Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for Trapper Creek Elementary Drinking Water System,
Trapper Creek, Alaska
PWSID 220723

April 2004

DRINKING WATER PROTECTION PROGRAM REPORT Report 1492
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 Trapper Creek Elementary Source of Public Drinking Water,
Trapper Creek, 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 Trapper Creek Elementary to potential contamination. This Class A (non-community) water system consists of one well on the south side of Petersville Road near Trappers Creek, Alaska. The well received a susceptibility rating of **Low**. This rating is a combination of a **Low** rating 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 Trapper Creek Elementary public water system include: an above ground diesel storage tank, a road, and two DEC-recognized contaminated sites. 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 Trapper Creek Elementary received an overall vulnerability rating of **Medium** for volatile organic chemicals, and a **Low** for bacteria and viruses, nitrates and/or nitrites, heavy metals and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals.

TRAPPER CREEK ELEMENTARY PUBLIC DRINKING WATER SYSTEM

Trapper Creek Elementary public water system is a Class A (non-community) water system. The system consists of one well on the south side of Petersville Road near Trappers Creek, Alaska (T26N, R6W, Section 25) (See Map 1 of Appendix A). Trapper Creek is located at the intersection of Petersvill Road with the George Parks Highway north of Anchorage, Alaska. Trapper Creek 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 Trapper Creek primarily use individual water wells and septic systems or outhouses. Electricity is available on Petersville Road for approximately 6 miles west of the Parks Highway. Residents beyond this point use individual generators (ADCED, 2002). 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). There is a Borough refuse transfer station located at mile 15.3 of the Parks Hwy.

Trapper Creek Elementary lies in the broad alluvial plain of the Chulitna and Susitna Rivers at an elevation of approximately 500 feet above sea level.

According to the well log, the depth of the well is about 115 feet below the ground surface and is screened in sandy gravel. Most of these wells in this area are shallow with depths of less than 100 feet. Static water levels varies between 15 and 60 feet below the surface. The coarse, alluvial, sandy gravel in the floodplains of the areas streams and rivers provides a large aquifer even in the winter when infiltration is low. 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 Chulitna River and surface infiltration contribute water to this alluvial aquifer.

The Trapper Creek Elementary public drinking water system serves approximately 40 non-residents through one service connection.

TRAPPER CREEK ELEMENTARY DRINKING WATER PROTECTION AREA

The pathways most likely for surface contamination to reach the groundwater are identified as the first step in determining a drinking water system's risk. These areas are determined by looking at the characteristics of the soil, groundwater, aquifer, and well.

The most probable area for contamination to reach the drinking water well is the 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 and were obtained from various area well logs and the Groundwater textbook by Freeze and Cherry (Freeze and Cherry, 1979).

Only limited information is available for the aquifer Trapper Creek Elementary's 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

Zone	Definition
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 Trapper Creek Elementary 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 Trapper Creek Elementary 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 7 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals.

VULNERABILITY OF TRAPPER CREEK ELEMENTARY 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 Trapper Creek Elementary received a Low Susceptibility rating. The 1/31/01 Sanitary Survey for this system indicates the well is capped with a sanitary seal and the land surface is sloped away from the well; 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 Trapper Creek Elementary well is completed in received a Medium Susceptibility rating. Although the highly transmissive aquifer material (sand and gravel) in the area allows contaminants to travel quickly through it, there are some clay and silts above the aquifer that help to slow the migration of contaminants downward from the surface with the precipitation and surface water runoff. The depth of the water table allows some natural filtering of contaminants before they come into contact with the water table where they can disperse quickly. Wells in the area can also provide a quick pathway for contaminants to travel down into the aquifer if the wells are not grouted correctly. No wells were identified in the protection area for Trapper Creek Elementary. Table 2 summarizes the Susceptibility scores and ratings for Trapper Creek Elementary.

Table 2. Susceptibility

	Score	**Rating**
Susceptibility of the Wellhead	5	Low
Susceptibility of the Aquifer	12	Medium
Natural Susceptibility	17	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	13	Low
Volatile Organic Chemicals	23	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	14	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:

Natural Susceptibility (0 – 50 points)
+
Contaminant Risks (0 – 50 points)
=
Vulnerability of the
Drinking Water Source to Contamination (0 – 100).

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	25	Low
Nitrates and Nitrites	30	Low
Volatile Organic Chemicals	40	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	30	Low
Synthetic Organic Chemicals	15	Low
Other Organic Chemicals	25	Low

Bacteria and Viruses

The road represents the only risk of Bacteria and Viruses to the Trapper Creek Elementary water system.

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 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). Coli forms have not been detected during recent sampling (within the past 5 years).

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 road also represents the greatest risk to to nitrates and nitrites for this source of public drinking water.

Nitrates are very mobile, moving at approximately the same rate as water. Low concentrations of nitrates with respect to the Maximum Contaminant Level (MCL) have been detected during routine sampling in the Trapper Creek Elementary well. An MCL is the maximum concentration of a contaminant allowed in drinking water by the Environmental Protection Agency (EPA).

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 diesel storage tank located in Zone A represents the greatest risk of volatile organic chemical contamination to the Trapper Creek Elementary water system.

Both underground and above ground residential heating oil tanks are common in rural areas of Alaska. 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 and proper decommissioning can help prevent many of these harmful fuel leaks.

There are two DEC-recognized contaminated sites located in protection area (displayed on Map 2). The closest site to the well (U04-1, RecKey 2000220116701) resulted from diesel contamination from generator operation and maintenance. This site was closed on 12/20/00 and represents very little risk to the well. The second site (U04-2) is the location of 30-35 cubic yards of fuel-contaminated soils at a former drum storage area. This site is still open. The ADEC

Contaminated Sites program identifies, assesses, and ensures cleanup of sites based on their prioritized order. Specific information on each site can be found on the internet at http://www.dec.state.ak.us/spar/cs/search/csites/csites_search.asp.

Toluene was detected on 2/26/01 at a concentration of 0.00042 mg/L, well below its Maximum Contaminant Level (MCL) of 1 mg/L. A MCL is the concentration of a contaminant in water allowed by the Environmental Protection Agency (EPA). No other Volatile Organic Chemicals were detected during the 2/26/01 sampling event.

After combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well is medium.

Heavy Metals, Cyanide, and Other Inorganic Chemicals

The road also represents the only risk to Heavy Metals, Cyanide, and Other Inorganic Chemicals for this source of public drinking water.

Arsenic was detected at a concentration of 0.0044 mg/L or about 9% of the current MCL for arsenic. No other heavy metals have been detected during recent 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 low.

Synthetic Organic Chemicals

No potential risks have been identified for Synthetic Organic Chemical contamination to 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 road represents the only risk to Other Organic Chemicals for Trapper Creek Elementary public drinking water system.

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.

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

Trapper Creek Elementary
Drinking Water Protection Area Location Map
(Map 1)

Trapper Creek Elementary
Drinking Water Protection Area

Petersville Road

Landing Strip

Talkeetna

Area enlarged at left

Chase

Talkeetna

Skwentna

Willow

Sutton

Butte

Knik

Map 1:Trapper Creek Elementary Drinking Water Protection Area

PWSID: 220723

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 2,500 5,000 10,000 15,000 Feet

1:60,000

Data Sources:

Background image
- USGS 1:63,000 mapping

Legend

- MSBSD Trapper Creek Elementary
- Zone A
- Zone C
- Zone B
- Zone D

APPENDIX B

Contaminant Source Inventory and Risk Ranking for Trapper Creek Elementary (Tables 1-7)

Table 1

Contaminant Source Inventory for

MSBSD Trapper Creek Elementary

PWSID 220723.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Tanks, diesel (above ground)	T06		A	2	Information given to us by the operator
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-1	A	2	AT&T Alascom Scotty Lake; RecKey 2000220116701
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-2	A	2	AT&T Alascom Bartlett Earth Station, RecKey 1997220114001
Highways and roads, dirt/gravel	X24		A	2	Petersville Road

Table 2

Contaminant Source Inventory and Risk Ranking for MSBSD Trapper Creek Elementary Sources of Bacteria and Viruses

PWSID 220723.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24		A	Low	2	Petersville Road

Table 3

Contaminant Source Inventory and Risk Ranking for MSBSD Trapper Creek Elementary Sources of Nitrates/Nitrites

PWSID 220723.001

Contaminant Source Type	***Contaminant Source ID***	***CS ID tag***	***Zone***	***Risk Ranking for Analysis***	***Map Number***	***Comments***
Highways and roads, dirt/gravel	X24		A	Low	2	Petersville Road

Table 4

Contaminant Source Inventory and Risk Ranking for MSBSD Trapper Creek Elementary Sources of Volatile Organic Chemicals

PWSID 220723.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Tanks, diesel (above ground)	T06		A	Medium	2	Information given to us by the operator
Highways and roads, dirt/gravel	X24		A	Low	2	Petersville Road
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-1	A	Low	2	AT&T Alascom Scotty Lake; RecKey 2000220116701
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-2	A	Medium	2	AT&T Alascom Bartlett Earth Station, RecKey 1997220114001

Table 5

Contaminant Source Inventory and Risk Ranking for MSBSD Trapper Creek Elementary Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 220723.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24		A	Low	2	Petersville Road

Table 6

Contaminant Source Inventory and Risk Ranking for MSBSD Trapper Creek Elementary Sources of Other Organic Chemicals

PWSID 220723.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24		A	Low	2	Petersville Road

APPENDIX C

Trapper Creek Elementary
Drinking Water Protection Area
and Potential and Existing Contaminant Sources
(Map 2)

U04-2

U04-1

Scotty Lake

T06 Tanks diesel aboveground

Water System Intake

Area enlarged at left

Map 2: Trapper Creek Elementary Potential Contaminant Sources

PWSID: 220723

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 950 1,900 3,800 Feet

1:22,800

Data Sources:

Background image
- ***USGS 1:63,000 mapping***
- ***Matanuska-Susitna Borough parcels***

Legend

- Trapper Creek Elementary well
- Zone A
- Zone B
- Zone C
- Zone D
- T06
- U04
- Parcels

N W E S

0 2.5 Miles

January 22, 2004

APPENDIX D

Vulnerability Analysis for Trapper Creek Elementary Public Drinking Water Source

(Charts 1-14)

