

Source Water Assessment for
Sand Lake Services - Wells #1 & #3
Anchorage, Alaska

A Hydrogeologic Susceptibility and Vulnerability Analysis

DRINKING WATER PROTECTION PROGRAM REPORT 426
PWSID 210485

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Source Water Assessment for Sand Lake Services - Wells #1 & #3 Anchorage, Alaska

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The Drinking Water Protection Program is producing Source Water Assessments in compliance with the Safe Drinking Water Act Amendments of 1996. Each assessment includes a delineation of the source water area, an inventory of potential and existing contaminant sources that may impact the water, a risk ranking for each of these contaminants, and an evaluation of the potential vulnerability of these drinking water sources.

These assessments are intended to provide public water systems owners/operators, communities, and local governments with the best available information that may be used to protect the quality of their drinking water. The assessments combine information obtained from various sources, including the U.S. Environmental Protection Agency, Alaska Department of Environmental Conservation (ADEC), public water system owners/operators, and other public information sources. The results of this assessment are subject to change if additional data becomes available. If you have any additional information that may affect the results of this assessment, please contact the Program Coordinator of DWPP, (907) 269-7521.

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Source Water Assessment for Sand Lake Services - Wells #1 & #3, Anchorage, Alaska

A Hydrogeologic Susceptibility and Vulnerability Analysis

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Drinking Water Protection Program Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

Sand Lake Services - Wells #1 & #3 are part of the Class A (community) water system for Sand Lake Services. Well #3 is the primary component of the greater Sand Lake Services water system while Wells #1 and #2 serve as secondary sources. Due to the location and position of the drinking water protection areas for each of the drinking water sources this Source Water Assessment focuses only on Wells #1 and #3. Identified potential and current sources of contaminants that present the most significant risk to Wells #1 and #3 includes approximately 170 acres of residential area, residential septic systems, sewer lines, roads, recreation trails, a city park, a construction trade area, a lawn and garden supply distributor, and a railroad yard. 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 Sand Lake Services - Well #1 received a vulnerability rating of **medium** for volatile organic chemicals, heavy metals, synthetic organic chemicals and other organic

chemicals; and **high** for bacteria and viruses and nitrates and/or nitrites. Well #3 received a vulnerability rating of **low** for volatile organic chemicals and other organic chemicals; **medium** for bacteria and viruses, heavy metals, and synthetic organic chemicals; and **high** for 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 Sand Lake Services - Wells #1 & #3. This water system consists of three wells 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 sources 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 system.

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 Arm 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



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

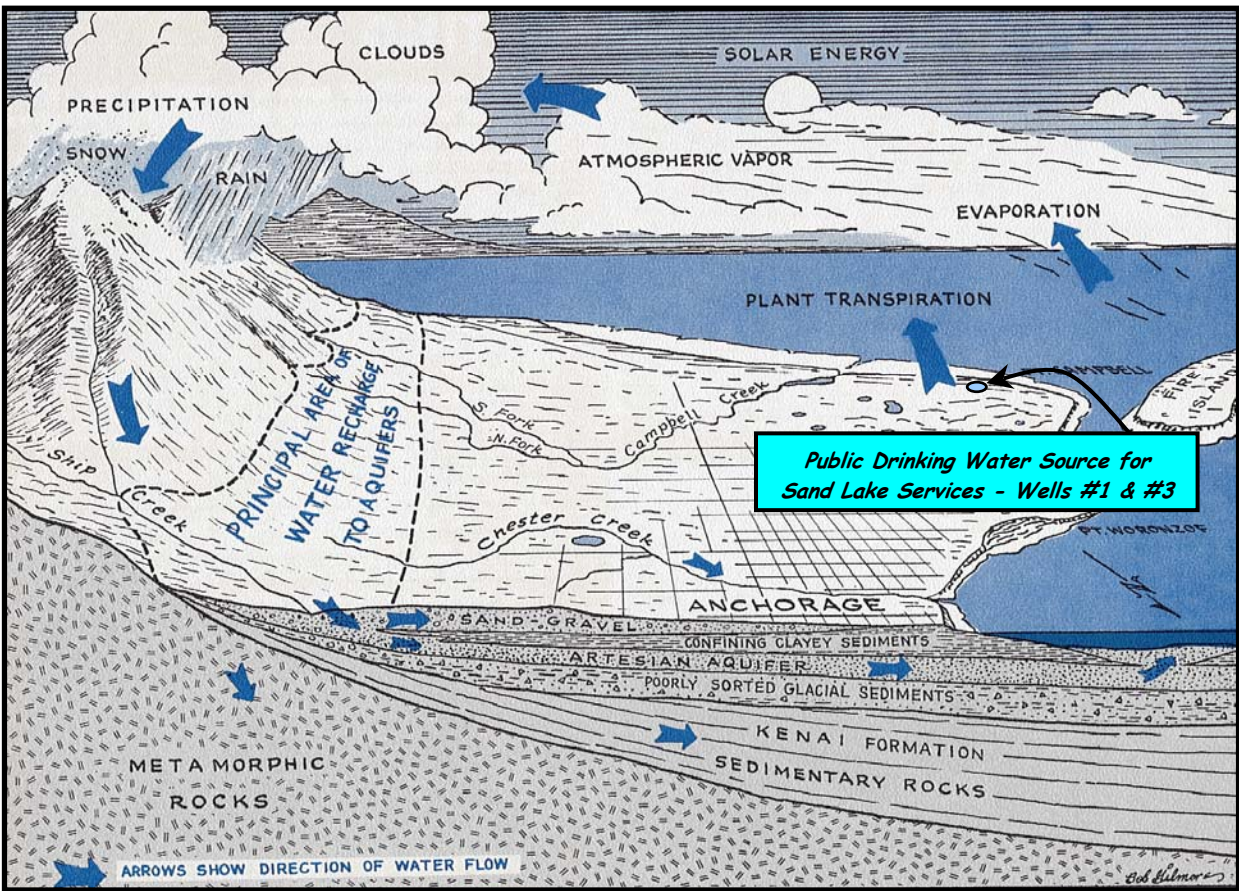


Figure 2. Generalized hydrologic cycle in the Anchorage area [Barnwell, George, Dearborn, Weeks, and Zenone, 1972].

at elevations exceeding 3,700 feet in elevation above sea level.

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 enters 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.

SAND LAKE SERVICES - WELLS #1 & #3

Sand Lake Services Public Drinking Water System is a

Class A (community) water system consisting of three wells. This Source Water Assessment focuses on Wells #1 & #3. Well #3 is the primary source for this drinking water system while Wells #1 and #2 serve as backup sources. Wells #1 and #3 are located at the corner of Shorecrest Drive and Endicott Street at an elevation of approximately 50 feet above sea level (see Figure 3).

According to the most recent Sanitary Survey (10/26/98), installation of Well #1 occurred in 1964 to a total depth of 206 feet below ground surface and was completed in a 6 inch well casing. No well log is available for Well #1 and it is suspected that the well was not grouted upon installation. Proper grouting can provide added protection against contaminants traveling from the ground surface, along the well casing and into source waters.

Installation of Well #3 occurred February 11, 1995 to a total depth of 530 feet below ground surface and was completed in a 6 inch well casing. According to the well log grouting was applied at the time of drilling.

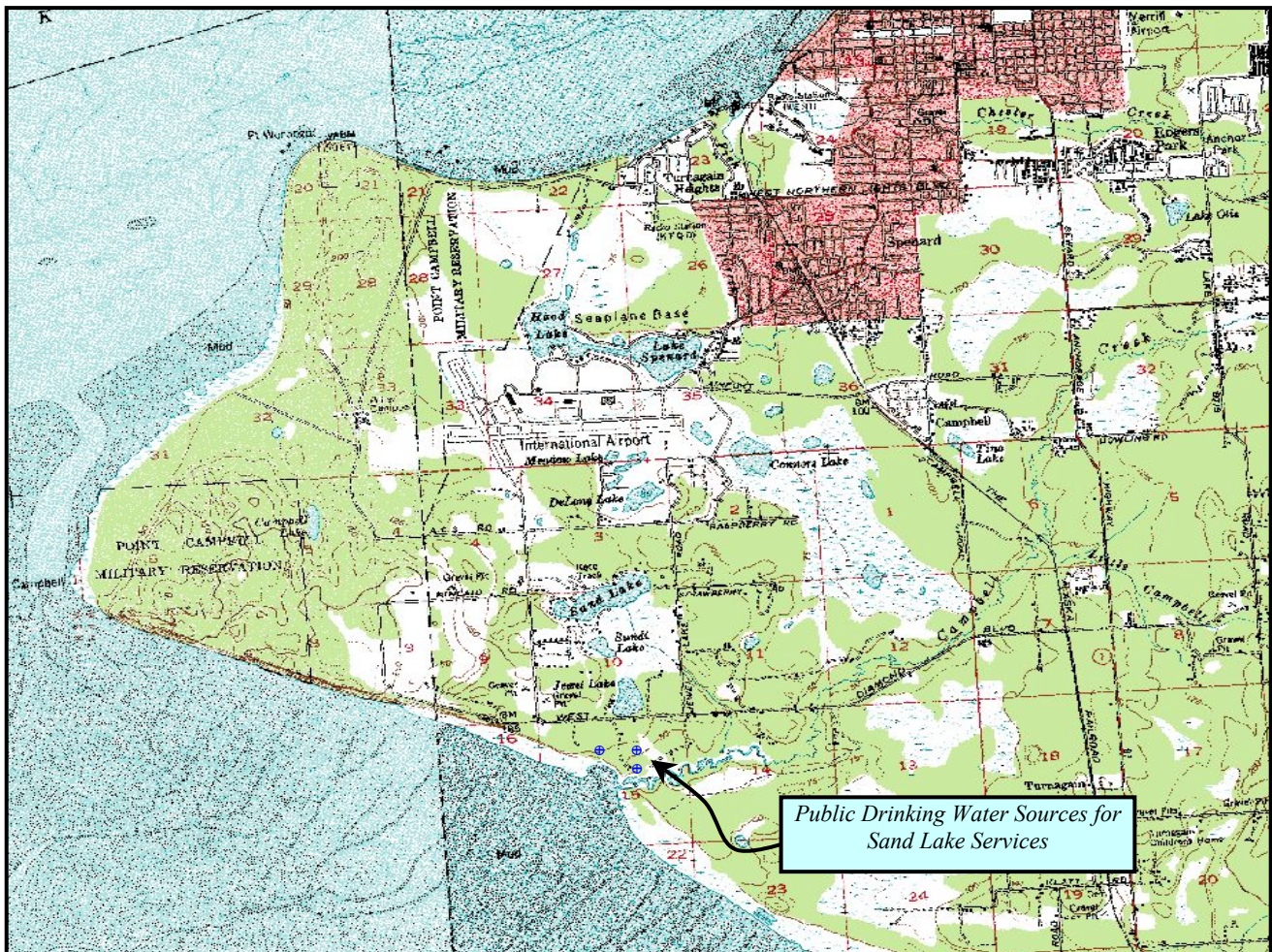


Figure 3. Map showing the location of the drinking water sources for Sand Lake Services - Wells #1 & #3 [Base: USGS Tyonek A1].

The Sanitary Survey notes that the ground surface surrounding each well site is sloped away from the well casing to divert surface water and foreign matter from entering the source waters along the well casing. Each well is equipped with a sanitary seal, which provides added protection against contaminants entering source waters at the well site.

This system operates year round and serves approximately 465 residents through 110 service connections.

ASSESSMENT AND PROTECTION AREA FOR SAND LAKE SERVICES - WELLS #1 & #3

The Drinking Water Protection and Assessment Area that has been established for Sand Lake Services - Wells #1 & #3 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 Sand Lake Services - Wells #1 & #3 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 Sand Lake Services - Wells #1 & #3. 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 Map 4 in Appendix C depict the Contaminant Source Inventory for Sand Lake Services - Wells #1 & #3. 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 115 acres of residential area;
- residential septic systems;
- sewer lines;
- roads;
- recreation trails;
- a construction trade area;
- city parks;
- a lawn and garden supply distributor;
- a railroad yard.

These potential and existing contaminant sources present

the most significant risk for all six categories, respectively.

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 SAND LAKE SERVICES - WELLS #1 & #3

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.

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

According to the well log, Well #3 as completed in a confined aquifer to a total depth of 530 feet below ground surface and had a static water level of 53 feet below ground surface at the time of drilling. The depth to the top of the confining layer is 307 feet below ground surface. The confining layer has a thickness of

approximately 87 feet and consists of silty clay. No well log was available for Well #1. However, due to the close proximity of Wells #1 and #3 it is suspected that they pass through similar geological barriers. Well #1 was drilled to a total depth of 206 feet below ground surface and does not penetrate the lower confined aquifer that Well #3 draws water from. It is suspected, based on the information from the well log for Well #3, that Well #1 draws water from an unconfined aquifer and penetrates layers consisting mostly of sand and gravel with occasional lenses of silt. The vulnerability analysis totals will differ for each well due to the varying depths at which they were completed. An unconfined aquifer is more susceptible to contamination due to the lack of a continuous protective barrier.

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 and E). Tables 1 and 2 depict the overall Susceptibility score and rating for Sand Lake Services - Wells #1 & #3.

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

| | Score | Rating |
|--------------------------------|-------|-----------|
| Susceptibility of the Wellhead | 5 | Low |
| Susceptibility of the Aquifer | 24 | Very High |
| Natural Susceptibility | 29 | Medium |

Table 2. Natural Susceptibility - Susceptibility of the Wellhead and Aquifer to Contamination – Well #3

| | Score | Rating |
|--------------------------------|-------|--------|
| Susceptibility of the Wellhead | 5 | Low |
| Susceptibility of the Aquifer | 19 | High |
| Natural Susceptibility | 24 | 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 and E) 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. Tables 3 and 4 summarize the Contaminant Risks for each category of drinking water contaminants for Wells #1 and #3.

Table 3. Contaminant Risks to Sand Lake Services - Well #1

| Contaminant Risks | Score | Rating |
|--|-------|--------|
| Bacteria and Viruses | 33 | High |
| Nitrates and/or Nitrites | 37 | High |
| Volatile Organic Chemicals | 12 | Low |
| Heavy Metals, Cyanide, And Other Inorganic Chemicals | 19 | Low |
| Synthetic Organic Chemicals | 22 | Medium |
| Other Organic Chemicals | 12 | Low |

Table 4. Contaminant Risks to Sand Lake Services – Well #3

| Contaminant Risks | Score | Rating |
|--|-------|--------|
| Bacteria and Viruses | 33 | High |
| Nitrates and/or Nitrites | 37 | High |
| Volatile Organic Chemicals | 12 | Low |
| Heavy Metals, Cyanide, And Other Inorganic Chemicals | 19 | Low |
| Synthetic Organic Chemicals | 22 | Medium |
| Other Organic Chemicals | 12 | Low |

Appendix D and E contain 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. Tables 5 and 6 contain the overall vulnerability scores (0 – 100) and ratings for each of the six categories of drinking water contaminants (See Appendix D and E). Note: scores are rounded off to the nearest five.

Table 5. Overall Vulnerability of Sand Lake Services - Well #1

| Category | Score | Rating |
|--|-------|--------|
| Bacteria and Viruses | 60 | High |
| Nitrates and Nitrites | 65 | High |
| Volatile Organic Chemicals | 40 | Medium |
| Heavy Metals, Cyanide, and Other Inorganic Chemicals | 50 | Medium |
| Synthetic Organic Chemicals | 50 | Medium |
| Other Organic Chemicals | 40 | Medium |

Table 6. Overall Vulnerability of Sand Lake Services – Well #3

| Category | Score | Rating |
|--|-------|--------|
| Bacteria and Viruses | 55 | Medium |
| Nitrates and Nitrites | 60 | High |
| Volatile Organic Chemicals | 35 | Low |
| Heavy Metals, Cyanide, and Other Inorganic Chemicals | 45 | Medium |
| Synthetic Organic Chemicals | 45 | Medium |
| 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.

The contaminant risk for bacteria and viruses is high with residential areas, sewer lines, and septic systems presenting the most significant risk to the drinking water well. After combining the contaminant risk for bacteria and viruses with the natural susceptibility of the well, the overall vulnerability of the well to contamination is high for Well #1 and medium for Well #3 from bacteria and viruses.

Review of the historical sampling data indicates that no bacteria and viruses have been detected in Sand Lake Services - Wells #1 & #3 within the past 5 years (See Chart 3 – Contaminant Risks for Bacteria and Viruses in Appendix D and E).

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 Sand Lake Services - Wells #1 & #3 indicates that low concentrations of nitrates have been detected in source waters (See Chart 5 – Contaminant Risks for Nitrates and/or Nitrites in Appendix D and E). The most recent nitrate detection occurred August 2, 2000 with a concentration of approximately 8% 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.

The contaminant risk for nitrates and/or nitrites is high with residential areas, residential septic systems, sewer lines, and parks and recreation trails presenting the most significant risk to the drinking water source. After combining the contaminant risk with the natural susceptibility of the well, the overall vulnerability of the well to contamination is high for both sources of drinking water from nitrates and/or nitrites.

The contaminant risk for volatile organic chemicals is low with residential areas, sewer lines, roads, and residential septic systems presenting the most significant risk to the drinking water well. Due to the potential for fuel spills to occur, roads ranked as a low source of contamination to the drinking water source for volatile organic chemicals. Combining the contaminant risk for volatile organic chemicals with the natural susceptibility

of the well, the overall vulnerability of the well to contamination from volatile organic chemicals is medium for Well #1 and low for Well #3.

Review of the historical sampling data indicates that no volatile organic chemical contamination has been detected in Sand Lake Services - Wells #1 & #3 (See Chart 7 – Contaminant Risks for Volatile Organic Chemicals in Appendix D and E).

The contaminant risk for heavy metals and other organic chemicals is low with residential areas, roads, sewer lines, residential septic systems, a park, and a construction trade area presenting the most significant risk to the drinking water well.

The presence of existing contamination also contributes to the overall risk for other inorganic chemicals. Recent historical sampling indicates that arsenic was detected in very low levels. Sampling done on 10/01/01 detected arsenic at 0.00145 mg/l or 15% of the MCL of 0.01 mg/l and barium at 0.0418mg/l or <1% MCL (See Chart 9 – Contaminant Risks for Heavy Metals and Other Inorganic Chemicals in Appendix D and E). Combining the contaminant risk with the natural susceptibility of the well leads to an overall vulnerability to heavy metals and inorganic chemical contamination of medium.

According to the EPA “arsenic occurs naturally in rocks and soil, water, air, and plants and animals. It can be further released into the environment through natural activities such as volcanic action, erosion of rocks, and forest fires, or through human actions. Approximately 90 percent of industrial arsenic in the U.S. is currently used as a wood preservative, but arsenic is also used in paints, dyes, metals, drugs, soaps, and semi-conductors. Agricultural applications, mining, and smelting also contribute to arsenic releases in the environment.” (EPA, 2001) Since there are no known sources of arsenic, it is likely that the arsenic detected at Sand Lake Services - Wells #1 & #3 is naturally occurring.

Studies have linked long-term exposure to arsenic in drinking water to cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate. Non-cancer effects of ingesting arsenic include cardiovascular, pulmonary, immunological, neurological, and endocrine (e.g., diabetes) effects. Short-term exposure to high doses

of arsenic can cause other adverse health effects, but such effects are unlikely to occur from U.S. public water supplies that are in compliance with the previous arsenic standard of 0.05 mg/l (EPA, 2001). The levels of arsenic detected at Sand Lake Services Wells #1 and #3 are considered safe for human consumption.

Barium is a lustrous metal, which exists in ores containing mixtures of elements. It is used in making a wide variety of electronic components, in metal alloys, bleaches, dyes, fireworks, ceramics and glass. In particular, it is used in well drilling operations where it is directly released into the ground (USEPA, 2002).

The EPA has found barium to potentially cause gastrointestinal disturbances and muscular weakness at levels above the MCL when exposed for relatively short periods of time. Long term exposure above the MCL has the potential to cause high blood pressure (USEPA, 2002).

Not enough information is exists to determine where the barium originates. However, due to the low levels it is highly likely that it is from natural sources. The levels of barium are very low and are considered safe for human consumption.

The contaminant risk for synthetic organic chemicals is medium and other organic chemicals is low with residential areas, sewer lines, residential septic systems, a park, and roads presenting the most significant risk to the drinking water well. After combining the contaminant risk for synthetic organic chemicals and other organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination from both contaminant categories is medium for Wells #1 and #3.

Review of the historical sampling data indicates that no synthetic organic chemicals or other organic chemicals have been detected in Sand Lake Services - Wells #1 & #3 within the past 5 years (See Charts 11 and 13 – Contaminant Risks for Synthetic Organic Chemicals and Other Organic Chemicals in Appendix D and E, respectively).

SUMMARY

A *Source Water Assessment* has been completed for Sand Lake Services - Wells #1 & #3. Overall Sand Lake Services - Well #1 received a vulnerability rating of **medium** for volatile organic chemicals, heavy metals, synthetic organic chemicals and other organic chemicals; and **high** for bacteria and viruses and nitrates and/or nitrites. Well #3 received a vulnerability rating of **low** for volatile organic chemicals and other organic chemicals; **medium** for bacteria and viruses, heavy metals, and synthetic organic chemicals; and **high** for

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 continuous efforts on the part of Sand Lake Services 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 Sand Lake Services - Wells #1 & #3.

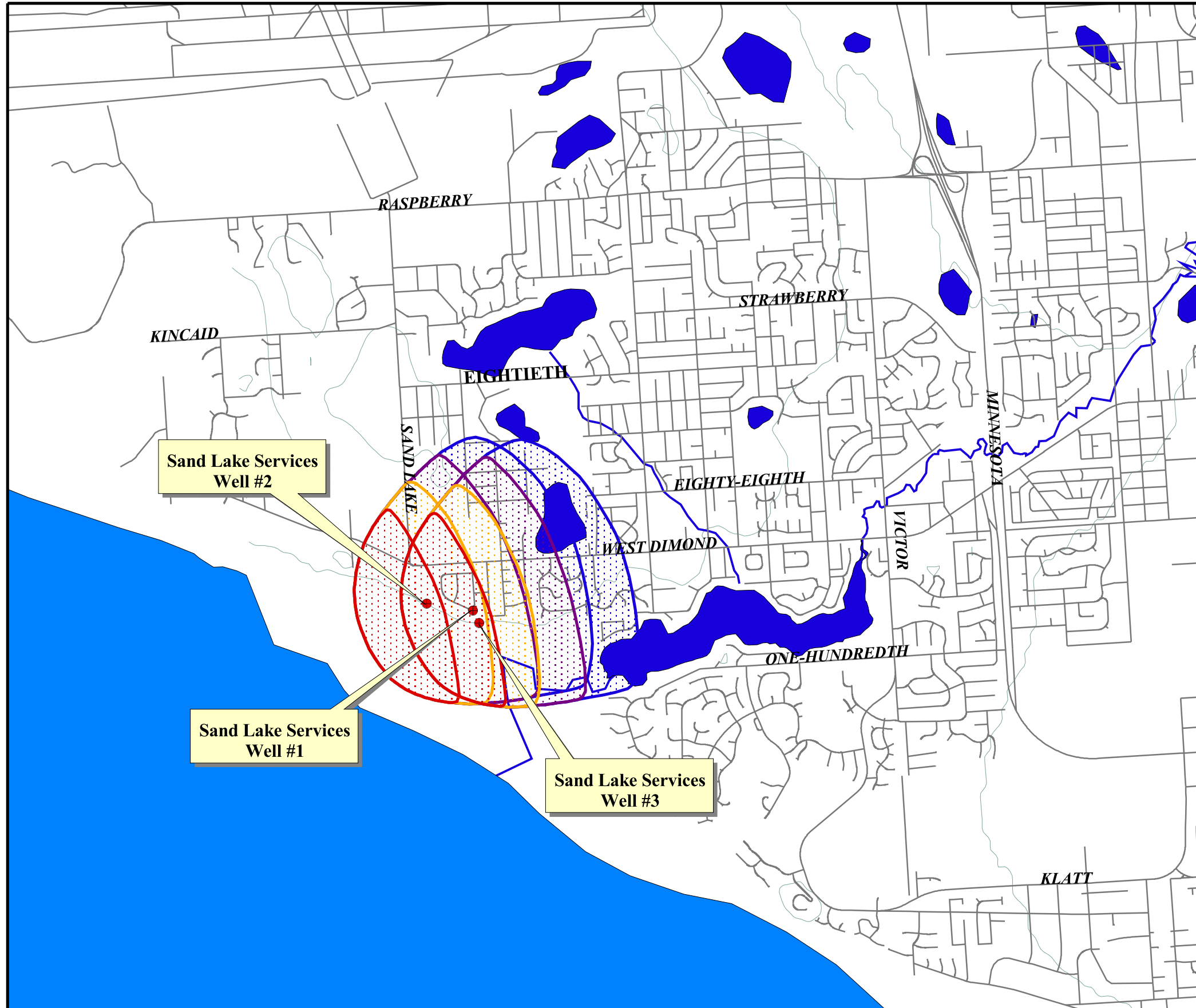
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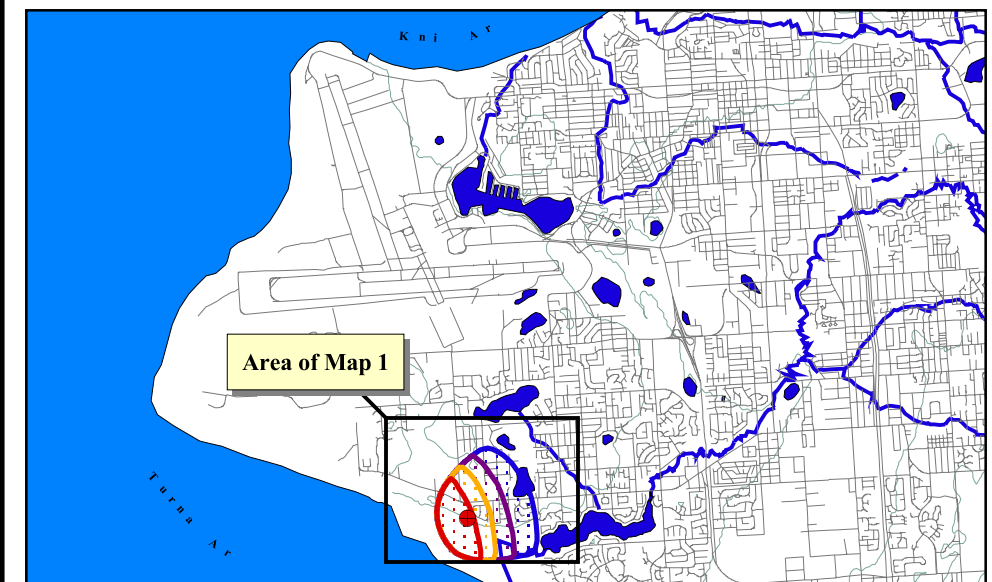
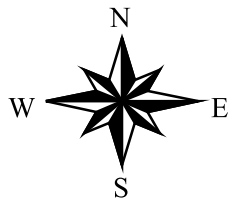
APPENDIX A

