Source Water Assessment for Anchorage School District - Bear Valley Elementary School Anchorage, Alaska

A Hydrogeologic Susceptibility and Vulnerability Analysis

DRINKING WATER PROTECTION PROGRAM REPORT 179
PWSID 213954.001

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ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION: 2002

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By Heather A. Hammond

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The Public Water System for Anchorage School District (ASD) - Bear Valley Elementary School is a Class A (non-transient/non-community) water system consisting of one well in the Anchorage area. Identified potential and current sources of contaminants for ASD Bear Valley Elementary School's public water system includes: approximately 220 acres of residential area, residential septic systems, roads, parks and recreation trails, a public utility easement, an above ground diesel storage tank, and a class V motor vehicle waste disposal well. These identified potential and existing sources of contamination are considered sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, synthetic organic chemicals, and other organic chemicals. Overall, the public water source for ASD Bear Valley Elementary School received a vulnerability rating of **Medium** for nitrates and/or nitrites, volatile organic chemicals, and heavy metals; and **Low** bacteria and viruses, synthetic organic chemicals, and other organic chemicals.

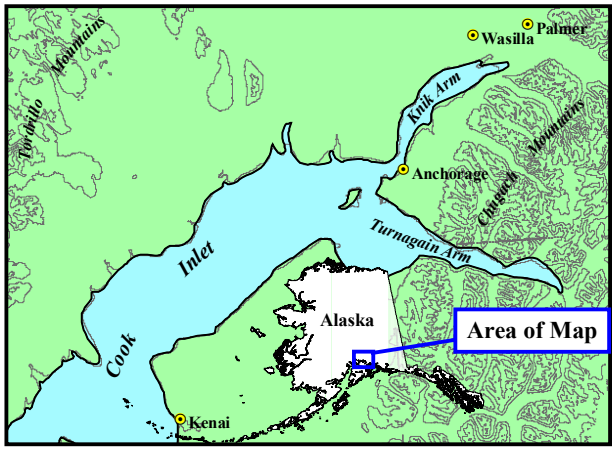

Figure 1. Index map showing the location of Anchorage, Alaska

INTRODUCTION

The purpose of this environmental assessment is to provide public water system owners and/or operators, communities, and local governments with information they can use to preserve the quality of Alaska's public drinking water supplies. This assessment was completed for the source of public drinking water serving ASD Bear Valley Elementary School. This water system consists of one well in the Anchorage area (see Figure 1). This assessment, known under the Alaska Drinking Water Protection Program as the *Source Water Assessment*, has combined a review of the natural hydrogeologic sensitivity with potential and existing contaminant risks to arrive at an overall vulnerability of the drinking water source to contamination. This assessment has been completed as a basis for local voluntary protection efforts and to assist agencies in their efforts to reduce risk to this public drinking water supply.

DESCRIPTION OF THE ANCHORAGE AREA, ALASKA

Location

Anchorage, located in southcentral Alaska, encompasses 1,698 square miles of land and 264 square miles of water. The area containing a majority of the urban development, commonly referred to as the Anchorage Bowl, encompasses approximately 180 square miles [*Partick, Brabets, and Glass, 1989*] and envelopes the low lands of the area. This area is bounded on the east by the Chugach Mountains and the north, west, and south by the Knik and Turnagain Arms of Cook Inlet (Figure 1). In recent times, urban development has extended eastward along the flanks of the Chugach Mountains. This area, known locally as the Anchorage Hillside, contains development at elevations exceeding 3,700 feet in elevation above sea level.

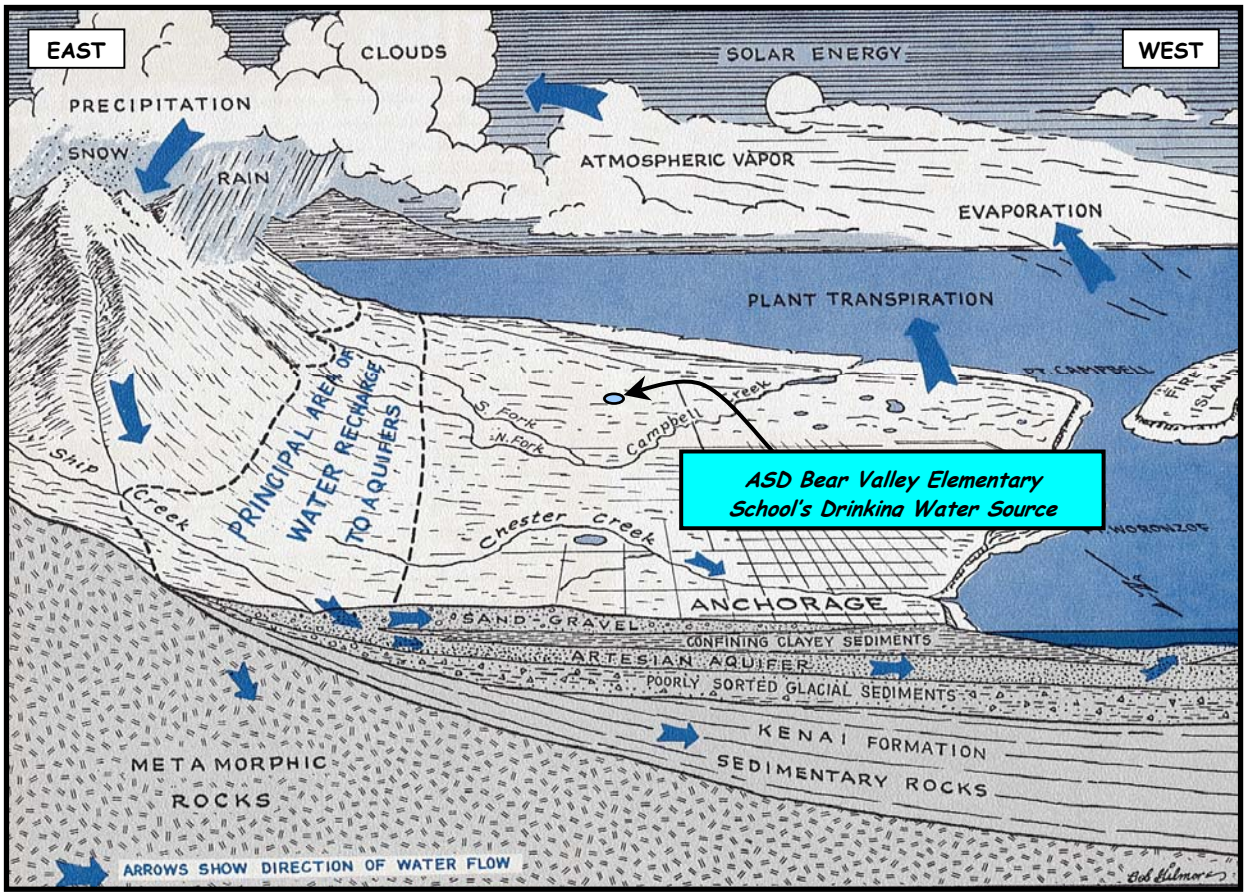

Figure 2. Generalized hydrologic cycle in the Anchorage area [*Barnwell, George, Dearborn,Weeks, and Zenone*, 1972].

Climate

The Anchorage area climate is somewhat transitional in that it does not experience large daily and annual temperature fluctuations like those experienced in the interior of Alaska nor does it experience high amounts of precipitation typified by gulf coast regions. Mean annual precipitation at the Anchorage International Airport is approximately 16 inches per year. On average, Anchorage receives a total snow accumulation of 69 inches per year. Precipitation generally increases inland toward the Chugach Mountains where annual precipitation may exceed 160 inches per year [*Barnwell, George, Dearborn, Weeks, and Zenone*, 1972]. Mean daily temperature ranges from 65° F during July to 8° F in January [*Western Regional Climate Center*, 2000].

Physiography and Groundwater Conditions

Surface elevations in the Anchorage area range from sea level at Knik and Turnagain Arms to well over 5,000 feet in the peaks that bound the area. Glacial moraine and outwash deposits primarily mantle the surface of the Anchorage Bowl.

The backbone of the Chugach Mountains is composed primarily of metamorphic marine and volcanic rocks (bedrock). These high peaks that bound Anchorage's east side are flanked with colluvium or slope deposits. These slope deposits eventually grade into the glacial and stream deposits at lower elevations in the Anchorage Bowl.

In the Anchorage area, two principal groundwater flow systems or aquifers exist (see Figure 2). The upper unconfined aquifer or water-table aquifer is separated from a lower confined aquifer system by layers of silty, clayey glacially derived sediments (confining layer) [*Ulery and Updike*, 1983]. The lower confined aquifer system consists of a series of hydrologically interconnected layers and lenses of gravel, sand and silt that, collectively, form the confined aquifer. The confining layer ranges from 0 to 270 feet thick throughout the Anchorage area and generally thins with increasing distance from Cook Inlet, thus pinching out at the mountain front [*Patrick, Brabets, and Glass*, 1989].

Water enters or recharges these two aquifer systems in several different ways. Along the front of the Chugach Mountains, groundwater seeps from fractures in bedrock into the sediments. At these higher elevations, rain and

snowmelt also enter the sediments. This area along the mountain front is considered the principal recharge area for wells in the Anchorage area. Precipitation in the low lands may also percolate directly into the ground. Lastly, aquifers may also be recharged by streams where surface water percolates into surrounding permeable sediments (losing reaches of streams). Groundwater flow in the confined aquifer is generally east to west from the mountain front toward Cook Inlet and Turnagain Arm, except in areas where the direction of flow is influenced by large municipal or industrial production wells. The direction of groundwater flow in the upper unconfined aquifer is more variable due to the influence from surfacial topography as well as its close connection with surface water bodies.

ASD BEAR VALLEY ELEMENTARY SCHOOL'S PUBLIC DRINKING WATER SYSTEM

ASD Bear Valley Elementary School's Public Drinking Water System is a Class A (non-community/non-transient) public drinking water system, which is owned and operated by the Anchorage School District. The system consists of one well, which is located near the southeast corner of the playground (Sec. 35, T12N, R3W, SM), at an elevation of approximately 950 feet above sea level (see Figure 3).

Installation of the well occurred January 15, 1983 to a total depth of 74 feet below ground surface. The well was completed in a 6 inch well casing and has a static water level of 12 feet below ground surface. According to the well log the well is screened from 53 to 74 feet and is grouted from the ground surface to 17 feet below ground surface. Proper grouting provides added protection against contaminants travelling along the well casing and into source waters.

According to the most recent Sanitary Survey (08/29/01) the well casing is topped with a sanitary seal and the topography surrounding the well is properly graded to divert surface water from flowing toward the well.

This system operates seasonally, from September through

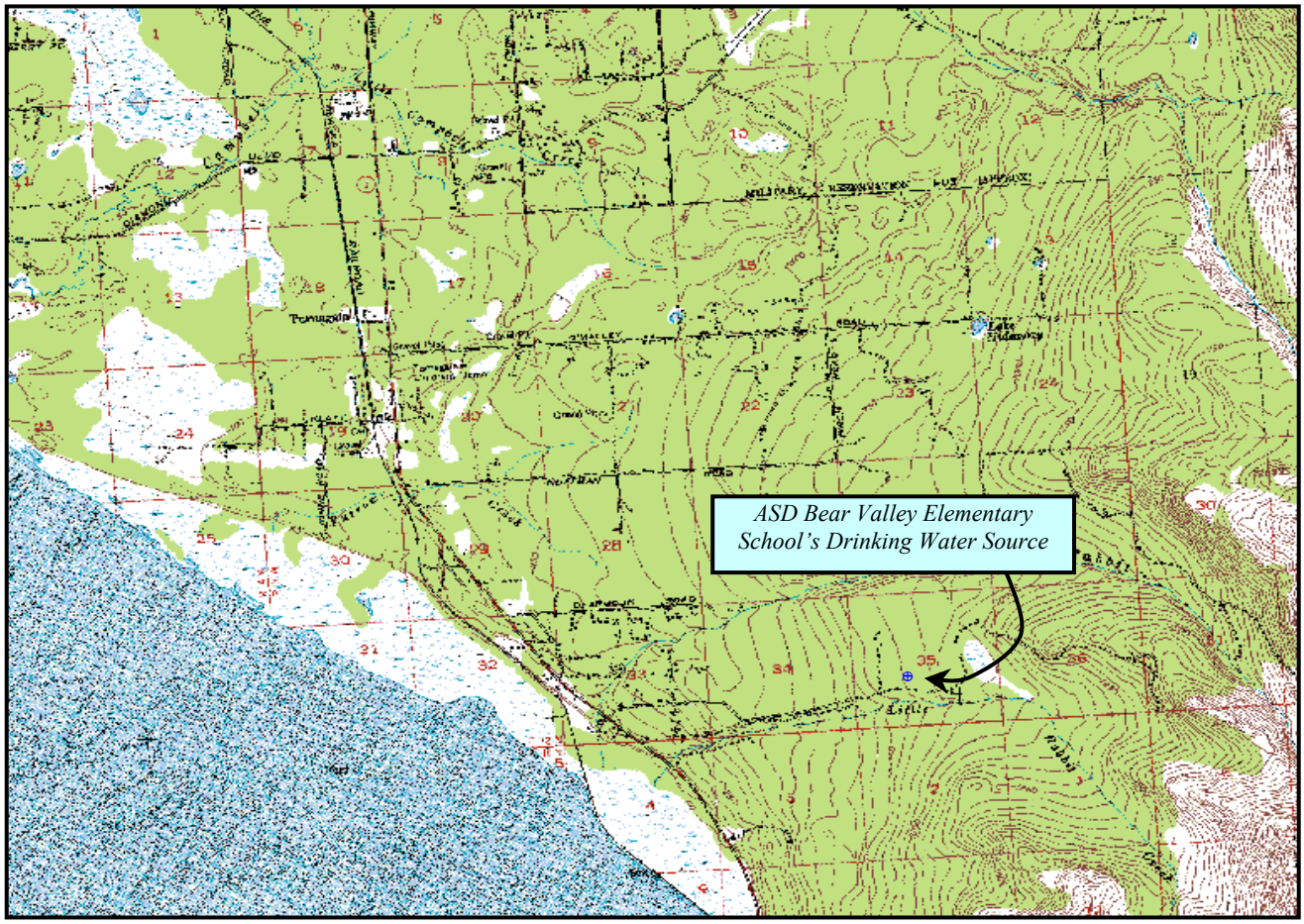

Figure 3. Map showing the location of the drinking water sources for ASD Bear Valley Elementary School [Base: USGS Anchorage A8].

June, and serves approximately 524 non-residents through one service connection.

ASSESSMENT AND PROTECTION AREA FOR ASD BEAR VALLEY ELEMENTARY SCHOOL'S PUBLIC DRINKING WATER SOURCE

The Drinking Water Protection and Assessment Area that has been established for ASD Bear Valley Elementary School's source of public drinking water is the area that is most sensitive to contamination. This area serves as a basis for assessing the risk of the drinking water source to contamination. The zones around the drinking water source outline the most critical area for the preservation of the quality of the drinking water for this system. For simplicity, this area will be known as your Drinking Water Protection Area and will serve as the focus for voluntary protection efforts.

Conceptually, groundwater enters the aquifer systems along the front range of the Chugach Mountains (Figure 2) and flows toward Cook Inlet. An analytical calculation was used to determine the size and shape of the area that contributes water to the well. The input parameters describing the attributes of the aquifer in this calculation were adopted from the U.S. Geological Survey [*Patrick, Brabets, and Glass, 1989*]. This analytical calculation was used as a guide as the first step in establishing the protection area for each public drinking water source in Anchorage. Additional methods were further employed to take into account any uncertainties in groundwater flow and aquifer characteristics to arrive at meaningful and conservative protection areas with respect to public health (Please refer to the Guidance Manual for Class A Public Water Systems for additional information).

The Drinking Water Protection Areas established for wells by the Alaska Department of Environmental Conservation are separated into zones. These zones correspond to a time-of-travel. Time-of-travel is the time required for water to move in the saturated zone of the ground from a specific point to the well. The Drinking Water Protection Area for ASD Bear Valley Elementary School contains four zones, Zone A through Zone D (See Map 1 in Appendix A). Zone A corresponds to the area between the wells and the distance equal to ¼ of the distance of the 2-year time-of-travel. Depending on where a contaminant source is located within Zone A, travel time for a contaminant to the wells may be on the order of several days to several hours. Zone A also extends downgradient from the wells to take into account the area of the aquifer that is influenced by pumping of the wells. Zone B corresponds to a time-of-travel of less than two years. Zones C and D correspond to those areas between 5 years and 10 years time-of-travel, respectively.

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

The Drinking Water Protection Program has completed an inventory of potential and existing sources of contamination within the Drinking Water Protection Area for ASD Bear Valley Elementary School. This survey was completed through a search of agency records and other publicly available information. Potential sources of contamination to drinking water supplies cover a wide range of categories and types. Potential drinking water contaminants are found within agricultural, residential, commercial, and industrial areas, but can also occur within areas that have little or no development.

For the basis of this assessment and 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
- Other organic chemicals

Maps 2 through 4 in Appendix C depict the Contaminant Source Inventory for ASD Bear Valley Elementary School. Table 1 in Appendix B lists the inventoried potential sources of contamination within Zones A through D. Below is a summary of the contaminant sources inventoried:

- Approximately 220 acres of residential area;
- residential septic systems;
- roads;
- parks and recreation trails;
- a public utility easement;
- an above ground diesel fuel storage tank;
- a class V motor vehicle waste disposal well.

