

Source Water Assessment for
DeArmoun Homeowners Association
Anchorage, Alaska

A Hydrogeologic Susceptibility and Vulnerability Analysis

DRINKING WATER PROTECTION PROGRAM REPORT 177
PWSID 211936.001

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Source Water Assessment for DeArmoun Homeowners Association’s Source of Public Drinking Water, Anchorage, Alaska

A Hydrogeologic Susceptibility and Vulnerability Analysis

By Heather A. Hammond

Drinking Water Protection Program Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The Public Water System for DeArmoun Homeowners Association is a Class A (community) water system consisting of one well in the Anchorage area. Identified potential and current sources of contaminants for DeArmoun Homeowners Association’s public water system includes: approximately 129 acres of residential area, residential septic systems, dirt and paved roads, recreation trails, a public utility easement, and a lumber processing area. 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 DeArmoun Homeowners Association received a vulnerability rating of **Low** for volatile organic chemicals, heavy metals, synthetic organic chemicals, and other organic chemicals; and **Medium** for bacteria and viruses and nitrates and/or nitrites.

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 DeArmoun Homeowners Association. 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 1. Index map showing the location of Anchorage, Alaska

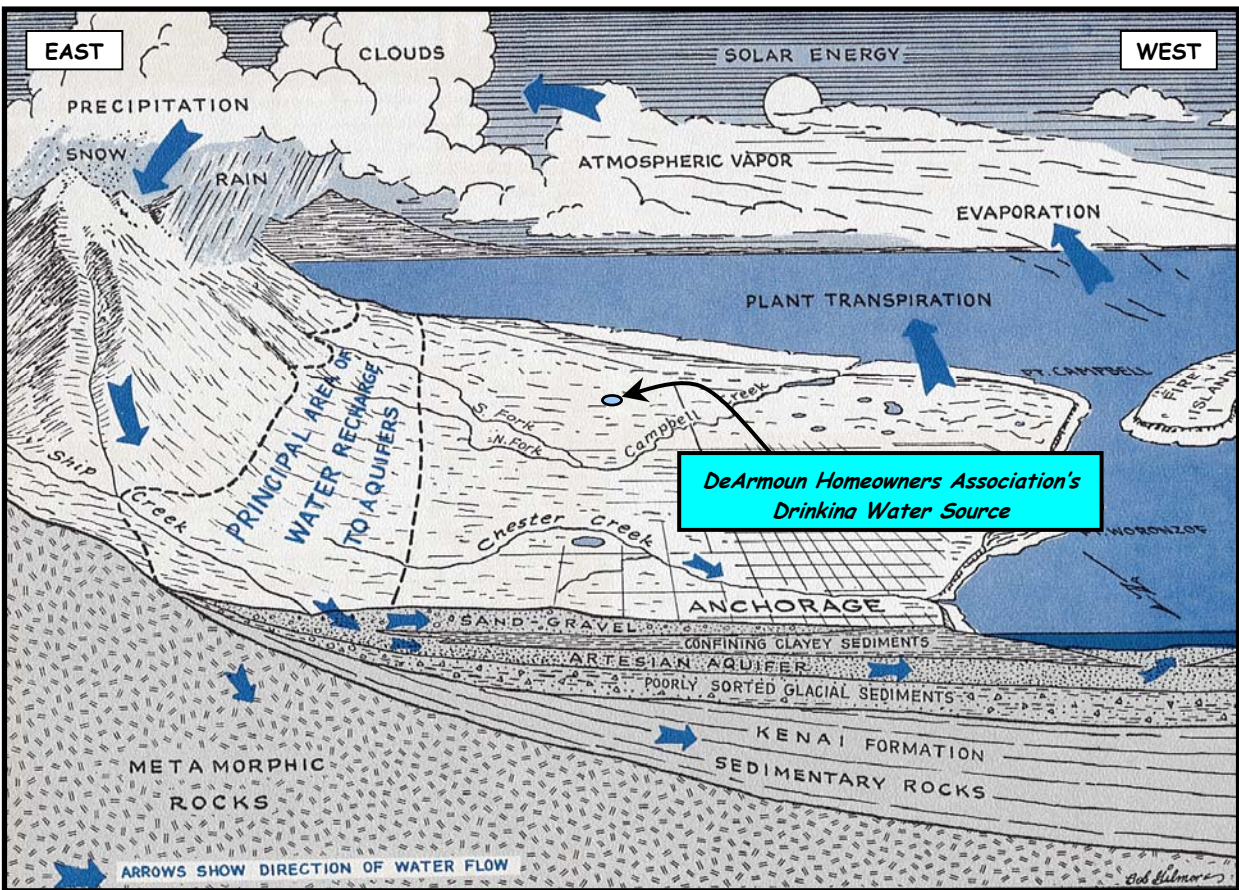


Figure 2. Generalized hydrologic cycle in the Anchorage area [Barnwell, George, Dearborn, Weeks, and Zenone, 1972].

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 surficial topography as well as its close connection with surface water bodies.

DEARMOUN HOMEOWNERS ASSOCIATION’S PUBLIC DRINKING WATER SYSTEM

DeArmoun Homeowners Association’s Public Drinking Water System is a Class A (community) water system,

located within the cul-de-sac off of Schubert Circle, in the DeArmoun Subdivision (T12N, R3W, Section 22, SE 1/4), at an elevation of approximately 500 feet above sea level (see Figure 3).

According to the most recent Monitoring Waiver (2/6/98) the area surrounding the well is slightly sloped away from the well casing and properly drained and protected against flooding. No well log was available for DeArmoun Homeowners Association’s public drinking water source. It is suspected that the well was installed prior to 1971 in and is completed in a 6 inch well casing.

Total depth of the well is unknown. Because the well was installed prior to 1993 it is suspected that the well lacks proper grouting which provides added protection against contaminants travelling along the well casing and into source waters.

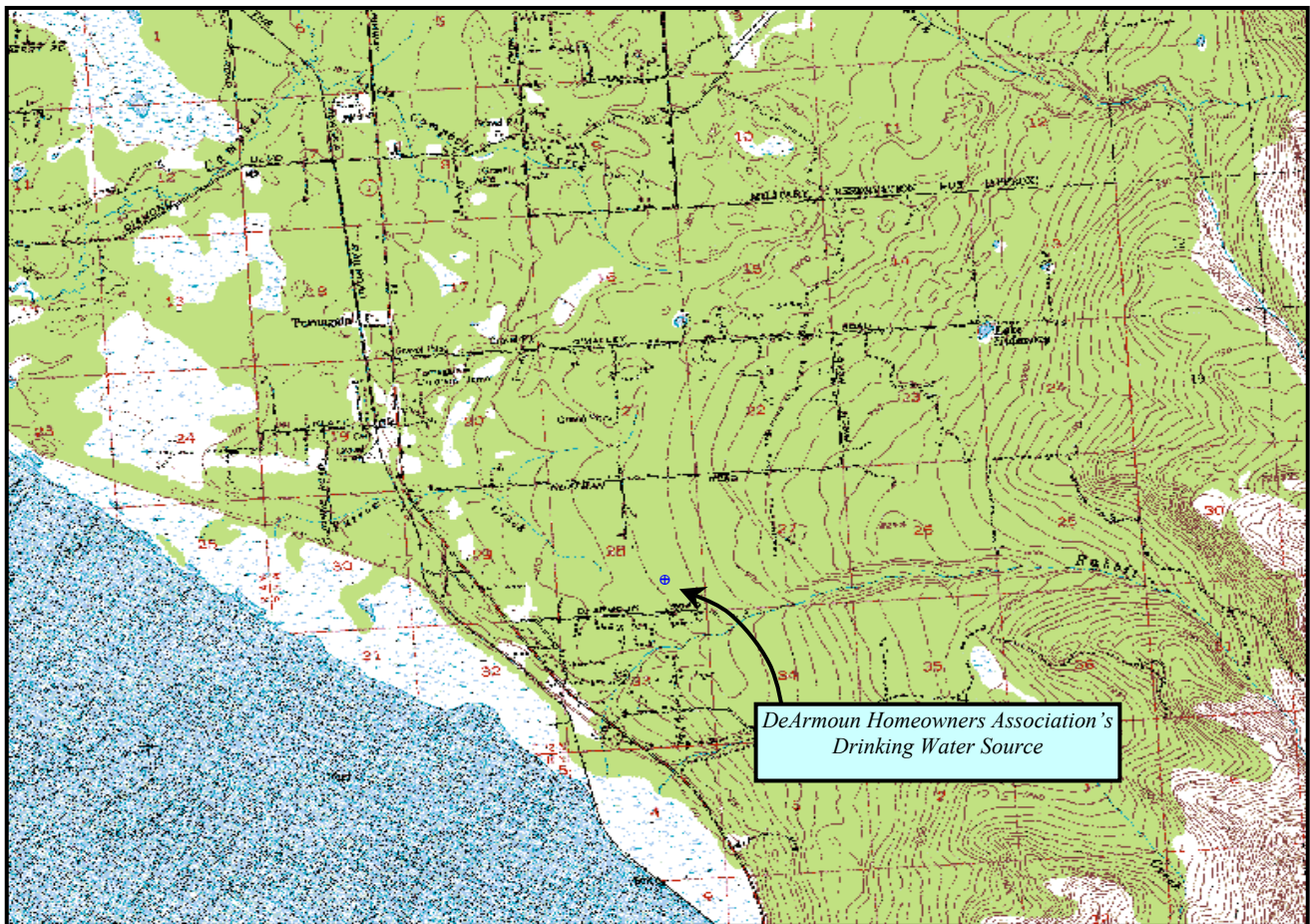


Figure 3. Map showing the location of the drinking water sources for DeArmoun Homeowners Association [Base: USGS Anchorage A8].

which is owned and operated by the Homeowners Association. The system consists of one well, which is 3

This system operates year round and serves 80 residents through 18 service connections.

ASSESSMENT AND PROTECTION AREA FOR DEARMOUN HOMEOWNERS ASSOCIATION'S PUBLIC DRINKING WATER SOURCE

The Drinking Water Protection and Assessment Area that has been established for DeArmoun Homeowners Association'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 DeArmoun Homeowners Association 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 $\frac{1}{4}$ 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 DeArmoun Homeowners Association. 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 DeArmoun Homeowners Association. 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 within the Drinking Water Protection Area for DeArmoun Homeowners Association:

- Approximately 129 acres of residential area;
- residential septic systems;
- dirt and paved roads;
- recreation trails;
- a public utility easement;
- and a lumber processing area.

These potential and existing contaminant sources present risk for all six categories of drinking water contaminants for DeArmoun Homeowners Association'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 DEARMOUN HOMEOWNERS ASSOCIATION’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:

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

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

$$\begin{array}{r}
 \text{Susceptibility of the Wellhead (0 – 25 Points)} \\
 + \\
 \text{Susceptibility of the Aquifer (0 – 25 Points)} \\
 = \text{Natural Susceptibility (Susceptibility of the Well)} \\
 \text{(0 – 50 Points)}
 \end{array}$$

No well log was available for DeArmoun Homeowners Association’s public drinking water source. The geologic information presented in this report was compiled by gathering information from wells drilled within a ¼ mile distance from the public source of drinking water serving DeArmoun Homeowners Association. Assuming that the geologic information is similar it is suspected that the well was completed in a confined aquifer. There is a

strata of blue till and hardpan from 54 to 63 feet below land surface. Groundwater is not encountered in the area until approximately 170 feet below land surface. Static water level was recorded at 105 feet below land surface at the time of drilling. This is an indication that the aquifer is confined. 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 sources of public drinking water serving DeArmoun Homeowners Association.

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

	Score	Rating
Susceptibility of the Wellhead	5	Low
Susceptibility of the Aquifer	17	High
Natural Susceptibility	22	Medium

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 either well. Table 2 summarizes the Contaminant Risks for each category of drinking water contaminants.

Table 2. Contaminant Risks to DeArmoun Homeowners Association’s Public Drinking Water Source

Contaminant Risks	Score	Rating
Bacteria and Viruses	25	Medium
Nitrates and/or Nitrites	28	Medium
Volatile Organic Chemicals	12	Low
Heavy Metals, Cyanide, And Other Inorganic Chemicals	12	Low
Synthetic Organic Chemicals	12	Low
Other Organic Chemicals	12	Low

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 DeArmoun Homeowners Association’s Public Drinking Water Source to Contamination by Category

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

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

Sampling history for DeArmoun Homeowners Association 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 12% 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.

It is unknown how much of the existing nitrate concentration can be attributed to natural or human-made sources. The most recent Sanitary Survey (07/16/97) notes that a number of septic systems in the DeArmoun Subdivision are less than 200 feet from the well. Residential septic systems, because of their effluent discharge, pose the greatest potential contaminant risk to the DeArmoun Homeowners Association for bacteria and viruses and nitrates and or nitrites. Review of the

historical sampling data indicate that bacteria and viruses have not been detected at the source waters serving DeArmoun Homeowners Association and suggests that the surrounding septic systems have not impacted the groundwater source.

public drinking water source.

Dirt and paved roads within the protection area are the most significant source of potential volatile organic chemical contamination to DeArmoun Homeowners Association drinking water source. Because paved 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 B Protection Area. 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 DeArmoun Homeowners Association's 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.

There is a lumber processing area located off of Foster Street within the Zone D Protection Area. This potential contaminant site ranked as a high risk for synthetic organic chemicals and other organic chemicals. However, due to its proximity to the public drinking water source the overall potential contaminant risk to DeArmoun Homeowners Association's source waters is low.

SUMMARY

A *Source Water Assessment* has been completed for the source of public drinking water serving DeArmoun Homeowners Association. The overall vulnerability of this source to contamination is **Low** for volatile organic chemicals, heavy metals, synthetic organic chemicals, and other organic chemicals; and **Medium** for bacteria and viruses and nitrates and/or nitrites. This assessment of contaminant risks can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of DeArmoun Homeowners Association 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 DeArmoun Homeowners Association's

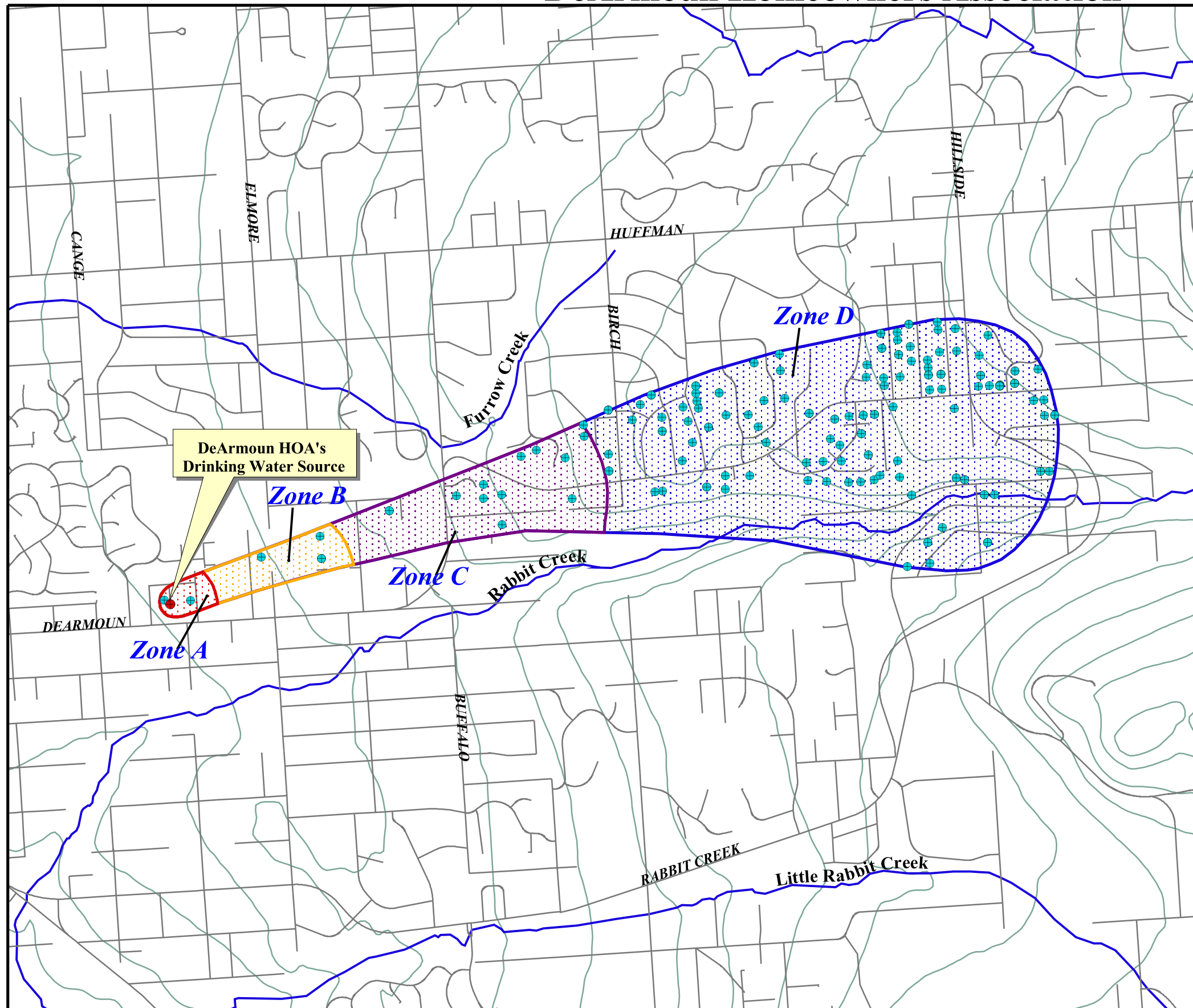
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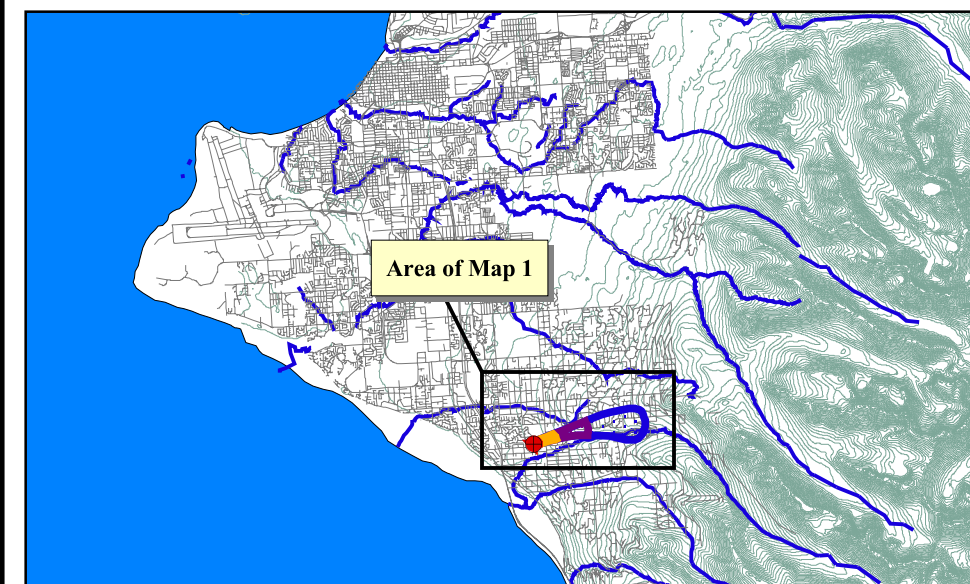
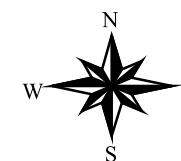
APPENDIX A