Drinking Water Protection Area for Sand Lake Services - Wells #1 & #3

Drinking Water Protection Area for Sand Lake Services



- Drinking Water Sources for Sand Lake Services
- 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 Lakes
- Cook Inlet Water
- Anchorage Streams
- Elevation Contours



4000 0 4000 8000 Feet

PWSID 210485

Map 1

APPENDIX B

Contaminant Source Inventory and Risk Ranking for Sand Lake Services - Wells #1 & #3

Table 1

**Contaminant Source Inventory for
Sand Lake Services - Well #1 & #3**

PWSID 210485.003

| Contaminant Source Type | Contaminant Source ID | CS ID tag | Zone | Location | Map Number | Comments |
|---|------------------------------|------------------|-------------|---|-------------------|---|
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-1 | A | Along Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-2 | A | Near Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-3 | A | Along Ninety-fourth Ave. | 3 | |
| Residential Areas | R01 | R1-1 | A | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-1 | A | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-2 | A | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-3 | A | Off of Jaclaire Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-4 | A | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-5 | A | Off of Jaclaire Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-6 | A | Off of Shorecrest Drive | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-1 | A | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-2 | A | Ninety-Fourth Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-3 | A | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-4 | A | Jaclaire Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-5 | A | Shorecrest Drive | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-6 | A | Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-7 | A | Dimond Blvd. | 2 | |
| Dog walking areas/foot trails | X46 | X46-1 | A | Trail along Dimond Blvd. | 2 | |
| Dog walking areas/foot trails | X46 | X46-2 | A | Trail intersecting Zone A | 2 | |
| Construction trade areas and materials | C09 | C9-1 | B | Off of Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-10 | B | Along Emeral Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-11 | B | Along Topaz Ave. | 3 | |

| <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> |
|---|------------------------------|------------------|-------------|--|-------------------|---|
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-12 | B | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-13 | B | Along Tanya Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-4 | B | Near Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-5 | B | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-6 | B | Connecting Jade Street with Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-7 | B | Along Carousel Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-8 | B | Along Arnica Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-9 | B | Along Catkin Circle | 3 | |
| Residential Areas | R01 | R1-2 | B | Residential areas located within Zone B | 2 | Approximately 31 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-7 | B | Off of Endicott Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-8 | B | Off of Kavik Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-9 | B | Off of Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-10 | B | Emerald Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-11 | B | Carousel Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-12 | B | Arnica Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-13 | B | Catkin Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-14 | B | Topaz Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-15 | B | Tanya Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-16 | B | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-17 | B | Eighty-Eighth Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-8 | B | Byrd Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-9 | B | Jade Street | 2 | |
| Municipal or city parks (with green areas) | X04 | X4-1 | B | Anchorage park intersecting Zones B and C | 3 | |

| <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> |
|---|------------------------------|------------------|-------------|---|-------------------|---|
| Dog walking areas/foot trails | X46 | X46-3 | B | Trail along Jade Street | 2 | |
| Lawn and garden supplies/services | C23 | C23-1 | C | Off of Elgin Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-14-22 | C | Sewer lines located within Zone C | 3 | |
| Residential Areas | R01 | R1-3 | C | Residential areas located within Zone C | 2 | Approximately 76 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-10-11 | C | Septic Systems located within Zone C | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-18-27 | C | Roads located within Zone C | 2 | |
| Railroad yards | X31 | X31-1 | D | Off of Edinburgh Drive | 4 | |

Table 2

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Bacteria and Viruses*

PWSID 210485.003

| <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 | A | Low | 1 | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Residential Areas | R01 | R1-2 | B | Low | 2 | Residential areas located within Zone B | 2 | Approximately 31 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-1 | A | Low | 3 | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-2 | A | Low | 4 | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-3 | A | Low | 5 | Off of Jaclaire Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-4 | A | Low | 6 | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-5 | A | Low | 7 | Off of Jaclaire Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-6 | A | Low | 8 | Off of Shorecrest Drive | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-1 | A | Medium | 9 | Along Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-2 | A | Medium | 10 | Near Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-3 | A | Medium | | Along Ninety-fourth Ave. | 3 | |
| Residential Areas | R01 | R1-1 | A | Low | | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Highways and roads, paved (cement or asphalt) | X20 | X20-1 | A | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-2 | A | Low | | Ninety-Fourth Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-3 | A | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-4 | A | Low | | Jaclaire Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-5 | A | Low | | Shorecrest Drive | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-6 | A | Low | | Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-7 | A | Low | | Dimond Blvd. | 2 | |
| Dog walking areas/foot trails | X46 | X46-1 | A | Low | | Trail along Dimond Blvd. | 2 | |
| Dog walking areas/foot trails | X46 | X46-2 | A | Low | | Trail intersecting Zone A | 2 | |

Table 2 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Bacteria and Viruses*

PWSID 210485.003

| <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> |
|---|------------------------------|------------------|-------------|----------------------------------|------------------------------------|--|-------------------|-----------------|
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-10 | B | Medium | | Along Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-11 | B | Medium | | Along Topaz Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-12 | B | Medium | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-13 | B | Medium | | Along Tanya Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-4 | B | Medium | | Near Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-5 | B | Medium | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-6 | B | Medium | | Connecting Jade Street with Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-7 | B | Medium | | Along Carousel Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-8 | B | Medium | | Along Arnica Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-9 | B | Medium | | Along Catkin Circle | 3 | |
| Septic systems (serves one single-family home) | R02 | R2-7 | B | Low | | Off of Endicott Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-8 | B | Low | | Off of Kavik Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-9 | B | Low | | Off of Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-10 | B | Low | | Emerald Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-11 | B | Low | | Carousel Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-12 | B | Low | | Arnica Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-13 | B | Low | | Catkin Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-14 | B | Low | | Topaz Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-15 | B | Low | | Tanya Circle | 2 | |

Table 2 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Bacteria and Viruses*

PWSID 210485.003

| <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, paved (cement or asphalt) | X20 | X20-16 | B | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-17 | B | Low | | Eighty-Eighth Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-8 | B | Low | | Byrd Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-9 | B | Low | | Jade Street | 2 | |
| Municipal or city parks (with green areas) | X04 | X4-1 | B | Medium | | Anchorage park intersecting Zones B and C | 3 | |
| Dog walking areas/foot trails | X46 | X46-3 | B | Low | | Trail along Jade Street | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-14-22 | C | Medium | | Sewer lines located within Zone C | 3 | |
| Residential Areas | R01 | R1-3 | C | Low | | Residential areas located within Zone C | 2 | Approximately 76 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-10-11 | C | Low | | Septic Systems located within Zone C | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-18-27 | C | Low | | Roads located within Zone C | 2 | |

Table 3

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Nitrates/Nitrites*

PWSID 210485.003

| <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 | A | Low | 1 | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Residential Areas | R01 | R1-2 | B | Low | 2 | Residential areas located within Zone B | 2 | Approximately 31 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-1 | A | Low | 3 | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-2 | A | Low | 4 | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-3 | A | Low | 5 | Off of Jaclaire Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-4 | A | Low | 6 | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-5 | A | Low | 7 | Off of Jaclaire Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-6 | A | Low | 8 | Off of Shorecrest Drive | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-1 | A | Medium | 9 | Along Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-2 | A | Medium | 10 | Near Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-3 | A | Medium | | Along Ninety-fourth Ave. | 3 | |
| Residential Areas | R01 | R1-1 | A | Low | | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Highways and roads, paved (cement or asphalt) | X20 | X20-1 | A | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-2 | A | Low | | Ninety-Fourth Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-3 | A | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-4 | A | Low | | Jaclaire Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-5 | A | Low | | Shorecrest Drive | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-6 | A | Low | | Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-7 | A | Low | | Dimond Blvd. | 2 | |
| Dog walking areas/foot trails | X46 | X46-1 | A | Low | | Trail along Dimond Blvd. | 2 | |
| Dog walking areas/foot trails | X46 | X46-2 | A | Low | | Trail intersecting Zone A | 2 | |

Table 3 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Nitrates/Nitrites*

PWSID 210485.003

| <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> |
|---|------------------------------|------------------|-------------|----------------------------------|------------------------------------|--|-------------------|-----------------|
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-10 | B | Medium | | Along Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-11 | B | Medium | | Along Topaz Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-12 | B | Medium | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-13 | B | Medium | | Along Tanya Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-4 | B | Medium | | Near Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-5 | B | Medium | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-6 | B | Medium | | Connecting Jade Street with Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-7 | B | Medium | | Along Carousel Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-8 | B | Medium | | Along Arnica Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-9 | B | Medium | | Along Catkin Circle | 3 | |
| Septic systems (serves one single-family home) | R02 | R2-7 | B | Low | | Off of Endicott Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-8 | B | Low | | Off of Kavik Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-9 | B | Low | | Off of Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-10 | B | Low | | Emerald Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-11 | B | Low | | Carousel Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-12 | B | Low | | Arnica Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-13 | B | Low | | Catkin Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-14 | B | Low | | Topaz Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-15 | B | Low | | Tanya Circle | 2 | |

Table 3 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Nitrates/Nitrites*

PWSID 210485.003

| <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, paved (cement or asphalt) | X20 | X20-16 | B | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-17 | B | Low | | Eighty-Eighth Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-8 | B | Low | | Byrd Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-9 | B | Low | | Jade Street | 2 | |
| Municipal or city parks (with green areas) | X04 | X4-1 | B | Medium | | Anchorage park intersecting Zones B and C | 3 | |
| Dog walking areas/foot trails | X46 | X46-3 | B | Low | | Trail along Jade Street | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-14-22 | C | Medium | | Sewer lines located within Zone C | 3 | |
| Residential Areas | R01 | R1-3 | C | Low | | Residential areas located within Zone C | 2 | Approximately 76 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-10-11 | C | Low | | Septic Systems located within Zone C | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-18-27 | C | Low | | Roads located within Zone C | 2 | |

Table 4

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Volatile Organic Chemicals*

PWSID 210485.003

| <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 | A | Low | 1 | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Residential Areas | R01 | R1-2 | B | Low | 2 | Residential areas located within Zone B | 2 | Approximately 31 acres of residential area. |
| Highways and roads, paved (cement or asphalt) | X20 | X20-1 | A | Low | 3 | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-2 | A | Low | 4 | Ninety-Fourth Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-3 | A | Low | 5 | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-4 | A | Low | 6 | Jaclair Lane | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-1 | A | Low | 7 | Along Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-2 | A | Low | 8 | Near Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-3 | A | Low | 9 | Along Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-4 | B | Low | 10 | Near Dimond Blvd. | 3 | |
| Residential Areas | R01 | R1-1 | A | Low | | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-1 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-2 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-3 | A | Low | | Off of Jaclair Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-4 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-5 | A | Low | | Off of Jaclair Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-6 | A | Low | | Off of Shorecrest Drive | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-5 | A | Low | | Shorecrest Drive | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-6 | A | Low | | Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-7 | A | Low | | Dimond Blvd. | 2 | |

Table 4 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Volatile Organic Chemicals*

PWSID 210485.003

| <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> |
|---|------------------------------|------------------|-------------|----------------------------------|------------------------------------|--|-------------------|-----------------|
| Construction trade areas and materials | C09 | C9-1 | B | Low | | Off of Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-10 | B | Low | | Along Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-11 | B | Low | | Along Topaz Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-12 | B | Low | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-13 | B | Low | | Along Tanya Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-5 | B | Low | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-6 | B | Low | | Connecting Jade Street with Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-7 | B | Low | | Along Carousel Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-8 | B | Low | | Along Arnica Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-9 | B | Low | | Along Catkin Circle | 3 | |
| Septic systems (serves one single-family home) | R02 | R2-7 | B | Low | | Off of Endicott Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-8 | B | Low | | Off of Kavik Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-9 | B | Low | | Off of Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-10 | B | Low | | Emerald Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-11 | B | Low | | Carousel Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-12 | B | Low | | Arnica Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-13 | B | Low | | Catkin Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-14 | B | Low | | Topaz Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-15 | B | Low | | Tanya Circle | 2 | |

Table 4 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Volatile Organic Chemicals*

PWSID 210485.003

| <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, paved (cement or asphalt) | X20 | X20-16 | B | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-17 | B | Low | | Eighty-Eighth Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-8 | B | Low | | Byrd Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-9 | B | Low | | Jade Street | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-14-22 | C | Low | | Sewer lines located within Zone C | 3 | |
| Residential Areas | R01 | R1-3 | C | Low | | Residential areas located within Zone C | 2 | Approximately 76 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-10-11 | C | Low | | Septic Systems located within Zone C | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-18-27 | C | Low | | Roads located within Zone C | 2 | |
| Railroad yards | X31 | X31-1 | D | High | | Off of Edinburgh Drive | 4 | |

Table 5

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 210485.003

| <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 | A | Low | 1 | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Highways and roads, paved (cement or asphalt) | X20 | X20-1 | A | Low | 2 | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-2 | A | Low | 3 | Ninety-Fourth Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-3 | A | Low | 4 | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-4 | A | Low | 5 | Jaclair Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-5 | A | Low | 6 | Shorecrest Drive | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-1 | A | Low | 7 | Along Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-2 | A | Low | 8 | Near Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-3 | A | Low | 9 | Along Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-4 | B | Low | 10 | Near Dimond Blvd. | 3 | |
| Residential Areas | R01 | R1-1 | A | Low | | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-1 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-2 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-3 | A | Low | | Off of Jaclair Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-4 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-5 | A | Low | | Off of Jaclair Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-6 | A | Low | | Off of Shorecrest Drive | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-6 | A | Low | | Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-7 | A | Low | | Dimond Blvd. | 2 | |
| Construction trade areas and materials | C09 | C9-1 | B | Low | | Off of Emerald Street | 3 | |

Table 5 (continued)

Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3

PWSID 210485.003

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

| <i>Contaminant Source Type</i> | <i>Contaminant Source ID</i> | <i>CS ID tag</i> | <i>Zone</i> | <i>Risk Ranking for Analysis</i> | <i>Overall Rank after Analysis</i> | <i>Location</i> | <i>Map Number</i> | <i>Comments</i> |
|---|------------------------------|------------------|-------------|----------------------------------|------------------------------------|--|-------------------|---|
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-10 | B | Low | | Along Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-11 | B | Low | | Along Topaz Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-12 | B | Low | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-13 | B | Low | | Along Tanya Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-5 | B | Low | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-6 | B | Low | | Connecting Jade Street with Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-7 | B | Low | | Along Carousel Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-8 | B | Low | | Along Arnica Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-9 | B | Low | | Along Catkin Circle | 3 | |
| Residential Areas | R01 | R1-2 | B | Low | | Residential areas located within Zone B | 2 | Approximately 31 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-7 | B | Low | | Off of Endicott Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-8 | B | Low | | Off of Kavik Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-9 | B | Low | | Off of Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-10 | B | Low | | Emerald Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-11 | B | Low | | Carousel Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-12 | B | Low | | Arnica Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-13 | B | Low | | Catkin Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-14 | B | Low | | Topaz Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-15 | B | Low | | Tanya Circle | 2 | |

Table 5 (continued)

Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3

PWSID 210485.003

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

| <i>Contaminant Source Type</i> | <i>Contaminant Source ID</i> | <i>CS ID tag</i> | <i>Zone</i> | <i>Risk Ranking for Analysis</i> | <i>Overall Rank after Analysis</i> | <i>Location</i> | <i>Map Number</i> | <i>Comments</i> |
|---|------------------------------|------------------|-------------|----------------------------------|------------------------------------|---|-------------------|---|
| Highways and roads, paved (cement or asphalt) | X20 | X20-16 | B | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-17 | B | Low | | Eighty-Eighth Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-8 | B | Low | | Byrd Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-9 | B | Low | | Jade Street | 2 | |
| Lawn and garden supplies/services | C23 | C23-1 | C | Low | | Off of Elgin Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-14-22 | C | Low | | Sewer lines located within Zone C | 3 | |
| Residential Areas | R01 | R1-3 | C | Low | | Residential areas located within Zone C | 2 | Approximately 76 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-10-11 | C | Low | | Septic Systems located within Zone C | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-18-27 | C | Low | | Roads located within Zone C | 2 | |

Table 6

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Synthetic Organic Chemicals*

PWSID 210485.003

| <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 | A | Low | 1 | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Residential Areas | R01 | R1-2 | B | Low | 2 | Residential areas located within Zone B | 2 | Approximately 31 acres of residential area. |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-1 | A | Low | 3 | Along Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-2 | A | Low | 4 | Near Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-3 | A | Low | 5 | Along Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-4 | B | Low | 6 | Near Dimond Blvd. | 3 | |
| Septic systems (serves one single-family home) | R02 | R2-1 | A | Low | 7 | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-2 | A | Low | 8 | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-3 | A | Low | 9 | Off of Jaclaire Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-4 | A | Low | 10 | Off of Shorecrest Drive | 2 | |
| Residential Areas | R01 | R1-1 | A | Low | | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-5 | A | Low | | Off of Jaclaire Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-6 | A | Low | | Off of Shorecrest Drive | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-10 | B | Low | | Along Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-11 | B | Low | | Along Topaz Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-12 | B | Low | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-13 | B | Low | | Along Tanya Circe | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-5 | B | Low | | Along Jade Street | 3 | |

Table 6 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Synthetic Organic Chemicals*

PWSID 210485.003

| <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> |
|---|------------------------------|------------------|-------------|----------------------------------|------------------------------------|--|-------------------|---|
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-6 | B | Low | | Connecting Jade Street with Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-7 | B | Low | | Along Carousel Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-8 | B | Low | | Along Arnica Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-9 | B | Low | | Along Catkin Circle | 3 | |
| Septic systems (serves one single-family home) | R02 | R2-7 | B | Low | | Off of Endicott Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-8 | B | Low | | Off of Kavik Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-9 | B | Low | | Off of Kavik Street | 2 | |
| Municipal or city parks (with green areas) | X04 | X4-1 | B | Low | | Anchorage park intersecting Zones B and C | 3 | |
| Lawn and garden supplies/services | C23 | C23-1 | C | Medium | | Off of Elgin Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-14-22 | C | Low | | Sewer lines located within Zone C | 3 | |
| Residential Areas | R01 | R1-3 | C | Low | | Residential areas located within Zone C | 2 | Approximately 76 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-10-11 | C | Low | | Septic Systems located within Zone C | 2 | |

Table 7

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Other Organic Chemicals*

PWSID 210485.003

| <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 | A | Low | 1 | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Residential Areas | R01 | R1-2 | B | Low | 2 | Residential areas located within Zone B | 2 | Approximately 31 acres of residential area. |
| Highways and roads, paved (cement or asphalt) | X20 | X20-1 | A | Low | 3 | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-2 | A | Low | 4 | Ninety-Fourth Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-3 | A | Low | 5 | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-4 | A | Low | 6 | Jaclair Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-5 | A | Low | 7 | Shorecrest Drive | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-1 | A | Low | 8 | Along Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-2 | A | Low | 9 | Near Ninety-fourth Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-3 | A | Low | 10 | Along Ninety-fourth Ave. | 3 | |
| Residential Areas | R01 | R1-1 | A | Low | | Residential areas located within Zone A | 2 | Approximately 67 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-1 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-2 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-3 | A | Low | | Off of Jaclair Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-4 | A | Low | | Off of Shorecrest Drive | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-5 | A | Low | | Off of Jaclair Lane | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-6 | A | Low | | Off of Shorecrest Drive | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-6 | A | Low | | Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-7 | A | Low | | Dimond Blvd. | 2 | |
| Construction trade areas and materials | C09 | C9-1 | B | Low | | Off of Emerald Street | 3 | |

Table 7 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Other Organic Chemicals*

PWSID 210485.003

| <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> |
|---|------------------------------|------------------|-------------|----------------------------------|------------------------------------|--|-------------------|-----------------|
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-10 | B | Low | | Along Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-11 | B | Low | | Along Topaz Ave. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-12 | B | Low | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-13 | B | Low | | Along Tanya Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-4 | B | Low | | Near Dimond Blvd. | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-5 | B | Low | | Along Jade Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-6 | B | Low | | Connecting Jade Street with Emerald Street | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-7 | B | Low | | Along Carousel Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-8 | B | Low | | Along Arnica Circle | 3 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-9 | B | Low | | Along Catkin Circle | 3 | |
| Septic systems (serves one single-family home) | R02 | R2-7 | B | Low | | Off of Endicott Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-8 | B | Low | | Off of Kavik Street | 2 | |
| Septic systems (serves one single-family home) | R02 | R2-9 | B | Low | | Off of Kavik Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-10 | B | Low | | Emerald Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-11 | B | Low | | Carousel Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-12 | B | Low | | Arnica Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-13 | B | Low | | Catkin Circle | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-14 | B | Low | | Topaz Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-15 | B | Low | | Tanya Circle | 2 | |

Table 7 (continued)

*Contaminant Source Inventory and Risk Ranking for
Sand Lake Services - Well #1 & #3
Sources of Other Organic Chemicals*

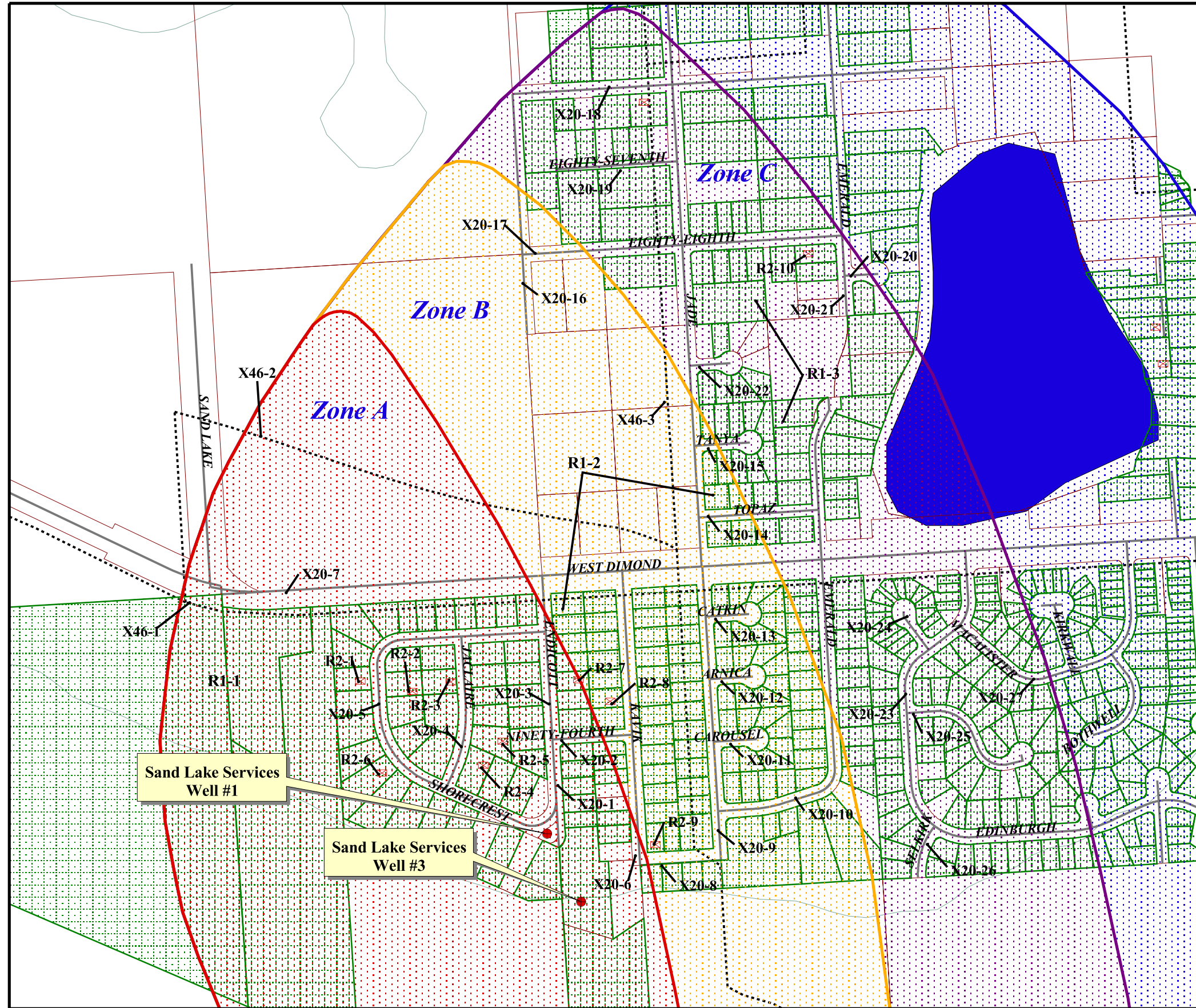
PWSID 210485.003

| <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, paved (cement or asphalt) | X20 | X20-16 | B | Low | | Endicott Street | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-17 | B | Low | | Eighty-Eighth Ave. | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-8 | B | Low | | Byrd Lane | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-9 | B | Low | | Jade Street | 2 | |
| Domestic wastewater collection systems (sewer lines or lift stations) | D01 | D1-14-22 | C | Low | | Sewer lines located within Zone C | 3 | |
| Residential Areas | R01 | R1-3 | C | Low | | Residential areas located within Zone C | 2 | Approximately 76 acres of residential area. |
| Septic systems (serves one single-family home) | R02 | R2-10-11 | C | Low | | Septic Systems located within Zone C | 2 | |
| Highways and roads, paved (cement or asphalt) | X20 | X20-18-27 | C | Low | | Roads located within Zone C | 2 | |
| Railroad yards | X31 | X31-1 | D | High | | Off of Edinburgh Drive | 4 | |

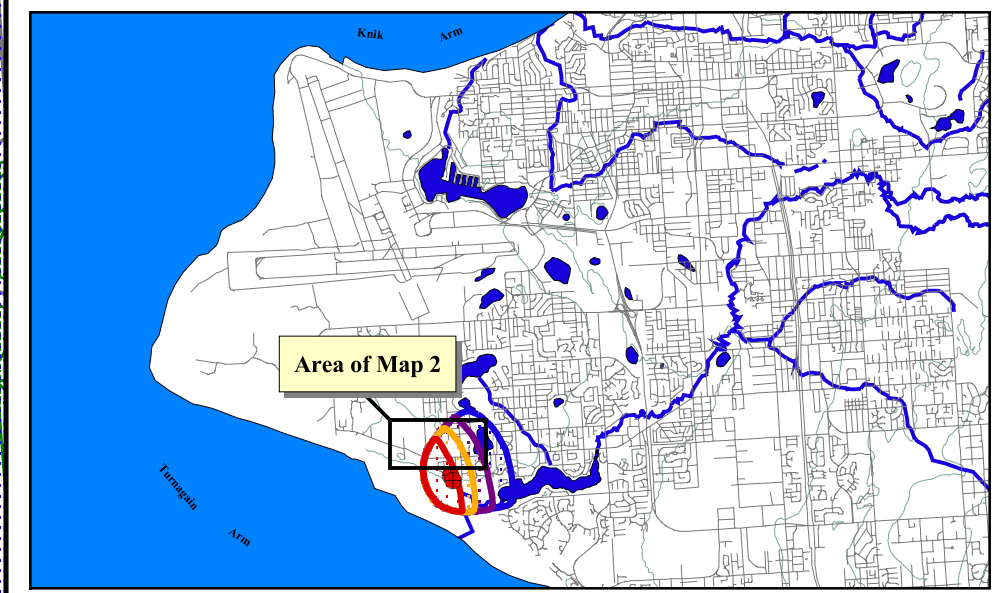
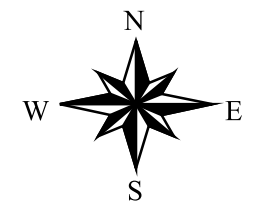
APPENDIX C