These potential and existing contaminant sources present risk for all six categories of drinking water contaminants for ASD Bear Valley Elementary School's source of public drinking water.

RANKING OF CONTAMINANT RISKS

Potential and existing sources of contamination have been

identified, sorted, and ranked according to what type and level of risk they represent. Ranking of contaminant risks for a "potential" or "existing" source of contamination is a function of toxicity and volumes of specific contaminants associated with that source. Contaminant risks are further a function of the number and density of those types of contaminant sources as well as the proximity of those sources to the public drinking water wells.

VULNERABILITY OF ASD BEAR VALLEY ELEMENTARY SCHOOL'S PUBLIC DRINKING WATER SOURCE

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

- natural susceptibility; and
- contaminant risks.

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

Natural Susceptibility (0 – 50 points)

+

Contaminant Risks (0 – 50 points)

=

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

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

Susceptibility of the Wellhead (0 – 25 Points)
+
Susceptibility of the Aquifer (0 – 25 Points)

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

According to the As-Built Report produced by Dowl Engineers (1/31/83) it appears that the well was completed in a confined aquifer. The depth to the top of the confining layer is approximately 17 feet below ground surface and consists of a layer of clay mixed with some gravel and has a thickness of approximately 12 feet. This confining layer may provide a protective barrier against the movement of contaminants in the subsurface. However, near the base of the Chugach Mountains, these clay layers tend to be discontinuous and thin toward the mountains. Therefore, contaminants that enter the subsurface near the base of the mountains may enter the confined aquifer uninhibited by the absence of any protective layer.

Combining the susceptibility of the wellhead and the aquifer to contamination leads to a score (0 – 50 points) and rating of overall Susceptibility of the well to contamination (See Appendix D). Table 1 depicts the overall Susceptibility score and rating for the source of public drinking water serving ASD Bear Valley Elementary School.

Table 1. Natural Susceptibility - Susceptibility of the Wellhead and Aquifer to Contamination

	Score	Rating
Susceptibility of the Wellhead	0	Low
Susceptibility of the Aquifer	14	Medium
Natural Susceptibility	14	Low

Contaminant risks to a drinking water source depend on the type, number or density, and distribution of contaminant sources. A score (0 – 50 points) and rating of Contaminant Risks (See Appendix D) is assigned based on the findings of the Contaminant Source Inventory (See Appendix B - Table 1 – Table 7). This portion of the analysis examines any existing or historical contamination that has been detected at the drinking water source through routine sampling. It also reviews contamination that has or may have occurred but has not arrived or been detected at the well. Table 2 summarizes the Contaminant Risks for each category of drinking water contaminants.

Table 2. Contaminant Risks to ASD Bear Valley Elementary School's Public Drinking Water Source

Contaminant Risks	Score	Rating
Bacteria and Viruses	25	Medium
Nitrates and/or Nitrites	36	High
Volatile Organic Chemicals	36	High
Heavy Metals, Cyanide, And Other Inorganic Chemicals	32	High
Synthetic Organic Chemicals	12	Low
Other Organic Chemicals	22	Medium

Appendix D contains fourteen charts, which together form the 'Vulnerability Analysis' for a Class A public drinking water system. Chart 1 analyzes the 'Susceptibility of the Wellhead' to contamination by looking at the construction of the well and its surrounding area. Chart 2 analyzes the 'Susceptibility of the Aquifer' to contamination by looking at the naturally occurring attributes of the water source and influences on the groundwater system that might lead to contamination. Chart 3 analyzes 'Contaminant Risks' for the drinking water source with respect to bacteria and viruses. The 'Contaminant Risks' portion of the analysis considers potential sources of contaminants as well as a review of contamination that has or may have occurred but has not arrived or been detected at the well. Lastly, Chart 4 contains the 'Vulnerability Analysis for Bacteria and Viruses'. Charts 5 through 14 contain the Contaminant Risks and Vulnerability Analysis for nitrates and nitrites, volatile organic chemicals, heavy metals, synthetic organic chemicals, and other organic chemicals, respectively.

Vulnerability of drinking water sources to contamination is the combination of susceptibility of the aquifer and the well with contaminant risks. Table 3 contains the overall vulnerability scores (0 – 100) and ratings for each of the six categories of drinking water contaminants (See Appendix D). Note: scores are rounded off to the nearest five.

Table 3. Overall Vulnerability of ASD Bear Valley Elementary School's Public Drinking Water Source to Contamination by Category

Category	Score	Rating
Bacteria and Viruses	35	Low
Nitrates and Nitrites	50	Medium
Volatile Organic Chemicals	50	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	45	Medium
Synthetic Organic Chemicals	25	Low
Other Organic Chemicals	35	Low

Tables 2 through 7 in Appendix B contain the ranking of potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, heavy metals, synthetic organic chemicals, and other organic chemicals, respectively.

Residential areas and parks and recreation trails are sources of potential contamination that present the highest risk for bacteria and viruses and nitrates and/or nitrites. Residential septic systems because of their effluent discharge, are also a potential contaminant concern for bacteria and viruses and nitrites and/or nitrites. However, because of the low density of residential septic systems within Zone A and B the potential contaminant threat is very low.

Review of the historical sampling data indicates that bacteria and viruses have not been detected at the source waters serving ASD Bear Valley Elementary School. Nitrates and/or nitrites are found in natural background concentration at this site, as elsewhere throughout Alaska. Nitrate concentrations in uncontaminanted groundwater are typically less than 2 milligrams per liter (mg/L) and are derived primarily from the decomposition of organic matter in soils [Wang, Strelakos, Jokela, 2000].

Sampling history for ASD Bear Valley Elementary School indicates that low concentrations of nitrates have been detected (See Chart 5 – Contaminant Risks for Nitrates and/or Nitrites in Appendix D). Existing nitrate concentration is approximately 11% of the Maximum Contaminant Level or MCL. The MCL is the maximum level of contaminant that is allowed to exist in drinking water and still be consumed by humans without harmful health effects. Due to the high solubility and weak retention by soil, nitrates are very mobile, moving at approximately the same rate as water. Though existing nitrate contamination was detected at the site, concentrations remain at very safe levels with respect to human health.

There is a class V motor vehicle waste disposal well located off of Jamie Avenue in the Zone C Protection Area. This potential source of contamination represents a high risk for volatile organic chemicals and heavy metals; and a medium risk for other organic chemicals.

Review of the historical sampling data indicate that toluene and xylene, constituents that make up volatile organic chemicals, have been detected in ASD Bear Valley Elementary School's source waters at levels below the MCL (See Chart 7 – Contaminant Risks for Volatile Organic Chemicals in Appendix D). Existing toluene and xylene concentrations were less than 1% of the MCL. Toluene is driving the contaminant risk for the vulnerability analysis of ASD Bear Valley Elementary School's source of public drinking water because it was detected in slightly higher concentrations than levels detected for xylene.

According to the Environmental Protection Agency's

(EPA) Contaminant Specific Fact Sheet for Consumers toluene and xylene can enter groundwater through spills on land during the storage, transport and disposal of fuels and oils.

On July 21, 1993 a petroleum release occurred from an underground storage tank that was used to store diesel fuel for the school's emergency backup generator. The Anchorage School District worked with Dowl Engineers, B.C. Excavating, Inc., the Municipality of Anchorage and the ADEC to repair the underground storage tank serving the emergency generator. Soils that were contaminated by the leaking tank were excavated and from the site and transported and disposed of at the Anchorage Regional Landfill. In a Release Investigation Report produced by Dowl Engineers, Inc., in August of 1993, it is noted that soil contamination was identified in contact with groundwater at the site. In order to monitor the extent of contamination Dowl suggests the installation of three groundwater monitoring wells near the location of the leaking underground storage tank.

Dirt and paved roads within the protection area are a significant source of potential volatile organic chemical contamination to the drinking water source. Because roads do pose a potential for fuel spills to occur, major routes were ranked as low for volatile organic chemicals.

A natural gas pipeline transverses the Zone A and B Protection Areas. Natural gas does not pose a threat to drinking water supplies. However, this area is an active public utility easement. This utility easement, though not heavily used, presents a very low contaminant risk from volatile organic chemicals due to activities along the natural gas pipeline corridor. Overall, this corridor ranks as a low potential source of contamination due to its proximity to the public drinking water source.

Residential areas within the protection area present the most significant source of potential contamination, from synthetic organic chemicals and other organic chemicals, to the well. Activities associated with maintaining residential areas are driving the potential risk to the groundwater source.

SUMMARY

A *Source Water Assessment* has been completed for the source of public drinking water serving ASD Bear Valley Elementary School. The overall vulnerability of this source to contamination is **Medium** for nitrates and/or nitrites, volatile organic chemicals, and heavy metals; and **Low** for bacteria and viruses, synthetic organic chemicals, and other organic chemicals. This assessment of contaminant risks can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of ASD Bear Valley Elementary School to protect public health. It is anticipated that *Source Water Assessments* will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of ASD Bear Valley Elementary School's public drinking water source.

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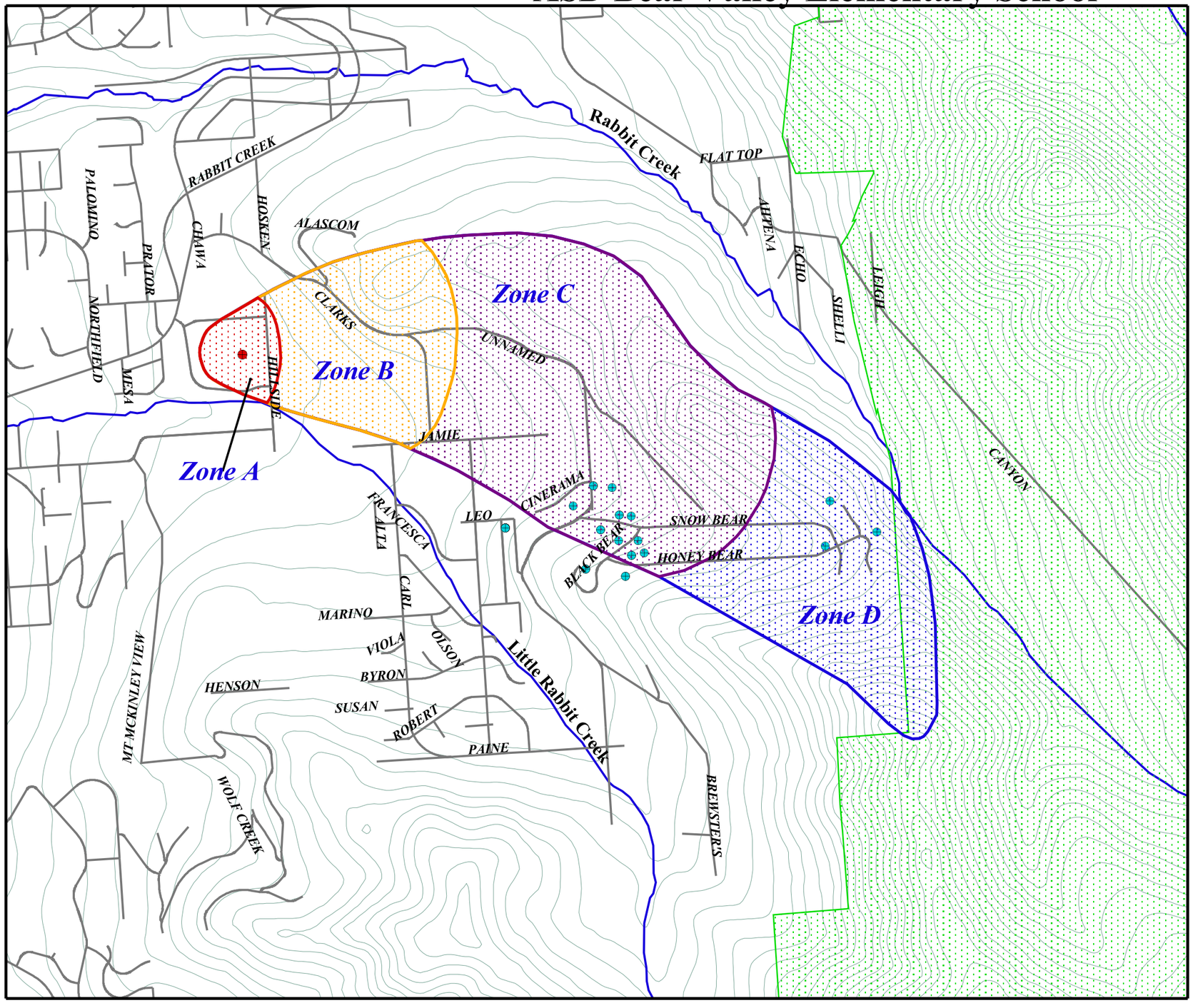
APPENDIX A

ASD Bear Valley Elementary School's Drinking Water Protection Area

Drinking Water Protection Area for ASD Bear Valley Elementary School



- ASD Bear Valley Drinking Water Well

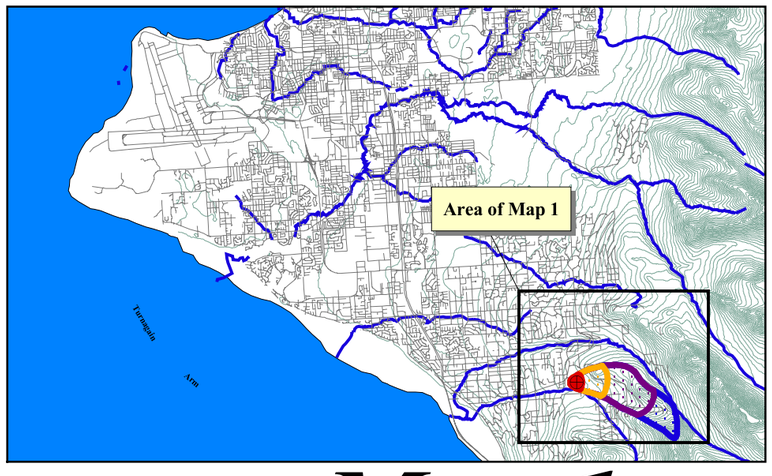
Zone A Protection Area
- Several Months Travel Time

Zone B Protection Area
- Less Than 2 Years Travel Time

Zone C Protection Area
- Less Than 5 Years Travel Time

Zone D Protection Area
- Less Than 10 Years Travel Time
- Private and Public Wells
- Chugach State Park
- Anchorage Roads (X20)
- Anchorage Streams
- Elevation Contours

N W E S



0.6 0 0.6 1.2 Miles

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Map 1

APPENDIX B

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley Elementary School

Table 1

Contaminant Source Inventory for
ASD Bear Valley

PWSID 213954.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Location*	*Map Number*	*Comments*
Septic systems (serves one single-family home)	R02	R2-1	A	Next to ASD Elementary School	2	
Tanks, diesel (above ground)	T06	T6-1	A	Inside of ASD Elementary School	2	Used for generators.
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Hillside Drive	2	
Municipal or city parks (with green areas)	X04	X4-1	A	Anchorage parks located within Zone B	2	
Dog walking areas/foot trails	X46	X46-1	A	Trail to the east of Mountain Air Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	One-hundred-forty-ninth Ave.	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Mountain Air Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Clarks Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Alascom Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Unnamed Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Heights Hill Road	2	
Municipal or city parks (with green areas)	X04	X4-2	B		2	Park extends into the Zone C Protection area as well.
Public utility easements/corridors	X42	X42-1	B	Public utilitiy easement along dual purpose pipeline intersecting Zone B	2	Pipeline is currently transporting natural gas but has been used to transport oil in the past.
Dog walking areas/foot trails	X46	X46-2	B	Trail to the east of Hillside Drive	2	
Dog walking areas/foot trails	X46	X46-3	B	Trail to the west of Clarks Road	2	
Dog walking areas/foot trails	X46	X46-4	B	Trail to the east of Clarks Road	2	
Dog walking areas/foot trails	X46	X46-5	B	Trail to the west of Heights Hill Road	2	
Dog walking areas/foot trails	X46	X46-6	B	Trail to the east of Heights Hill Road	2	
Dog walking areas/foot trails	X46	X46-7	B	Trail to the North of Jamie Ave.	2	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	C	Off of Jamie Ave.	3	
Residential Areas	R01	R1-1	C	Residentail areas located within Zone C	3	Approximately 220 acres of residential area.
Septic systems (serves one single-family home)	R02	R2-2-24	C	Septics located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-8-17	C	All roads located within Zone C	3	

Table 2

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley Sources of Bacteria and Viruses

