is a summary of the four zones for wells and the calculated time-of-travel for each:

**Table 1. Definition of Zones**

<b>Zone</b>	<b>Definition</b>
A	¼ the distance for the 2-yr. time-of-travel
B	Less than 2 years time-of-travel
C	Less than 5 years time-of-travel
D	Less than 10 years time-of-travel

The protection area for Glacier View Elementary School is limited to Zone C by the immediate watershed.

The time of travel for *contaminants* within the water varies with their unique physical and chemical characteristics.

The drinking water protection area outlined for the Glacier View Elementary School on Map 1 of Appendix A will serve as the focus for voluntary protection efforts.

**INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES**

The Drinking Water Protection Program (DWPP) has completed an inventory of potential and existing sources of contamination within the Glacier View Elementary School protection area. This inventory was completed through a search of agency records and other publicly available information. 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 A public water system assessments, six categories of drinking water contaminants were inventoried. They include:

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

The sources 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.

Bacteria and Viruses are only inventoried in Zones A and B because of their short life span. Only “Very High” and “High” rankings are inventoried within the outer Zone D due to the probability of contaminant dilution by the time the contaminants get to the well.

Tables 2 through 6 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to the six contaminant categories.

**VULNERABILITY OF GLACIER VIEW ELEMENTARY SCHOOL DRINKING WATER SYSTEM**

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

- Natural susceptibility; and
- Contaminant risks.

Appendix D contains fourteen 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 properties of the aquifer and the presence of other wells or boreholes in the area. 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 the water system’s contaminant sample results. Lastly, Chart 4 combines the results of the first three charts to produce the ‘Vulnerability Analysis for Bacteria and Viruses’. Charts 5 through 14 contain the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites, volatile organic chemicals, heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals, respectively.

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

Susceptibility of the Wellhead (0 – 25 Points)  
(Chart 1 of Appendix D)

+

Susceptibility of the Aquifer (0 – 25 Points)  
(Chart 2 of Appendix D)

=

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

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

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

The wellhead for the Glacier View Elementary School received a Low Susceptibility rating. The 1/31/01 Sanitary Survey indicates the well is capped with a sanitary seal, and the land surface is sloped away from the wells; however, the well is not grouted. A sanitary seal prevents potential contaminants from entering the well from the inside while sloping the land surface away from the well and grouting help to prevent potential contaminants from traveling down the outside of the well casing.

The aquifer the Glacier View Elementary School well is completed in received a Medium Susceptibility rating.

The highly transmissive aquifer material (sand and gravel) in the area allows contaminants to travel quickly through it. The depth of the water table (about 45 feet below ground surface) allows some natural filtering of contaminants before they come into contact with the water table where they can disperse quickly. If there are any other wells in the area, they can also provide a quick pathway for contaminants to travel down into the aquifer if they are not grouted correctly. Table 2 summarizes the Susceptibility scores and ratings for Glacier View Elementary School.

**Table 2. Susceptibility**

	Score	Rating
Susceptibility of the Wellhead	5	Low
Susceptibility of the Aquifer	14	Medium
Natural Susceptibility	198	Low

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

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

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

**Table 3. Contaminant Risks**

Category	Score	Rating
Bacteria and Viruses	10	Low
Nitrates and/or Nitrites	15	Low
Volatile Organic Chemicals	20	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	10	Low
Synthetic Organic Chemicals	0	Low
Other Organic Chemicals	10	Low

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

contaminant risk scores with the natural susceptibility score:

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

Again, rankings are assigned according to a point score:

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

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

**Table 4. Overall Vulnerability**

Category	Score	Rating
Bacteria and Viruses	30	Low
Nitrates and/or Nitrites	35	Low
Volatile Organic Chemicals	40	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	30	Low
Synthetic Organic Chemicals	20	Low
Other Organic Chemicals	30	Low

### Bacteria and Viruses

The Glenn Highway represents the only identified risk of Bacteria and Viruses to this water system.

Only a small amount of bacteria and viruses are required to endanger public health. Coliforms (a 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 coliforms 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). Routine sampling has not recently detected coliforms in the water.

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 low.

### Nitrates and Nitrites

The Glenn Highway also represents the only identified risk of nitrates and nitrites for this source of public drinking water.

Nitrates are very mobile, moving at approximately the same rate as water. Nitrates have not been detected in significant concentrations in recent sampling history for the Glacier View Elementary School well.

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 low.

### Volatile Organic Chemicals

The fuel storage tanks represent the greatest risk for volatile organic chemical contamination to the well.

Both underground and above ground heating oil storage tanks are the standard way of heating homes and businesses in this area. The most common causes of fuel leaks of these heating oil systems are overfilling the tank, ruptured fuel lines, leaking storage tanks, damaged or faulty valves and vandalism. Regular system maintenance can help prevent many of these harmful fuel leaks.

Volatile Organic Chemicals have not been detected during routine sampling of this water system. 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 medium.

### Heavy Metals, Cyanide, and Other Inorganic Chemicals

The underground heating oil tank represents the greatest risk to heavy metals for this source of public drinking water.

Heavy metals have not been detected during routine sampling.

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 low.

### Synthetic Organic Chemicals

No potential sources of risk of synthetic organic chemicals were identified for this source of public drinking water.

Synthetic Organic Chemicals have not recently been sampled for in this water system.

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

#### **Other Organic Chemicals**

Again, the Glenn Highway represents the only identified risk of other organic chemicals for this source of public drinking water.

Other Organic Chemicals have not recently been sampled for in this water system.

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



## REFERENCES

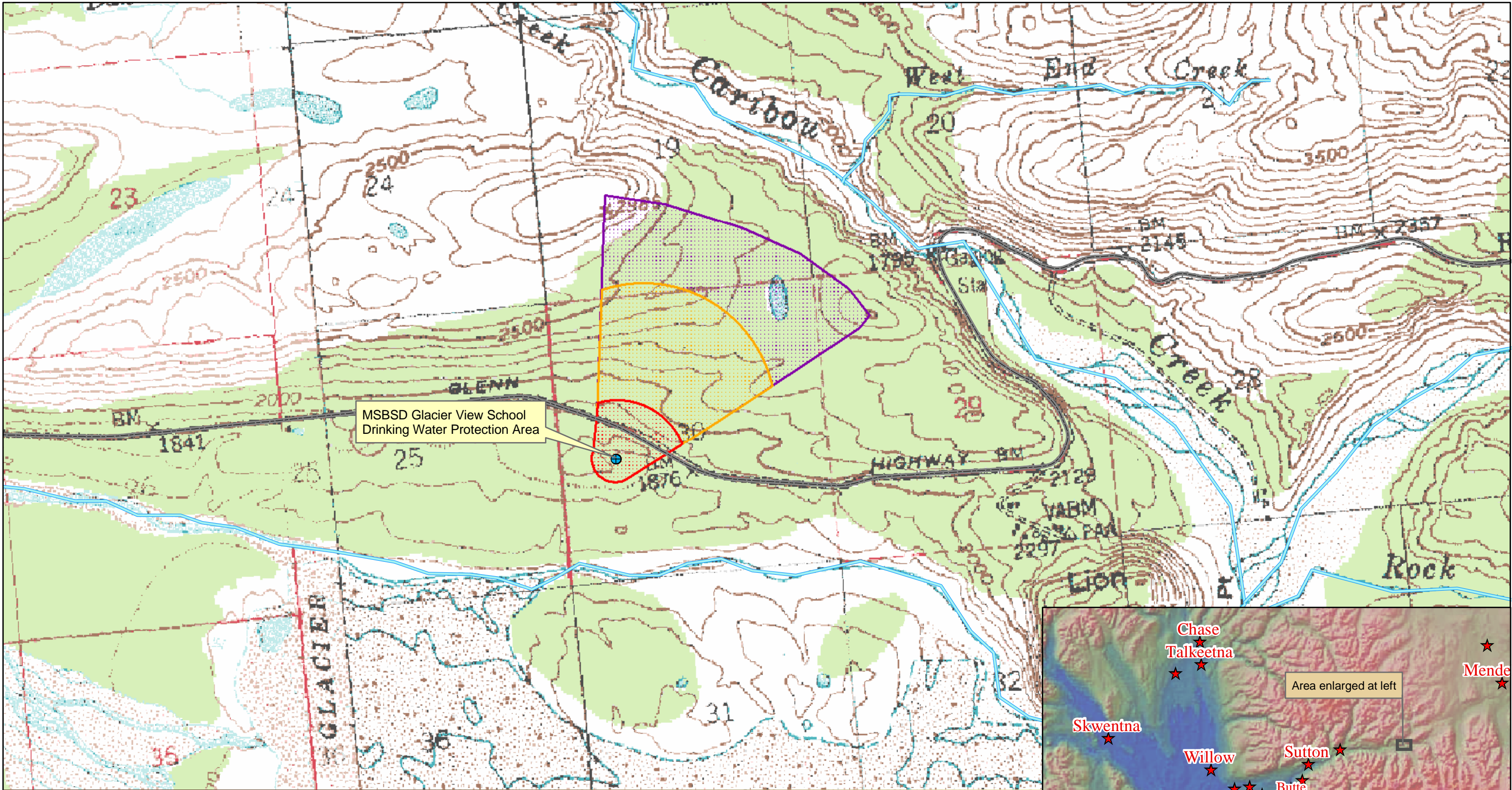
Alaska Department of Community and Economic Development (ADCED), 2002 [WWW document]. URL [http://www.dced.state.ak.us/mra/CF\\_BLOCK.cfm](http://www.dced.state.ak.us/mra/CF_BLOCK.cfm).

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

United States Environmental Protection Agency (EPA), 2002 [WWW document]. URL <http://www.epa.gov/safewater/mcl.html>.

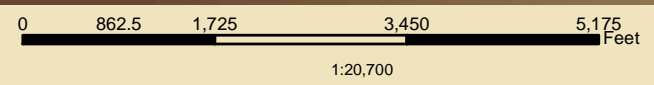
## **APPENDIX A**

### **Glacier View Elementary School Drinking Water Protection Area Location Map (Map 1)**



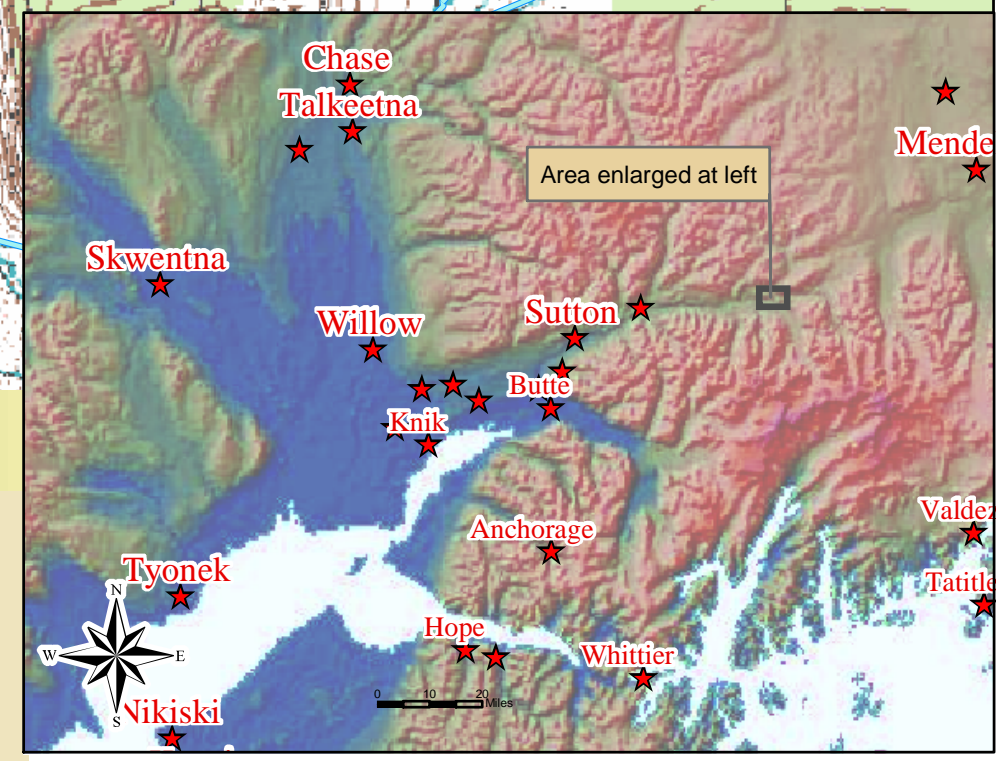
MSBSD Glacier View School  
Drinking Water Protection Area

**Map 1: MSBSD Glacier View School Drinking Water Protection Area** **PWSID: 227092**



**Data Sources:**  
Background image  
- USGS 1:63,000 mapping

- Legend**
- MSBSD Glacier View School
  - Zone A
  - Zone B
  - Zone C
  - Rivers
  - Roads



## **APPENDIX B**

### **Contaminant Source Inventory and Risk Ranking for Glacier View Elementary School (Tables 1-7)**

**Table 1**

**Contaminant Source Inventory for  
MSBSD Glacier View School**

**PWSID 227092.001**

<b>Contaminant Source Type</b>	<b>Contaminant Source ID</b>	<b>CS ID tag</b>	<b>Zone</b>	<b>Map Number</b>	<b>Comments</b>
Tanks, diesel (above ground)	T06		A	2	MSBSD Glacier View School
Tanks, heating oil, nonresidential (underground)	T16		A	2	MSBSD Glacier View School
Highways and roads, dirt/gravel	X24		A	2	Glenn Highway

**Table 2**

*Contaminant Source Inventory and Risk Ranking for  
MSBSD Glacier View School  
Sources of Bacteria and Viruses*

**PWSID 227092.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24		A	Low	2	Glenn Highway

**Table 3**

*Contaminant Source Inventory and Risk Ranking for  
MSBSD Glacier View School  
Sources of Nitrates/Nitrites*

**PWSID 227092.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24		A	Low	2	Glenn Highway

**Table 4**

*Contaminant Source Inventory and Risk Ranking for  
MSBSD Glacier View School  
Sources of Volatile Organic Chemicals*

**PWSID 227092.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Tanks, diesel (above ground)	T06		A	Medium	2	MSBSD Glacier View School
Tanks, heating oil, nonresidential (underground)	T16		A	Low	2	MSBSD Glacier View School
Highways and roads, dirt/gravel	X24		A	Low	2	Glenn Highway



**Table 5**

*Contaminant Source Inventory and Risk Ranking for  
MSBSD Glacier View School*

**PWSID 227092.001**

*Sources of Heavy Metals, Cyanide and Other Inorganic 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>Map Number</i>	<i>Comments</i>
Tanks, heating oil, nonresidential (underground)	T16		A	Low	2	MSBSD Glacier View School
Highways and roads, dirt/gravel	X24		A	Low	2	Glenn Highway