Chart 1. Susceptibility of the wellhead - Trapper Creek Elementary

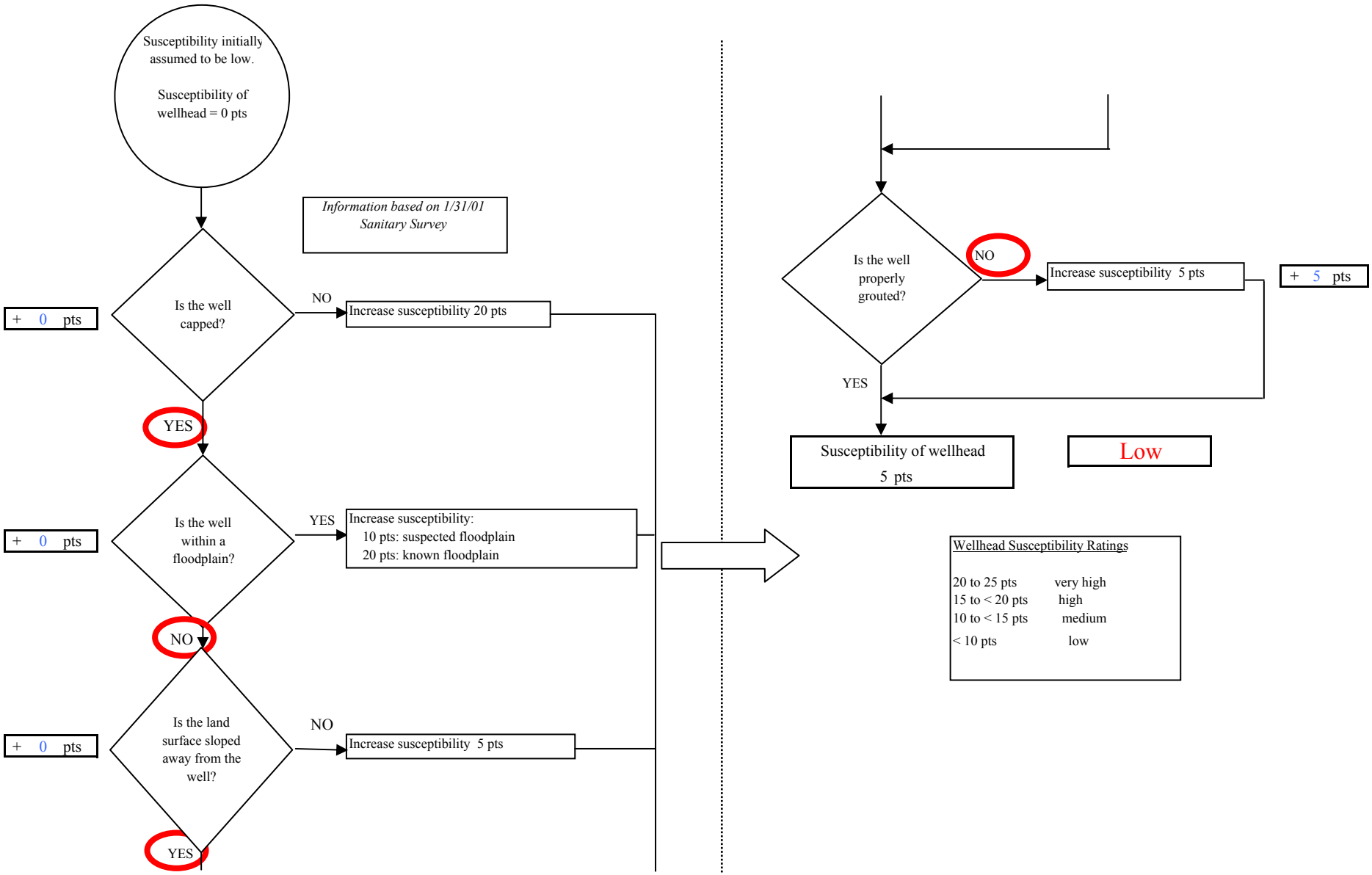


Chart 2. Susceptibility of the aquifer - Trapper Creek Elementary

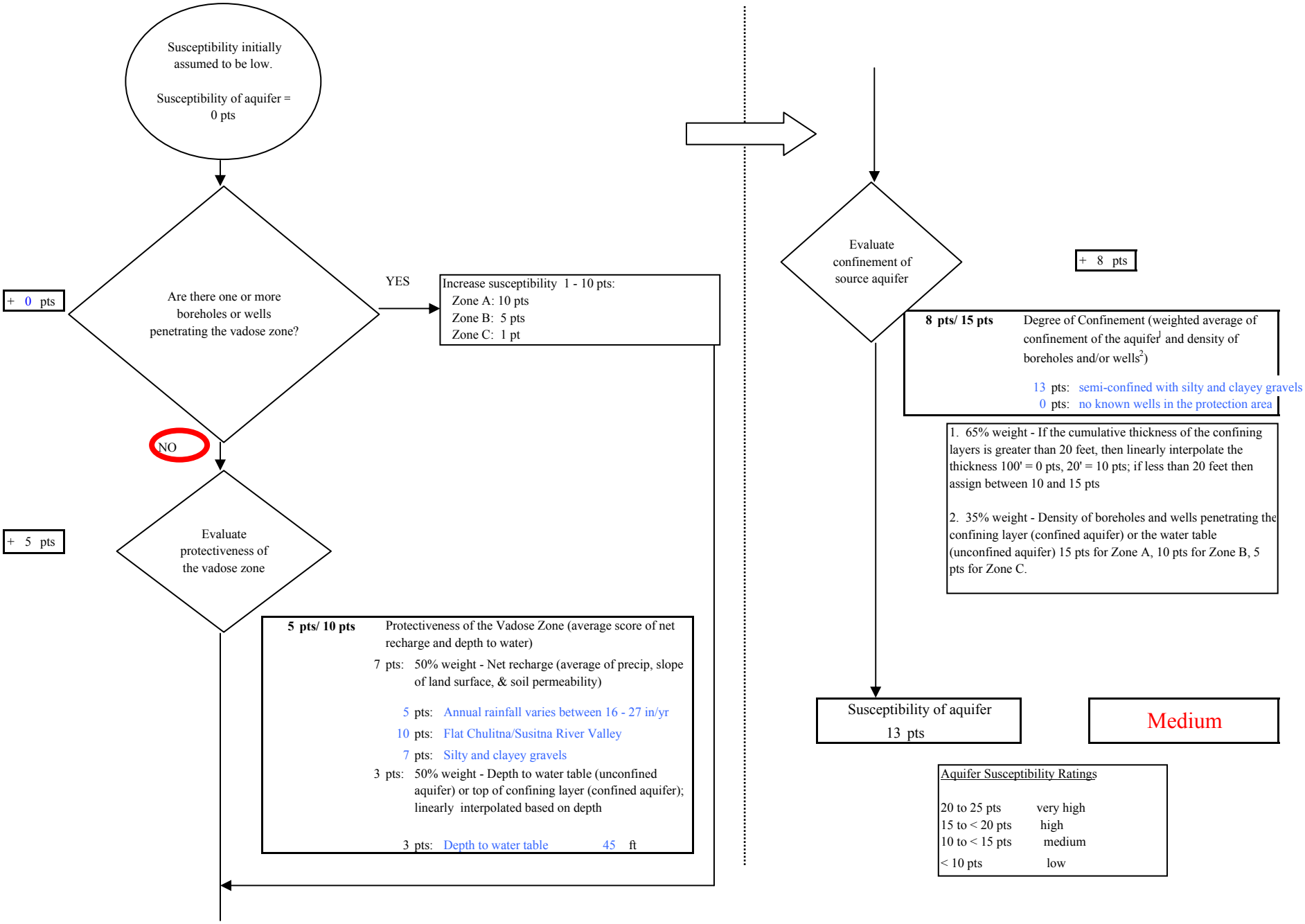
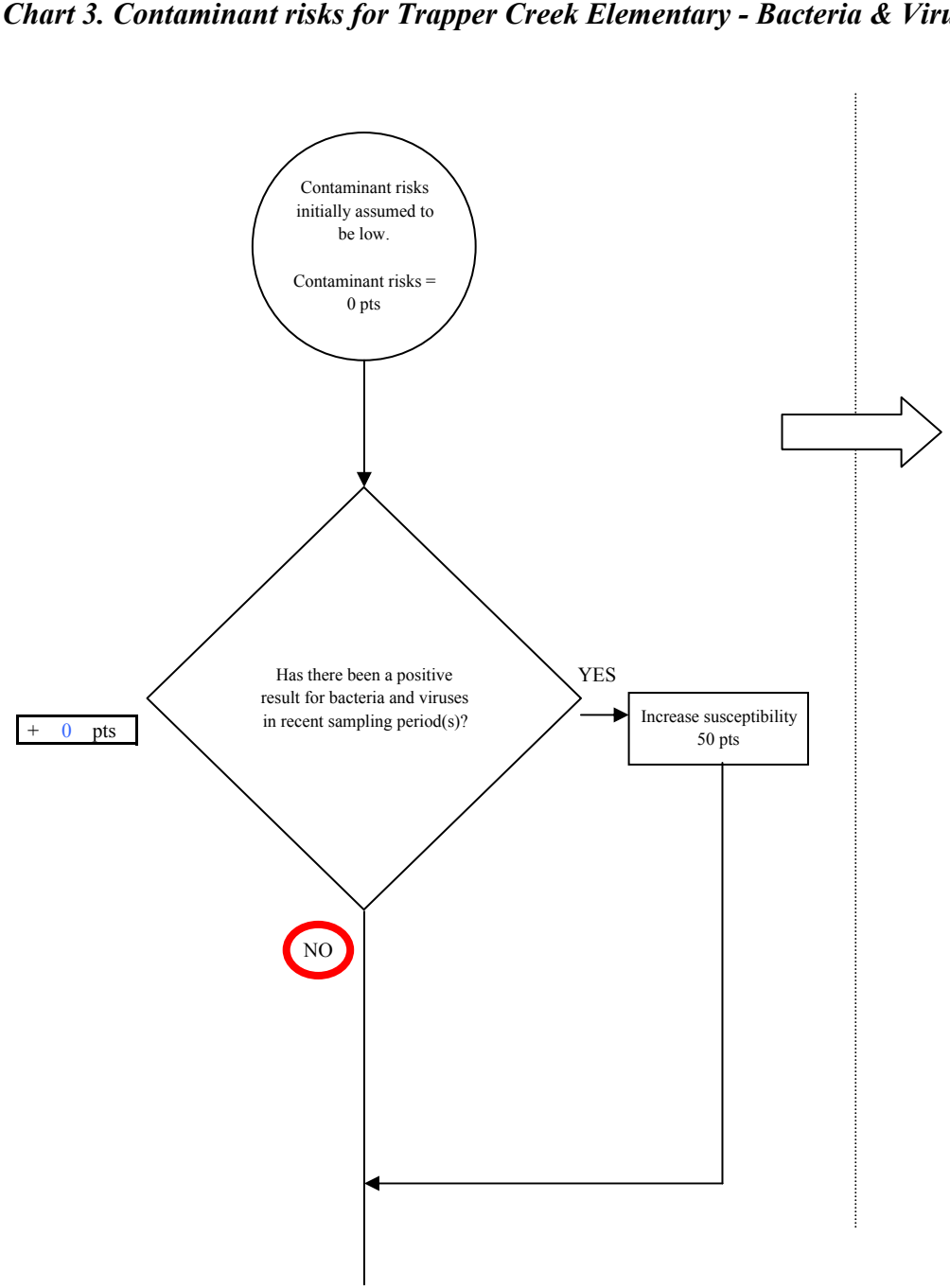
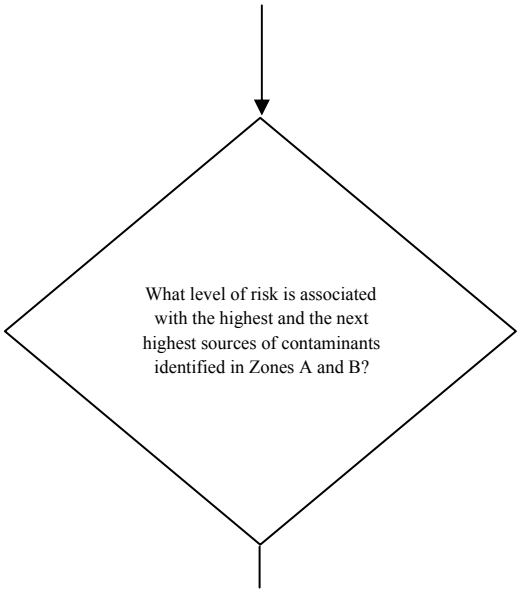


Chart 3. Contaminant risks for Trapper Creek Elementary - Bacteria & Viruses





+ 10 pts

Risk Rankings for Contaminant Sources Identified in Zones A and B

	Zone A	Zone B	Total
Very Highs(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 3. Contaminant risks for Trapper Creek Elementary - Bacteria & Viruses

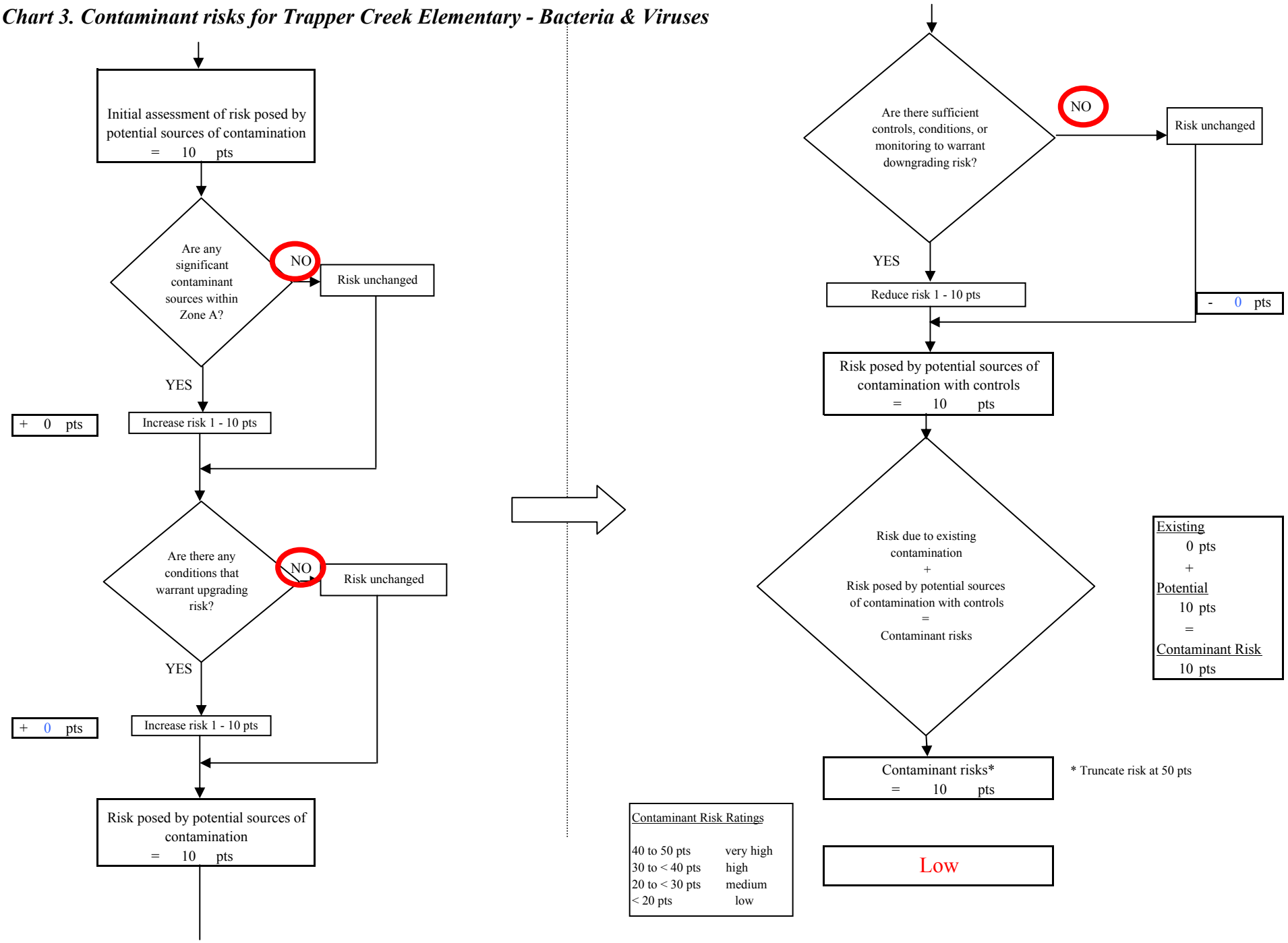


Chart 4. Vulnerability analysis for Trapper Creek Elementary - Bacteria & Viruses