DeArmoun Homeowners Association's Drinking Water Protection Area

Drinking Water Protection Area for DeArmoun Homeowners Association



- DeArmoun Homeowner's Association
- Private and Public Wells
- 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
- Anchorage Roads
- Anchorage Streams
- Elevation Contours



3000 0 3000 6000 Feet

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Map 1

APPENDIX B

Contaminant Source Inventory and Risk Ranking for DeArmoun Homeowners Association

Table 1

**Contaminant Source Inventory for
DeArmoun Homeowners Association**

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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	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-10	A	Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-2	A	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-3	A	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-4	A	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-5	A	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-6	A	Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-7	A	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-8	A	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-9	A	Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-1	A	Schubert Circle	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Donalds Street	2	
Residential Areas	R01	R1-1	B	Residential areas located within Zone A	2	
Residential Areas	R01	R1-2	B	Residential areas located within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-11	B	Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-12	B	Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-13	B	Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-14	B	Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-15	B	Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-16	B	Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-17	B	Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-18	B	Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-19	B	Along Elmore Road	2	

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-20	B	Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-21	B	Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-22	B	Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-23	B	Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-24	B	Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-25	B	Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-26	B	Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-27	B	Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-28	B	Located to the east of Elmore Road within Zone B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Ervin Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Elmore Road	2	
Public utility easements/corridors	X42	X42-1	B	Utility easement/corridor along dual purpose pipeline	2	Pipeline is currently transporting natural gas but has been used to transport oil in the past.
Dog walking areas/foot trails	X46	X46-1	B	Trail to the west of Elmore Road	2	
Dog walking areas/foot trails	X46	X46-2	B	Trail to the east of Elmore Road	2	
Residential Areas	R01	R1-3	C	Residential areas located within Zone C	3	Approximately 95 acres of residential area.
Septic systems (serves one single-family home)	R02	R2-29-52	C	Septics systems located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-6-12	C	Roads located within Zone C	3	
Dog walking areas/foot trails	X46	X46-3-4	C	Trails located within Zone C	3	
Lumber processing and preservation	N04	N4-1	D	Located off of Foster Street	4	
Tanks, gasoline (underground)	T12	T12-1	D	Located off of Saunders Road	4	

Table 2

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Bacteria and Viruses*

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<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-1	A	Low	1	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-2	A	Low	2	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-3	A	Low	3	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-4	A	Low	4	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-5	A	Low	5	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-6	A	Low	6	Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-7	A	Low	7	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-8	A	Low	8	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-9	A	Low	9	Matthews Drive	2	
Residential Areas	R01	R1-1	B	Low	10	Residential areas located within Zone A	2	
Septic systems (serves one single-family home)	R02	R2-10	A	Low		Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-1	A	Low		Schubert Circle	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Low		Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Low		Donalds Street	2	
Residential Areas	R01	R1-2	B	Low		Residential areas located within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-11	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-12	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-13	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-14	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-15	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-16	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-17	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-18	B	Low		Along Elmore Road	2	

Table 2 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Bacteria and Viruses*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-19	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-20	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-21	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-22	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-23	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-24	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-25	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-26	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-27	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-28	B	Low		Located to the east of Elmore Road within Zone B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low		Ervin Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low		Elmore Road	2	
Dog walking areas/foot trails	X46	X46-1	B	Low		Trail to the west of Elmore Road	2	
Dog walking areas/foot trails	X46	X46-2	B	Low		Trail to the east of Elmore Road	2	
Residential Areas	R01	R1-3	C	Low		Residential areas located within Zone C	3	Approximately 95 acres of residential area.

Table 2 (continued)

Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Bacteria and Viruses

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-29-52	C	Low		Septics systems located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-6-12	C	Low		Roads located within Zone C	3	
Dog walking areas/foot trails	X46	X46-3-4	C	Low		Trails located within Zone C	3	

Table 3

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Nitrates/Nitrites*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-1	A	Low	1	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-2	A	Low	2	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-3	A	Low	3	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-4	A	Low	4	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-5	A	Low	5	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-6	A	Low	6	Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-7	A	Low	7	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-8	A	Low	8	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-9	A	Low	9	Matthews Drive	2	
Residential Areas	R01	R1-1	B	Low	10	Residential areas located within Zone A	2	
Septic systems (serves one single-family home)	R02	R2-10	A	Low		Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-1	A	Low		Schubert Circle	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Low		Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Low		Donalds Street	2	
Residential Areas	R01	R1-2	B	Low		Residential areas located within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-11	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-12	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-13	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-14	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-15	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-16	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-17	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-18	B	Low		Along Elmore Road	2	

Table 3 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Nitrates/Nitrites*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-19	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-20	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-21	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-22	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-23	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-24	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-25	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-26	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-27	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-28	B	Low		Located to the east of Elmore Road within Zone B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low		Ervin Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low		Elmore Road	2	
Dog walking areas/foot trails	X46	X46-1	B	Low		Trail to the west of Elmore Road	2	
Dog walking areas/foot trails	X46	X46-2	B	Low		Trail to the east of Elmore Road	2	
Residential Areas	R01	R1-3	C	Low		Residential areas located within Zone C	3	Approximately 95 acres of residential area.

Table 3 (continued)

Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Nitrates/Nitrites

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-29-52	C	Low		Septics systems located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-6-12	C	Low		Roads located within Zone C	3	
Dog walking areas/foot trails	X46	X46-3-4	C	Low		Trails located within Zone C	3	

Table 4

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Volatile Organic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24	X24-1	A	Low	1	Schubert Circle	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Low	2	Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Low	3	Donalds Street	2	
Tanks, gasoline (underground)	T12	T12-1	D	High	4	Located off of Saunders Road	4	
Residential Areas	R01	R1-1	B	Low	5	Residential areas located within Zone A	2	
Residential Areas	R01	R1-2	B	Low	6	Residential areas located within Zone B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low	7	Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-1	A	Low	8	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-2	A	Low	9	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-3	A	Low	10	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-10	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-4	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-5	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-6	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-7	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-8	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-9	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-11	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-12	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-13	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-14	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-15	B	Low		Along Ervin Road	2	

Table 4 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Volatile Organic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-16	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-17	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-18	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-19	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-20	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-21	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-22	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-23	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-24	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-25	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-26	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-27	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-28	B	Low		Located to the east of Elmore Road within Zone B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low		Elmore Road	2	
Public utility easements/corridors	X42	X42-1	B	Low		Utility easement/corridor along dual purpose pipeline	2	Pipeline is currently transporting natural gas but has been used to transport oil in the past.

Table 4 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Volatile Organic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Residential Areas	R01	R1-3	C	Low		Residential areas located within Zone C	3	Approximately 95 acres of residential area.
Septic systems (serves one single-family home)	R02	R2-29-52	C	Low		Septics systems located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-6-12	C	Low		Roads located within Zone C	3	

Table 5

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Residential Areas	R01	R1-1	B	Low	1	Residential areas located within Zone A	2	
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Schubert Circle	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Low	3	Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Low	4	Donalds Street	2	
Residential Areas	R01	R1-2	B	Low	5	Residential areas located within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-1	A	Low	6	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-2	A	Low	7	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-3	A	Low	8	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-4	A	Low	9	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-5	A	Low	10	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-10	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-6	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-7	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-8	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-9	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-11	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-12	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-13	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-14	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-15	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-16	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-17	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-18	B	Low		Along Elmore Road	2	

Table 5 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-19	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-20	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-21	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-22	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-23	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-24	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-25	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-26	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-27	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-28	B	Low		Located to the east of Elmore Road within Zone B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low		Ervin Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low		Elmore Road	2	
Residential Areas	R01	R1-3	C	Low		Residential areas located within Zone C	3	Approximately 95 acres of residential area.
Septic systems (serves one single-family home)	R02	R2-29-52	C	Low		Septics systems located within Zone C	3	
Highways and roads, paved (cement or asphalt)	X20	X20-6-12	C	Low		Roads located within Zone C	3	

Table 5 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
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Table 6

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Synthetic Organic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Residential Areas	R01	R1-1	B	Low	1	Residential areas located within Zone A	2	
Residential Areas	R01	R1-2	B	Low	2	Residential areas located within Zone B	2	
Lumber processing and preservation	N04	N4-1	D	High	3	Located off of Foster Street	4	
Septic systems (serves one single-family home)	R02	R2-1	A	Low	4	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-2	A	Low	5	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-3	A	Low	6	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-4	A	Low	7	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-5	A	Low	8	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-6	A	Low	9	Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-7	A	Low	10	Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-10	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-8	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-9	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-11	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-12	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-13	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-14	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-15	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-16	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-17	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-18	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-19	B	Low		Along Elmore Road	2	

Table 6 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Synthetic Organic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-20	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-21	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-22	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-23	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-24	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-25	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-26	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-27	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-28	B	Low		Located to the east of Elmore Road within Zone B	2	
Residential Areas	R01	R1-3	C	Low		Residential areas located within Zone C	3	Approximately 95 acres of residential area.
Septic systems (serves one single-family home)	R02	R2-29-52	C	Low		Septics systems located within Zone C	3	

Table 7

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Other Organic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Residential Areas	R01	R1-1	B	Low	1	Residential areas located within Zone A	2	
Residential Areas	R01	R1-2	B	Low	2	Residential areas located within Zone B	2	
Lumber processing and preservation	N04	N4-1	D	High	3	Located off of Foster Street	4	
Highways and roads, dirt/gravel	X24	X24-1	A	Low	4	Schubert Circle	2	
Highways and roads, dirt/gravel	X24	X24-2	A	Low	5	Matthews Drive	2	
Highways and roads, dirt/gravel	X24	X24-3	A	Low	6	Donalds Street	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low	7	Ervin Road	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	8	Elmore Road	2	
Residential Areas	R01	R1-3	C	Low	9	Residential areas located within Zone C	3	Approximately 95 acres of residential area.
Highways and roads, paved (cement or asphalt)	X20	X20-6-12	C	Low	10	Roads located within Zone C	3	
Septic systems (serves one single-family home)	R02	R2-1	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-10	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-2	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-3	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-4	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-5	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-6	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-7	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-8	A	Low		Along Schubert Circle	2	
Septic systems (serves one single-family home)	R02	R2-9	A	Low		Matthews Drive	2	
Septic systems (serves one single-family home)	R02	R2-11	B	Low		Along Ervin Road	2	

Table 7 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Other Organic Chemicals*

PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-12	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-13	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-14	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-15	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-16	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-17	B	Low		Along Ervin Road	2	
Septic systems (serves one single-family home)	R02	R2-18	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-19	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-20	B	Low		Along Elmore Road	2	
Septic systems (serves one single-family home)	R02	R2-21	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-22	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-23	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-24	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-25	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-26	B	Low		Located to the east of Elmore Road within Zone B	2	
Septic systems (serves one single-family home)	R02	R2-27	B	Low		Along One-hundred-thirty-eighth Ave.	2	
Septic systems (serves one single-family home)	R02	R2-28	B	Low		Located to the east of Elmore Road within Zone B	2	

Table 7 (continued)

*Contaminant Source Inventory and Risk Ranking for
DeArmoun Homeowners Association
Sources of Other Organic Chemicals*

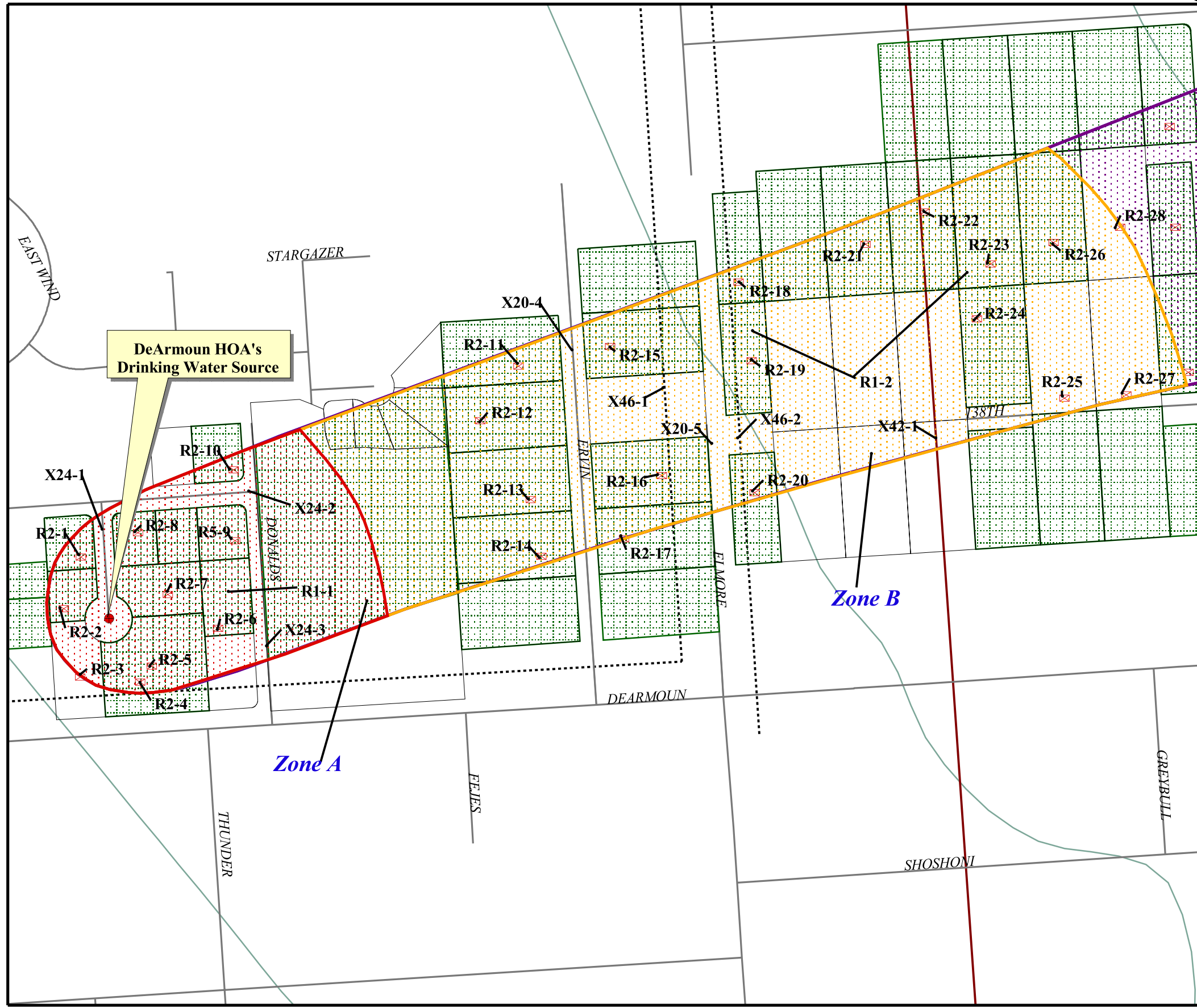
PWSID 211936.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Overall Rank after Analysis</i>	<i>Location</i>	<i>Map Number</i>	<i>Comments</i>
Septic systems (serves one single-family home)	R02	R2-29-52	C	Low		Septics systems located within Zone C	3	

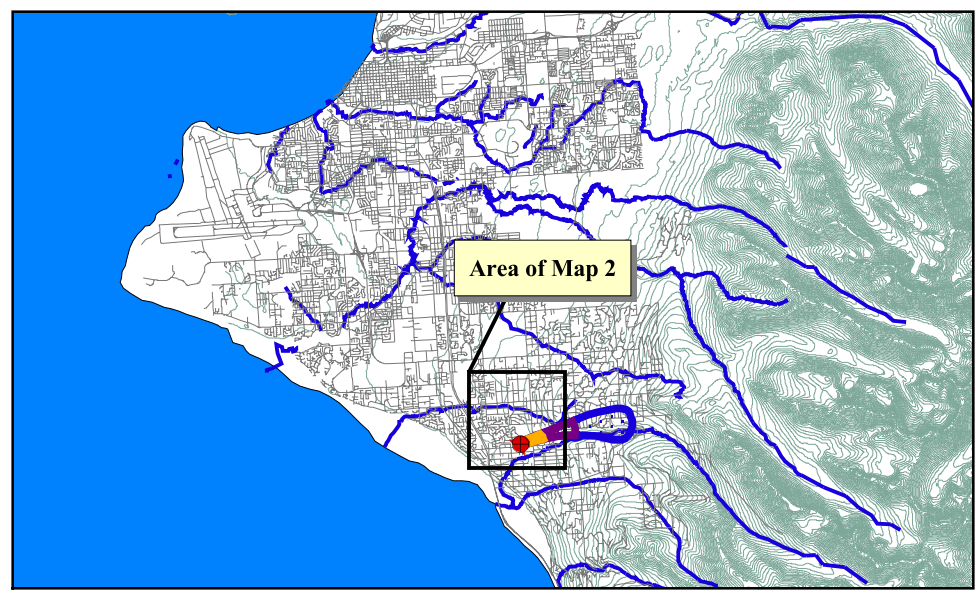
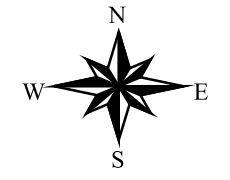
APPENDIX C

DeArmoun Homeowners Association's Drinking Water Protection Area and Potential & Existing Contaminant Sources

Drinking Water Protection Area for DeArmoun Homeowners Association and Potential & Existing Contaminant Sources