**Table 6**

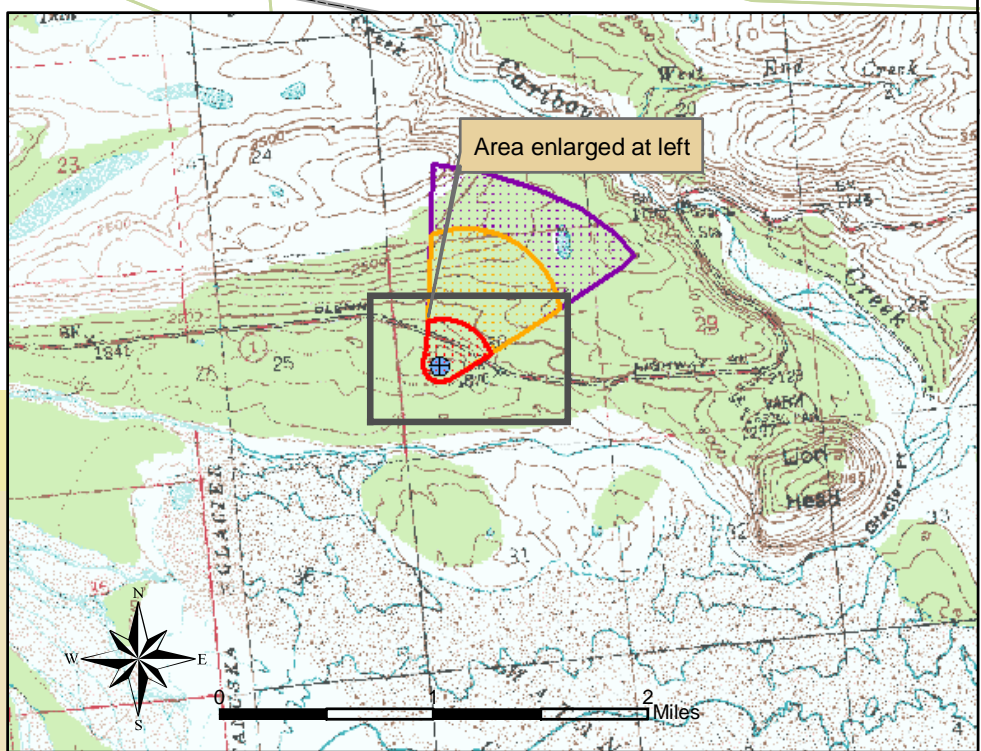
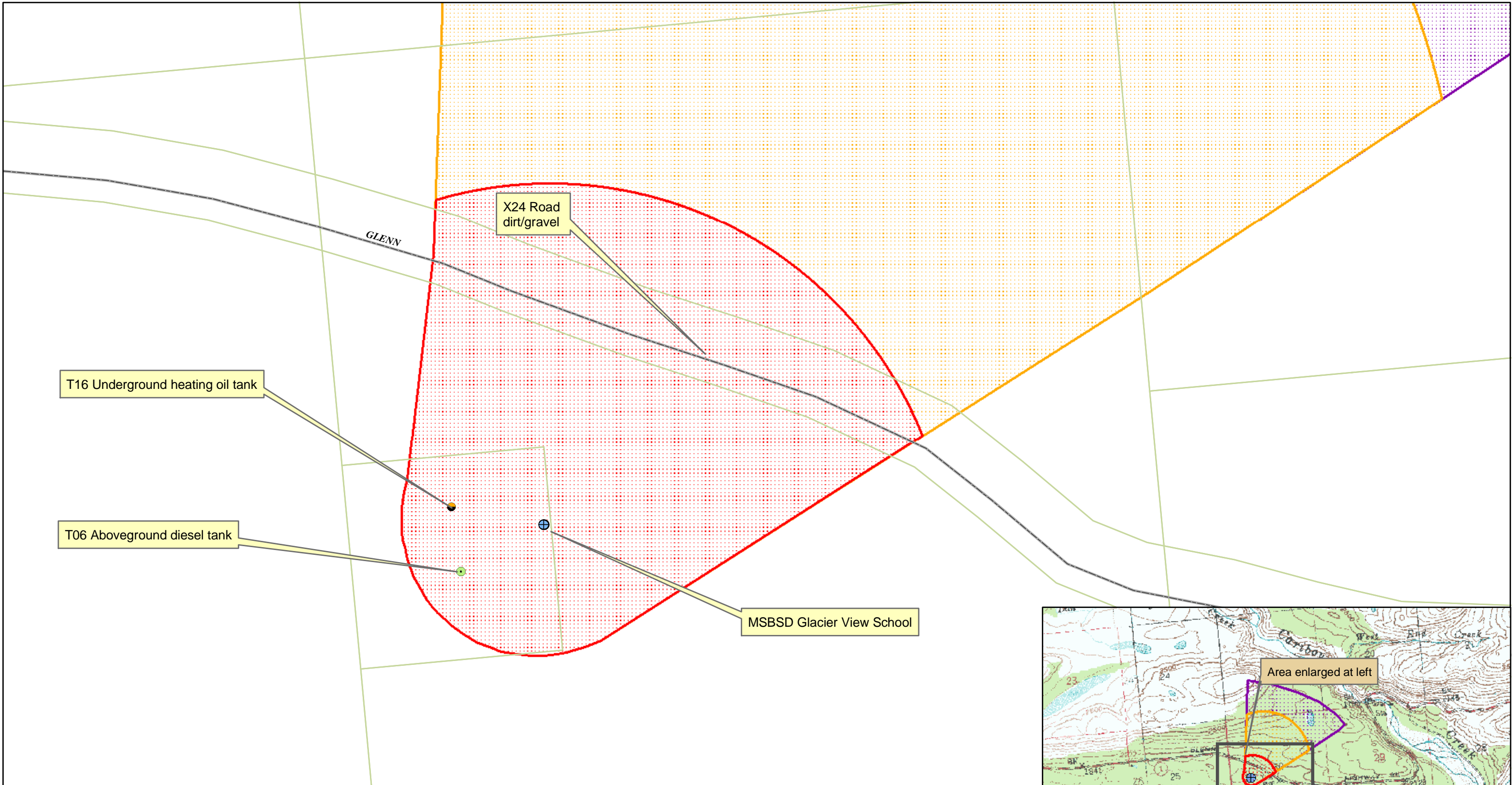
*Contaminant Source Inventory and Risk Ranking for  
MSBSD Glacier View School  
Sources of Other Organic Chemicals*

**PWSID 227092.001**

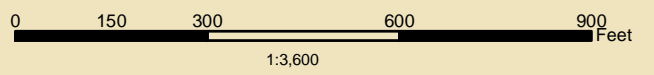
<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24		A	Low	2	Glenn Highway

## **APPENDIX C**

### **Glacier View Elementary School Drinking Water Protection Area and Potential and Existing Contaminant Sources (Map 2)**



**Map 2: MSBSD Glacier View Elementary Potential Contaminant Sources** PWSID: 227092



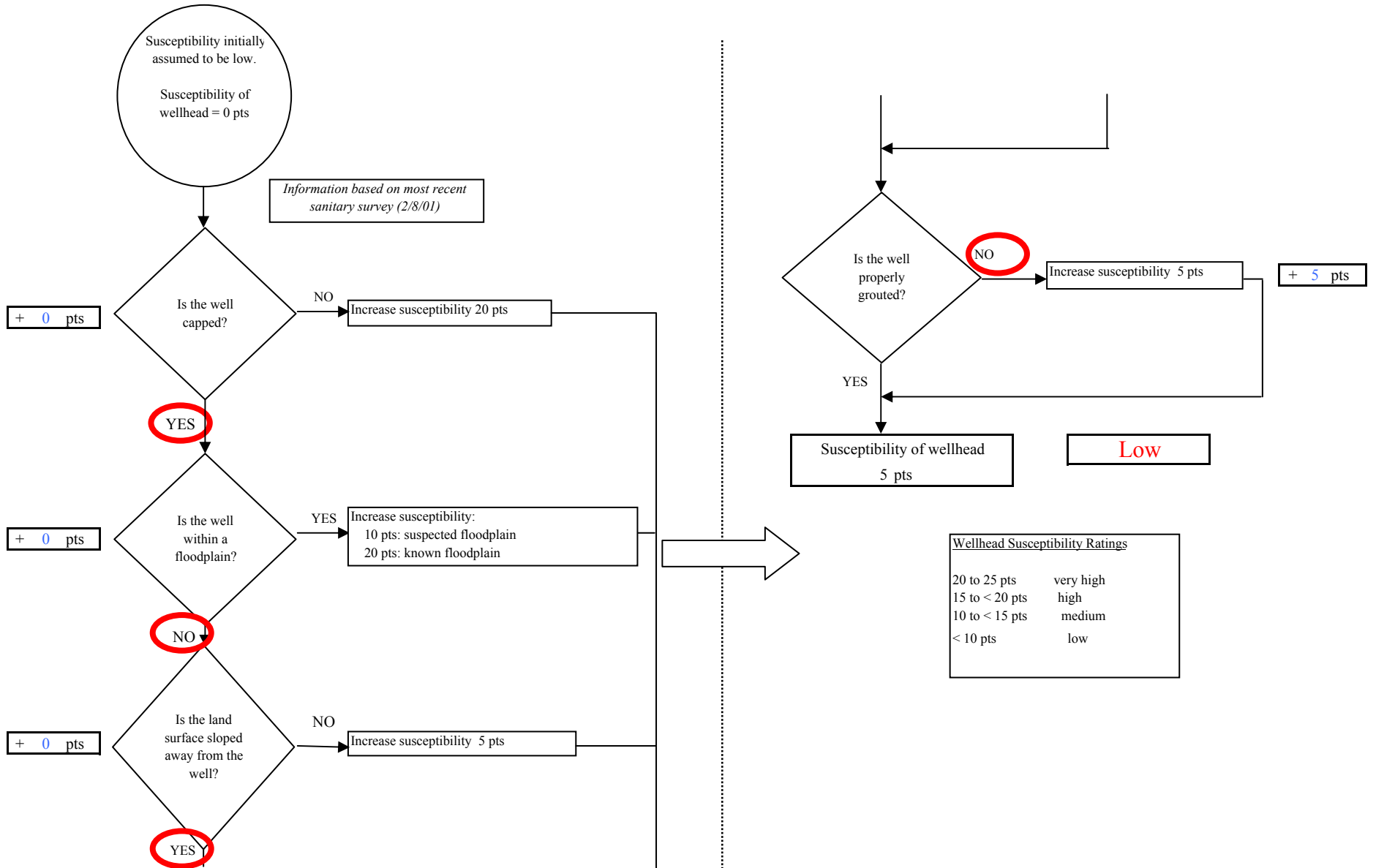
**Data Sources:**  
 Parcels, roads - MatSu Borough

- Legend**
- Zone A
  - Zone B
  - Zone C
  - + MSBSD Glacier View School
  - T06, Aboveground diesel tank
  - T16, Underground heating oil tank
  - Parcels

## **APPENDIX D**

### **Vulnerability Analysis for Glacier View Elementary School Public Drinking Water Source (Charts 1-14)**

**Chart 1. Susceptibility of the wellhead - Glacier View Elementary School**



**Chart 2. Susceptibility of the aquifer - Glacier View Elementary School**

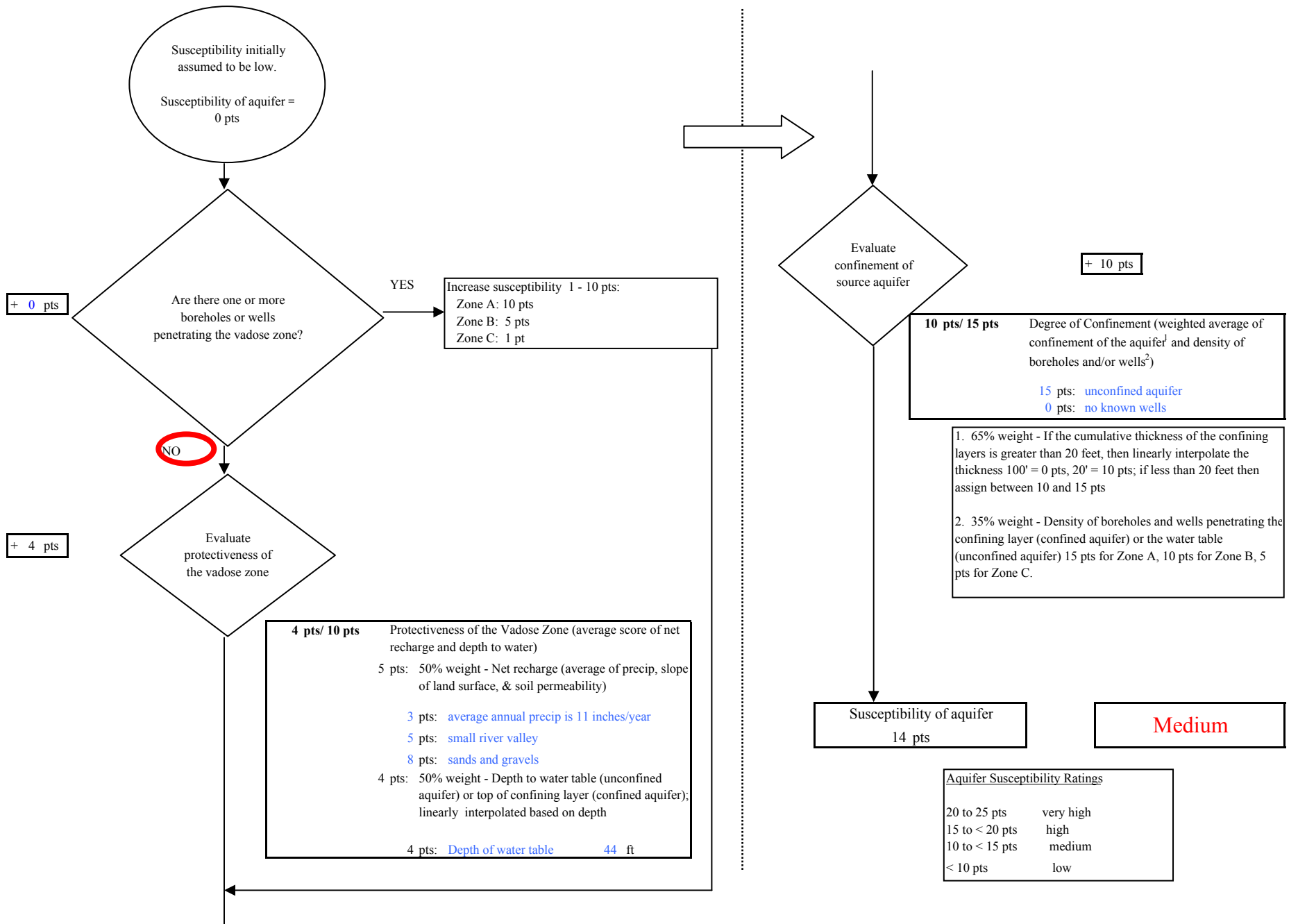
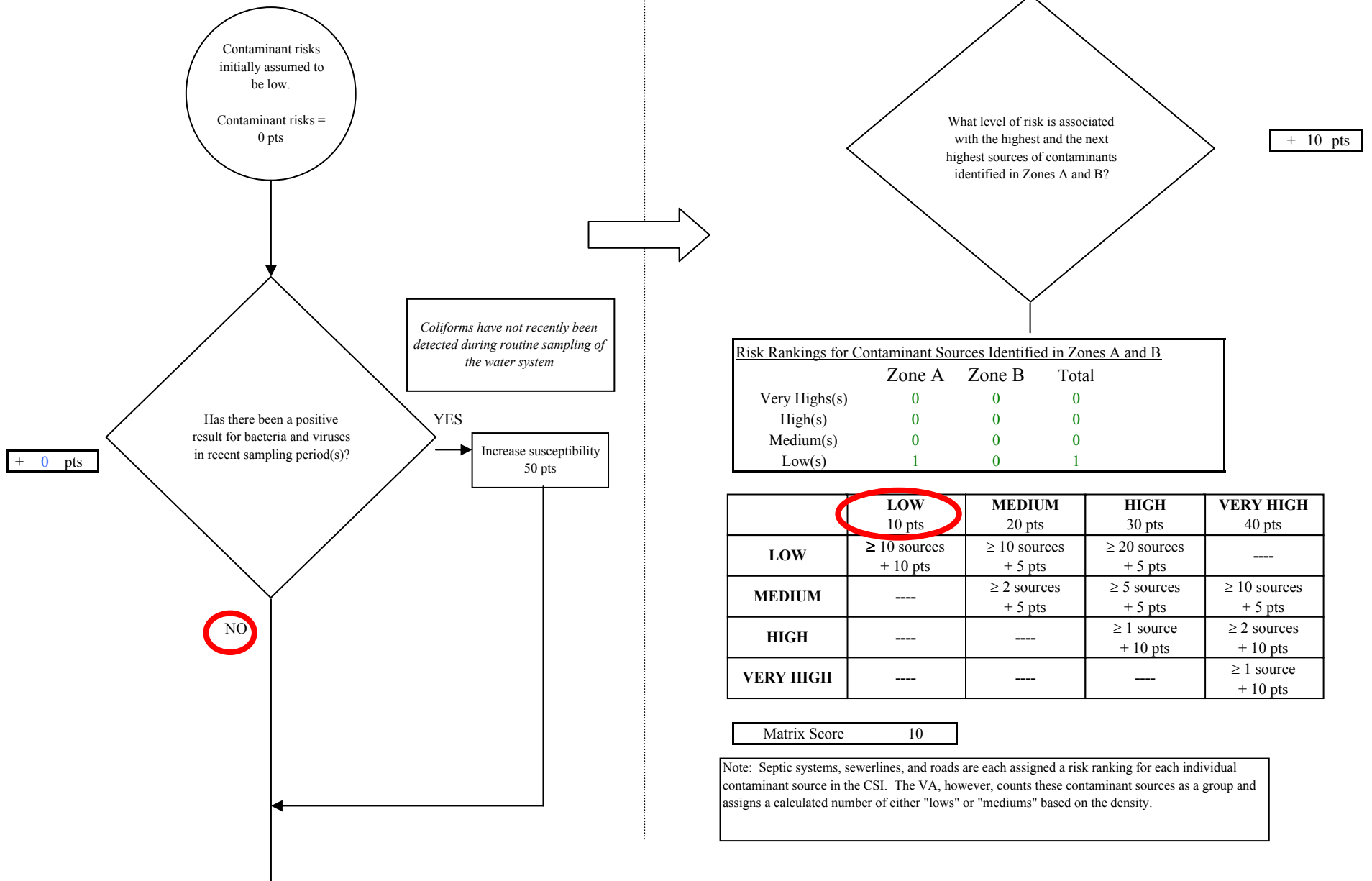
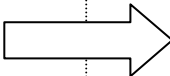
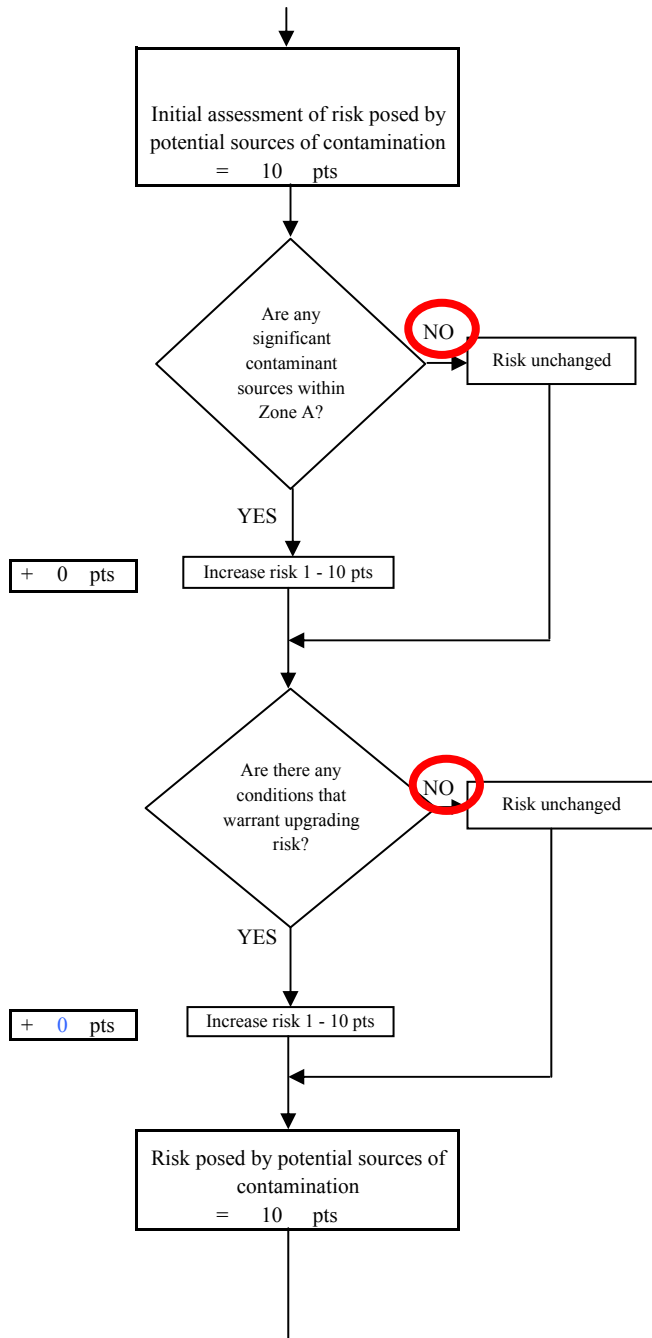