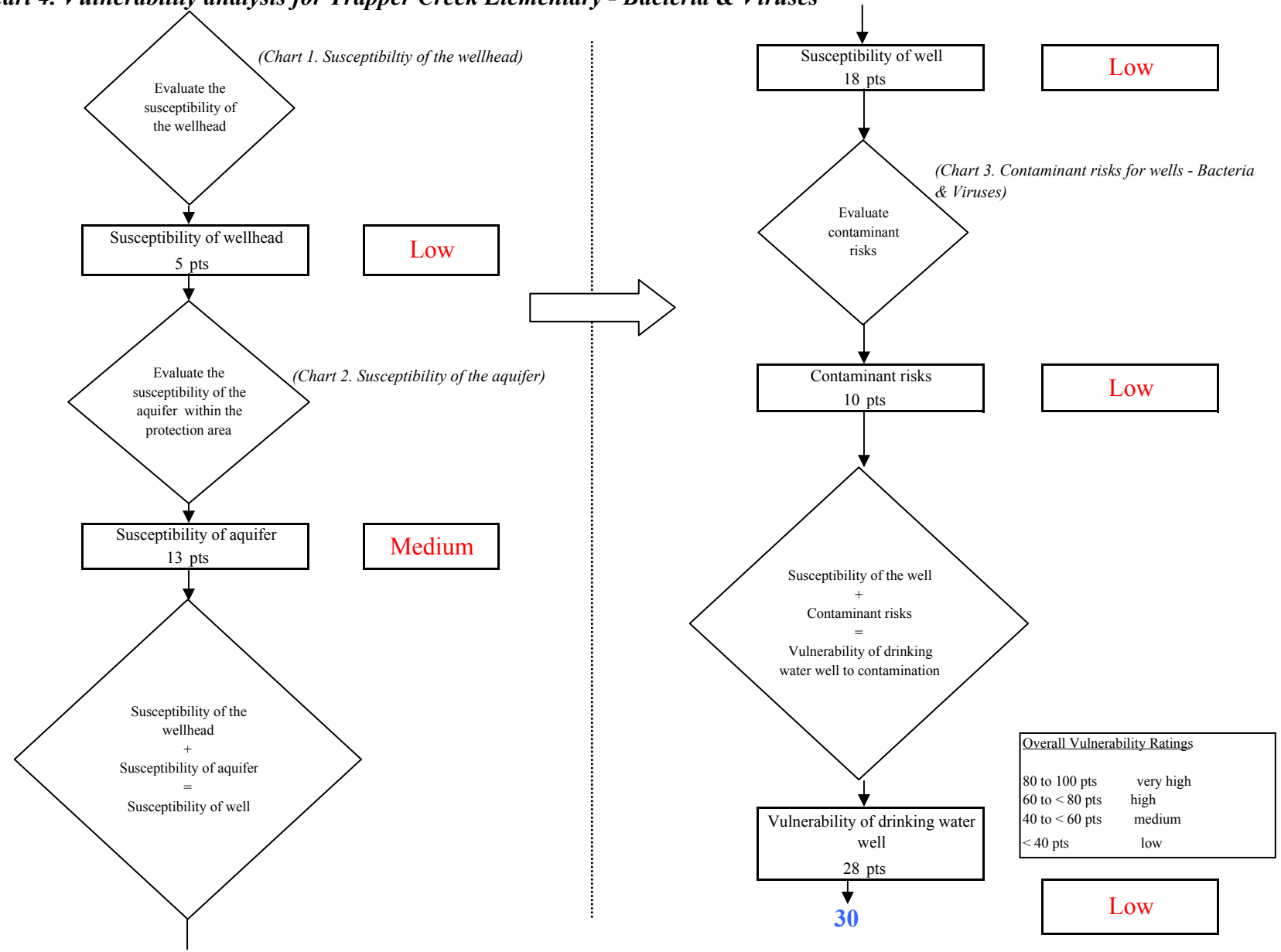


Chart 5. Contaminant risks for Trapper Creek Elementary - Nitrates and Nitrites

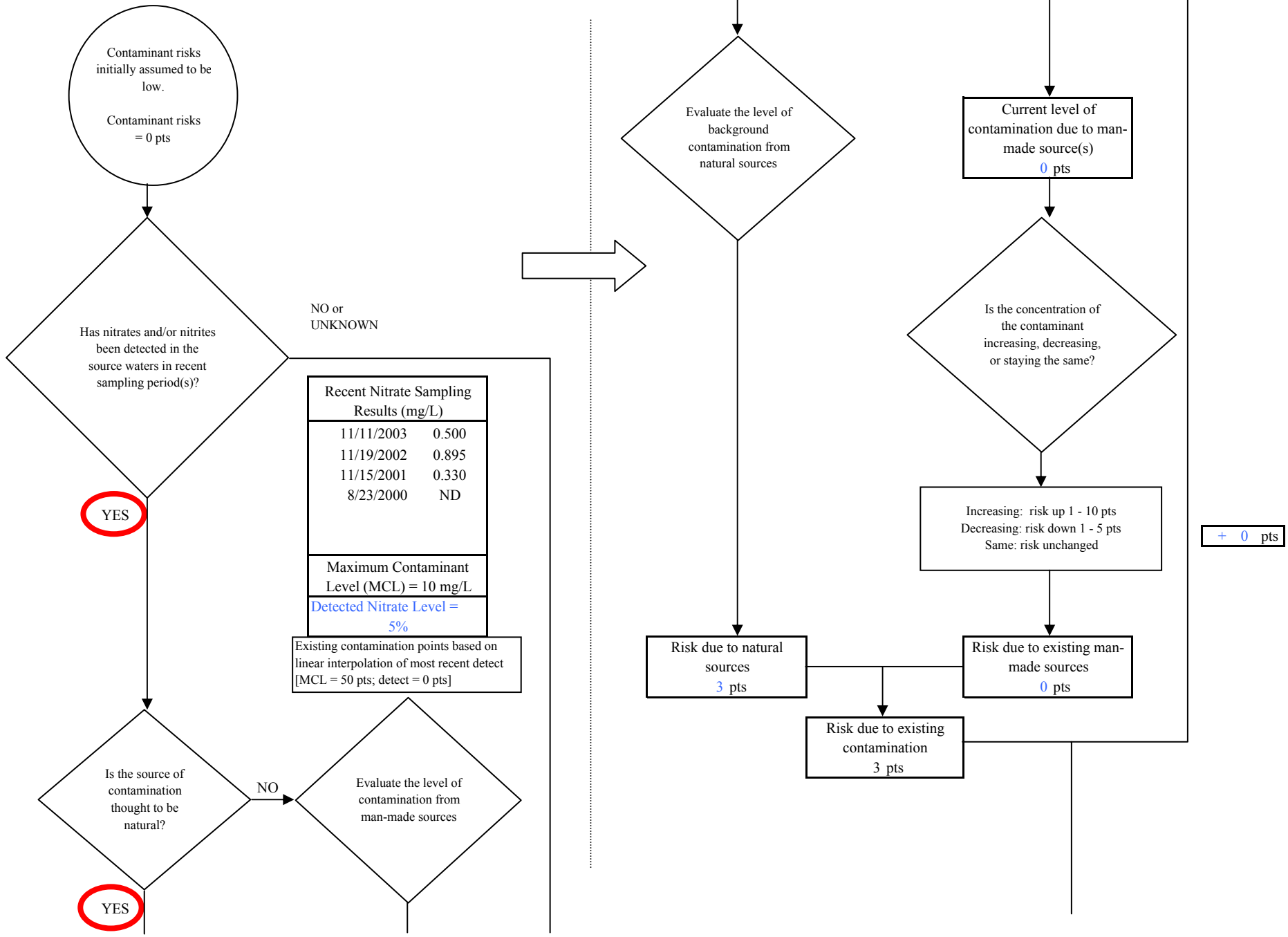
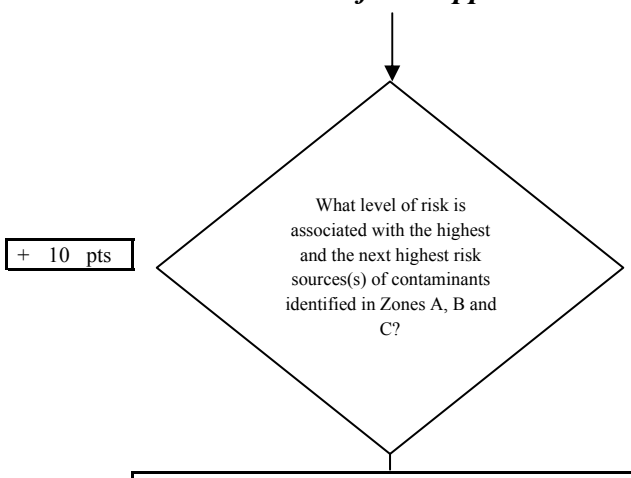


Chart 5. Contaminant risks for Trapper Creek Elementary - Nitrates and Nitrites



+ 10 pts

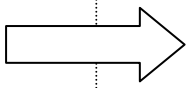
Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	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.



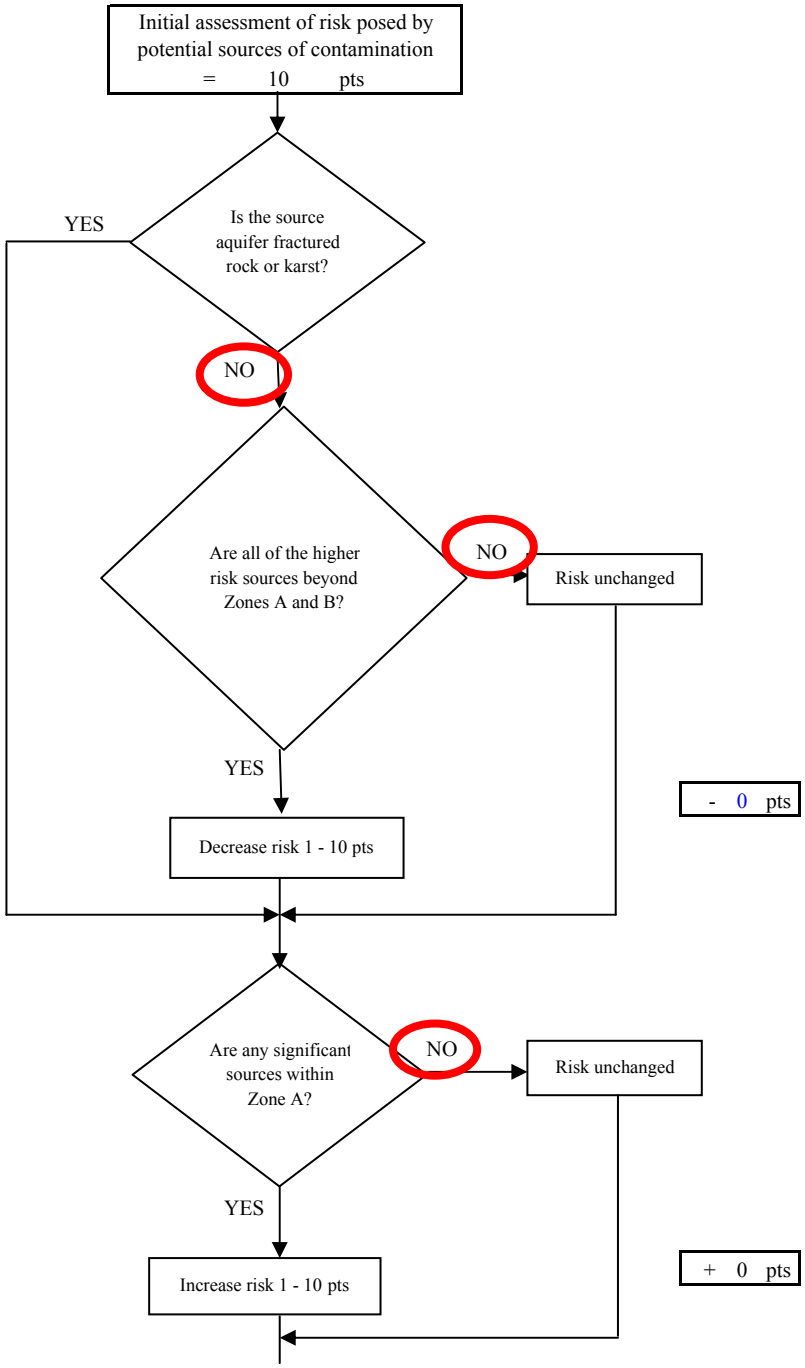
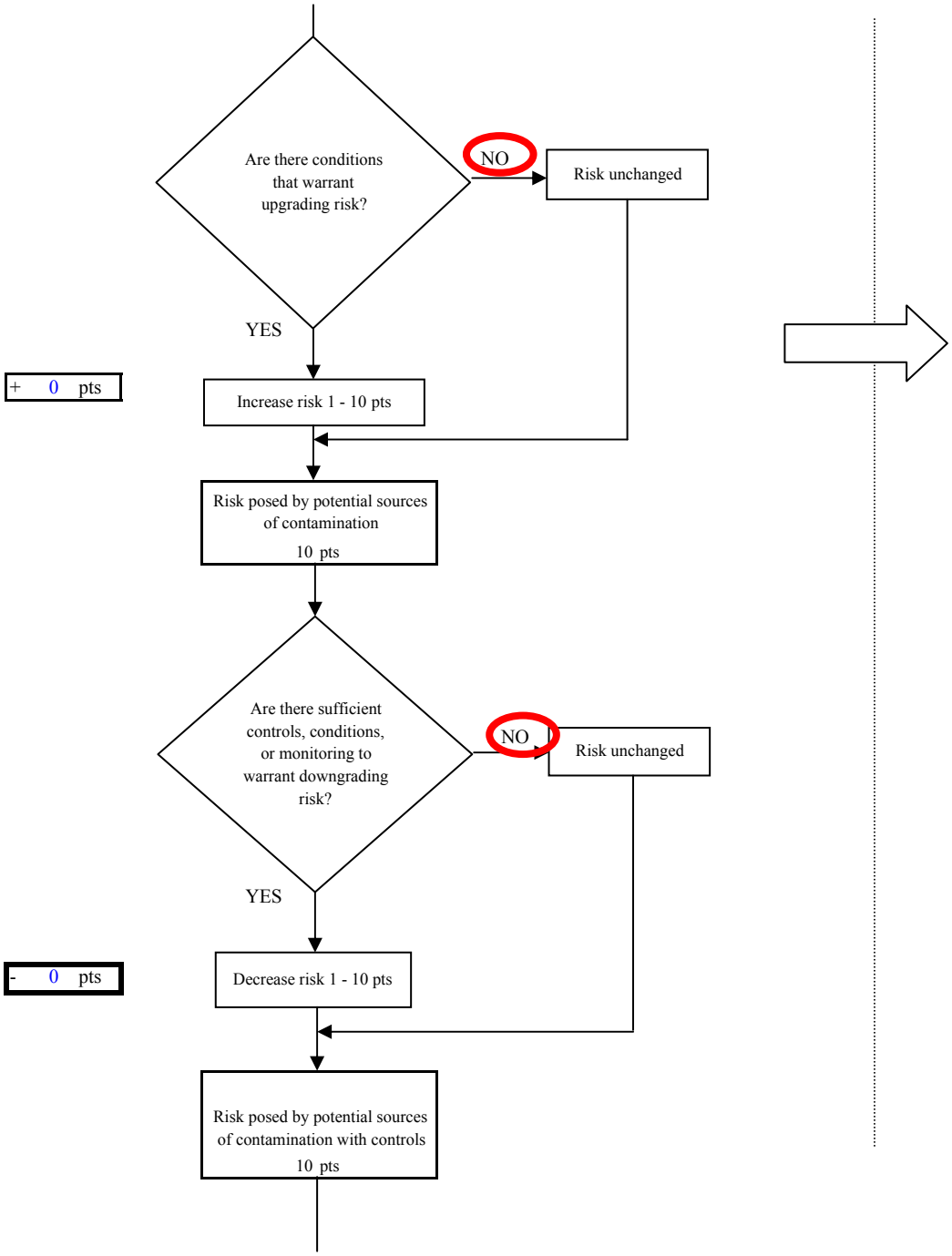