PWSID 213954.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Septic systems (serves one single-family home)	R02	R2-1	A	Low	1	Next to ASD Elementary School	2	
Municipal or city parks (with green areas)	X04	X4-1	A	Medium	2	Anchorage parks located within Zone B	2	
Dog walking areas/foot trails	X46	X46-1	A	Low	3	Trail to the east of Mountain Air Drive	2	
Dog walking areas/foot trails	X46	X46-2	B	Low	4	Trail to the east of Hillside Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	5	Hillside Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	6	One-hundred-forty-ninth Ave.	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	7	Mountain Air Drive	2	
Municipal or city parks (with green areas)	X04	X4-2	B	Medium	8		2	Park extends into the Zone C Protection area as well.
Dog walking areas/foot trails	X46	X46-3	B	Low	9	Trail to the west of Clarks Road	2	
Residential Areas	R01	R1-1	C	Low	10	Residentail areas located within Zone C	3	Approximately 220 acres of residential area.
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low		Clarks Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low		Alascom Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low		Unnamed Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low		Heights Hill Road	2	
Dog walking areas/foot trails	X46	X46-4	B	Low		Trail to the east of Clarks Road	2	
Dog walking areas/foot trails	X46	X46-5	B	Low		Trail to the west of Heights Hill Road	2	
Dog walking areas/foot trails	X46	X46-6	B	Low		Trail to the east of Heights Hill Road	2	
Dog walking areas/foot trails	X46	X46-7	B	Low		Trail to the North of Jamie Ave.	2	

Table 2 (continued)

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley Sources of Bacteria and Viruses

PWSID 213954.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	C	Low		Off of Jamie Ave.	3	
Septic systems (serves one single-family home)	R02	R2-2-24	C	Low		Septics located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-8-17	C	Low		All roads located within Zone C	3	

Table 3

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley Sources of Nitrates/Nitrites

PWSID 213954.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Septic systems (serves one single-family home)	R02	R2-1	A	Low	1	Next to ASD Elementary School	2	
Municipal or city parks (with green areas)	X04	X4-1	A	Medium	2	Anchorage parks located within Zone B	2	
Dog walking areas/foot trails	X46	X46-1	A	Low	3	Trail to the east of Mountain Air Drive	2	
Dog walking areas/foot trails	X46	X46-2	B	Low	4	Trail to the east of Hillside Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	5	Hillside Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	6	One-hundred-forty-ninth Ave.	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	7	Mountain Air Drive	2	
Municipal or city parks (with green areas)	X04	X4-2	B	Medium	8		2	Park extends into the Zone C Protection area as well.
Dog walking areas/foot trails	X46	X46-3	B	Low	9	Trail to the west of Clarks Road	2	
Residential Areas	R01	R1-1	C	Low	10	Residentail areas located within Zone C	3	Approximately 220 acres of residential area.
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low		Clarks Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low		Alascom Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low		Unnamed Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low		Heights Hill Road	2	
Dog walking areas/foot trails	X46	X46-4	B	Low		Trail to the east of Clarks Road	2	
Dog walking areas/foot trails	X46	X46-5	B	Low		Trail to the west of Heights Hill Road	2	
Dog walking areas/foot trails	X46	X46-6	B	Low		Trail to the east of Heights Hill Road	2	
Dog walking areas/foot trails	X46	X46-7	B	Low		Trail to the North of Jamie Ave.	2	

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley Sources of Nitrates/Nitrites

Contaminant Source Type	***Contaminant Source ID***	***CS ID tag***	***Zone***	***Risk Ranking for Analysis***	***Overall Rank after Analysis***	***Location***	***Map Number***	***Comments***
Septic systems (serves one single-family home)	R02	R2-2-24	C	Low		Septics located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-8-17	C	Low		All roads located within Zone C	3	

Table 4

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley Sources of Volatile Organic Chemicals

PWSID 213954.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	C	High	1	Off of Jamie Ave.	3	
Tanks, diesel (above ground)	T06	T6-1	A	Medium	2	Inside of ASD Elementary School	2	Used for generators.
Septic systems (serves one single-family home)	R02	R2-1	A	Low	3	Next to ASD Elementary School	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	4	Hillside Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	5	One-hundred-forty-ninth Ave.	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	6	Mountain Air Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low	7	Clarks Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	8	Alascom Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	9	Unnamed Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	10	Heights Hill Road	2	
Public utility easements/corridors	X42	X42-1	B	Low		Public utilitiy easement along dual purpose pipeline intersecting Zone B	2	Pipeline is currently transporting natural gas but has been used to transport oil in the past.
Residential Areas	R01	R1-1	C	Low		Residentail areas located within Zone C	3	Approximately 220 acres of residential area.
Septic systems (serves one single-family home)	R02	R2-2-24	C	Low		Septics located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-8-17	C	Low		All roads located within Zone C	3	

Table 5

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 213954.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	C	High	1	Off of Jamie Ave.	3	
Septic systems (serves one single-family home)	R02	R2-1	A	Low	2	Next to ASD Elementary School	2	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	3	Hillside Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	4	One-hundred-forty-ninth Ave.	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	5	Mountain Air Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low	6	Clarks Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	7	Alascom Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	8	Unnamed Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	9	Heights Hill Road	2	
Residential Areas	R01	R1-1	C	Low	10	Residentail areas located within Zone C	3	Approximately 220 acres of residential area.
Municipal or city parks (with green areas)	X04	X4-1	A	Low		Anchorage parks located within Zone B	2	
Municipal or city parks (with green areas)	X04	X4-2	B	Low			2	Park extends into the Zone C Protection area as well.
Septic systems (serves one single-family home)	R02	R2-2-24	C	Low		Septics located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-8-17	C	Low		All roads located within Zone C	3	

Table 6

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley Sources of Synthetic Organic Chemicals

PWSID 213954.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Residential Areas	R01	R1-1	C	Low	1	Residentail areas located within Zone C	3	Approximately 220 acres of residential area.
Septic systems (serves one single-family home)	R02	R2-1	A	Low	2	Next to ASD Elementary School	2	
Septic systems (serves one single-family home)	R02	R2-2-24	C	Low	3	Septics located within Zone C	3	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	C	Low	4	Off of Jamie Ave.	3	
Municipal or city parks (with green areas)	X04	X4-1	A	Low		Anchorage parks located within Zone B	2	
Municipal or city parks (with green areas)	X04	X4-2	B	Low			2	Park extends into the Zone C Protection area as well.

Table 7

Contaminant Source Inventory and Risk Ranking for ASD Bear Valley
Sources of Other Organic Chemicals

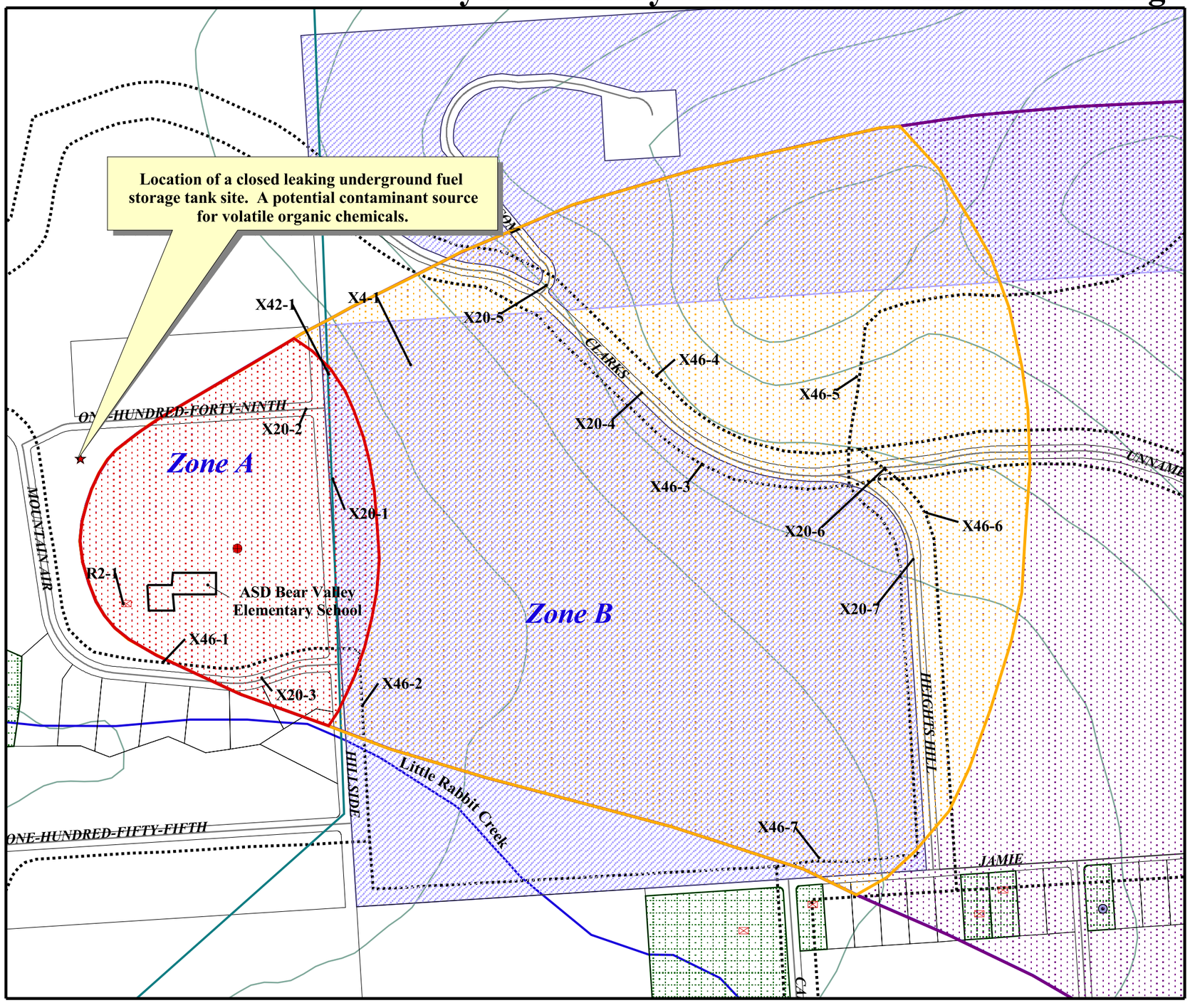
PWSID 213954.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	C	Medium	1	Off of Jamie Ave.	3	
Residential Areas	R01	R1-1	C	Low	2	Residentail areas located within Zone C	3	Approximately 220 acres of residential area.
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	3	Hillside Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	4	One-hundred-forty-ninth Ave.	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	5	Mountain Air Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low	6	Clarks Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	7	Alascom Drive	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	8	Unnamed Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	9	Heights Hill Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-8-17	C	Low	10	All roads located within Zone C	3	
Septic systems (serves one single-family home)	R02	R2-1	A	Low		Next to ASD Elementary School	2	
Septic systems (serves one single-family home)	R02	R2-2-24	C	Low		Septics located within Zone C	3	

APPENDIX C

ASD Bear Valley Elementary School's Drinking Water Protection Area and Potential & Existing Contaminant Sources

Drinking Water Protection Area for
ASD Bear Valley Elementary School and Potential & Existing Contaminant Sources



ASD Bear Valley Drinking Water Well

Zone A Protection Area
- Several Months Travel Time

Zone B Protection Area
- Less Than 2 Years Travel Time

Zone C Protection Area
- Less Than 5 Years Travel Time

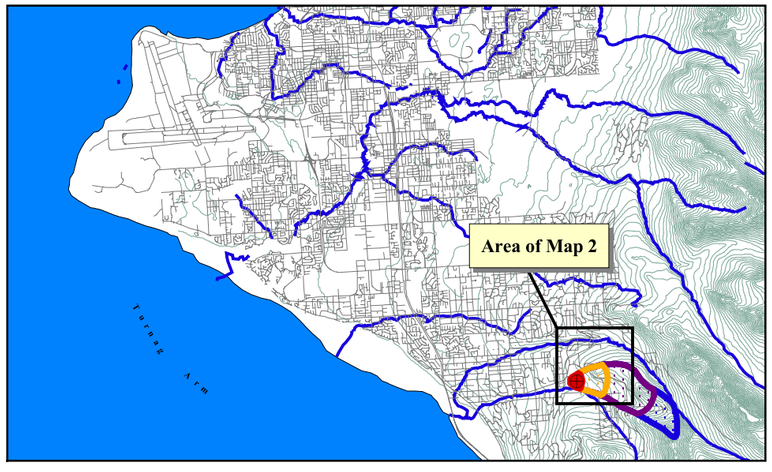
Zone D Protection Area
- Less Than 10 Years Travel Time

Public Utility Easements/Corridors (X42)

Potential Contminant Sources
- Class V Injection Well - Motor Vehicle Waste (D42)
- Anchorage Land Parcels
- Septic Systems (R2)

Potential Contminant Sources
- Class V Injection Well - Motor Vehicle Waste (D42)
- Closed Leaking Underground Storage Tank Site
- Lawns and Gardens (R1)
- Anchorage Parks (X4)
- Trails (X46)
- Anchorage Roads (X20)
- Anchorage Streams
- Elevation Contours

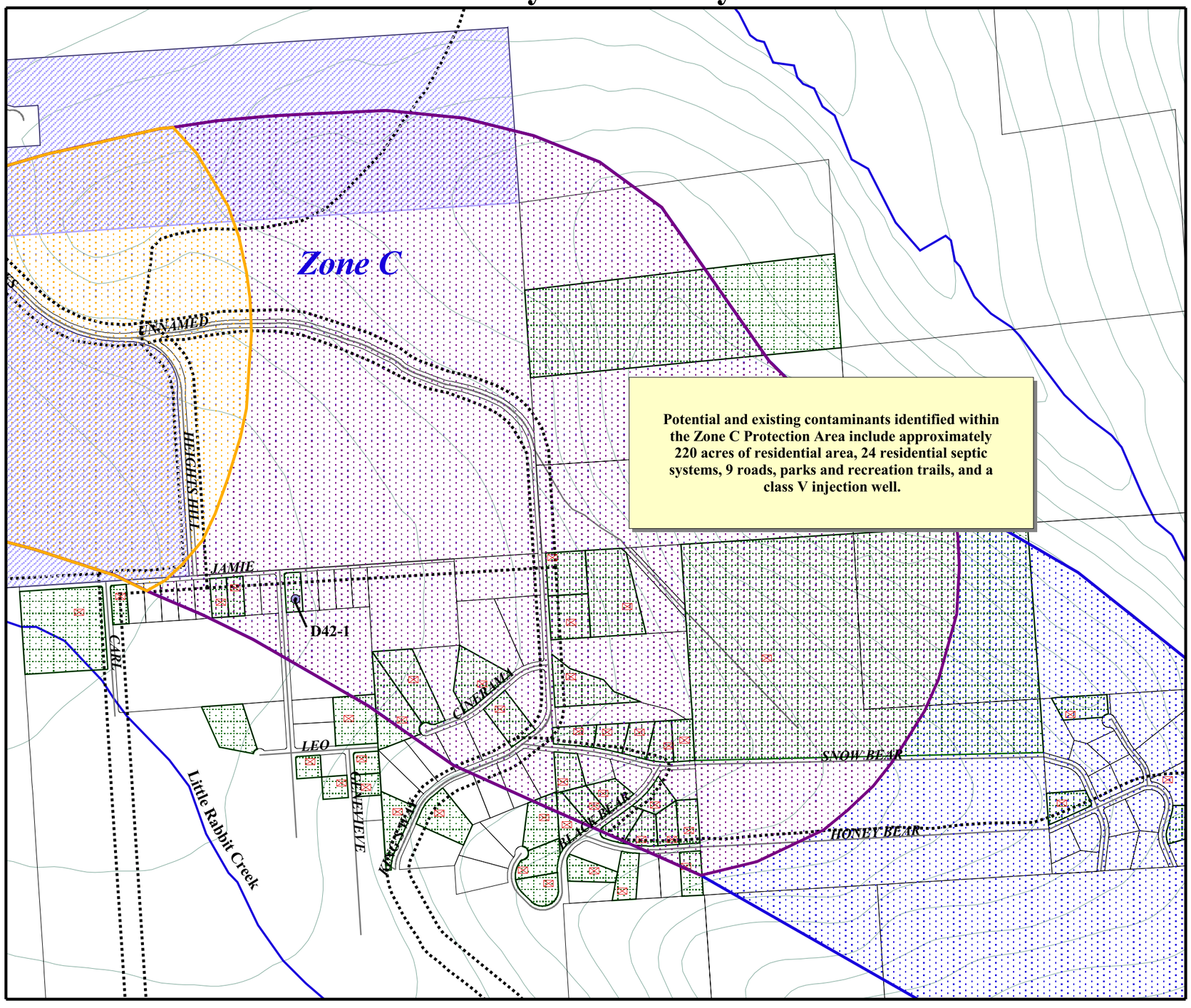
N W E S



PWSID 213594.001

Map 2

Drinking Water Protection Area for
ASD Bear Valley Elementary School and Potential & Existing Contaminant Sources



ASD Bear Valley Drinking Water Well

Zone A Protection Area

Several Months Travel Time

Zone B Protection Area

Less Than 2 Years Travel Time

Zone C Protection Area

Less Than 5 Years Travel Time

Zone D Protection Area

Less Than 10 Years Travel Time

Potential Contminant Sources

Class V Injection Well - Motor Vehicle Waste (D42)

Anchorage Land Parcels

Septic Systems (R2)

Lawns and Gardens (R1)

Anchorage Parks (X4)

Trails (X46)

Anchorage Roads (X20)