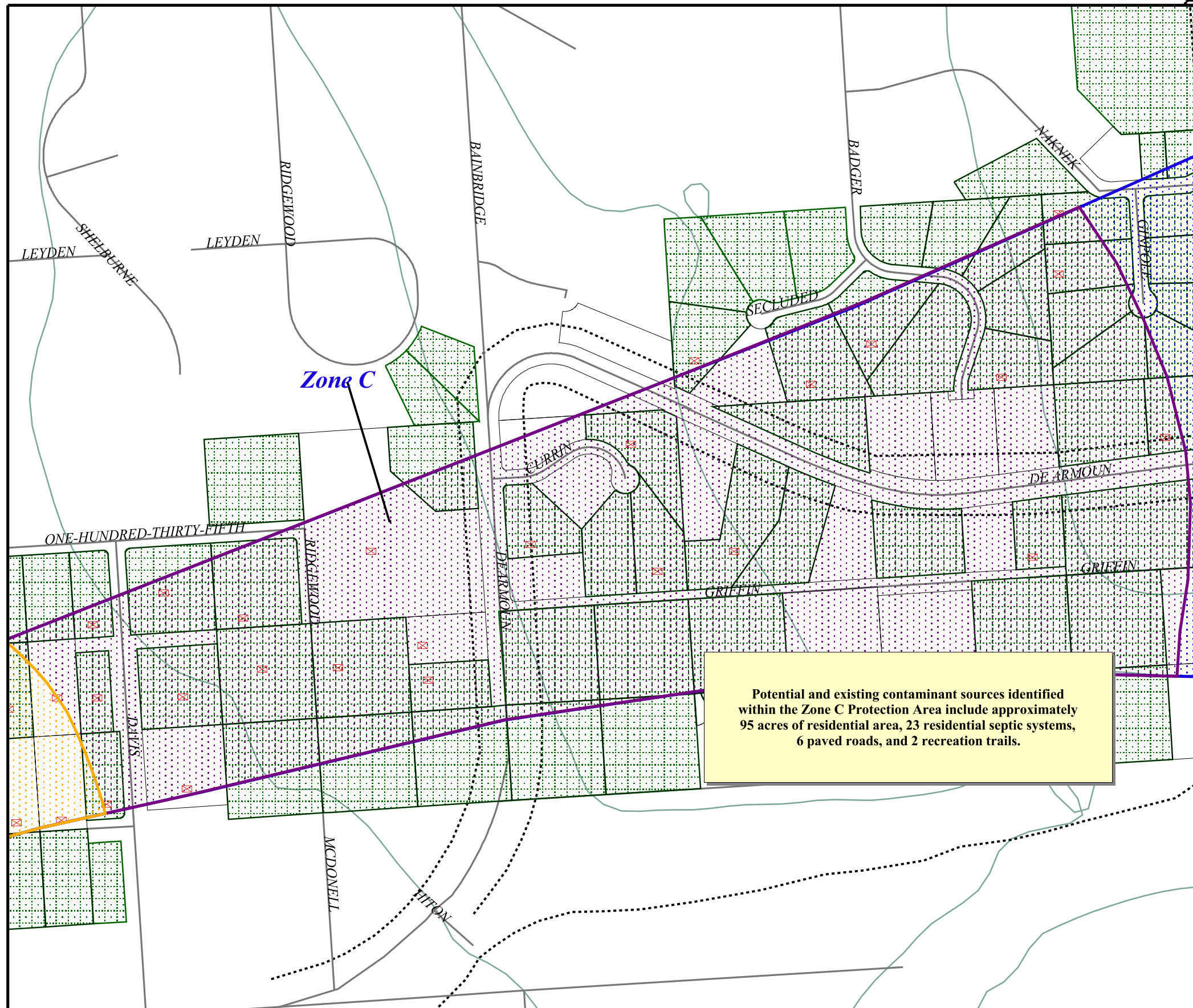
- DeArmoun Homeowners Association
- Zone A Protection Area**
- ▨ Several Months Travel Time
- Zone B Protection Area**
- ▨ Less Than 2 Years Travel Time
- Zone C Protection Area**
- ▨ Less Than 5 Years Travel Time
- Zone D Protection Area**
- ▨ Less Than 10 Years Travel Time
- ▨ Septic System (R2)
- ▨ Anchorage Land Parcels
- ▨ Lawns and Gardens (R1)
- ▨ Anchorage Roads
- ▨ Trails (X46)
- ▨ Public Utility Easements/Corridors (X42)
- ▨ Elevation Contours



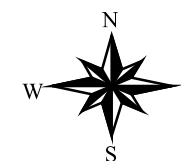
PWSID 211936.001

Map 2

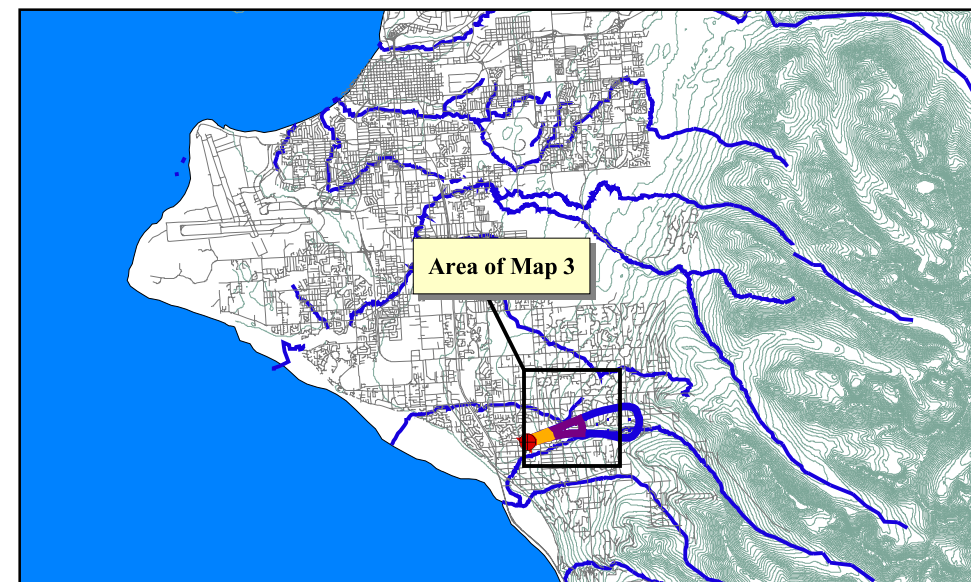
Drinking Water Protection Area for DeArmoun Homeowners Association and Potential & Existing Contaminant Sources



- DeArmoun Homeowners Association
- 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
- ⊠ Septic Systems (R2)
- Anchorage Land Parcels
- Lawns and Gardens (R1)
- Anchorage Roads
- - Trails (X46)
- ~ Elevation Contours



Potential and existing contaminant sources identified within the Zone C Protection Area include approximately 95 acres of residential area, 23 residential septic systems, 6 paved roads, and 2 recreation trails.

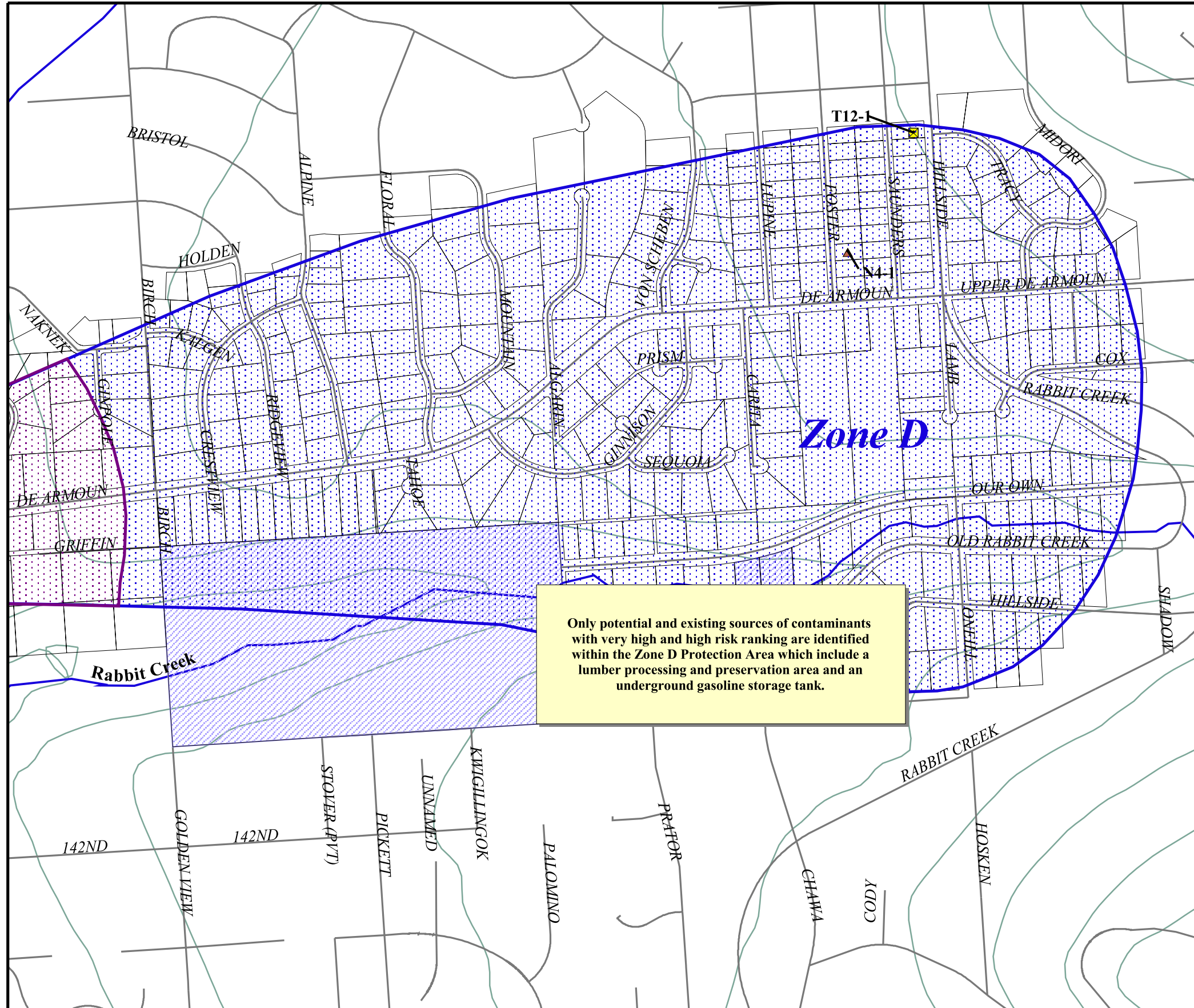


500 0 500 1000 Feet

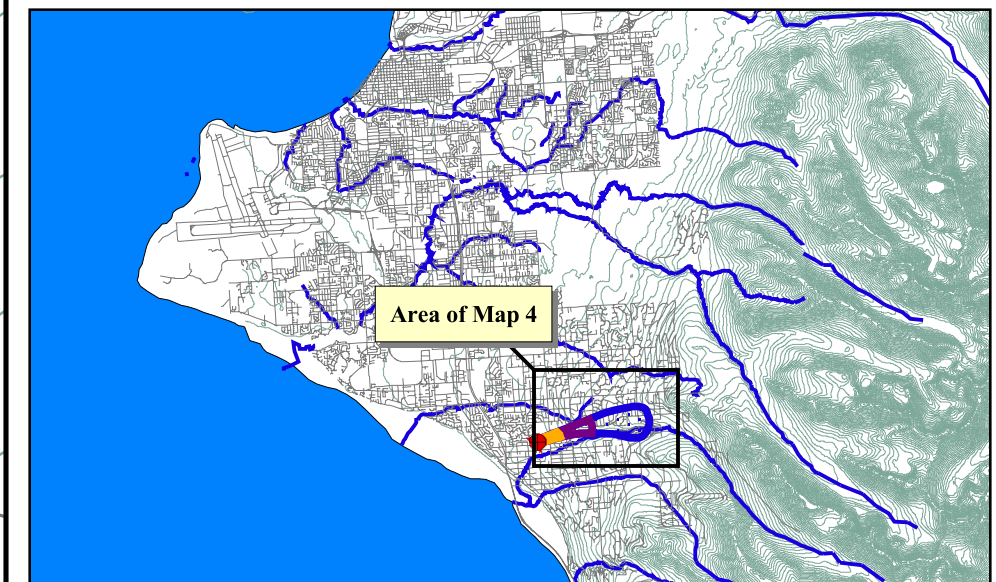
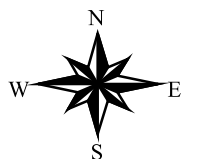
PWSID 211936.001

Map 3

Drinking Water Protection Area for DeArmoun Homeowners Association and Potential & Existing Contaminant Sources



- DeArmoun Homeowners Association
- 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 Contaminant Sources**
- ▲ Lumber Processing and Preservation (N4)
- Tanks, Gasoline - Underground (T12)
- Anchorage Land Parcels
- ▨ Anchorage Parks (X4)
- Anchorage Roads
- Anchorage Streams
- Elevation Contours



1000 0 1000 2000 Feet

PWSID 211936.001

Map 4

APPENDIX D

Vulnerability Analysis for DeArmoun Homeowners Association's Public Drinking Water Source

