



---

# Source Water Assessment

A Hydrogeologic Susceptibility and  
Vulnerability Assessment for  
Lakeview Terrace Trailer Court Drinking  
Water System,  
Fairbanks, Alaska  
PWSID 310390

October 2003

DRINKING WATER PROTECTION PROGRAM REPORT Report 1245  
Alaska Department of Environmental Conservation

# Source Water Assessment for Lakeview Terrace Trailer Court Drinking Water System

Fairbanks, Alaska

PWSID 310390

October 2003

DRINKING WATER PROTECTION PROGRAM REPORT Report 1245

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.

## CONTENTS

	Page	Inventory of Potential and Existing	Page
Executive Summary	1	Contaminant Sources	2
Lakeview Terrace Trailer Court Public Drinking Water System	1	Ranking of Contaminant Risks	2
Lakeview Terrace Trailer Court Protection Area	1	Vulnerability of Lakeview Terrace Trailer Court Drinking Water System	3
		References	7

## TABLES

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

## APPENDICES

APPENDIX	A. Lakeview Terrace Trailer Court Drinking Water Protection Area (Map 1)	
	B. Contaminant Source Inventory for Lakeview Terrace Trailer Court (Table 1)	
	Contaminant Source Inventory and Risk Ranking for Lakeview Terrace Trailer Court – Bacteria and Viruses (Table 2)	
	Contaminant Source Inventory and Risk Ranking for Lakeview Terrace Trailer Court – Nitrates/Nitrites (Table 3)	
	Contaminant Source Inventory and Risk Ranking for Lakeview Terrace Trailer Court – Volatile Organic Chemicals (Table 4)	
	Contaminant Source Inventory and Risk Ranking for Lakeview Terrace Trailer Court – Heavy Metals, Cyanide, and Other Inorganic Chemicals (Table 5)	
	Contaminant Source Inventory and Risk Ranking for Lakeview Terrace Trailer Court – Synthetic Organic Chemicals (Table 6)	
	Contaminant Source Inventory and Risk Ranking for Lakeview Terrace Trailer Court – Other Organic Chemicals (Table 7)	
	C. Lakeview Terrace Trailer Court Drinking Water Protection Area and Potential and Existing Contaminant Sources (Map 2)	
	D. Vulnerability Analysis for Contaminant Source Inventory and Risk Ranking for Lakeview Terrace Trailer Court Public Drinking Water Source (Charts 1 – 14)	

# Source Water Assessment for Lakeview Terrace Trailer Court Source of Public Drinking Water, Fairbanks, Alaska

---

## Drinking Water Protection Program Alaska Department of Environmental Conservation

### EXECUTIVE SUMMARY

This source water assessment provides an evaluation of the vulnerability of the public water system serving the Lakeview Terrace Trailer Court to potential contamination. This Class A (community) water system consists of one well on Lakeview Terrace Road south of downtown Fairbanks, Alaska. The well received a natural susceptibility rating of **High**. This rating is a combination of a **Very High** rating for the actual wellhead and a **High** rating for the aquifer in which the well is drawing water from. Identified potential and current sources of contamination for the Lakeview Terrace Trailer Court public water system include: a lift station, a gravel quarry, roads, a rail corridor, residential areas, septic systems, and an ADEC-recognized contaminated site. These are considered as sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals 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 Lakeview Terrace Trailer Court received an overall vulnerability rating of **High** for bacteria and viruses, nitrates and/or nitrites, and other organic chemicals; and a **Medium** for volatile organic chemicals, heavy metals and other inorganic chemicals, and synthetic organic chemicals.

### LAKEVIEW TERRACE TRAILER COURT PUBLIC DRINKING WATER SYSTEM

Lakeview Terrace Trailer Court public water system is a Class A (community) water system. The system consists of one well on Lakeview Terrace Road south of downtown Fairbanks, Alaska. (T1S, R1W, Section 23) (See Map 1 of Appendix A). Fairbanks is located in the Fairbanks North Star Borough which is near the center of Alaska (Please see the inset of Map 1 in Appendix A for location). The Borough's current population is 82,840 making it the second-largest population center in the state (ADCED, 2002). Communities located within the Borough include : College, Eielson Air Force Base, Ester, Fairbanks, Fox, Harding Lake, Moose Creek, North Pole, Pleasant Valley, Salcha, and Two Rivers.

Water and sewer service for the city of Fairbanks is

offered by Golden Heart Utilities. Electricity is provided by Golden Valley Electric Association. The majority of residents (approximately 70%) use heating oil (typically stored in both above and below ground 275 to 500-gallon tanks) to heat homes and buildings (ADCED, 2002). Garbage collection services are provided by the city, and refuse is transported to the Fairbanks North Star Borough Class I Landfill on South Cushman Street.

The Fairbanks area includes two distinct topographic areas: the alluvial plain between the Tanana River and the Chena River, and the uplands north of this alluvial plain. The Lakeview Terrace Trailer Court water system is located in the alluvial plain at an elevation of approximately 450 feet above sea level.

According to the Sanitary Survey (10/24/01) for this water system, the depth of the well is 140 feet below the ground surface. Most of the wells in this area are screened in a combination of gravel and sand, and it is assumed that these are also. The alluvial plain consists of alternating layers of sand and gravel up to over 500 feet thick, in some locations overlain by 1 to 10 feet of silt or sandy silt or a few feet of peat (Glass and others, 1996). Discontinuous permafrost (perennially frozen areas) is also common in the alluvial plain. The depth to permafrost in these areas ranges between 2 and 45 feet below the ground surface with the thickness of the permafrost ranging between 5 and 265 feet (Pewe, T.L. 1958). Areas with discontinuous permafrost may locally affect the ground water flow directions.

Primarily the Tanana River, but also the Chena River contribute water to this alluvial aquifer. The Chena River typically only contributes water when its stage is high and the Tanana is low (Nelson, 1978). The Tanana River gets approximately 85% of its water from snowmelt of the Alaska Range and 15% from the Yukon-Tanana uplands (Anderson, 1970).

The Lakeview Terrace Trailer Court public drinking water system serves approximately 400 to 450 residents through 160 service connections.

### LAKEVIEW TERRACE TRAILER COURT 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 the well.

The most probable area for contamination to reach the drinking water well 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 methods for 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 an estimate using the available information and resources, 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 various United States Geological Survey (USGS) reports, area well logs, and the Groundwater textbook by Freeze and Cherry (Freeze and Cherry, 1979).

The water table in the area of the Lakeview Terrace Trailer Court, the area between the Tanana and the Chena Rivers, is primarily influenced by the level of water flow in each river. The capture zones were drawn based on three separate configurations of the water table during various stages of the rivers: a period of high stage in the Chena River (October 14-17, 1986), high stage in the Tanana River (July 16-17, 1987), and low stages in both rivers (March 30-April 3, 1988) (Glass and others, 1996). High water levels in the Chena usually occur in the spring due to runoff from the uplands and in late summer due to rainstorms (Nelson, 1978). The Tanana usually experiences high flow during the hot, dry periods of mid-summer when maximum snowmelt from the Alaska Range occurs (Nelson, 1978). Groundwater in this area generally flows toward the northwest, from the Tanana River to the Chena River, however flow is reversed very near the Chena River during its high stage periods (Glass and others, 1996). These flow reversals are of short duration (i.e. days versus months) and of limited extent, generally within 1000 feet of the river (Nakanishi, et al, 1998).

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

The drinking water protection area outlined for the Lakeview Terrace Trailer Court 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 Lakeview Terrace Trailer Court 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 Organic 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 4 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals.

### VULNERABILITY OF LAKEVIEW TERRACE TRAILER COURT 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 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 Lakeview Terrace Trailer Court received a Very High Susceptibility rating. The well is located in floodplain which greatly increases the likelihood of flood waters entering the well. The Sanitary Survey (10/24/01) indicates there is a sanitary seal on the well, the land surface is sloped away from the well, and the well is grouted. A sanitary seal prevents potential contaminant from entering the well, while a sloped land surface and grouting help to prevent contaminants from traveling down the outside of the well casing.

The aquifer the Lakeview Terrace Trailer Court well is completed in received a High Susceptibility rating. The highly transmissive aquifer material (sand and gravel) in the area allows contaminants to travel downward from the surface with the precipitation and surface water runoff. The shallow water table allows potential contaminants to come into contact with the water table with little natural filtering where they can disperse quickly. If any wells exist in the area, they can provide a quick pathway for contaminants to reach the aquifer. Table 2 summarizes the Susceptibility scores and ratings for Lakeview Terrace Trailer Court.

**Table 2. Susceptibility**

	Score	Rating
Susceptibility of the Wellhead	20	Very High
Susceptibility of the Aquifer	16	High
Natural Susceptibility	36	High

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	25	Medium
Nitrates and/or Nitrites	25	Medium
Volatile Organic Chemicals	20	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	17	Low
Synthetic Organic Chemicals	20	Medium
Other Organic Chemicals	30	High

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	60	High
Nitrates and Nitrites	60	High
Volatile Organic Chemicals	55	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	55	Medium
Synthetic Organic Chemicals	55	Medium
Other Organic Chemicals	65	High

### Bacteria and Viruses

The lift station located 30 feet away from the well represents the greatest risk of bacteria and viruses to the drinking water well.

Only a small amount of bacteria and viruses are required to endanger public health. Coliforms 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 coli forms 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). Coli forms have not been detected in this water system within the past 5 years during routine sampling.

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

### Nitrates and Nitrites

The lift station near the well also represents the greatest risk of nitrates and nitrites for this source of public drinking water.

The Class I Municipal Landfill for the city of Fairbanks is located just west of the protection area. Although the landfill is not located in the protection area, it could represent a risk to the Lakeview Terrace water system because of its size and uncertainties in the groundwater flow directions. The landfill represents a substantial risk of Nitrates/Nitrites, Synthetic Organic Chemicals, and Other Organic Chemicals, and also a less substantial risk of Volatile Organic Chemicals and Heavy Metals.

Nitrates are very mobile, moving at approximately the same rate as water. Nitrates have not been detected in the Lakeview Terrace Trailer Court well within the past 5 years during routine sampling.

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

### **Volatile Organic Chemicals**

The DEC-recognized contaminated site along with the rail corridor represents the greatest risk for volatile organic chemical contamination to the well.

The ADEC-recognized contaminated site is located in Zone B of the protection area and on the east side of Lakeview Road one mile south of the Old Richardson Highway (RecKey 1991310913501). A lake of tar exists on the property apparently from the approximately 500 drums of tar and asphalt that were also discovered there.

Volatile Organic Chemicals were sampled most recently on 11/29/99 and 11/24/96 in the Lakeview Terrace Trailer Court public water system; none were detected. 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 DEC-recognized contaminated site also represents the greatest risk of heavy metals for this source of public drinking water.

No Heavy Metals were detected during sampling on 11/29/99 and 11/25/96. Arsenic and Barium were detected in very small concentrations (14% and 6% of their respective Maximum Contaminant Levels) during sampling on 2/13/01.

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

### **Synthetic Organic Chemicals**

The lift station near the well and the rail corridor also represents the greatest risk of synthetic organic chemicals for this source of public drinking water.

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

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

### **Other Organic Chemicals**

The DEC-recognized contaminated site also represents the greatest risk of other organic chemicals for this source of public drinking water.

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

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

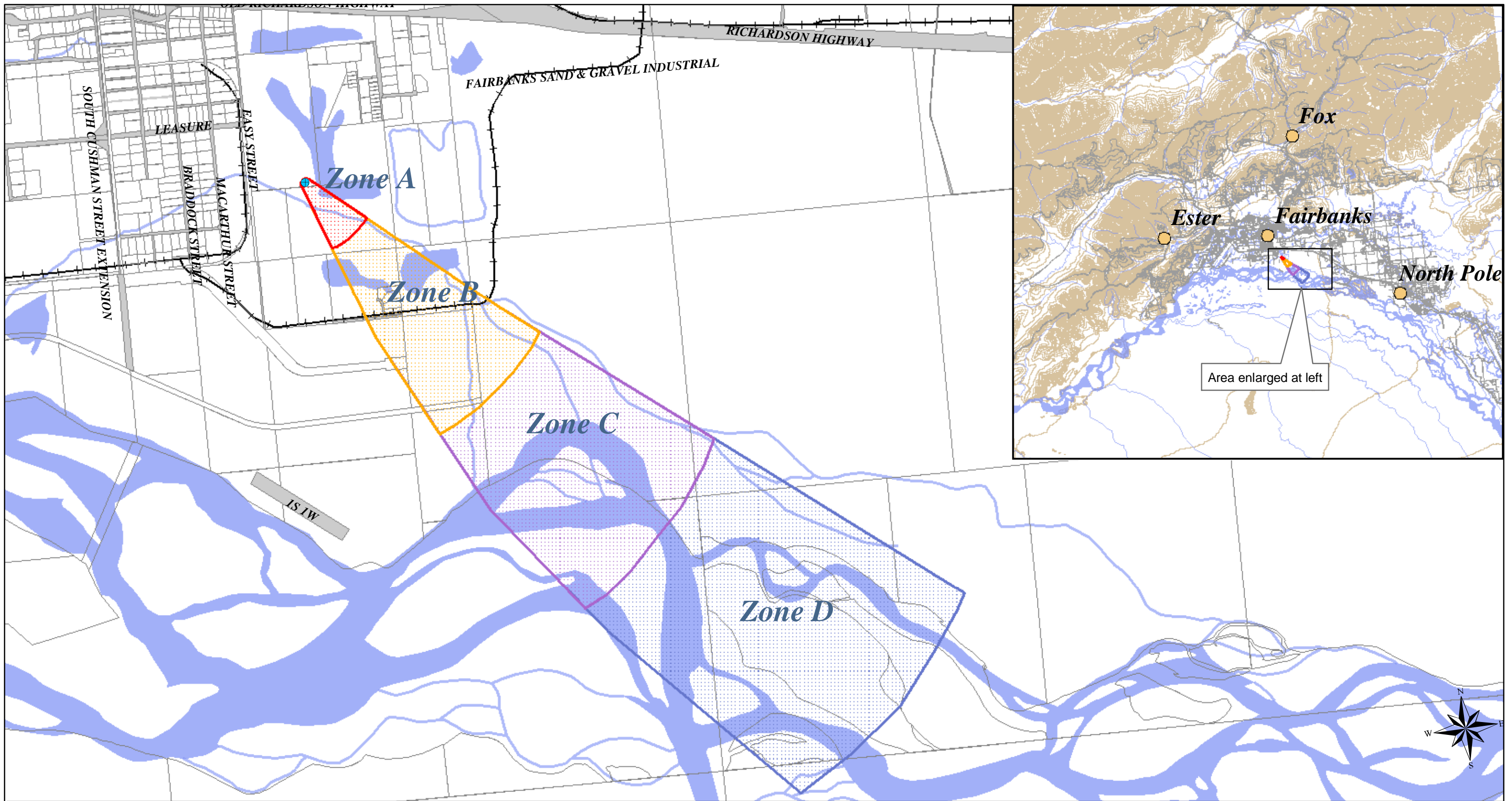


## REFERENCES

- 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).
- Anderson, G.S., 1970, Hydrologic reconnaissance of the Tanana basin, central Alaska: U.S. Geological Survey Hydrologic Investigations Atlas HA-319.
- Forbes, R.B. and Weber, F.R., 1981. Bedrock Geologic Map of the Fairbanks Mining District, Alaska. Funded by the State of Alaska, US Geological Survey, and The National Science Foundation.
- Freeze, R.A. and Cherry, J.A., 1979. Groundwater. Prentice-Hall, Englewood Cliffs, NJ.
- Glass, Roy L., Lilly, Micheal R., and Meyer, David F., 1996. Ground-Water Levels in an Alluvial Plain Between the Tanana and Chena Rivers Near Fairbanks, Alaska 1986-93. US Geological Survey Water Resources Investigations Report 96-4060, 39p.
- Nakanishi, Allan S. and Lilly, Micheal R., 1998. Estimate of Aquifer Properties by Numerically Simulating Ground-Water/Surface-Water Interactions, Fort Wainwright, Alaska. US Geological Survey Water Resources Investigations Report 98-4088, 27p.
- Nelson, Gordon L., 1978, Hydrologic Information for Land-Use Planning, Fairbanks Vicinity, Alaska. US Department of the Interior Geological Survey Open File Report 78-959, 47p.
- Pewe, T. L., 1958, Geologic map of the Fairbanks D-2 quadrangle, Alaska: U.S. Geol. Survey Geol. Quad. Map GQ-110, scale 1:63,360.
- United States Environmental Protection Agency (EPA), 2002 [WWW document]. URL <http://www.epa.gov/safewater/mcl.html>.