Drinking Water Protection Area and Potential & Existing Contaminant Sources for Sand Lake Services - Wells #1 & #3

Drinking Water Protection Area and Potential & Existing Contaminant Sources for Sand Lake Services - Wells #1 & #3



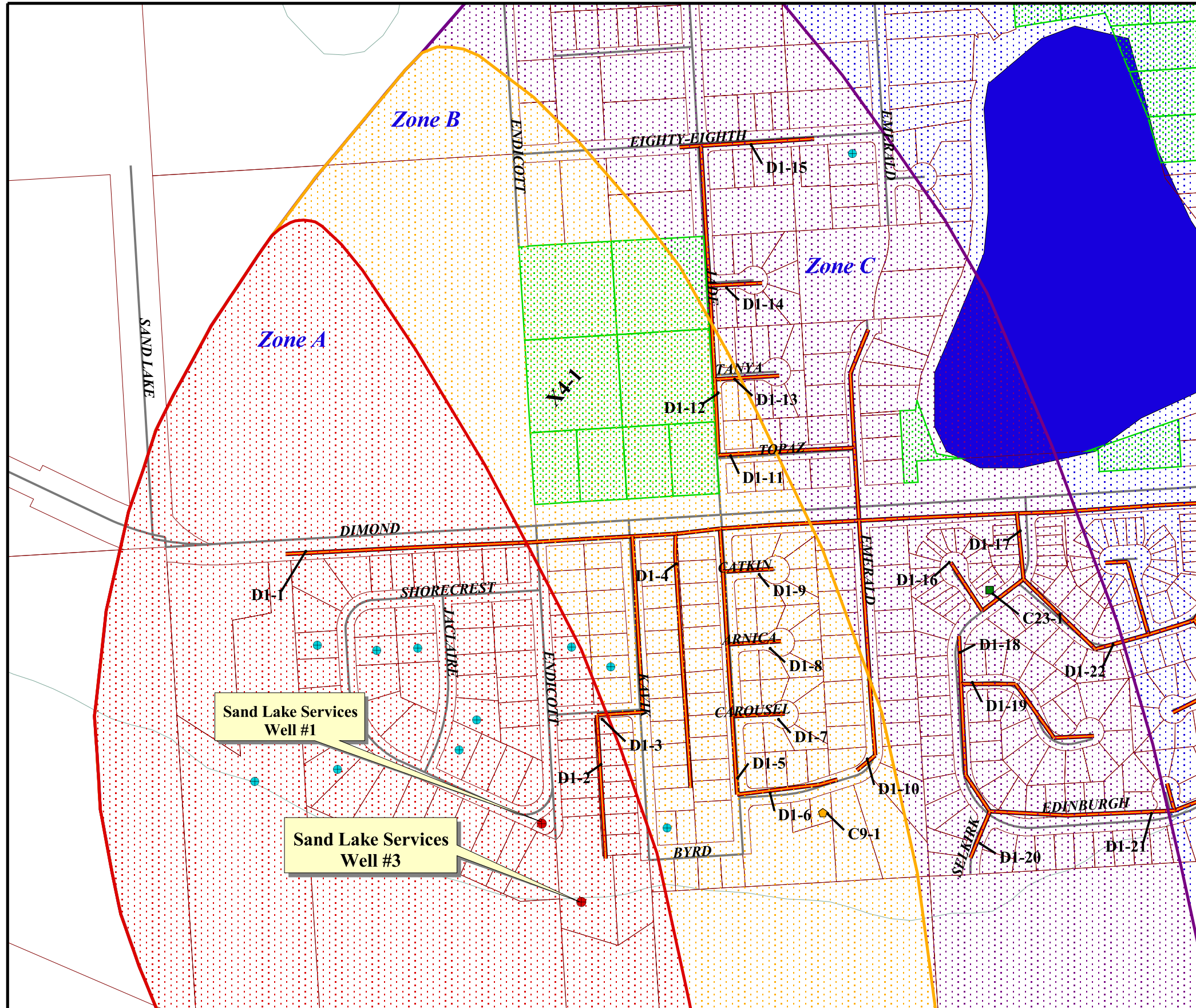
- Sand Lake Services Wells #1 & #3
- Zone Protection Area
- ▨ Several Months Travel Time
- Zone B Protection Area
- ▨ Less Than 2 Years Travel Time
- Zone C Protection Area
- ▨ Less Than 5 Years Travel Time
- Zone D Protection Area
- ▨ Less Than 10 Years Travel Time
- ⊠ Septic Systems (R2)
- ▨ Residential Areas (R1)
- ⋯ Trails (X46)
- ⋯ Anchorage Roads (X20)
- ▭ Anchorage Land Parcels
- Anchorage Lakes
- ⋯ Anchorage Streams
- ⋯ Elevation Contours



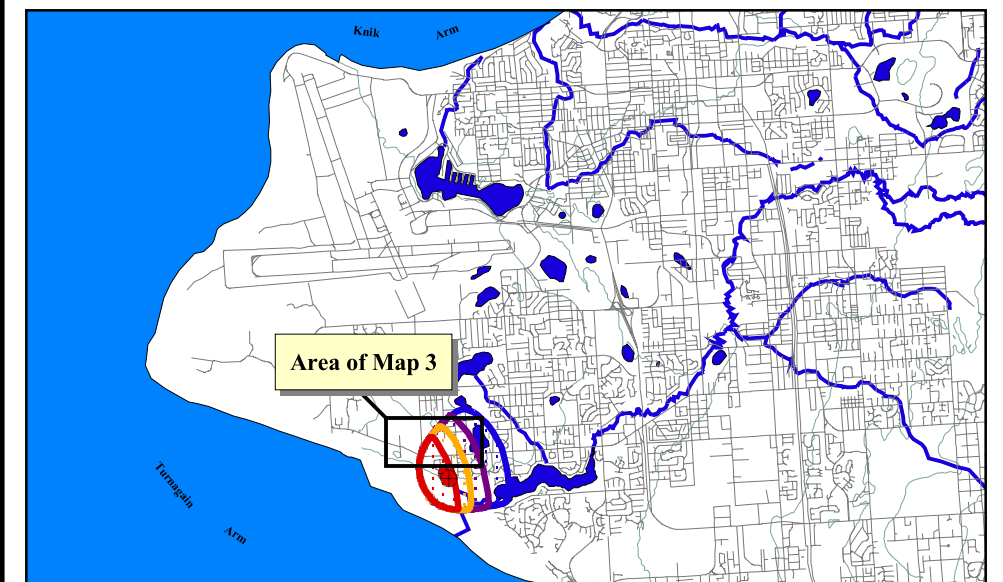
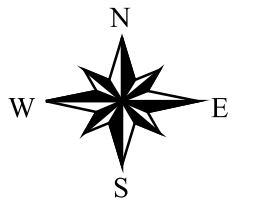
PWSID 210485

Map 2

Drinking Water Protection Area and Potential & Existing Contaminant Sources for Sand Lake Services - Wells #1 & #3



- Sand Lake Services Well #1 & #3
- Private and Public Wells
- Zone 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**
- Lawn and Garden Supplies/Services (C23)
- ◆ Construction Trade Areas (C9)
- ◆ Railroad Yards (X31)
- Anchorage Parks (X4)
- Sewer Lines (D1)
- Anchorage Roads (X20)
- Anchorage Land Parcels
- Anchorage Lakes
- Anchorage Streams
- Elevation Contours

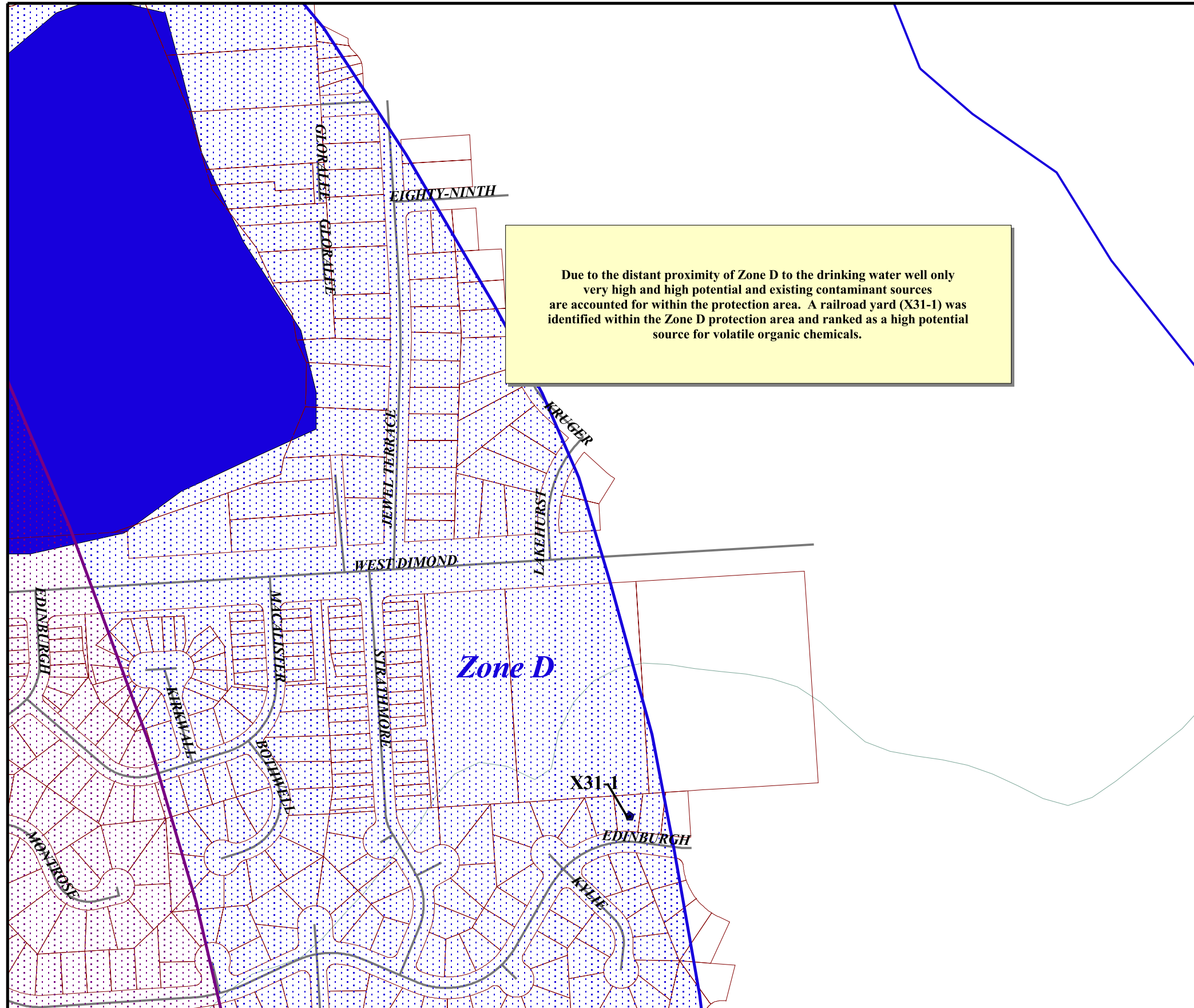


900 0 900 1800 Feet

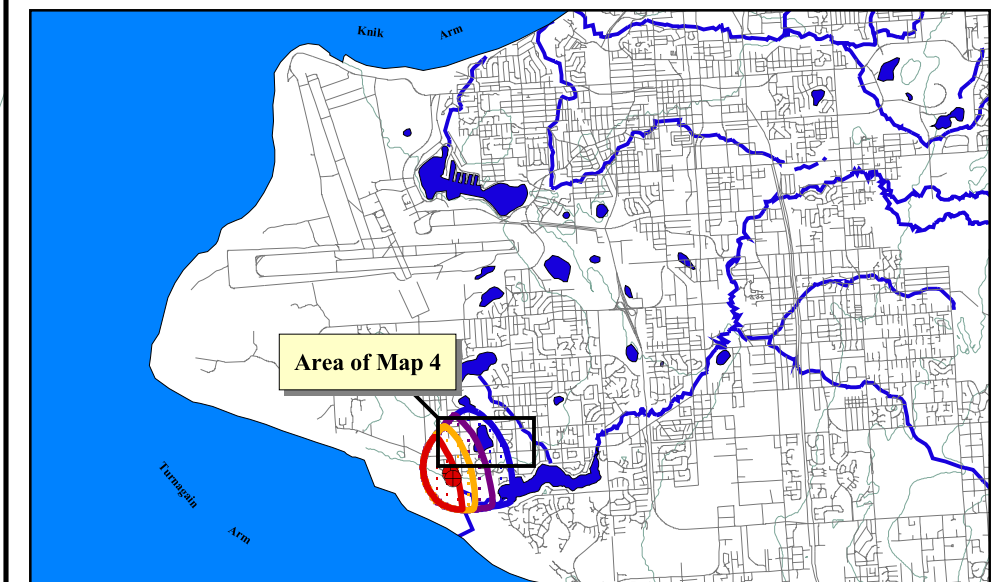
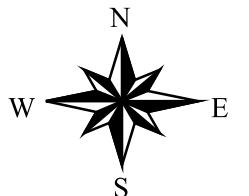
PWSID 210485

Map 3

Drinking Water Protection Area and Potential & Existing Contaminant Sources for Sand Lake Services - Wells #1 & #3



- Sand Lake Services Well #1 & #3
- Zone 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**
- Lawn and Garden Supplies/Services (C23)
- ✕ Construction Trade Areas (C9)
- Railroad Yards (X31)
- ∧ Anchorage Roads (X20)
- Anchorage Land Parcels
- Anchorage Lakes
- ∧ Anchorage Streams
- ∧ Elevation Contours



700 0 700 1400 Feet

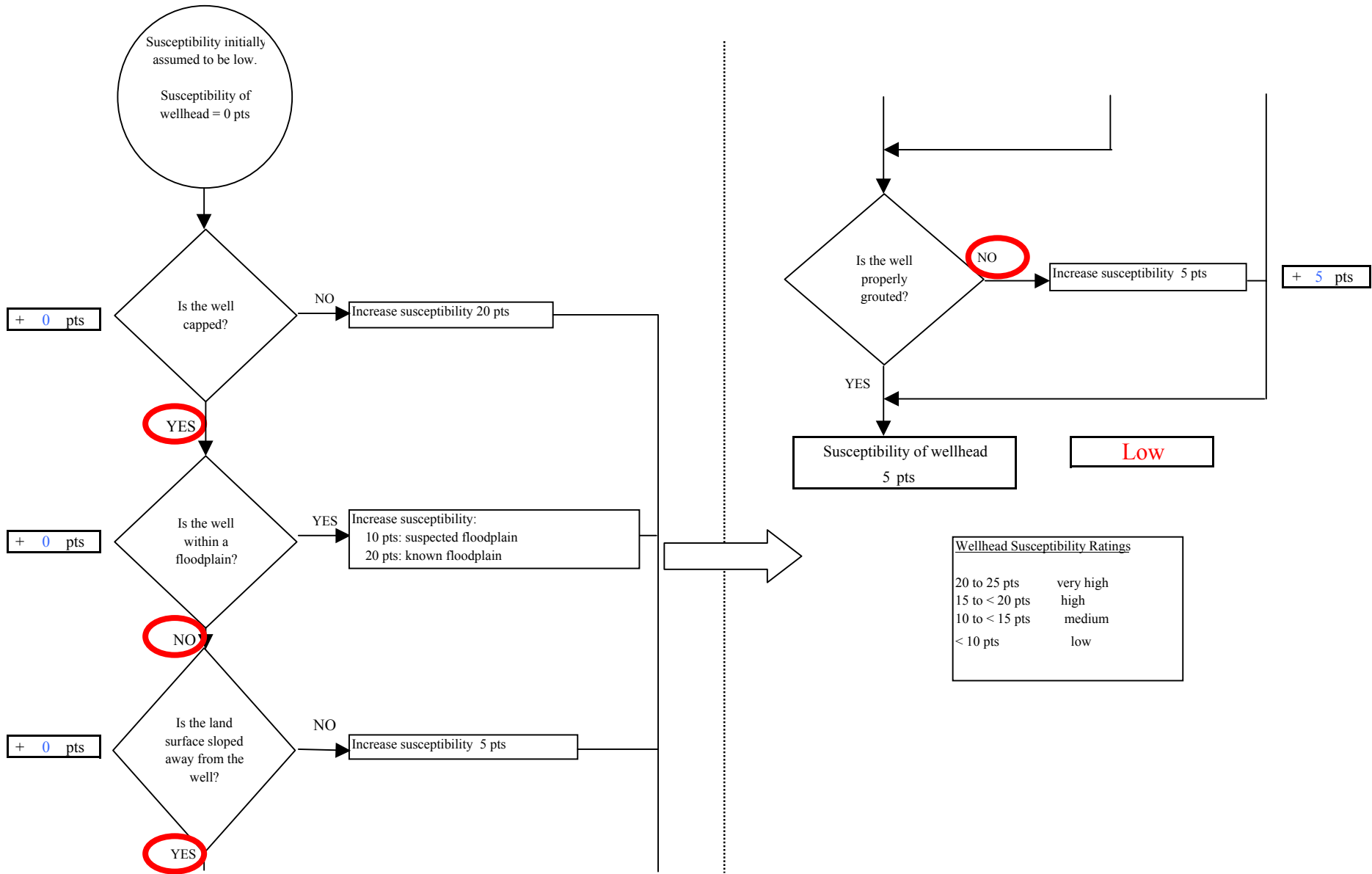
PWSID 210485

Map 4

APPENDIX D

Vulnerability Analysis for Sand Lake Services - Well #1

Chart 1. Susceptibility of the wellhead - Sand Lake Services - Well 1



| Wellhead Susceptibility Ratings | |
|---------------------------------|-----------|
| 20 to 25 pts | very high |
| 15 to < 20 pts | high |
| 10 to < 15 pts | medium |
| < 10 pts | low |

Chart 2. Susceptibility of the aquifer - Sand Lake Services - Well 1

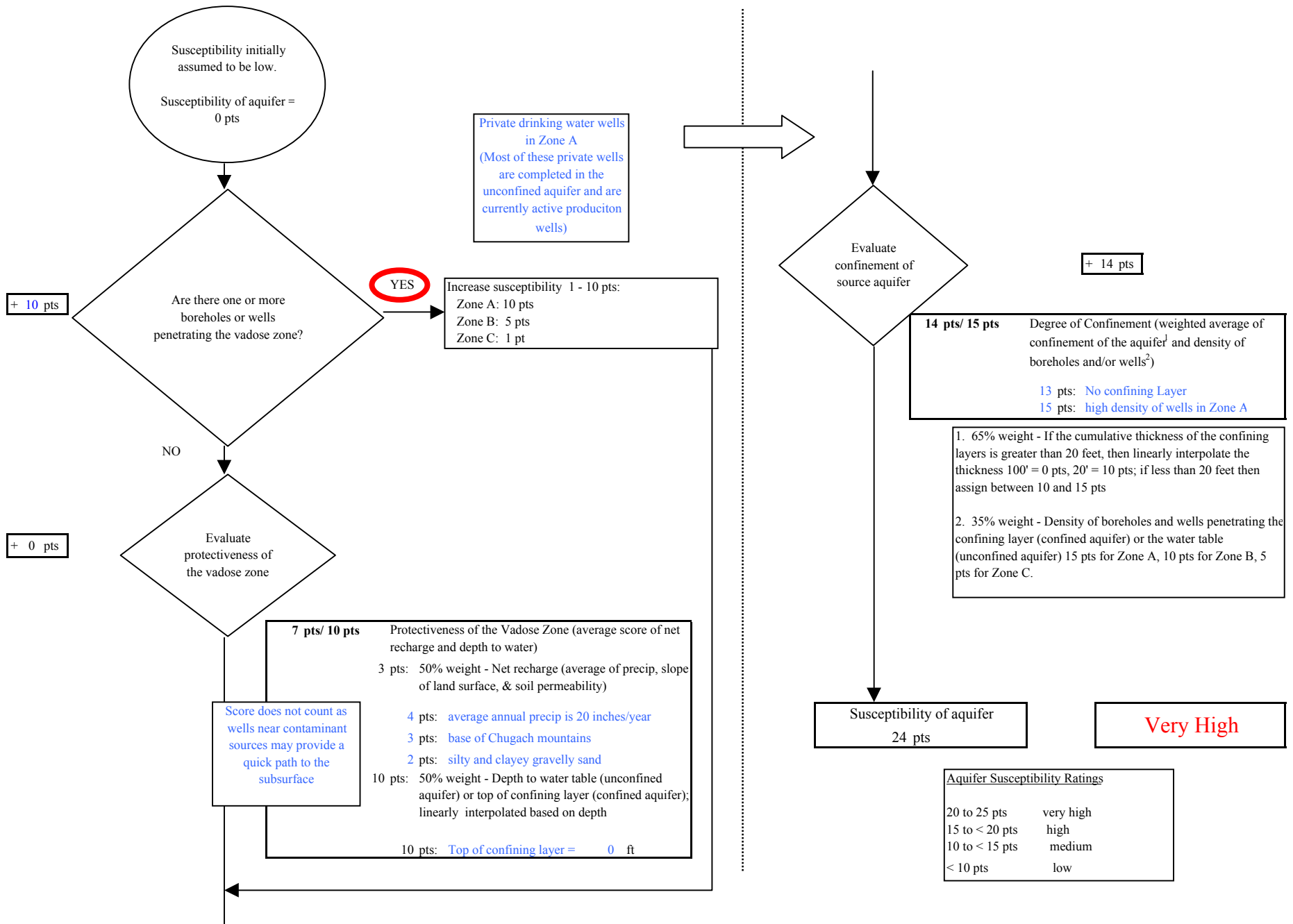
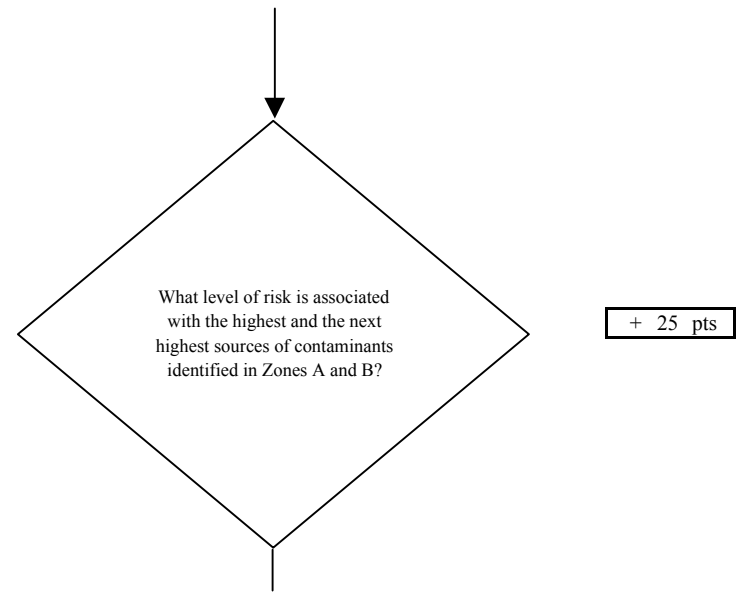
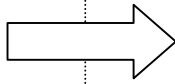
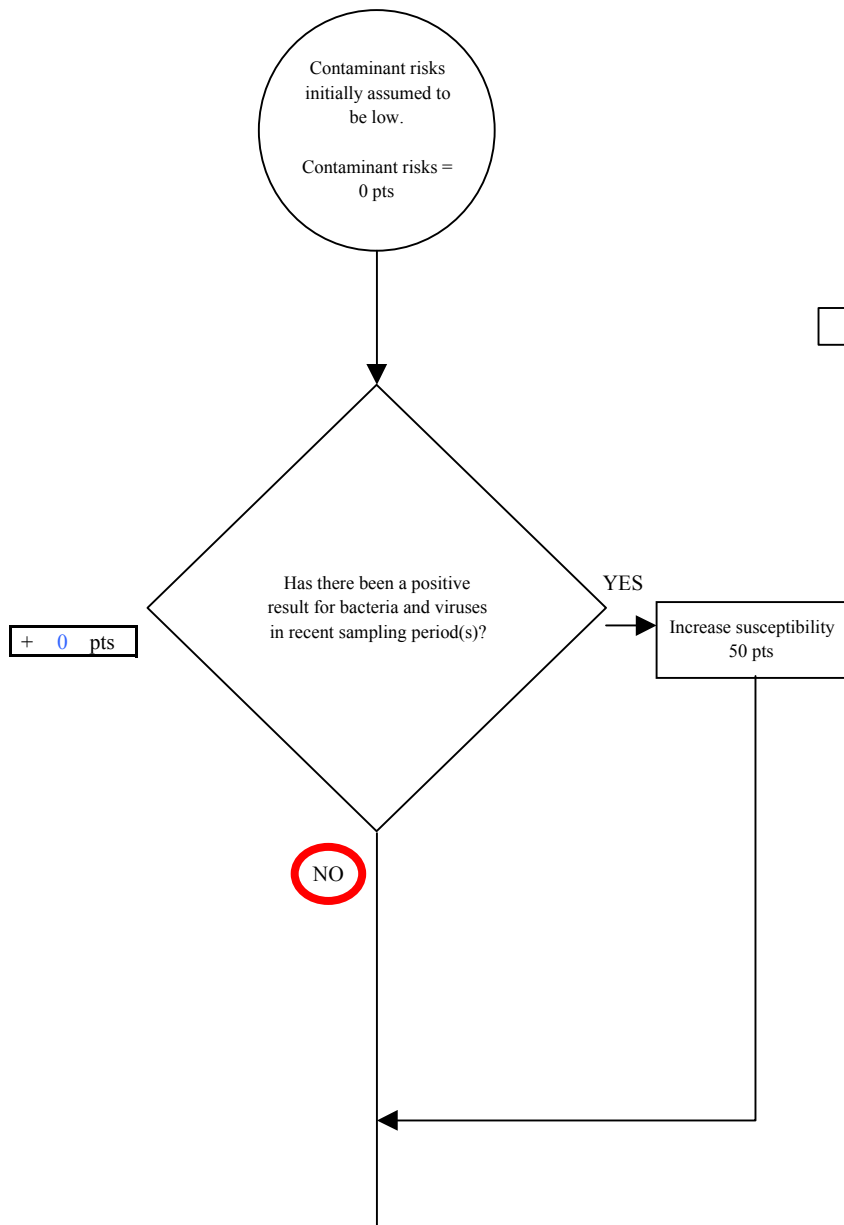