Chart 1. Susceptibility of the wellhead - DeArmoun Homeowners Association

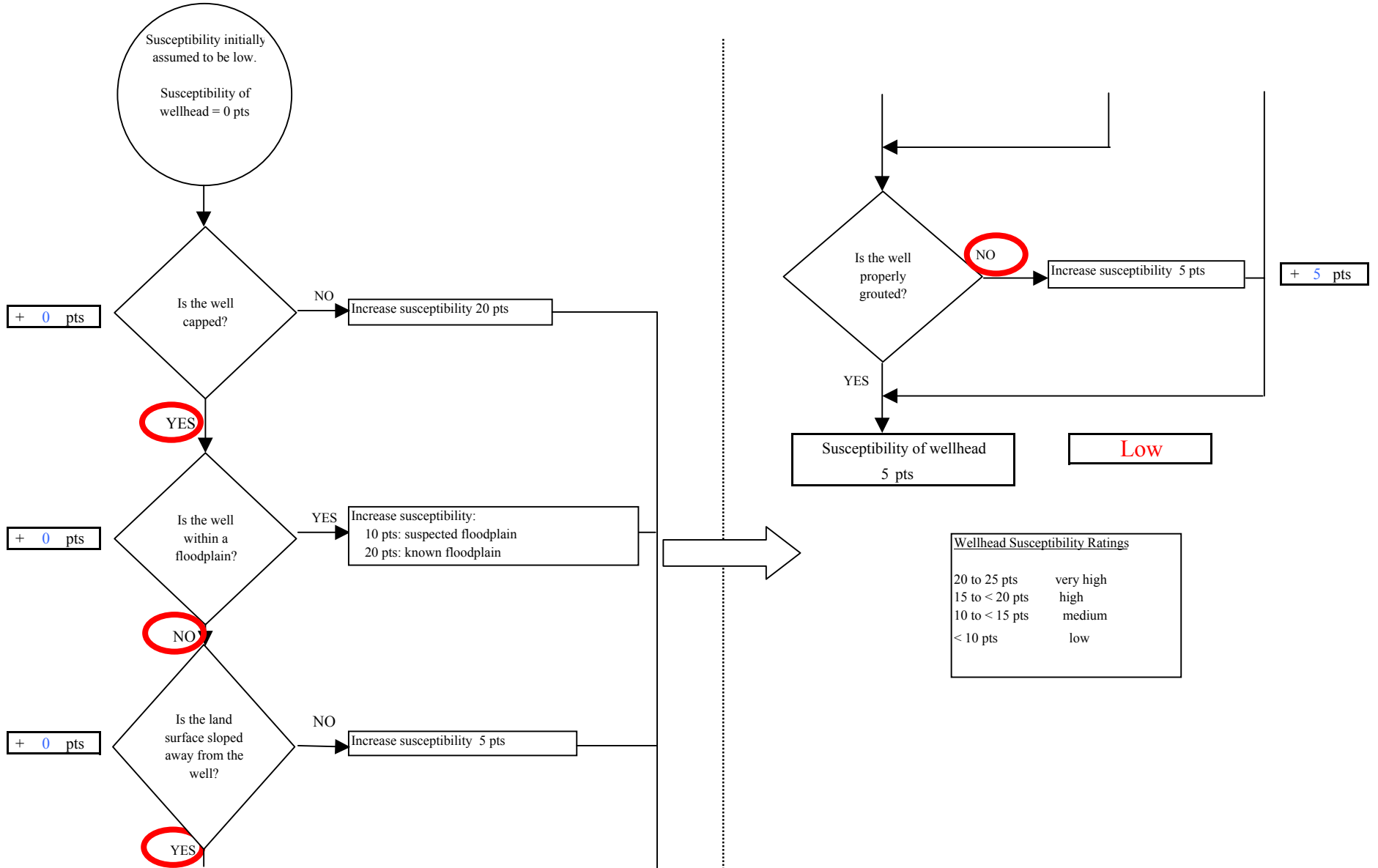


Chart 2. Susceptibility of the aquifer - DeArmoun Homeowners Association

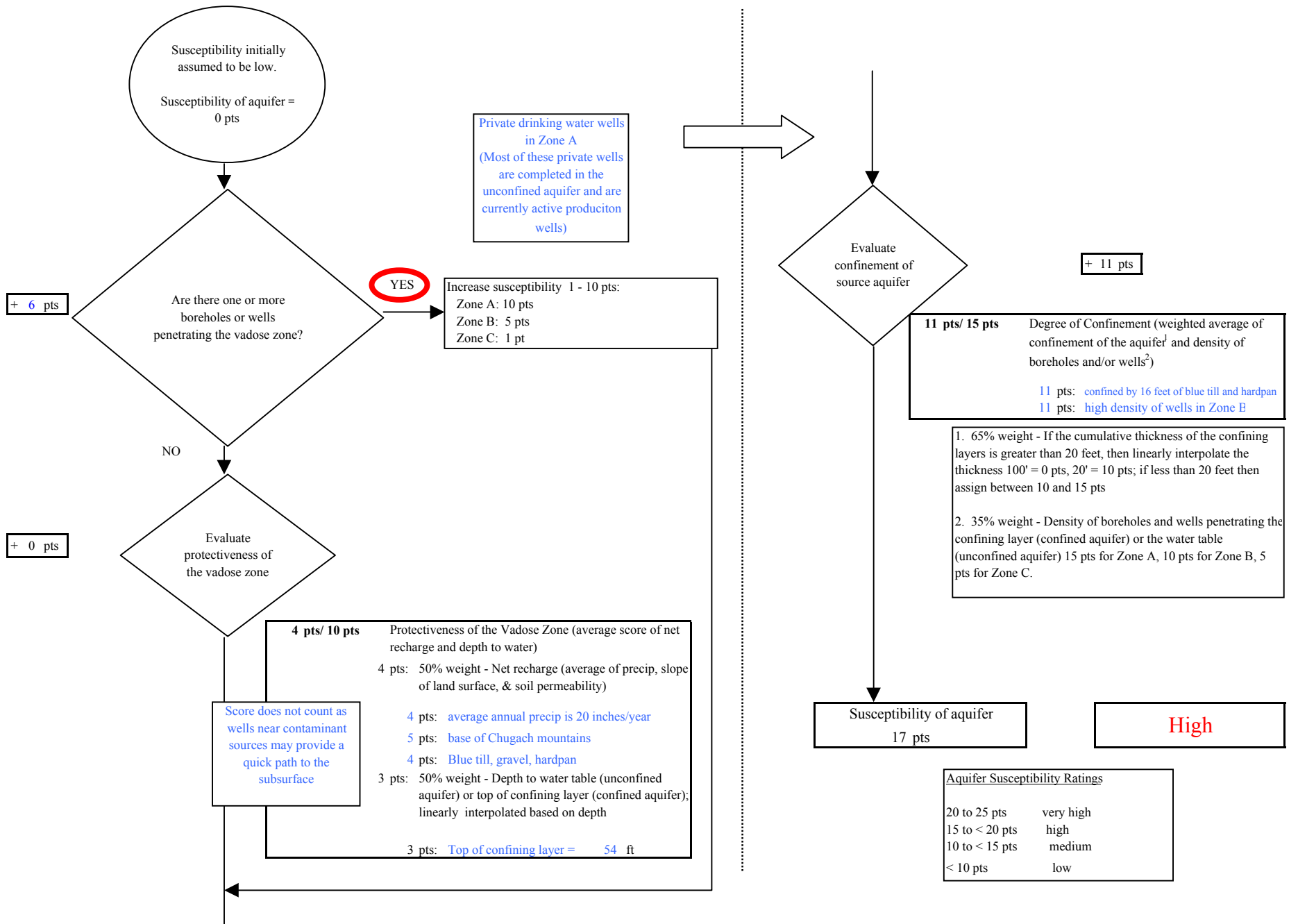
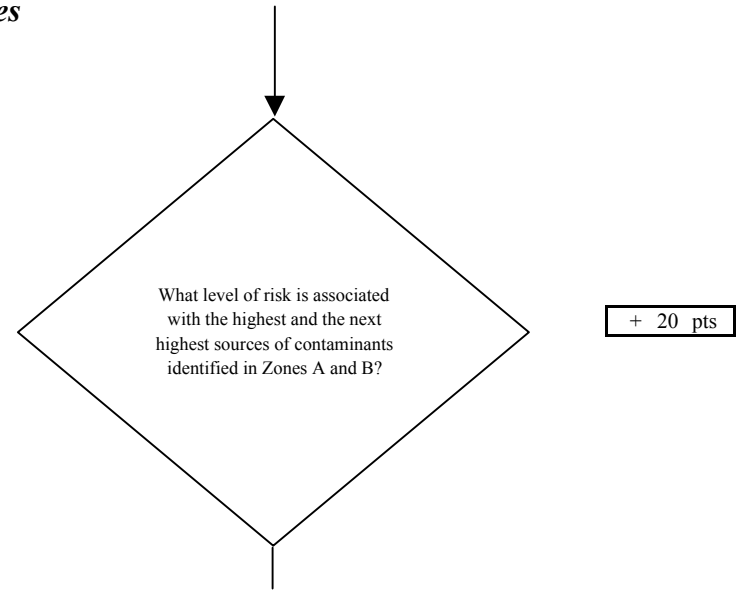
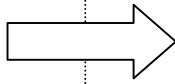
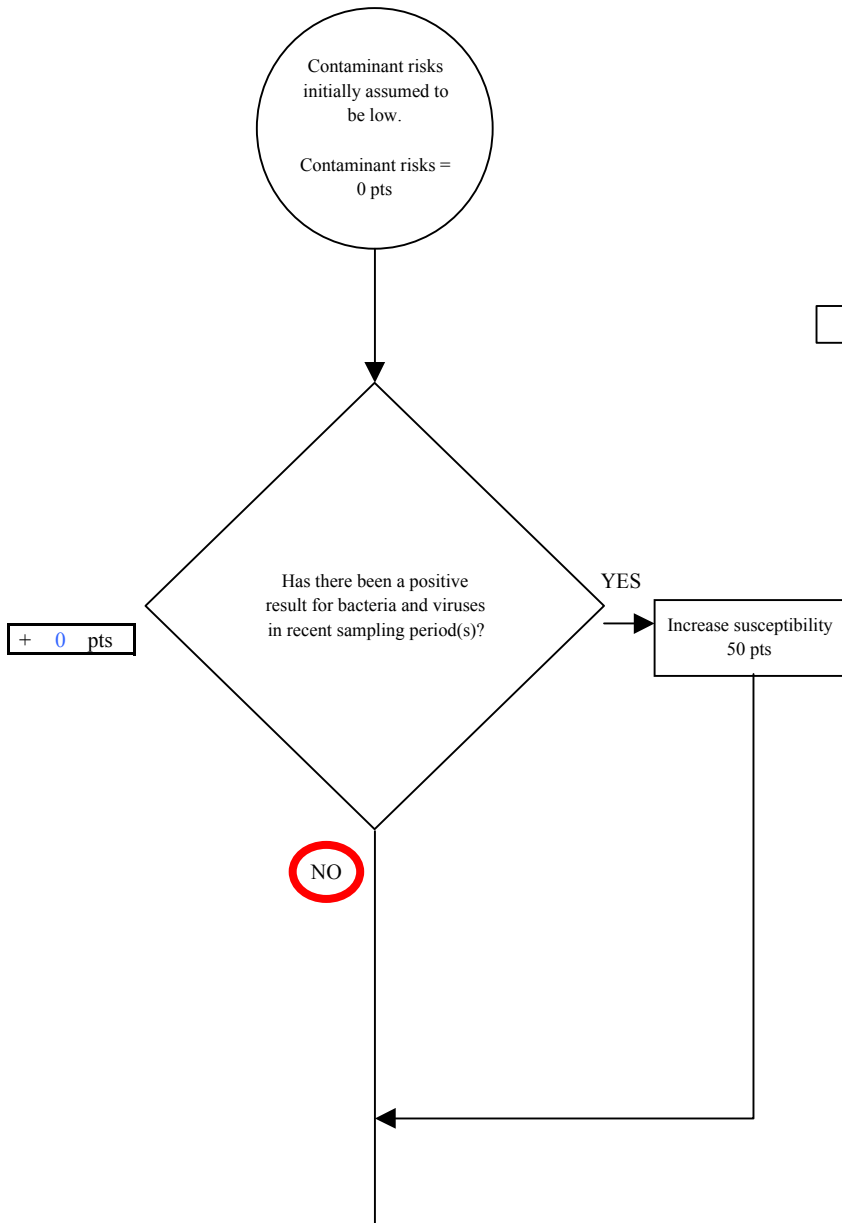


Chart 3. Contaminant risks for DeArmoun Homeowners Association - Bacteria & Viruses



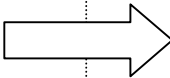
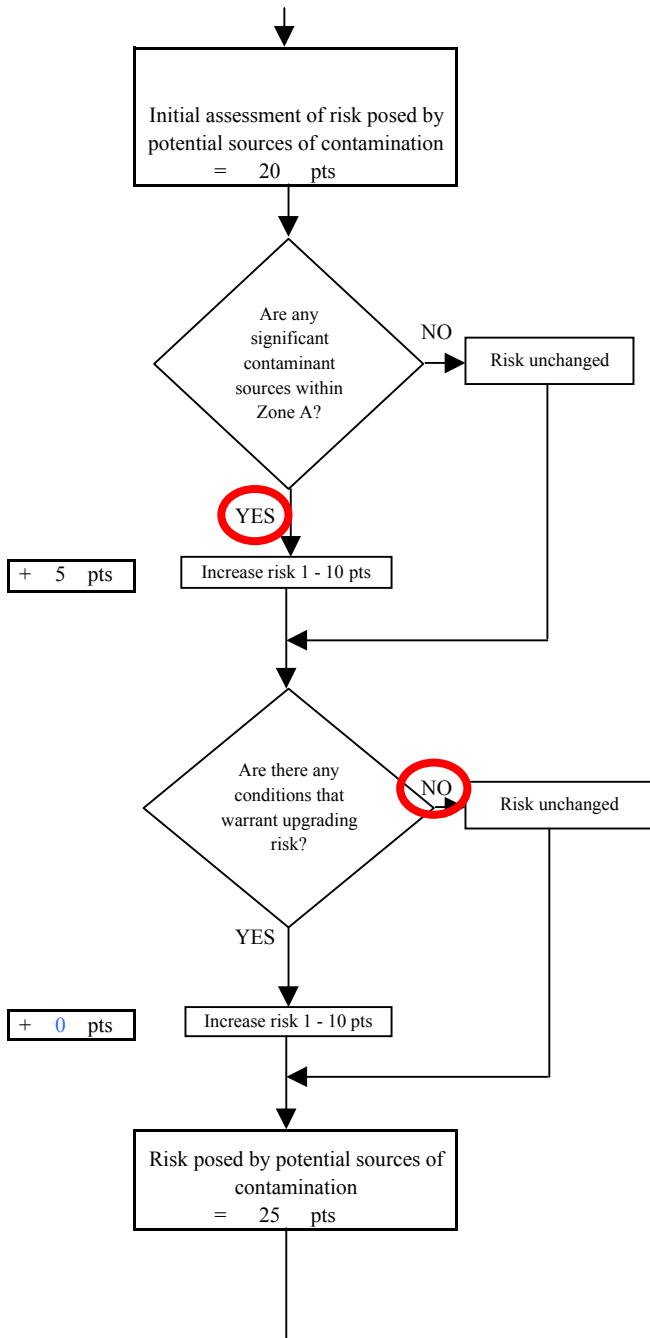
Risk Rankings for Contaminant Sources Identified in Zones A and B			
	Zone A	Zone B	Total
Very High(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	11	7	18

	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

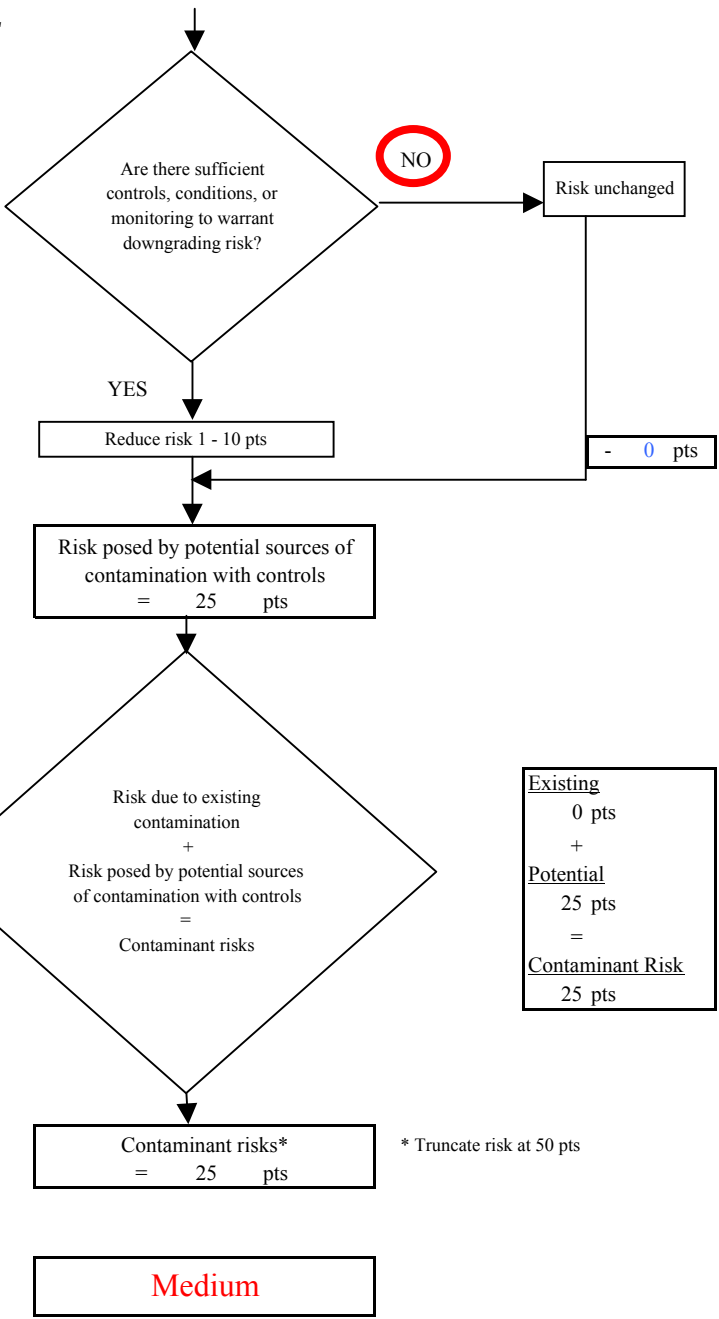
Matrix Score 20

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 DeArmoun Homeowners Association - Bacteria & Viruses



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



Existing	0 pts
+	
Potential	25 pts
=	
Contaminant Risk	25 pts

* Truncate risk at 50 pts

Chart 4. Vulnerability analysis for DeArmoun Homeowners Association - Bacteria & Viruses

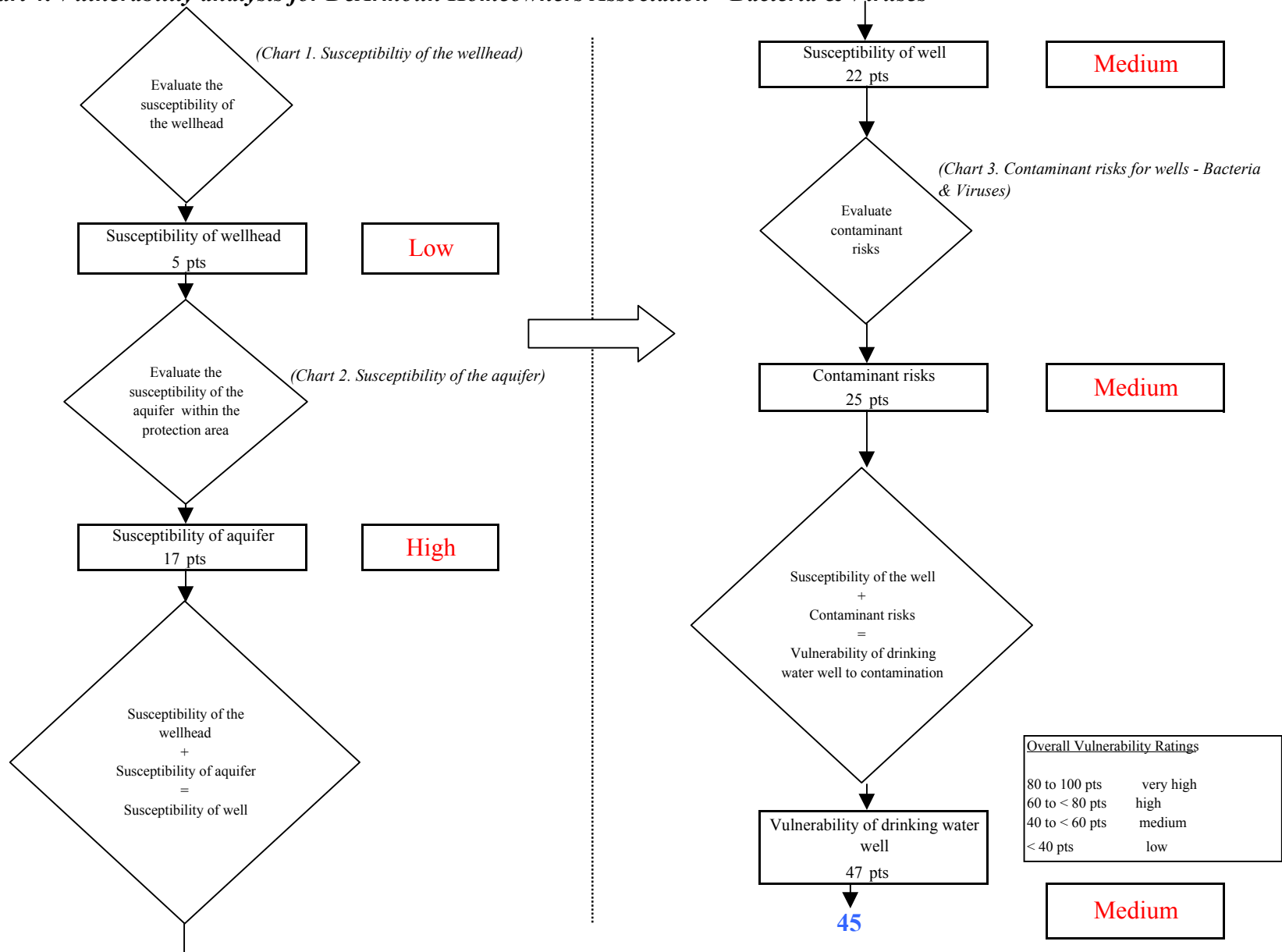


Chart 5. Contaminant risks for DeArmoun Homeowners Association - Nitrates and Nitrites

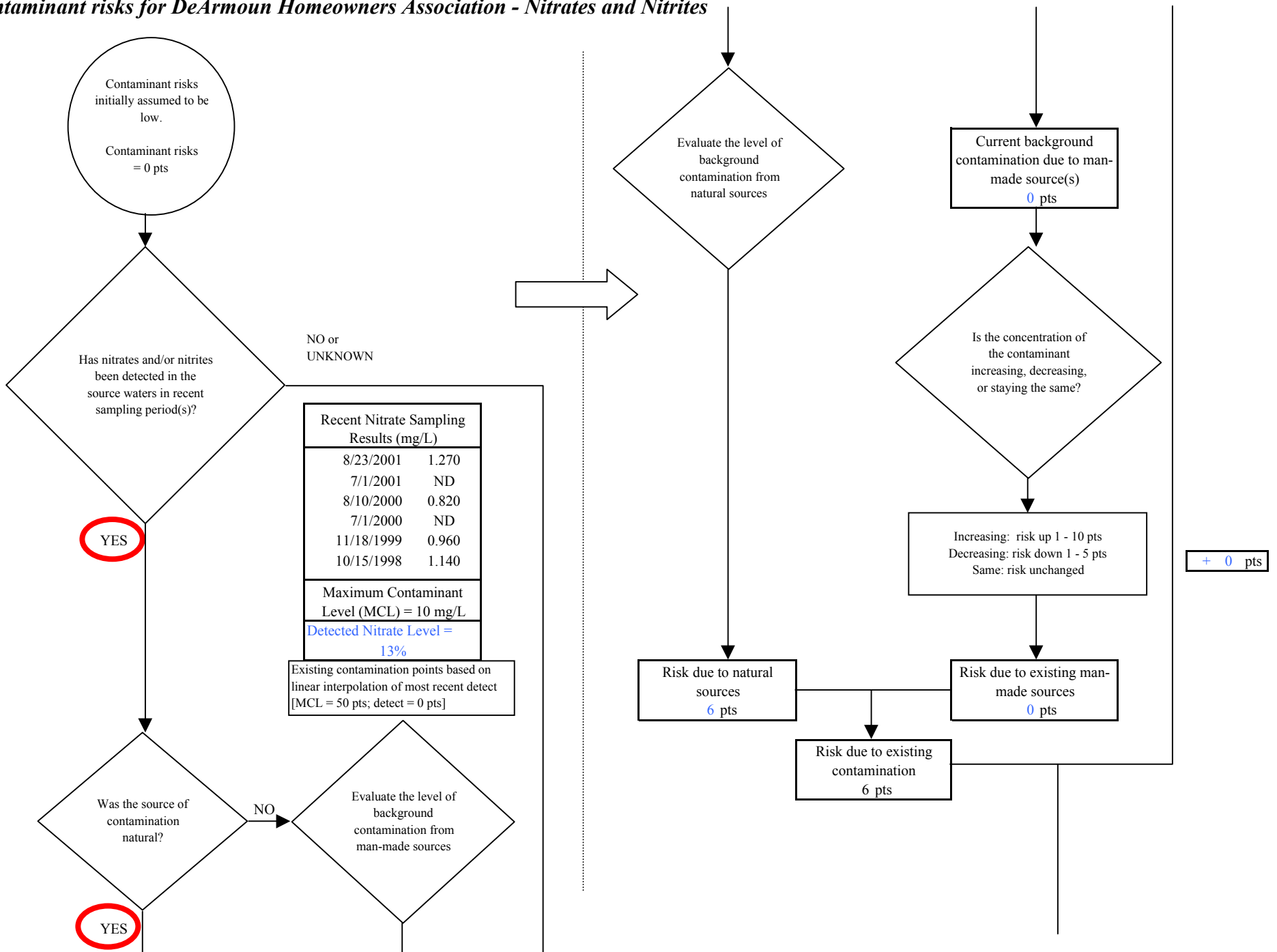
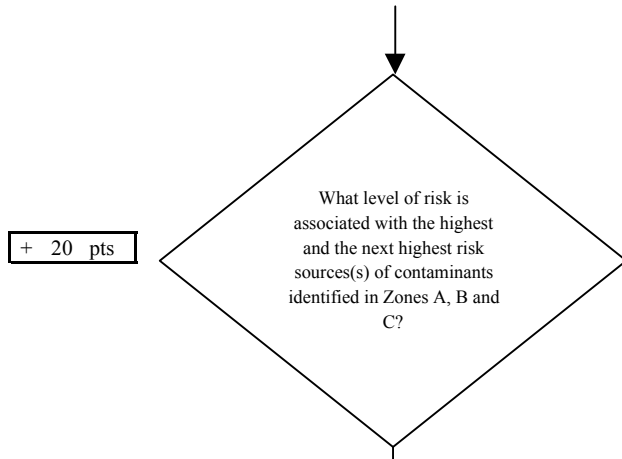


Chart 5. Contaminant risks for DeArmoun Homeowners Association - Nitrates and Nitrites



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	12	13

	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.