## **APPENDIX A**

### **Lakeview Terrace Trailer Court Drinking Water Protection Area Location Map (Map 1)**



**Legend**

- Lakeview Terrace Trailer Court Well
- ▭ Parcels
- ▭ Zone A Protection Area
- ▭ Zone B Protection Area
- ▭ Zone C Protection Area
- ▭ Zone D Protection Area
- Railroads
- Roads
- Lakes
- Rivers

**Data Sources:**  
 Parcels, Roads - Fairbanks North Star Borough  
 Water bodies, Railroad - Geographic Data Technology  
 Elevations contours - USGS digital elevation models (DEMs)

0 875 1,750 3,500 Feet  
 1:21,000

**Map 1. Lakeview Terrace Trailer Court Drinking Water Protection Area** **PWSID 310390**

## **APPENDIX B**

### **Contaminant Source Inventory and Risk Ranking for Lakeview Terrace Trailer Court (Tables 1-7)**

**Table 1**

**Contaminant Source Inventory for  
Lakeview Terrace Trailer Crt.**

**PWSID 310390.001**

<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>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D0-1	A	2	Lift station for Lakeview Terrace Trailer Court
Quarries (sand, gravel, rock, other?)	E10	E10-1	B	2	
Residential Areas	R01		B	2	Approximately 10 acres of residential area
Septic systems (serves one single-family home)	R02		B	2	Approximately 4 septic systems; number based on number of residential tax parcel not connected to Golden Heart Utilities sewer service
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-1	B	2	Lakeview Road Drum Site
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	2	Frontier Avenue
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	2	Alaska Railroad Right-of-Way
Rail corridors	X30	X30-1	B	2	

**Table 2**

*Contaminant Source Inventory and Risk Ranking for  
Lakeview Terrace Trailer Crt.  
Sources of Bacteria and Viruses*

**PWSID 310390.001**

<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>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D0-1	A	Medium	2	Lift station for Lakeview Terrace Trailer Court
Septic systems (serves one single-family home)	R02		B	Low	2	Approximately 4 septic systems; number based on number of residential tax parcel not connected to Golden Heart Utilities sewer service
Residential Areas	R01		B	Low	2	Approximately 10 acres of residential area
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	Low	2	Frontier Avenue
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	Alaska Railroad Right-of-Way

**Table 3**

*Contaminant Source Inventory and Risk Ranking for  
Lakeview Terrace Trailer Crt.  
Sources of Nitrates/Nitrites*

**PWSID 310390.001**

<b>Contaminant Source Type</b>	<b>Contaminant Source ID</b>	<b>CS ID tag</b>	<b>Zone</b>	<b>Risk Ranking for Analysis</b>	<b>Map Number</b>	<b>Comments</b>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D0-1	A	Medium	2	Lift station for Lakeview Terrace Trailer Court
Septic systems (serves one single-family home)	R02		B	Low	2	Approximately 4 septic systems; number based on number of residential tax parcel not connected to Golden Heart Utilities sewer service
Residential Areas	R01		B	Low	2	Approximately 10 acres of residential area
Quarries (sand, gravel, rock, other?)	E10	E10-1	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	Low	2	Frontier Avenue
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	Alaska Railroad Right-of-Way

**Table 4**

*Contaminant Source Inventory and Risk Ranking for  
Lakeview Terrace Trailer Crt.  
Sources of Volatile Organic Chemicals*

**PWSID 310390.001**

<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>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D0-1	A	Low	2	Lift station for Lakeview Terrace Trailer Court
Residential Areas	R01		B	Low	2	Approximately 10 acres of residential area
Septic systems (serves one single-family home)	R02		B	Low	2	Approximately 4 septic systems; number based on number of residential tax parcel not connected to Golden Heart Utilities sewer service
Quarries (sand, gravel, rock, other?)	E10	E10-1	B	Low	2	
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-1	B	High	2	Lakeview Road Drum Site
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	Low	2	Frontier Avenue
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	Alaska Railroad Right-of-Way
Rail corridors	X30	X30-1	B	Medium	2	



Table 5

*Contaminant Source Inventory and Risk Ranking for  
Lakeview Terrace Trailer Crt.*

*PWSID 310390.001*

*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>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D0-1	A	Low	2	Lift station for Lakeview Terrace Trailer Court
Residential Areas	R01		B	Low	2	Approximately 10 acres of residential area
Septic systems (serves one single-family home)	R02		B	Low	2	Approximately 4 septic systems; number based on number of residential tax parcel not connected to Golden Heart Utilities sewer service
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	Low	2	Frontier Avenue
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	Alaska Railroad Right-of-Way
Rail corridors	X30	X30-1	B	Low	2	

**Table 6**

*Contaminant Source Inventory and Risk Ranking for  
Lakeview Terrace Trailer Crt.  
Sources of Synthetic Organic Chemicals*

**PWSID 310390.001**

<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>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D0-1	A	Low	2	Lift station for Lakeview Terrace Trailer Court
Residential Areas	R01		B	Low	2	Approximately 10 acres of residential area
Septic systems (serves one single-family home)	R02		B	Low	2	Approximately 4 septic systems; number based on number of residential tax parcel not connected to Golden Heart Utilities sewer service
Rail corridors	X30	X30-1	B	Medium	2	

**Table 7**

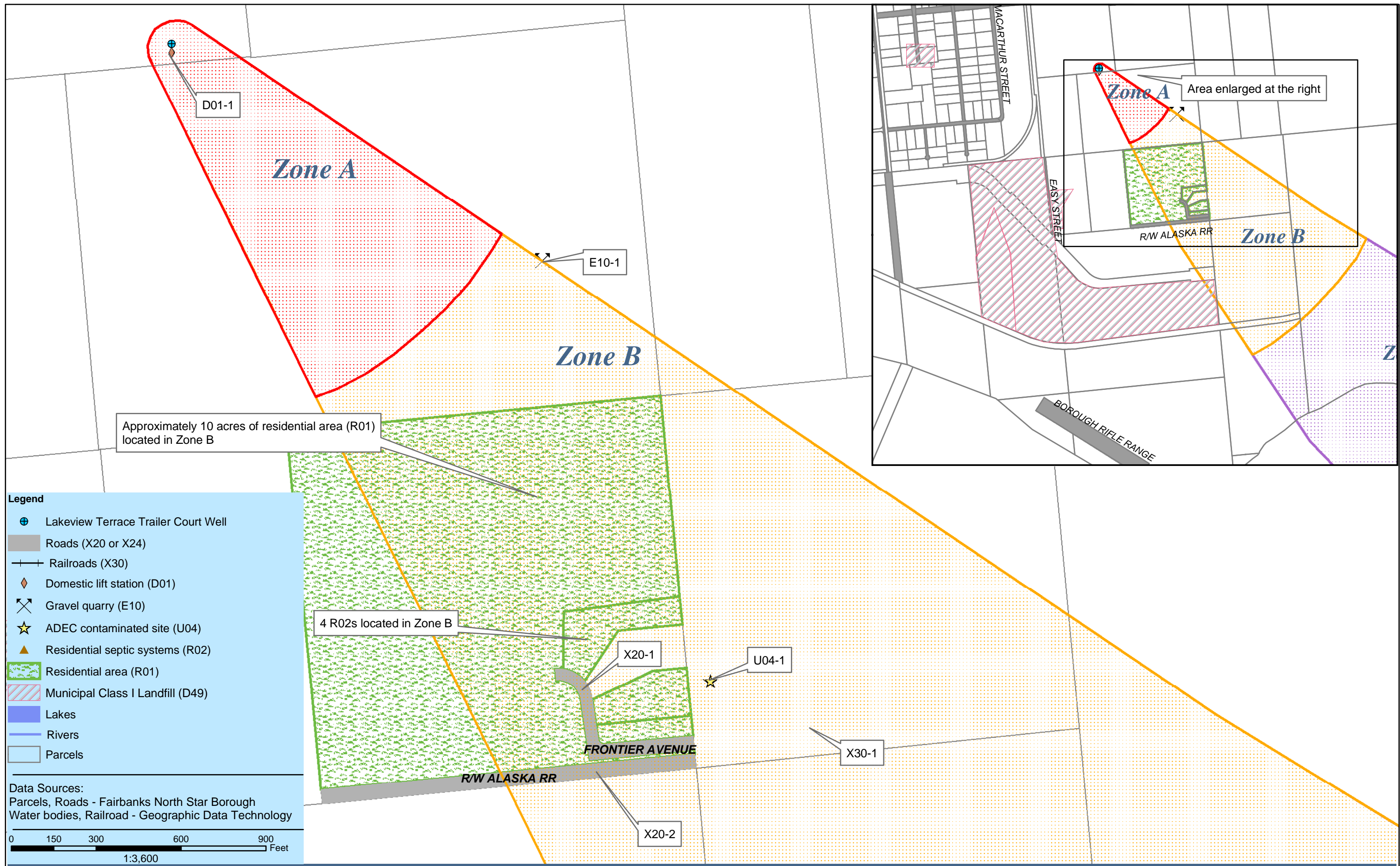
*Contaminant Source Inventory and Risk Ranking for  
Lakeview Terrace Trailer Crt.  
Sources of Other Organic Chemicals*

**PWSID 310390.001**

<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>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D0-1	A	Low	2	Lift station for Lakeview Terrace Trailer Court
Residential Areas	R01		B	Low	2	Approximately 10 acres of residential area
Septic systems (serves one single-family home)	R02		B	Low	2	Approximately 4 septic systems; number based on number of residential tax parcel not connected to Golden Heart Utilities sewer service
Quarries (sand, gravel, rock, other?)	E10	E10-1	B	Low	2	
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-1	B	Very High	2	Lakeview Road Drum Site
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	Low	2	Frontier Avenue
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	Alaska Railroad Right-of-Way
Rail corridors	X30	X30-1	B	Low	2	

## **APPENDIX C**

### **Lakeview Terrace Trailer Court Drinking Water Protection Area and Potential and Existing Contaminant Sources (Map 2)**



**Legend**

- ⊕ Lakeview Terrace Trailer Court Well
- Roads (X20 or X24)
- Railroads (X30)
- ◆ Domestic lift station (D01)
- ⚡ Gravel quarry (E10)
- ★ ADEC contaminated site (U04)
- ▲ Residential septic systems (R02)
- Residential area (R01)
- Municipal Class I Landfill (D49)
- Lakes
- Rivers
- Parcels

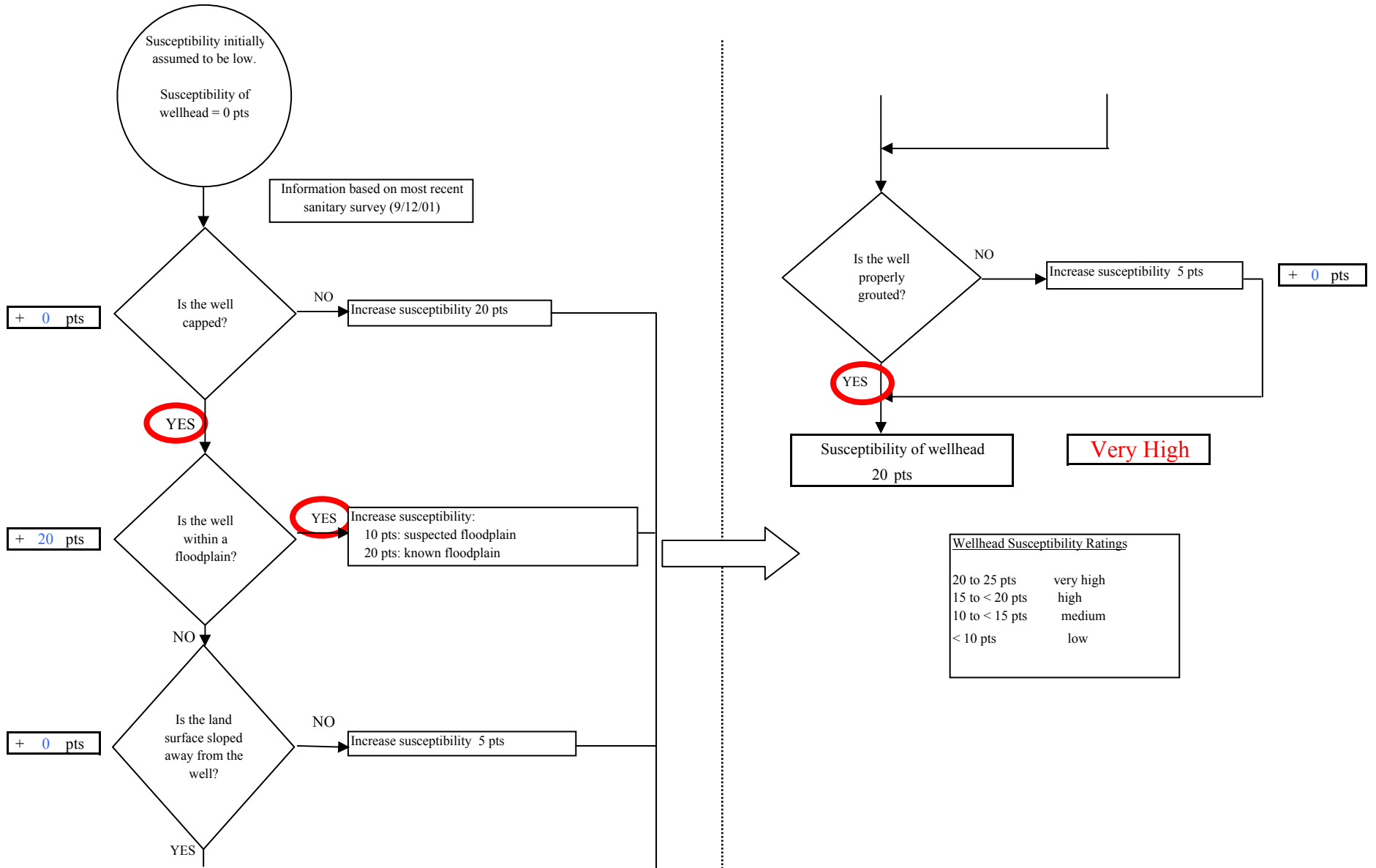
**Data Sources:**  
 Parcels, Roads - Fairbanks North Star Borough  
 Water bodies, Railroad - Geographic Data Technology