Anchorage Streams

Elevation Contours

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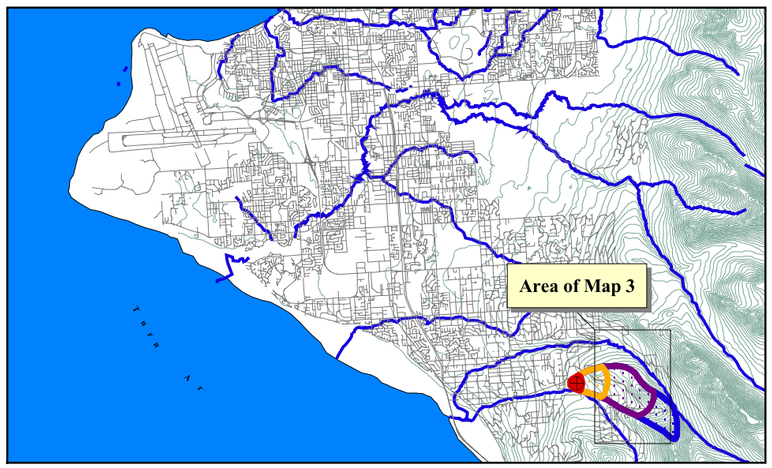
W E

S

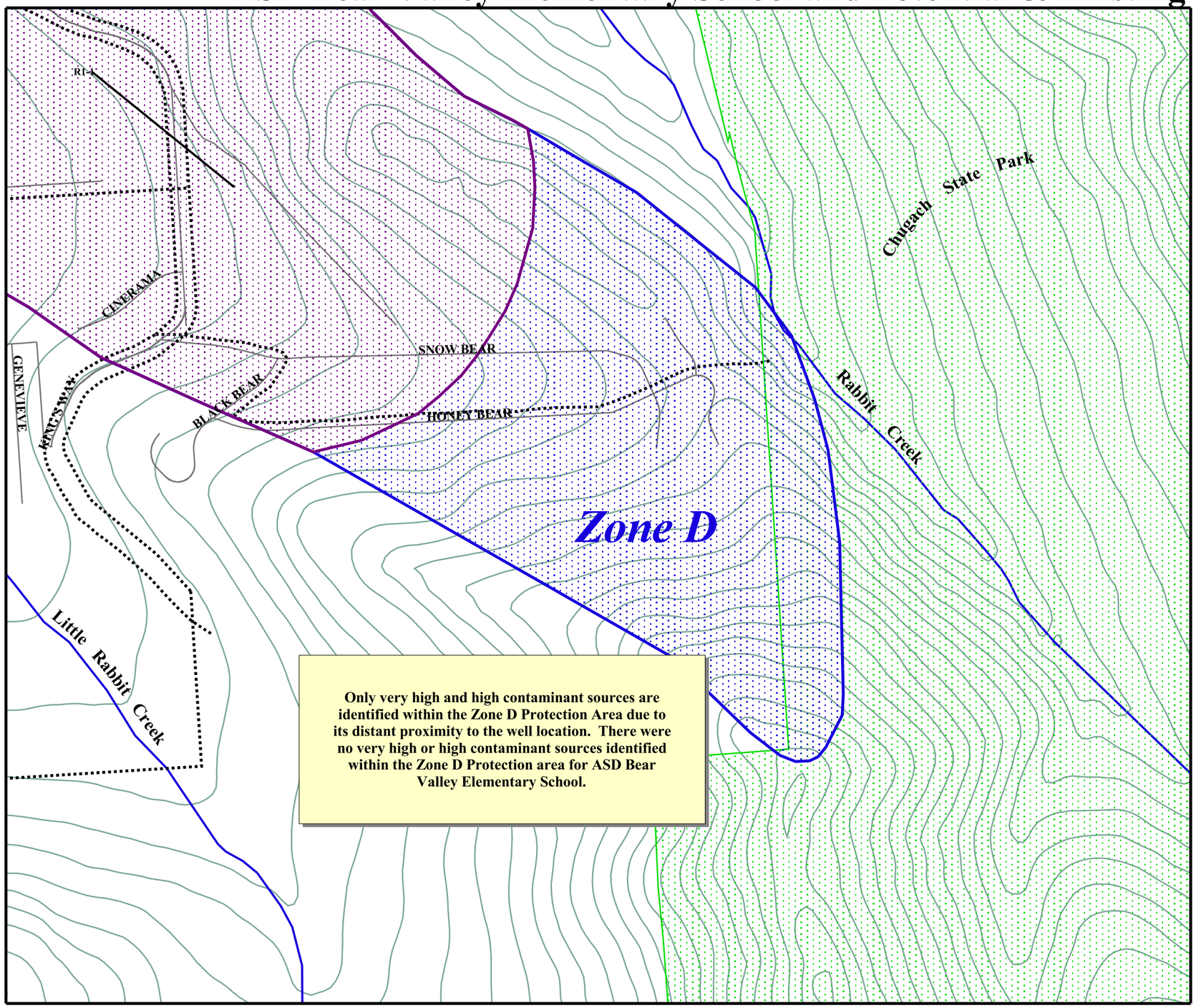


2000 0 2000 Feet

PWSID 213954.001

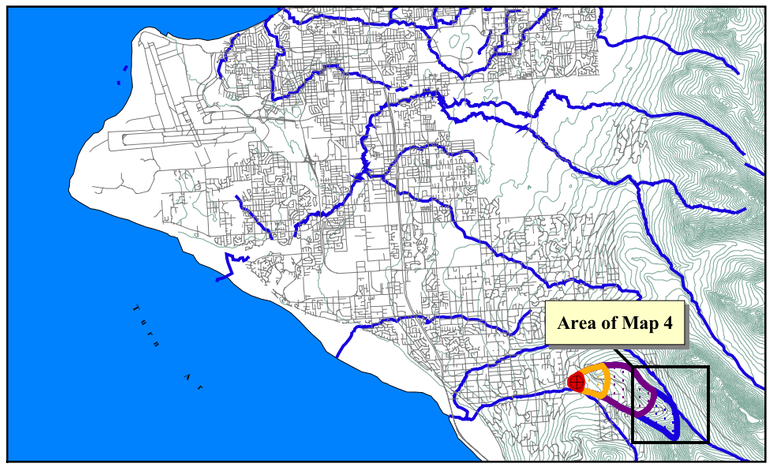
Map 3

Drinking Water Protection Area for
ASD Bear Valley Elementary School and Potential & Existing Contaminant Sources



- ASD Bear Valley Drinking Water Well
- Zone A Protection Area
- Several Months Travel Time
- Zone B Protection Area
- Less Than 2 Years Travel Time
- Zone C Protection Area
- Less Than 5 Years Travel Time
- Zone D Protection Area
- Less Than 10 Years Travel Time
- Chugach State Park
- Trails (X46)
- Anchorage Roads (X20)
- Anchorage Streams
- Elevation Contours

N
W E
S



2000 0 2000 4000 Feet

PWSID 213954.001

Map 4

APPENDIX D

Vulnerability Analysis for ASD Bear Valley Elementary School's Public Drinking Water Source

Chart 1. Susceptibility of the wellhead - ASD Bear Valley Elementary School

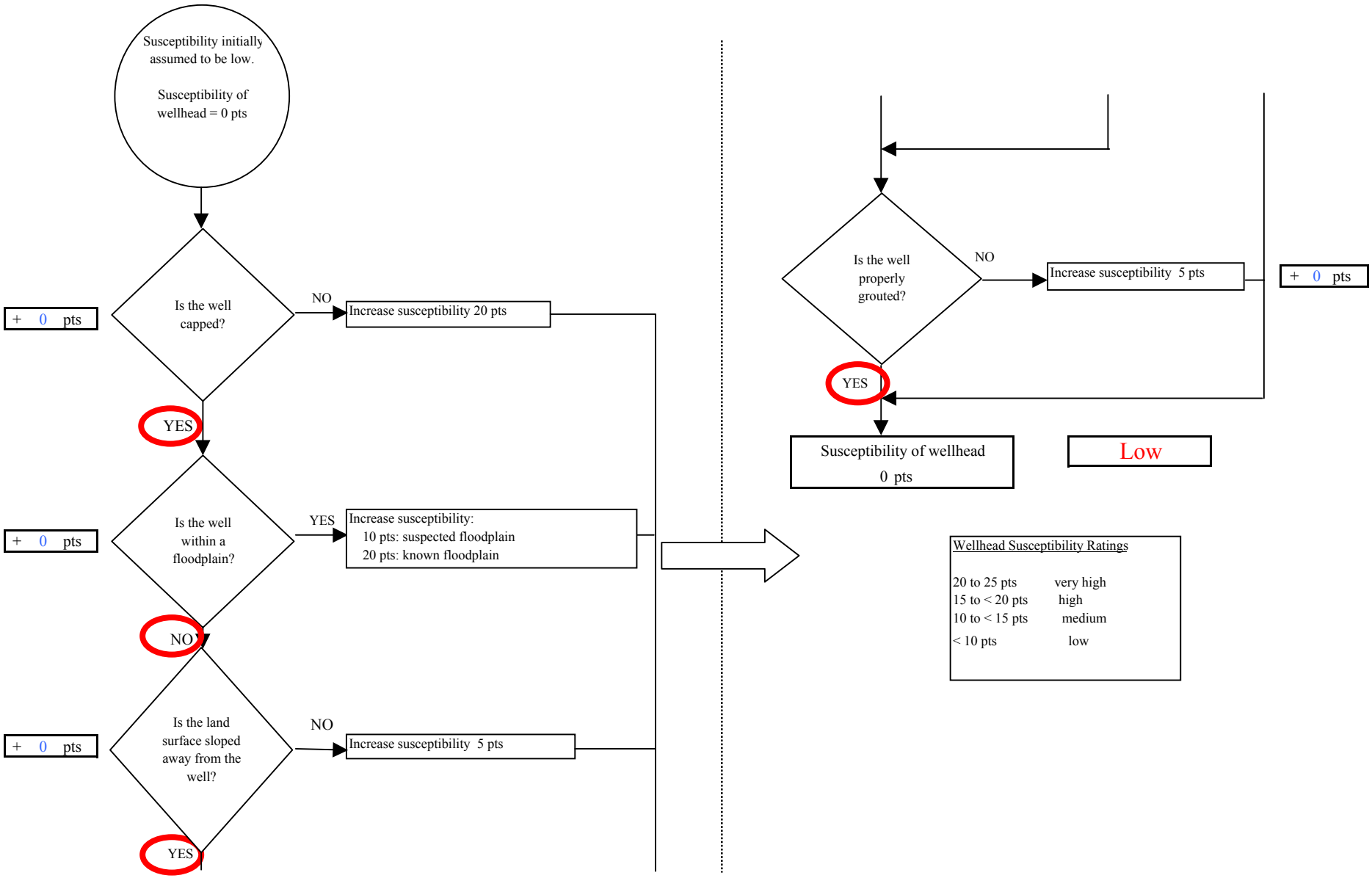


Chart 2. Susceptibility of the aquifer - ASD Bear Valley Elementary School

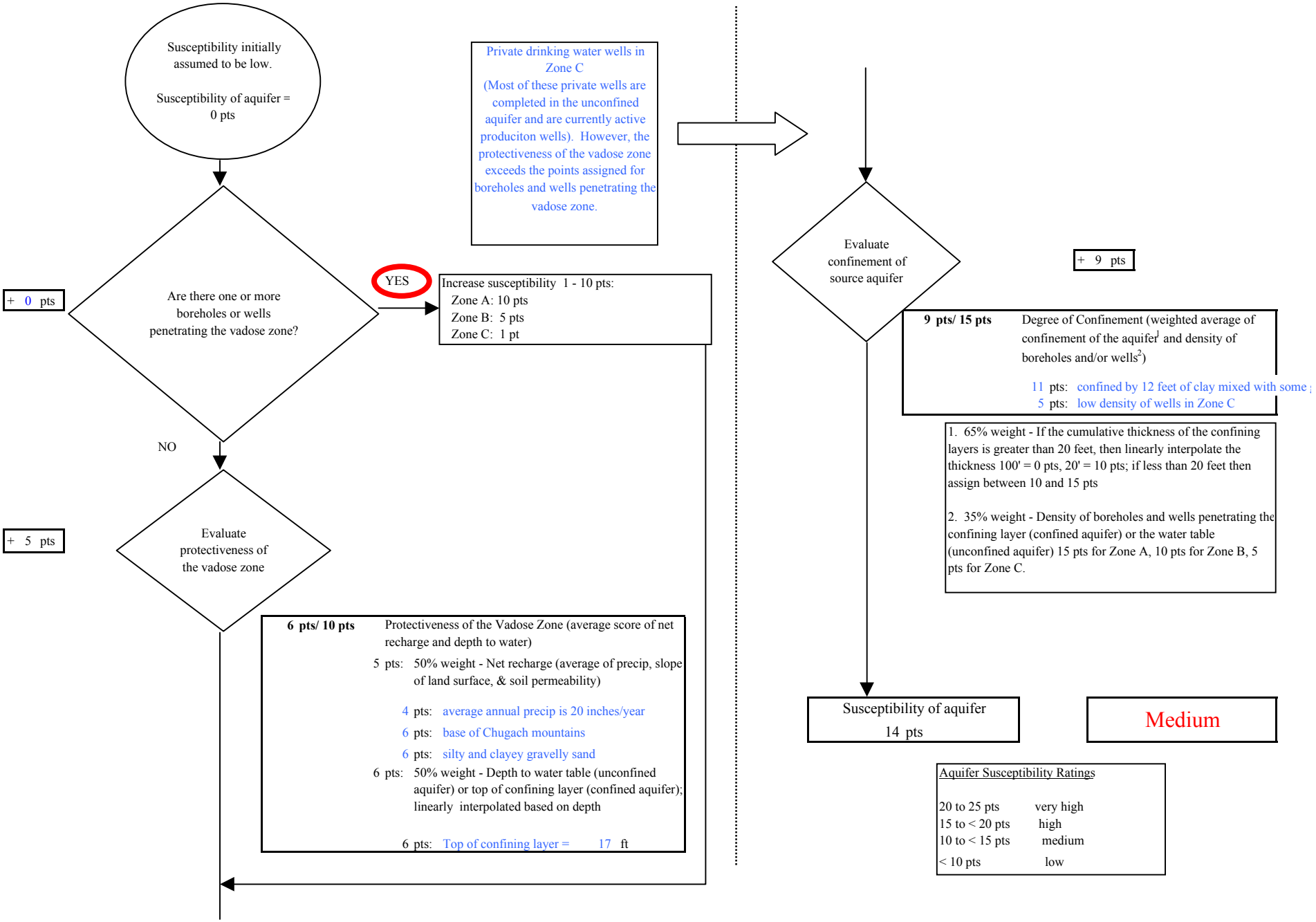
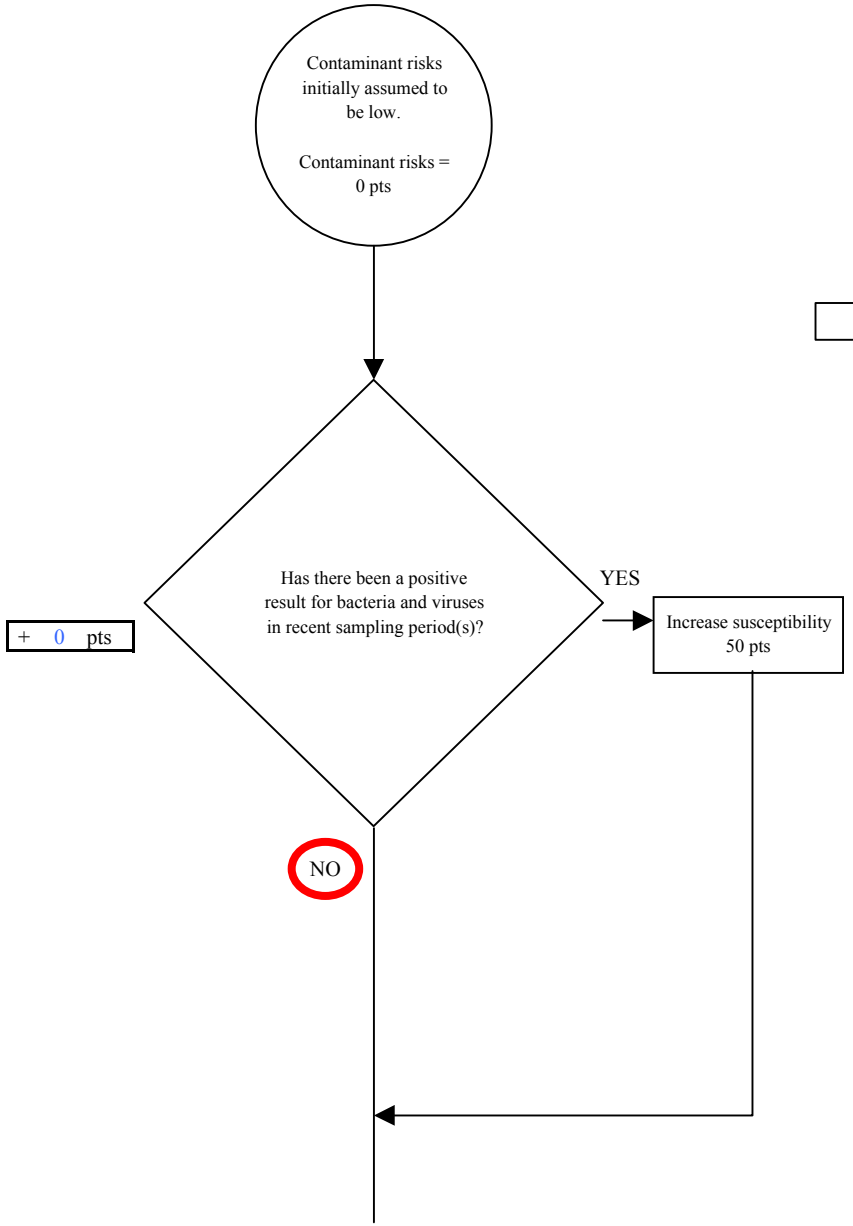
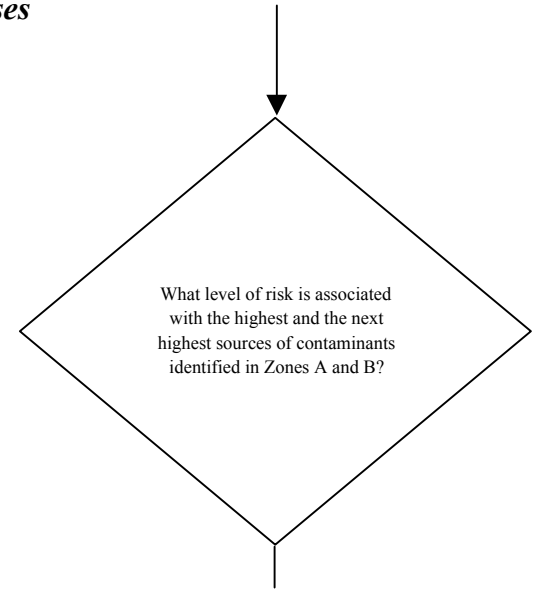


Chart 3. Contaminant risks for ASD Bear Valley Elementary School - Bacteria & Viruses





+ 20 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)	1	1	2
Low(s)	3	7	10

	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.