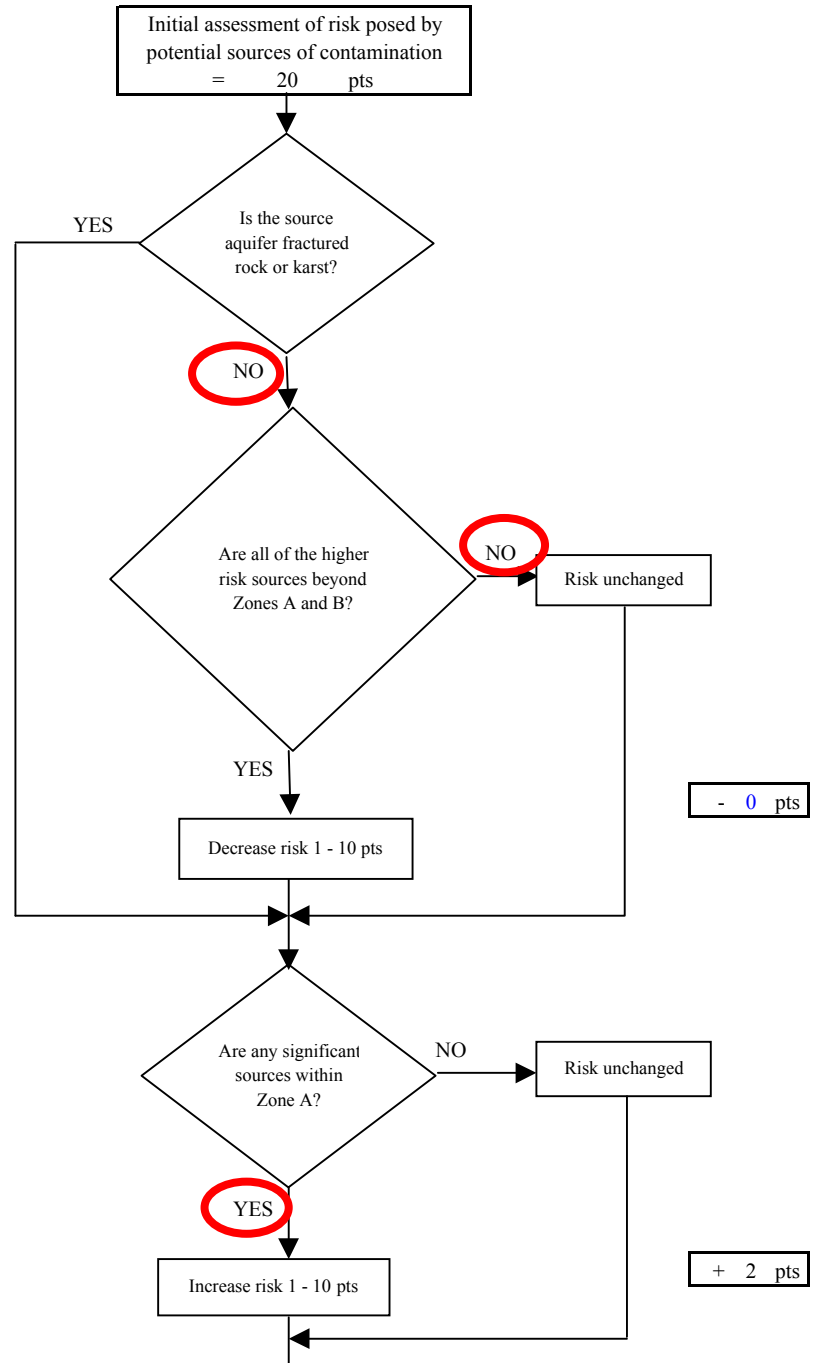
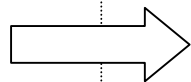


Chart 5. Contaminant risks for DeArmoun Homeowners Association - Nitrates and Nitrites

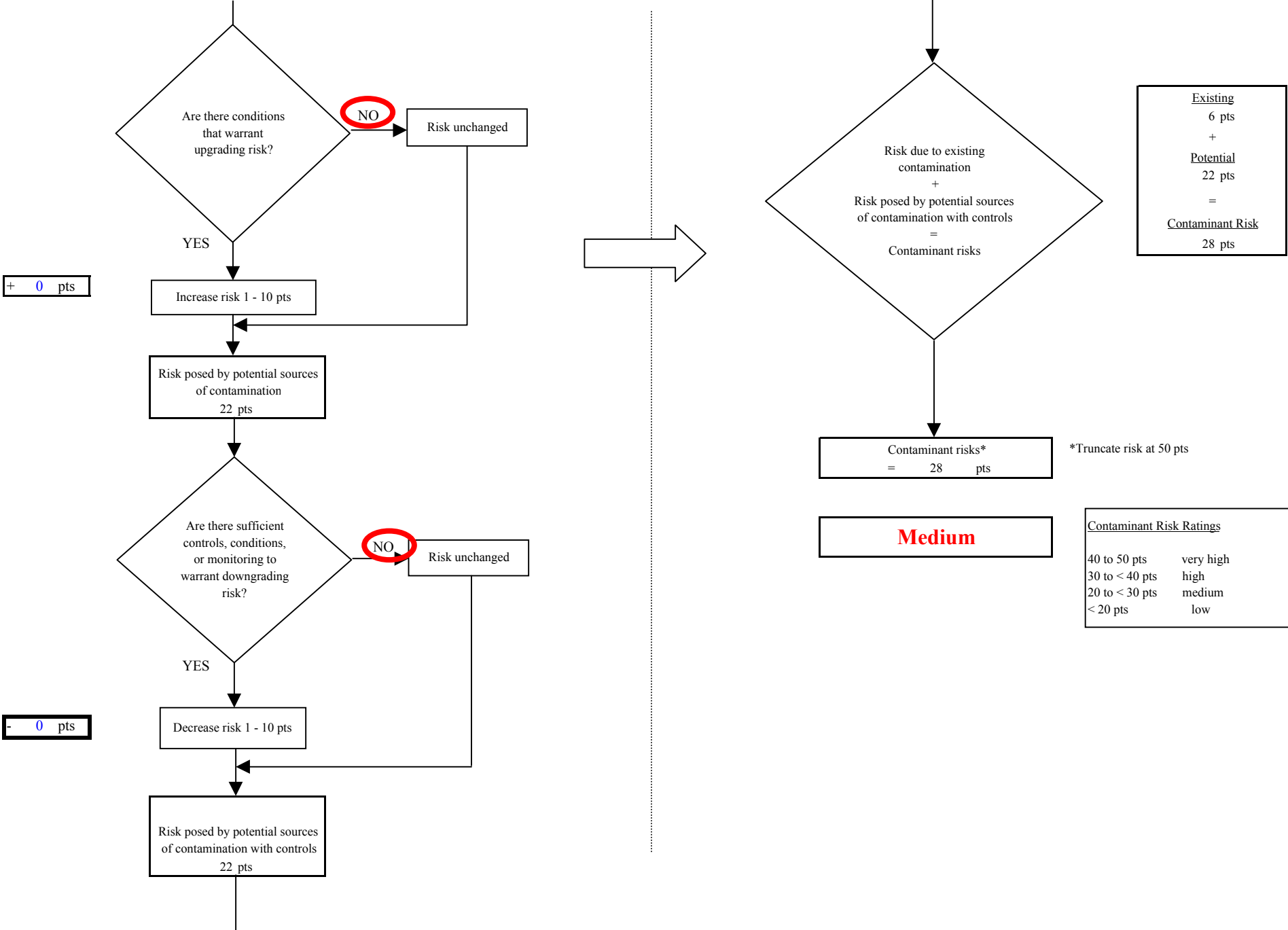


Chart 6. Vulnerability analysis for DeArmoun Homeowners Association - Nitrates and Nitrites

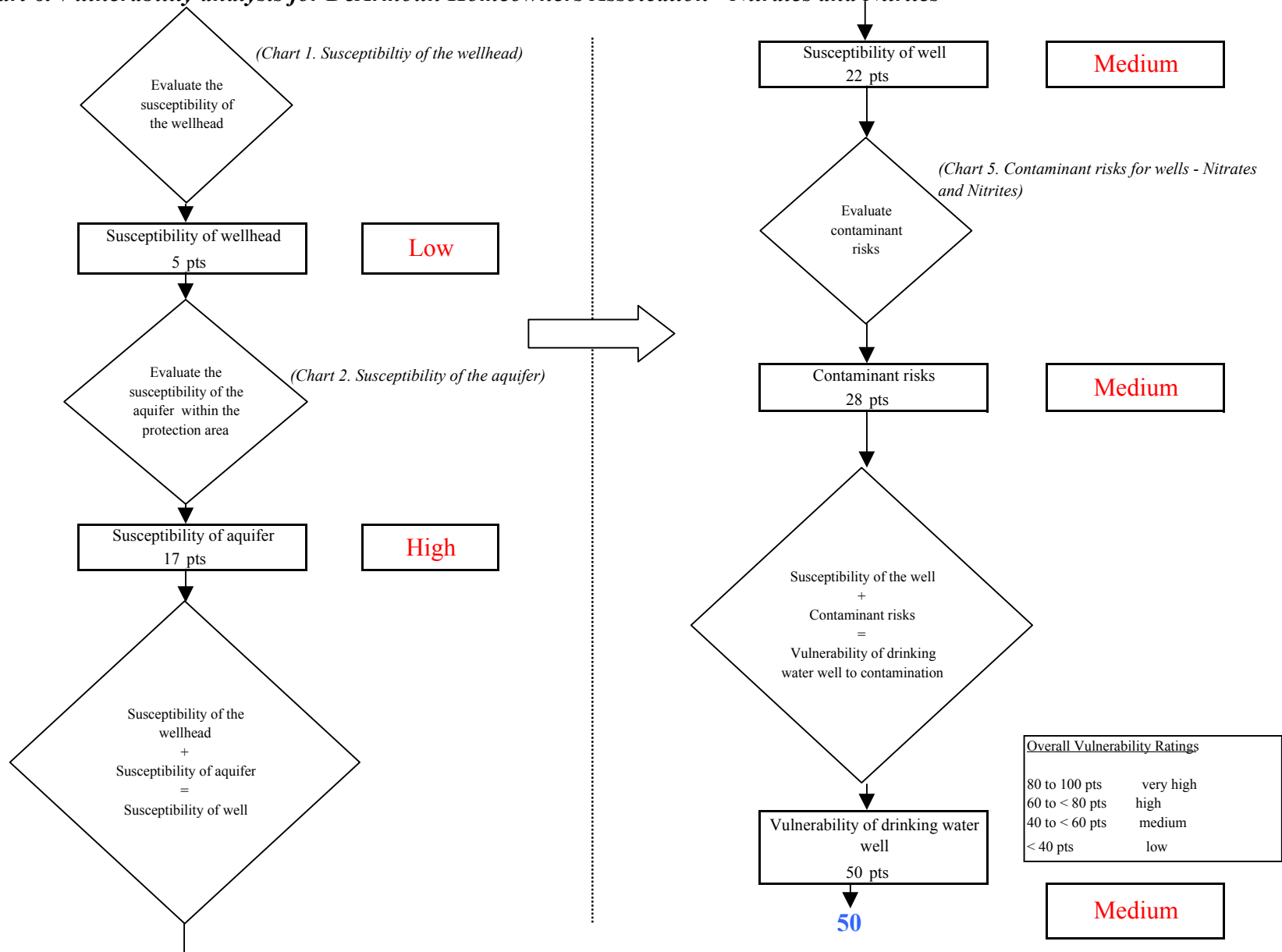


Chart 7. Contaminant risks for DeArmoun Homeowners Association - Volatile Organic Chemicals

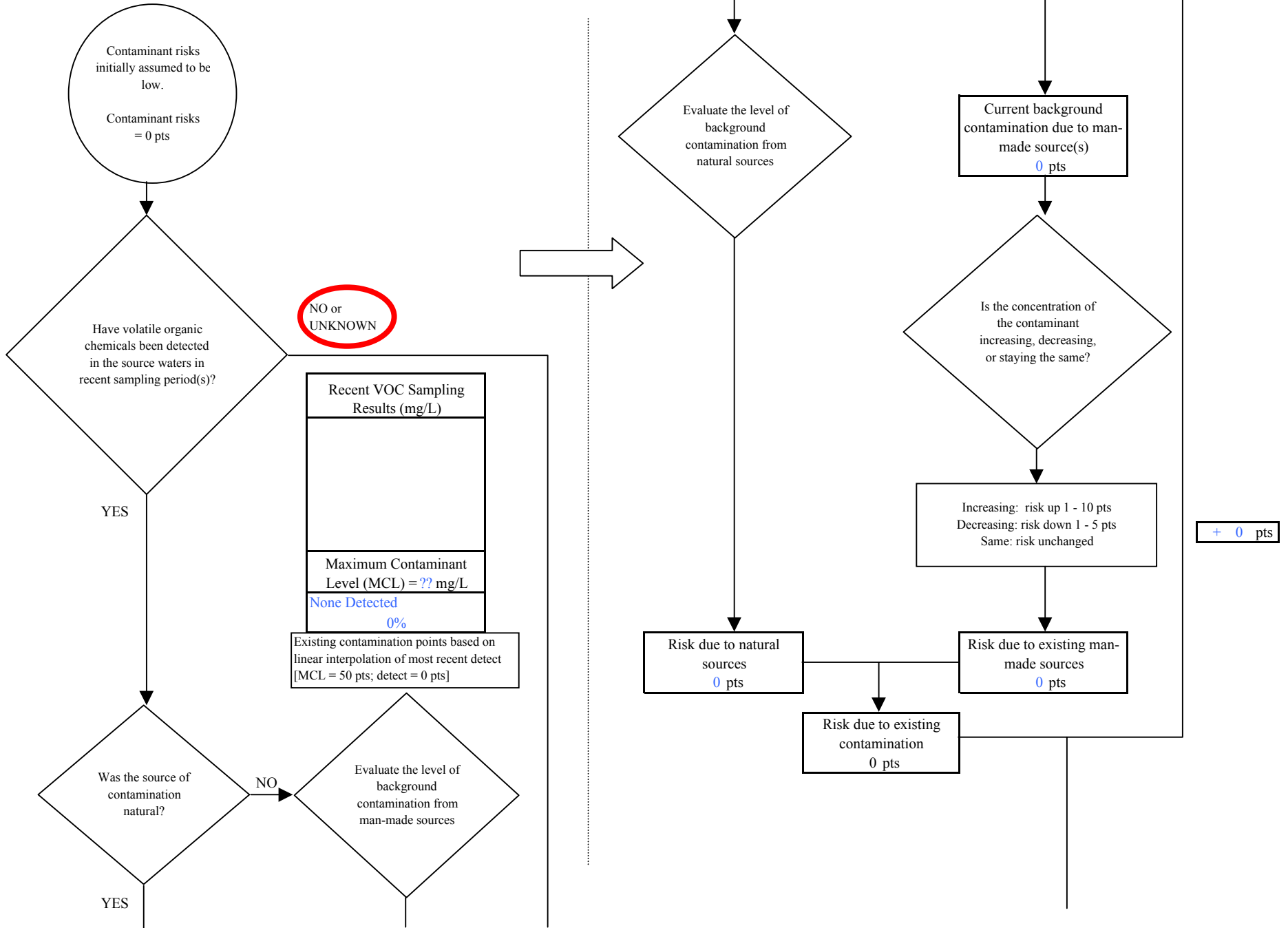
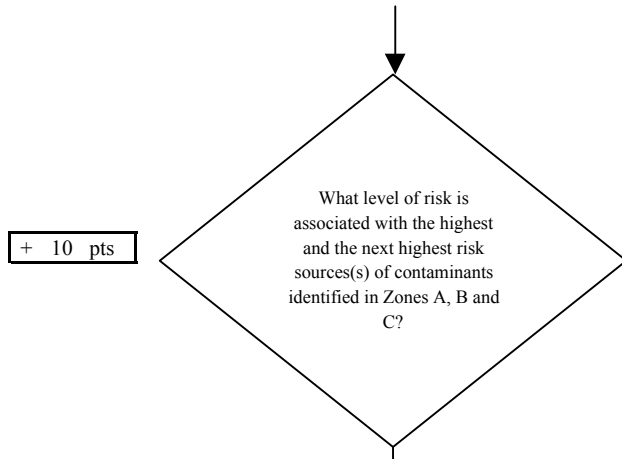


Chart 7. Contaminant risks for DeArmoun Homeowners Association - Volatile Organic Chemicals



Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	2	7	9

	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.