Chart 3. Contaminant risks for Sand Lake Services - Well 1 - Bacteria & Viruses



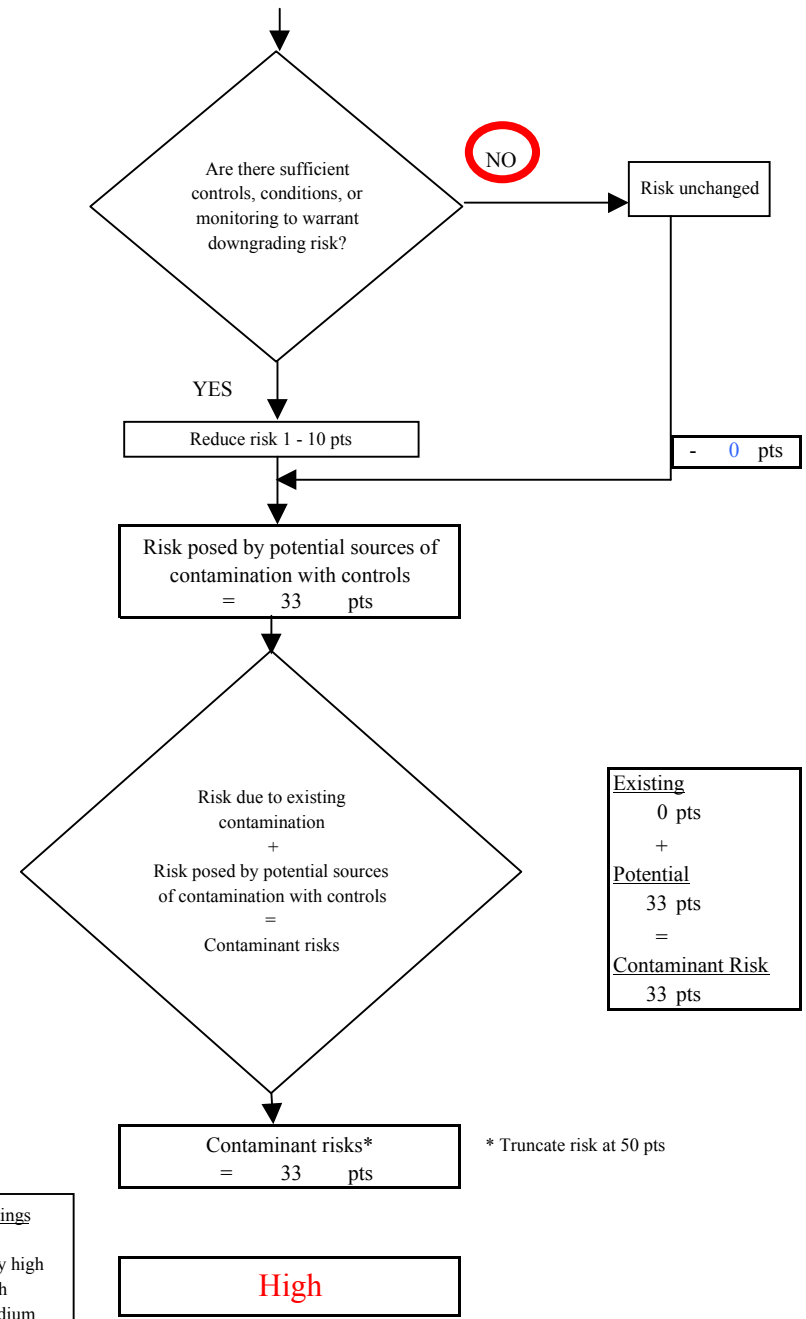
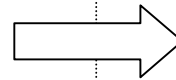
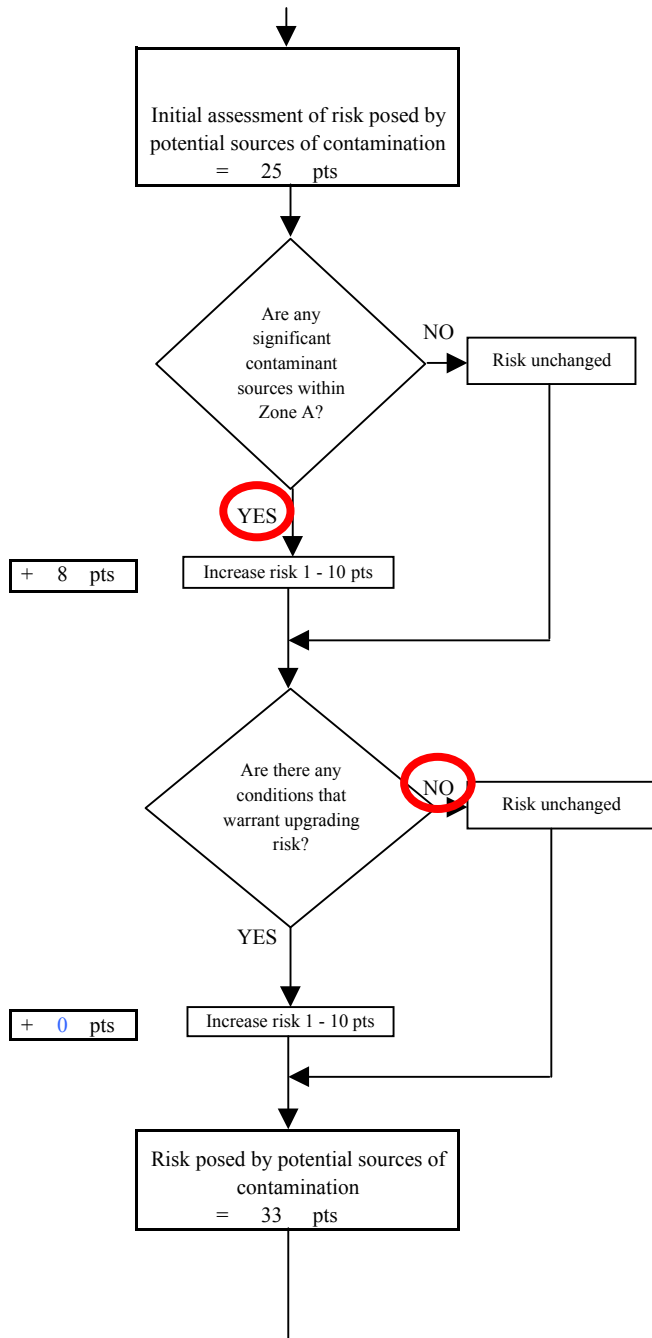
| Risk Rankings for Contaminant Sources Identified in Zones A and B | | | |
|---|--------|--------|-------|
| | Zone A | Zone B | Total |
| Very High(s) | 0 | 0 | 0 |
| High(s) | 0 | 0 | 0 |
| Medium(s) | 1 | 1 | 2 |
| Low(s) | 12 | 5 | 17 |

| | 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 Sand Lake Services - Well 1 - Bacteria & Viruses



| | |
|------------------|--------|
| Existing | 0 pts |
| + | |
| Potential | 33 pts |
| = | |
| Contaminant Risk | 33 pts |

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

* Truncate risk at 50 pts

Chart 4. Vulnerability analysis for Sand Lake - Well 1 - Bacteria & Viruses

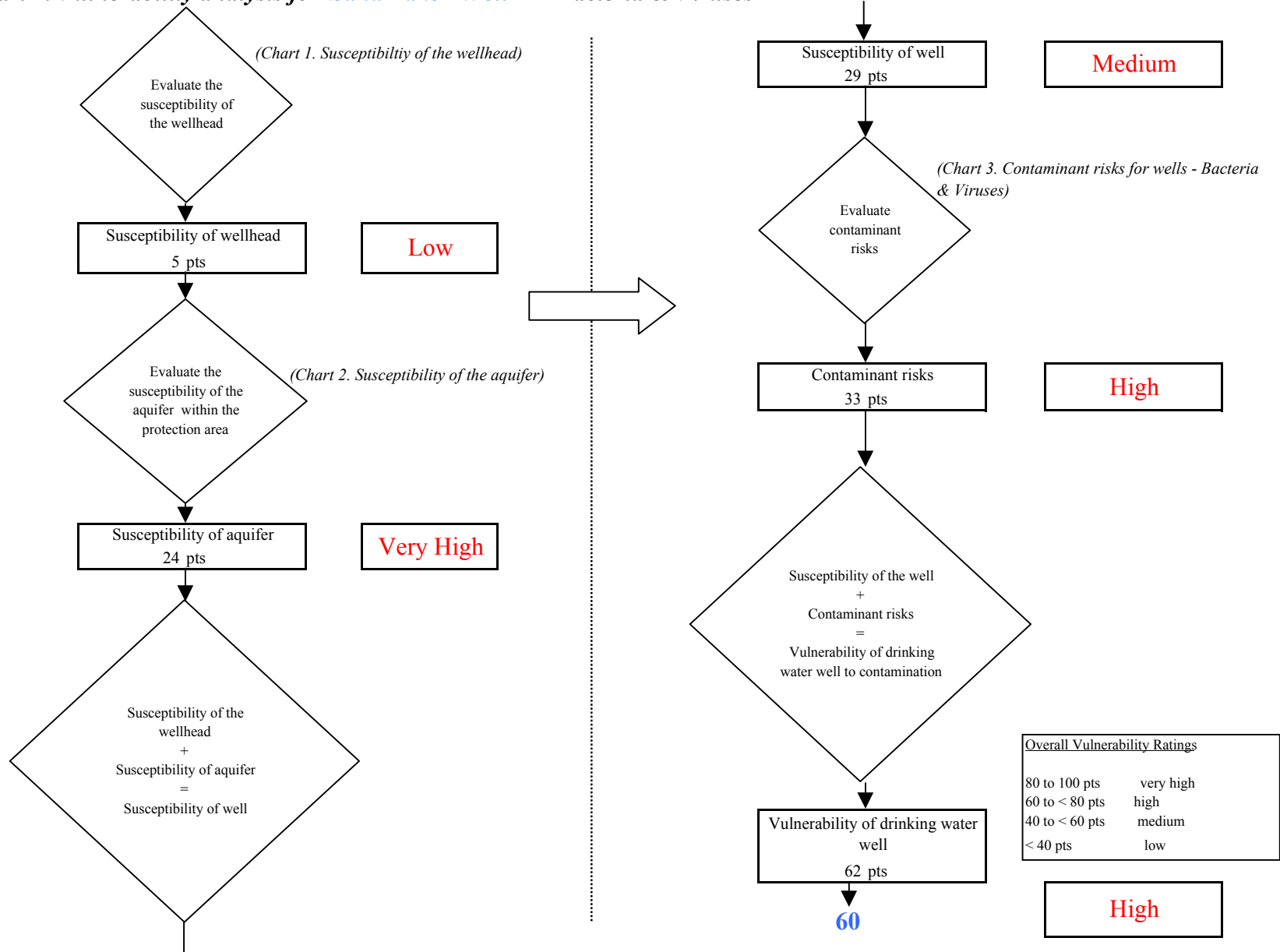


Chart 5. Contaminant risks for Sand Lake Services - Well 1 - Nitrates and Nitrites

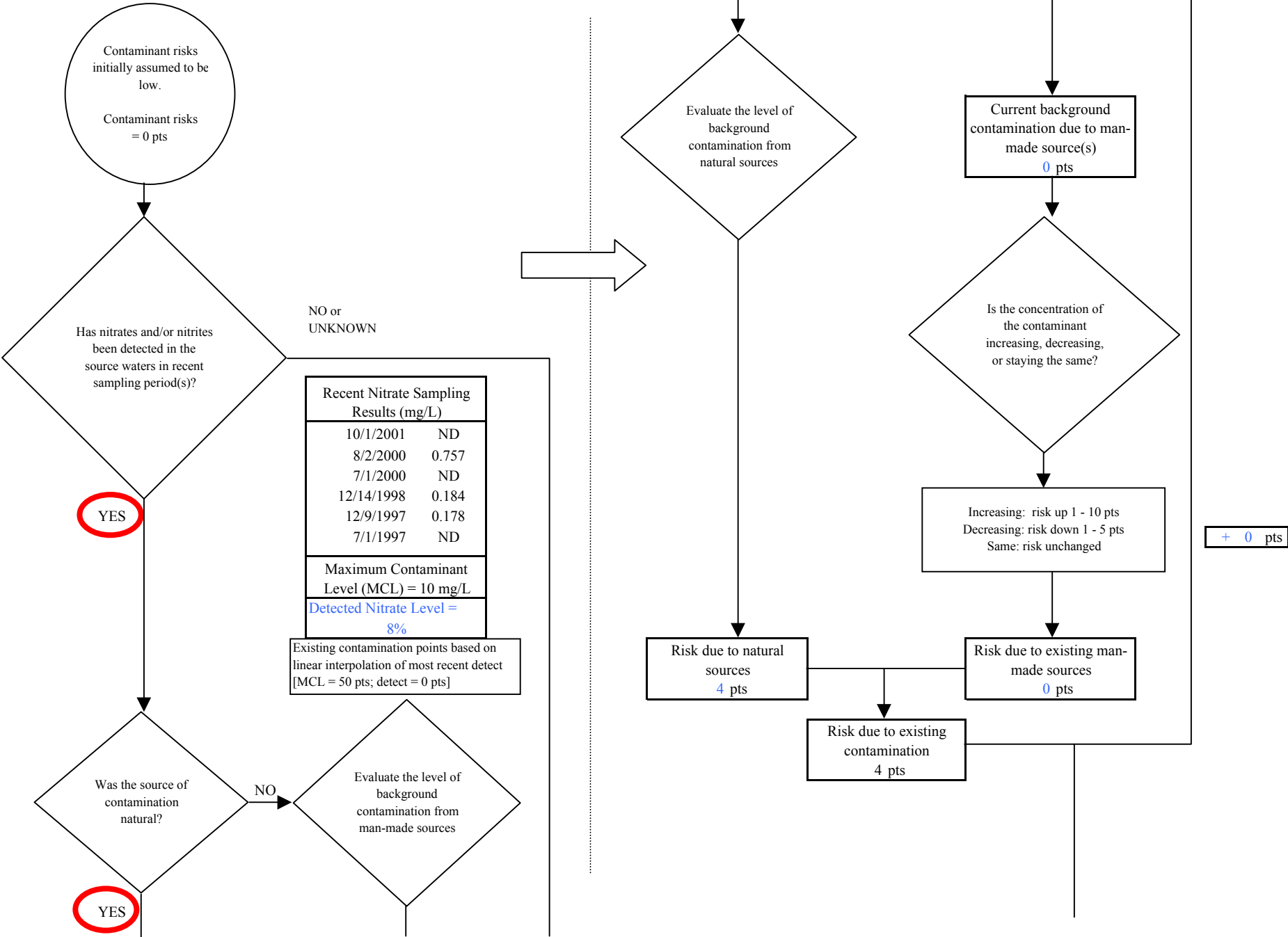
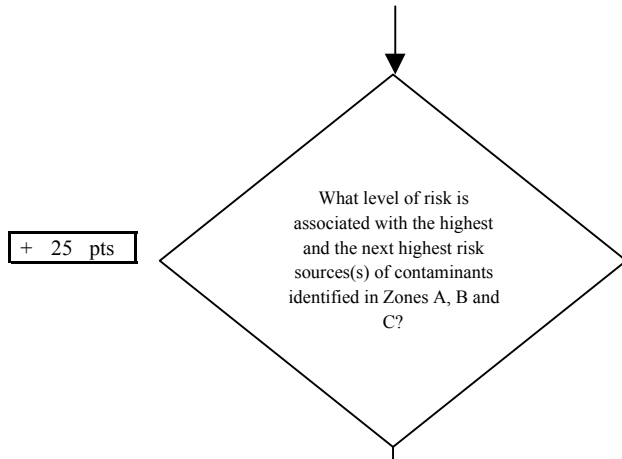


Chart 5. Contaminant risks for Sand Lake Services - Well 1 - Nitrates and Nitrites



| 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) | 1 | 1 | 2 |
| Low(s) | 12 | 7 | 19 |

| | 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.

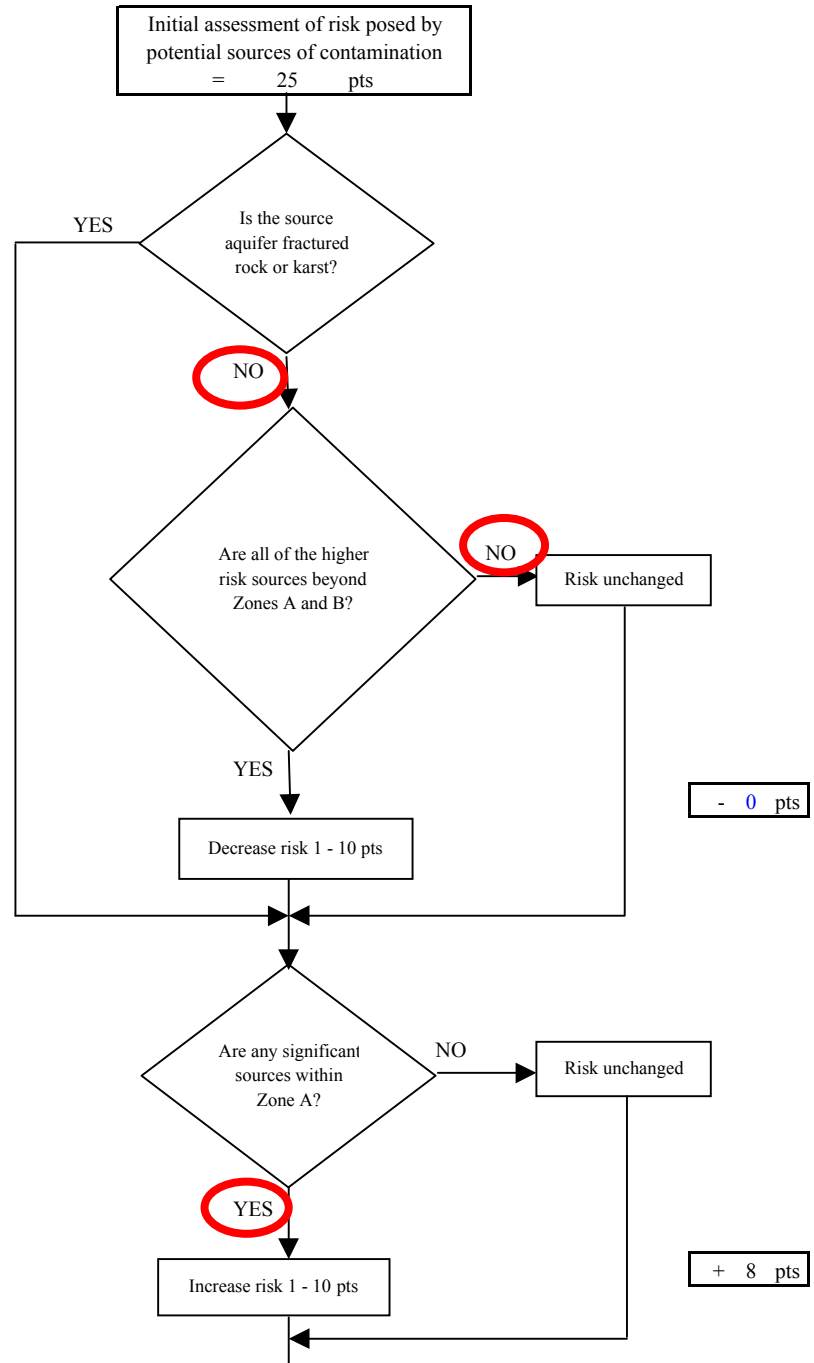
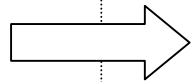


Chart 5. Contaminant risks for Sand Lake Services - Well 1 - Nitrates and Nitrites

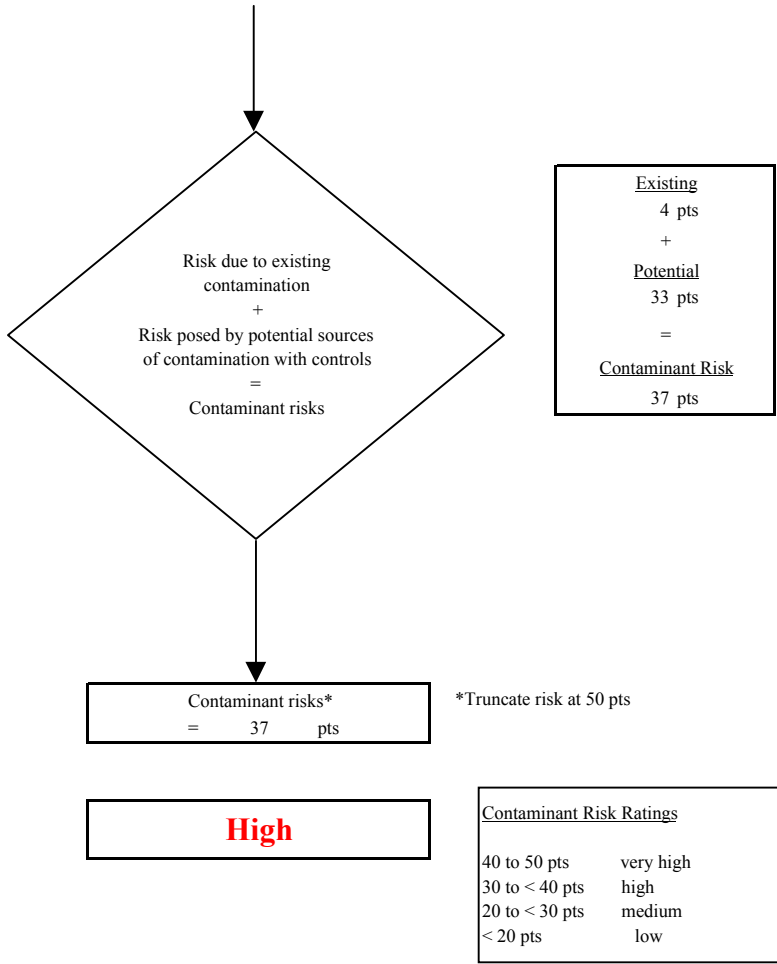
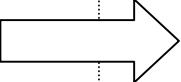
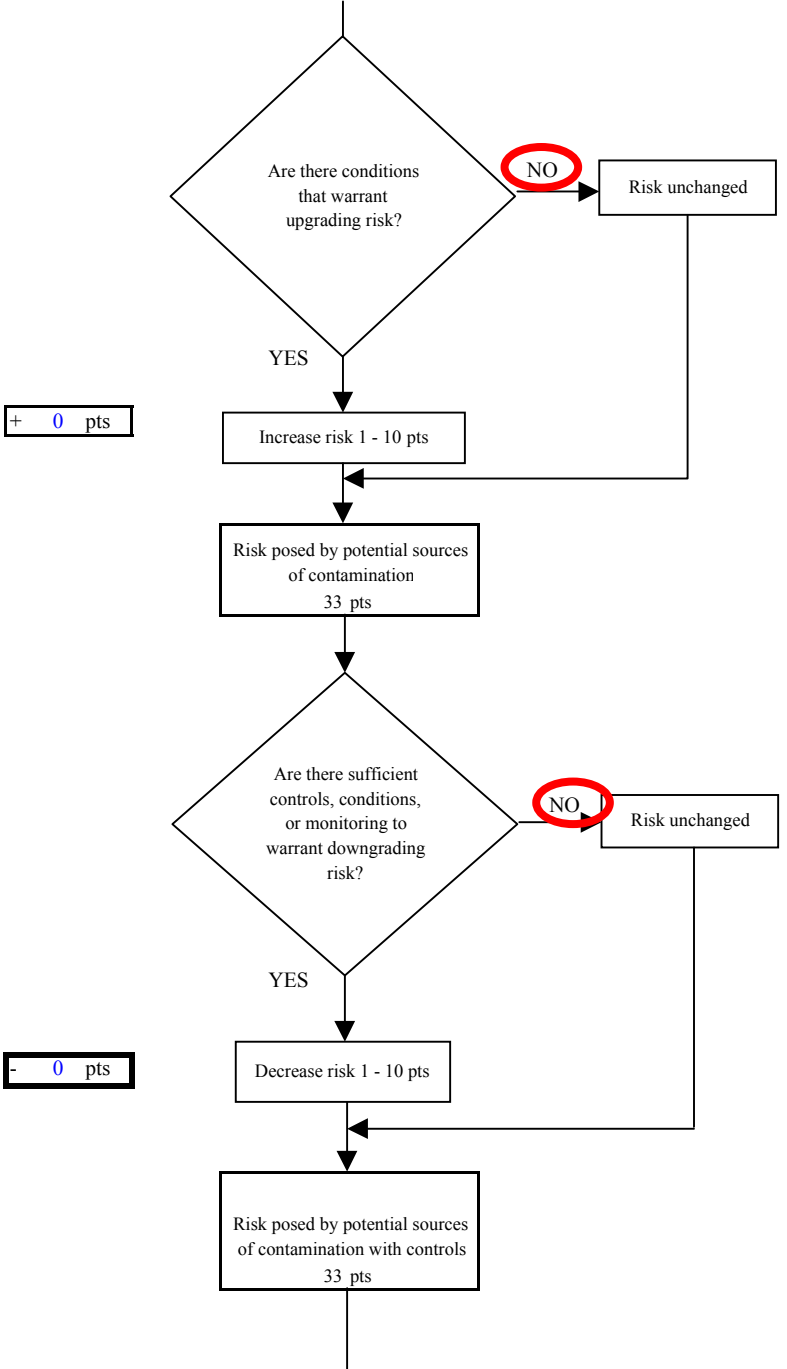


Chart 6. Vulnerability analysis for Sand Lake Services - Well 1 - Nitrates and Nitrites