Chart 3. Contaminant risks for ASD Bear Valley Elementary School - Bacteria & Viruses

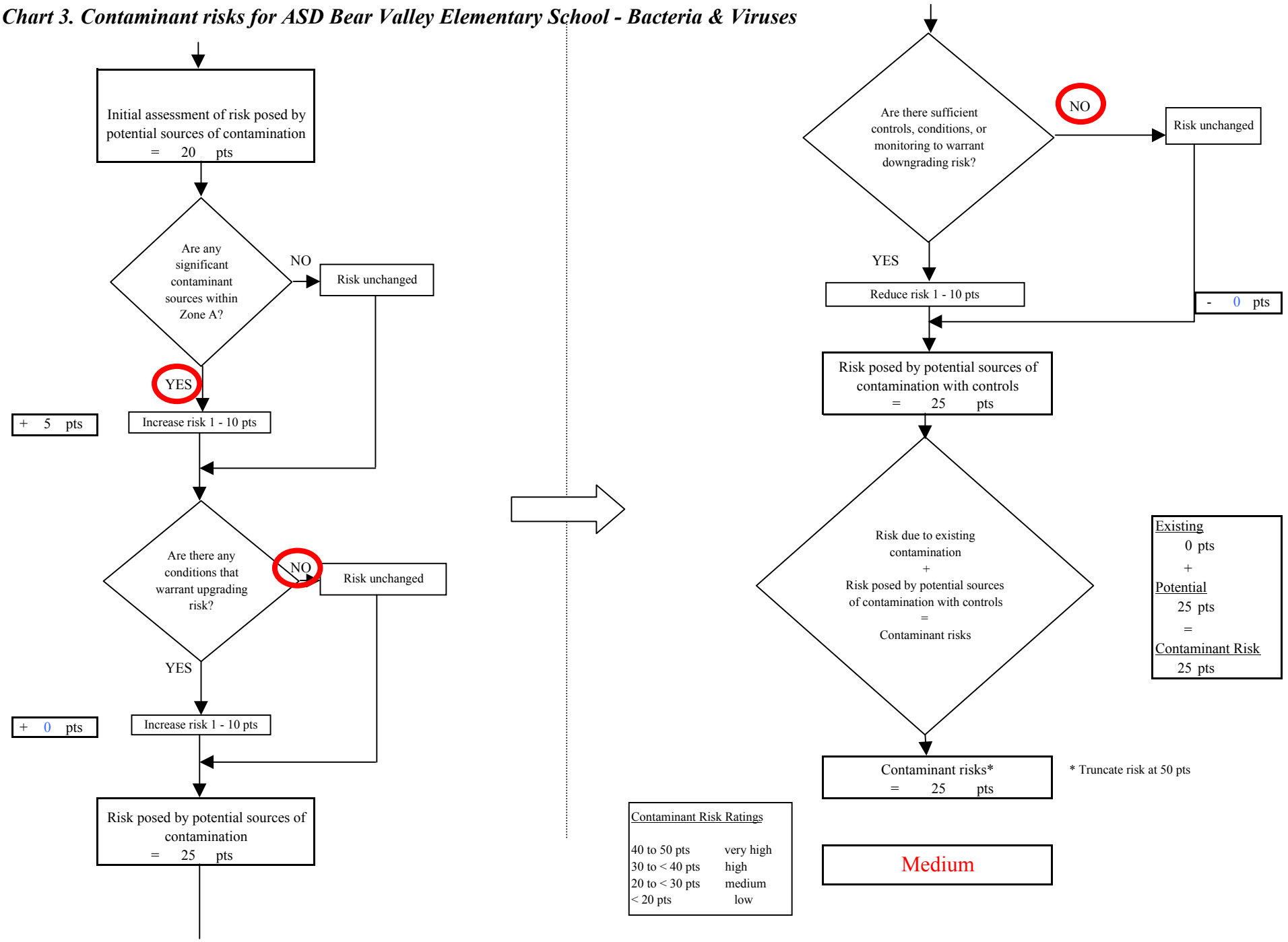


Chart 4. Vulnerability analysis for ASD Bear Valley Elementary School - Bacteria & Viruses

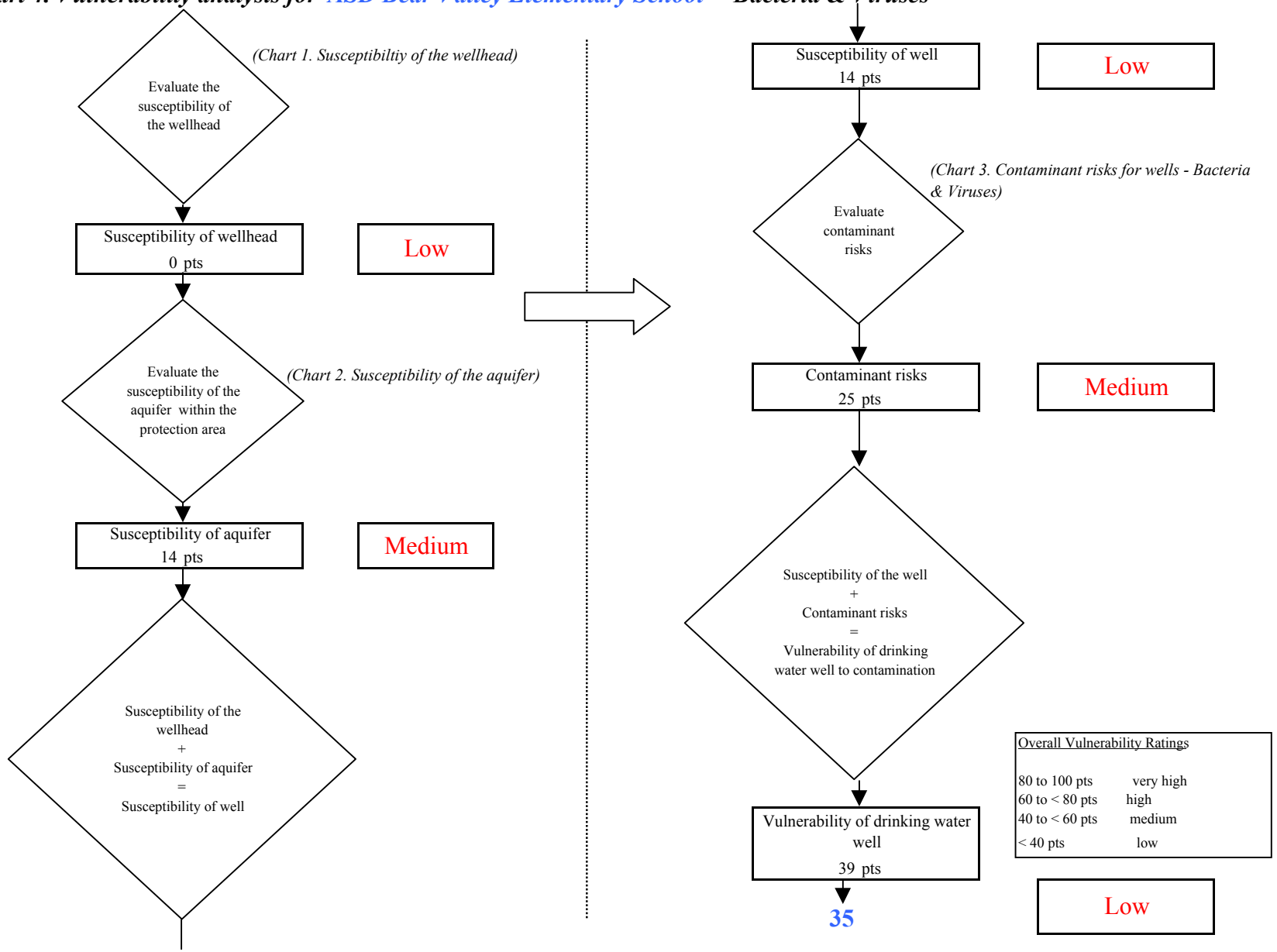


Chart 5. Contaminant risks for ASD Bear Valley Elementary School - Nitrates and Nitrites

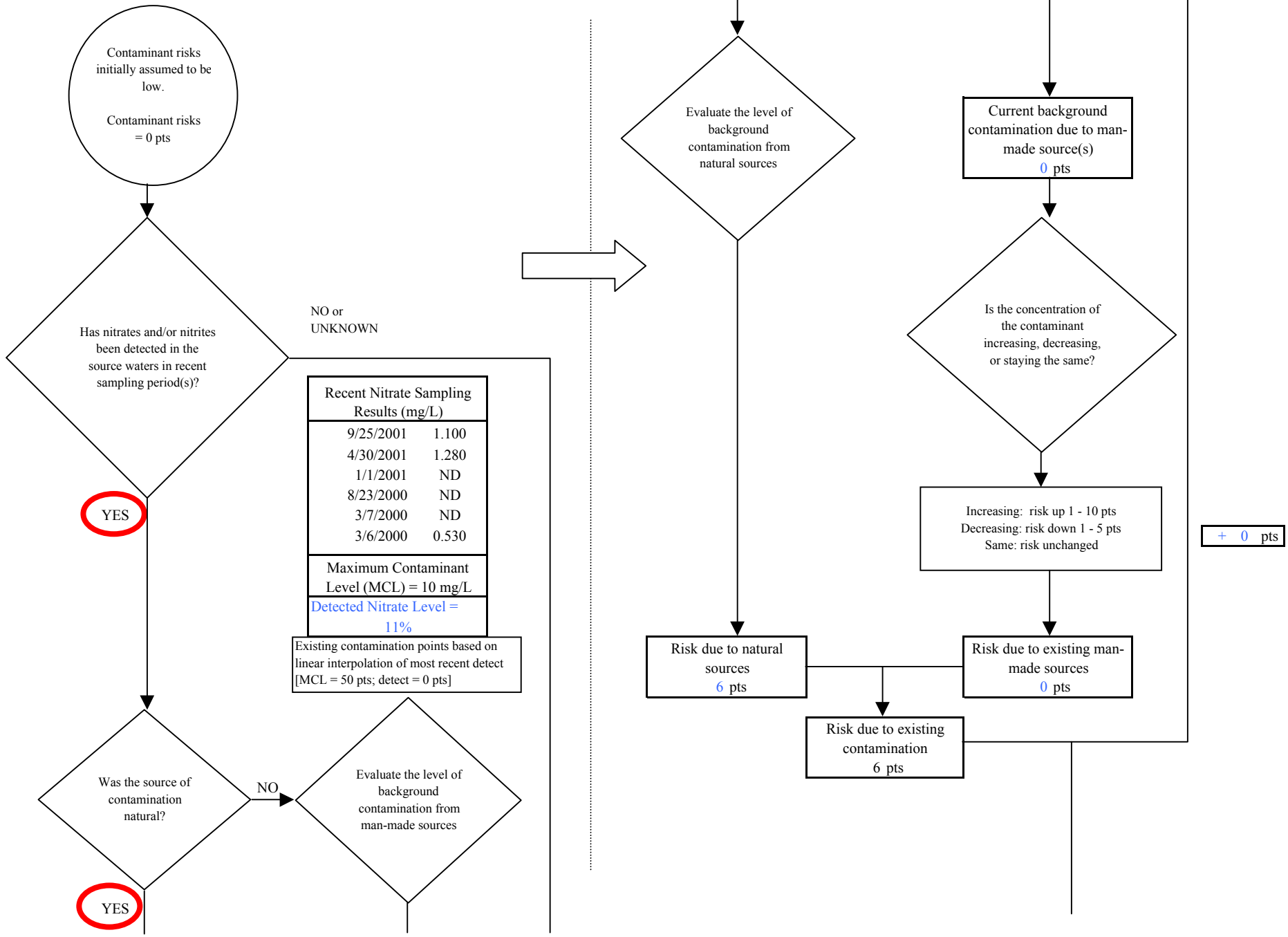


Chart 5. Contaminant risks for ASD Bear Valley Elementary School - Nitrates and Nitrites

+ 25 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)	1	1	2
Low(s)	3	13	16

	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 = 25 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

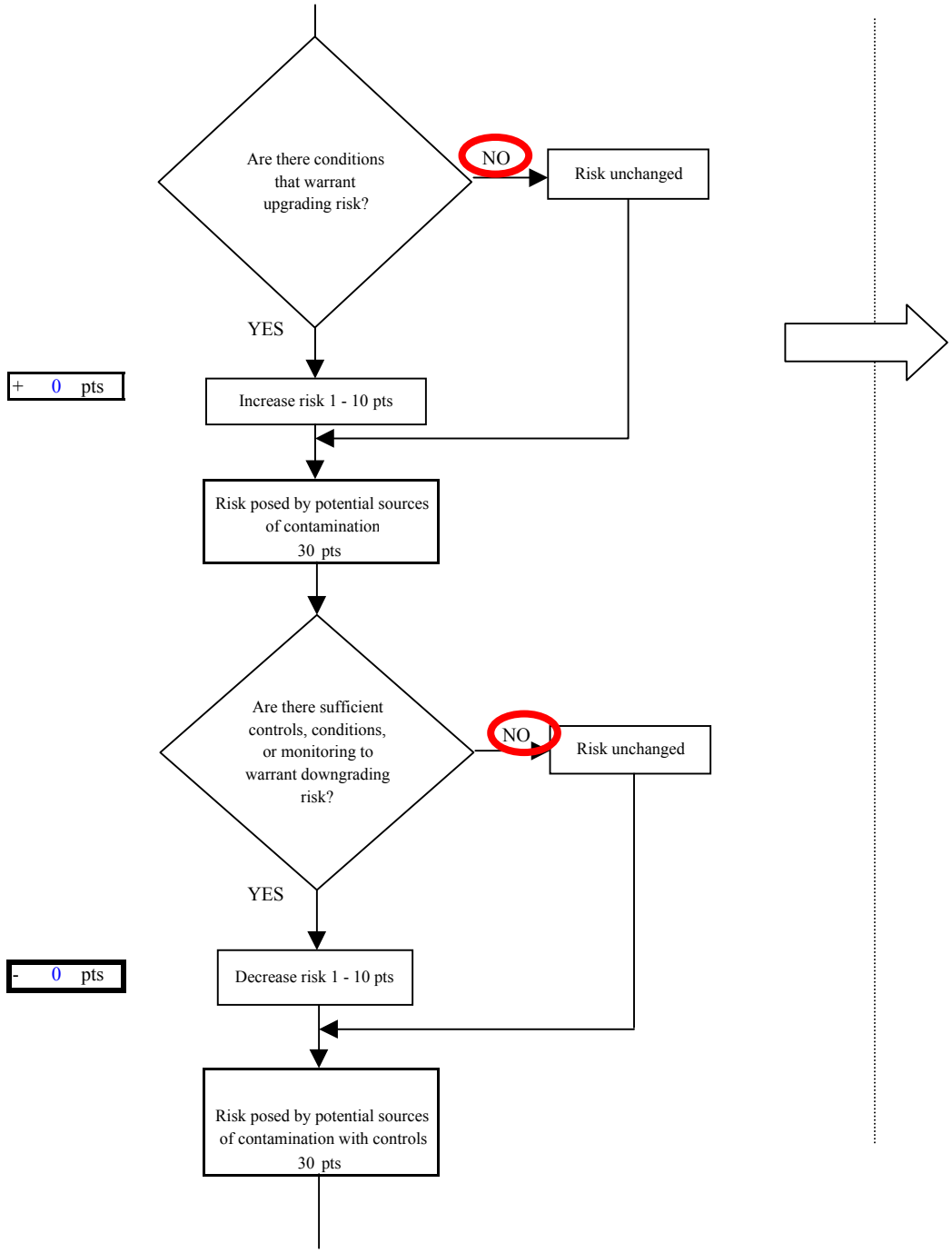
Risk unchanged

YES

Increase risk 1 - 10 pts

+ 5 pts

Chart 5. Contaminant risks for ASD Bear Valley Elementary School - Nitrates and Nitrites