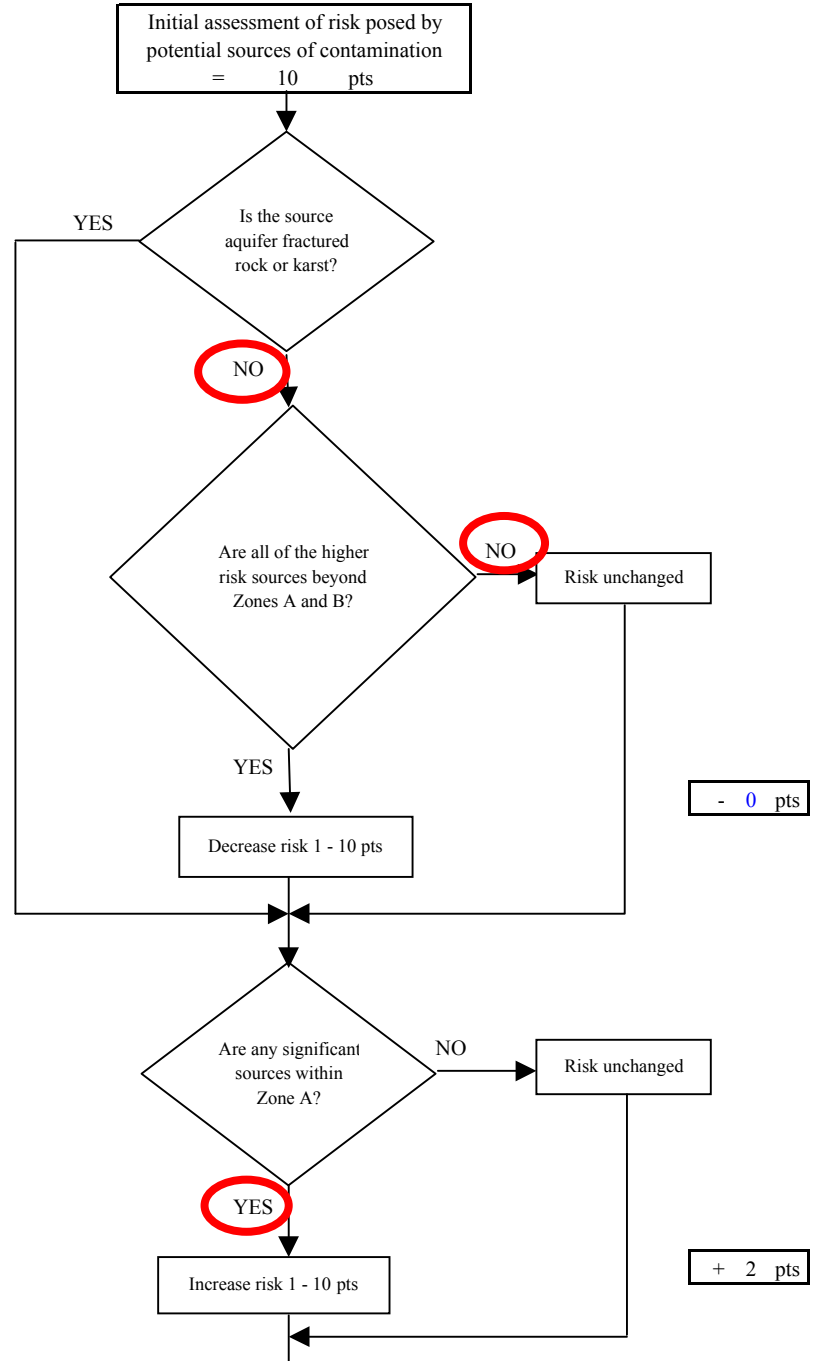
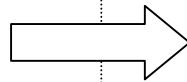


Chart 7. Contaminant risks for DeArmoun Homeowners Association - Volatile Organic Chemicals

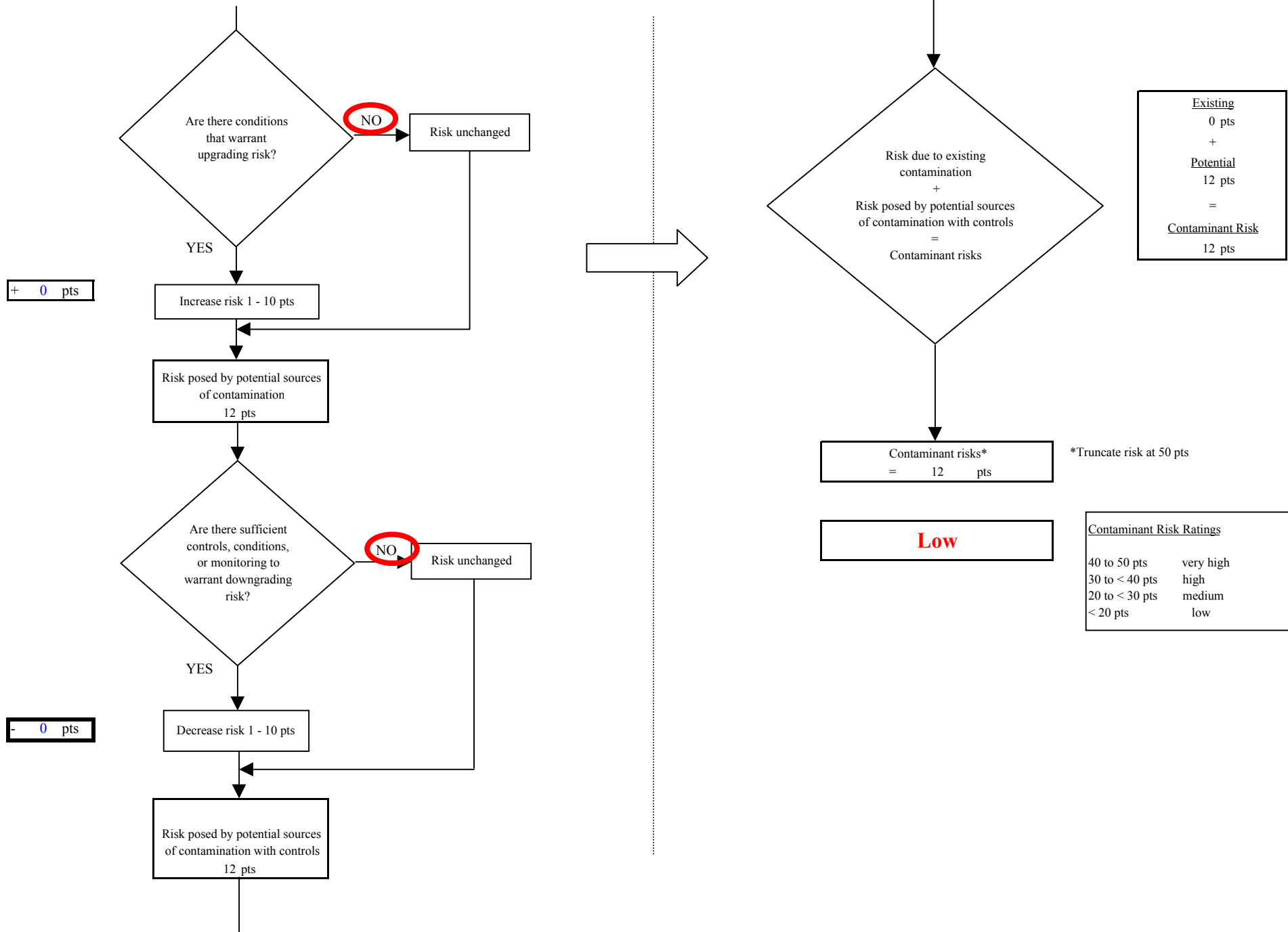


Chart 8. Vulnerability analysis for DeArmoun Homeowners Association - Volatile Organic Chemicals

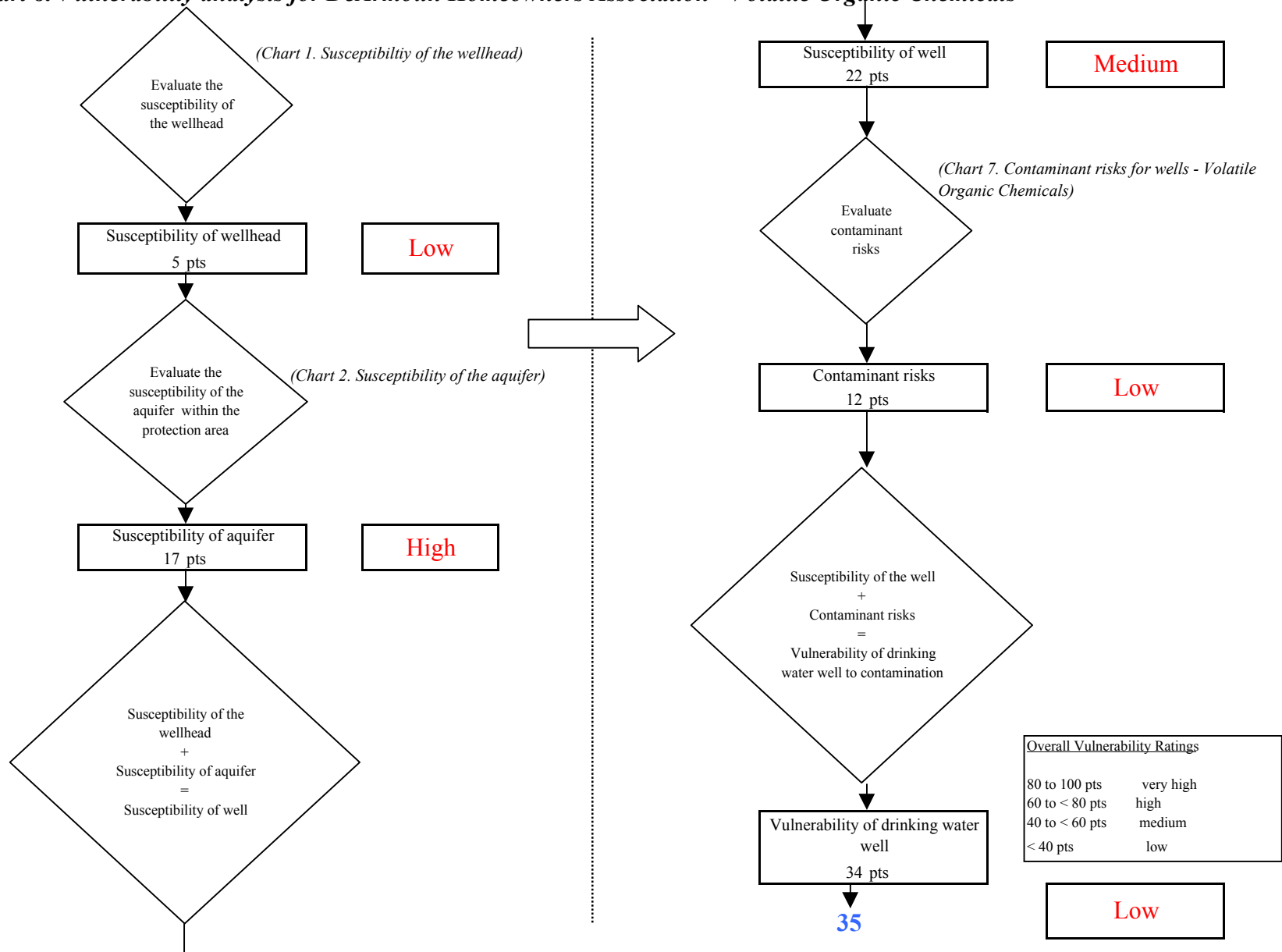


Chart 9. Contaminant risks for DeArmoun Homeowners Association - Heavy Metals, Cyanide and Other Inorganic Chemicals

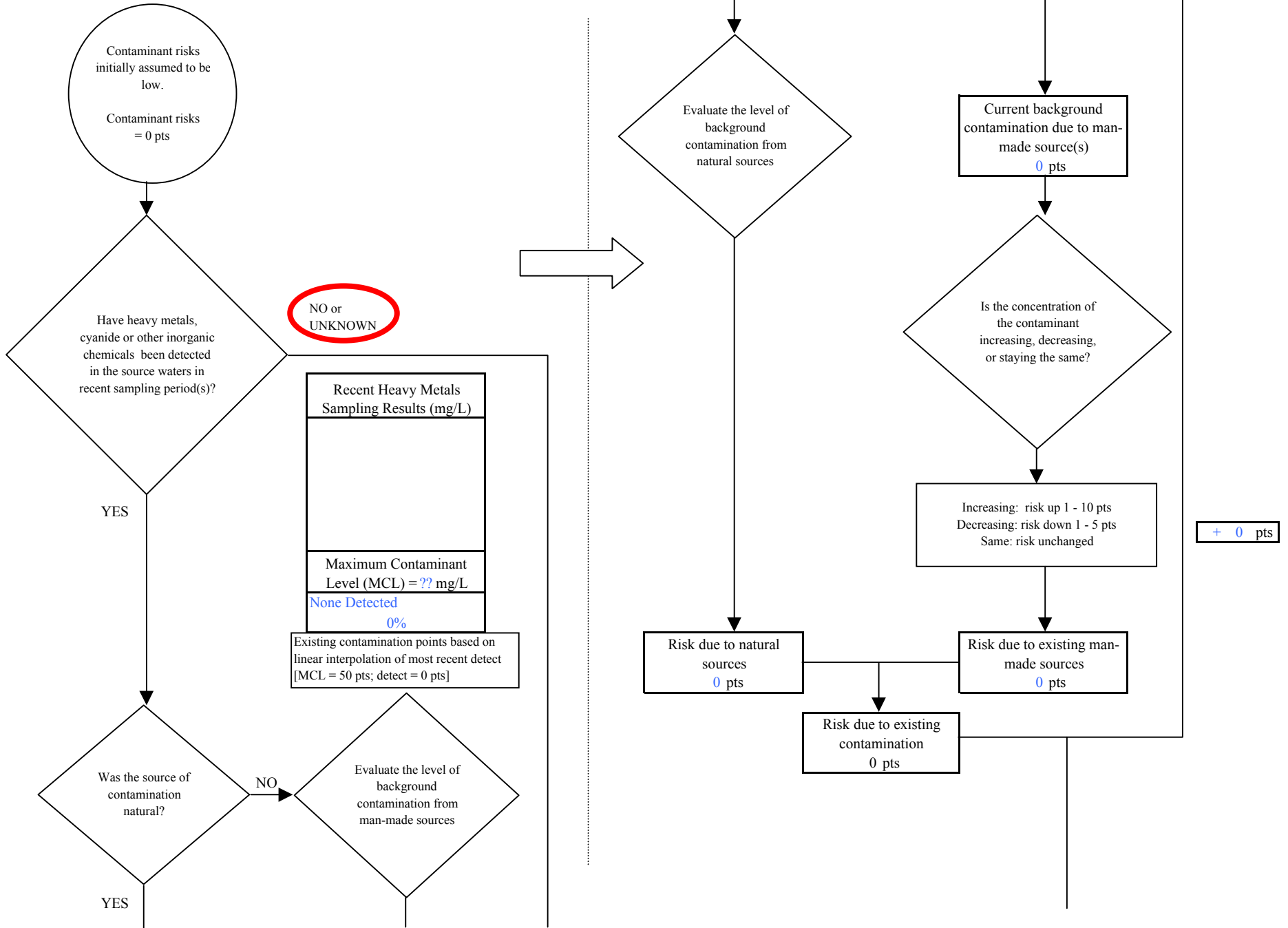
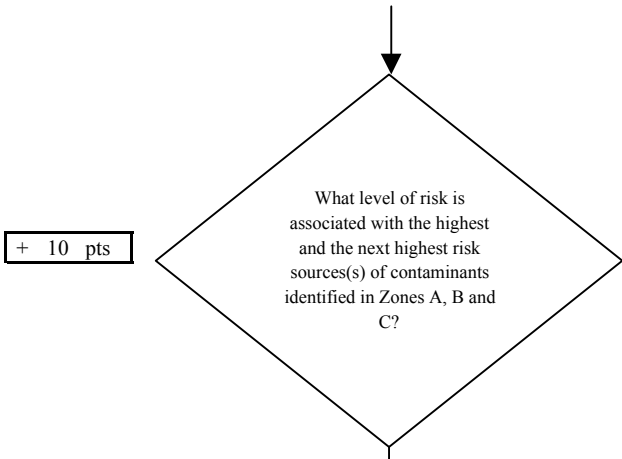


Chart 9. Contaminant risks for DeArmoun Homeowners Association - Heavy Metals, Cyanide and Other Inorganic Chemicals



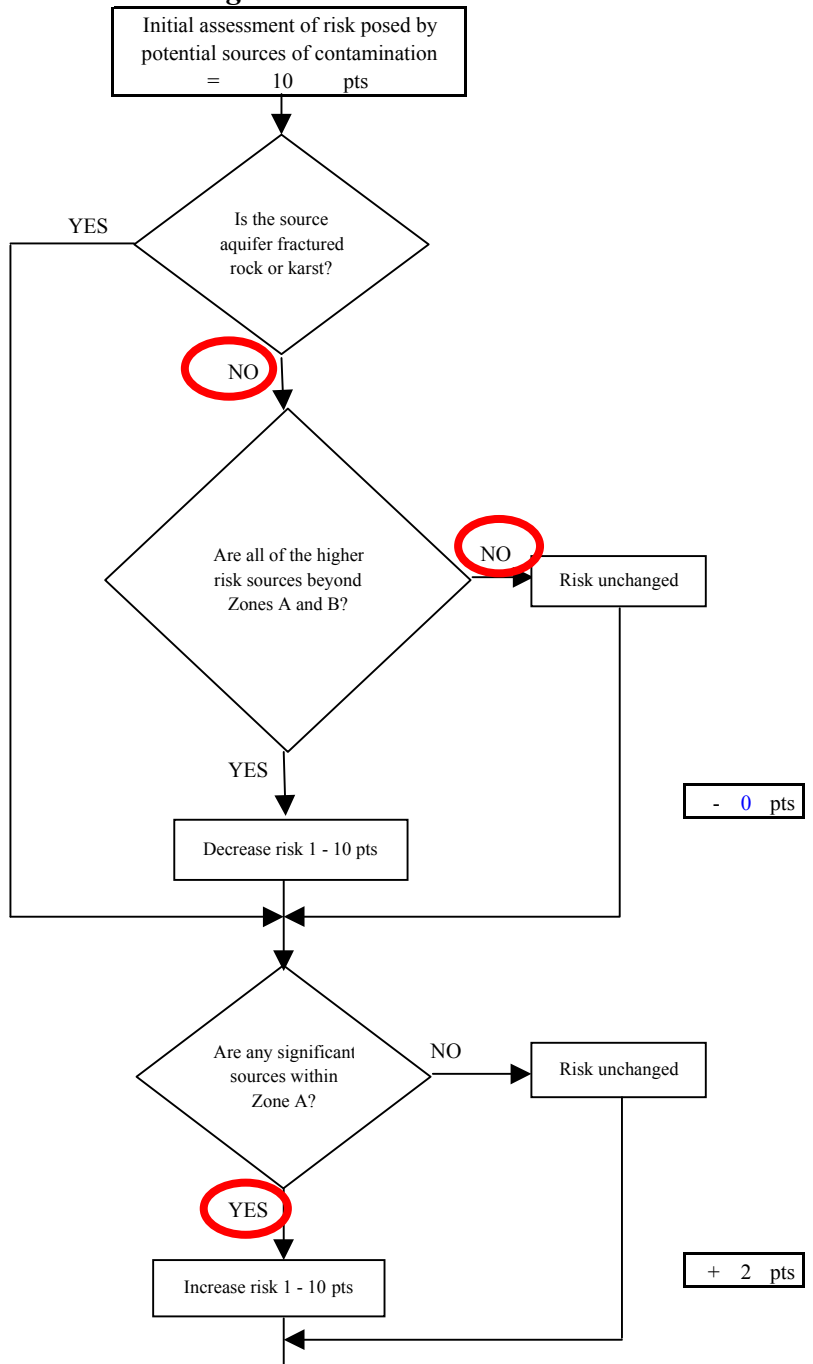
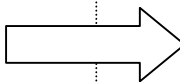
+ 10 pts

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)	2	5	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 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.