Chart 5. Contaminant risks for Trapper Creek Elementary - Nitrates and Nitrites



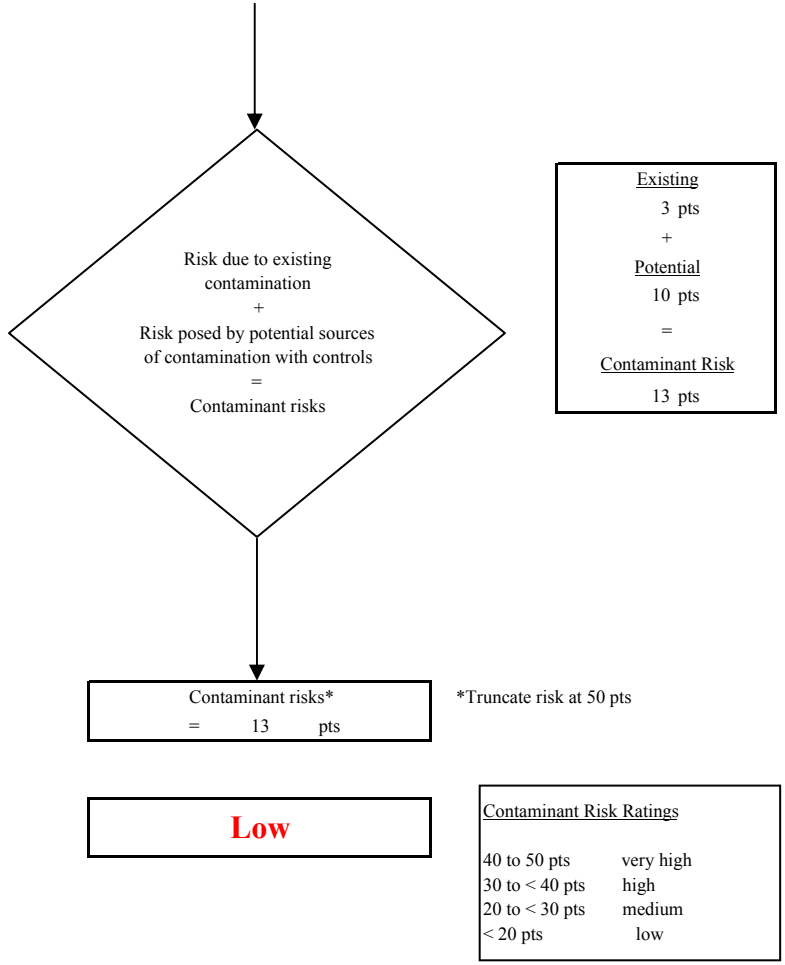


Chart 6. Vulnerability analysis for Trapper Creek Elementary - Nitrates and Nitrites

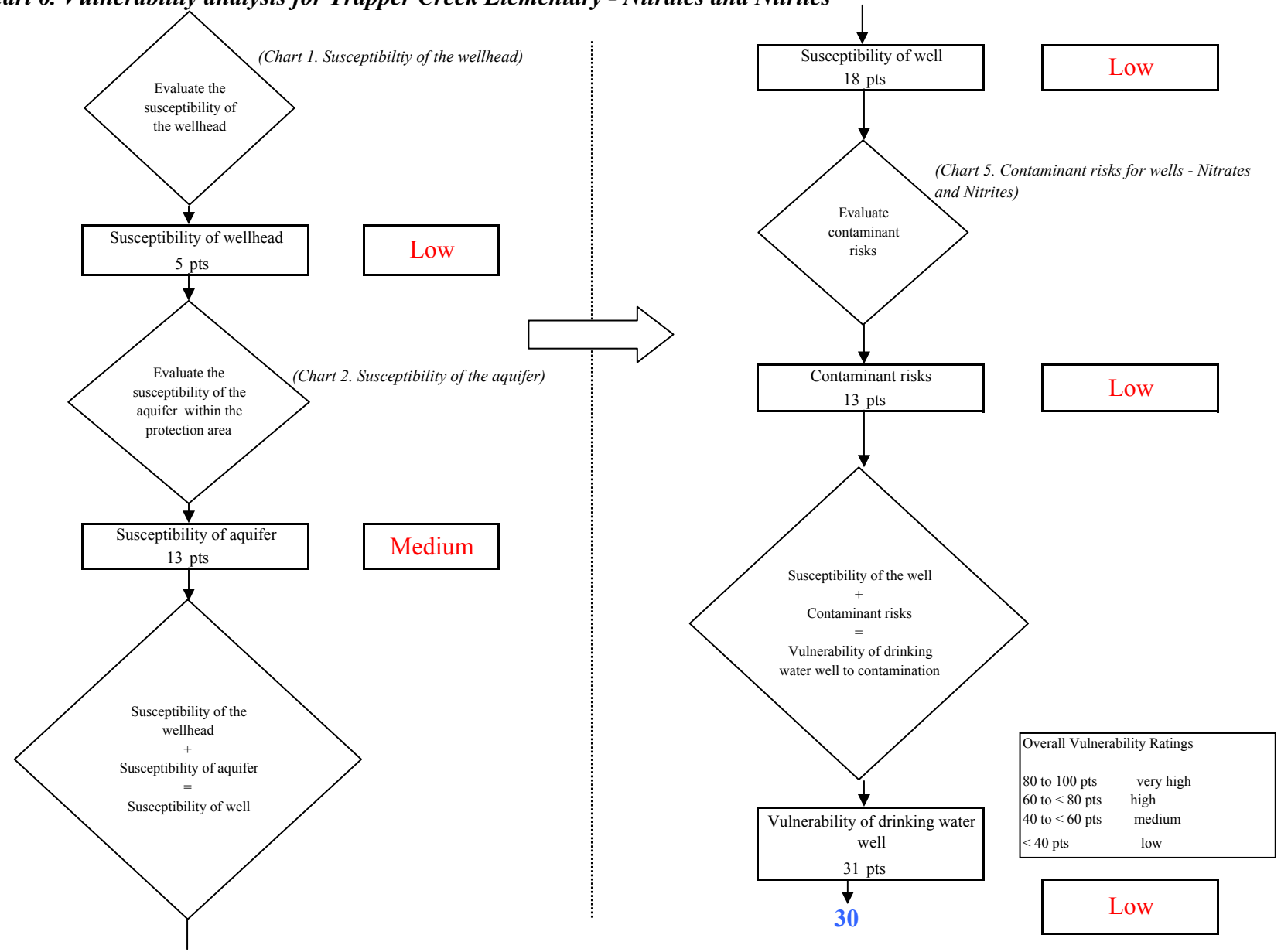


Chart 7. Contaminant risks for Trapper Creek Elementary - Volatile Organic Chemicals

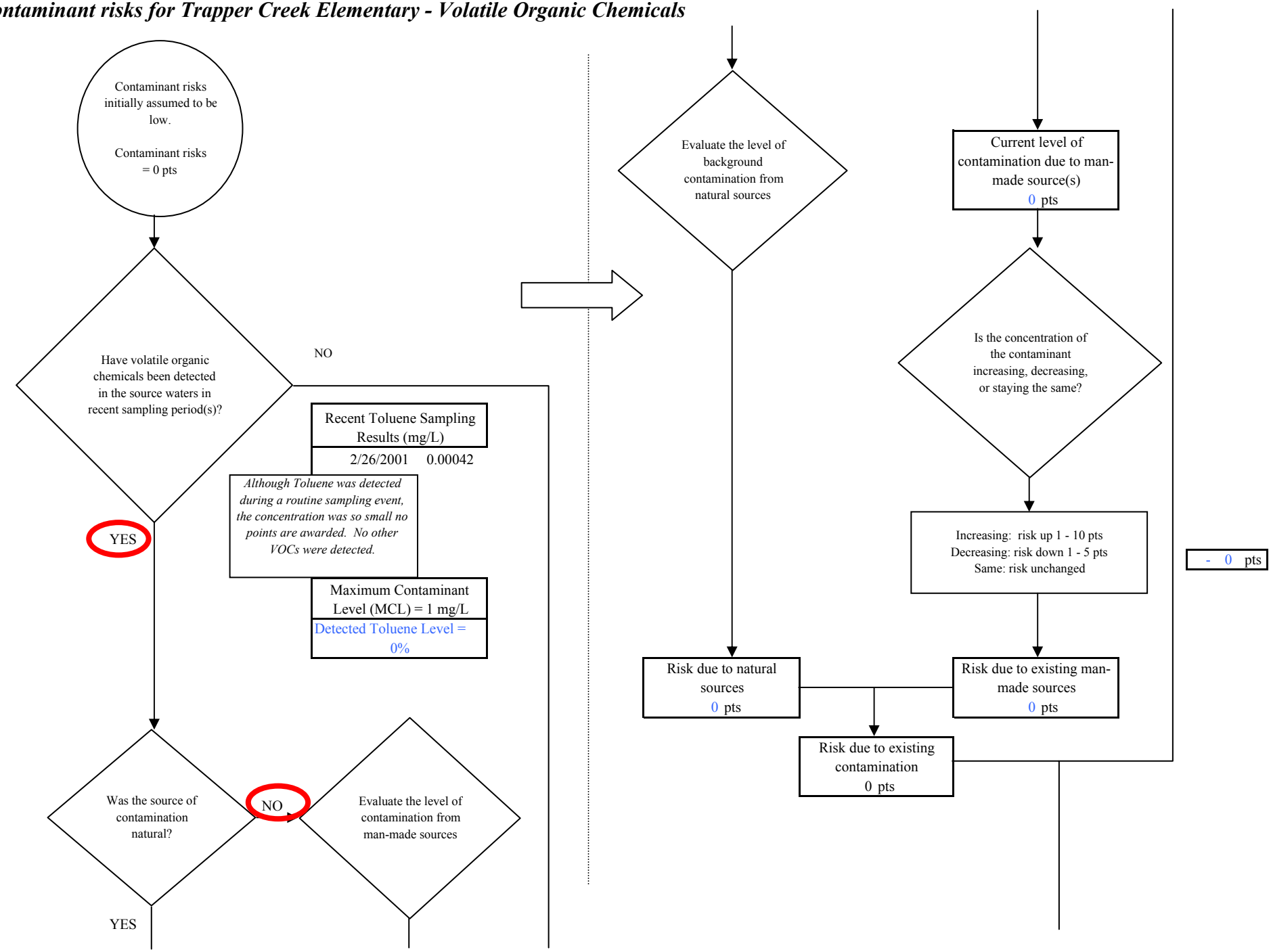


Chart 7. Contaminant risks for Trapper Creek Elementary - Volatile Organic Chemicals

+ 20 pts

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?