0 150 300 600 900 Feet  
 1:3,600

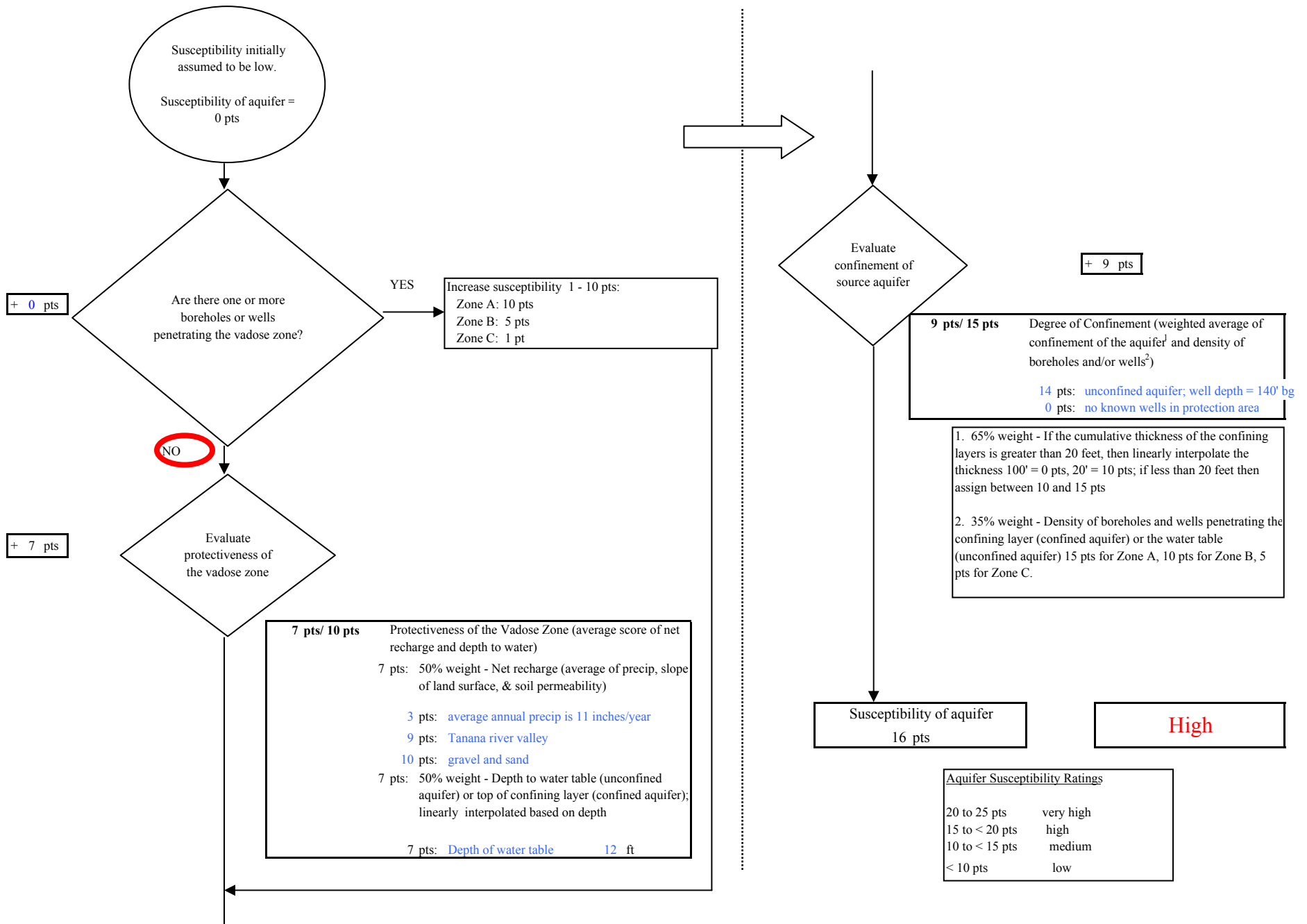
## **APPENDIX D**

### **Vulnerability Analysis for Lakeview Terrace Trailer Court Public Drinking Water Source (Charts 1-14)**

**Chart 1. Susceptibility of the wellhead - Lakeview Terrace Trailer Court**

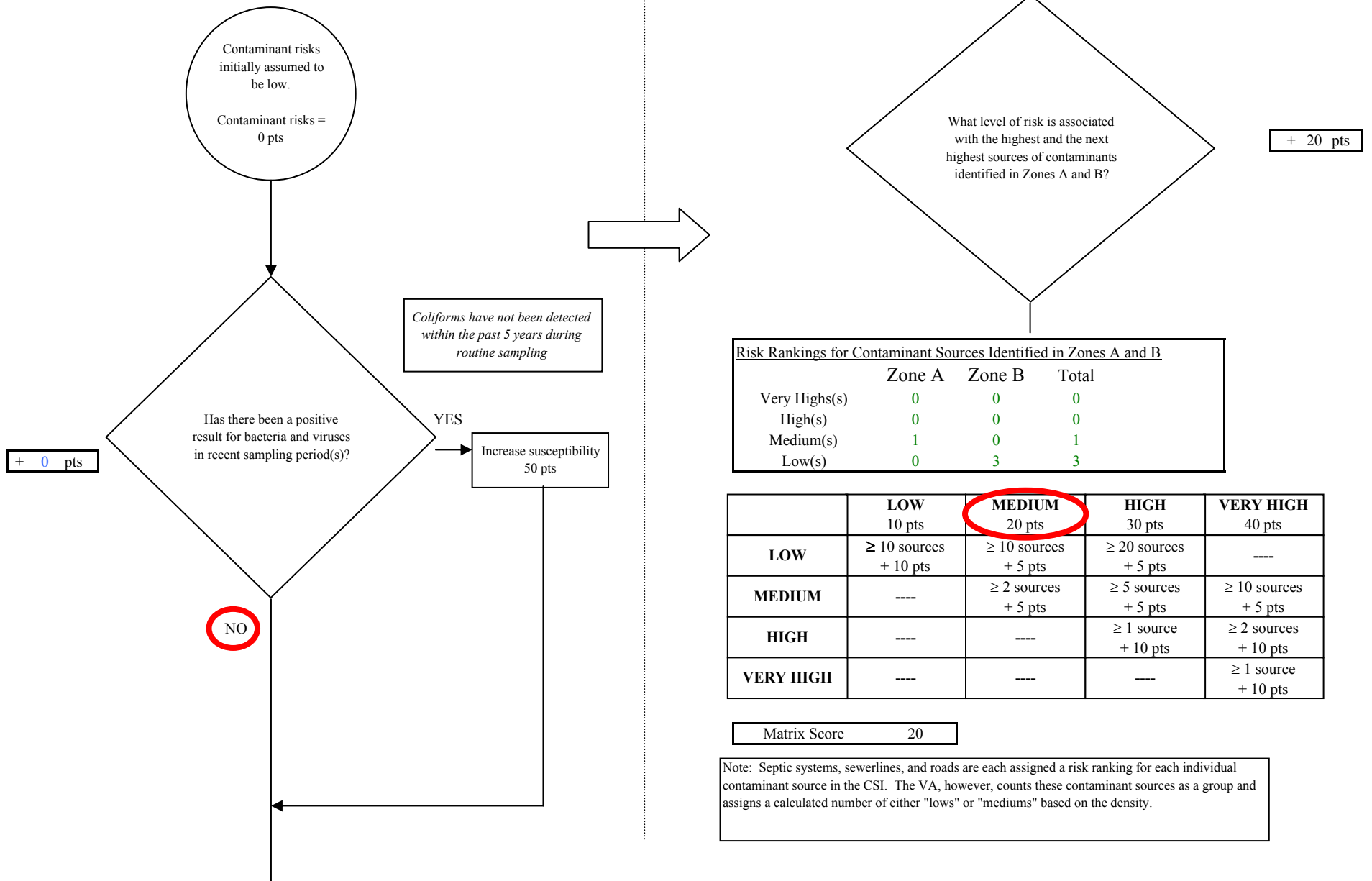


**Chart 2. Susceptibility of the aquifer - Lakeview Terrace Trailer Court**

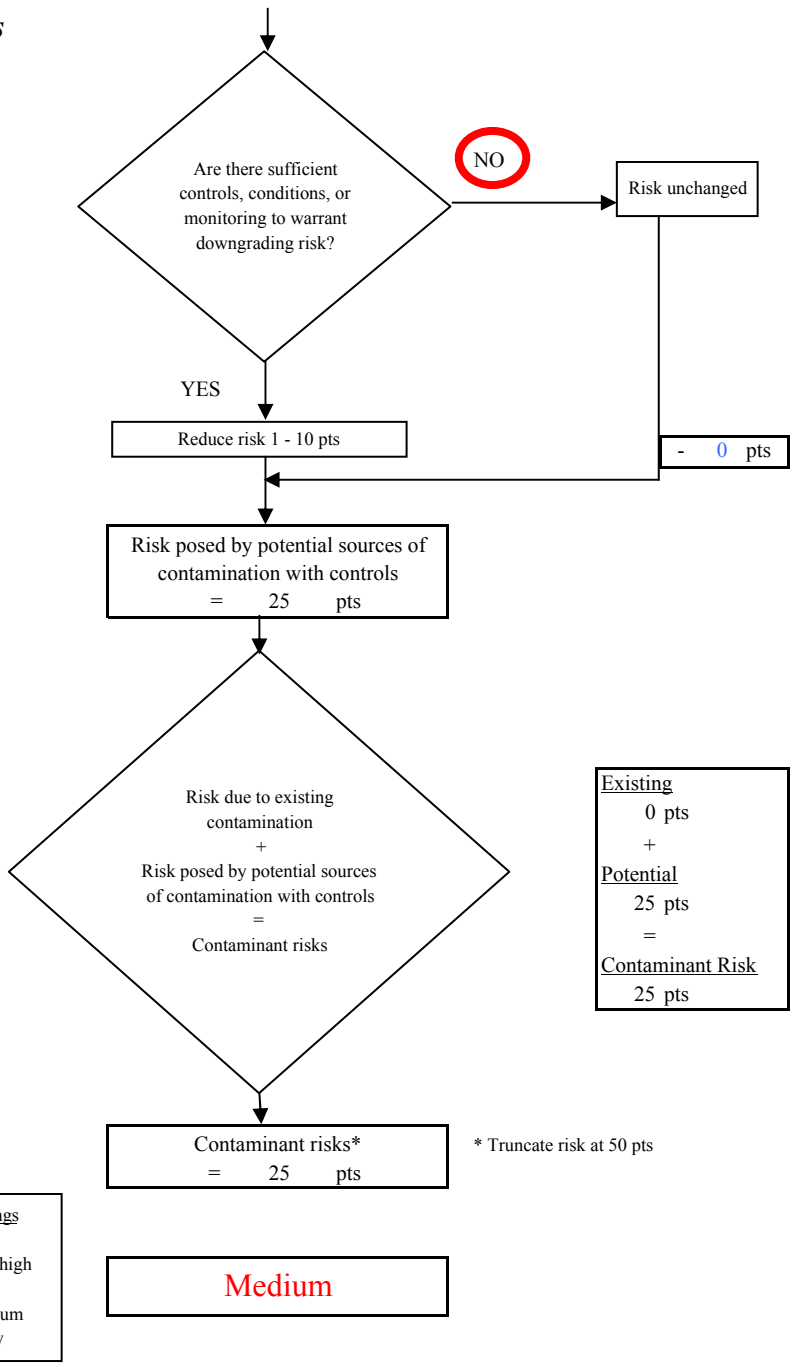
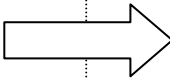
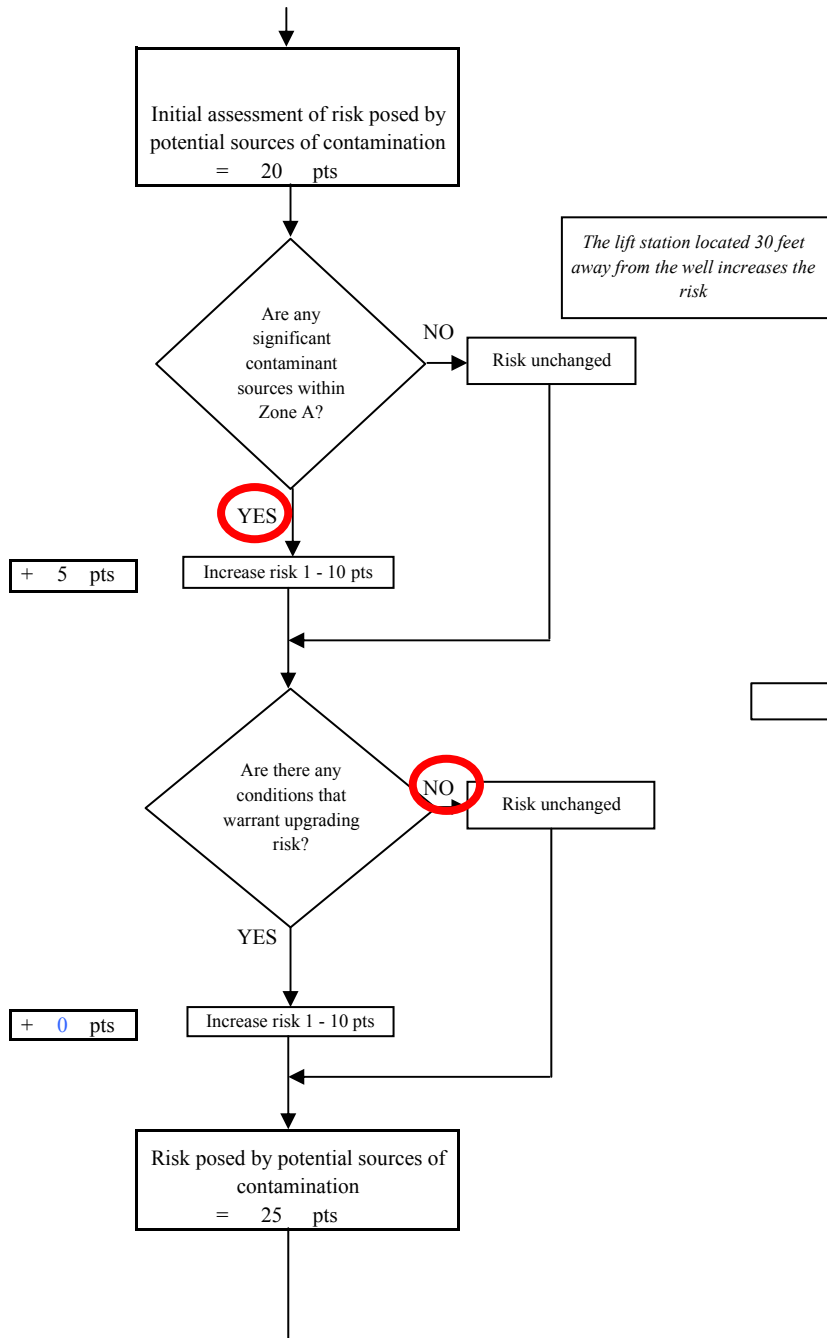