- 0 pts

+ 2 pts

Chart 9. Contaminant risks for DeArmoun Homeowners Association - Heavy Metals, Cyanide and Other Inorganic Chemicals

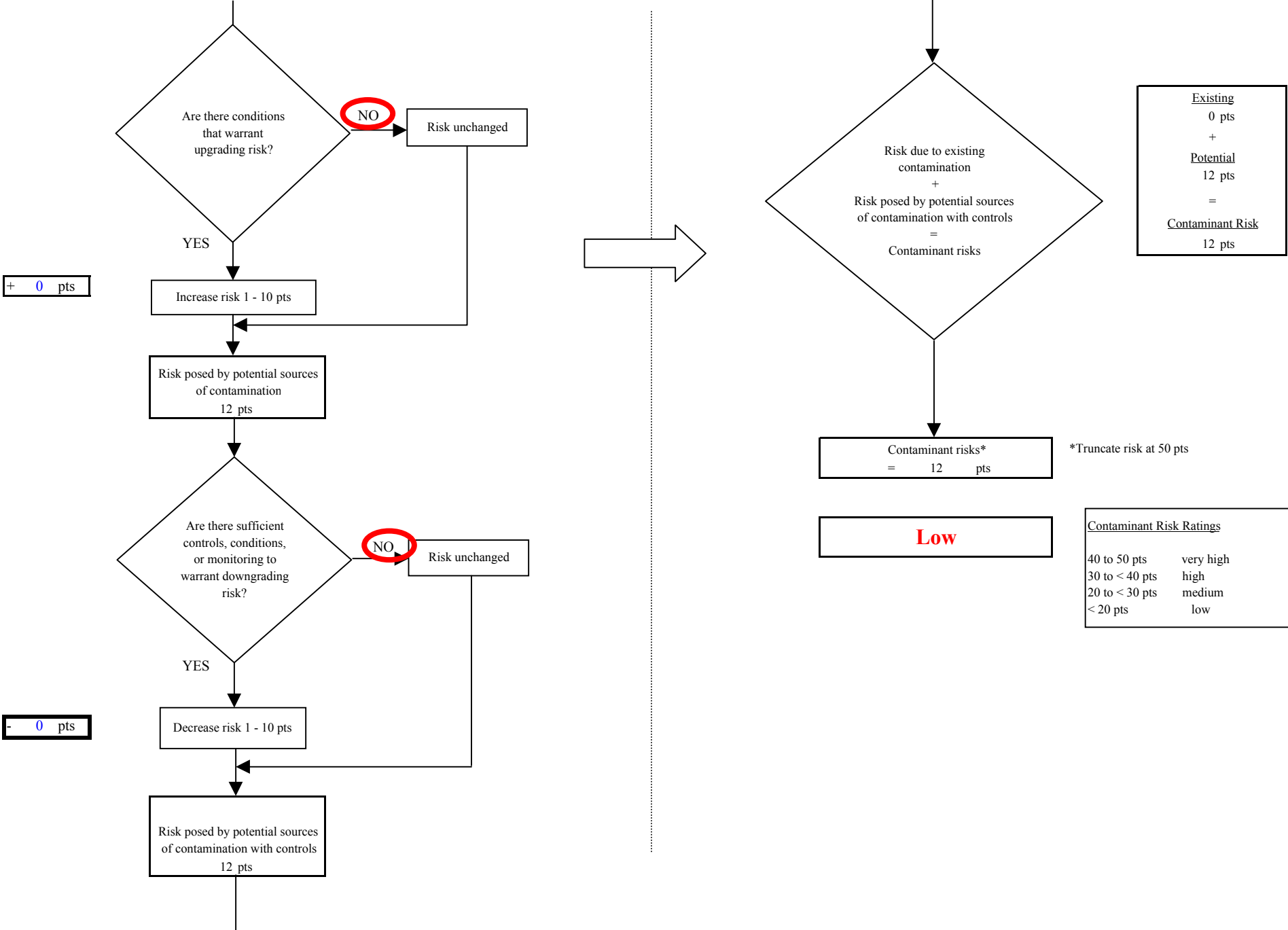


Chart 10. Vulnerability analysis for DeArmoun Homeowners Association - Heavy Metals, Cyanide and Other Inorganic Chemicals

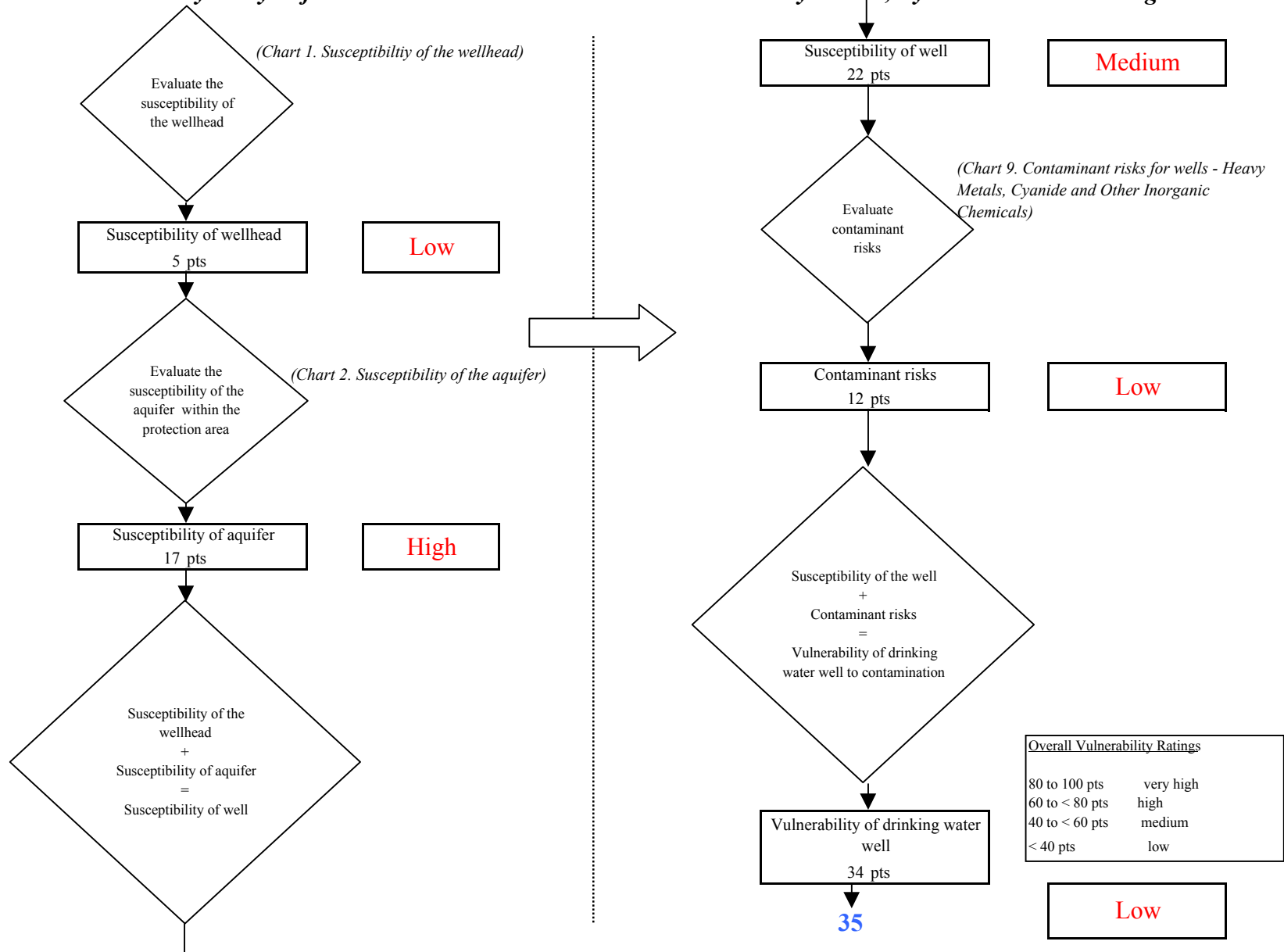


Chart 11. Contaminant risks for DeArmoun Homeowners Association - Synthetic Organic Chemicals

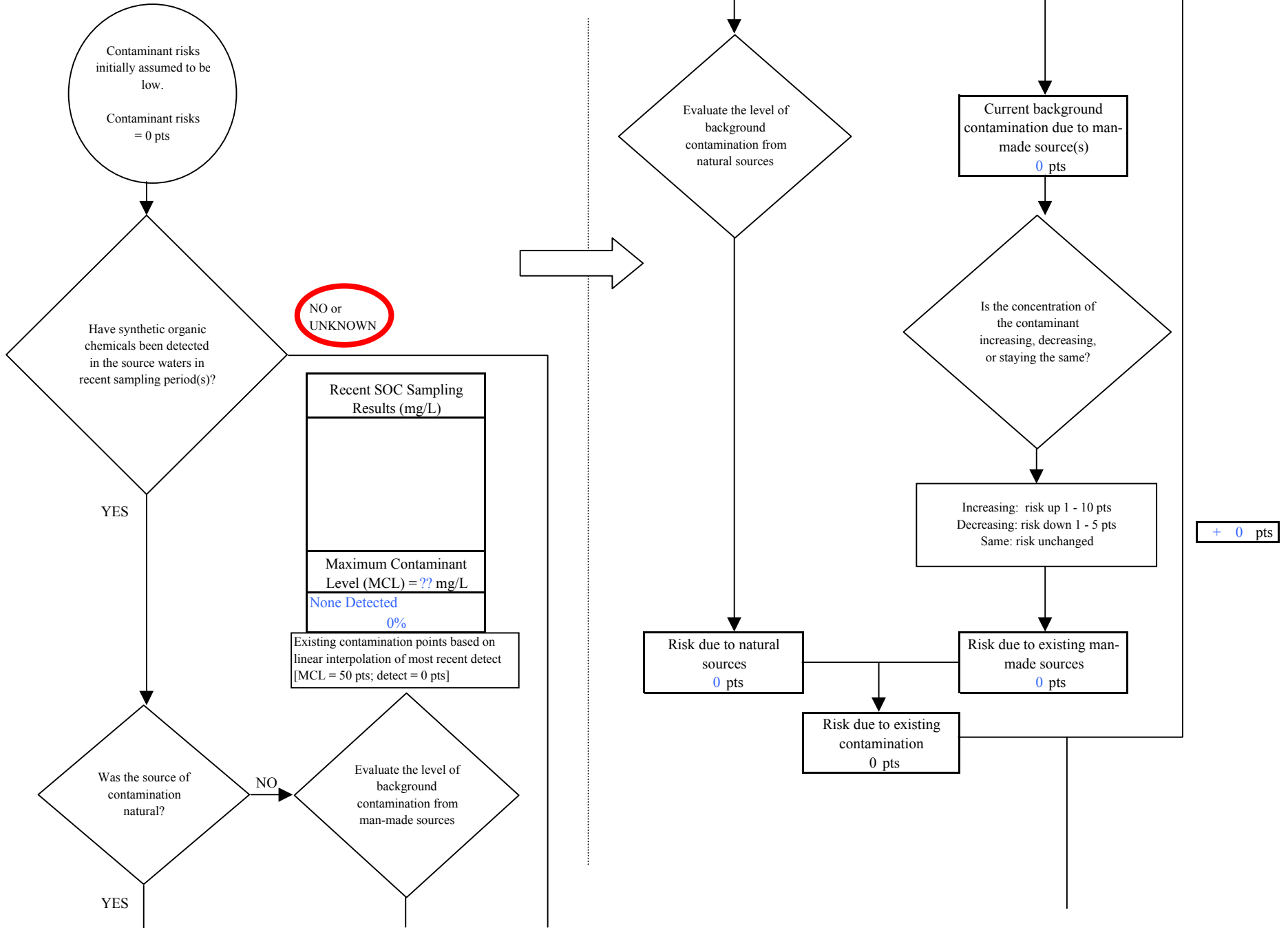


Chart 11. Contaminant risks for DeArmoun Homeowners Association - Synthetic Organic Chemicals

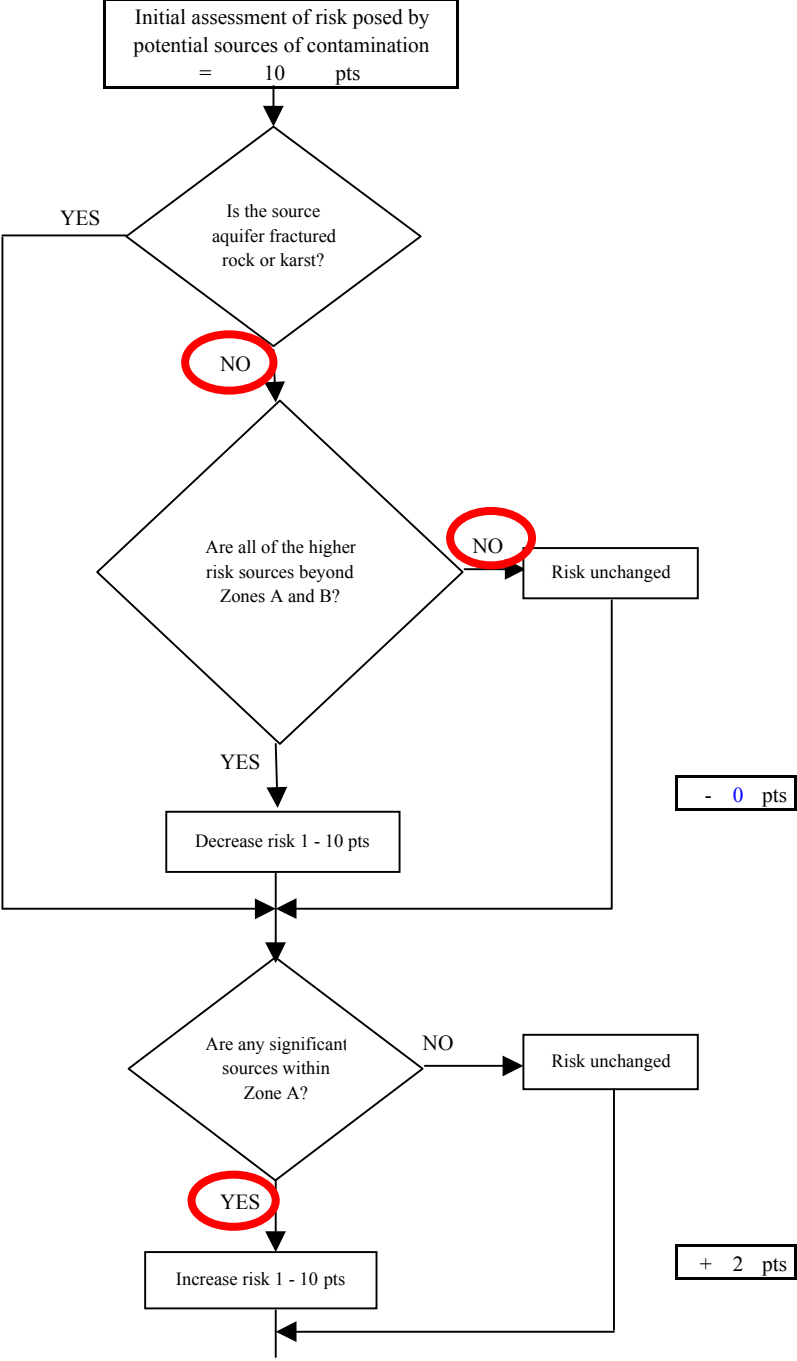
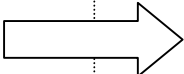
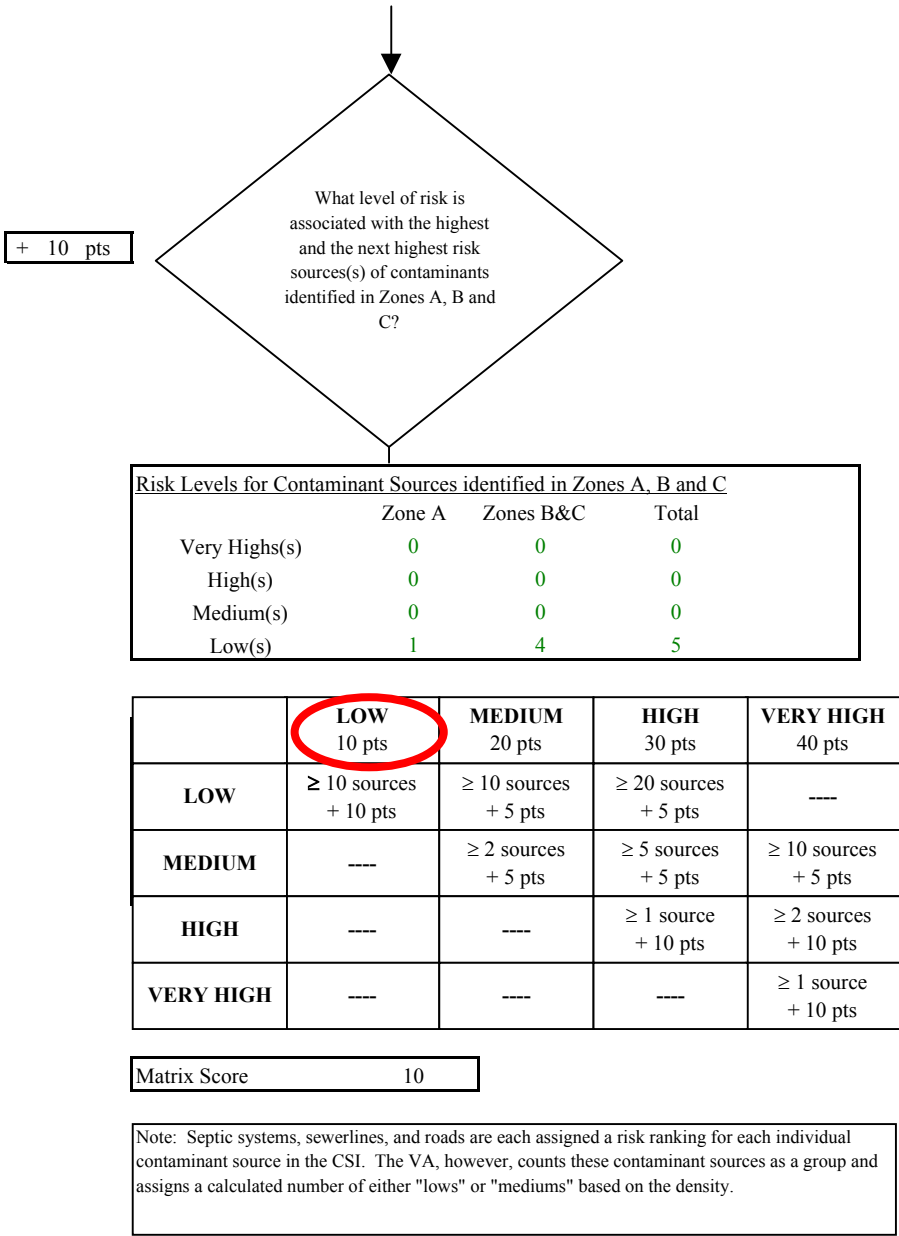


Chart 11. Contaminant risks for DeArmour Homeowners Association - Synthetic Organic Chemicals