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)	2	0	2
Low(s)	2	0	2

	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 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.

Initial assessment of risk posed by potential sources of contamination = 20 pts

Is the source aquifer fractured rock or karst?

YES

NO

Are all of the higher risk sources beyond Zones A and B?

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

Risk unchanged

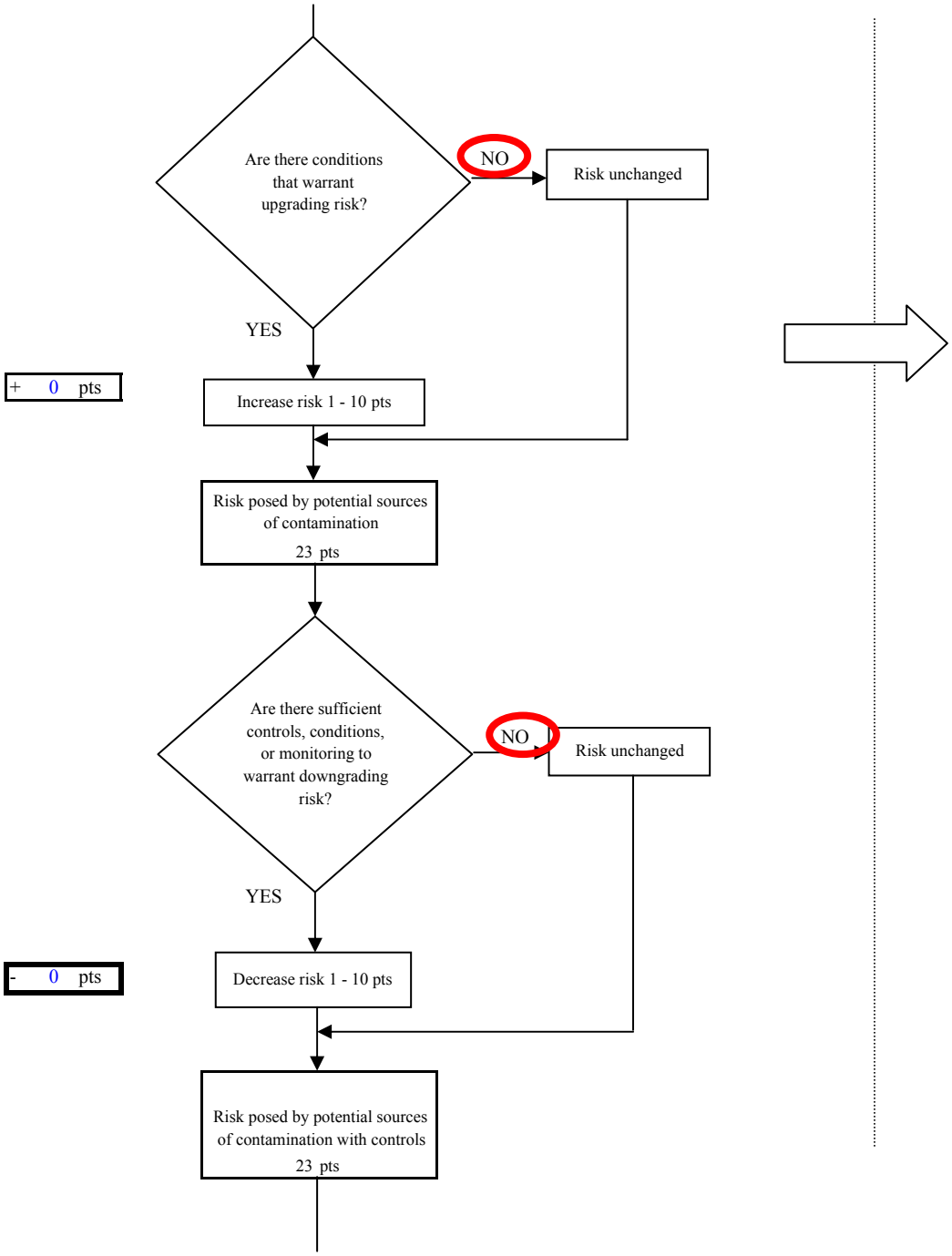
The above ground diesel tank in Zone A increases the risk

YES

Increase risk 1 - 10 pts

+ 3 pts

Chart 7. Contaminant risks for Trapper Creek Elementary - Volatile Organic Chemicals



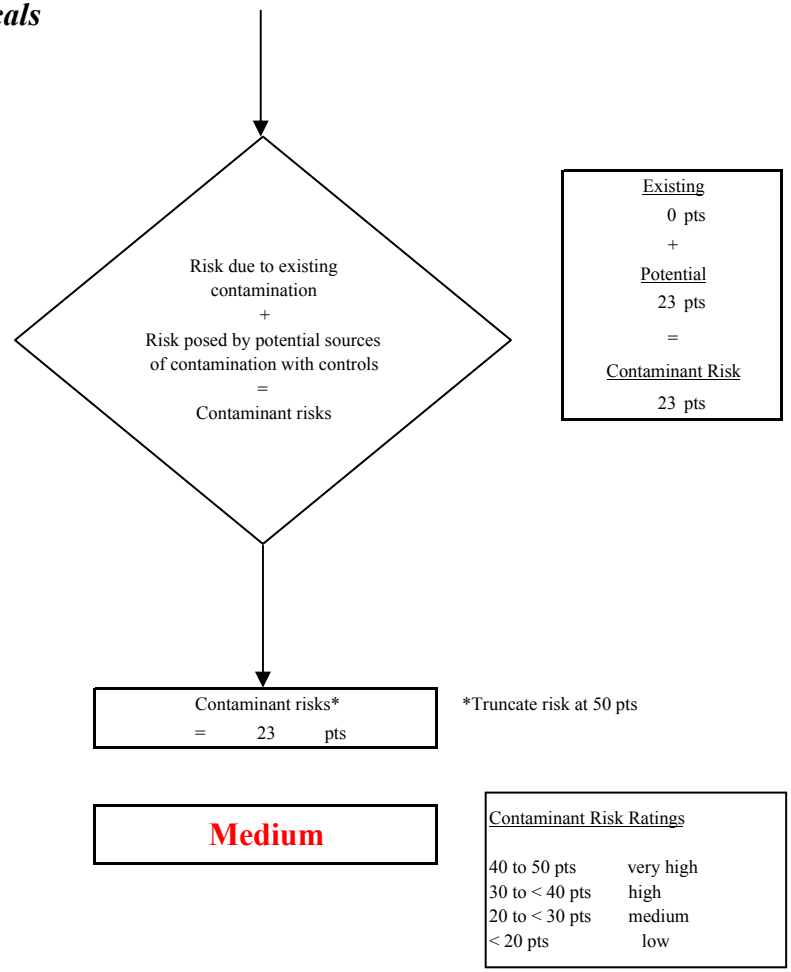


Chart 8. Vulnerability analysis for Trapper Creek Elementary - Volatile Organic Chemicals

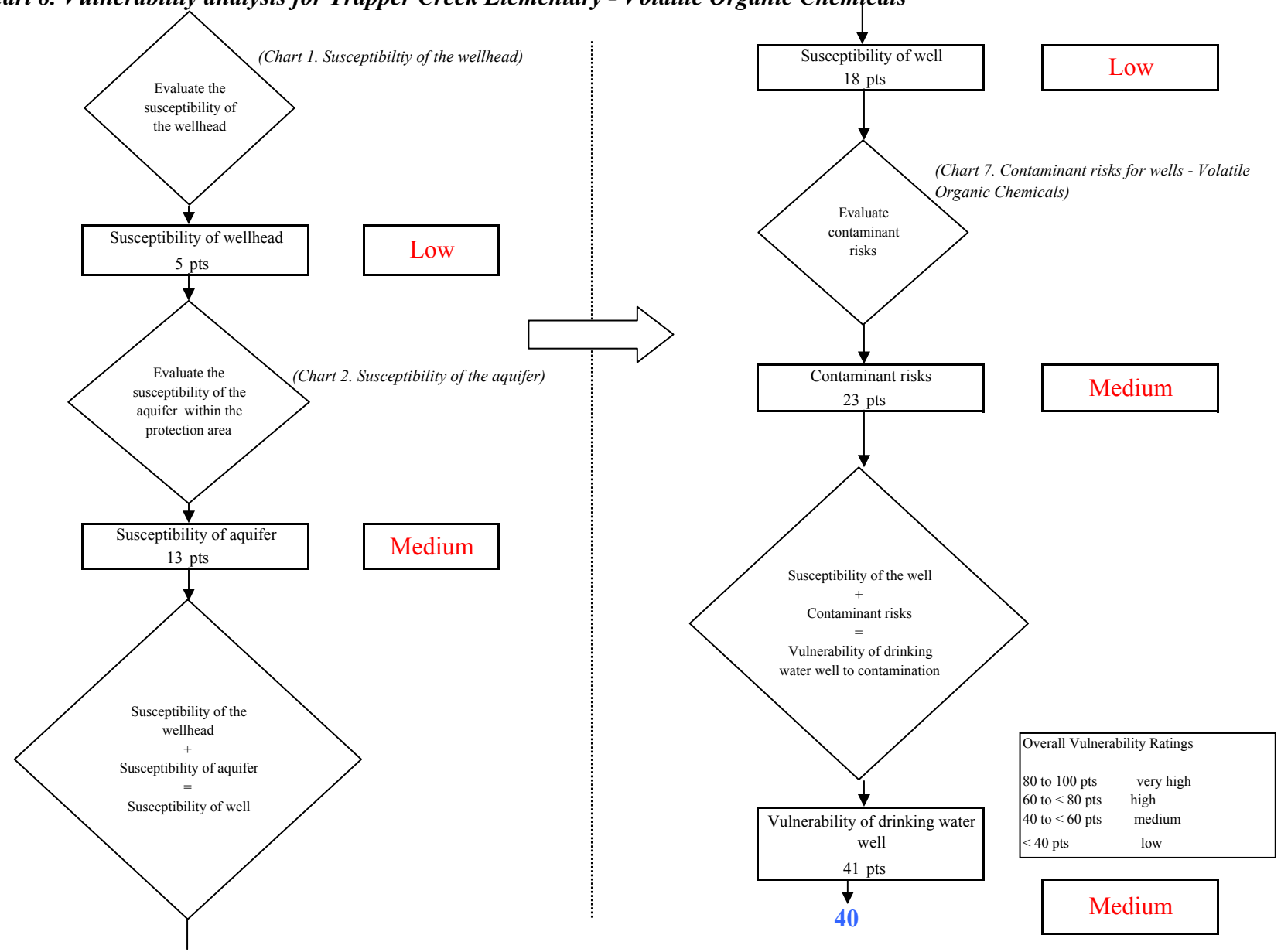


Chart 9. Contaminant risks for Trapper Creek Elementary - Heavy Metals, Cyanide and Other Inorganic Chemicals