**Chart 3. Contaminant risks for Lakeview Terrace Trailer Court - Bacteria & Viruses**



**Chart 3. Contaminant risks for Lakeview Terrace Trailer Court - Bacteria & Viruses**



**Chart 4. Vulnerability analysis for Lakeview Terrace Trailer Court - Bacteria & Viruses**

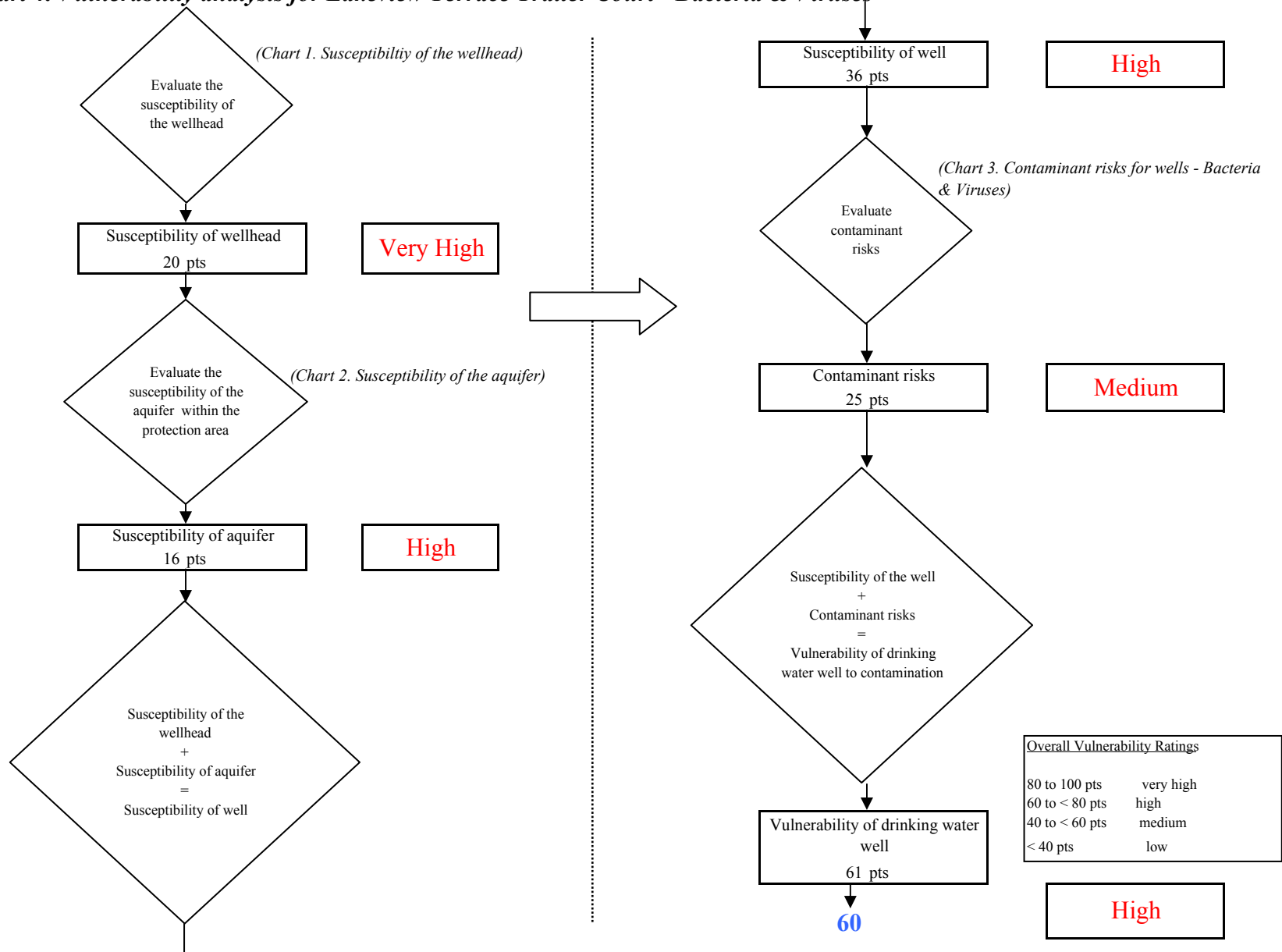
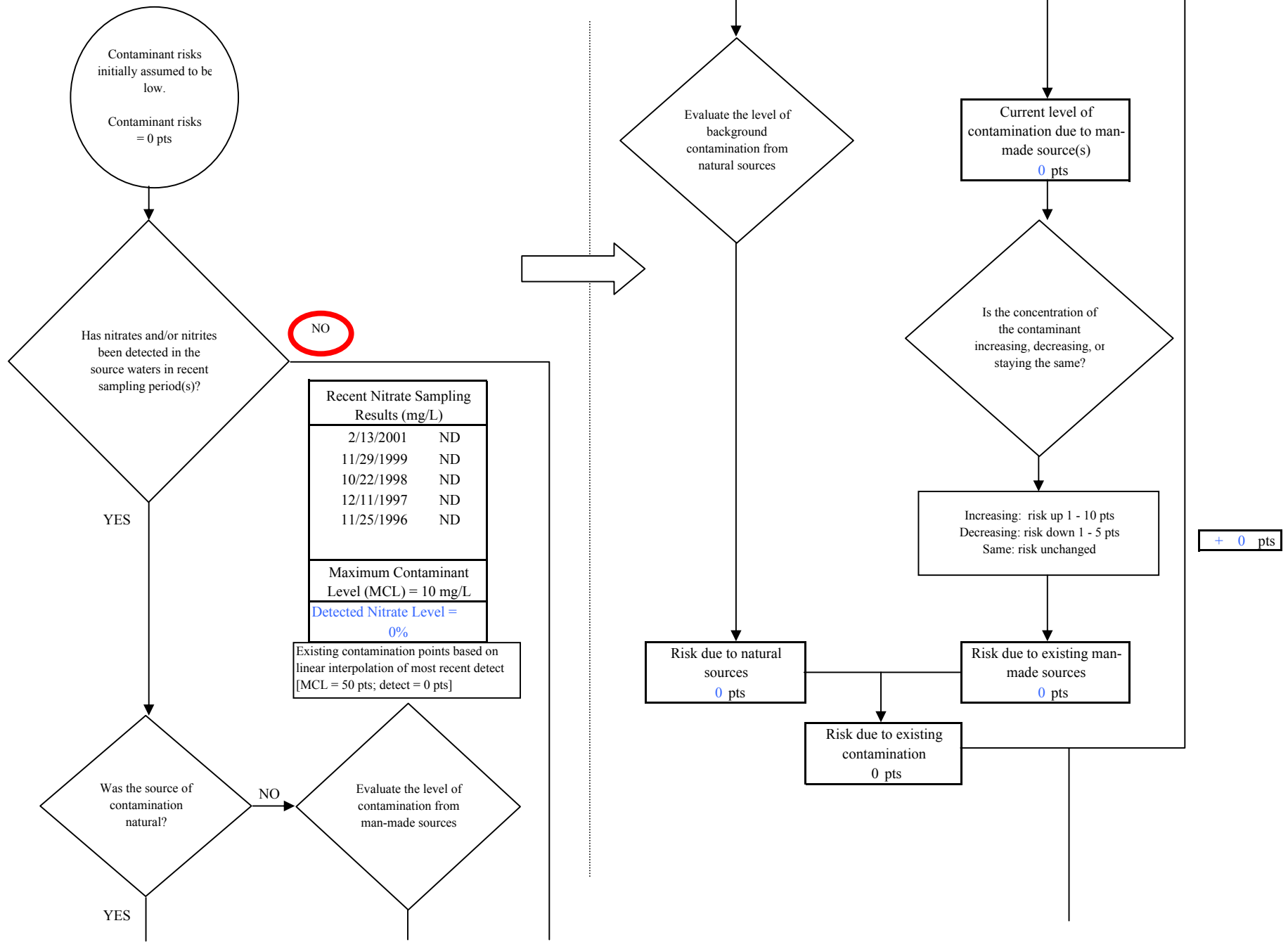
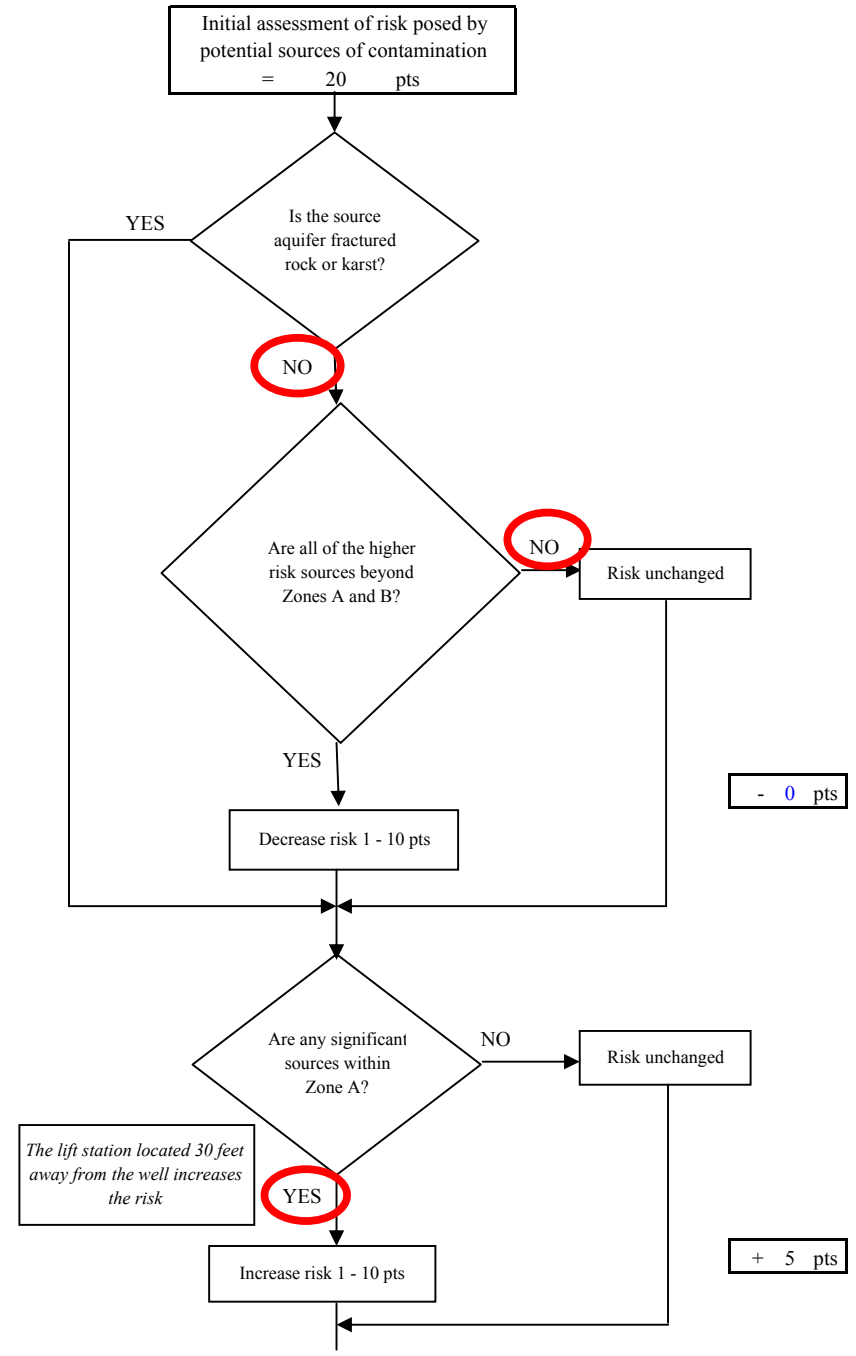
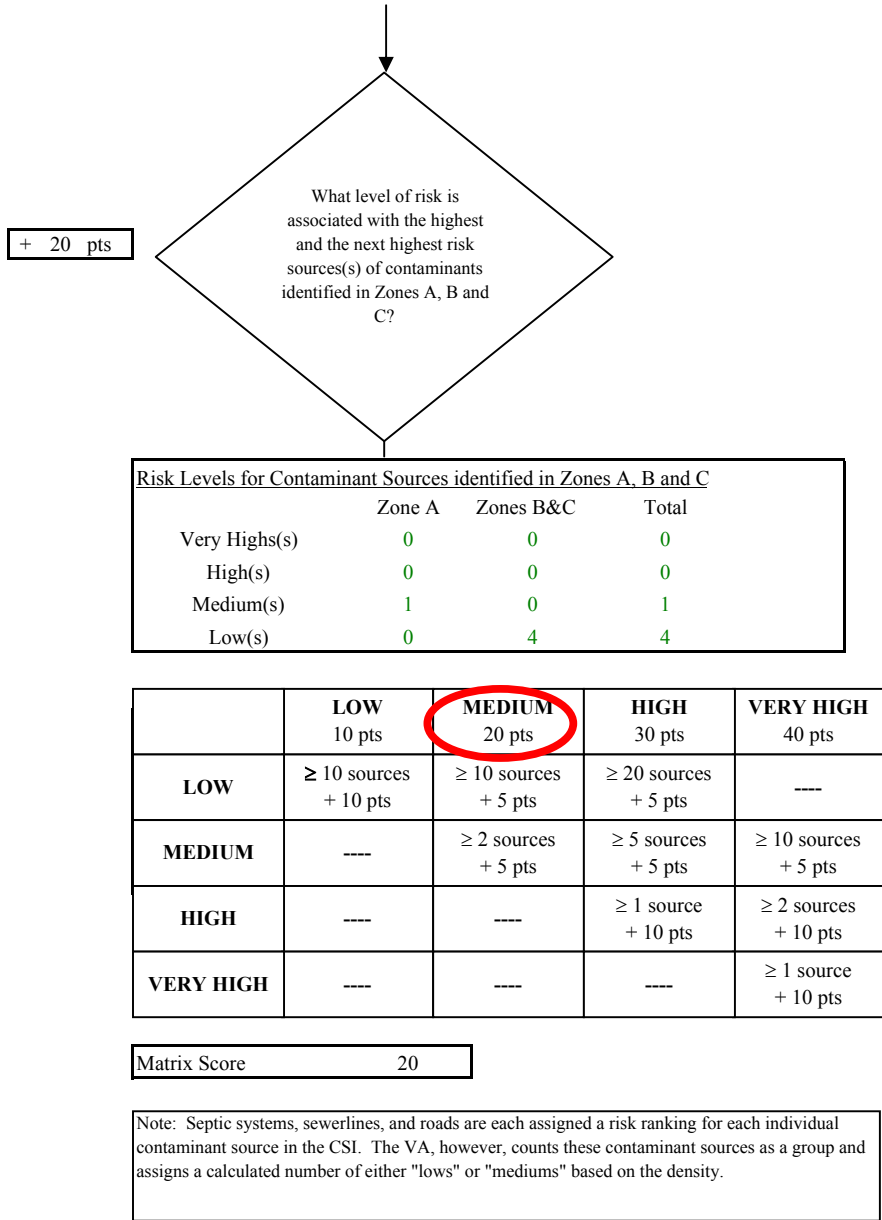


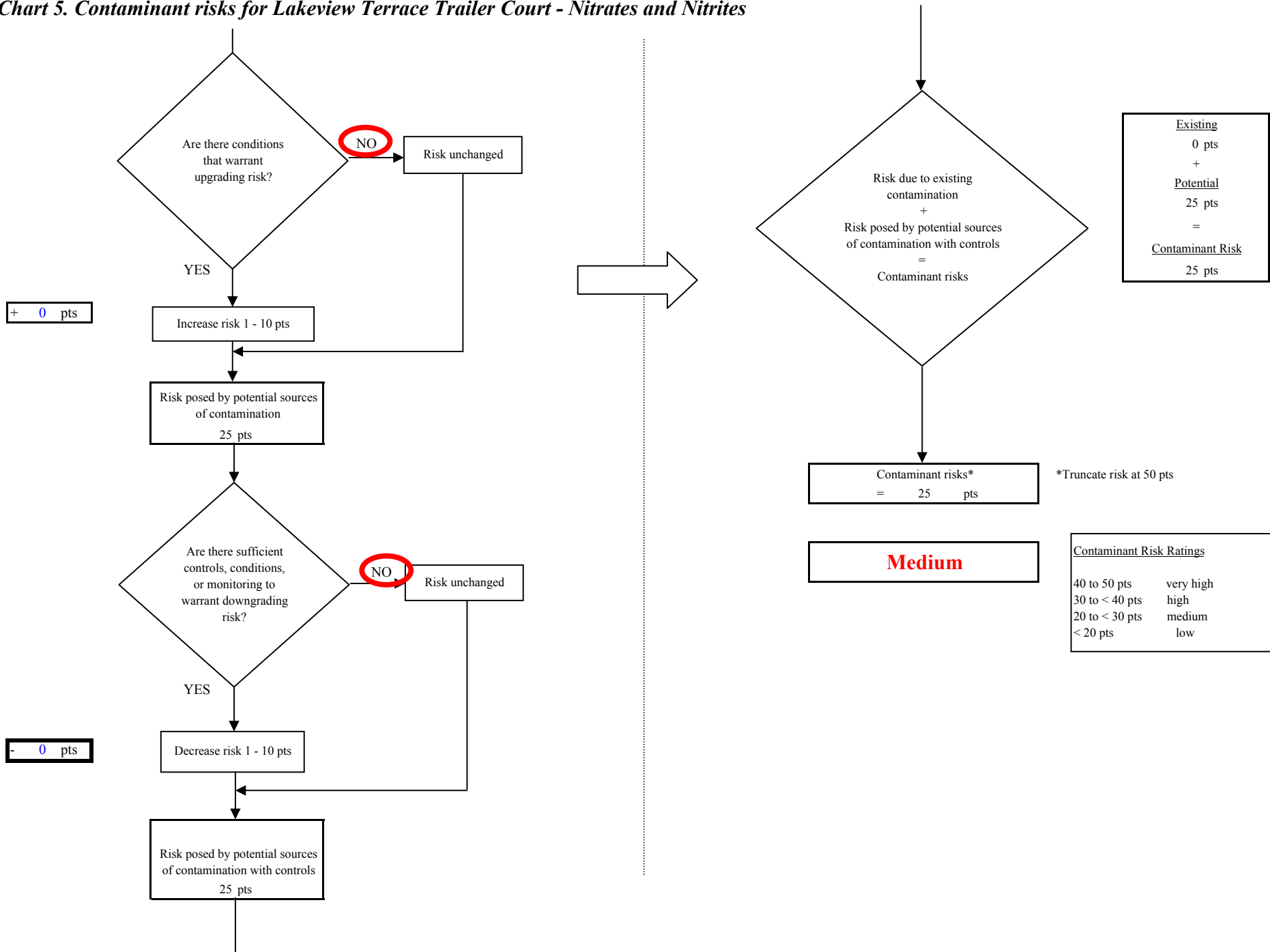
Chart 5. Contaminant risks for Lakeview Terrace Trailer Court - Nitrates and Nitrites