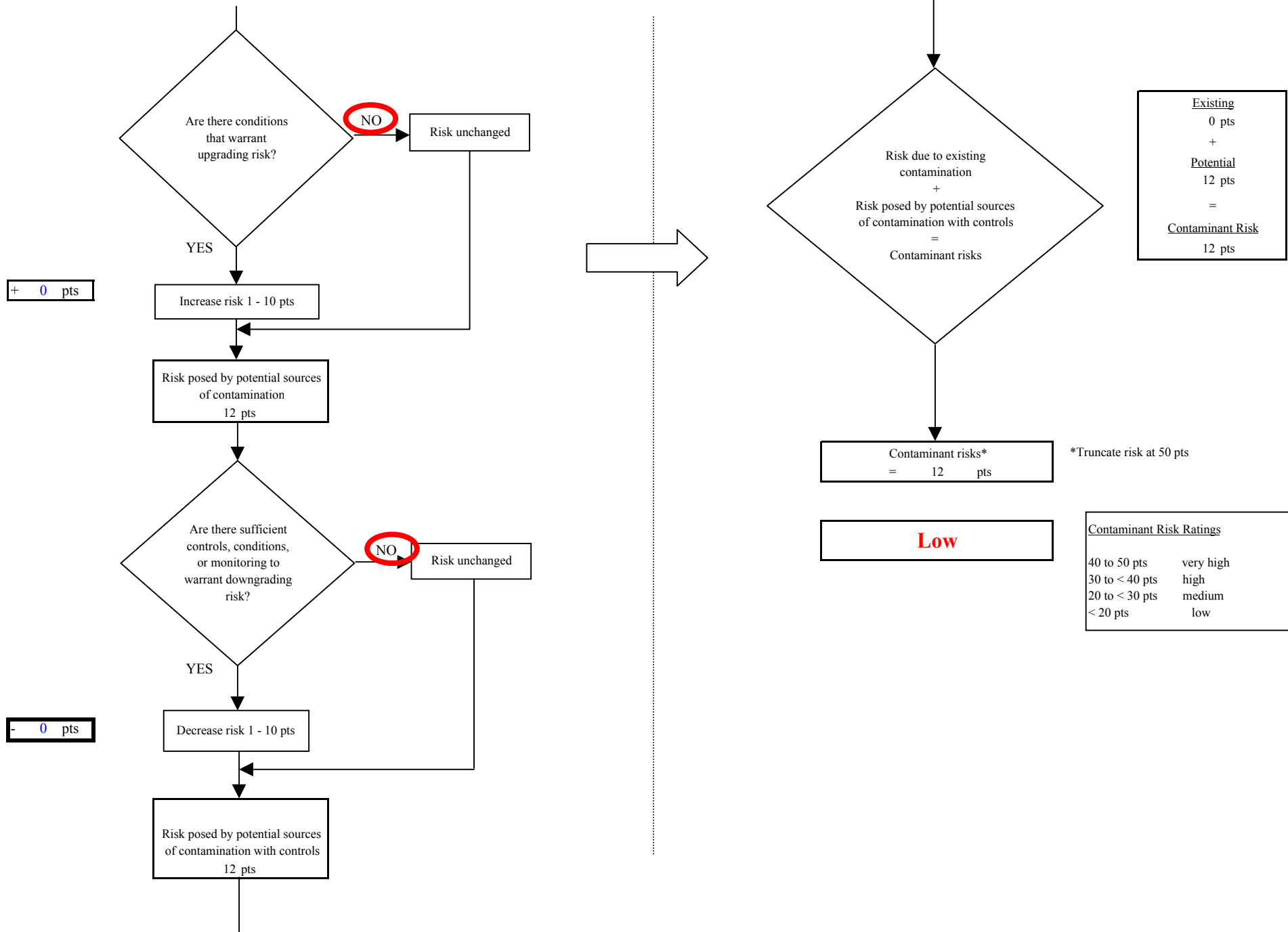


Chart 12. Vulnerability analysis for DeArmoun Homeowners Association - Synthetic Organic Chemicals

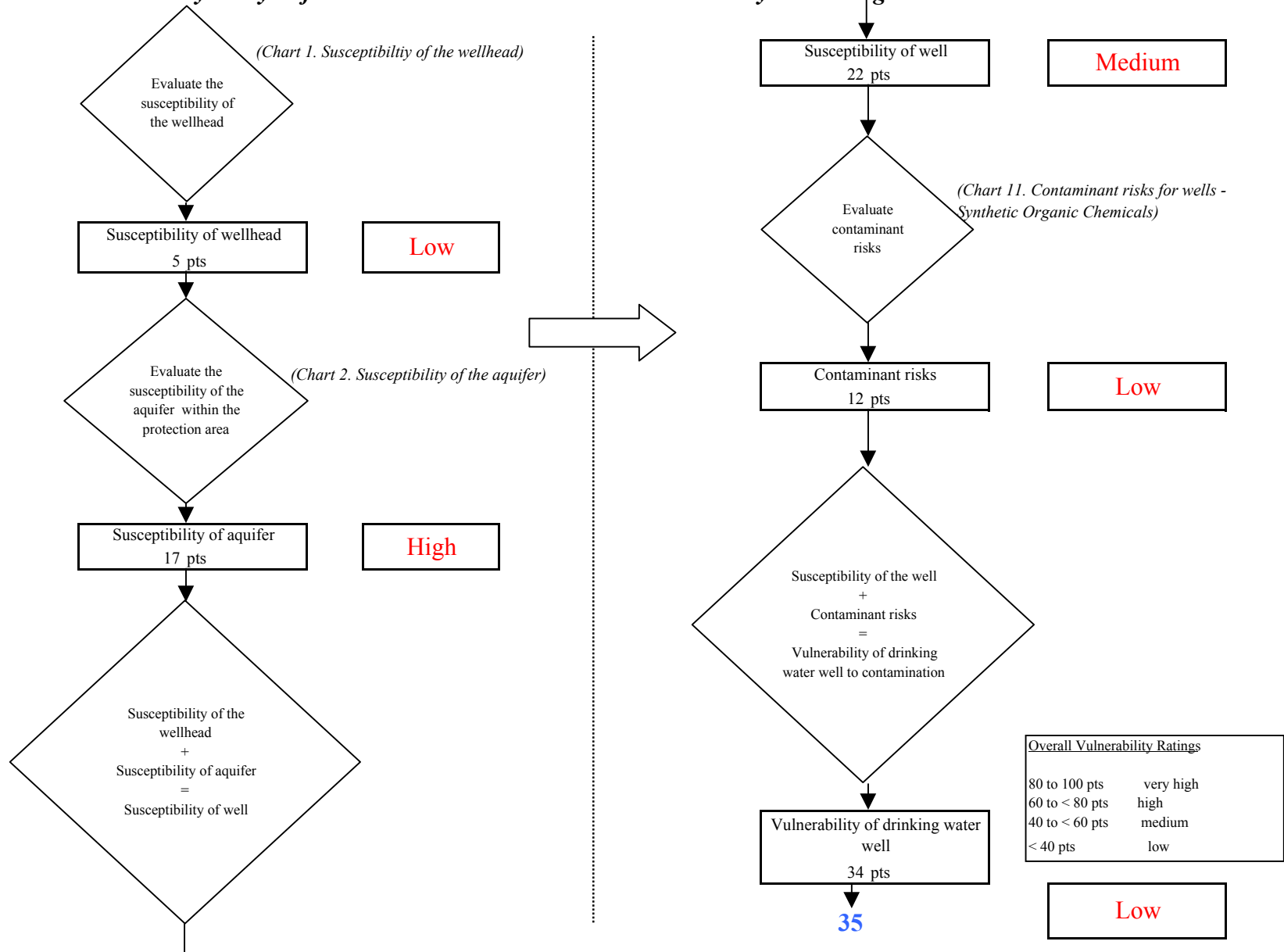


Chart 13. Contaminant risks for DeArmoun Homeowners Association - Other Organic Chemicals

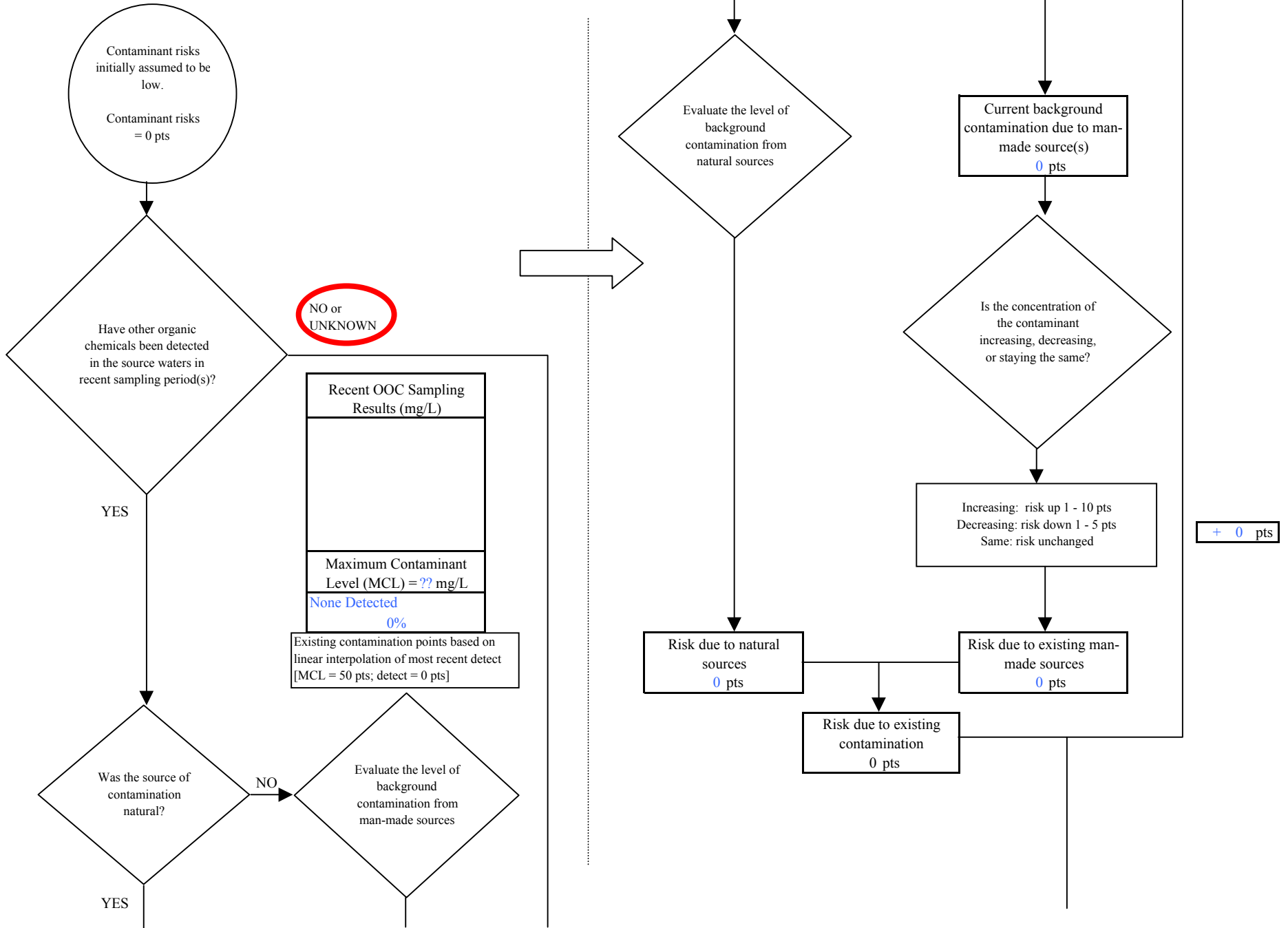
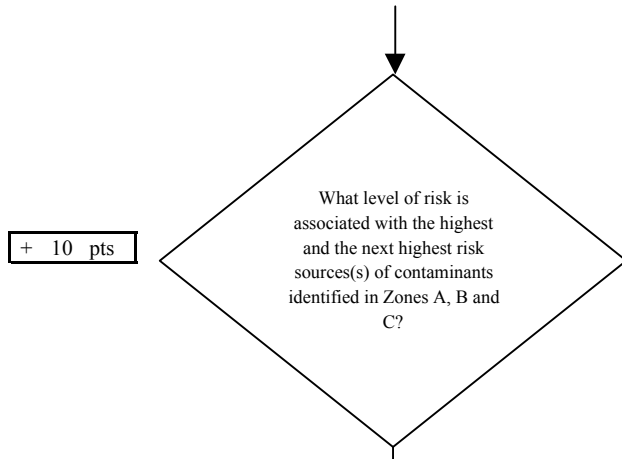


Chart 13. Contaminant risks for DeArmoun Homeowners Association - Other Organic Chemicals



Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	2	5	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 10

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

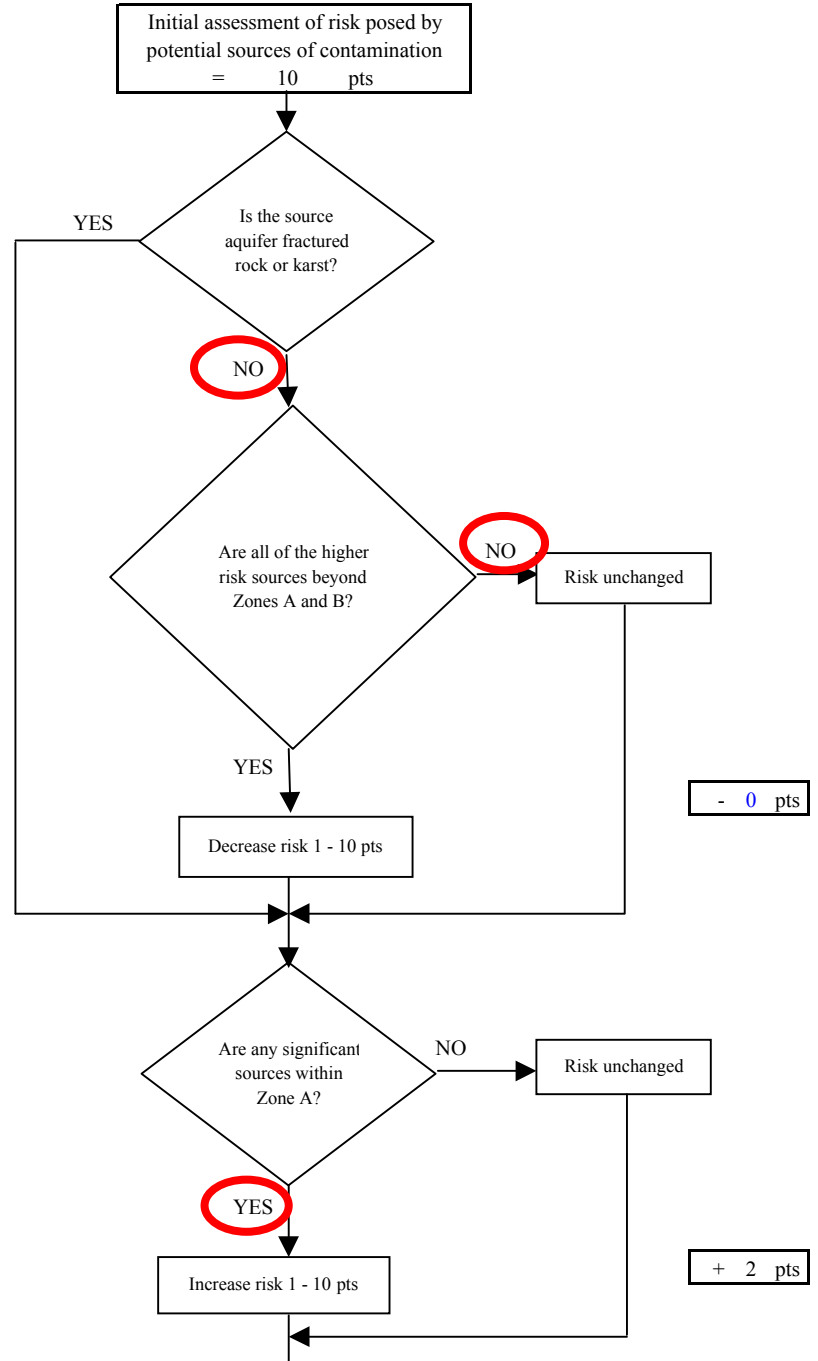
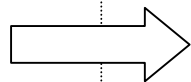


Chart 13. Contaminant risks for DeArmour Homeowners Association - Other Organic Chemicals

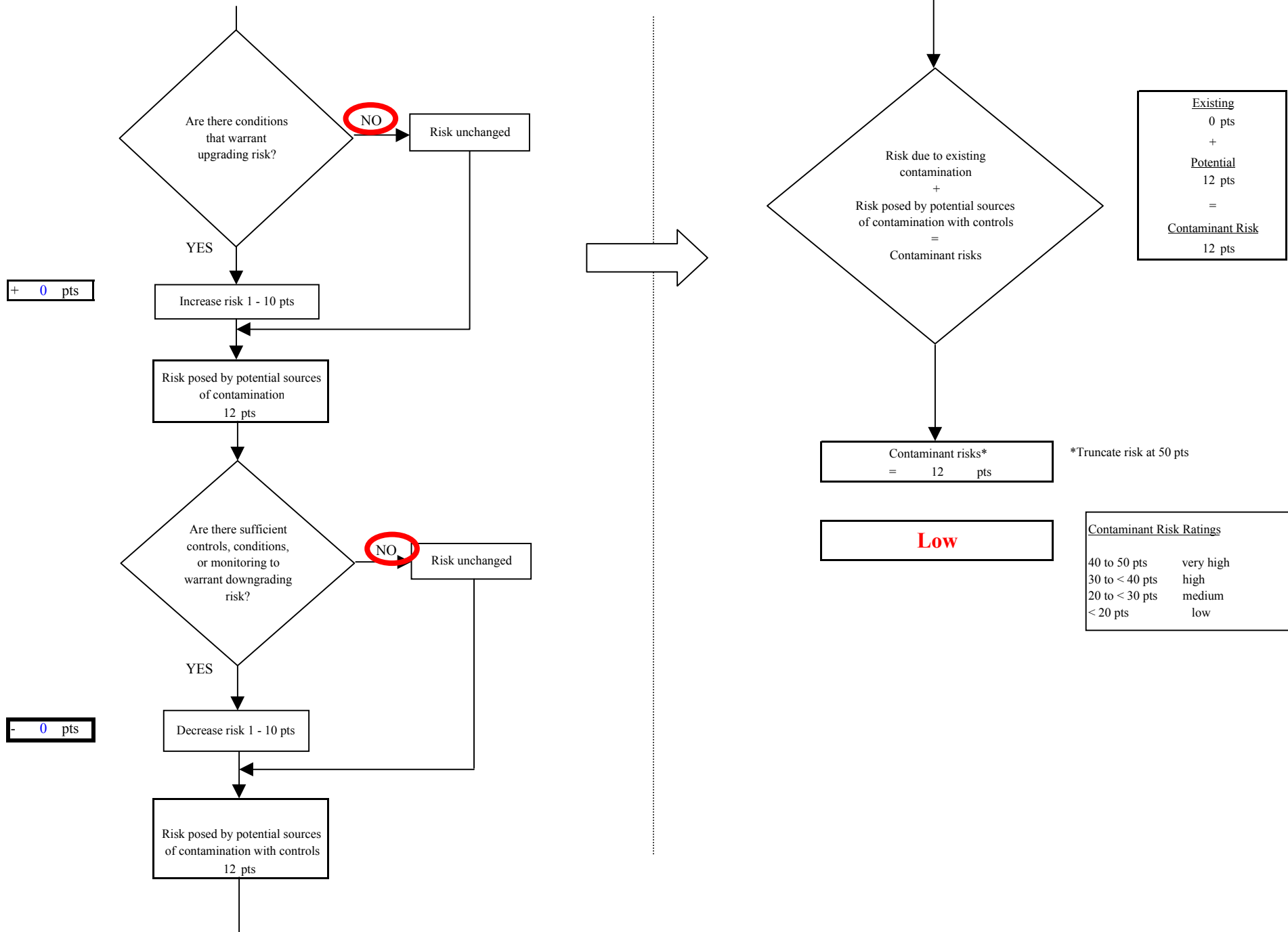


Chart 14. Vulnerability analysis for DeArmoun Homeowners Association - Other Organic Chemicals