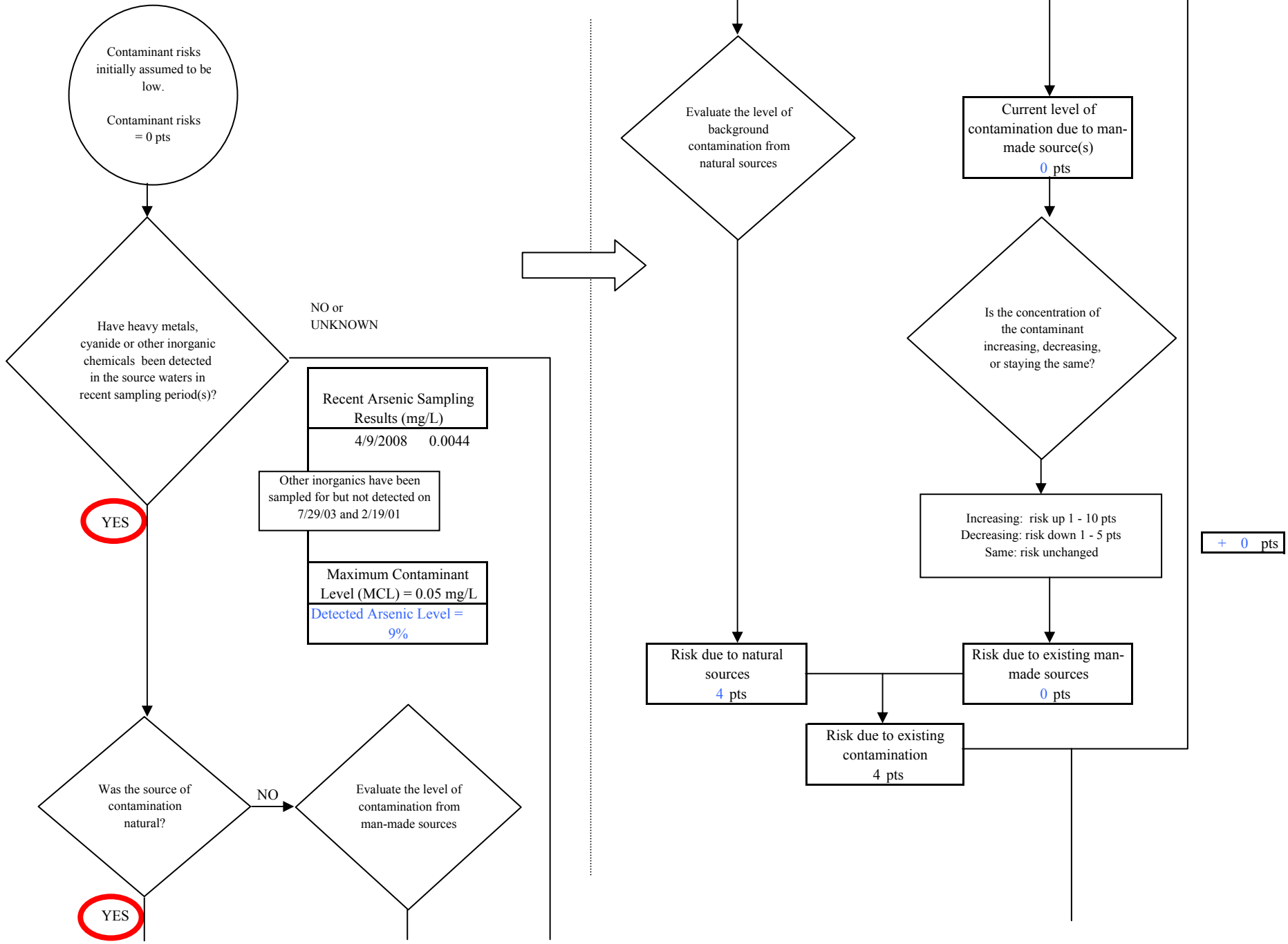
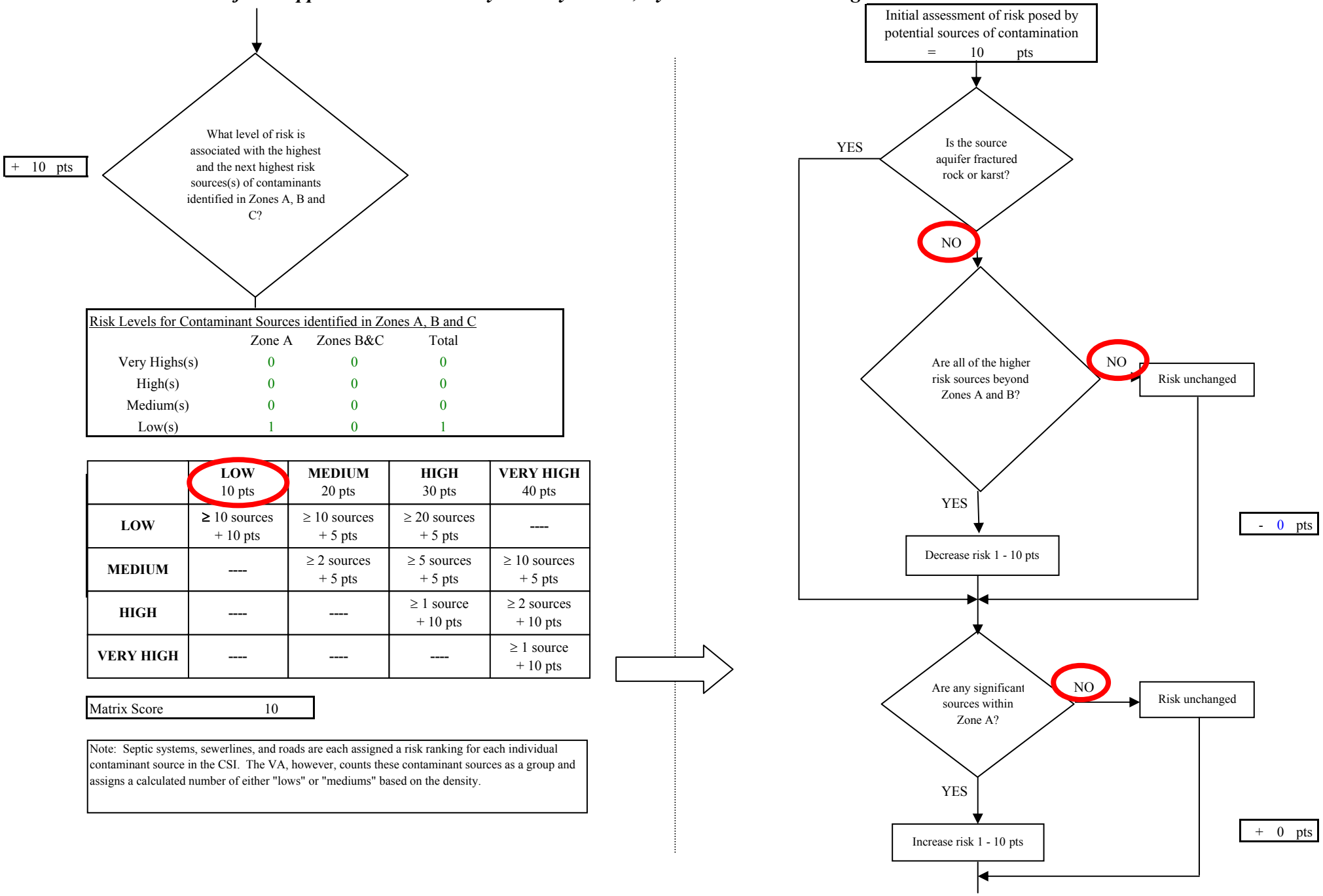


Chart 9. Contaminant risks for Trapper Creek Elementary - Heavy Metals, Cyanide and Other Inorganic Chemicals



Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(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 9. Contaminant risks for Trapper Creek Elementary - Heavy Metals, Cyanide and Other Inorganic Chemicals

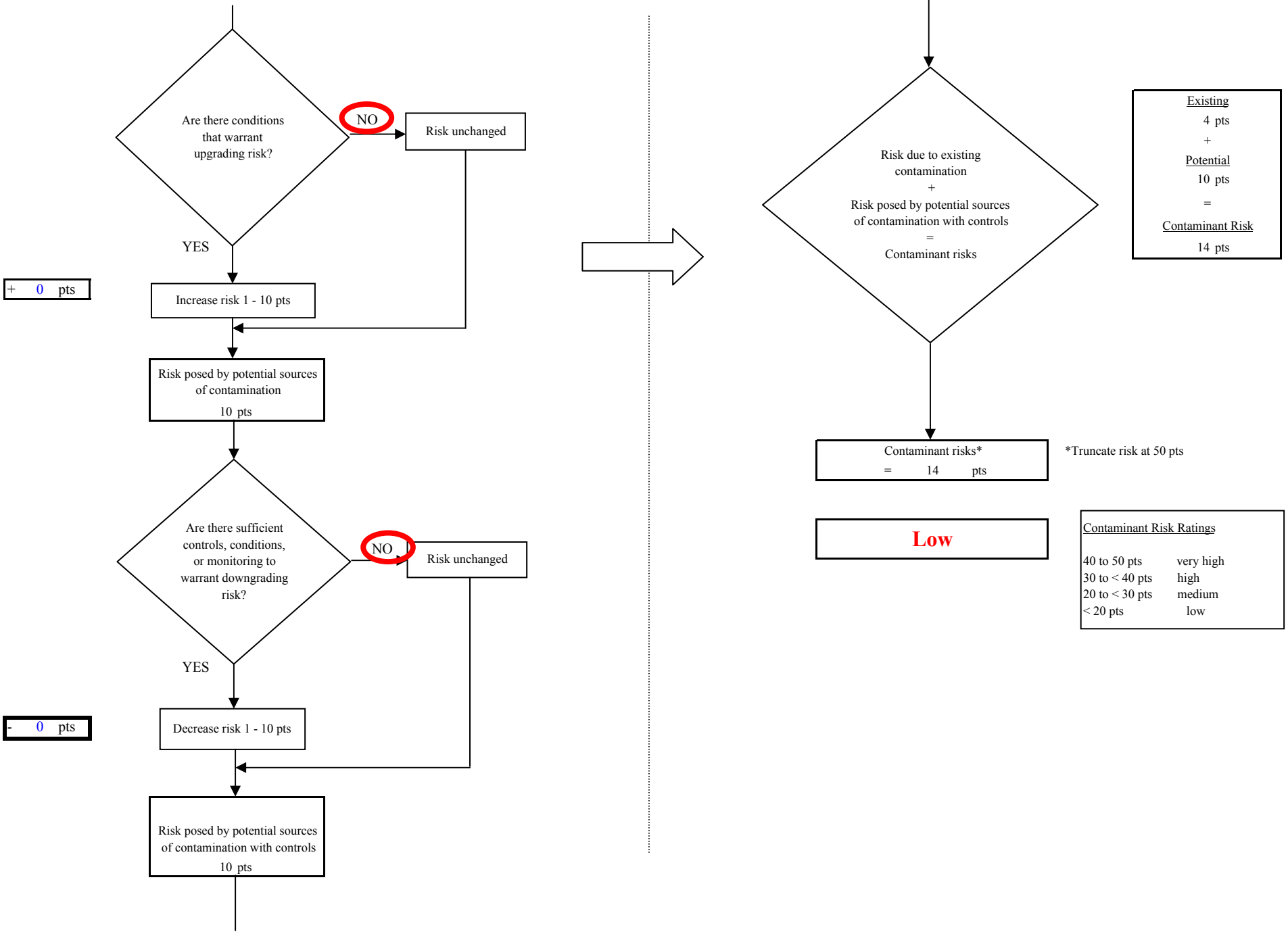


Chart 10. Vulnerability analysis for Trapper Creek Elementary - Heavy Metals, Cyanide and Other Inorganic Chemicals

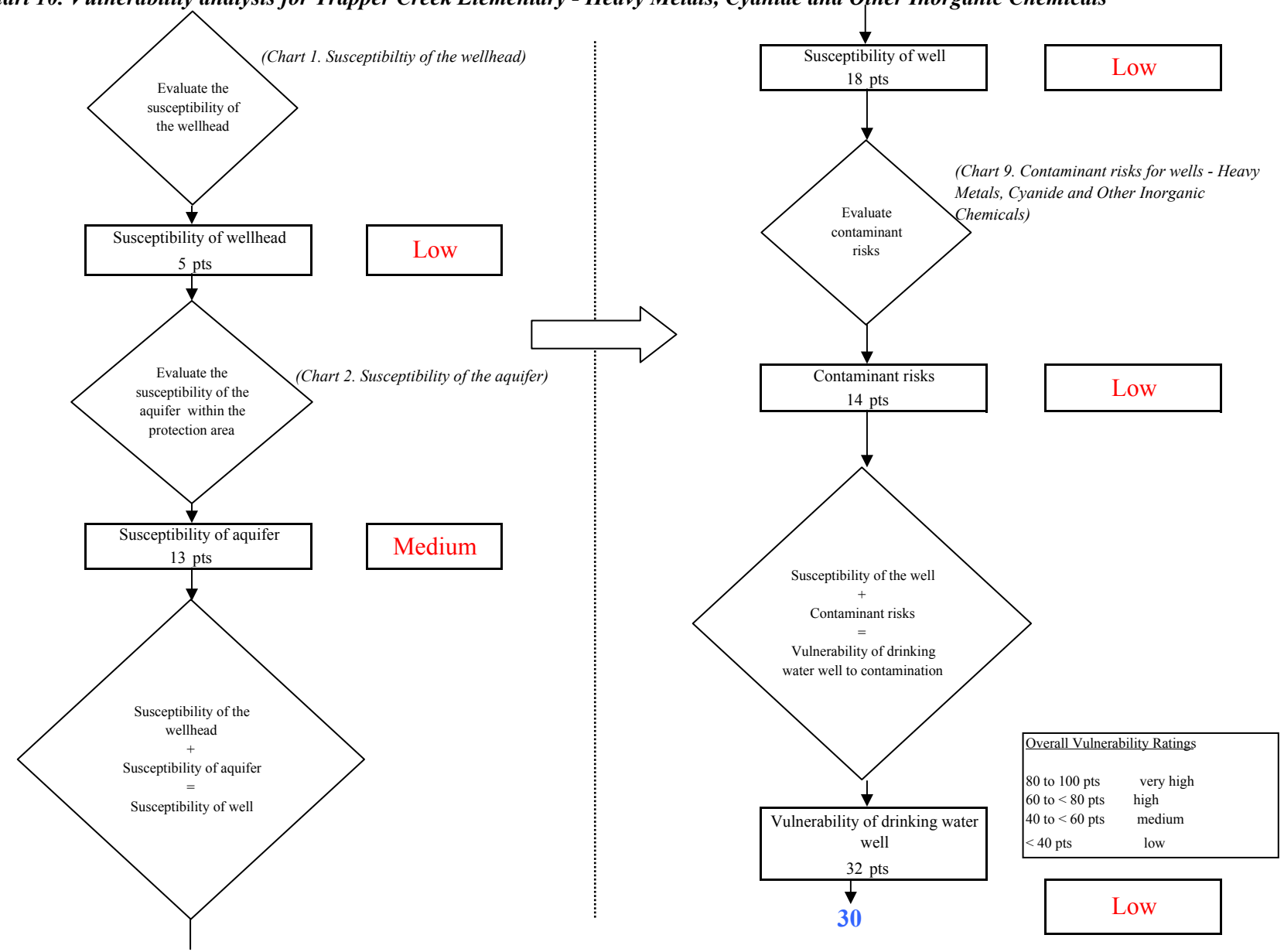


Chart 11. Contaminant risks for Trapper Creek Elementary - Synthetic Organic Chemicals