Chart 3. Contaminant risks for Glacier View Elementary School - Bacteria & Viruses

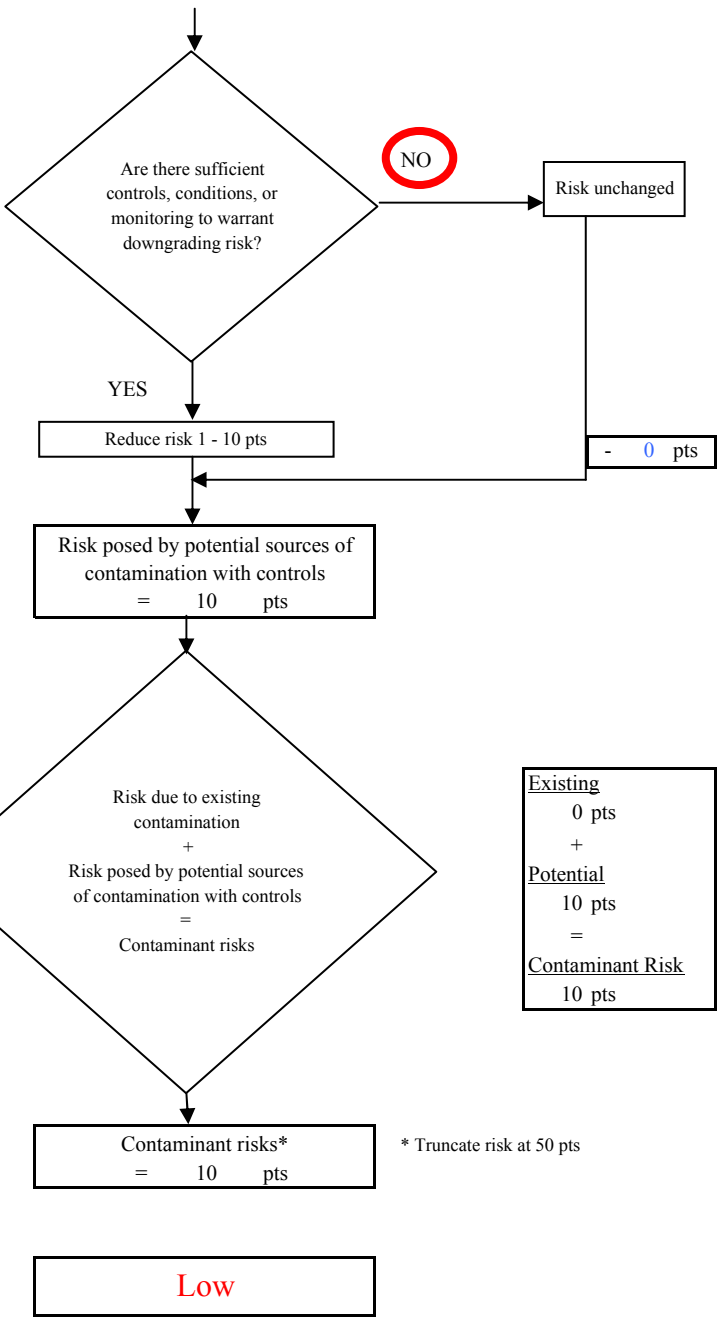




**Chart 3. Contaminant risks for Glacier View Elementary School - Bacteria & Viruses**



Contaminant Risk Ratings	
40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20 pts	low



Existing	0 pts
+	
Potential	10 pts
=	
Contaminant Risk	10 pts

\* Truncate risk at 50 pts

**Chart 4. Vulnerability analysis for Glacier View Elementary School - Bacteria & Viruses**

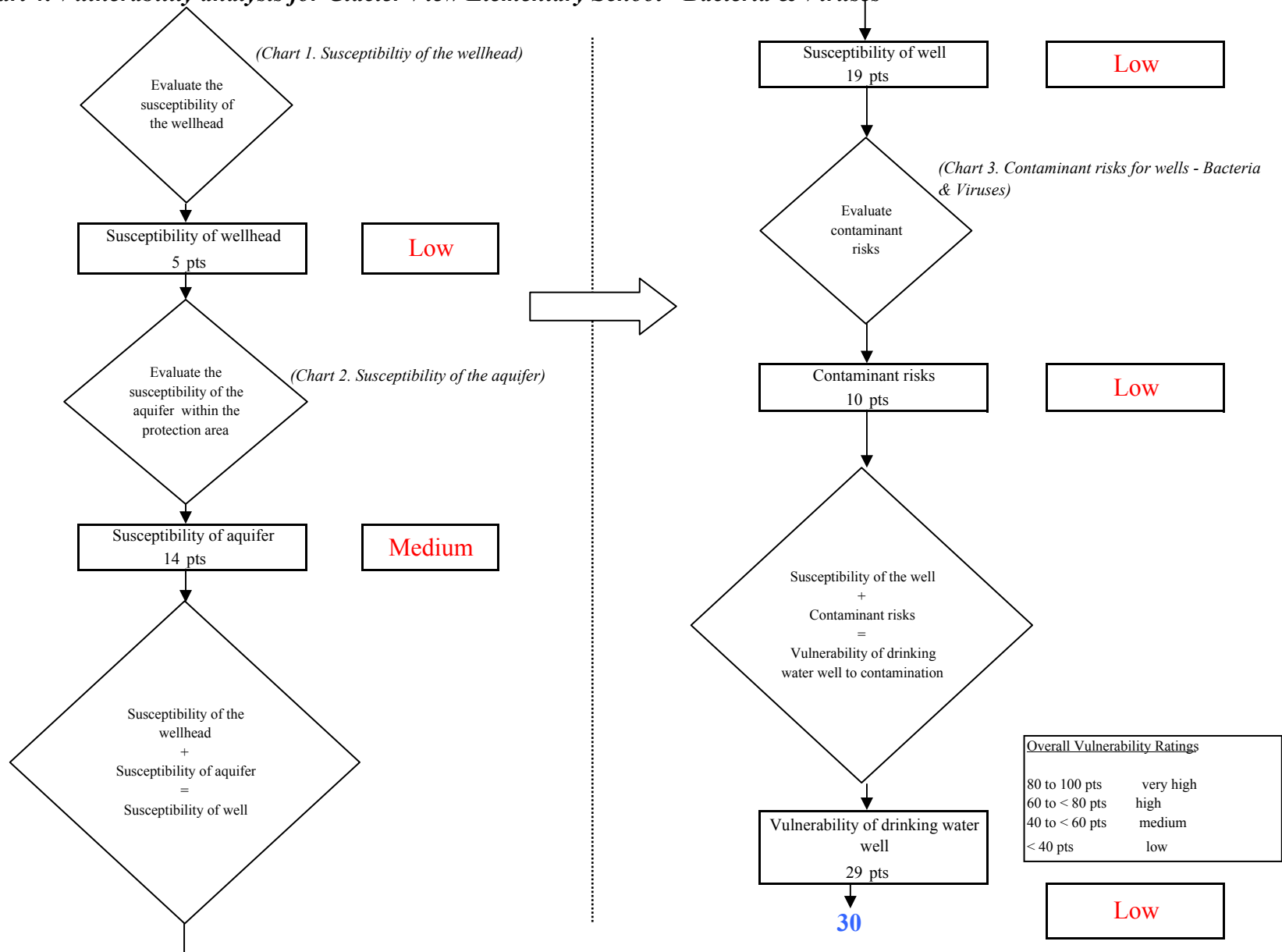
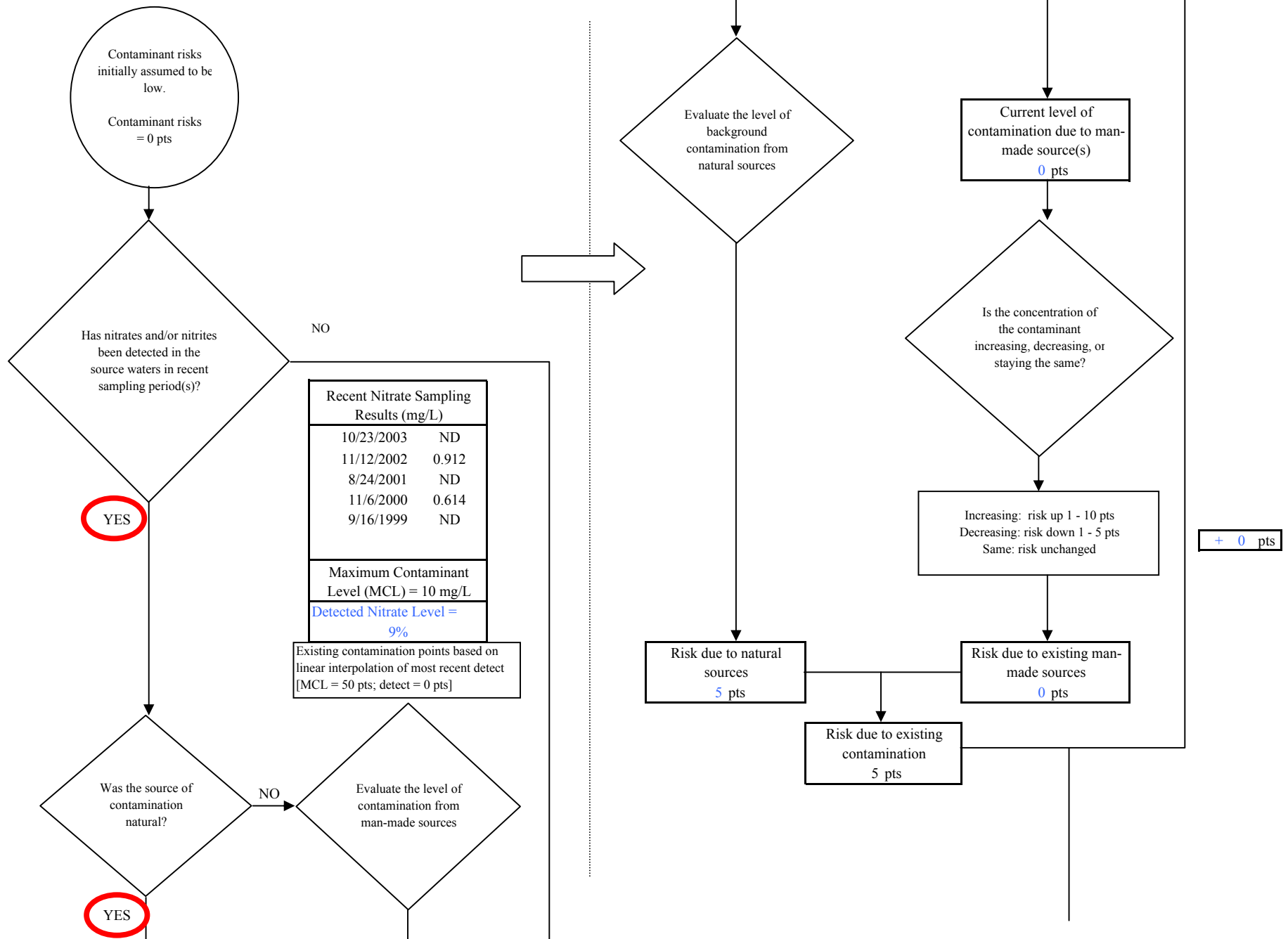
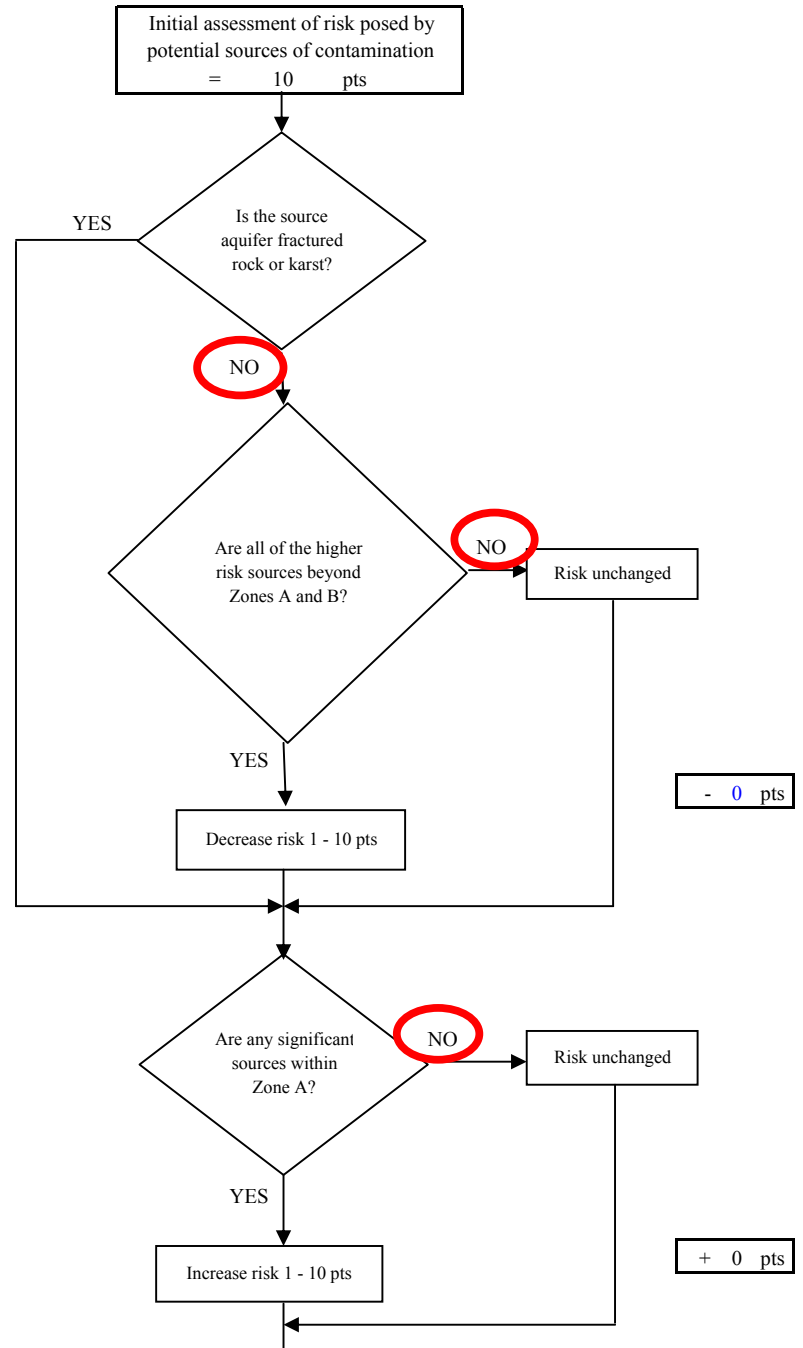
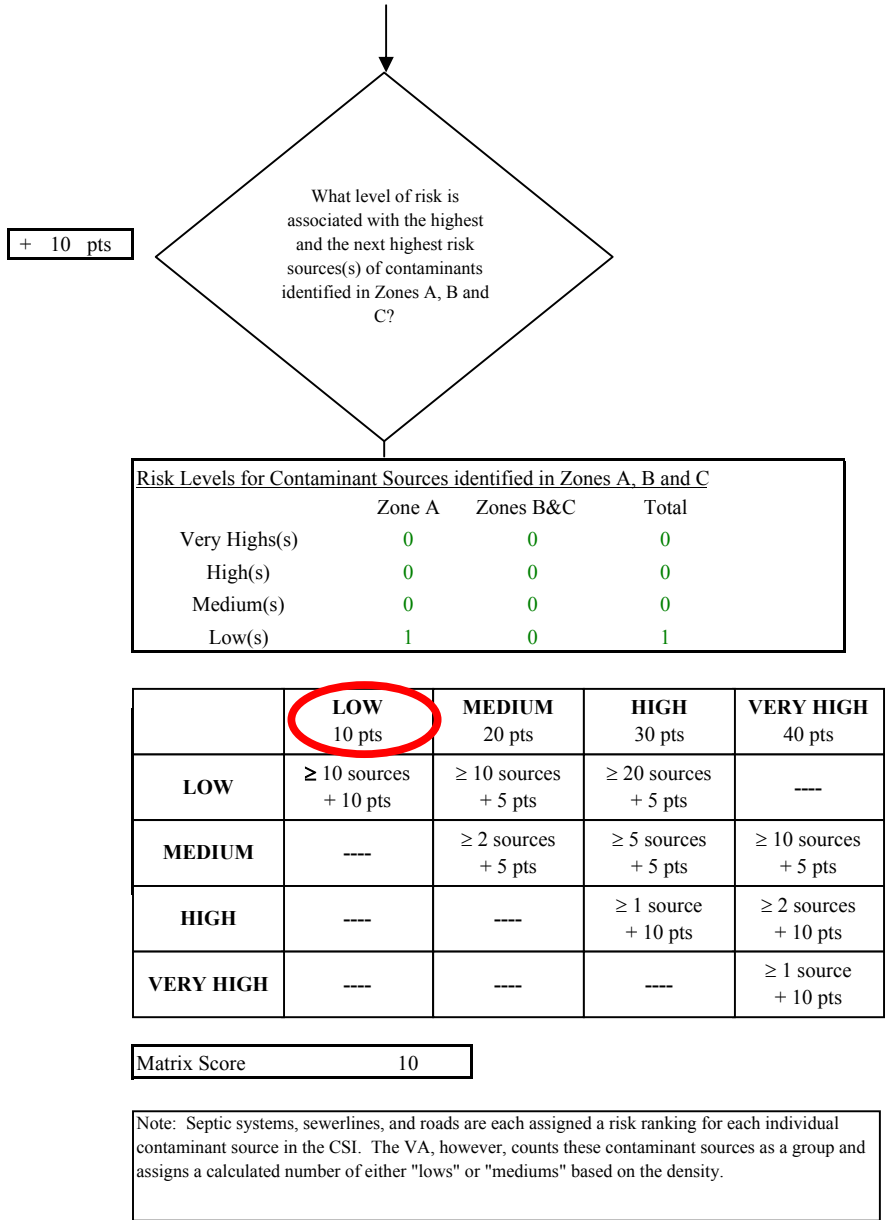