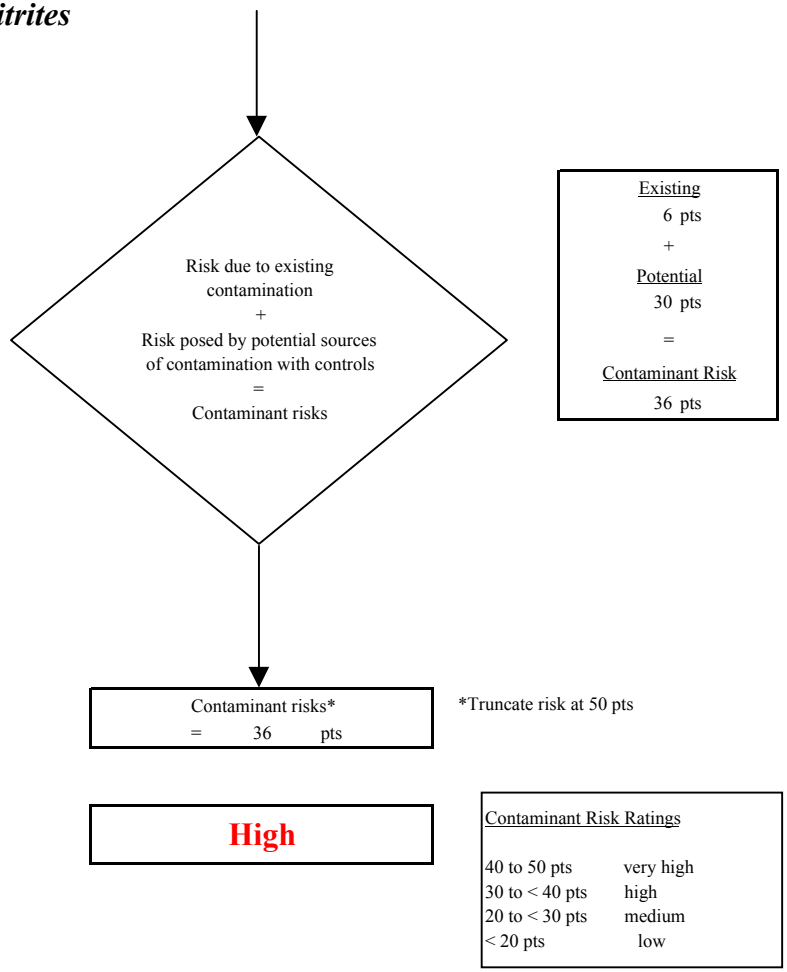


Chart 6. Vulnerability analysis for ASD Bear Valley Elementary School - Nitrates and Nitrites

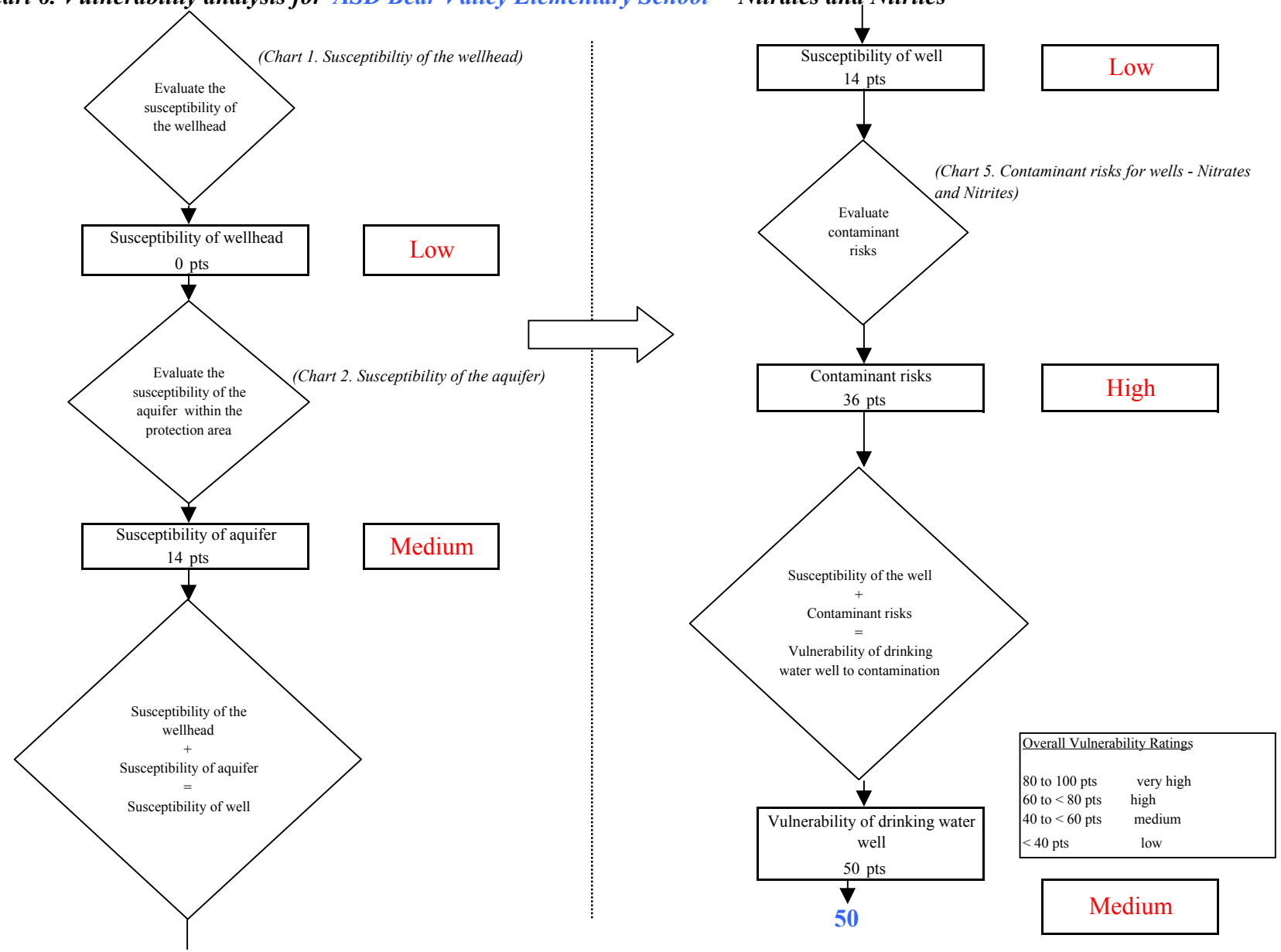


Chart 7. Contaminant risks for ASD Bear Valley Elementary School - Volatile Organic Chemicals

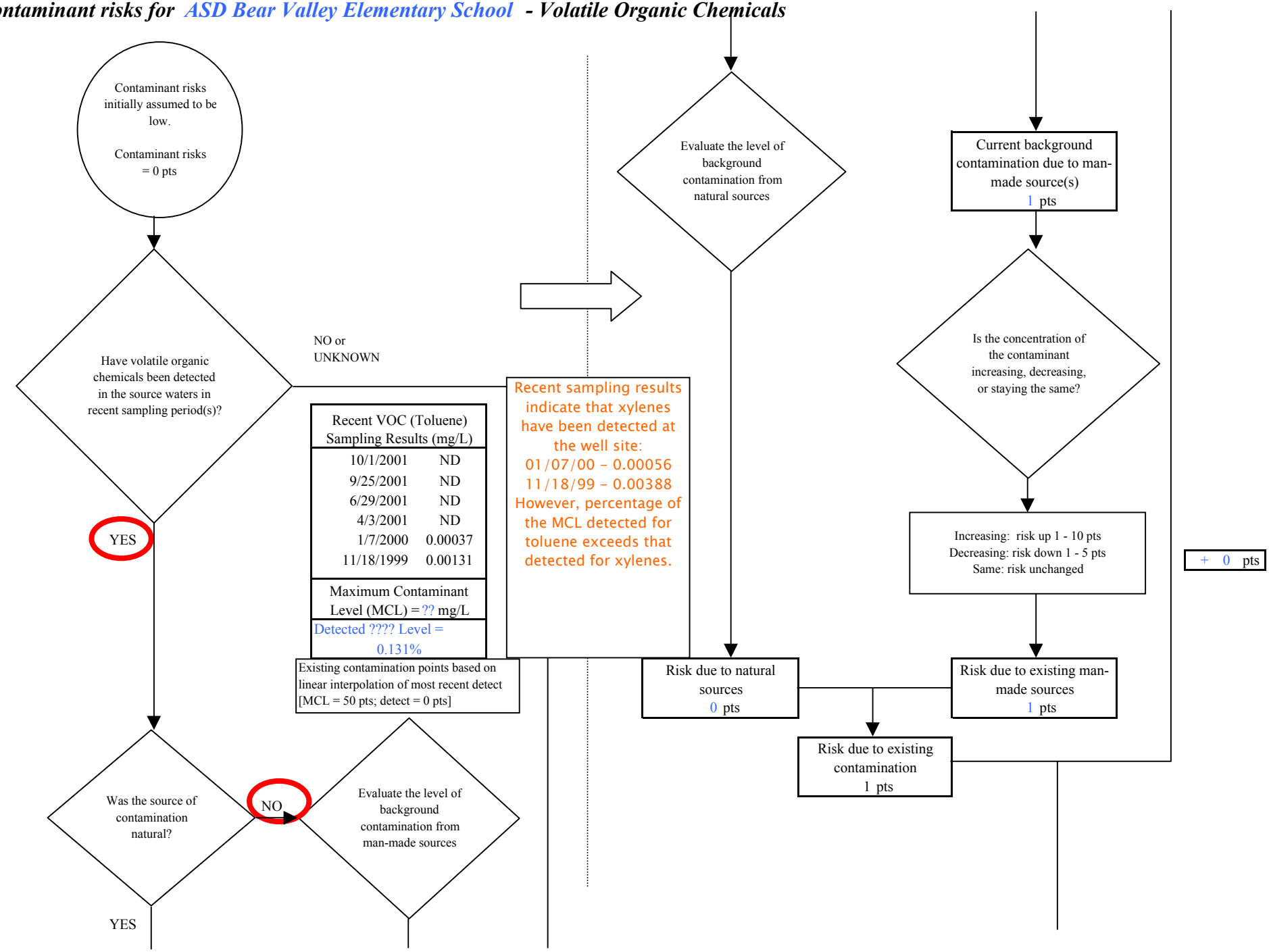


Chart 7. Contaminant risks for ASD Bear Valley Elementary School - Volatile Organic Chemicals

+ 30 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	1	1
Medium(s)	1	0	1
Low(s)	2	6	8

	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 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.

Initial assessment of risk posed by potential sources of contamination = 30 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

+ 5 pts

Chart 7. Contaminant risks for ASD Bear Valley Elementary School - Volatile Organic Chemicals

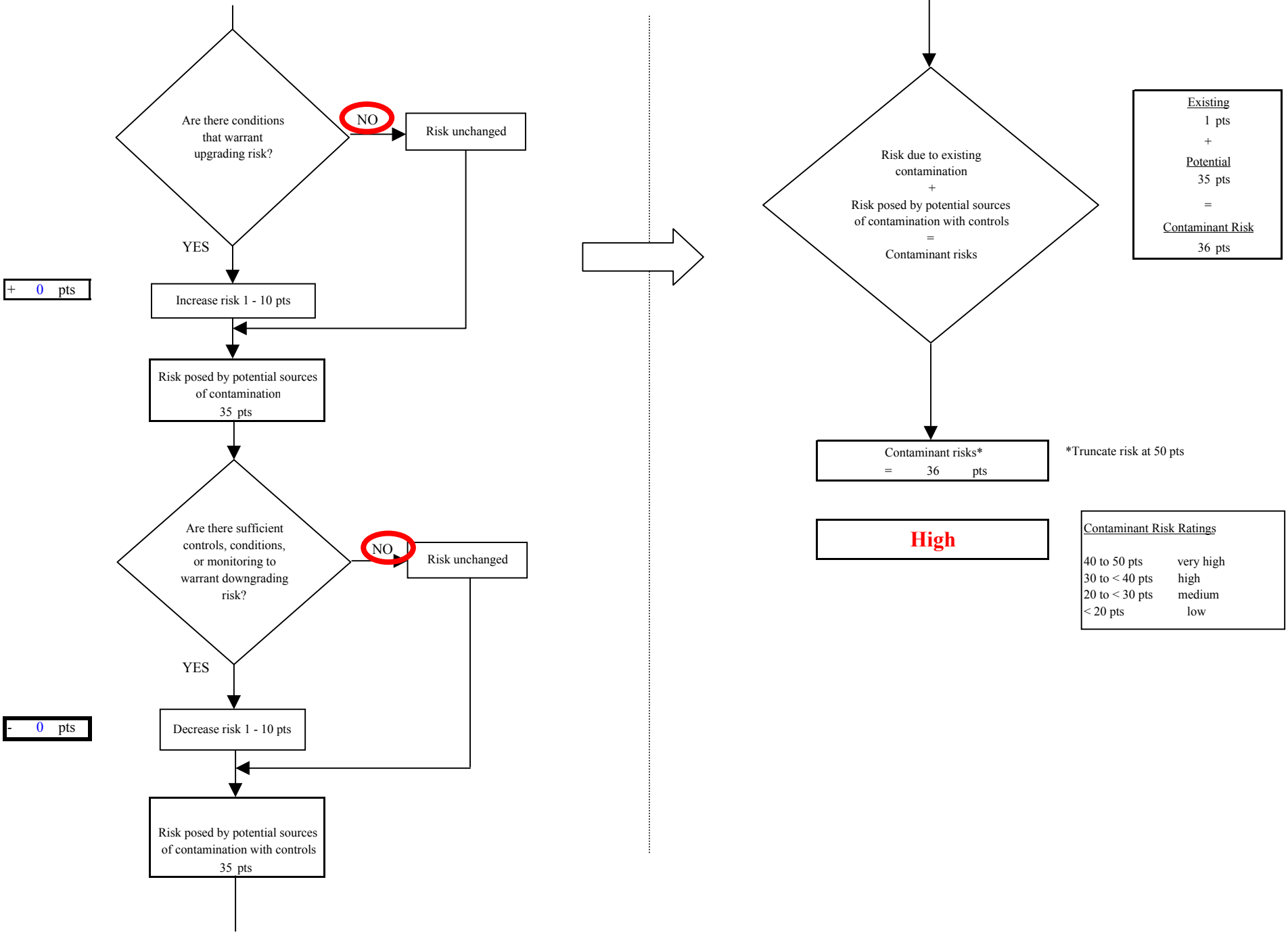


Chart 8. Vulnerability analysis for ASD Bear Valley Elementary School - Volatile Organic Chemicals

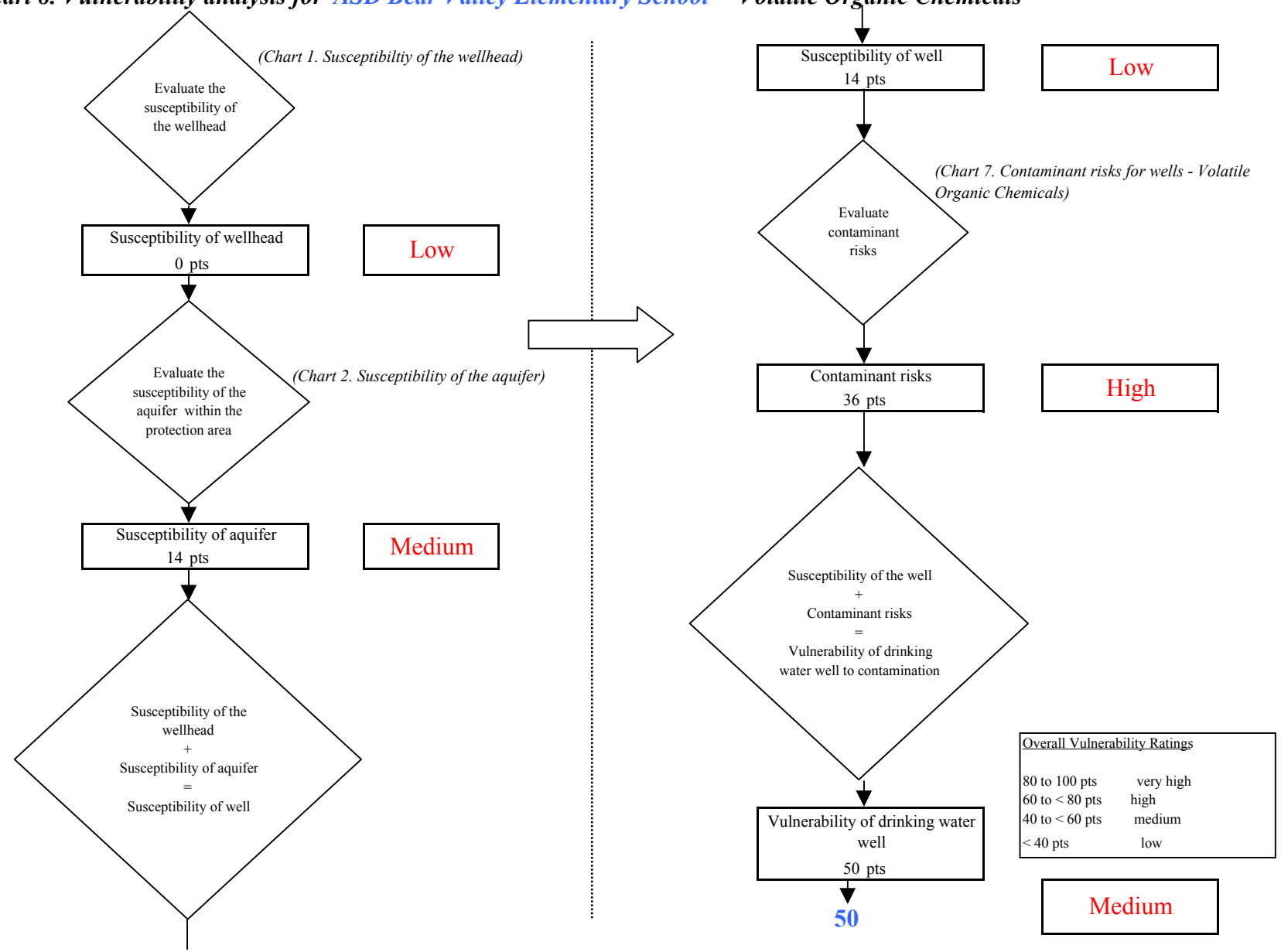


Chart 9. Contaminant risks for ASD Bear Valley Elementary School - Heavy Metals, Cyanide and Other Inorganic Chemicals