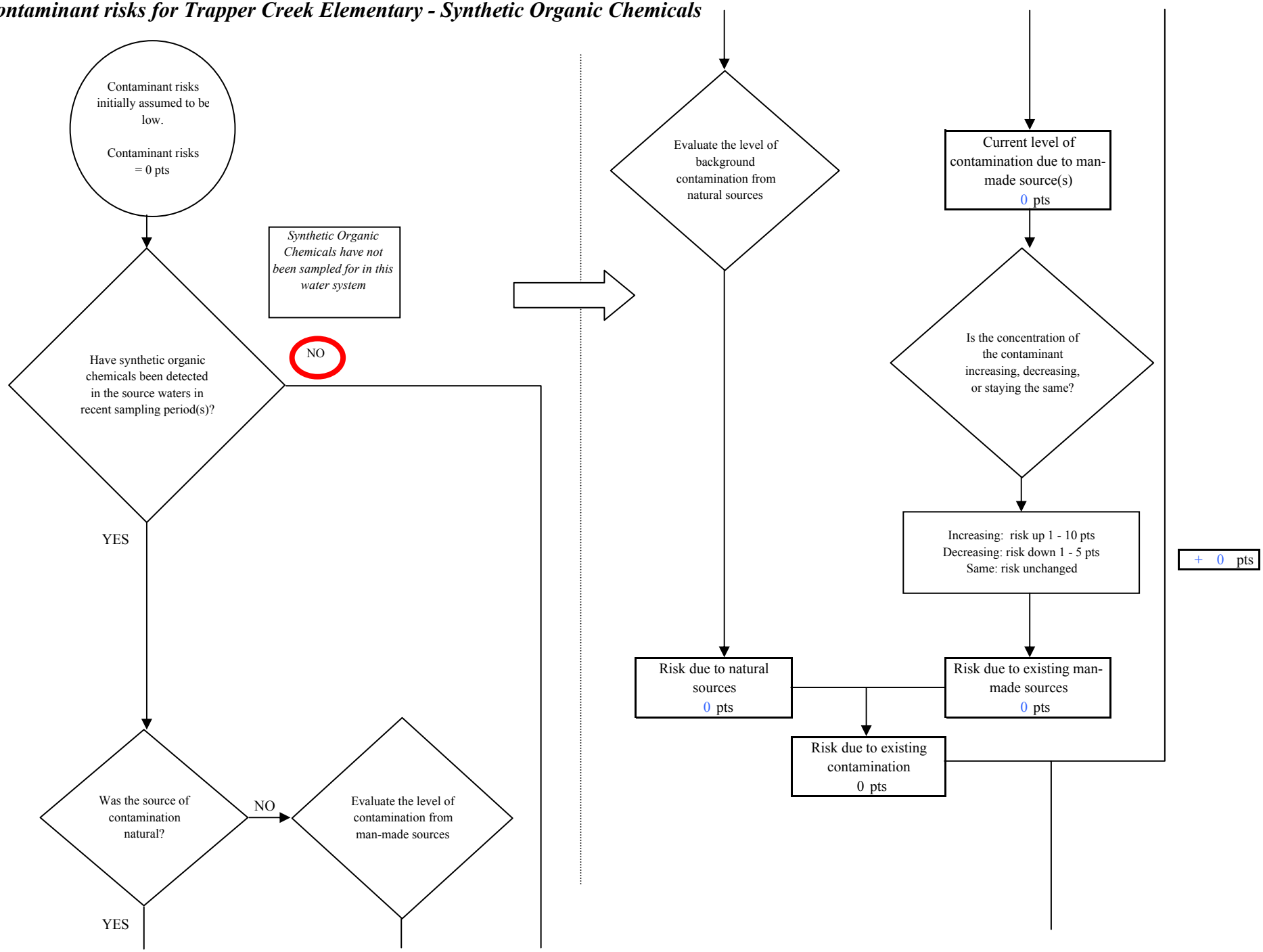
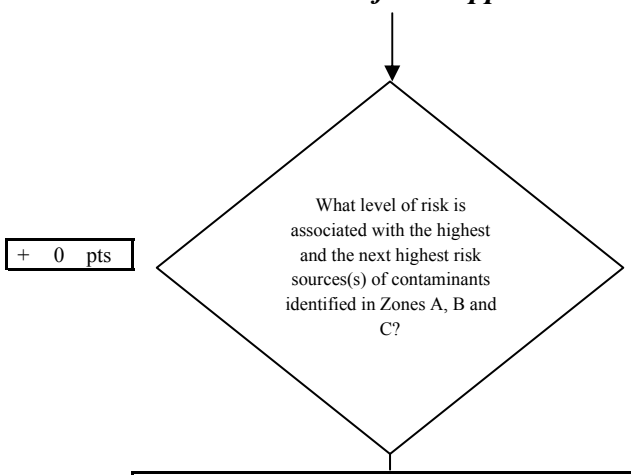


Chart 11. Contaminant risks for Trapper Creek Elementary - Synthetic Organic Chemicals



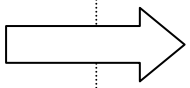
+ 0 pts

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	0	0
Low(s)	0	0	0

	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 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.



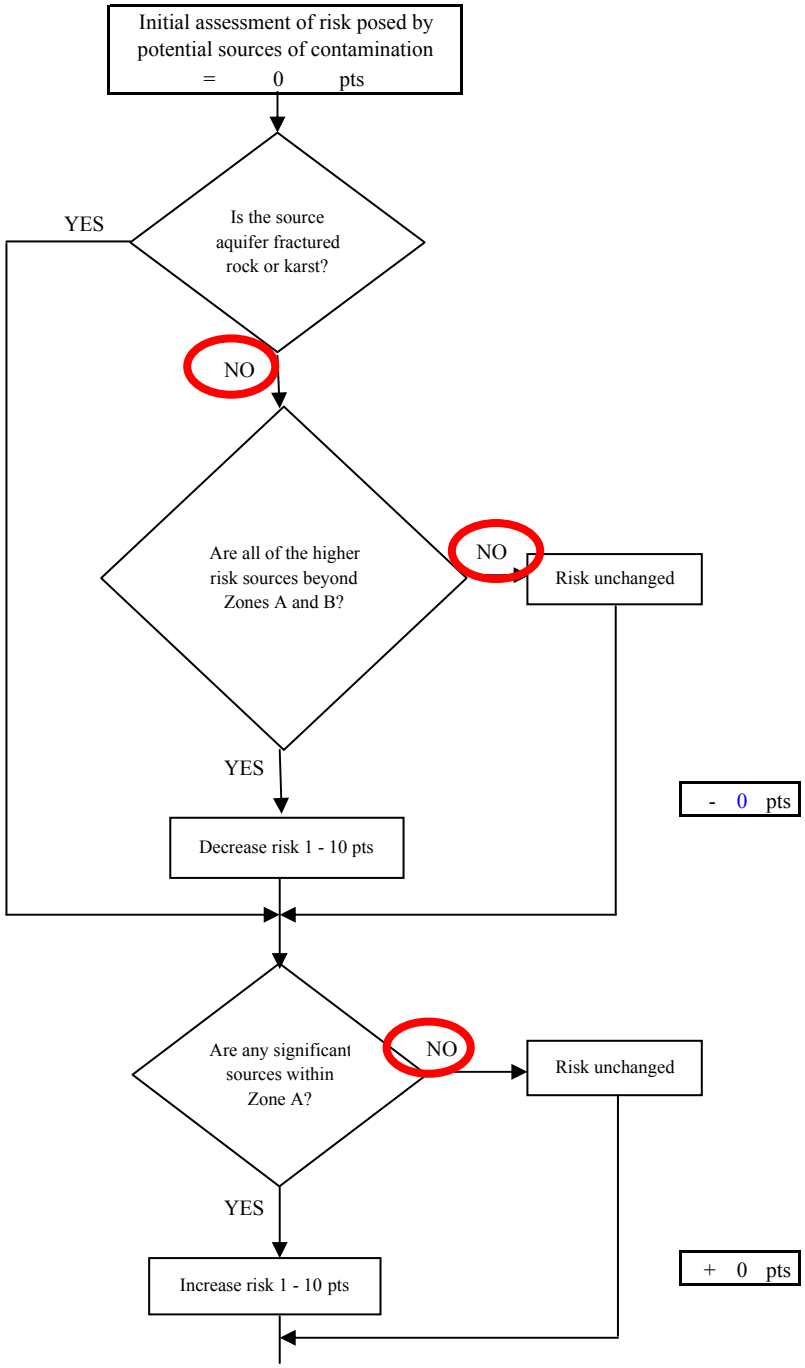


Chart 11. Contaminant risks for Trapper Creek Elementary - Synthetic Organic Chemicals

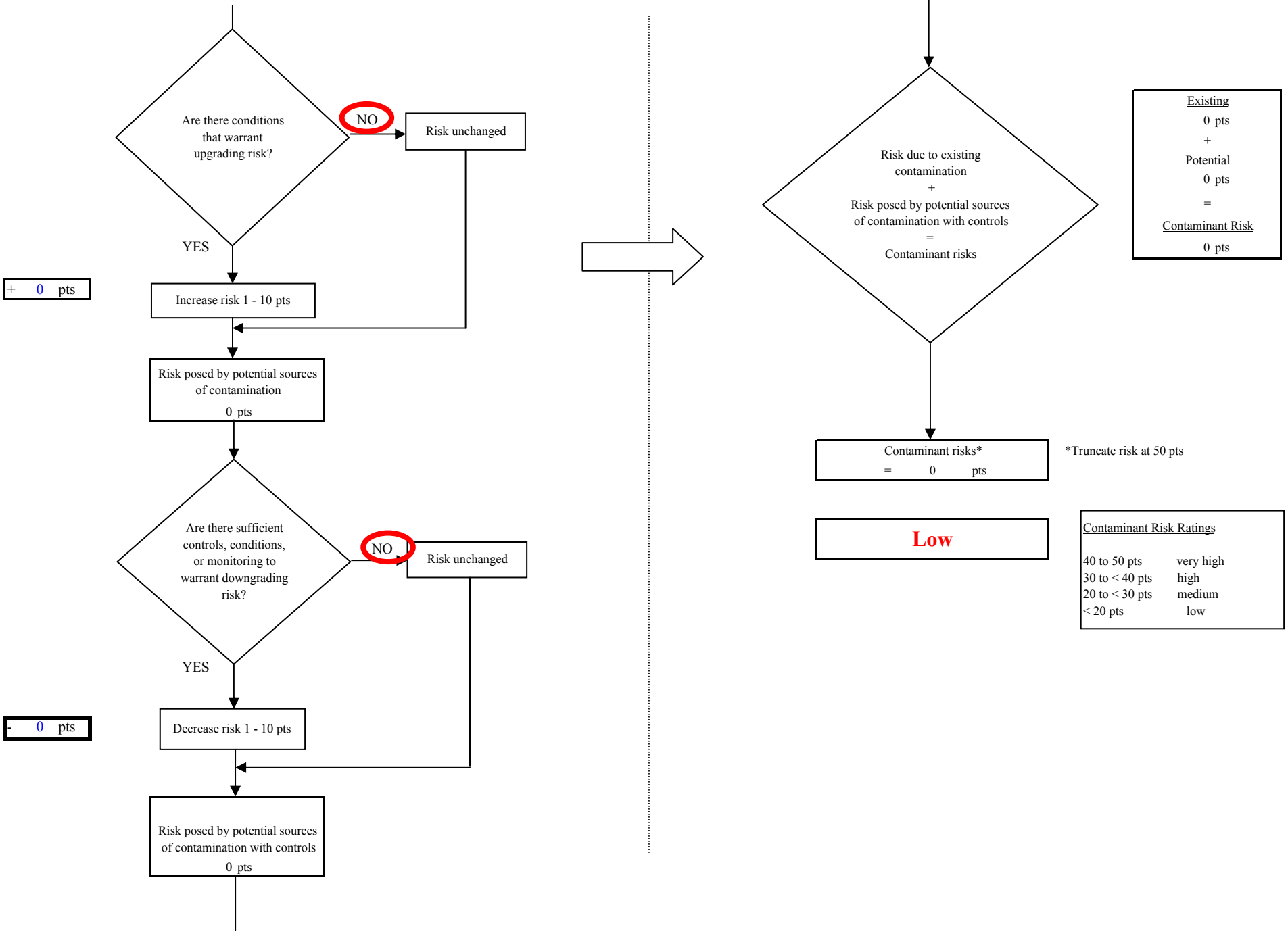


Chart 12. Vulnerability analysis for Trapper Creek Elementary - Synthetic Organic Chemicals