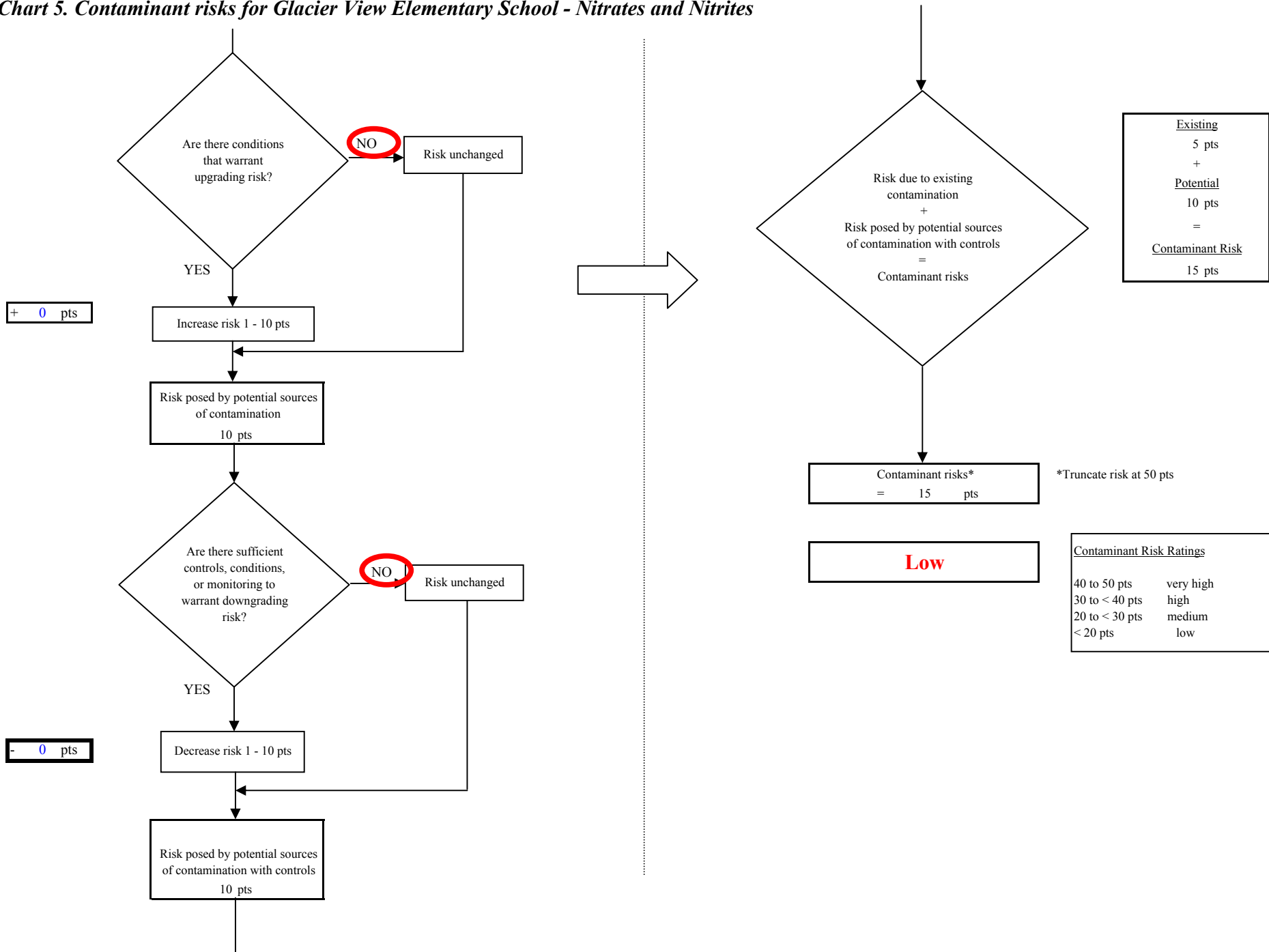
Chart 5. Contaminant risks for Glacier View Elementary School - Nitrates and Nitrites