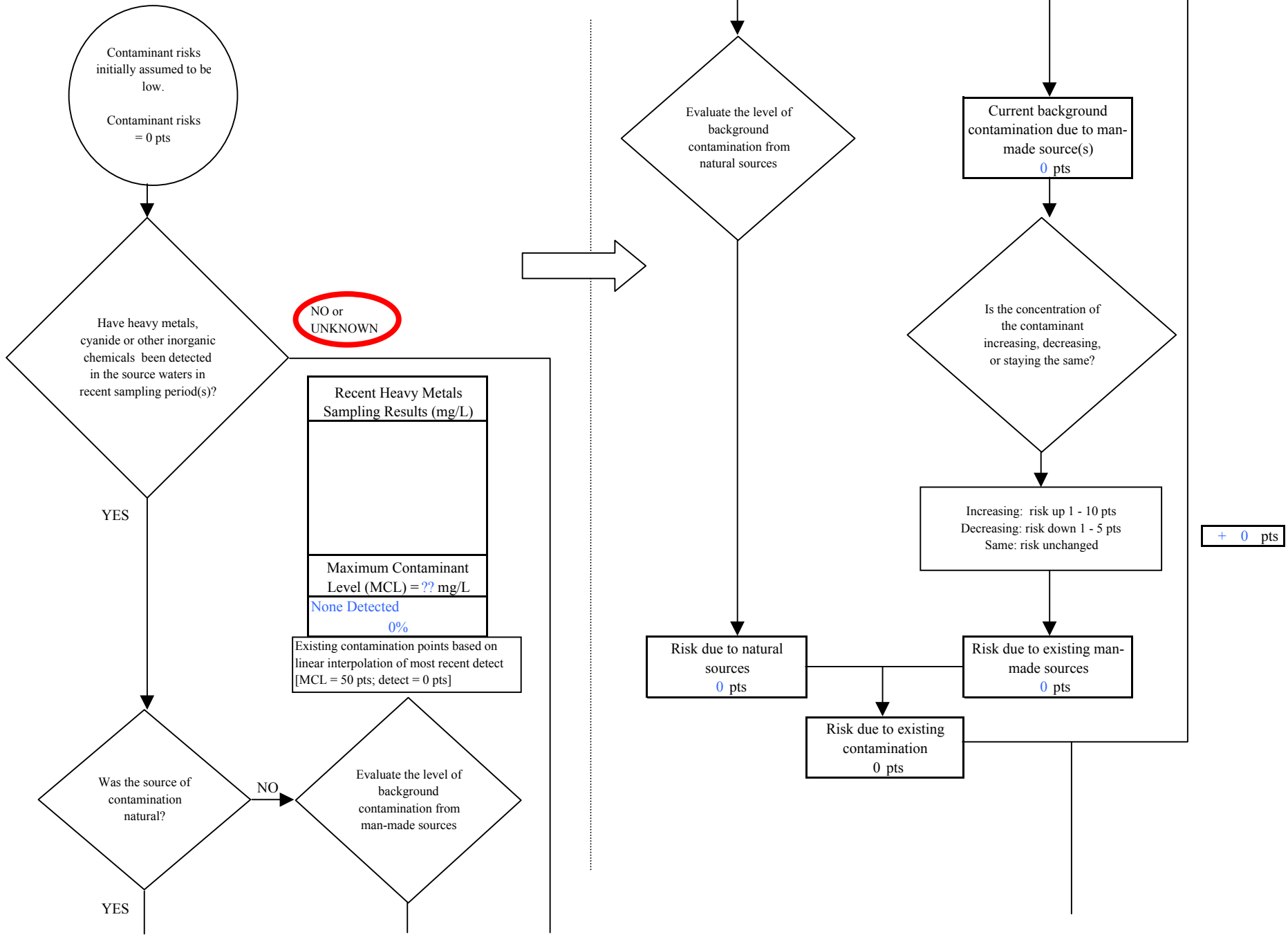


Chart 9. Contaminant risks for ASD Bear Valley Elementary School - Heavy Metals, Cyanide and Other Inorganic Chemicals

+ 30 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	1	1
Medium(s)	0	0	0
Low(s)	3	4	7

	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 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.

Initial assessment of risk posed by potential sources of contamination = 30 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

+ 2 pts

Chart 9. Contaminant risks for ASD Bear Valley Elementary School - Heavy Metals, Cyanide and Other Inorganic Chemicals

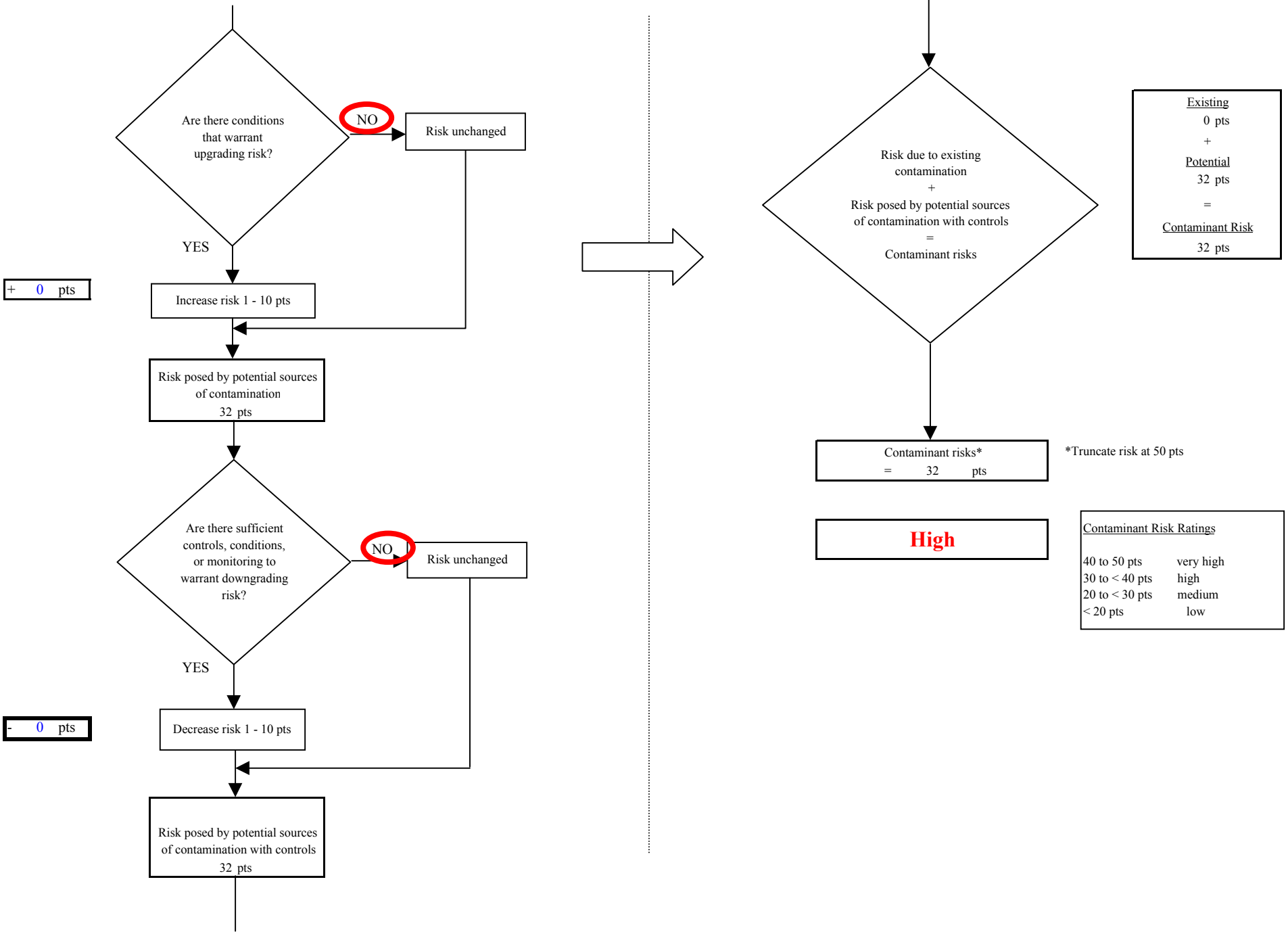


Chart 10. Vulnerability analysis for ASD Bear Valley Elementary School - Heavy Metals, Cyanide and Other Inorganic Chemicals

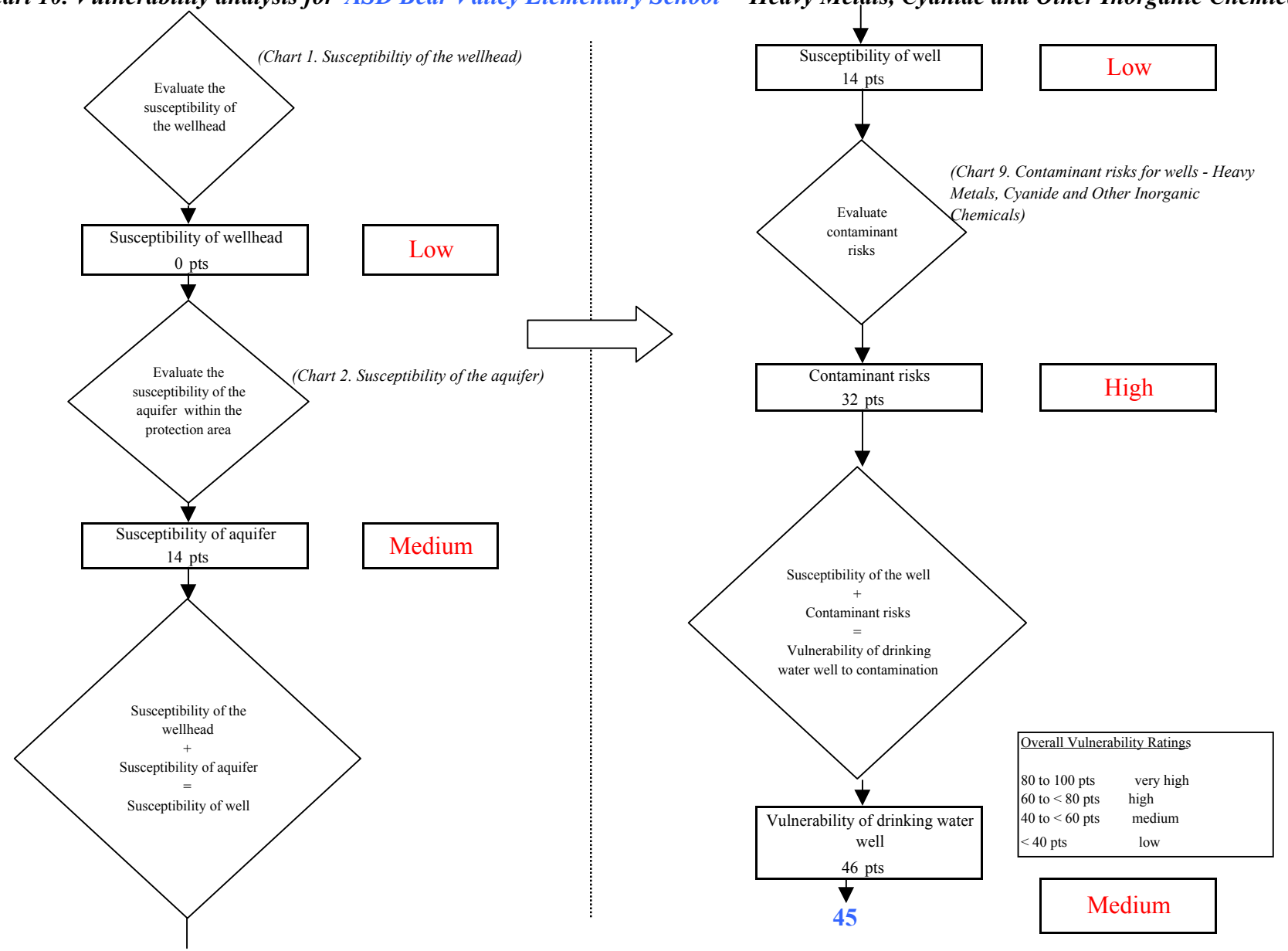


Chart 11. Contaminant risks for ASD Bear Valley Elementary School - Synthetic Organic Chemicals

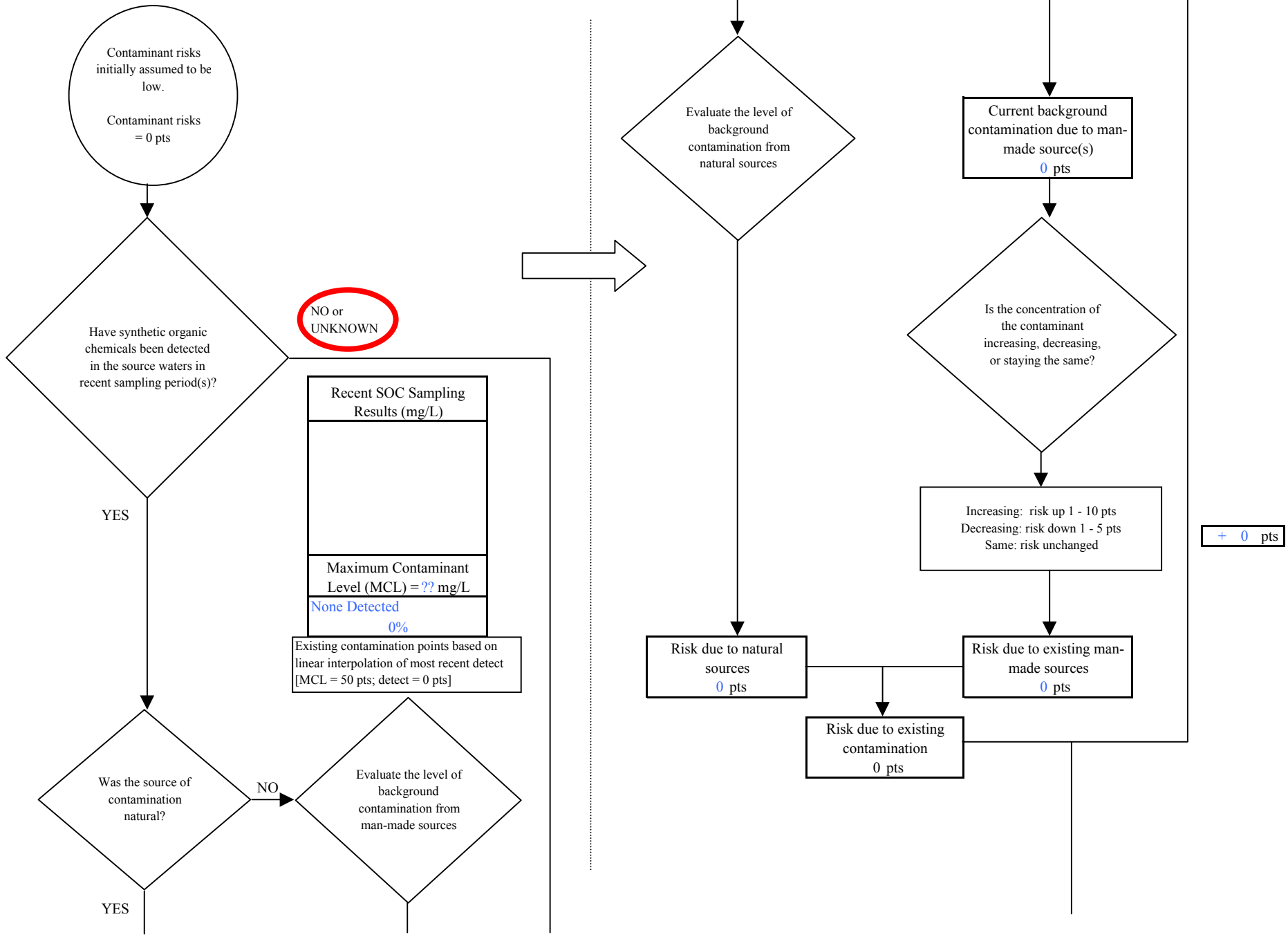


Chart 11. Contaminant risks for ASD Bear Valley Elementary School - Synthetic Organic Chemicals

+ 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)	2	4	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.