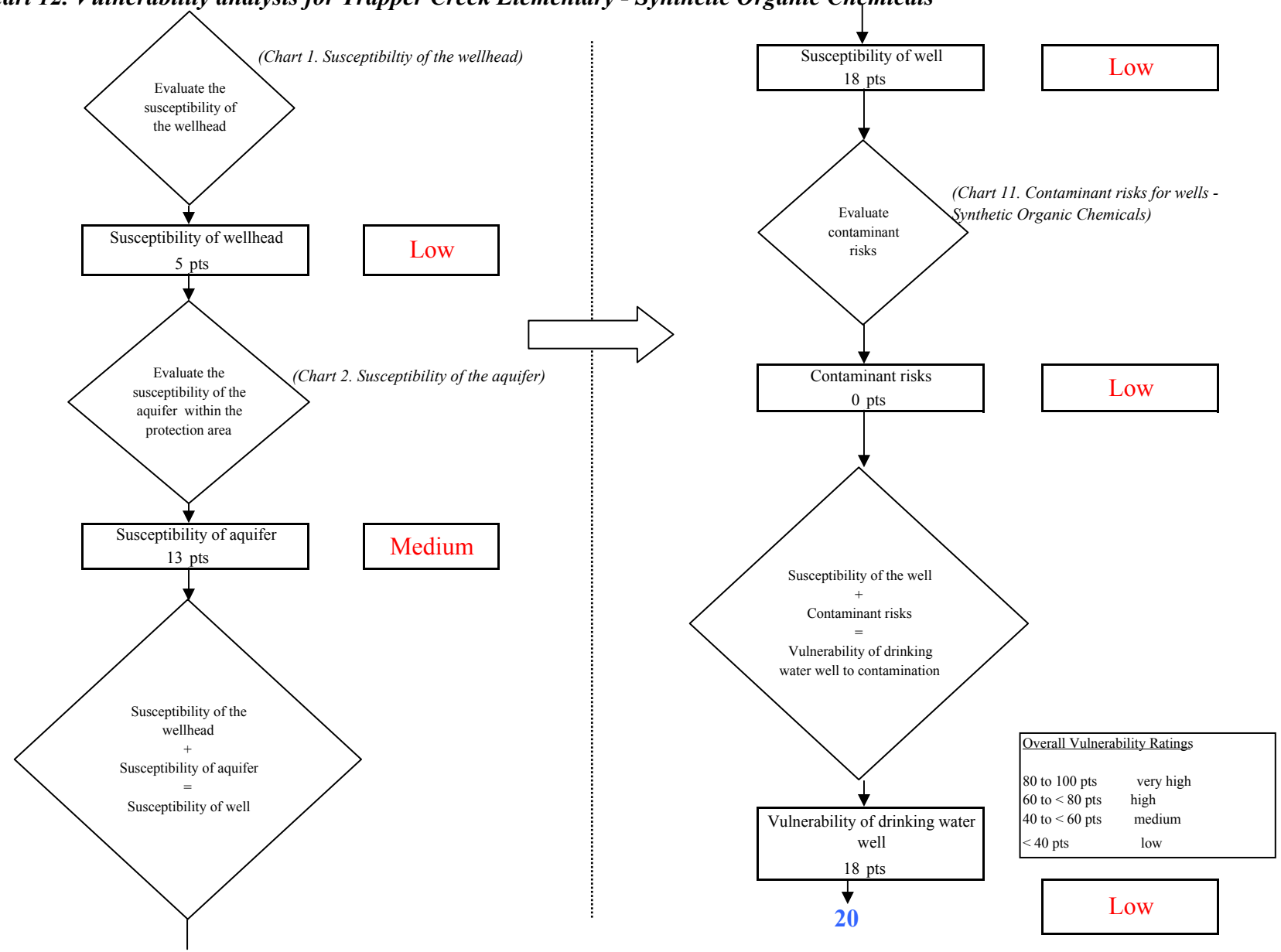


Chart 13. Contaminant risks for Trapper Creek Elementary - Other Organic Chemicals

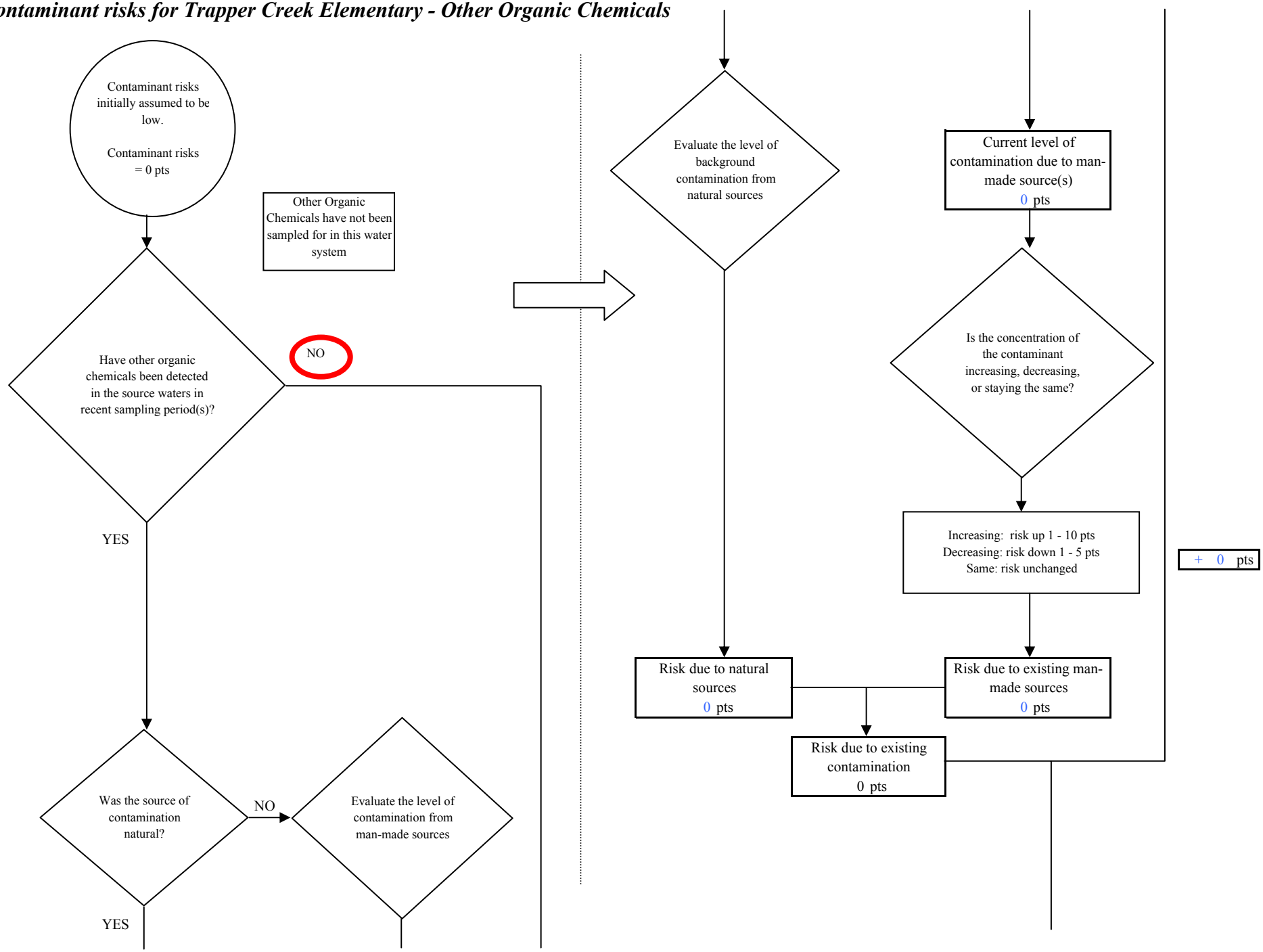


Chart 13. Contaminant risks for Trapper Creek Elementary - Other Organic Chemicals

+ 10 pts

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?

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	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.

Initial assessment of risk posed by potential sources of contamination = 10 pts

Is the source aquifer fractured rock or karst?

YES

NO

Are all of the higher risk sources beyond Zones A and B?

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

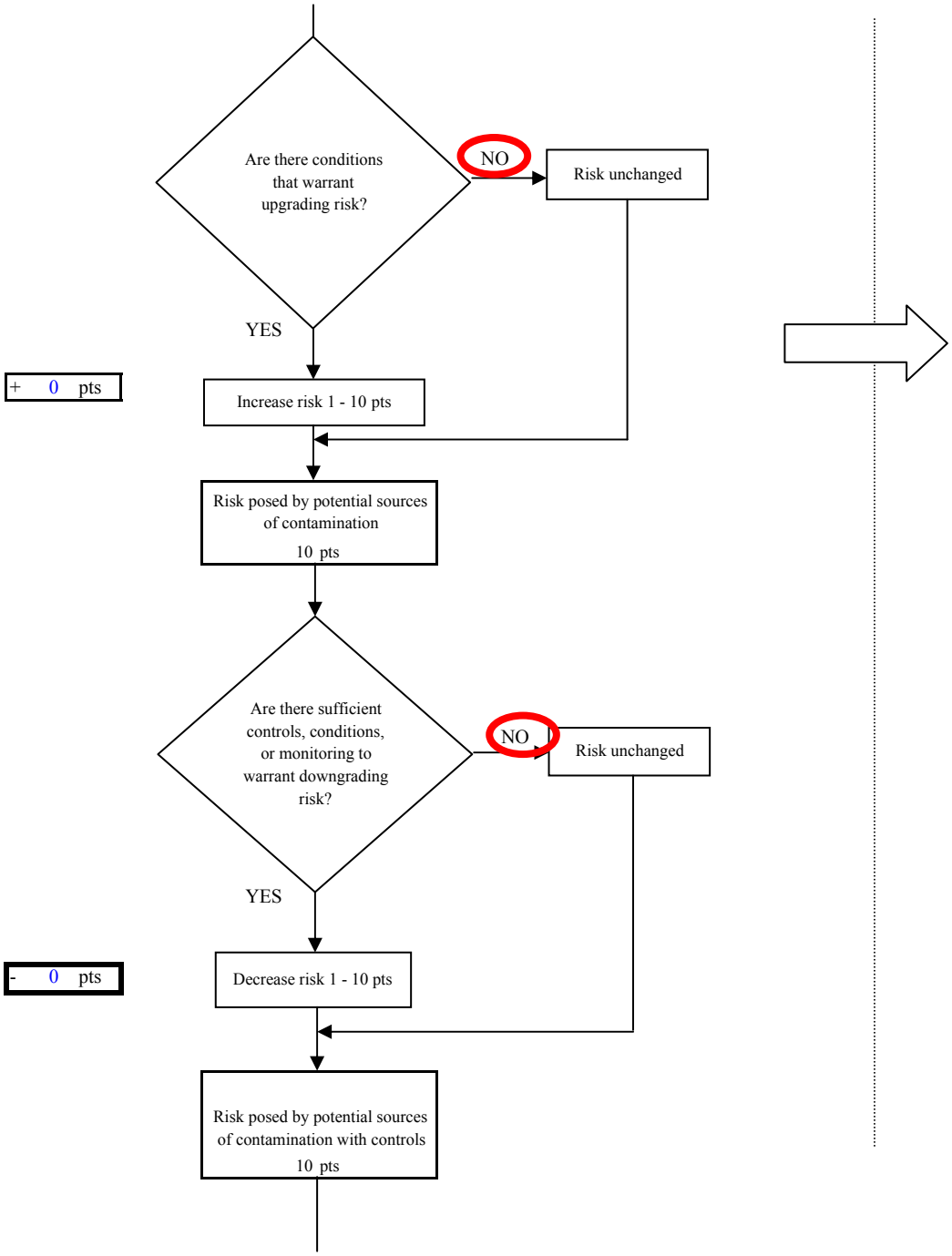
Risk unchanged

YES

Increase risk 1 - 10 pts

+ 0 pts

Chart 13. Contaminant risks for Trapper Creek Elementary - Other Organic Chemicals



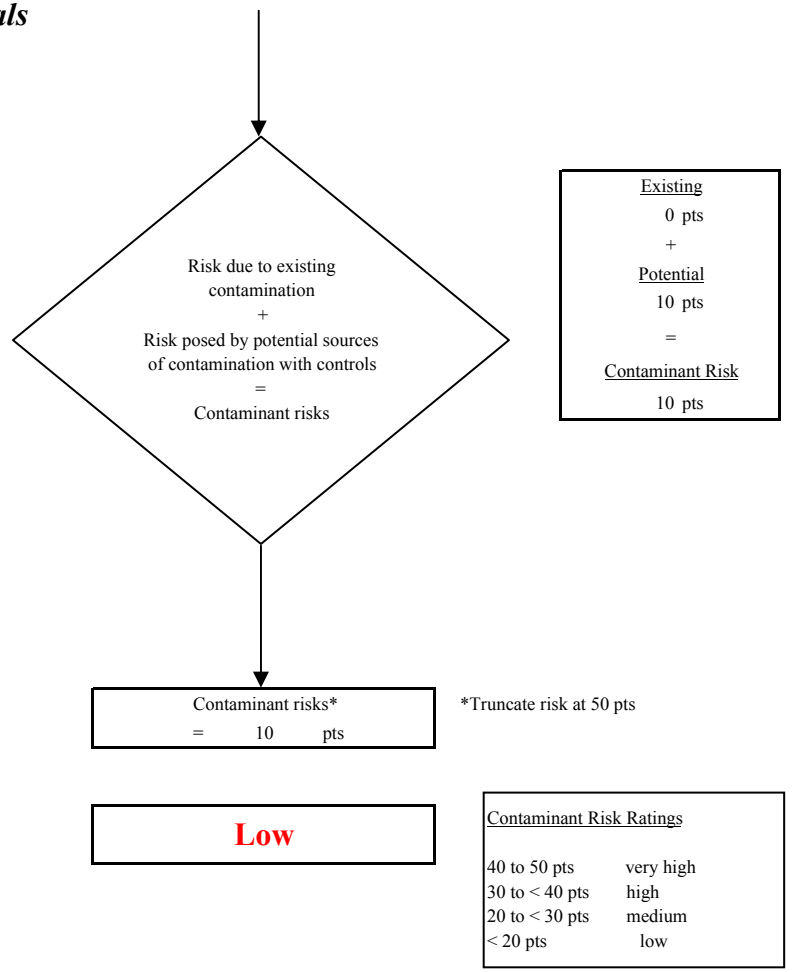


Chart 14. Vulnerability analysis for Trapper Creek Elementary - Other Organic Chemicals