**Chart 5. Contaminant risks for Glacier View Elementary School - Nitrates and Nitrites**



**Chart 5. Contaminant risks for Glacier View Elementary School - Nitrates and Nitrites**



**Chart 6. Vulnerability analysis for Glacier View Elementary School - Nitrates and Nitrites**

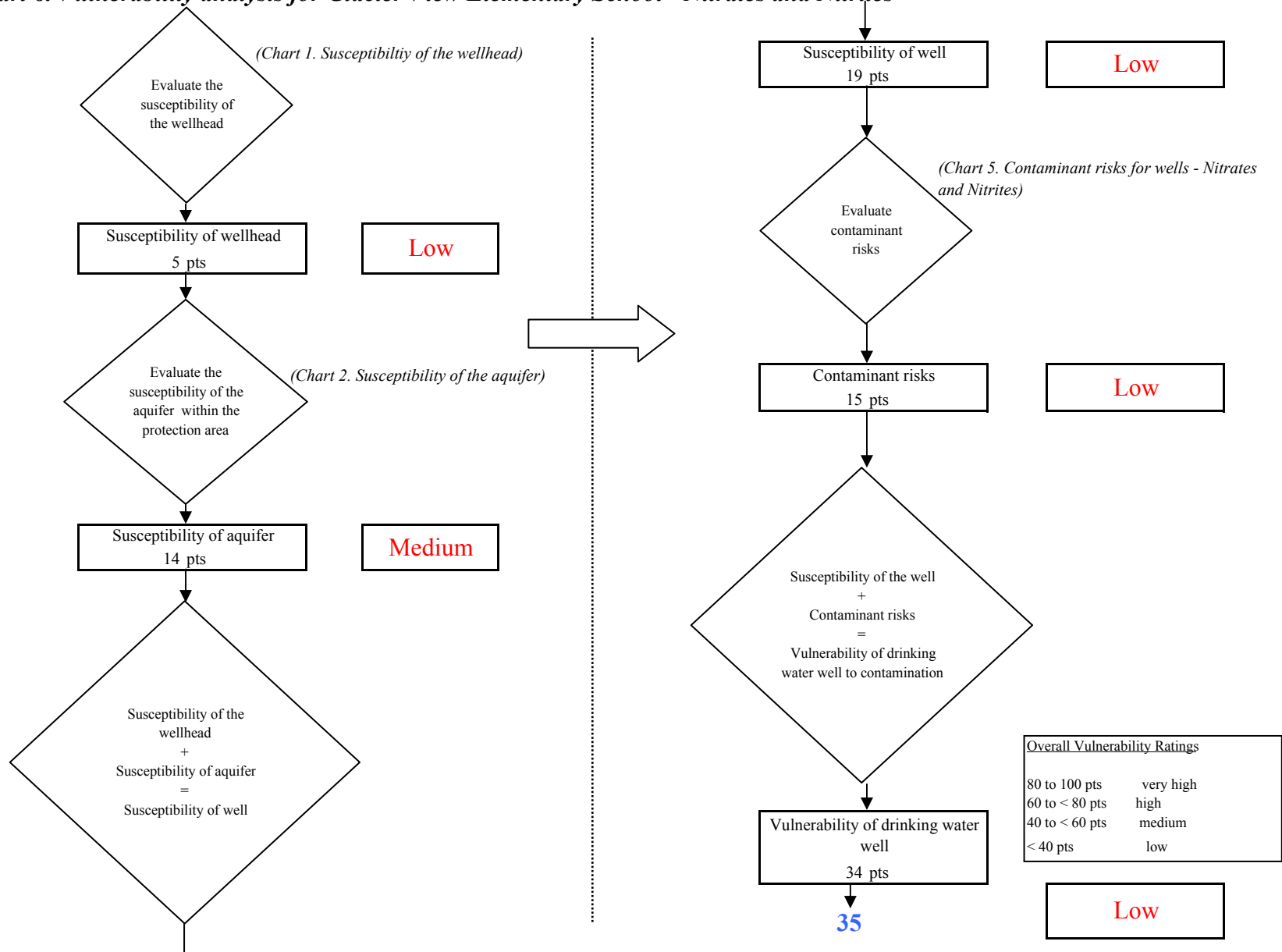
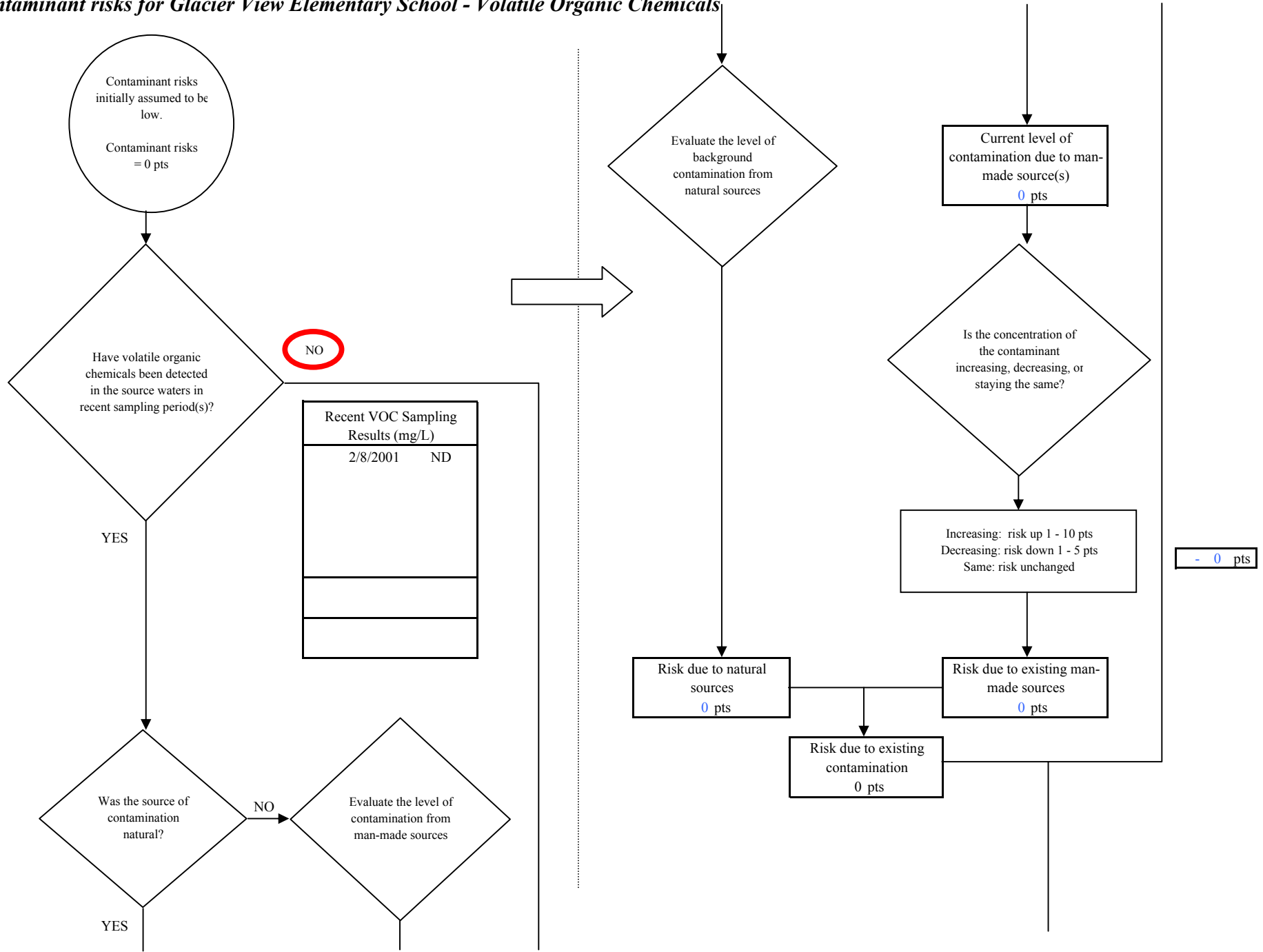
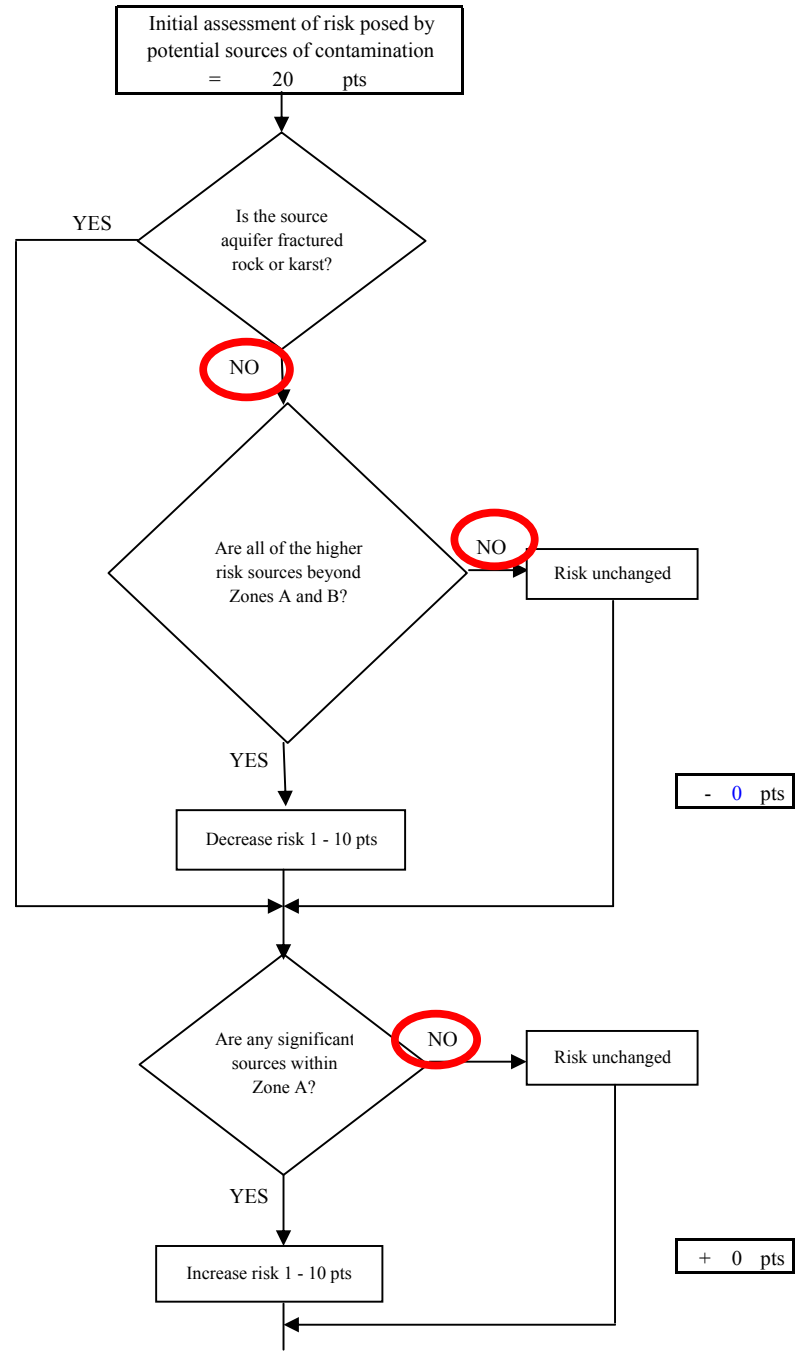
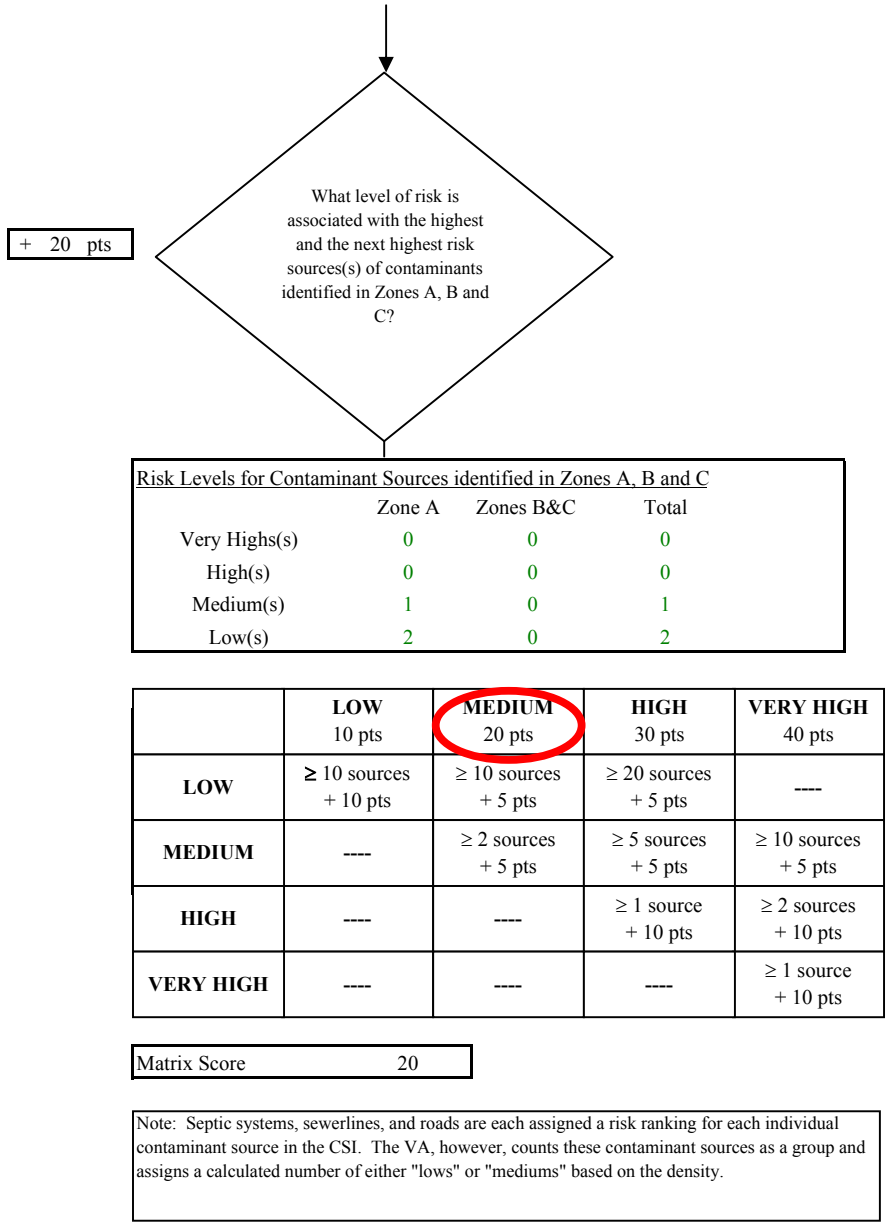


Chart 7. Contaminant risks for Glacier View Elementary School - Volatile Organic Chemicals