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

+ 2 pts

Chart 11. Contaminant risks for ASD Bear Valley Elementary School - Synthetic Organic Chemicals

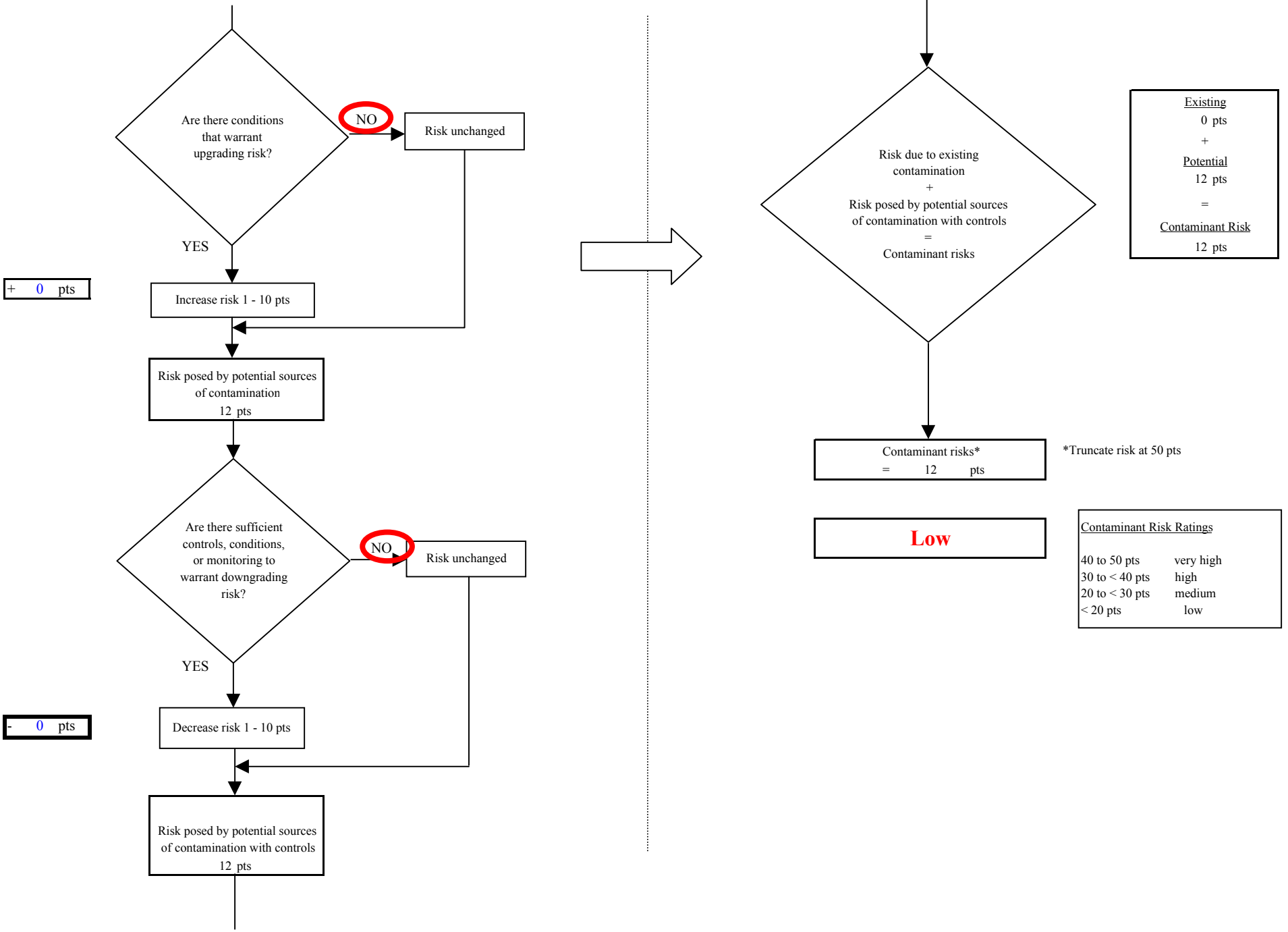


Chart 12. Vulnerability analysis for ASD Bear Valley Elementary School - Synthetic Organic Chemicals

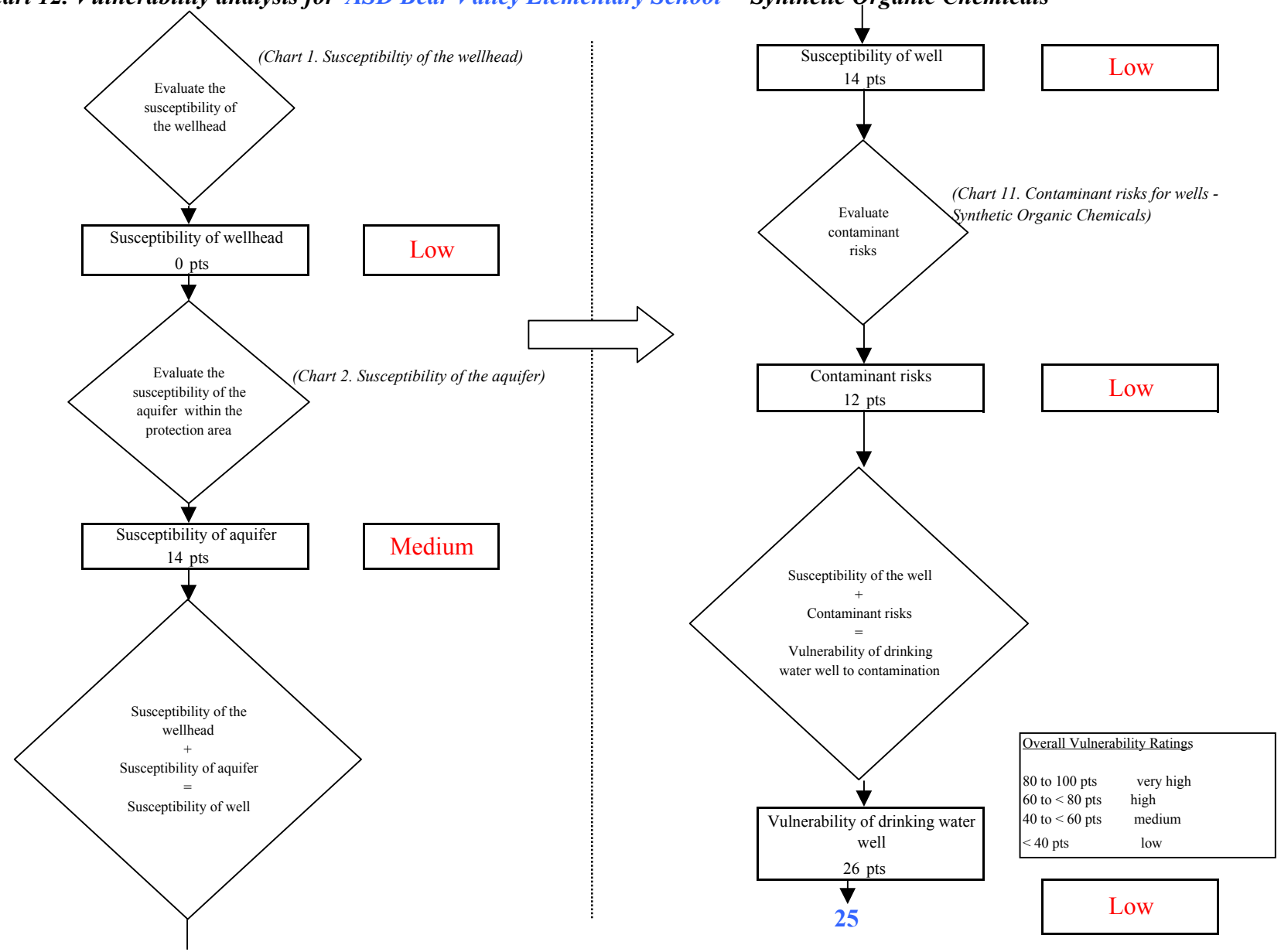


Chart 13. Contaminant risks for ASD Bear Valley Elementary School - Other Organic Chemicals

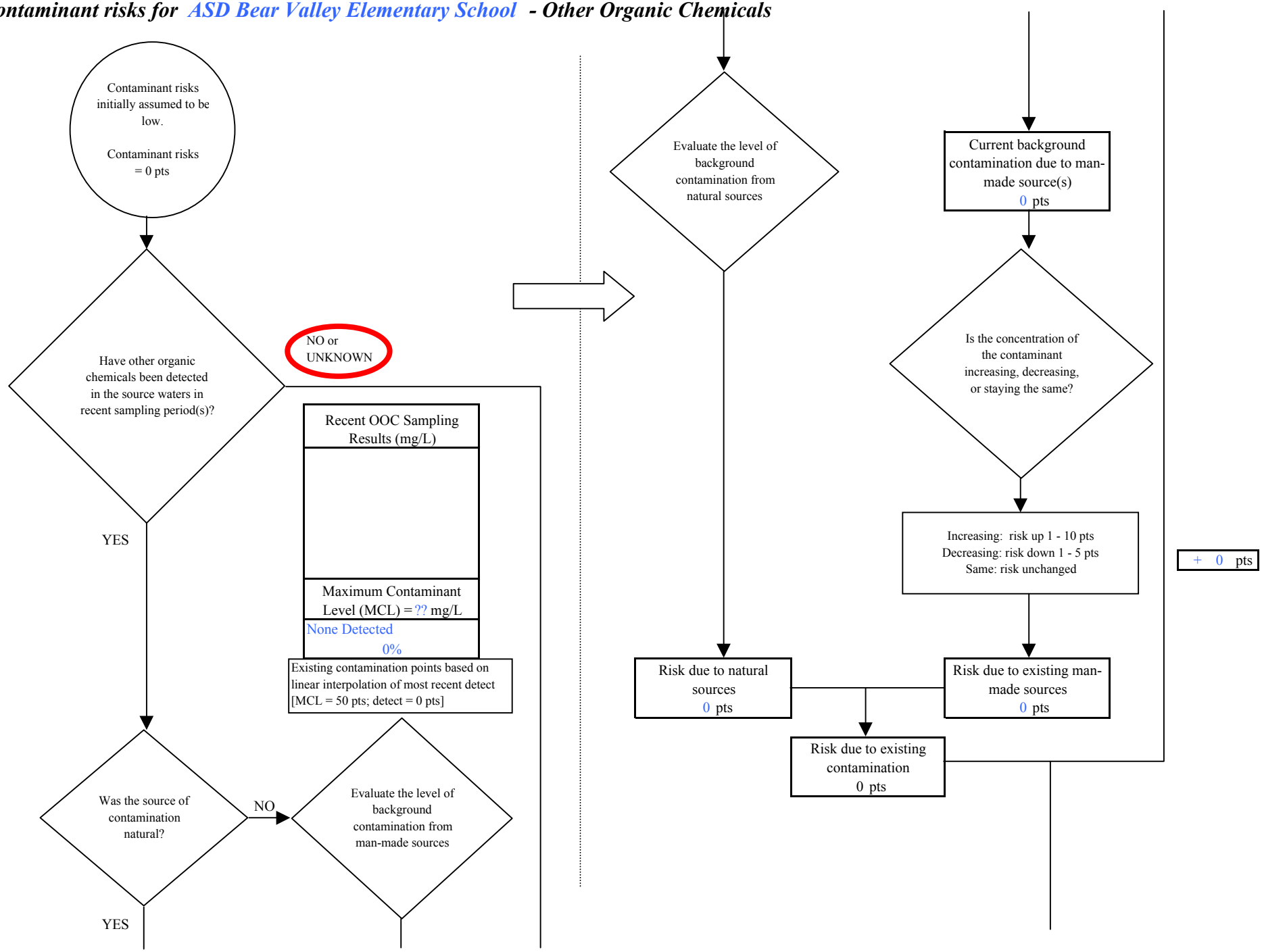


Chart 13. Contaminant risks for ASD Bear Valley Elementary School - Other Organic Chemicals

+ 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)	0	1	1
Low(s)	2	3	5

	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

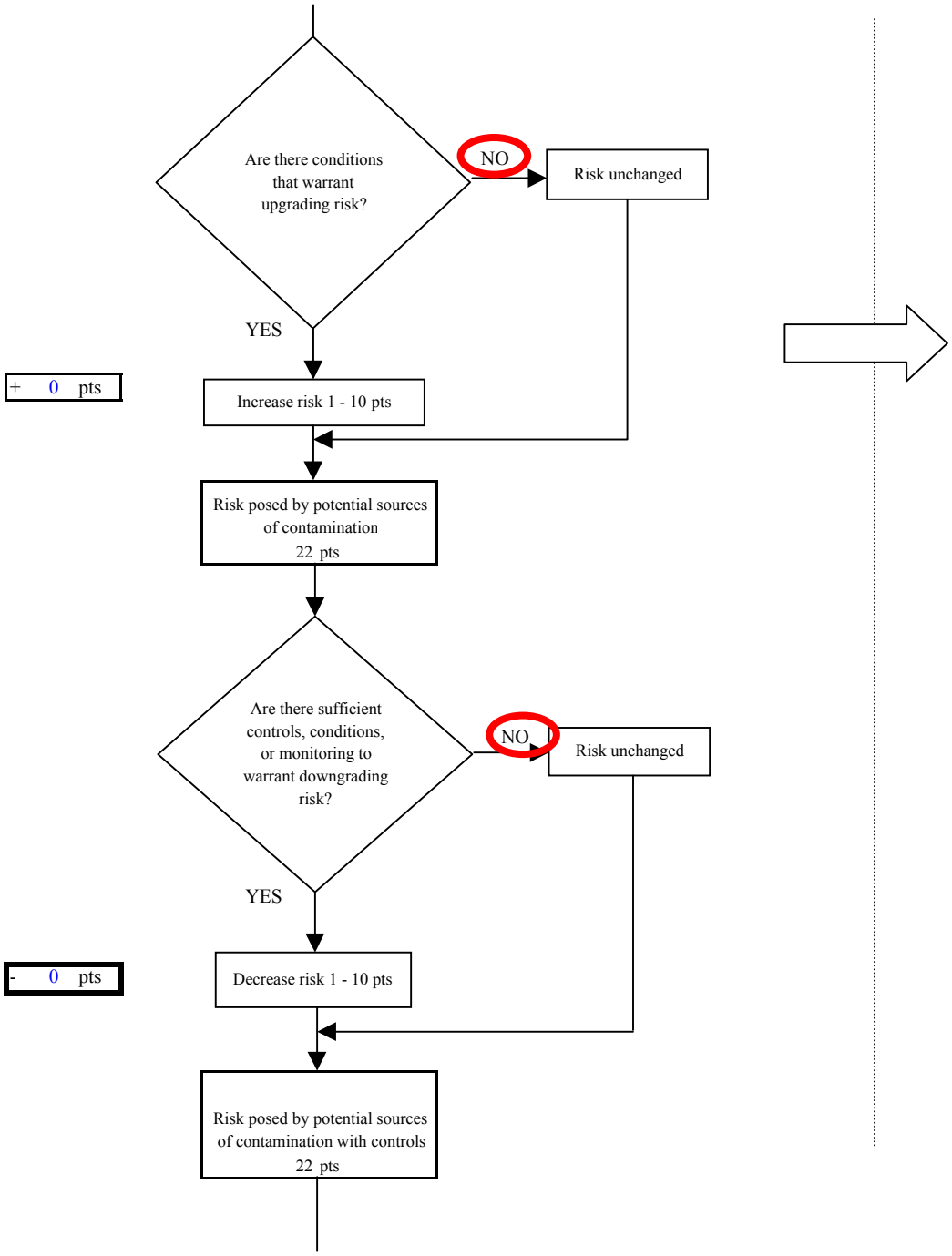
Risk unchanged

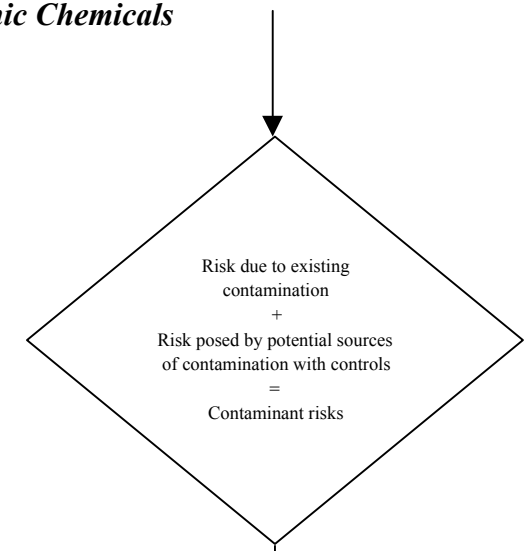
YES

Increase risk 1 - 10 pts

+ 2 pts

Chart 13. Contaminant risks for ASD Bear Valley Elementary School - Other Organic Chemicals





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

Contaminant risks*
= 22 pts

*Truncate risk at 50 pts

Medium

Contaminant Risk Ratings

40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20 pts	low

Chart 14. Vulnerability analysis for ASD Bear Valley Elementary School - Other Organic Chemicals