**Chart 5. Contaminant risks for Lakeview Terrace Trailer Court - Nitrates and Nitrites**



**Chart 5. Contaminant risks for Lakeview Terrace Trailer Court - Nitrates and Nitrites**



**Chart 6. Vulnerability analysis for Lakeview Terrace Trailer Court - Nitrates and Nitrites**

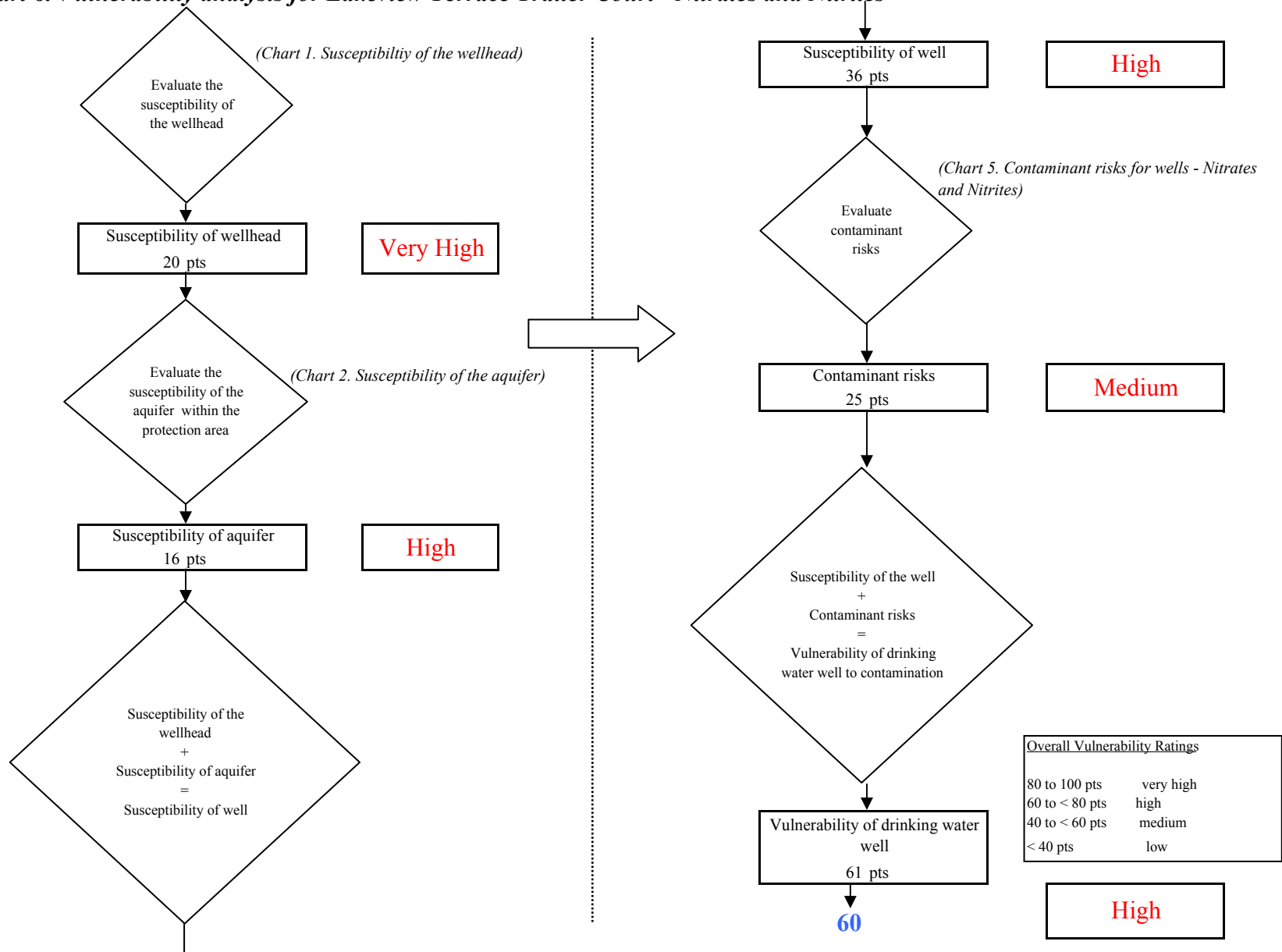
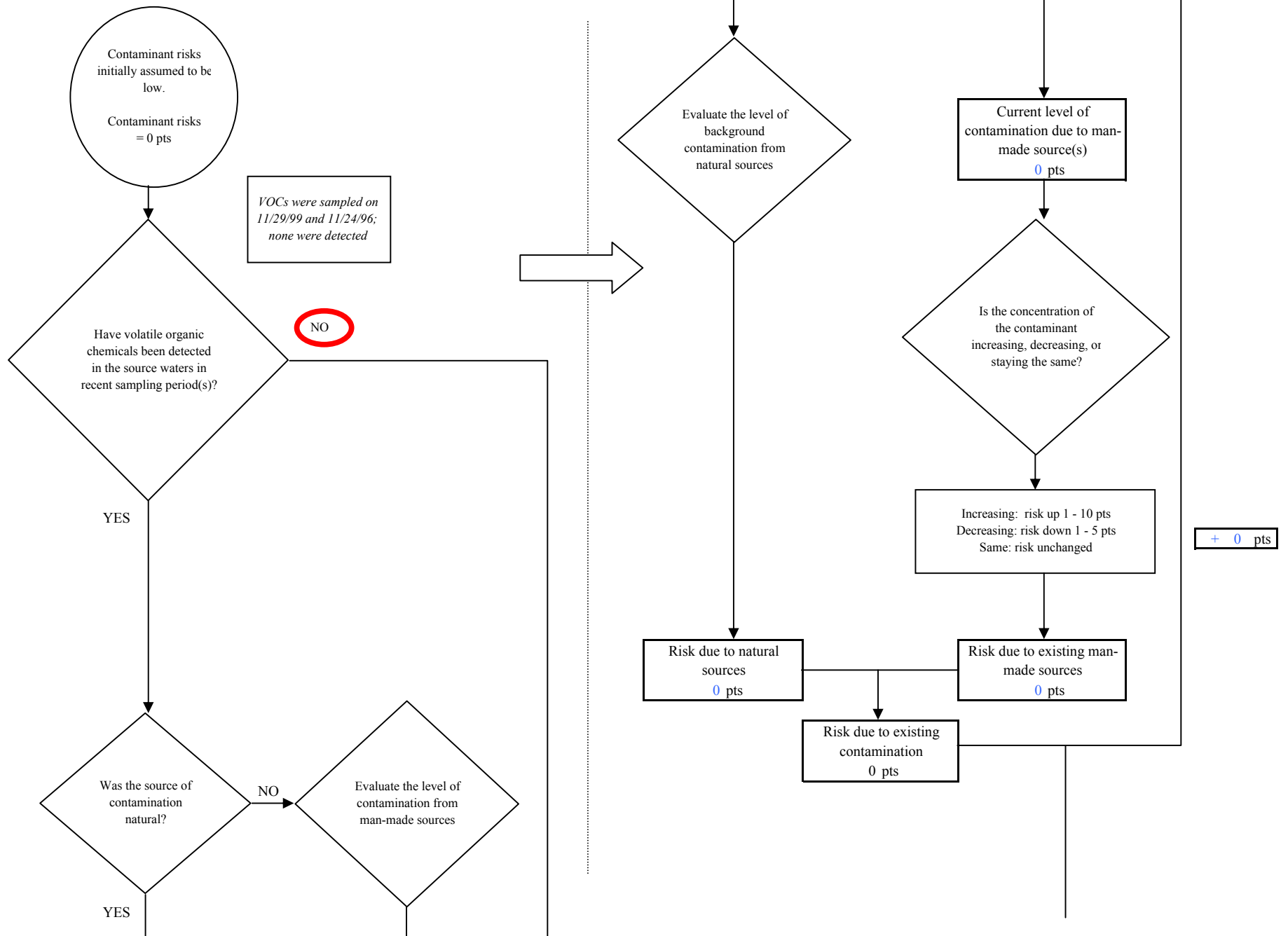
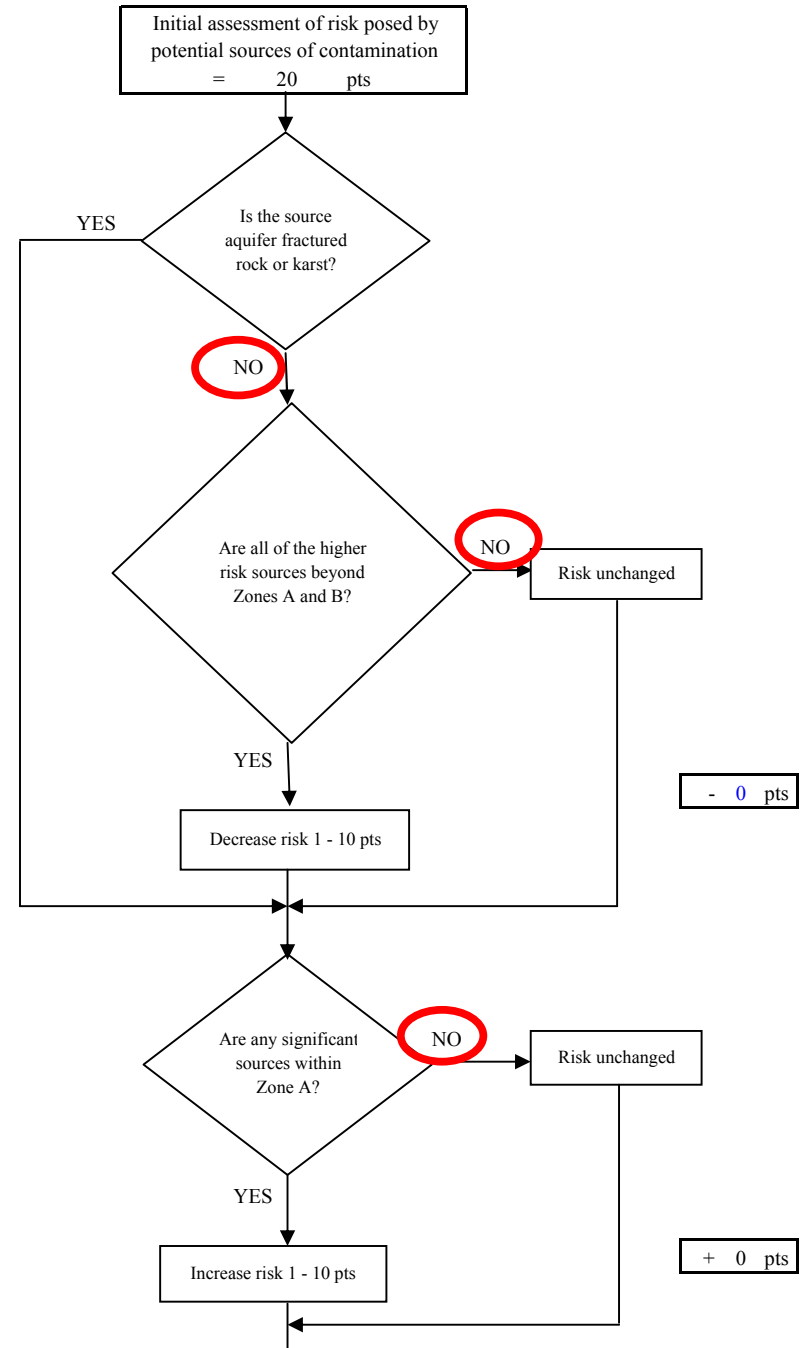
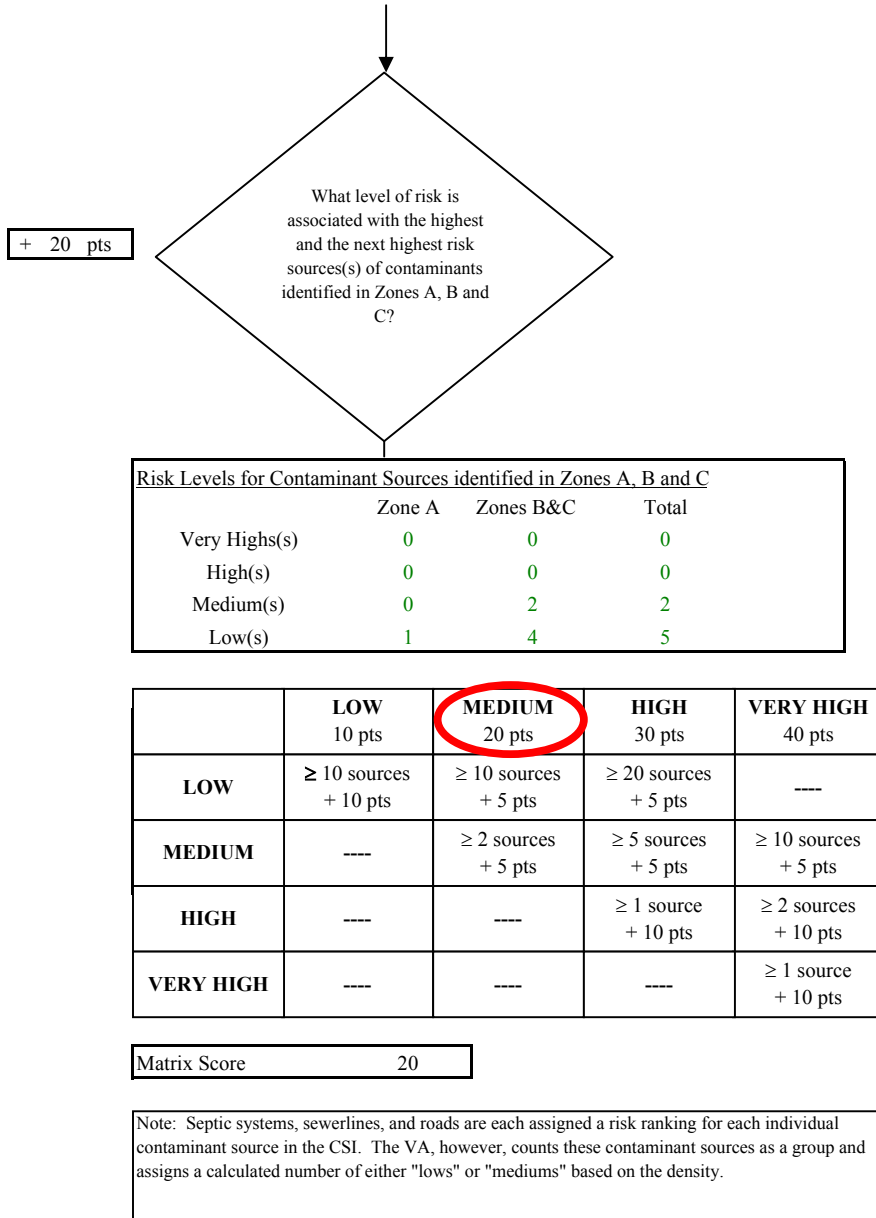


Chart 7. Contaminant risks for Lakeview Terrace Trailer Court - Volatile Organic Chemicals