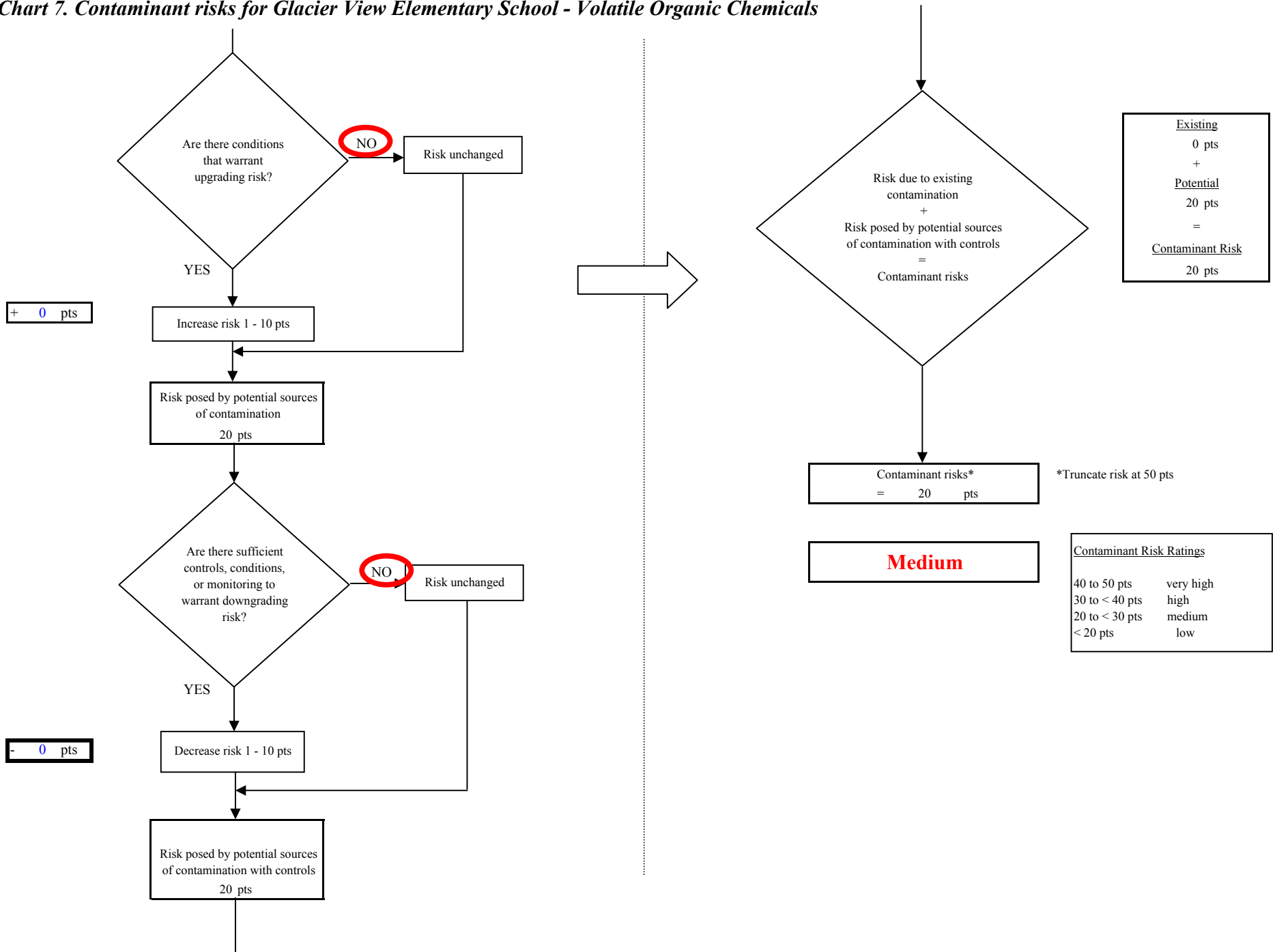


**Chart 7. Contaminant risks for Glacier View Elementary School - Volatile Organic Chemicals**

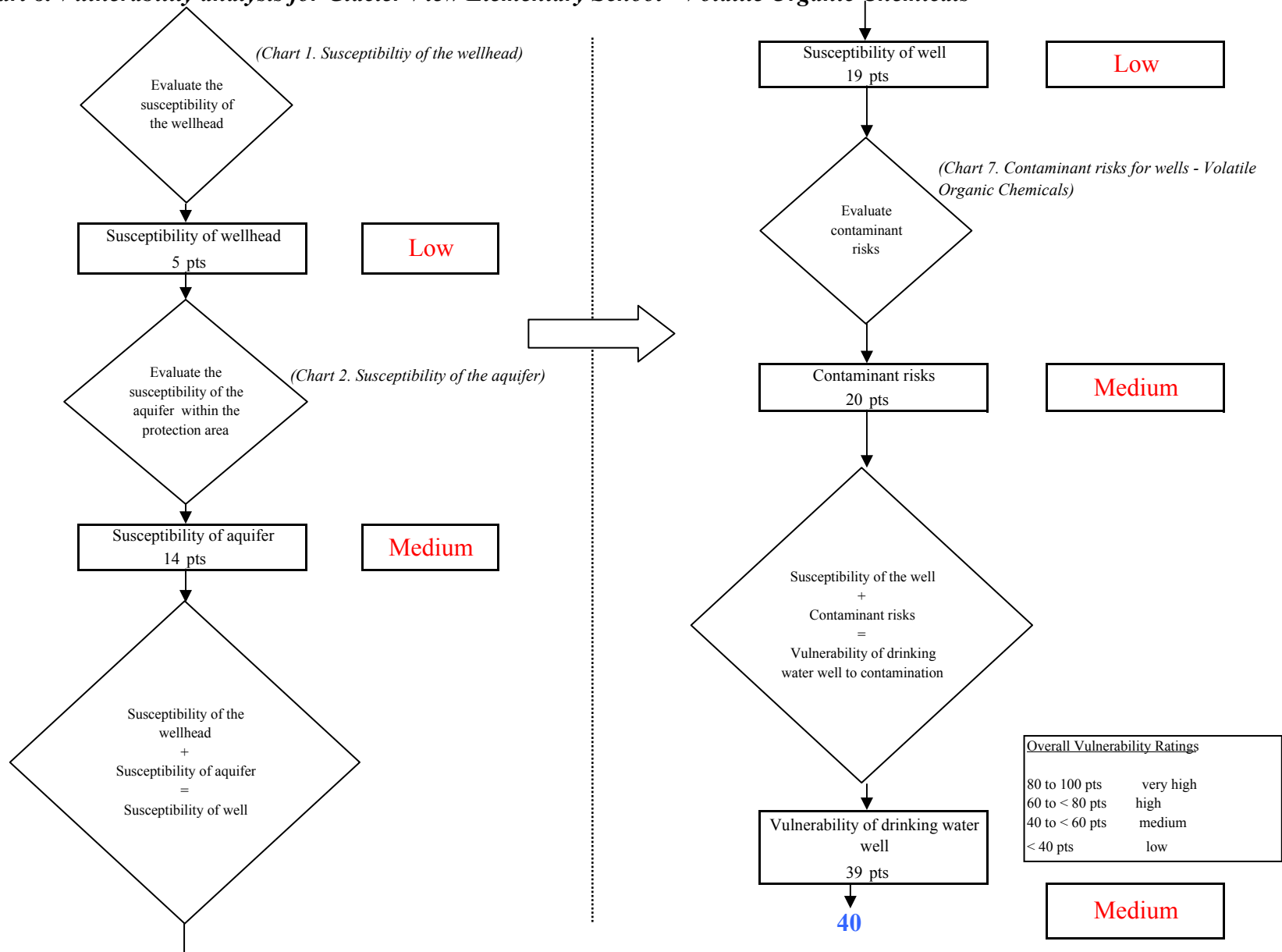




**Chart 7. Contaminant risks for Glacier View Elementary School - Volatile Organic Chemicals**



**Chart 8. Vulnerability analysis for Glacier View Elementary School - Volatile Organic Chemicals**



**Chart 9. Contaminant risks for Glacier View Elementary School - Heavy Metals, Cyanide and Other Inorganic Chemicals**

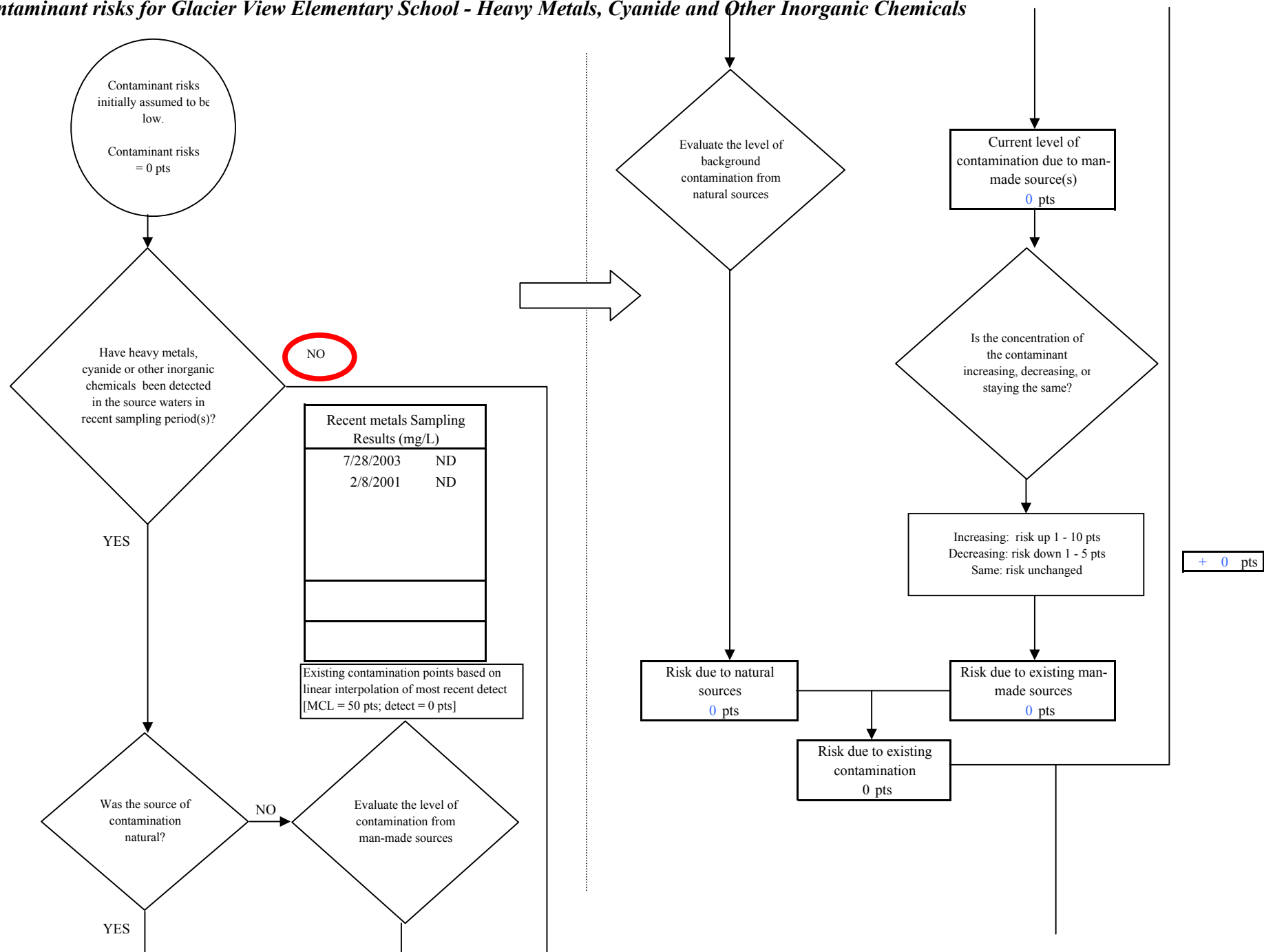
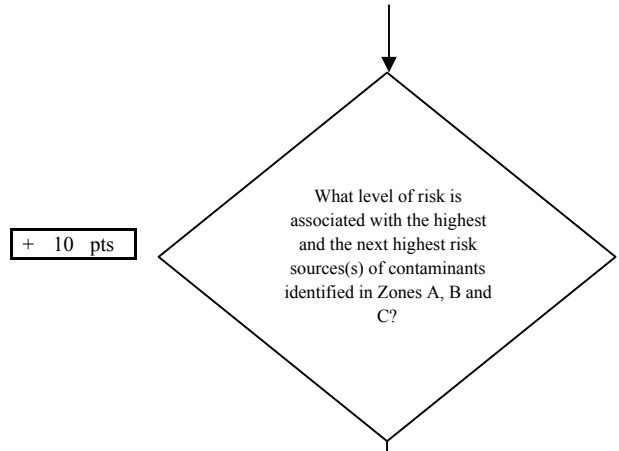


Chart 9. Contaminant risks for Glacier View Elementary School - Heavy Metals, Cyanide and Other Inorganic Chemicals

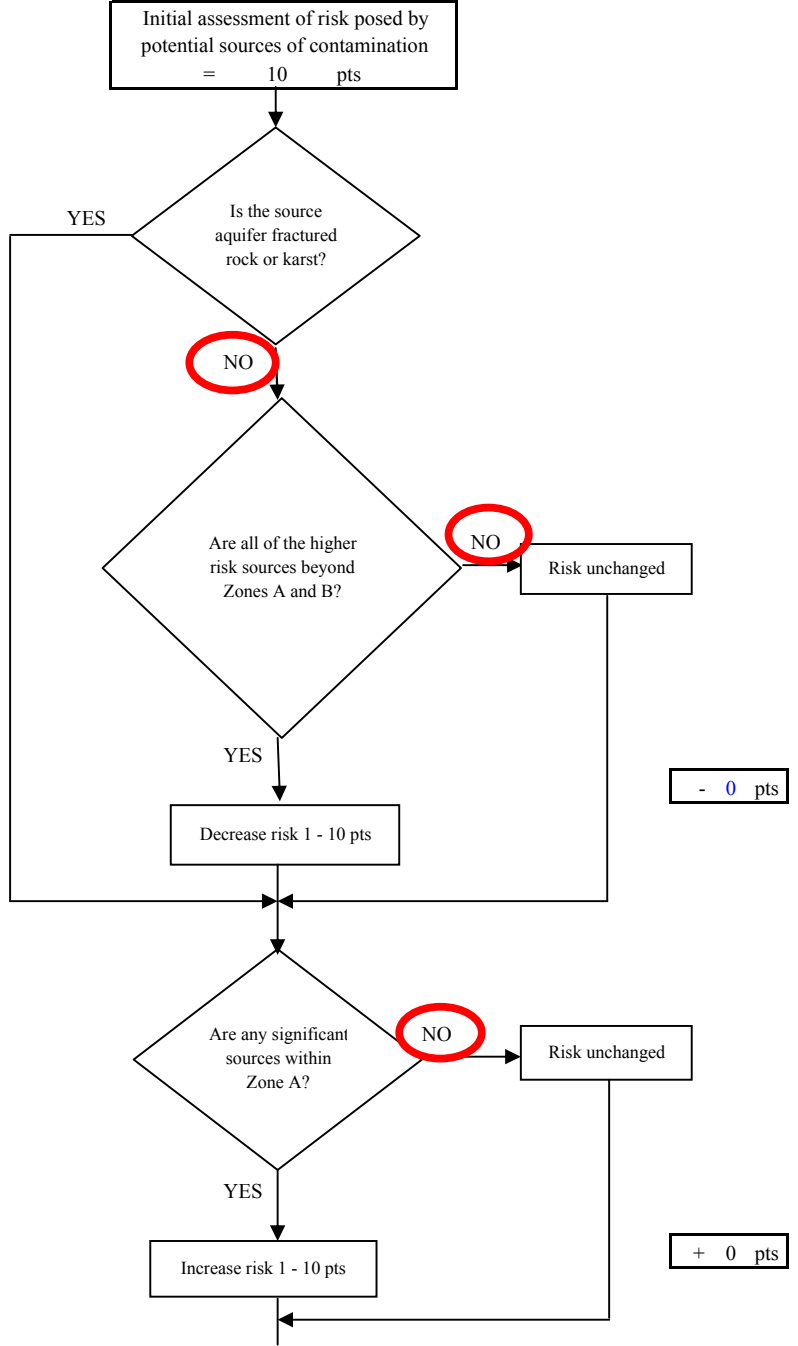
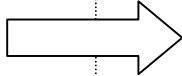


Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	2	0	2

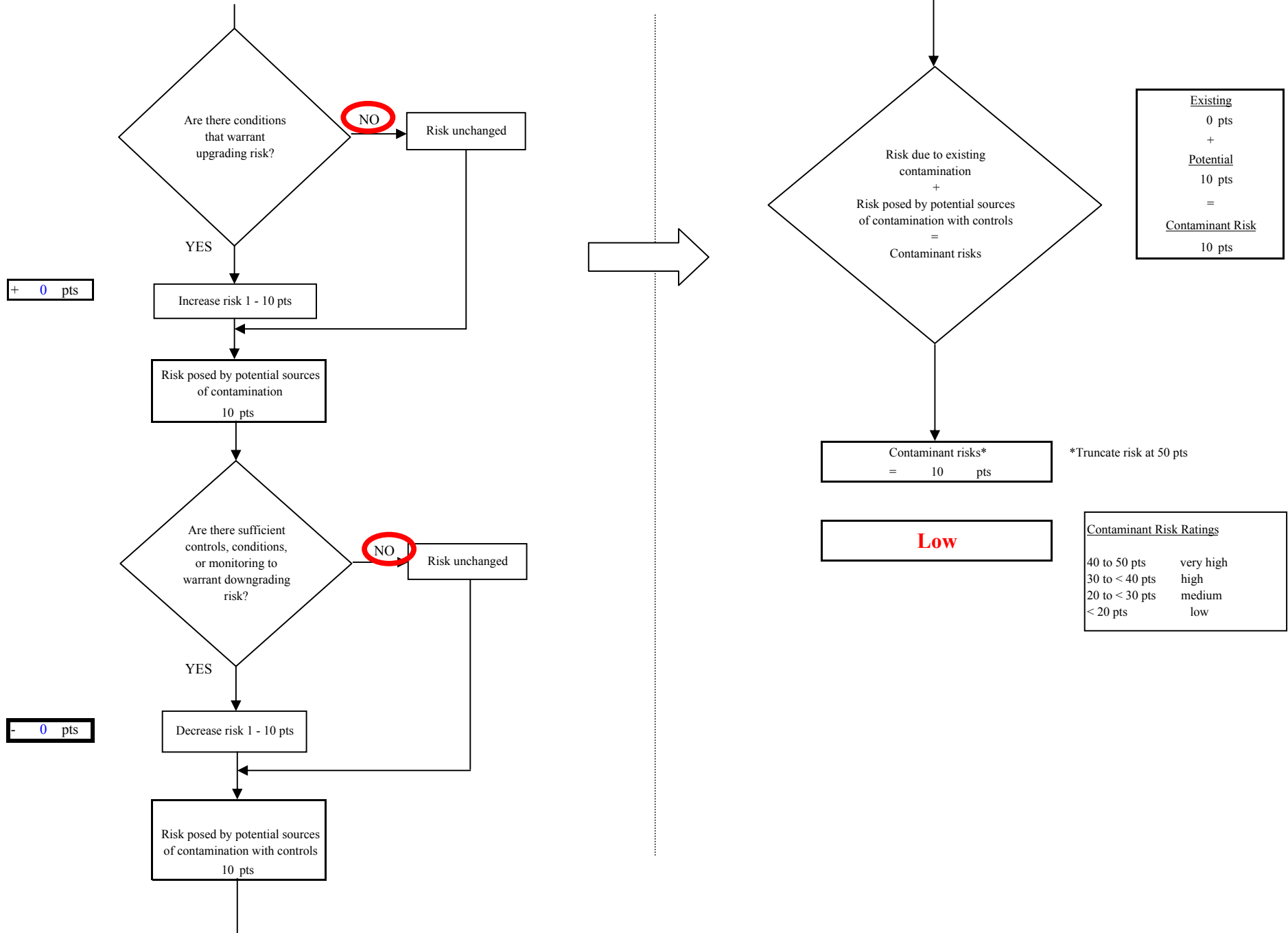
	<b>LOW</b> 10 pts	<b>MEDIUM</b> 20 pts	<b>HIGH</b> 30 pts	<b>VERY HIGH</b> 40 pts
<b>LOW</b>	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
<b>MEDIUM</b>	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
<b>HIGH</b>	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10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