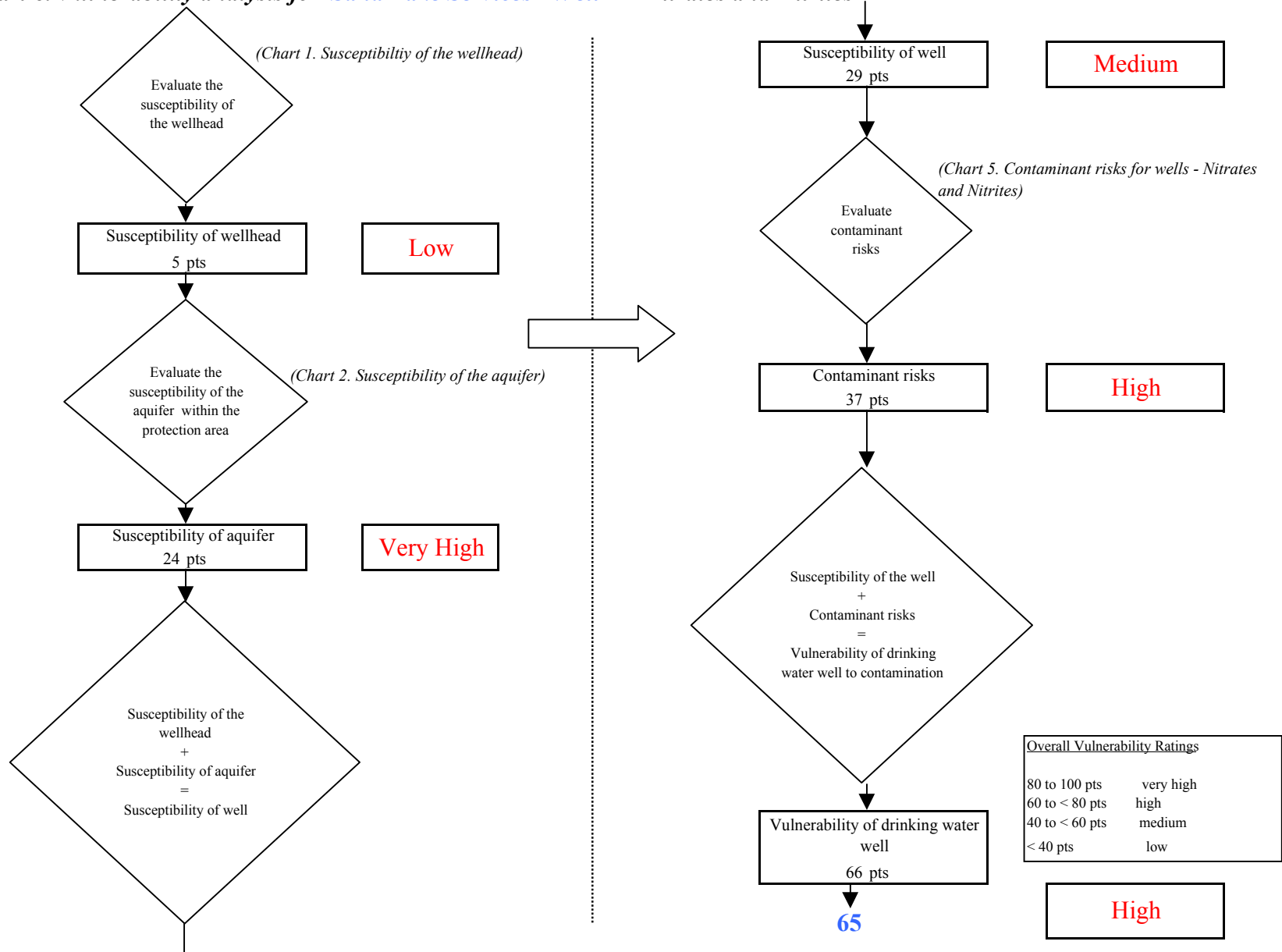


Chart 7. Contaminant risks for Sand Lake Services - Well 1 - Volatile Organic Chemicals

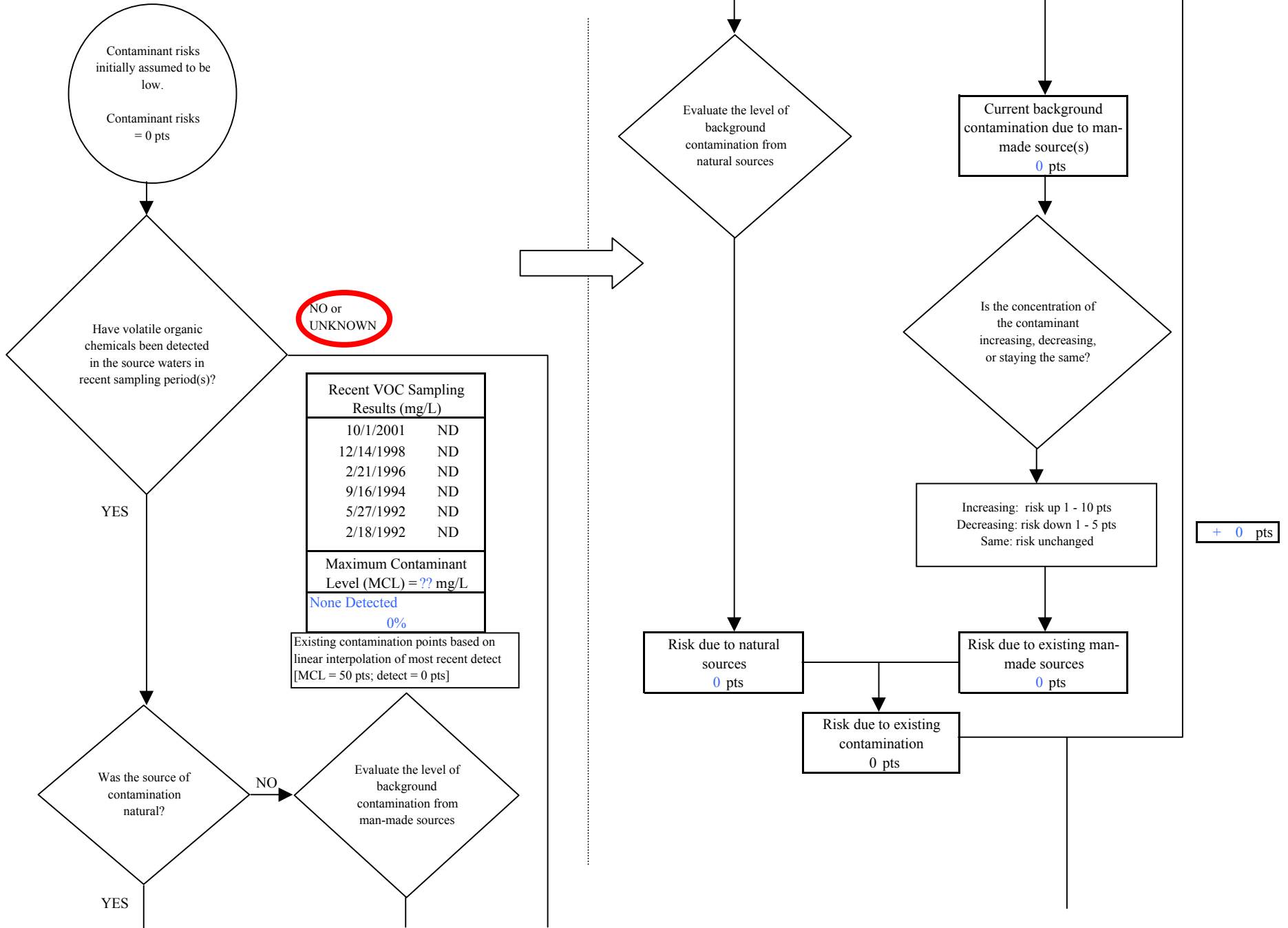
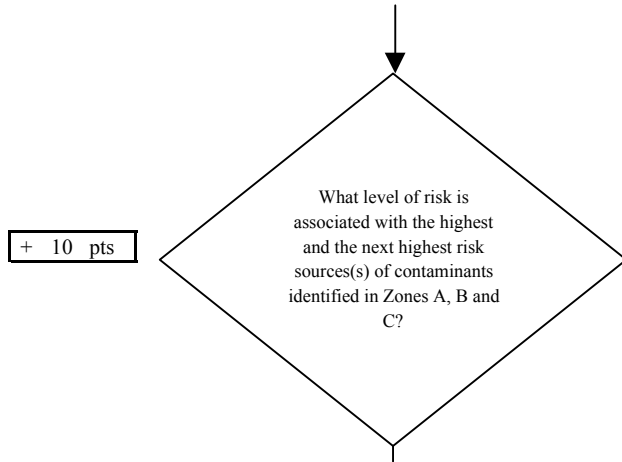


Chart 7. Contaminant risks for Sand Lake Services - Well 1 - Volatile Organic Chemicals



+ 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) | 6 | 6 | 12 |

| | 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.

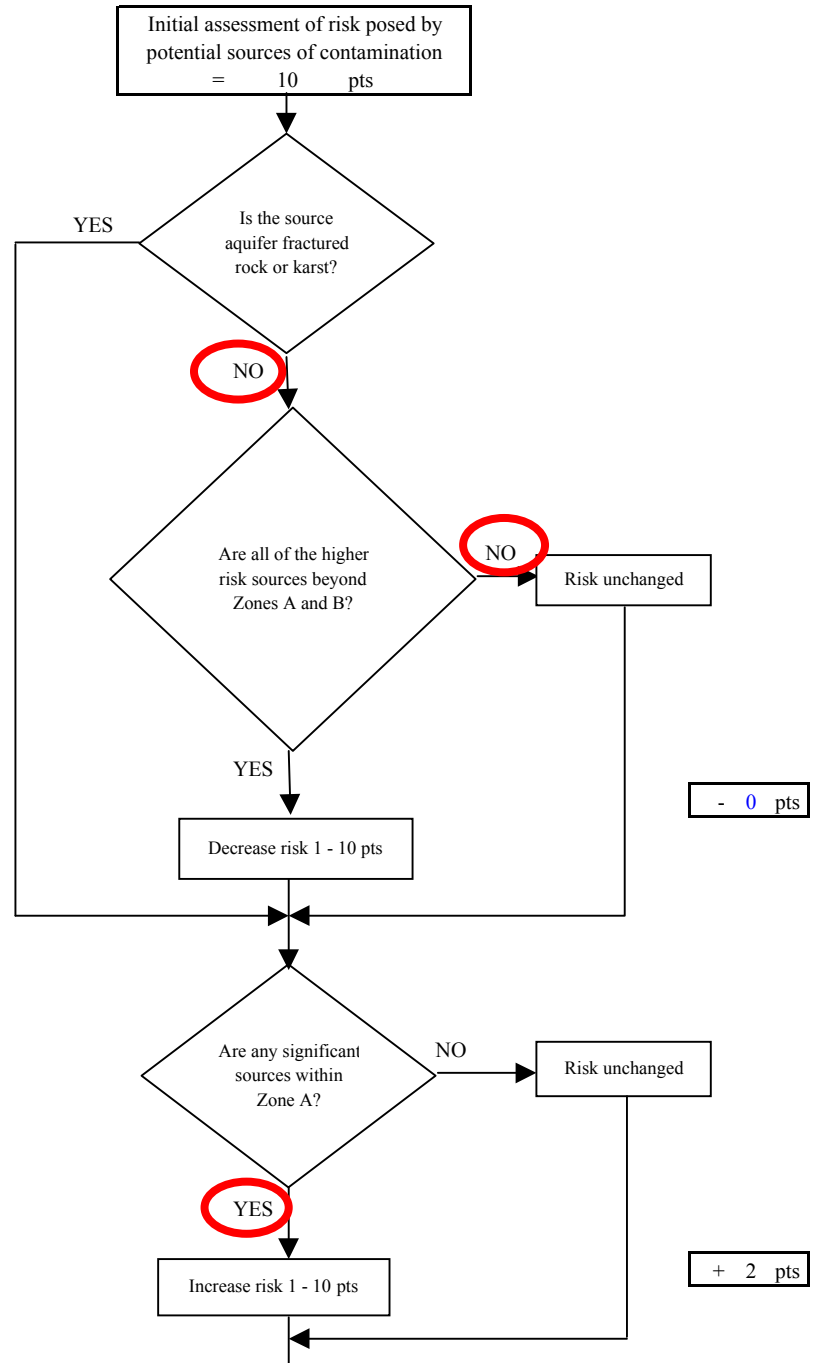
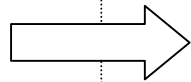


Chart 7. Contaminant risks for Sand Lake Services - Well 1 - Volatile Organic Chemicals

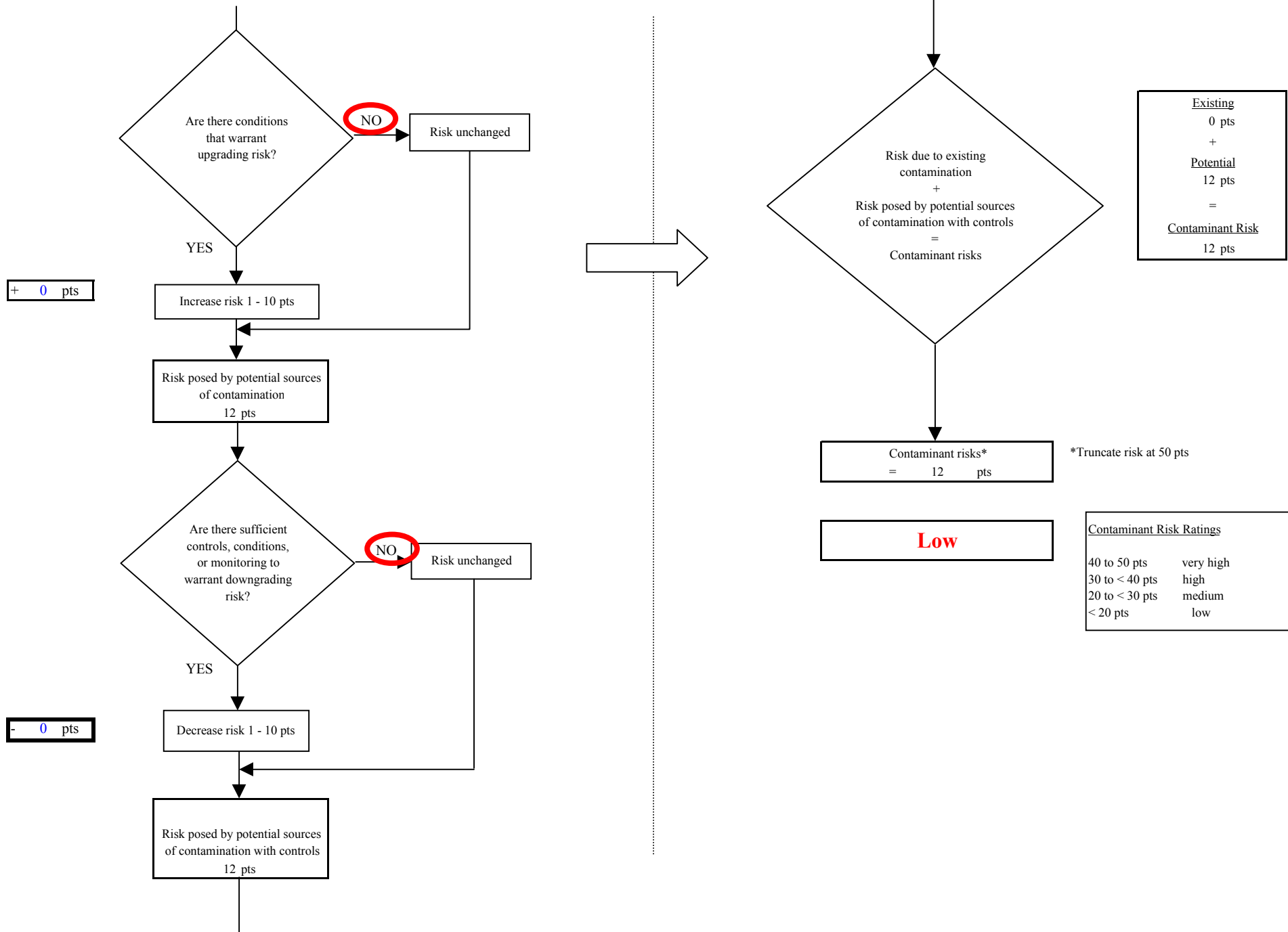


Chart 8. Vulnerability analysis for Sand Lake Services - Well 1 - Volatile Organic Chemicals

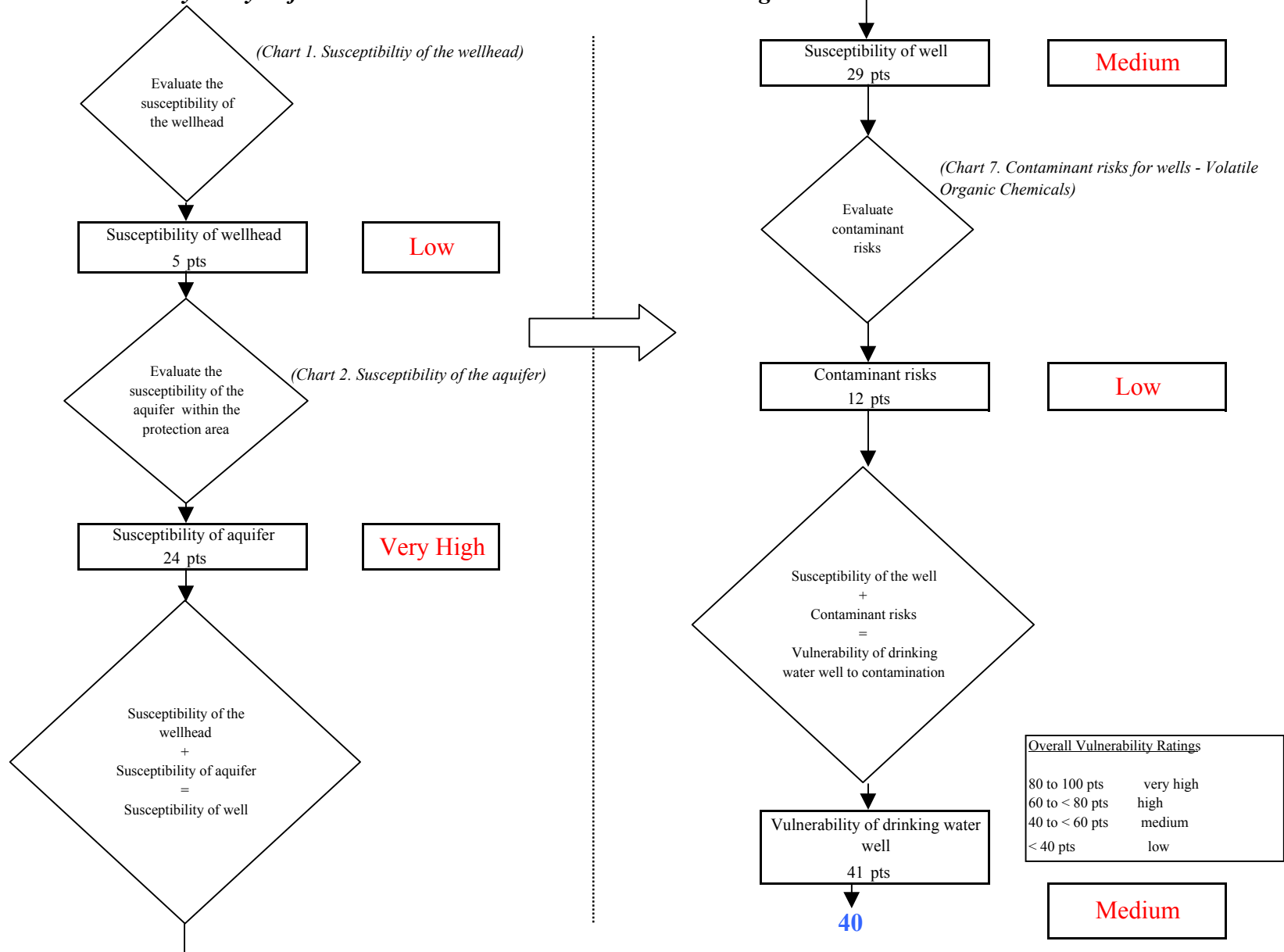


Chart 9. Contaminant risks for Sand Lake Services - Well 1 - Heavy Metals, Cyanide and Other Inorganic Chemicals

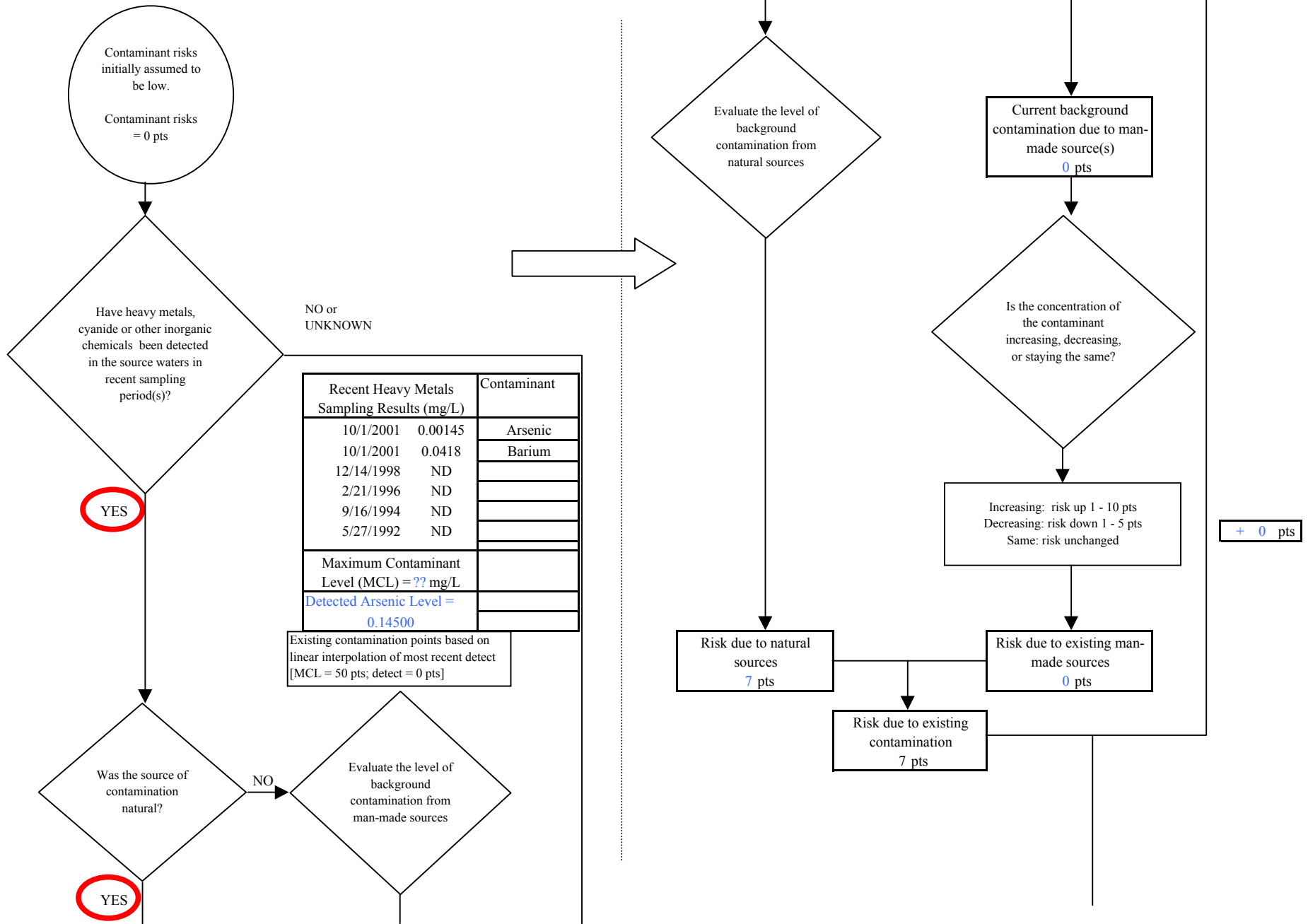
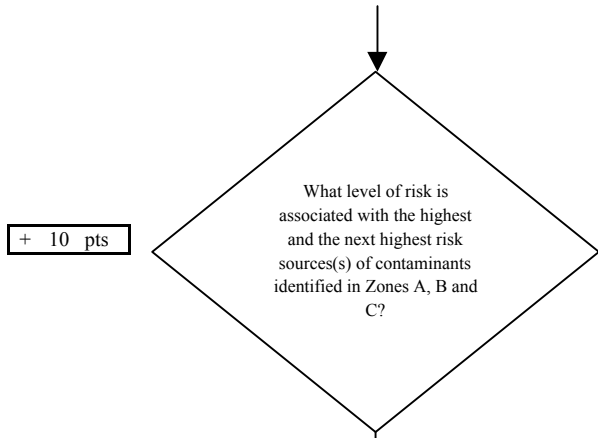


Chart 9. Contaminant risks for Sand Lake Services - Well 1 - Heavy Metals, Cyanide and Other Inorganic Chemicals



+ 10 pts

| Risk Levels for Contaminant Sources identified in Zones A, B and C | | | |
|--|--------|-----------|-------|
| | Zone A | Zones B&C | Total |
| Very High(s) | 0 | 0 | 0 |
| High(s) | 0 | 0 | 0 |
| Medium(s) | 0 | 0 | 0 |
| Low(s) | 5 | 6 | 11 |

| | 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.