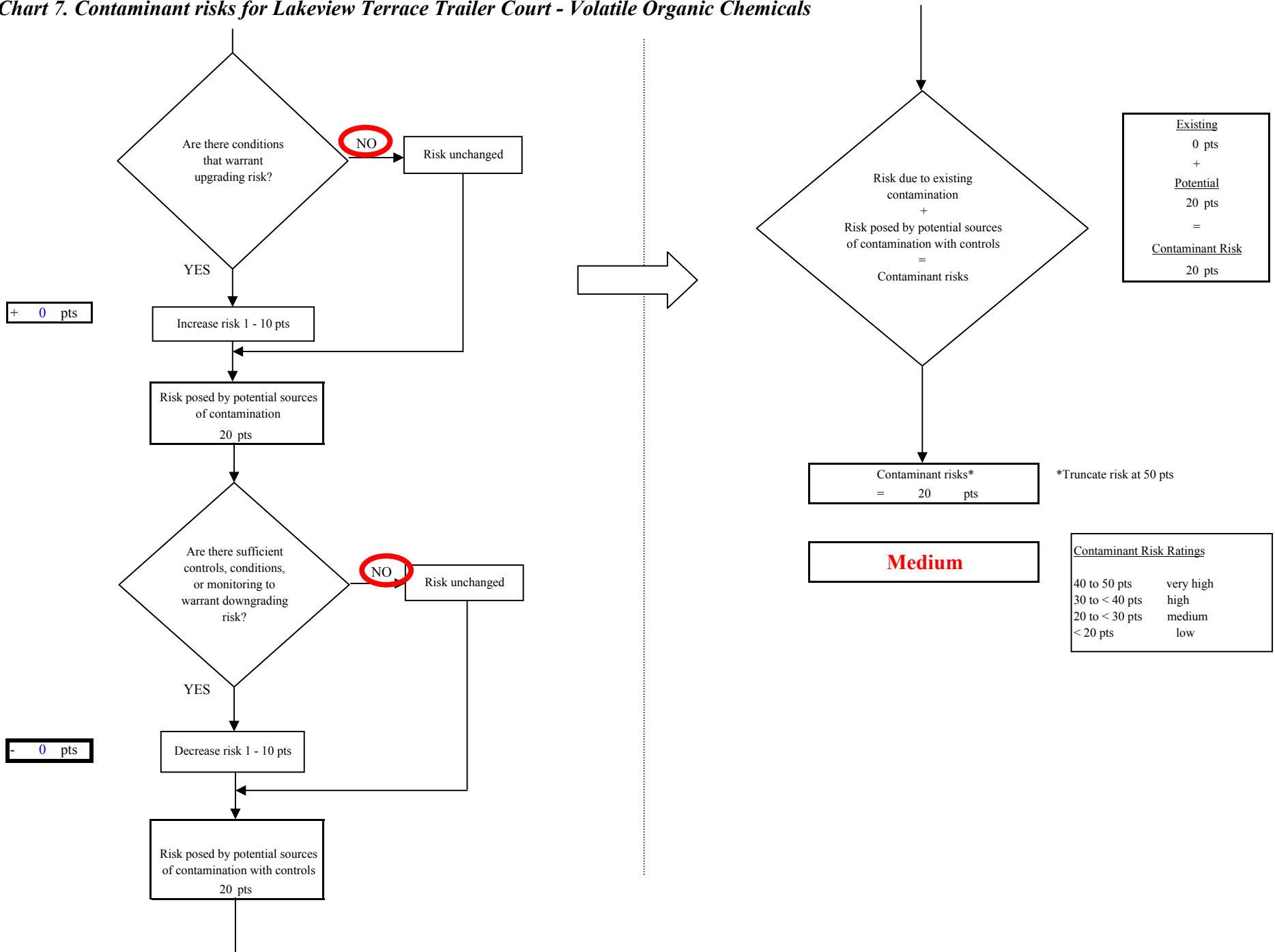




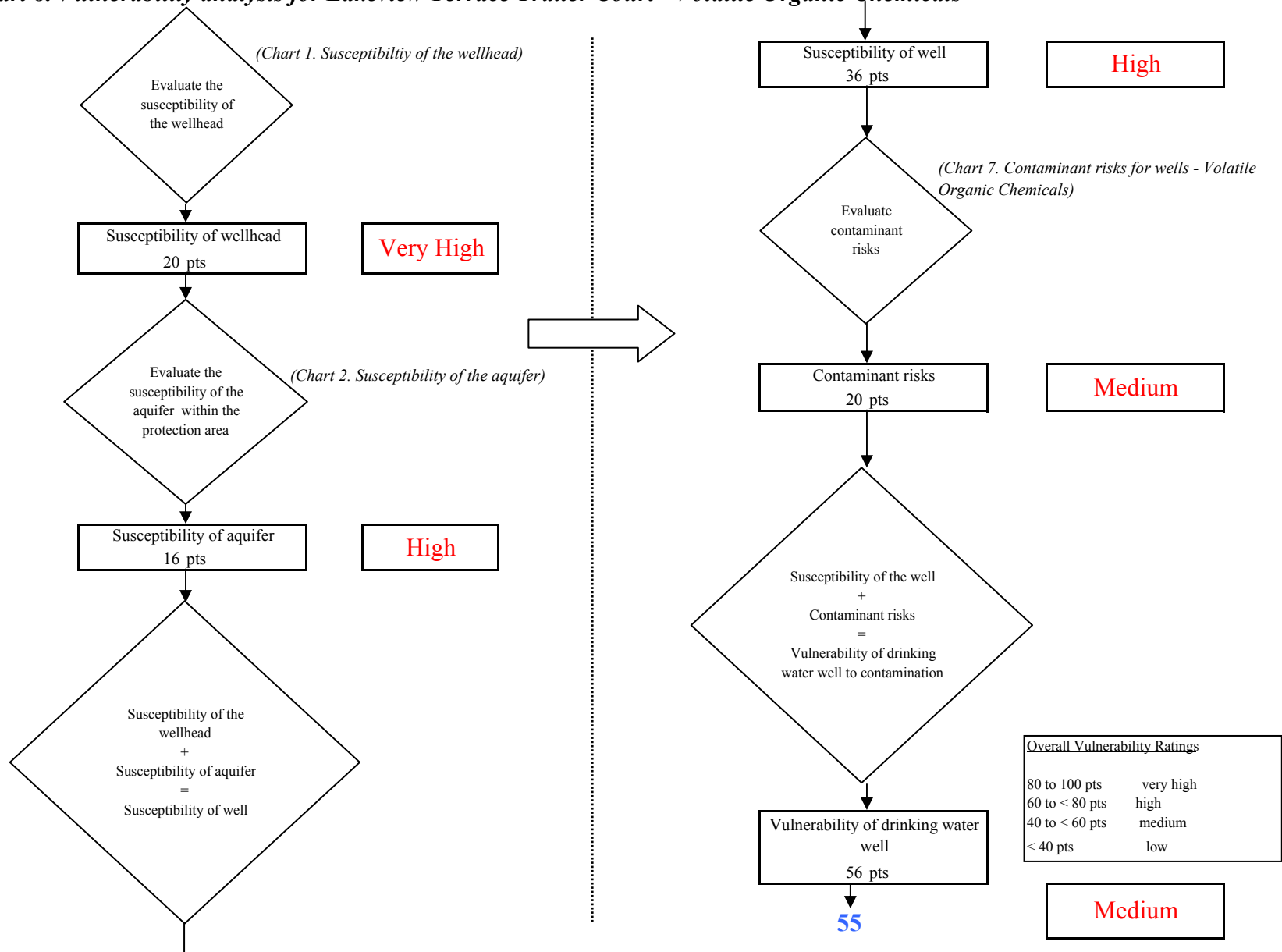
**Chart 7. Contaminant risks for Lakeview Terrace Trailer Court - Volatile Organic Chemicals**



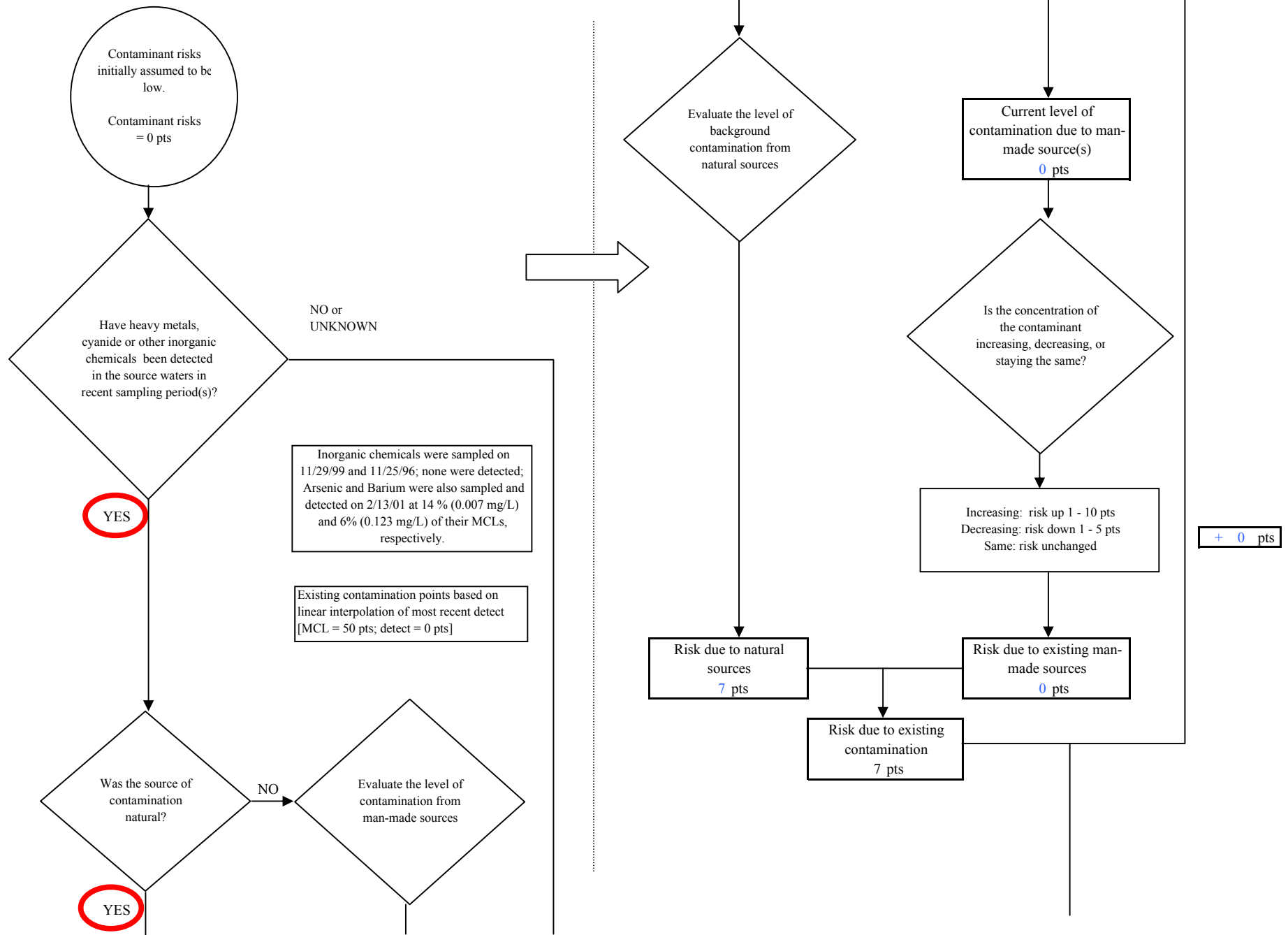
**Chart 7. Contaminant risks for Lakeview Terrace Trailer Court - Volatile Organic Chemicals**



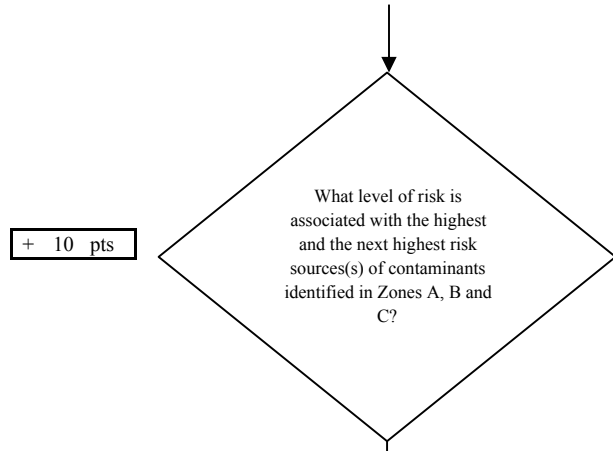
**Chart 8. Vulnerability analysis for Lakeview Terrace Trailer Court - Volatile Organic Chemicals**



**Chart 9. Contaminant risks for Lakeview Terrace Trailer Court - Heavy Metals, Cyanide and Other Inorganic Chemicals**



**Chart 9. Contaminant risks for Lakeview Terrace Trailer Court - Heavy Metals, Cyanide and Other Inorganic Chemicals**

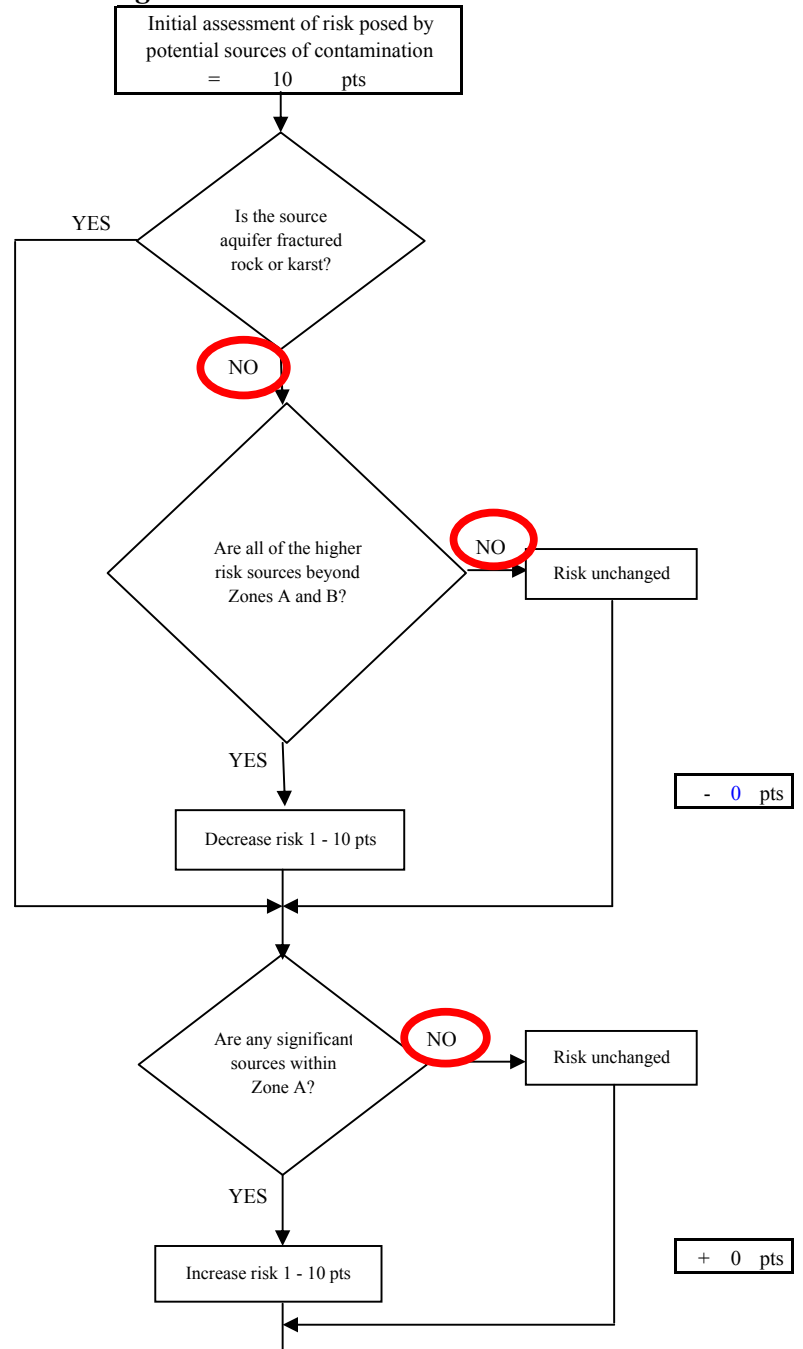


Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	1	5	6

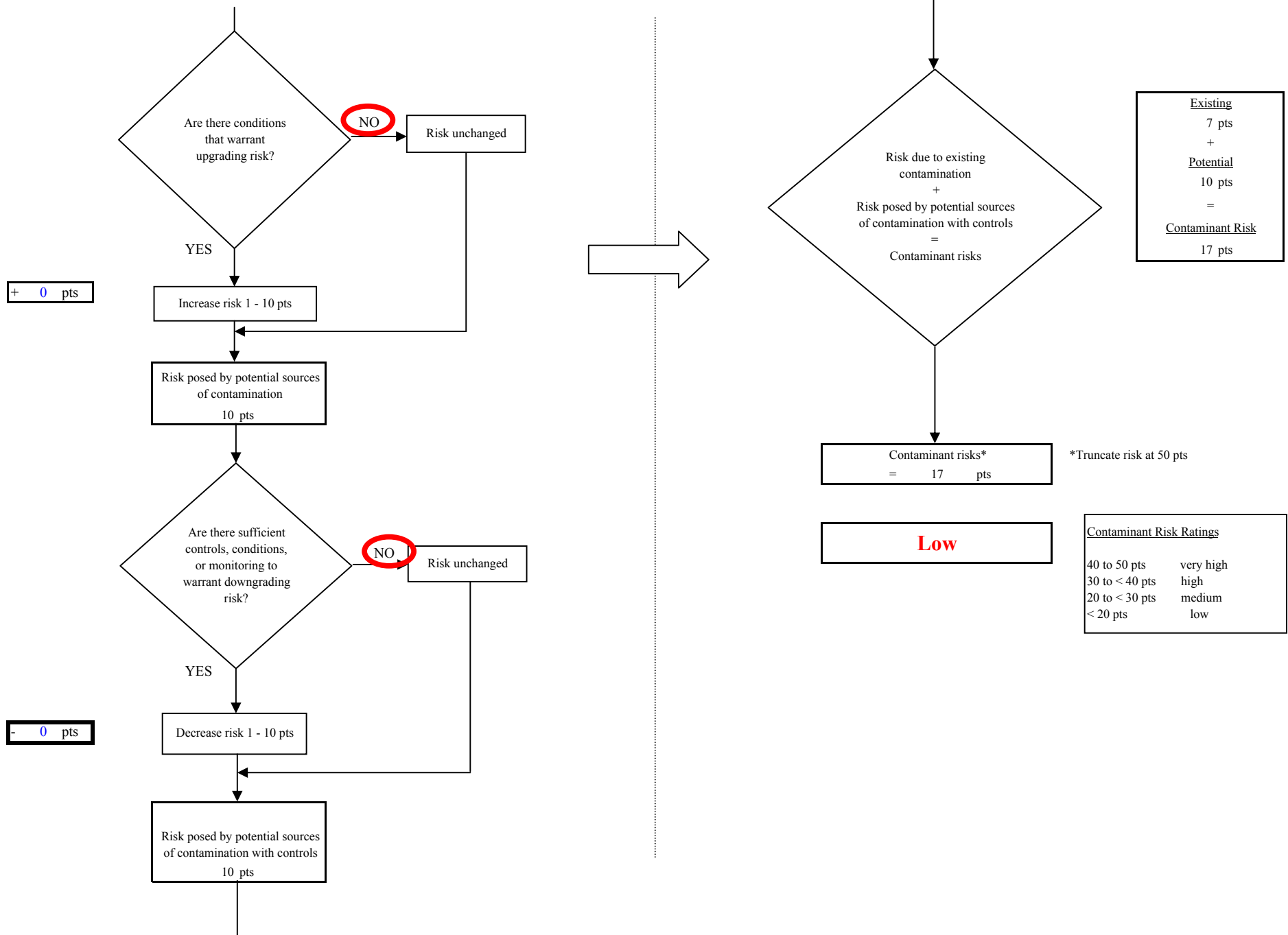
	LOW 10 pts	MEDIUM 20 pts	HIGH 30 pts	VERY HIGH 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score      10