Matrix Score 10

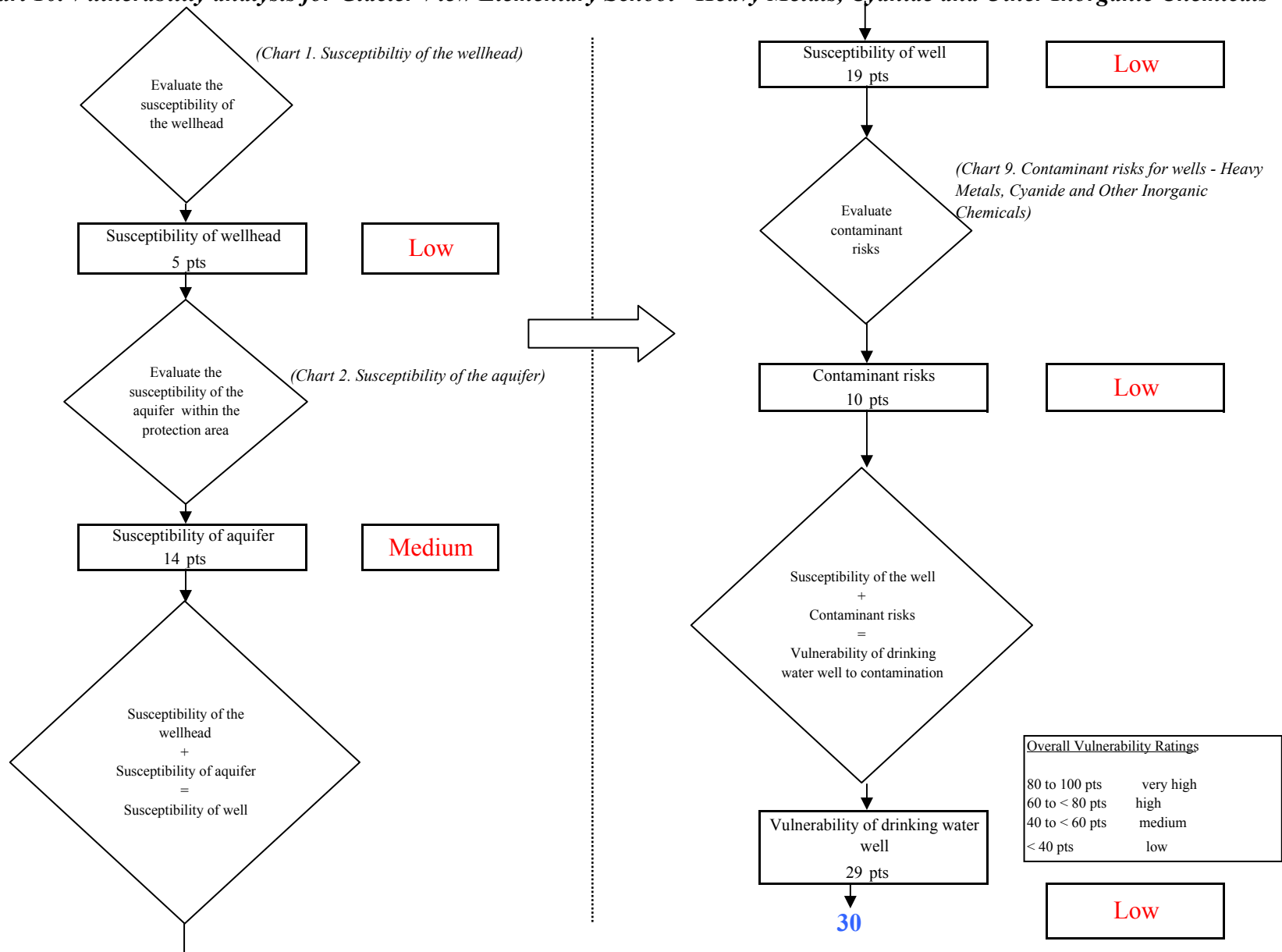
Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.



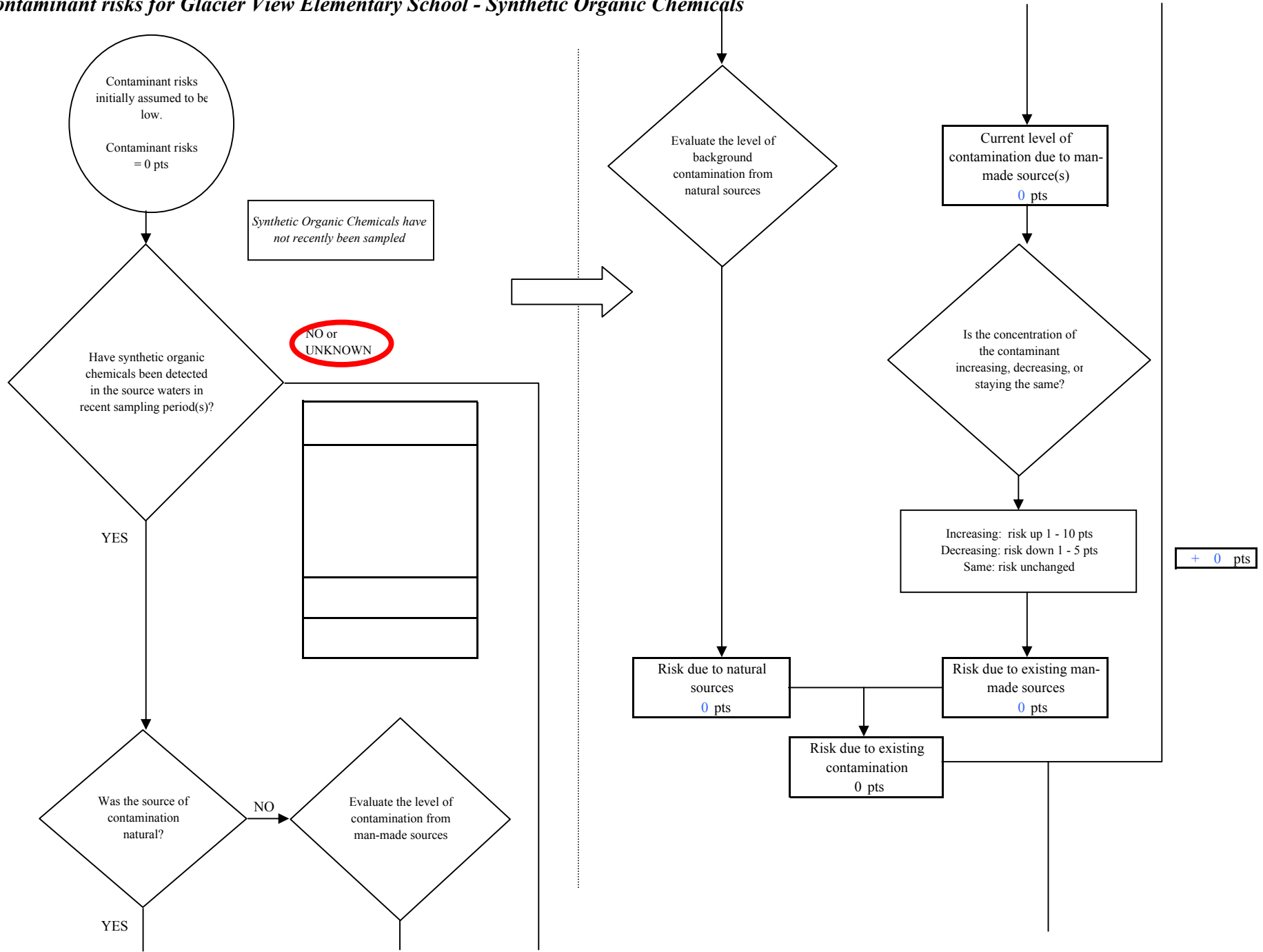
**Chart 9. Contaminant risks for Glacier View Elementary School - Heavy Metals, Cyanide and Other Inorganic Chemicals**



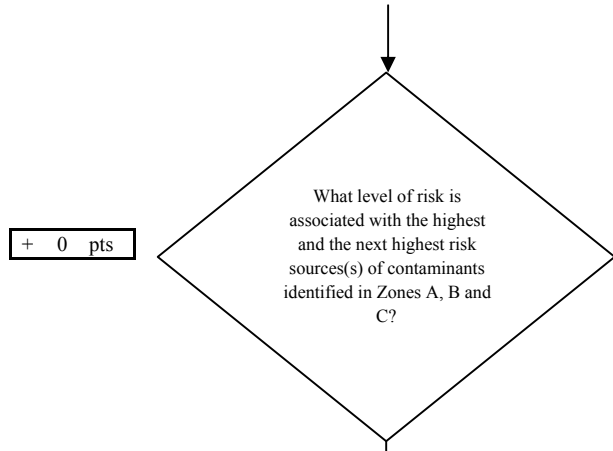
**Chart 10. Vulnerability analysis for Glacier View Elementary School - Heavy Metals, Cyanide and Other Inorganic Chemicals**



**Chart 11. Contaminant risks for Glacier View Elementary School - Synthetic Organic Chemicals**



**Chart 11. Contaminant risks for Glacier View Elementary School - Synthetic Organic Chemicals**

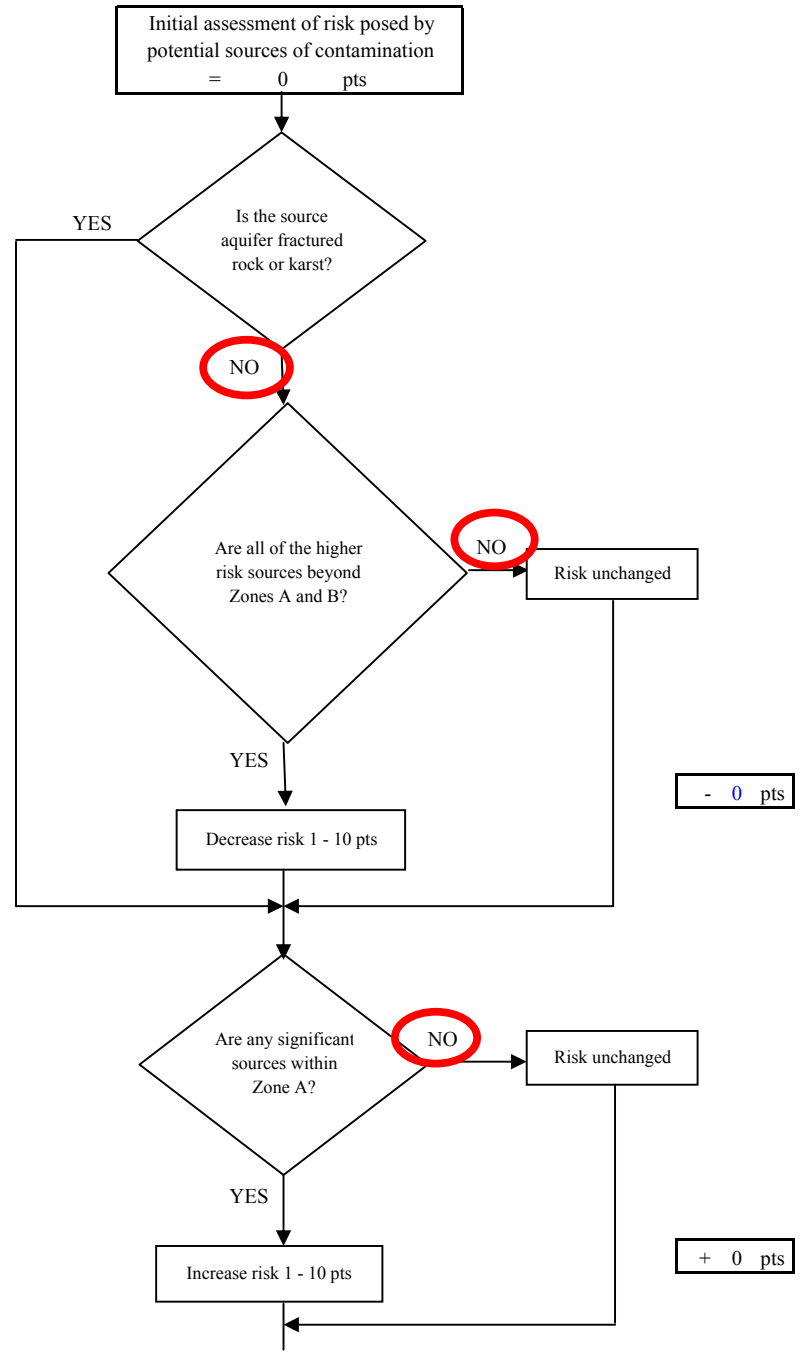
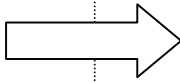


Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	0	0	0

	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

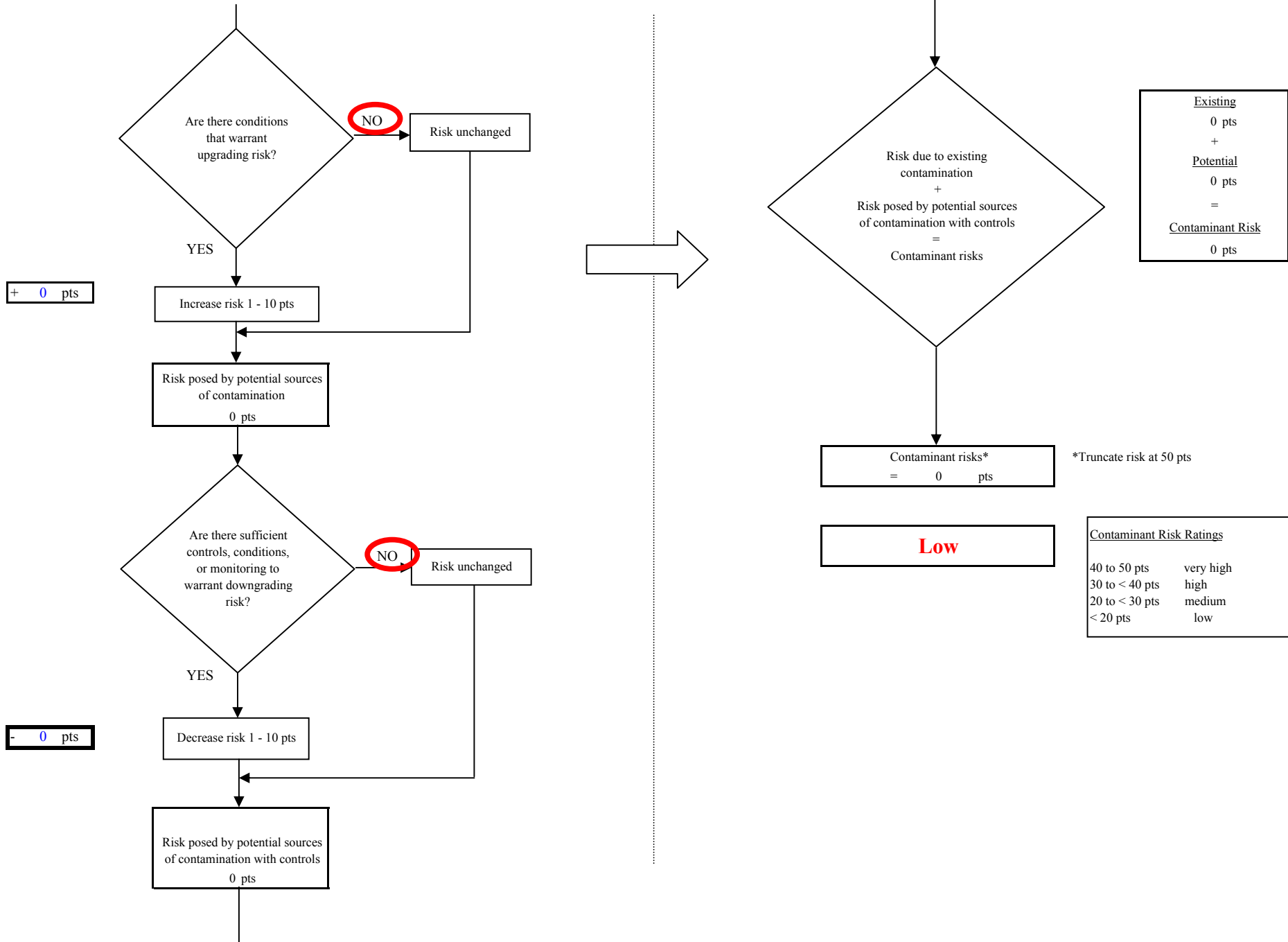
Matrix Score 0

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 11. Contaminant risks for Glacier View Elementary School - Synthetic Organic Chemicals**