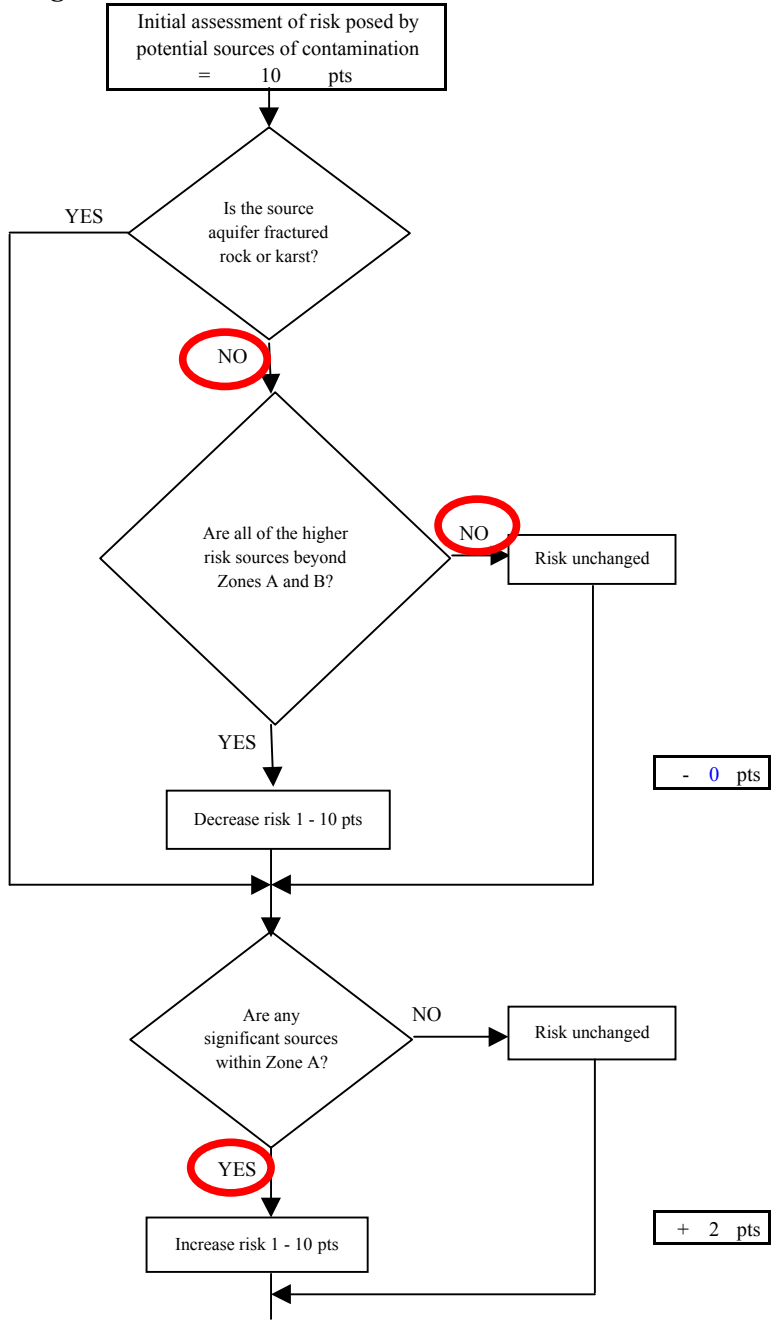
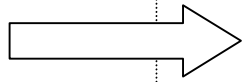


Chart 9. Contaminant risks for Sand Lake Services - Well 1 - Heavy Metals, Cyanide and Other Inorganic Chemicals

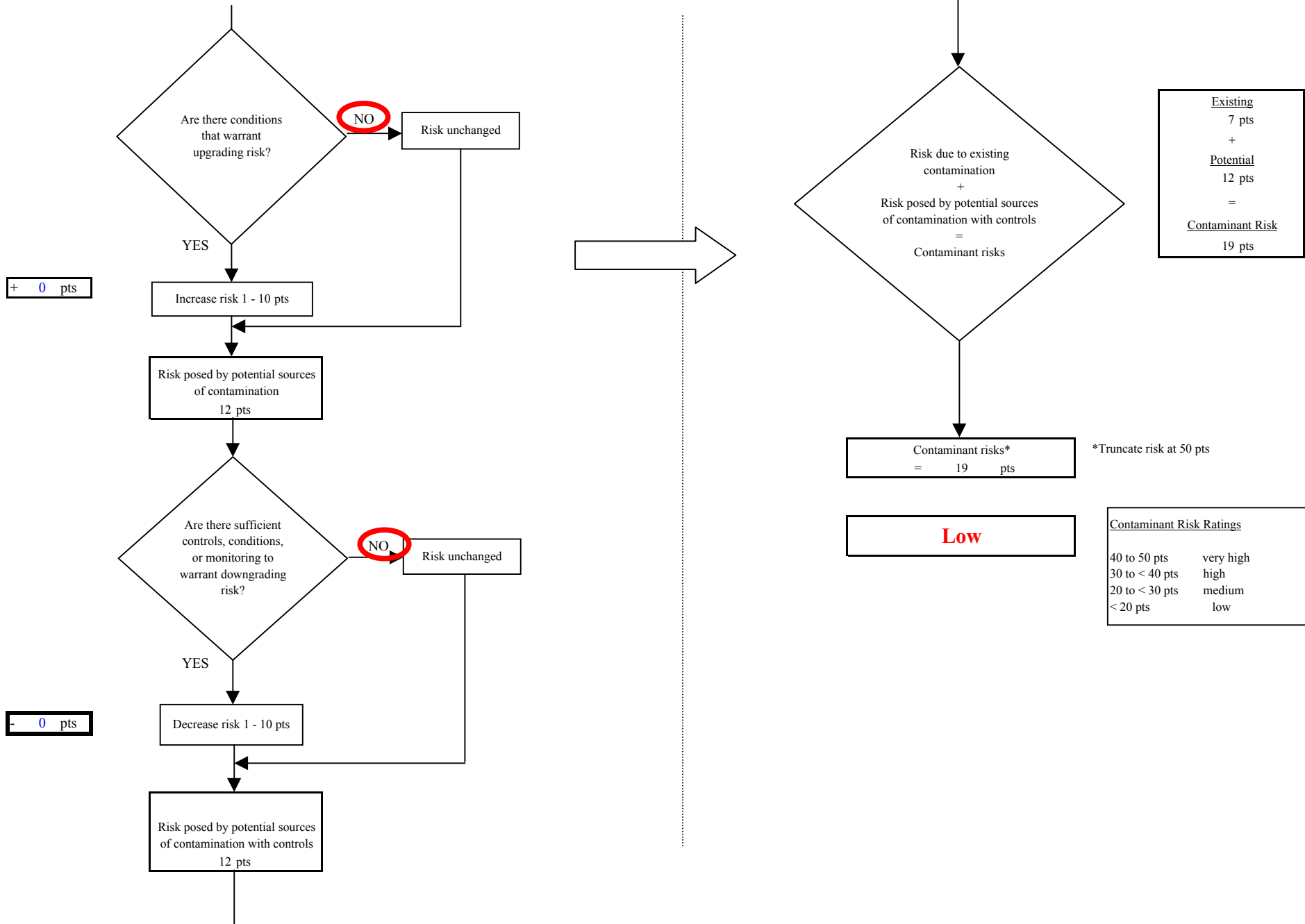


Chart 10. Vulnerability analysis for Sand Lake Services - Well 1 - Heavy Metals, Cyanide and Other Inorganic Chemicals

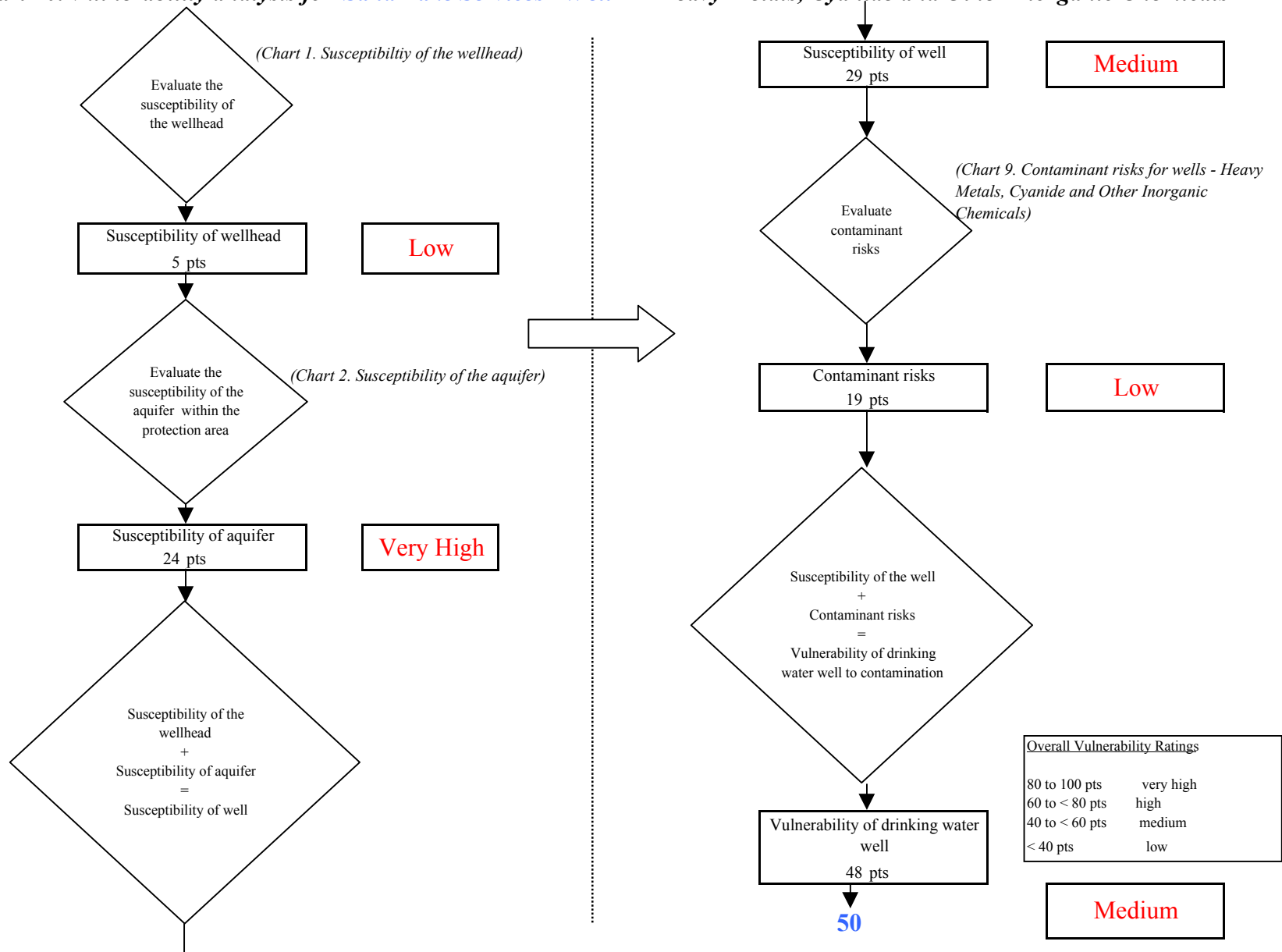


Chart 11. Contaminant risks for Sand Lake Services - Well 1 - Synthetic Organic Chemicals

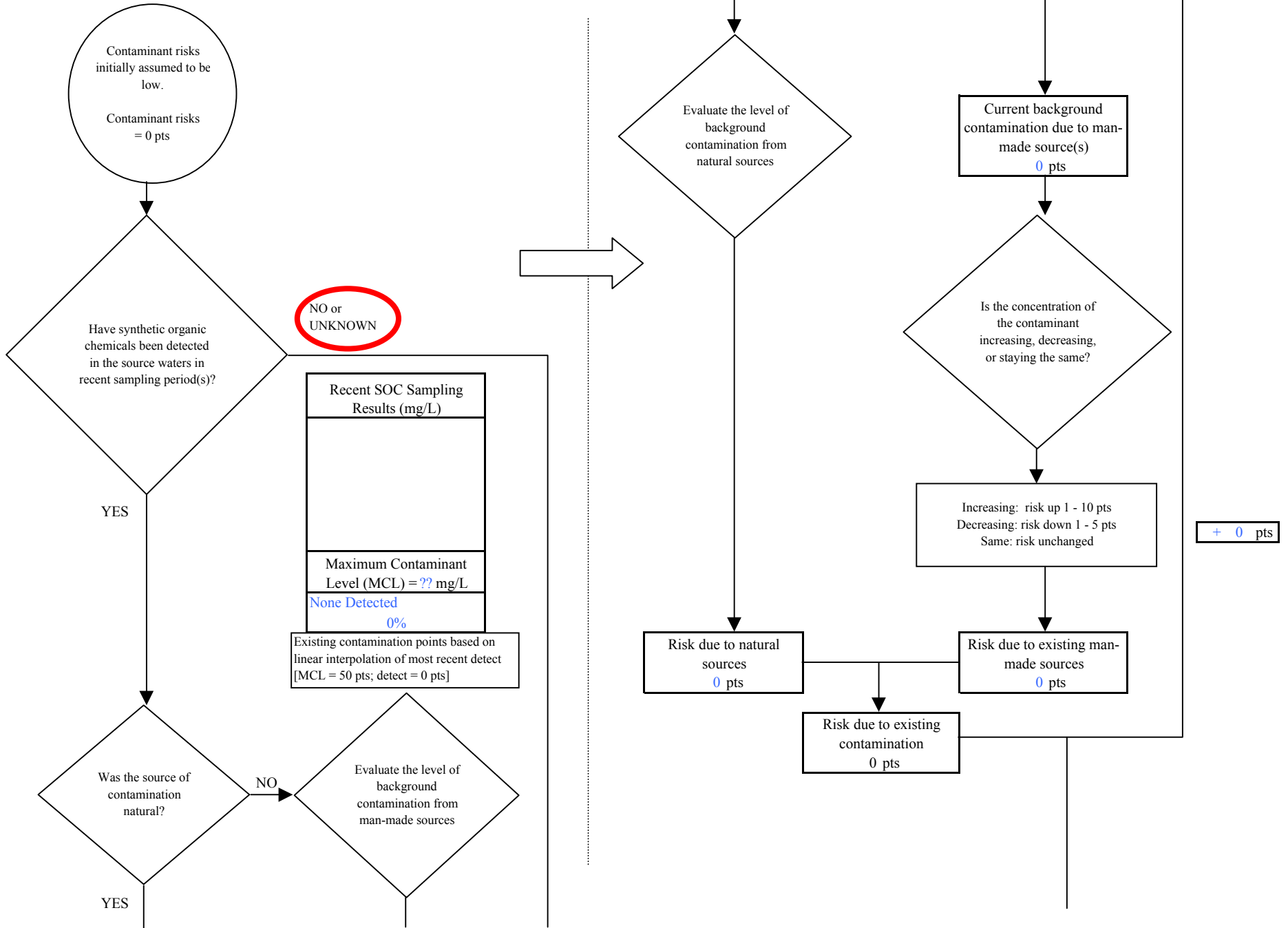
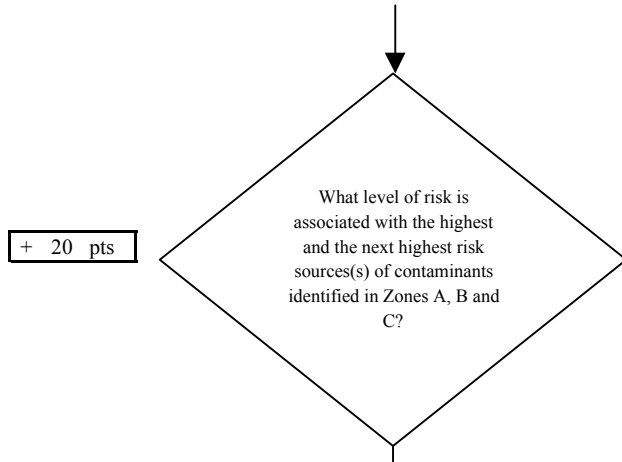


Chart 11. Contaminant risks for Sand Lake Services - Well 1 - Synthetic Organic Chemicals



| Risk Levels for Contaminant Sources identified in Zones A, B and C | | | |
|--|--------|-----------|-------|
| | Zone A | Zones B&C | Total |
| Very Highs(s) | 0 | 0 | 0 |
| High(s) | 0 | 0 | 0 |
| Medium(s) | 0 | 1 | 1 |
| Low(s) | 4 | 4 | 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 20

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

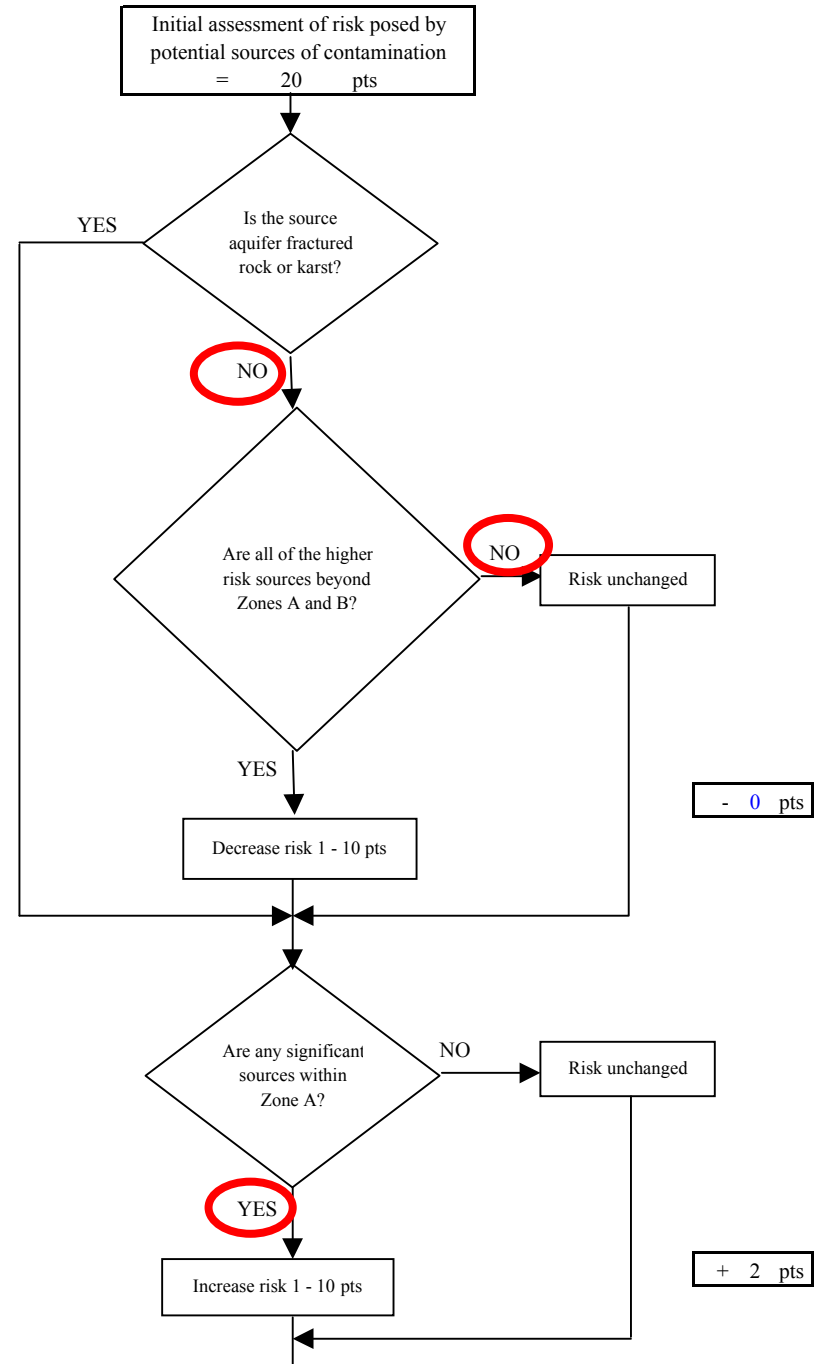
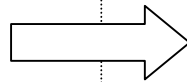


Chart 11. Contaminant risks for Sand Lake Services - Well 1 - Synthetic Organic Chemicals

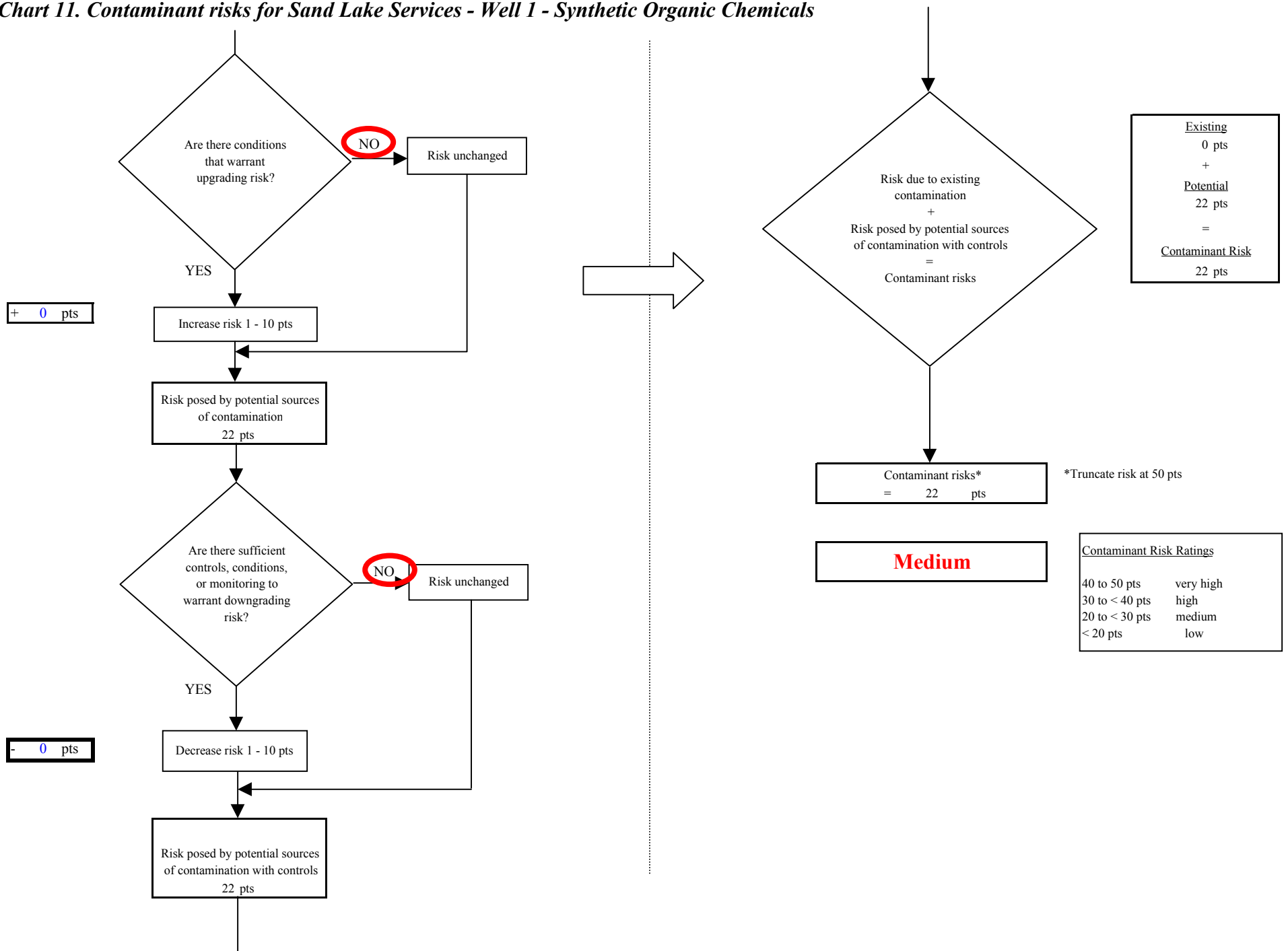


Chart 12. Vulnerability analysis for Sand Lake Services - Well 1 - Synthetic Organic Chemicals

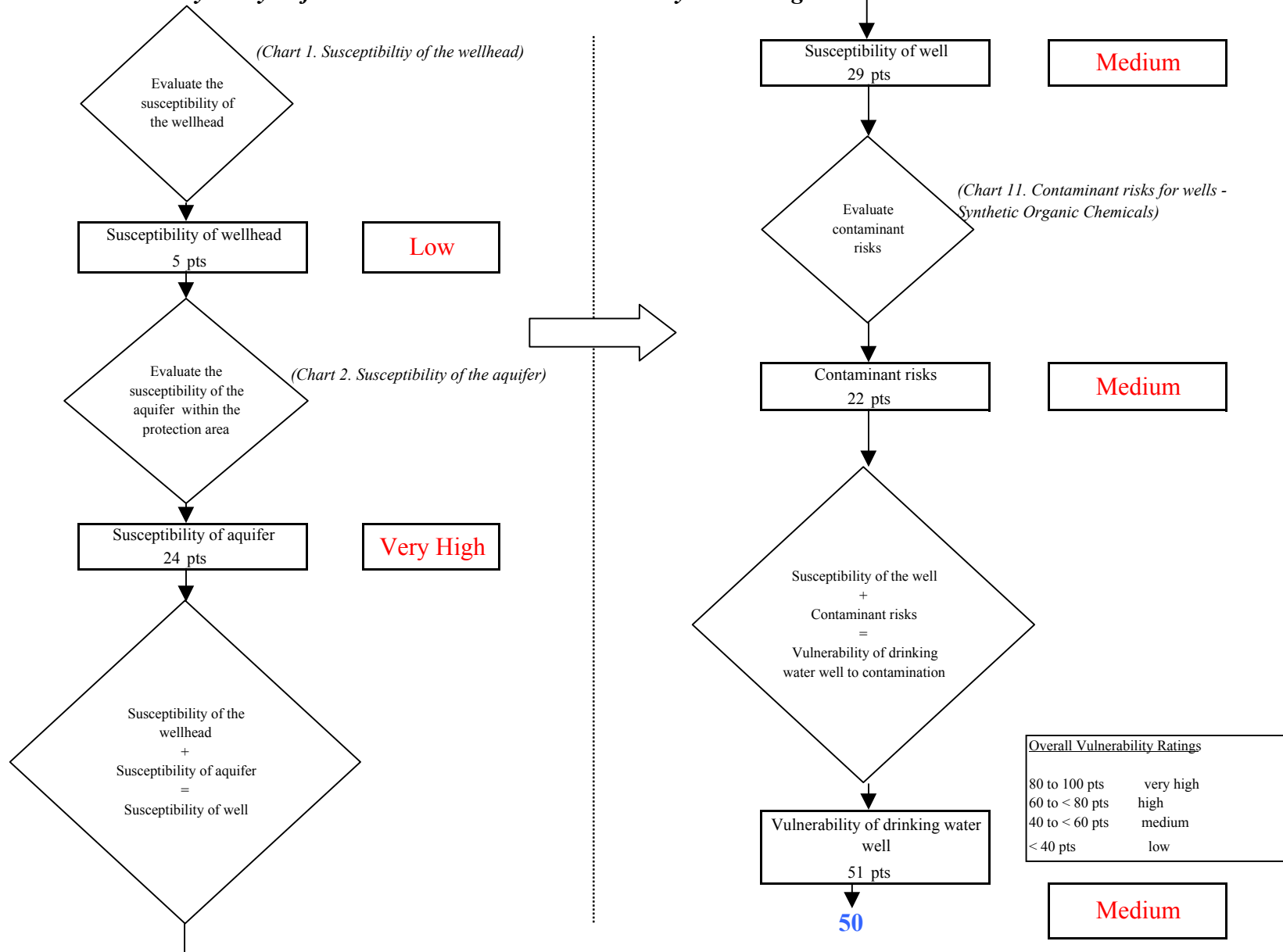


Chart 13. Contaminant risks for Sand Lake Services - Well 1 - Other Organic Chemicals

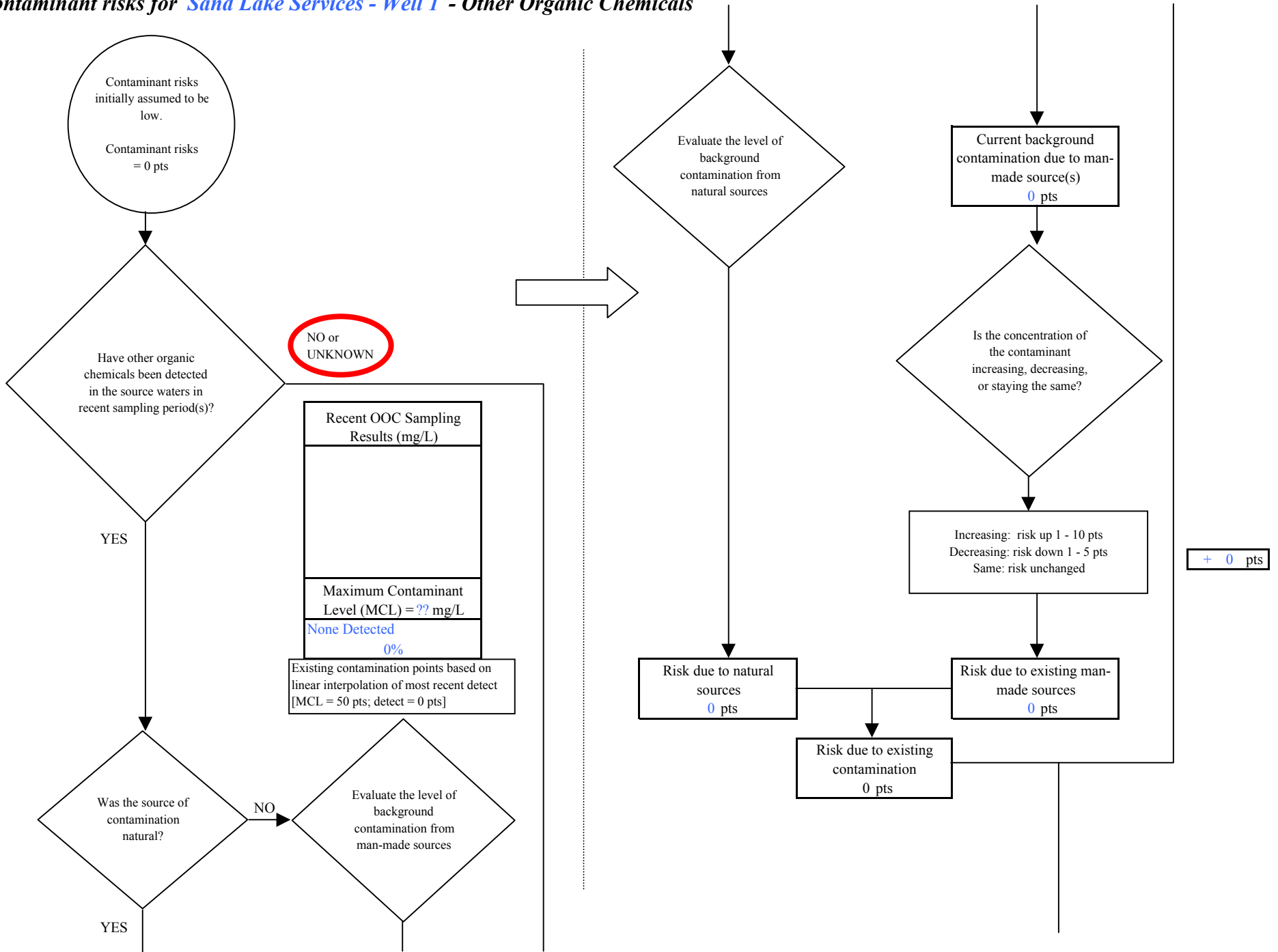
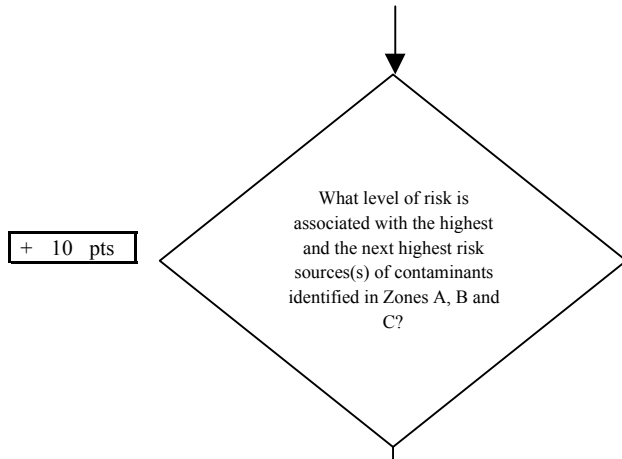


Chart 13. Contaminant risks for Sand Lake Services - Well 1 - Other Organic Chemicals



+ 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) | 5 | 4 | 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.