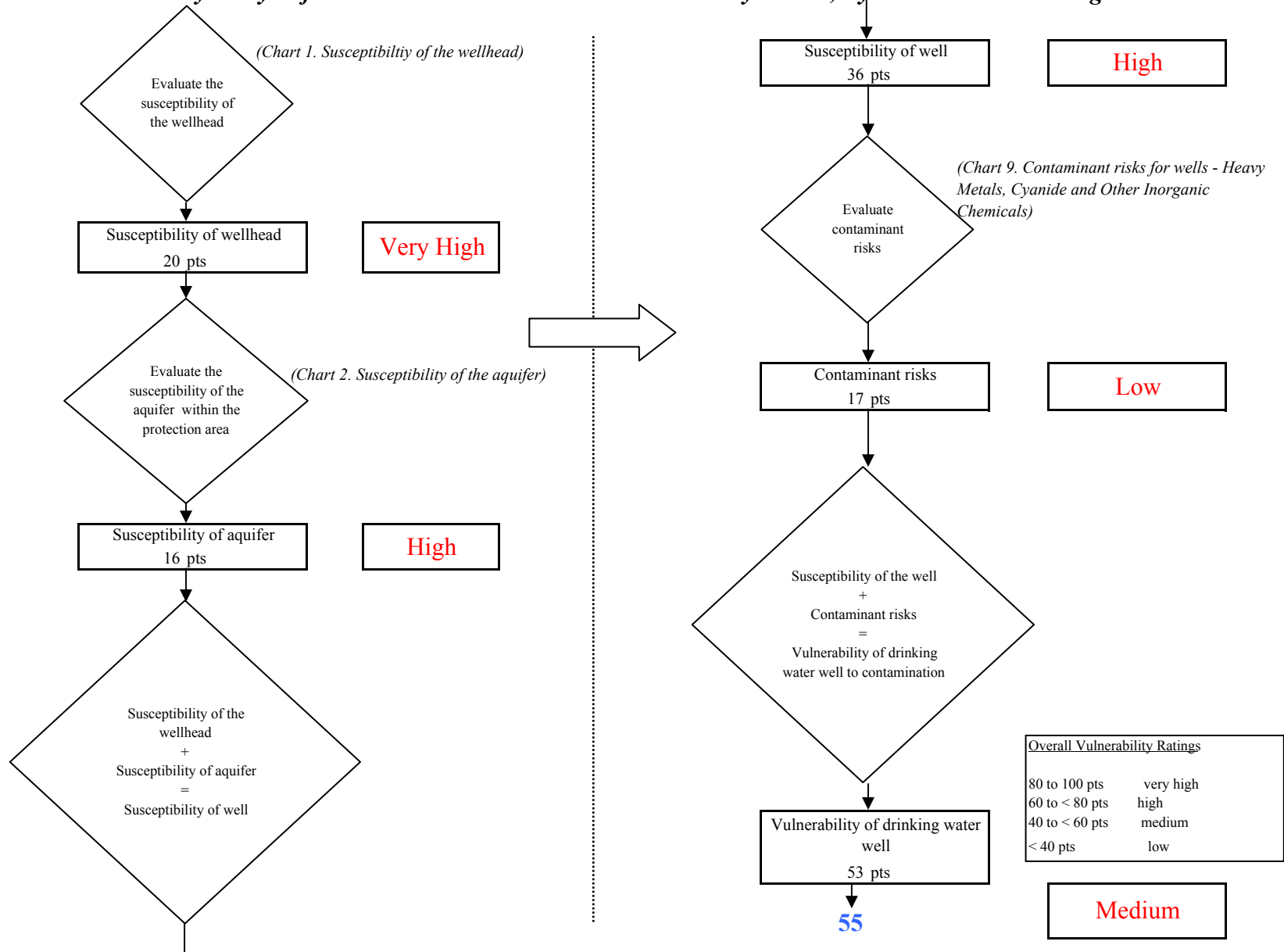
Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.



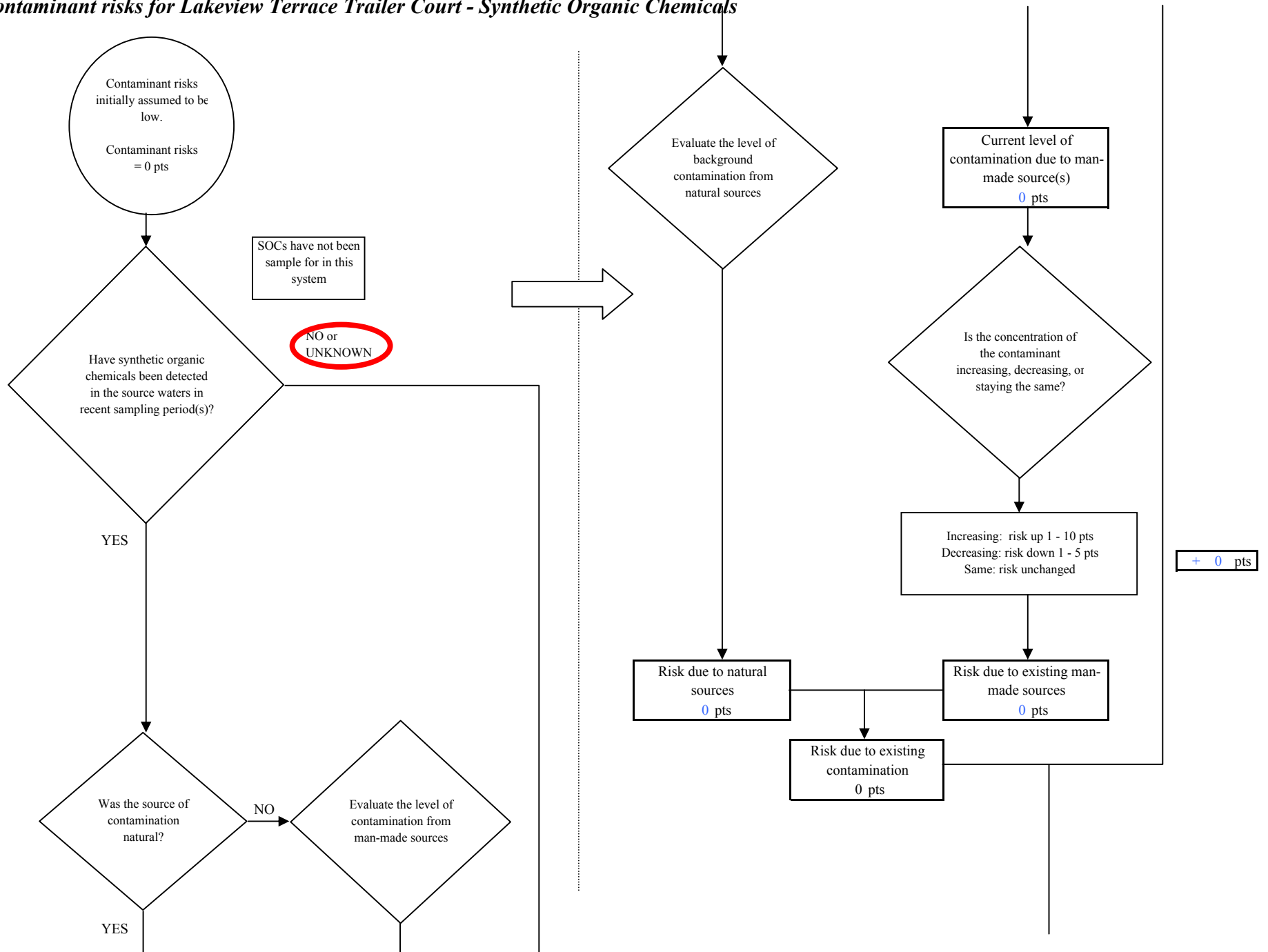
**Chart 9. Contaminant risks for Lakeview Terrace Trailer Court - Heavy Metals, Cyanide and Other Inorganic Chemicals**



**Chart 10. Vulnerability analysis for Lakeview Terrace Trailer Court - Heavy Metals, Cyanide and Other Inorganic Chemicals**

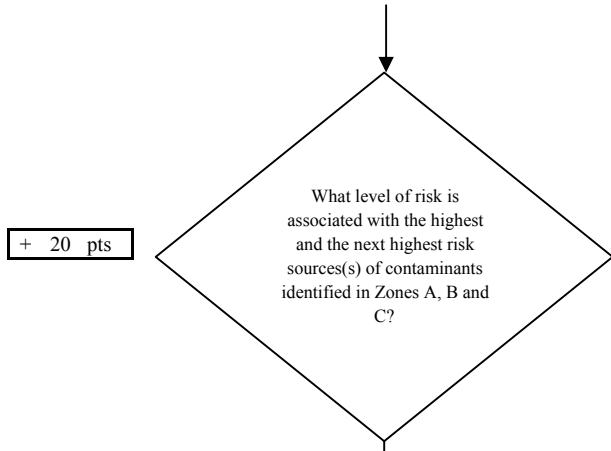


**Chart 11. Contaminant risks for Lakeview Terrace Trailer Court - Synthetic Organic Chemicals**





**Chart 11. Contaminant risks for Lakeview Terrace Trailer Court - Synthetic Organic Chemicals**

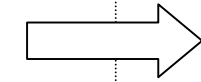
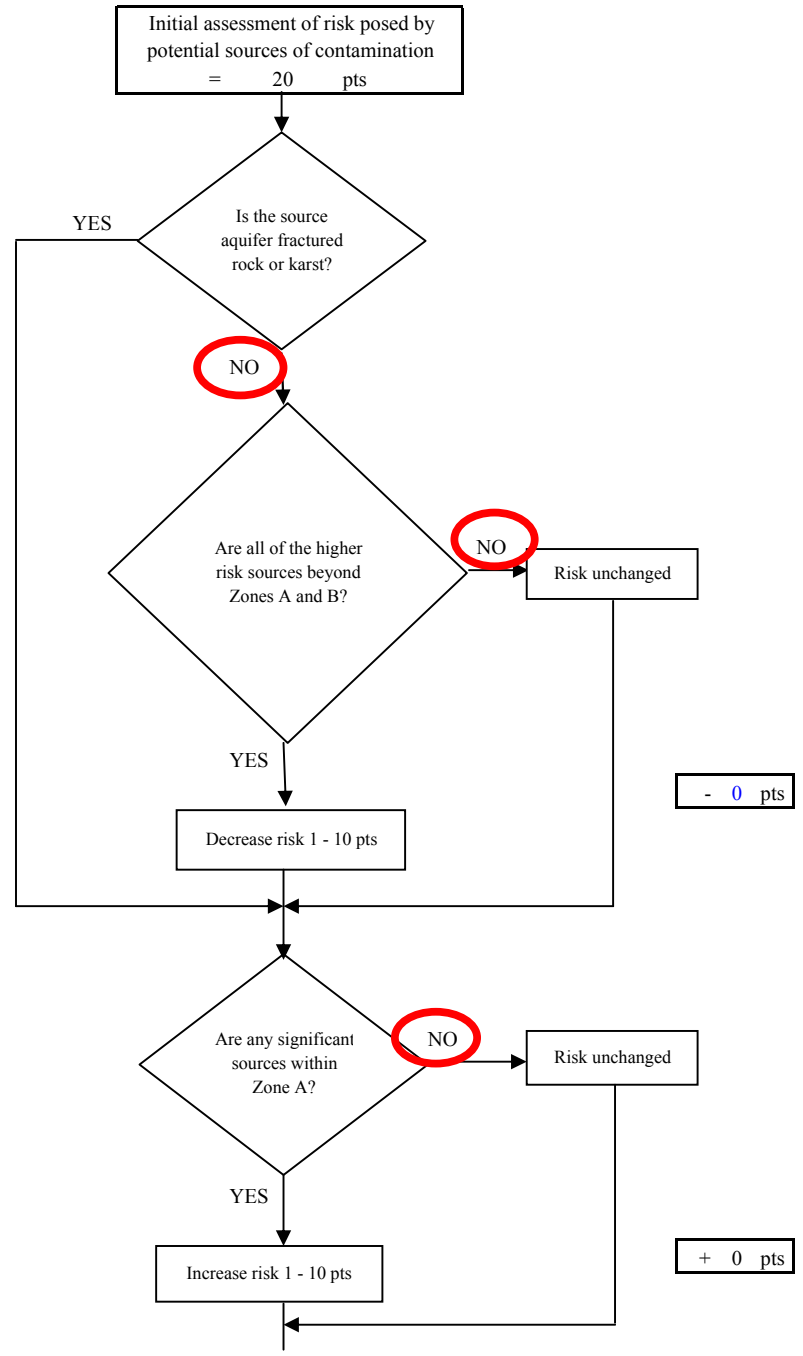


Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	1	1
Low(s)	1	2	3

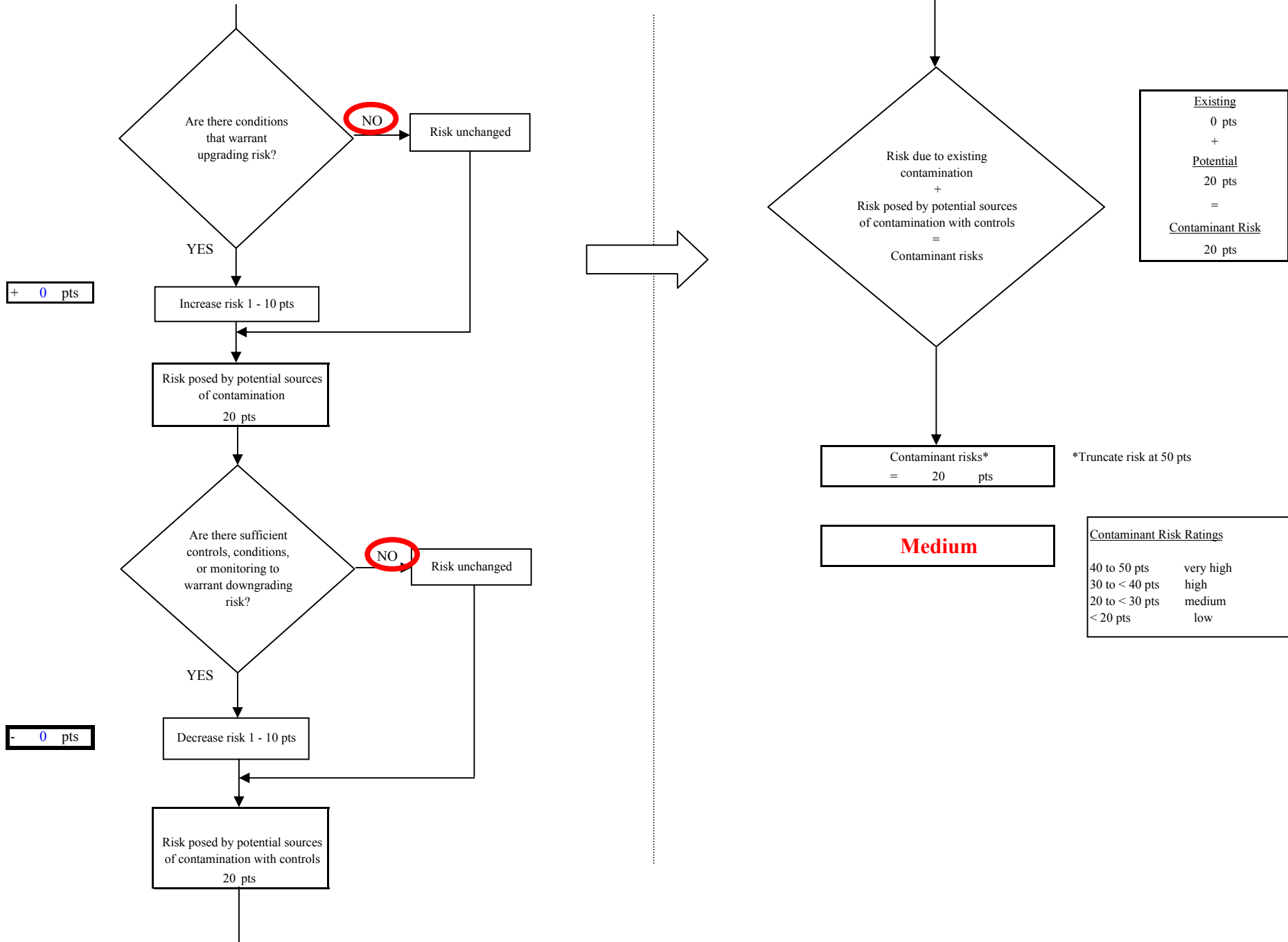
	LOW 10 pts	<b>MEDIUM 20 pts</b>	HIGH 30 pts	VERY HIGH 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source +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

Matrix Score 20

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 Lakeview Terrace Trailer Court - Synthetic Organic Chemicals**