**Chart 12. Vulnerability analysis for Glacier View Elementary School - Synthetic Organic Chemicals**

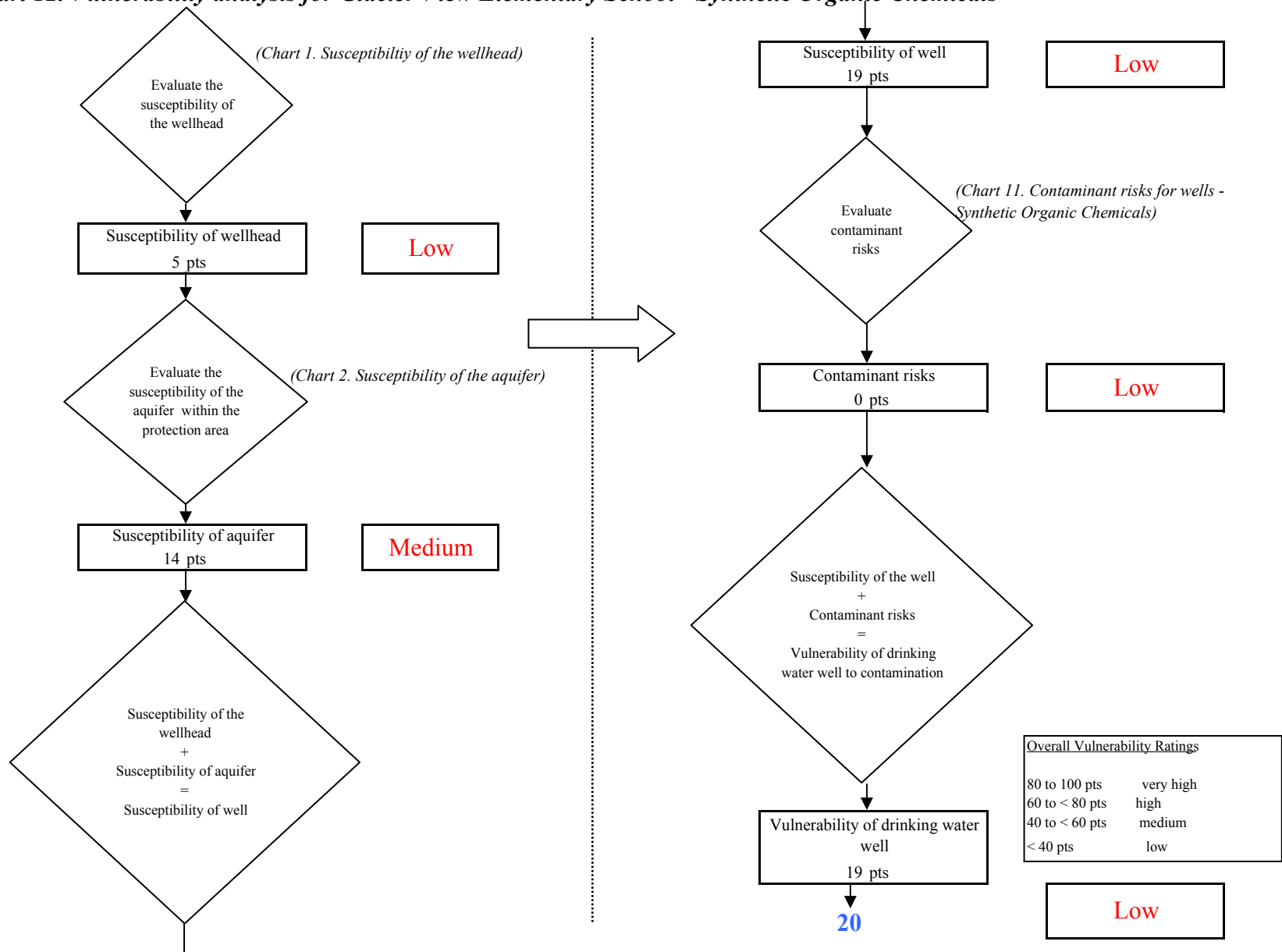
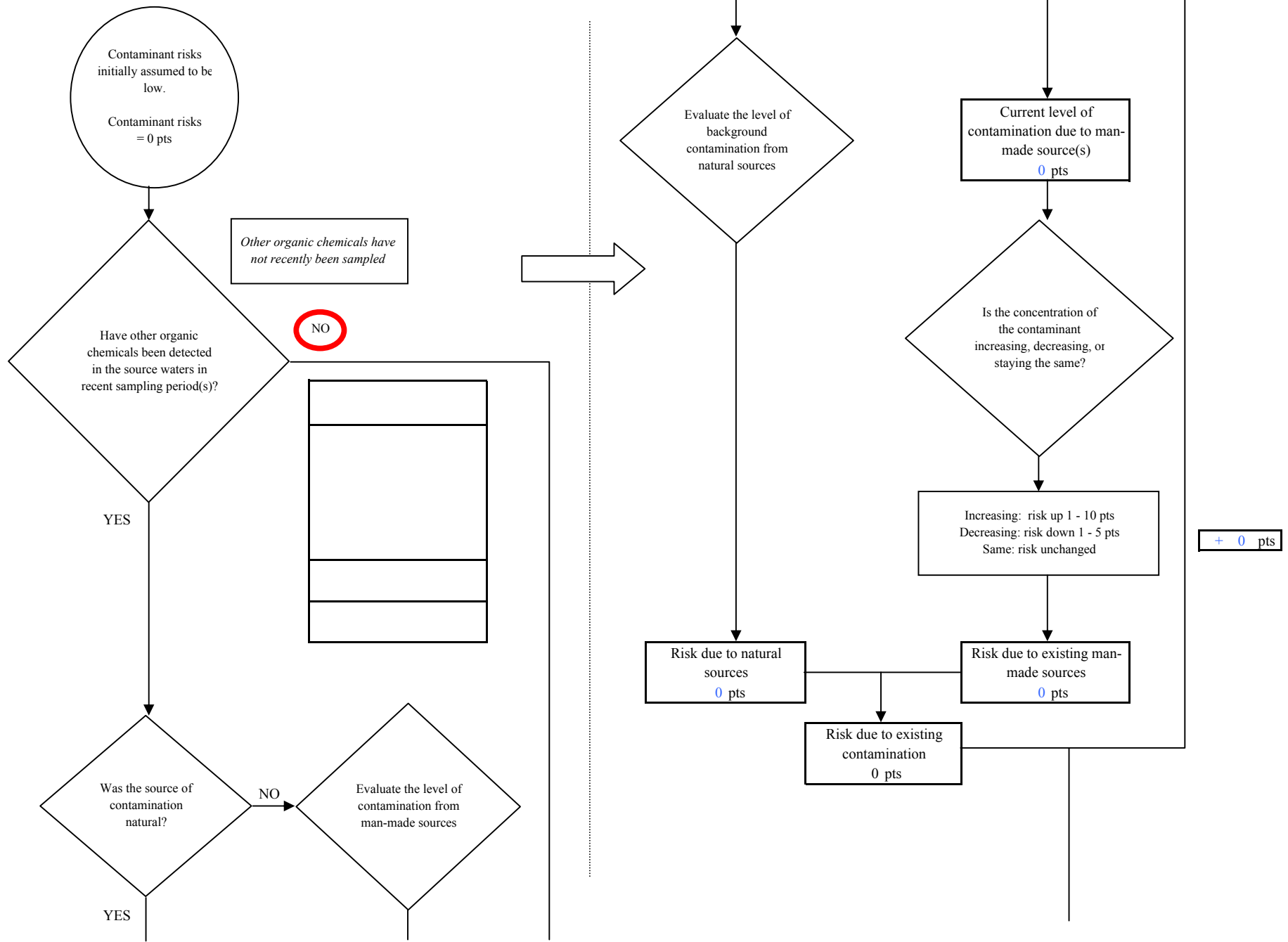
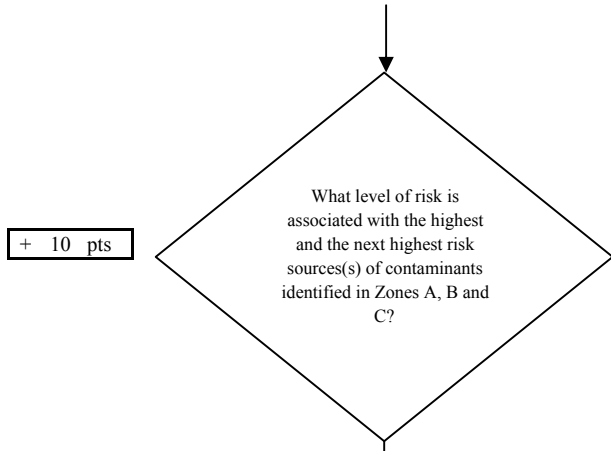


Chart 13. Contaminant risks for Glacier View Elementary School - Other Organic Chemicals



**Chart 13. Contaminant risks for Glacier View Elementary School - Other Organic Chemicals**

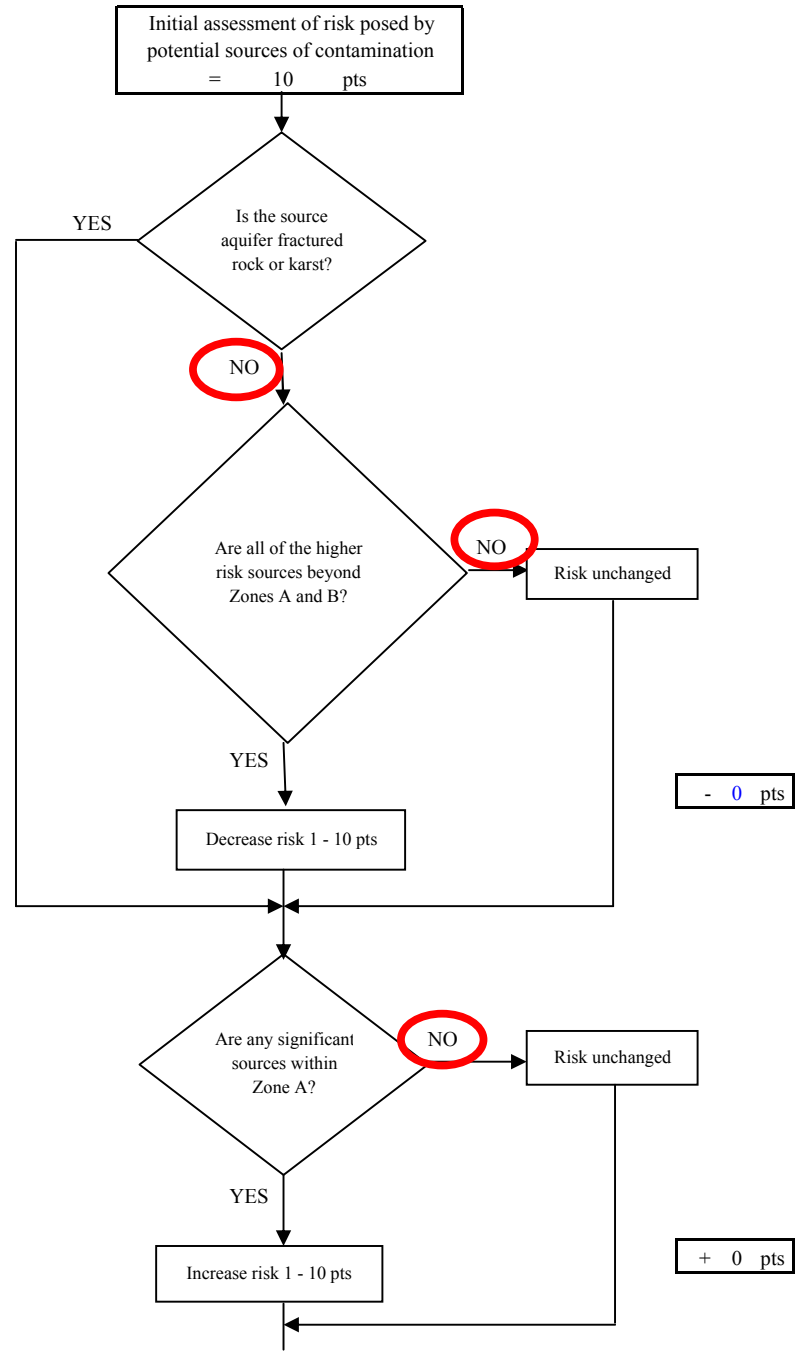
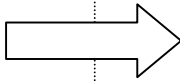


Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	1	0	1

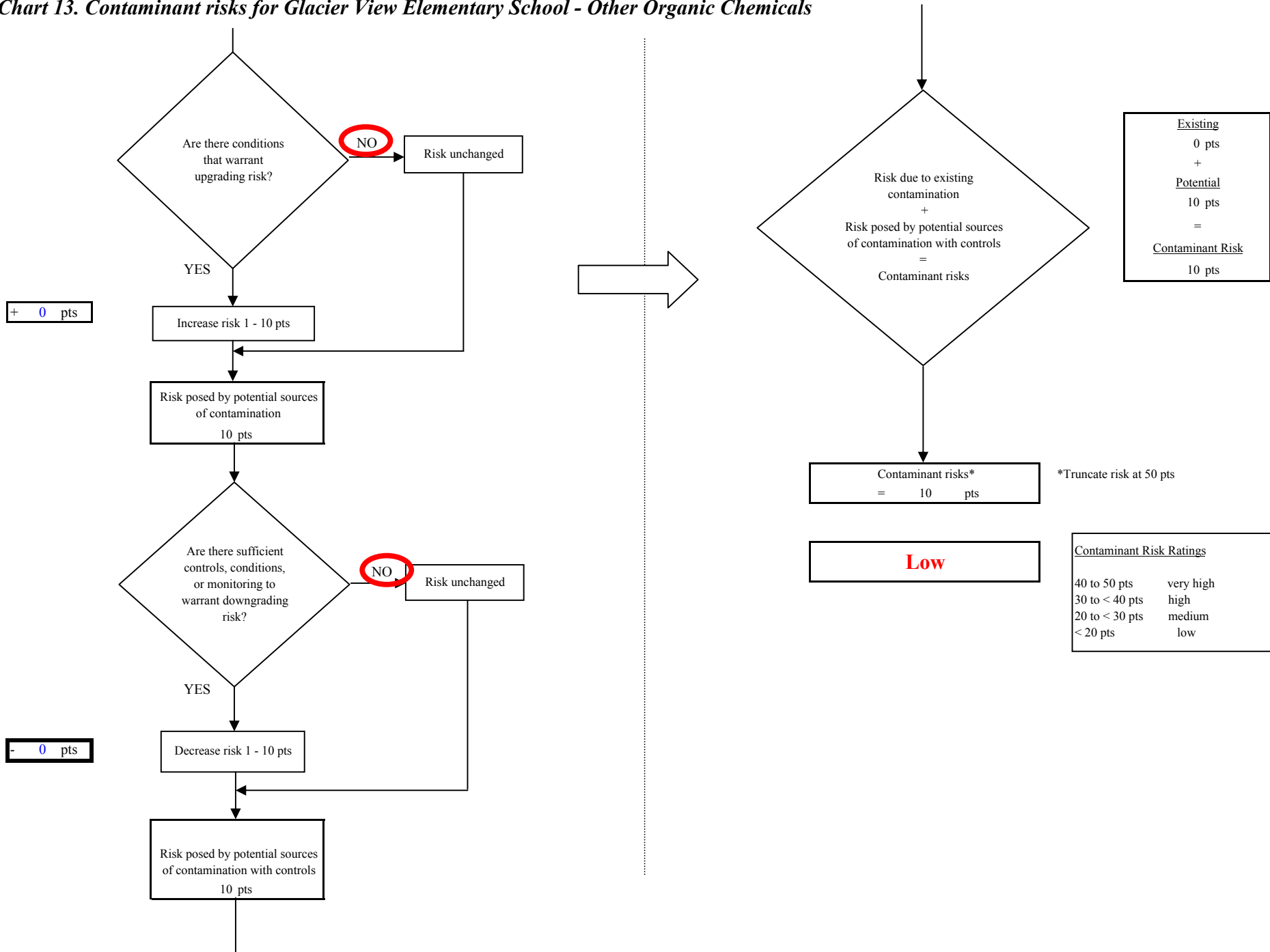
	LOW 10 pts	MEDIUM 20 pts	HIGH 30 pts	VERY HIGH 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 10

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 13. Contaminant risks for Glacier View Elementary School - Other Organic Chemicals**



**Chart 14. Vulnerability analysis for Glacier View Elementary School - Other Organic Chemicals**