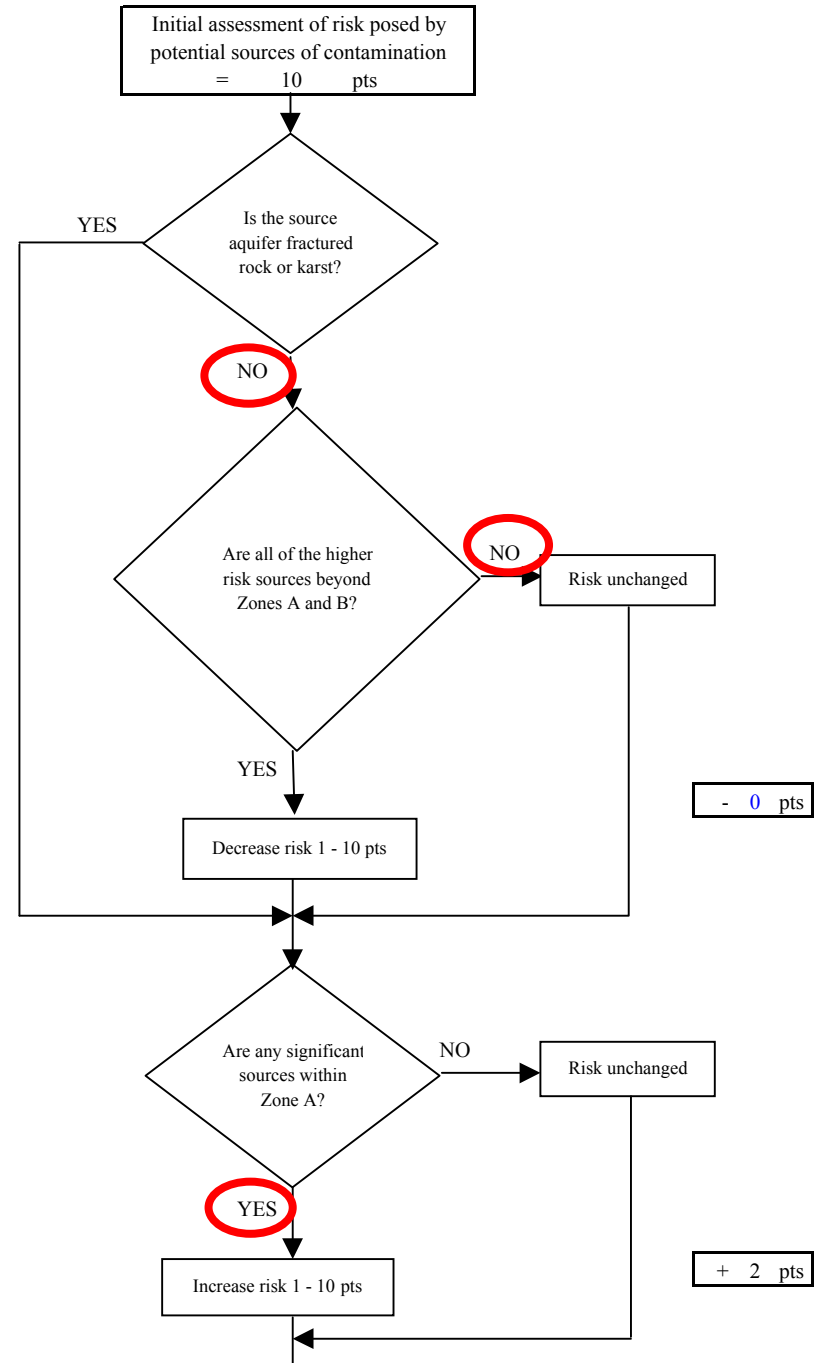
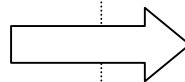


Chart 13. Contaminant risks for Sand Lake Services - Well 1 - Other Organic Chemicals

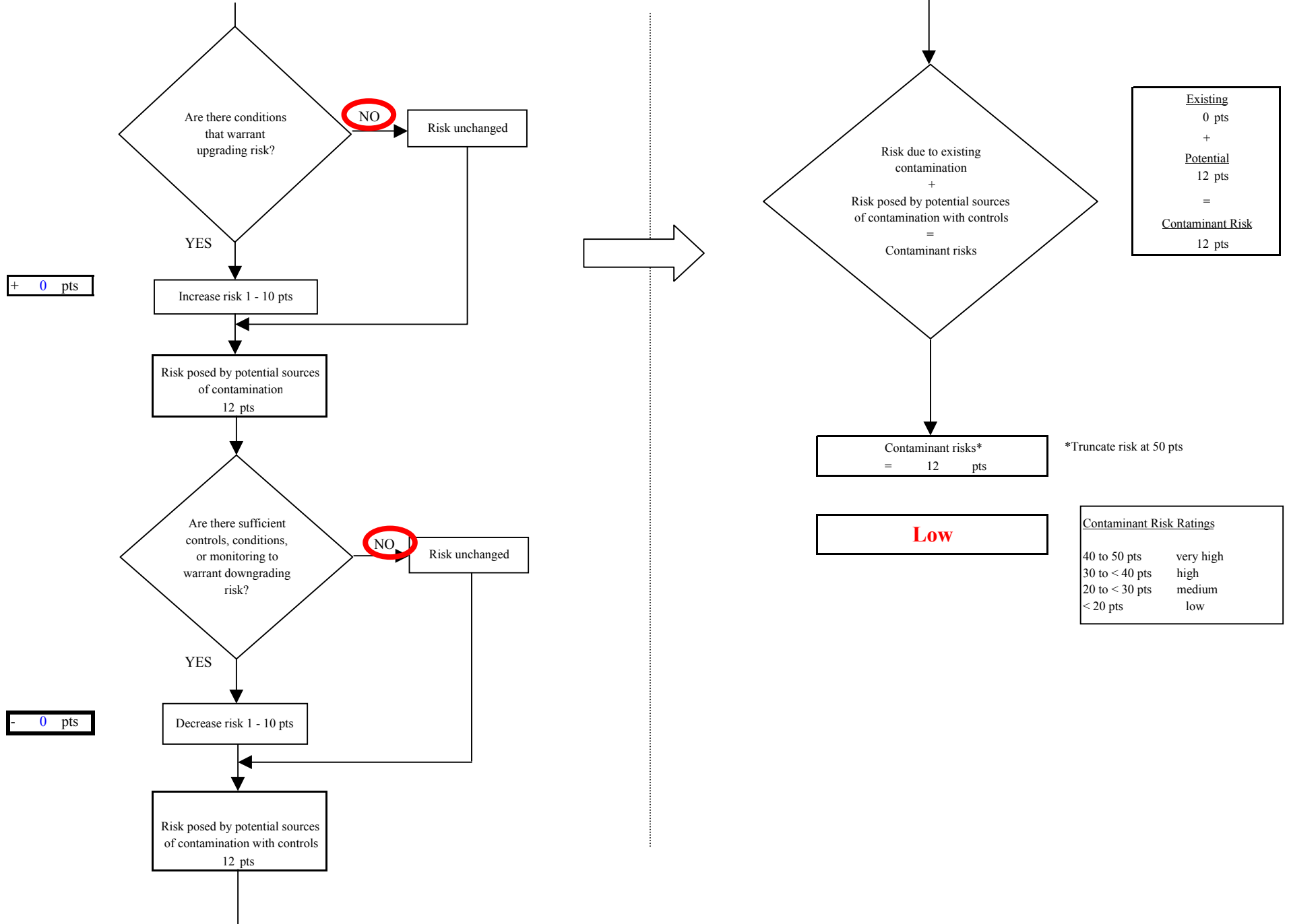
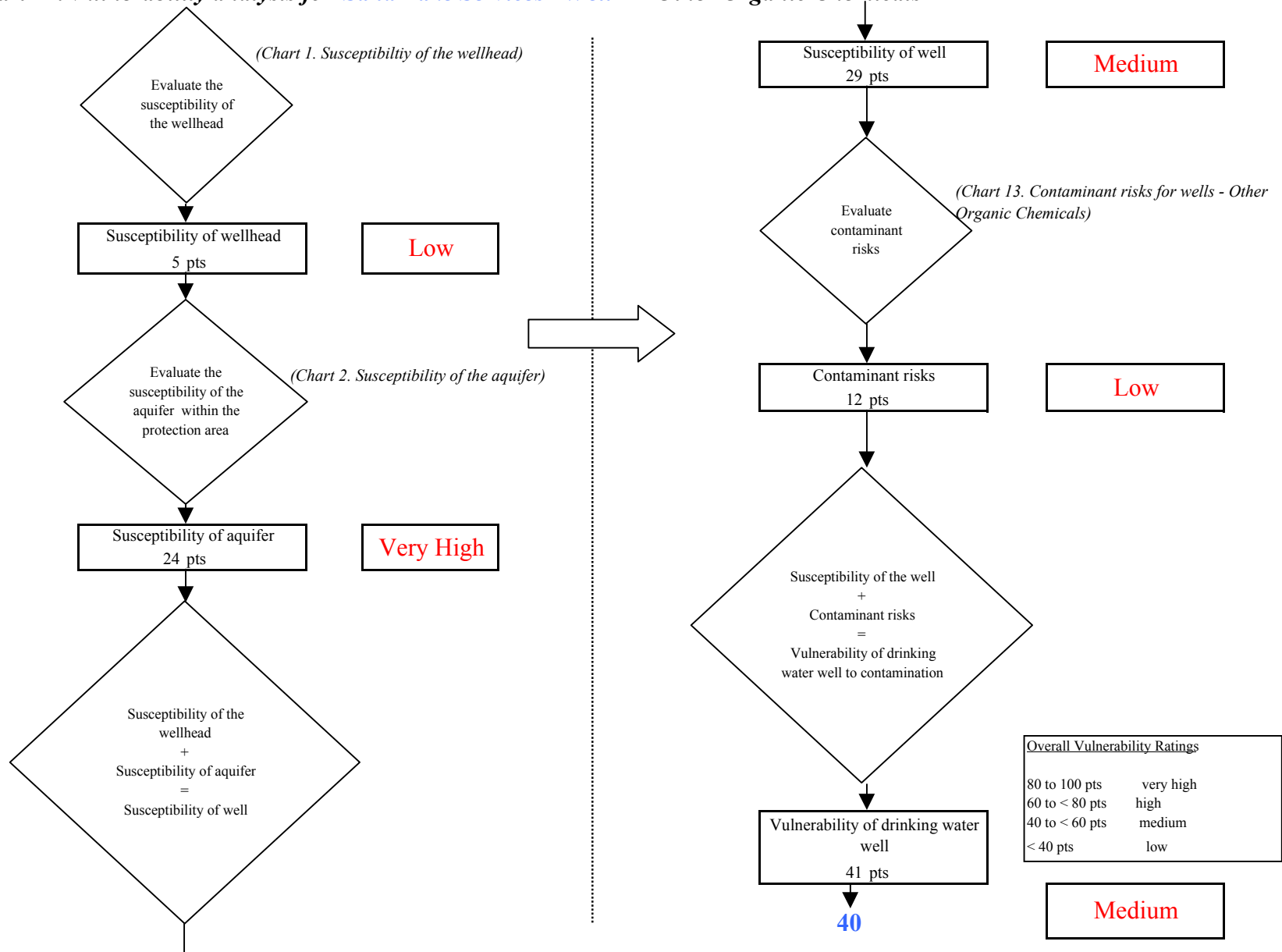


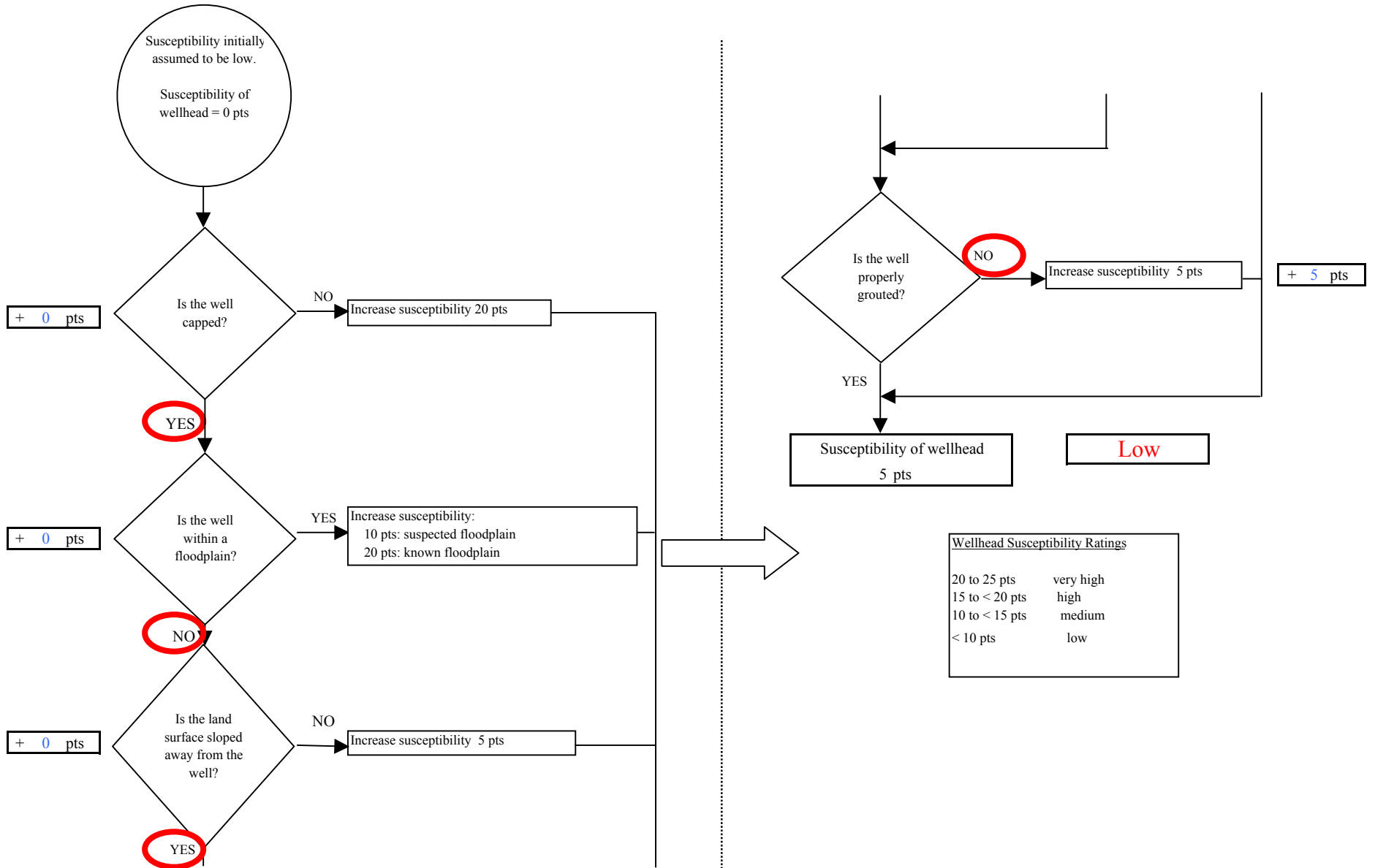
Chart 14. Vulnerability analysis for Sand Lake Services - Well 1 - Other Organic Chemicals



APPENDIX E

Vulnerability Analysis for Sand Lake Services – Well #3

Chart 1. Susceptibility of the wellhead - Sand Lake Services - Well 3



| Wellhead Susceptibility Ratings | |
|---------------------------------|-----------|
| 20 to 25 pts | very high |
| 15 to < 20 pts | high |
| 10 to < 15 pts | medium |
| < 10 pts | low |

Chart 2. Susceptibility of the aquifer - Sand Lake Services - Well 3

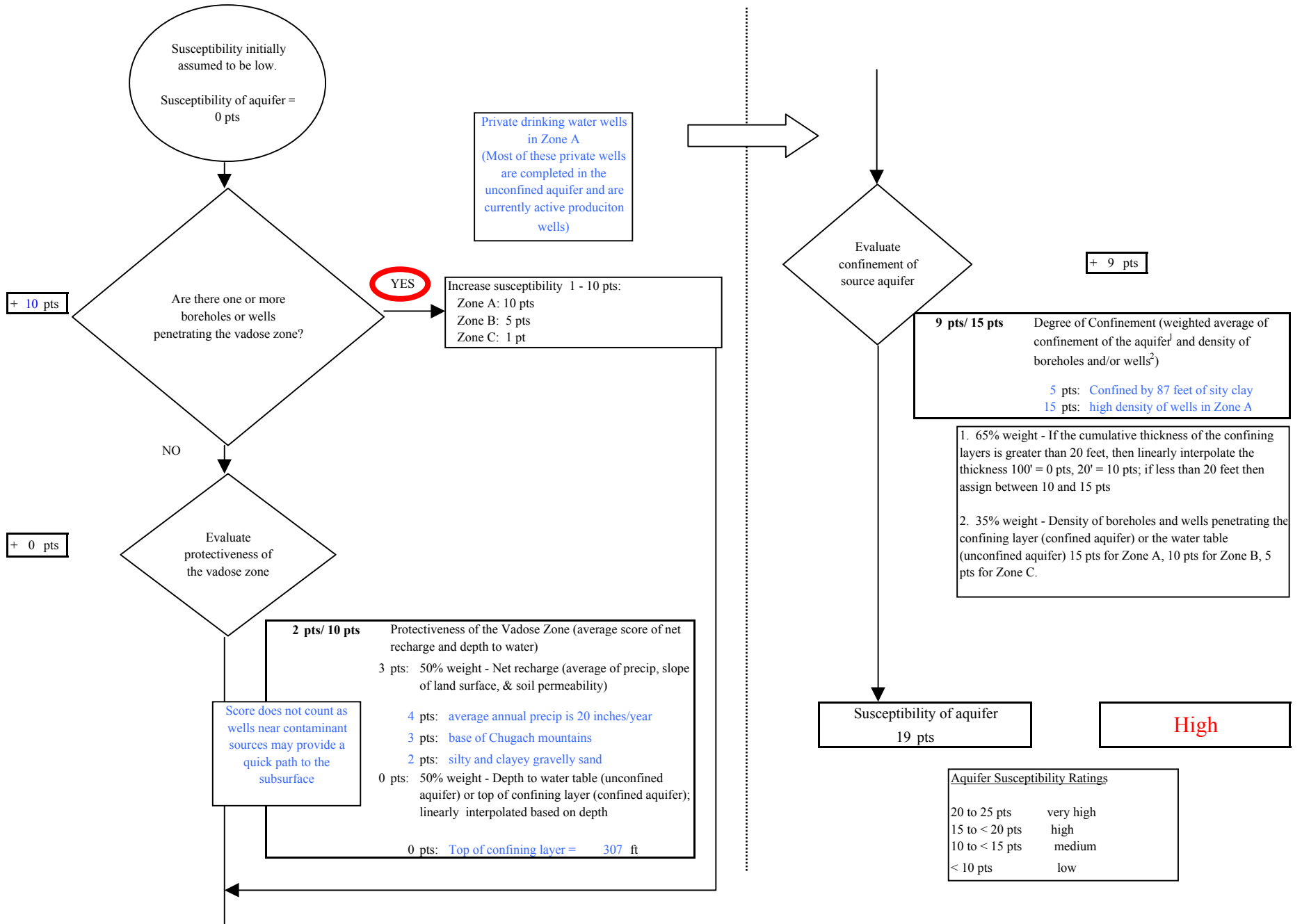
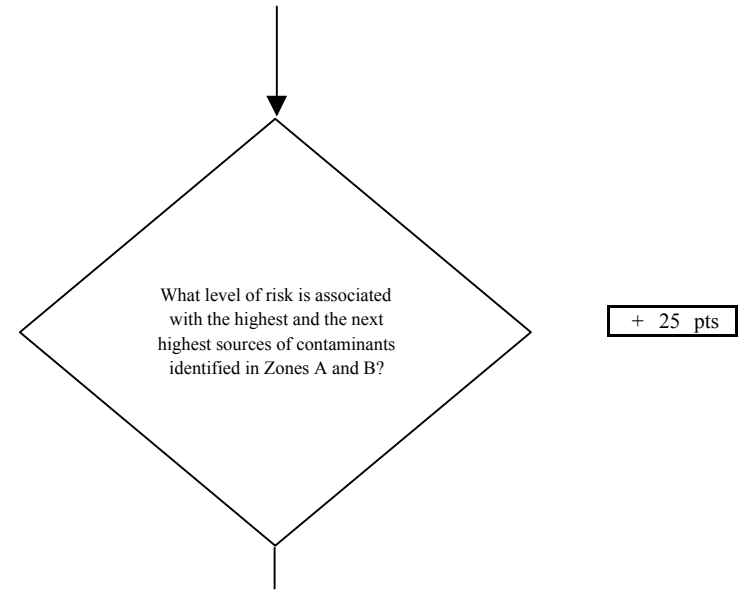
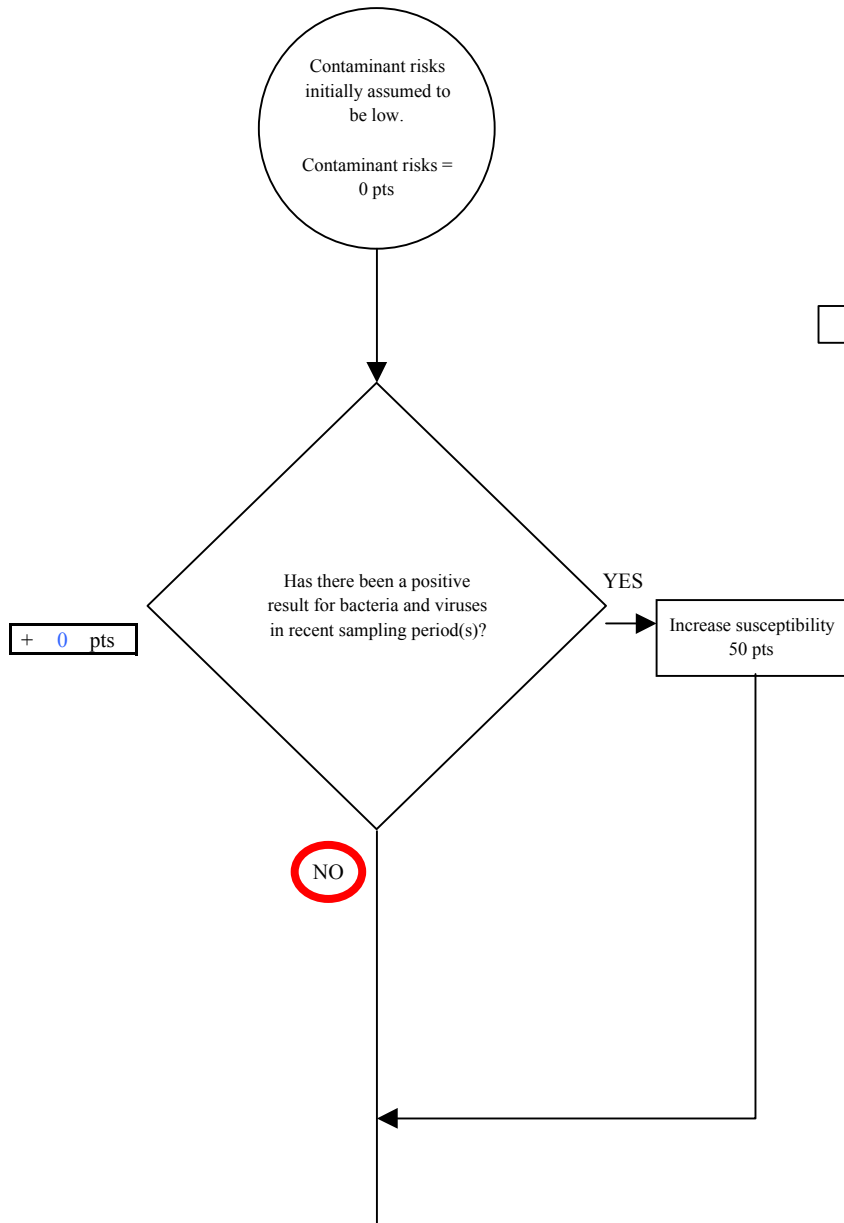