**Chart 12. Vulnerability analysis for Lakeview Terrace Trailer Court - Synthetic Organic Chemicals**

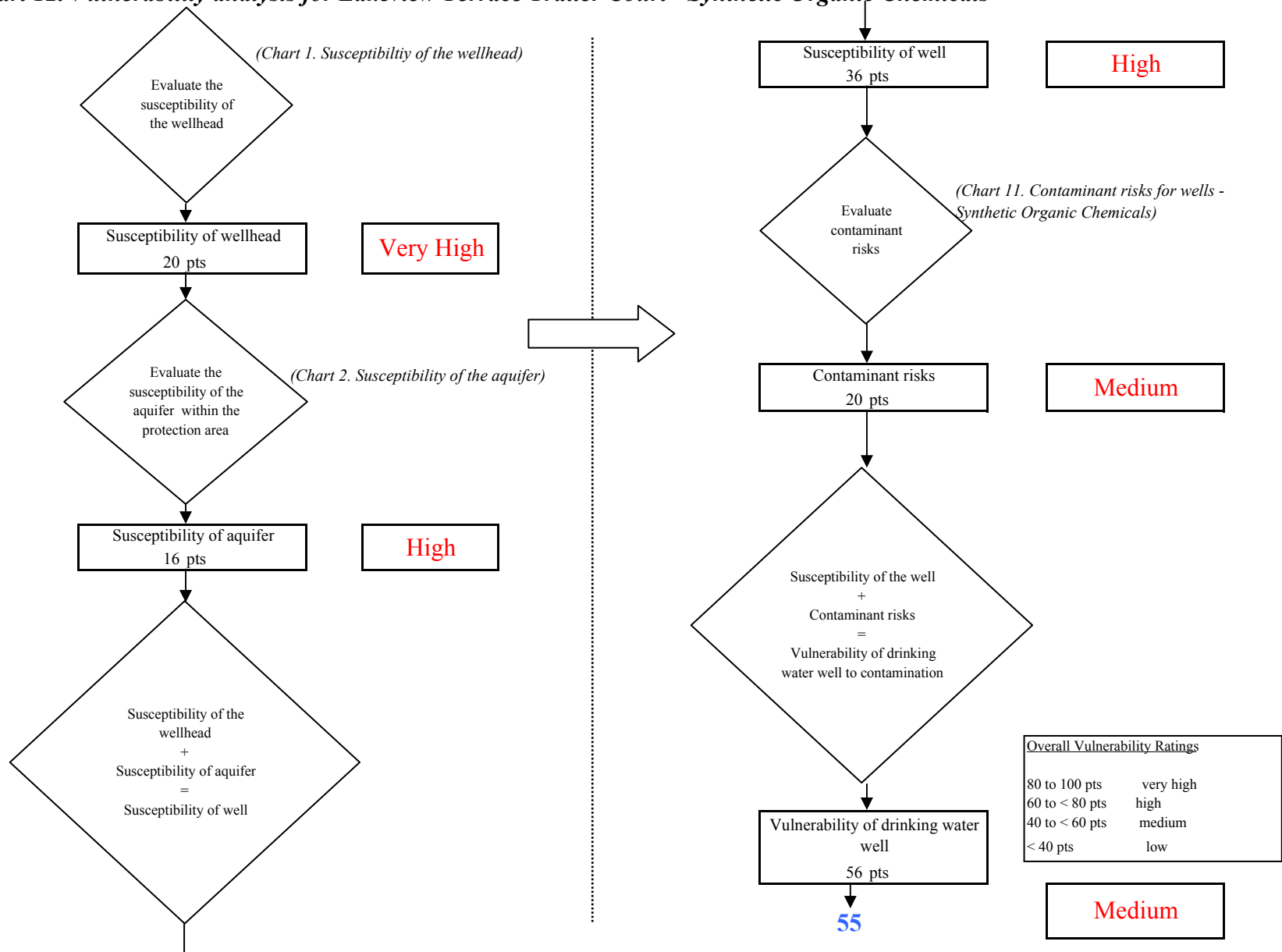
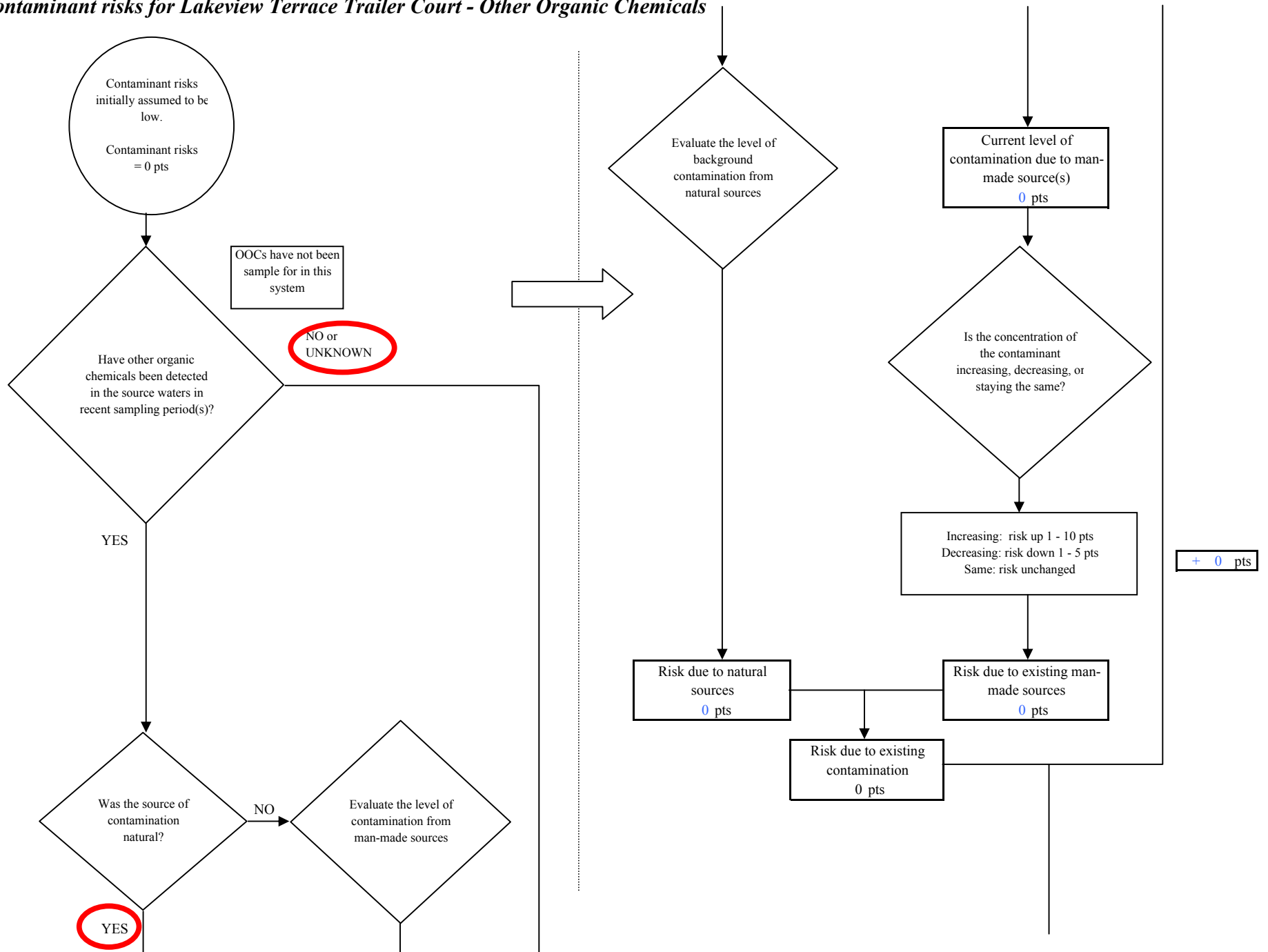
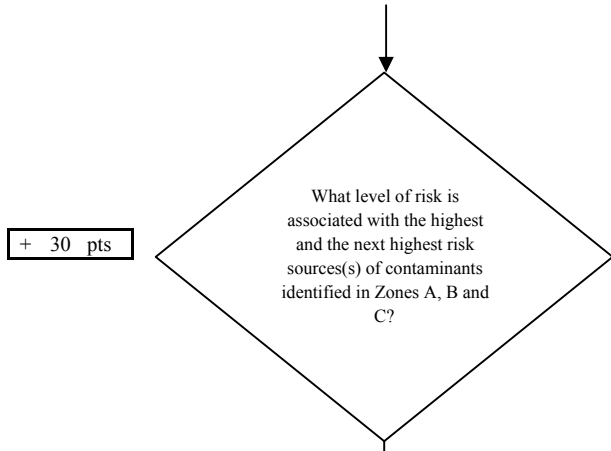


Chart 13. Contaminant risks for Lakeview Terrace Trailer Court - Other Organic Chemicals



**Chart 13. Contaminant risks for Lakeview Terrace Trailer Court - Other Organic Chemicals**

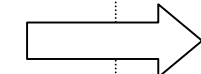
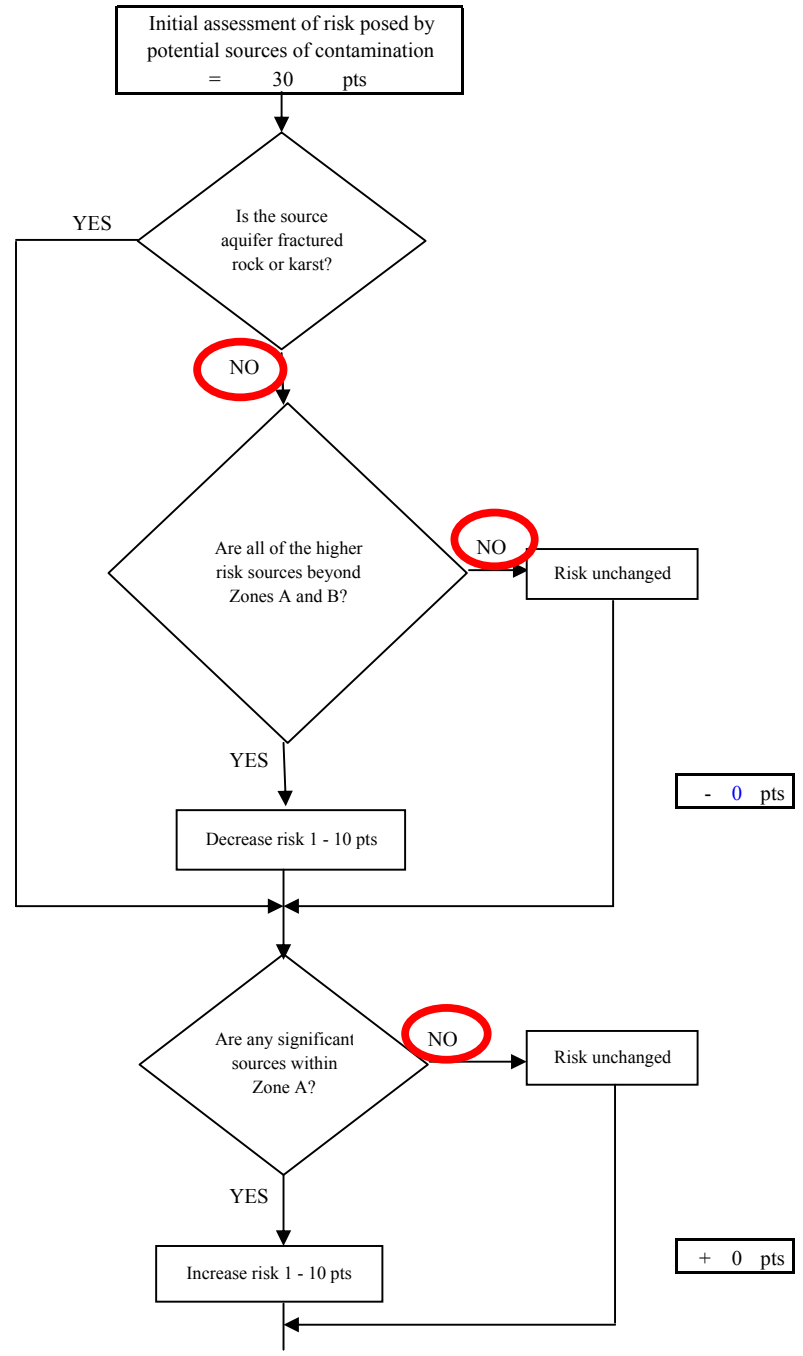


Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	0	0
High(s)	0	1	1
Medium(s)	0	0	0
Low(s)	1	5	6

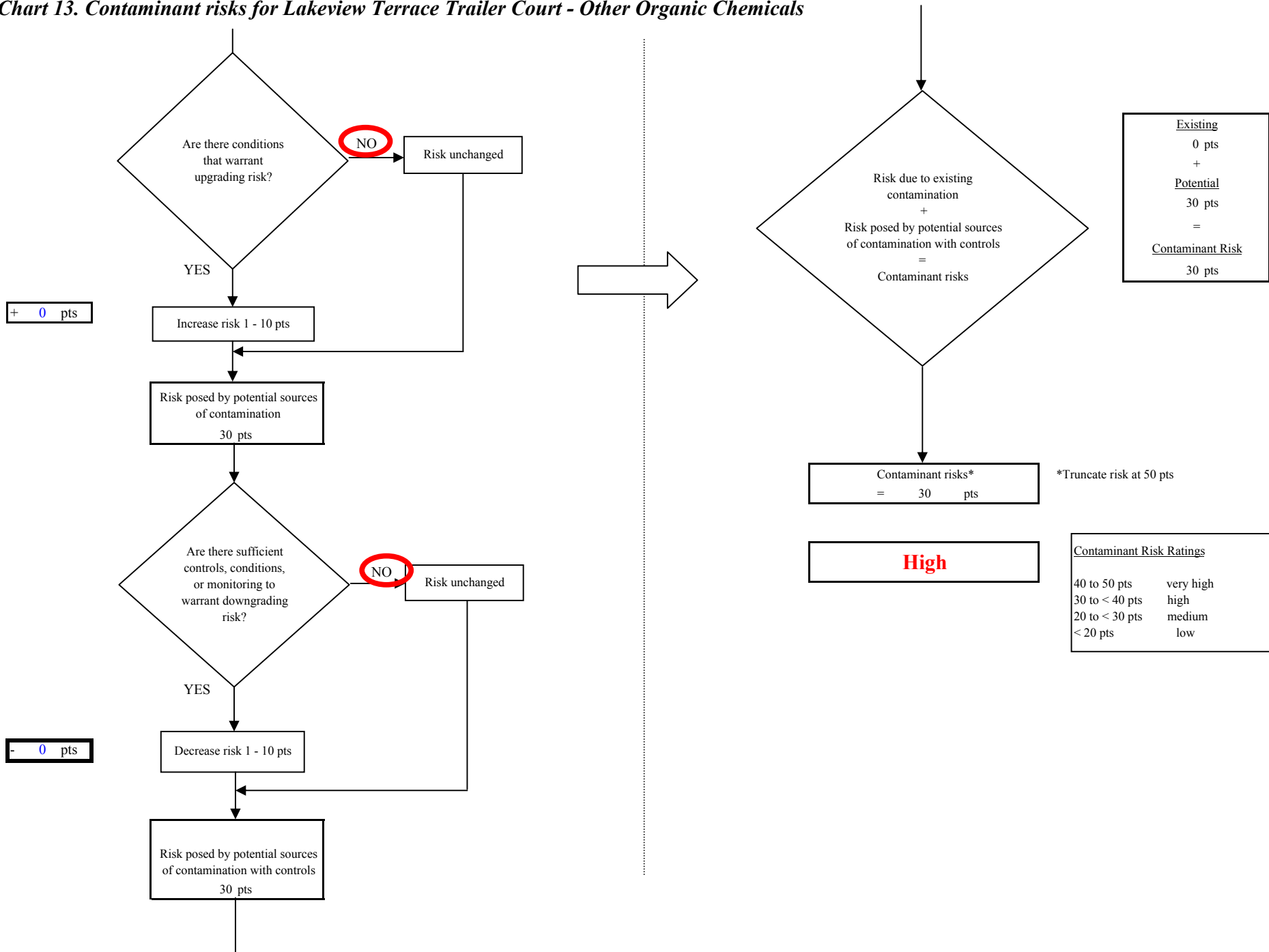
	LOW 10 pts	MEDIUM 20 pts	HIGH 30 pts	VERY HIGH 40 pts
<b>LOW</b>	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
<b>MEDIUM</b>	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
<b>HIGH</b>	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
<b>VERY HIGH</b>	----	----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

Matrix Score 30

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 Lakeview Terrace Trailer Court - Other Organic Chemicals**



**Chart 14. Vulnerability analysis for Lakeview Terrace Trailer Court - Other Organic Chemicals**