Chart 3. Contaminant risks for Sand Lake Services - Well 3 - Bacteria & Viruses



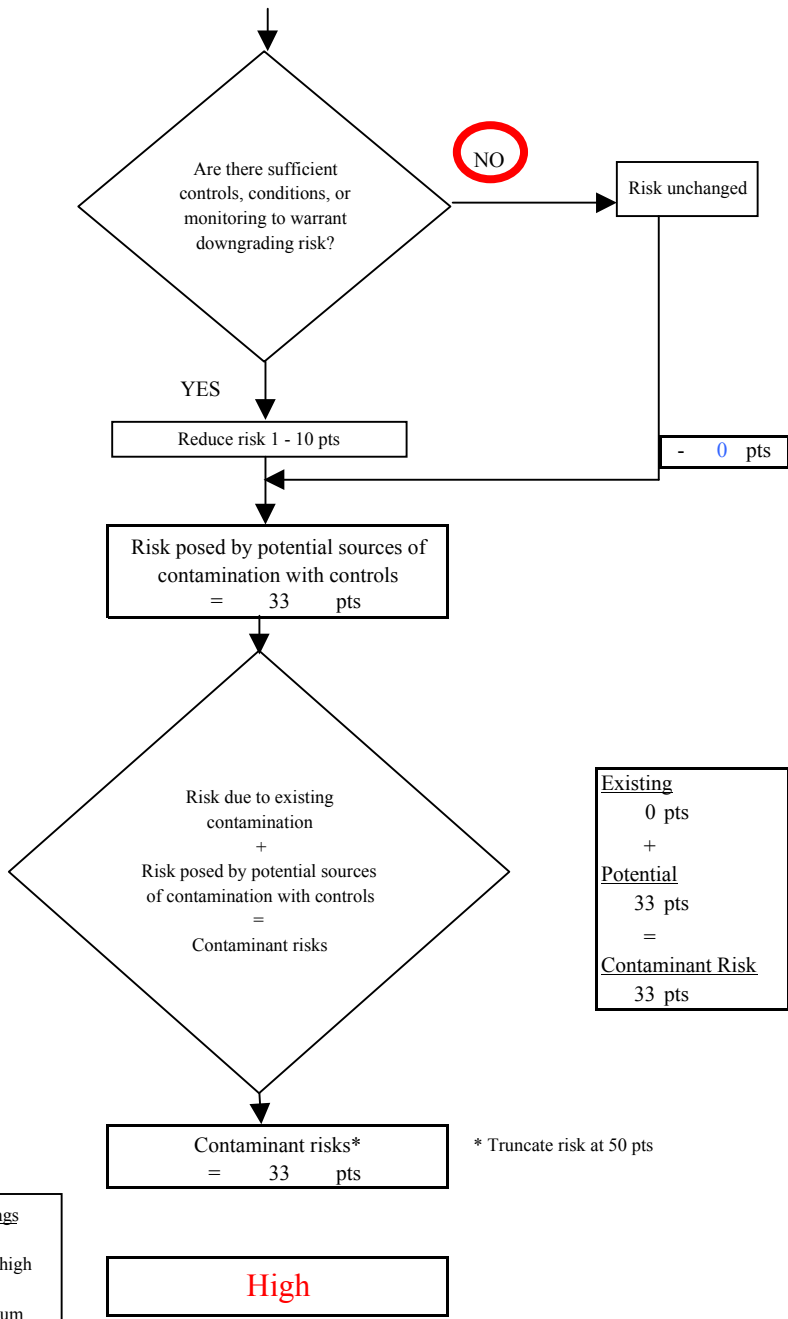
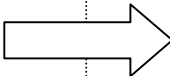
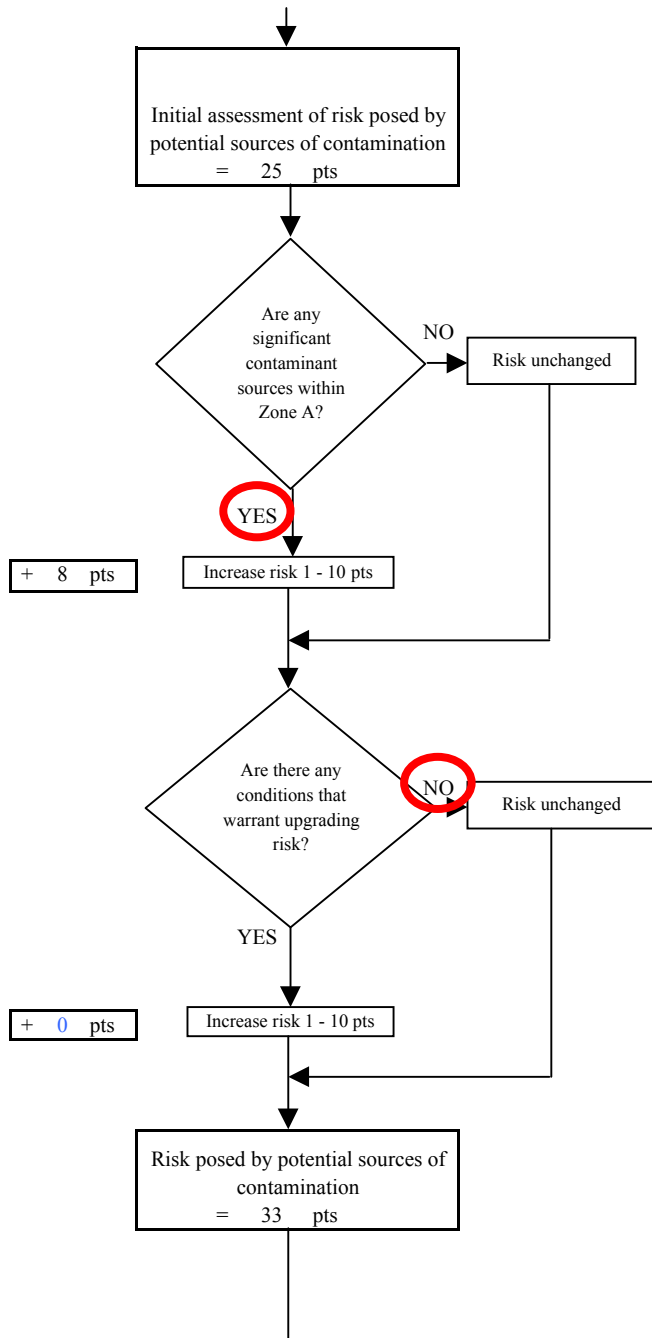
| Risk Rankings for Contaminant Sources Identified in Zones A and B | | | |
|---|--------|--------|-------|
| | Zone A | Zone B | Total |
| Very High(s) | 0 | 0 | 0 |
| High(s) | 0 | 0 | 0 |
| Medium(s) | 1 | 1 | 2 |
| Low(s) | 12 | 5 | 17 |

| | 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 Sand Lake Services - Well 3 - 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 | 33 pts |
| = | |
| Contaminant Risk | 33 pts |

* Truncate risk at 50 pts

Chart 4. Vulnerability analysis for Sand Lake - Well 3 - Bacteria & Viruses

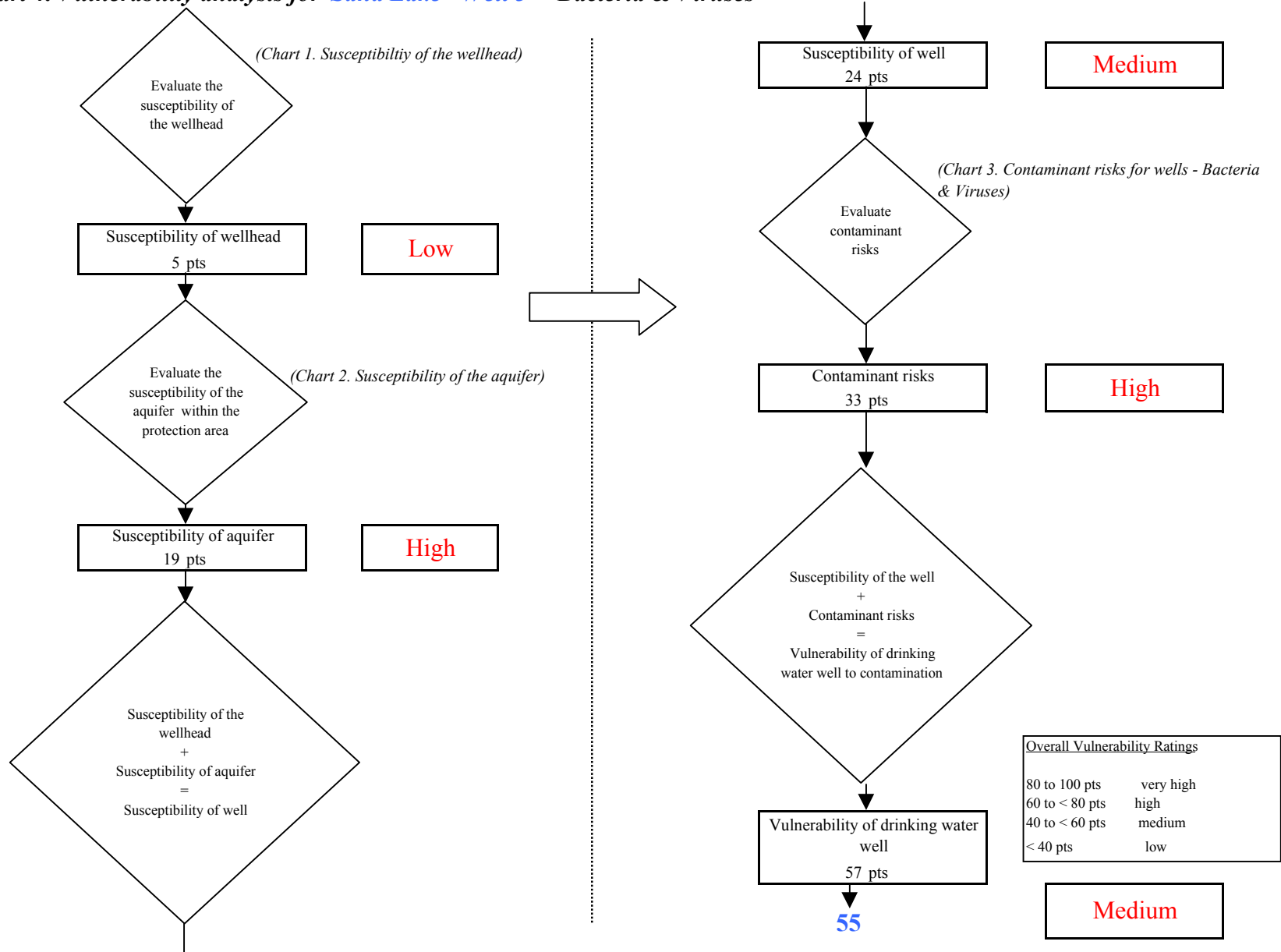


Chart 5. Contaminant risks for Sand Lake Services - Well 3 - Nitrates and Nitrites

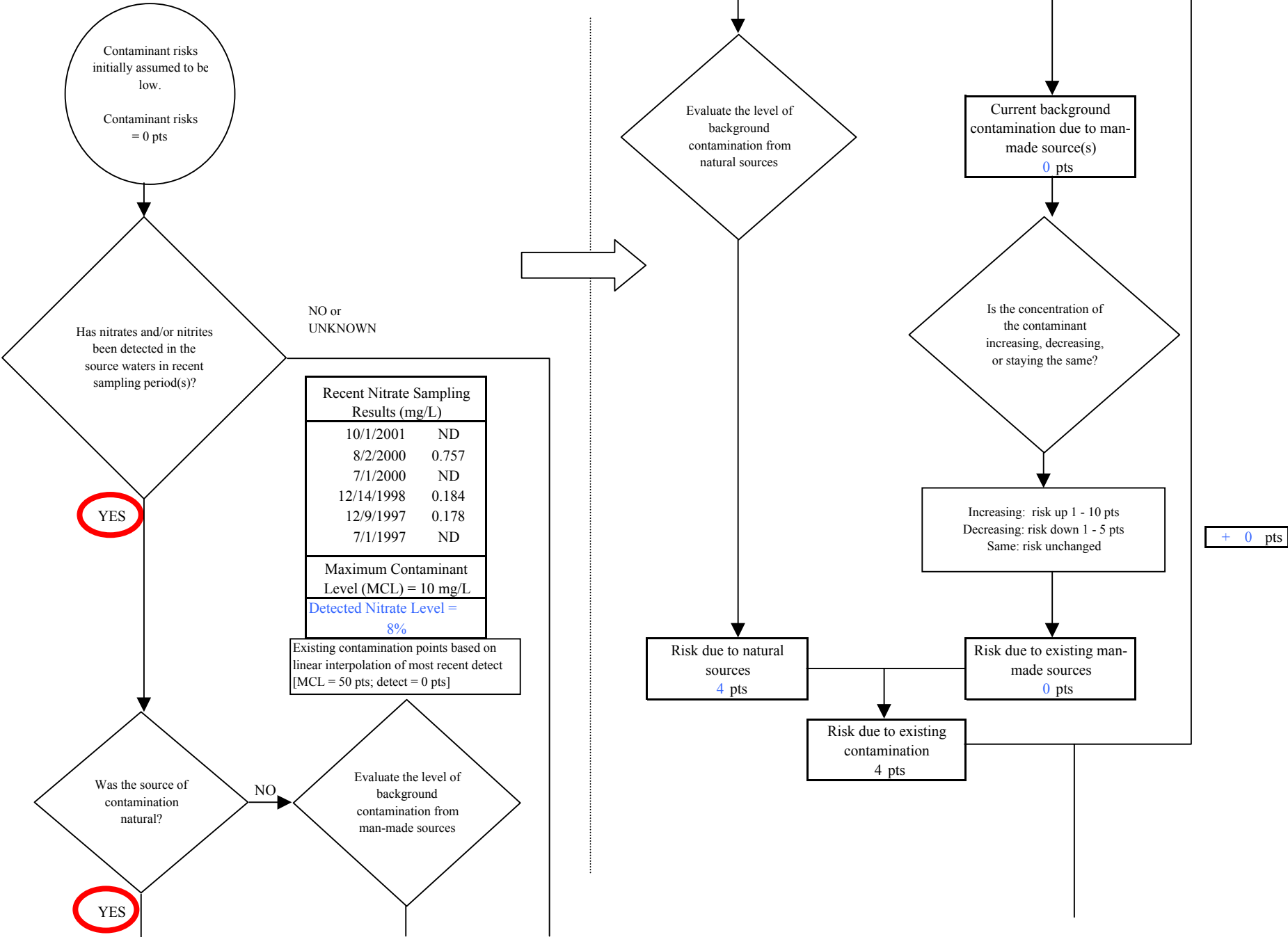
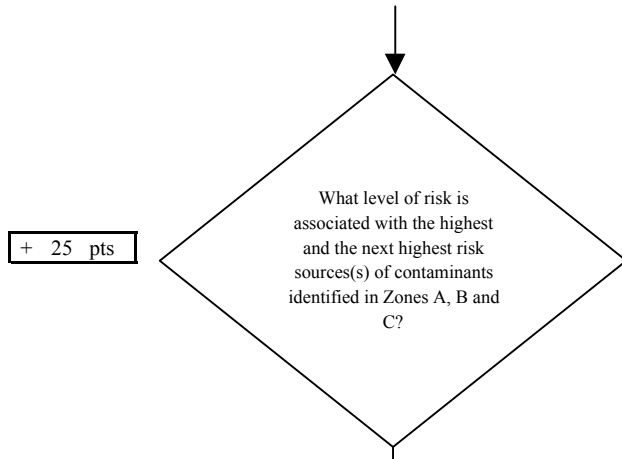


Chart 5. Contaminant risks for Sand Lake Services - Well 3 - Nitrates and Nitrites



| 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) | 1 | 1 | 2 |
| Low(s) | 12 | 7 | 19 |

| | 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.

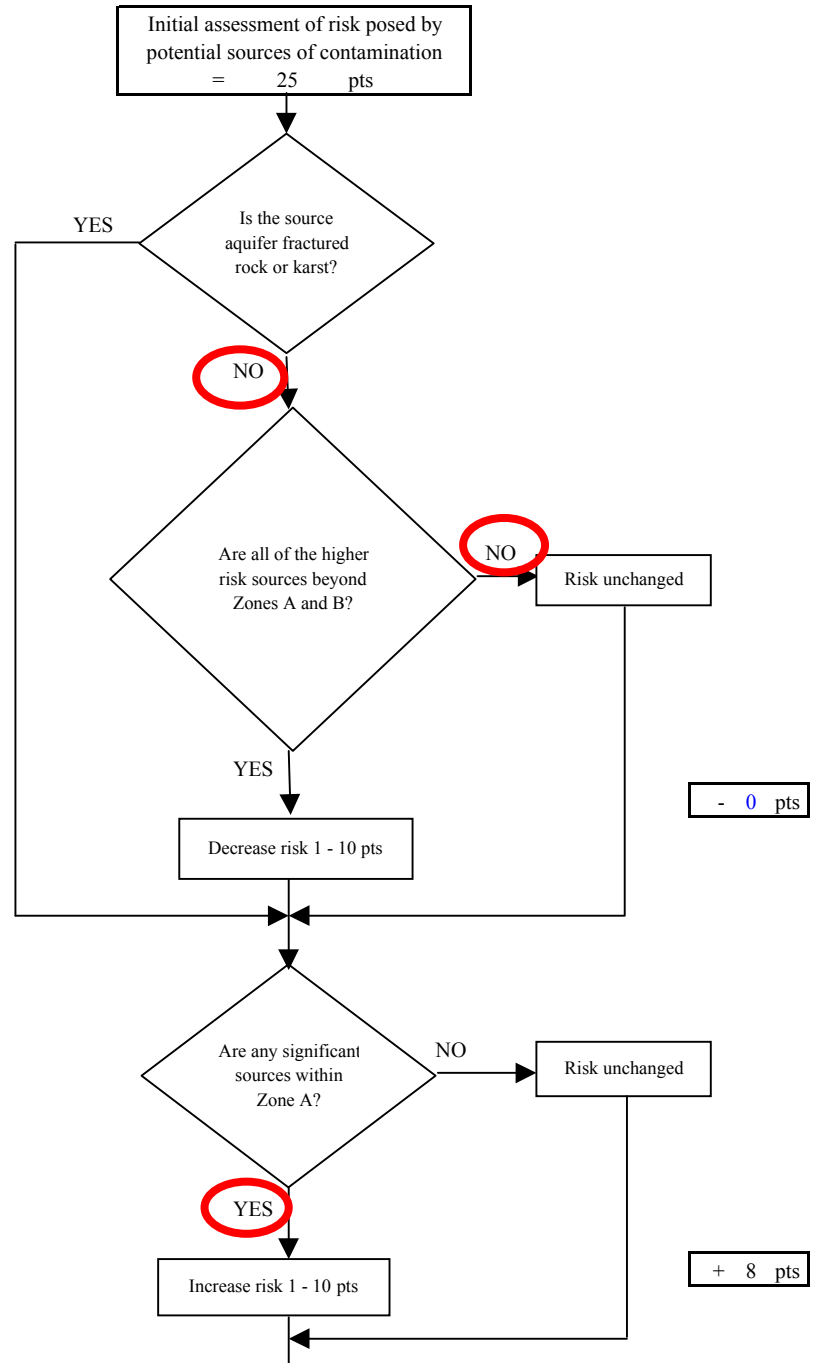
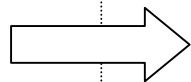


Chart 5. Contaminant risks for Sand Lake Services - Well 3 - Nitrates and Nitrites

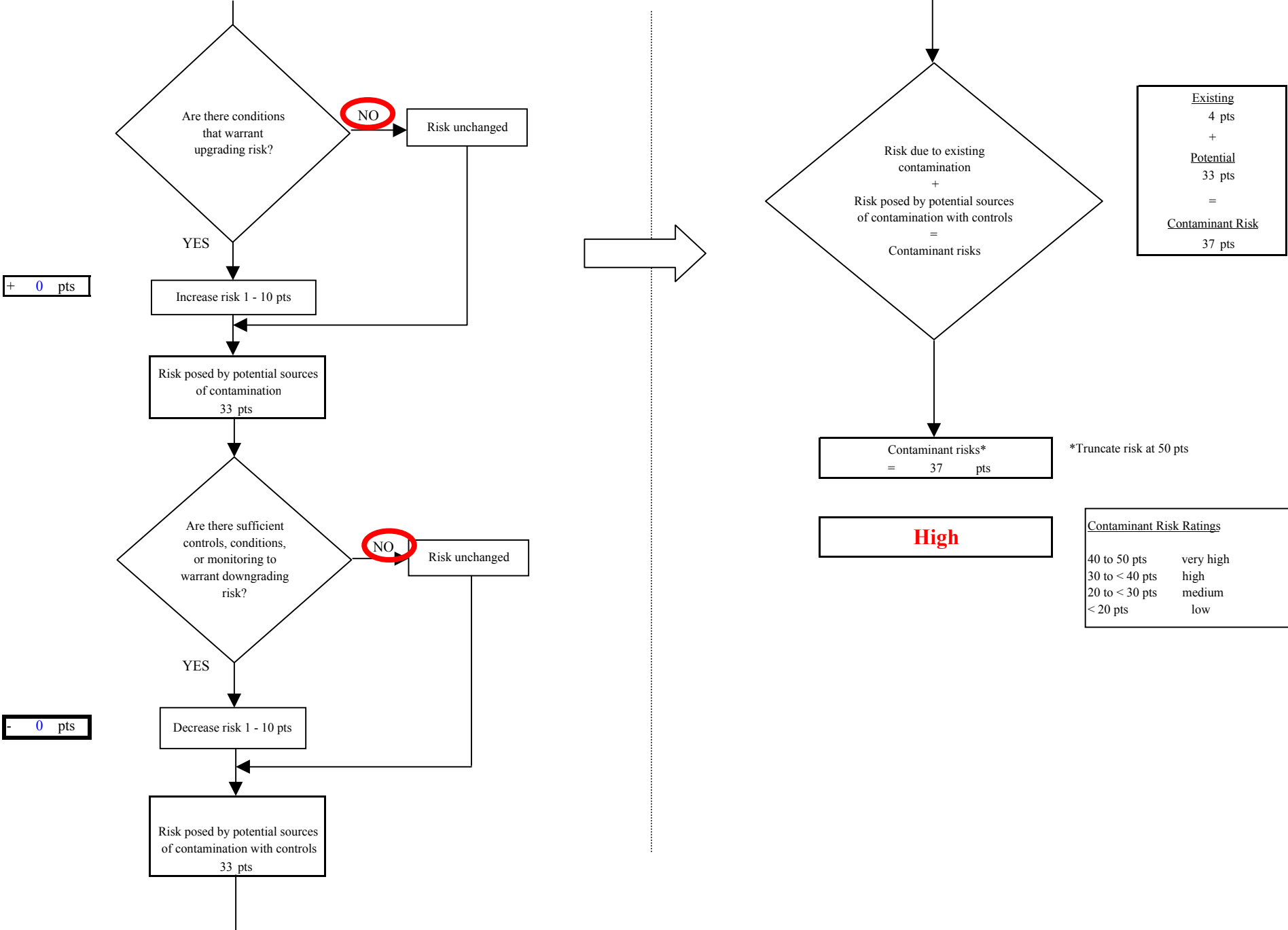


Chart 6. Vulnerability analysis for Sand Lake Services - Well 3 - Nitrates and Nitrites

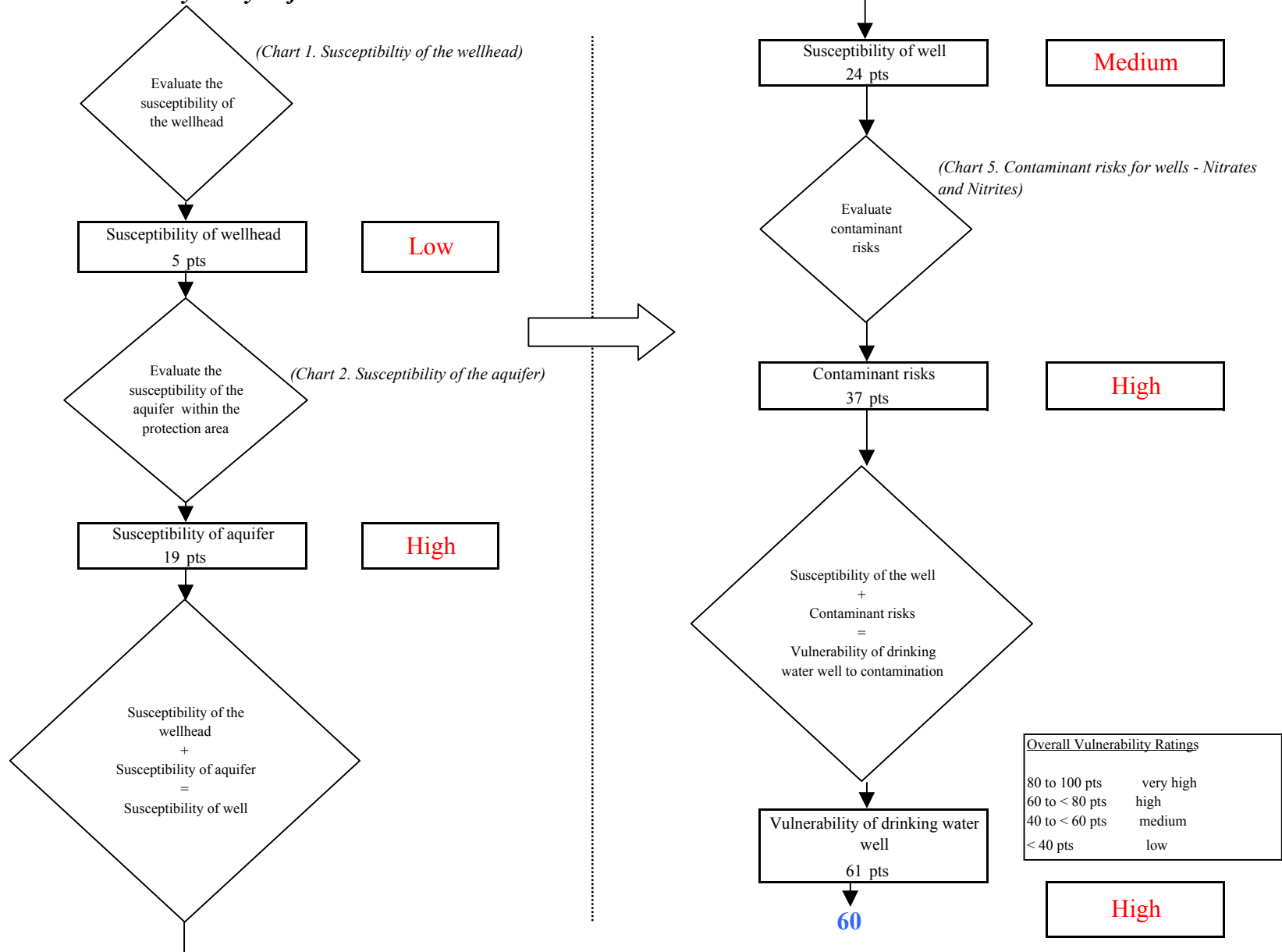


Chart 7. Contaminant risks for Sand Lake Services - Well 3 - Volatile Organic Chemicals

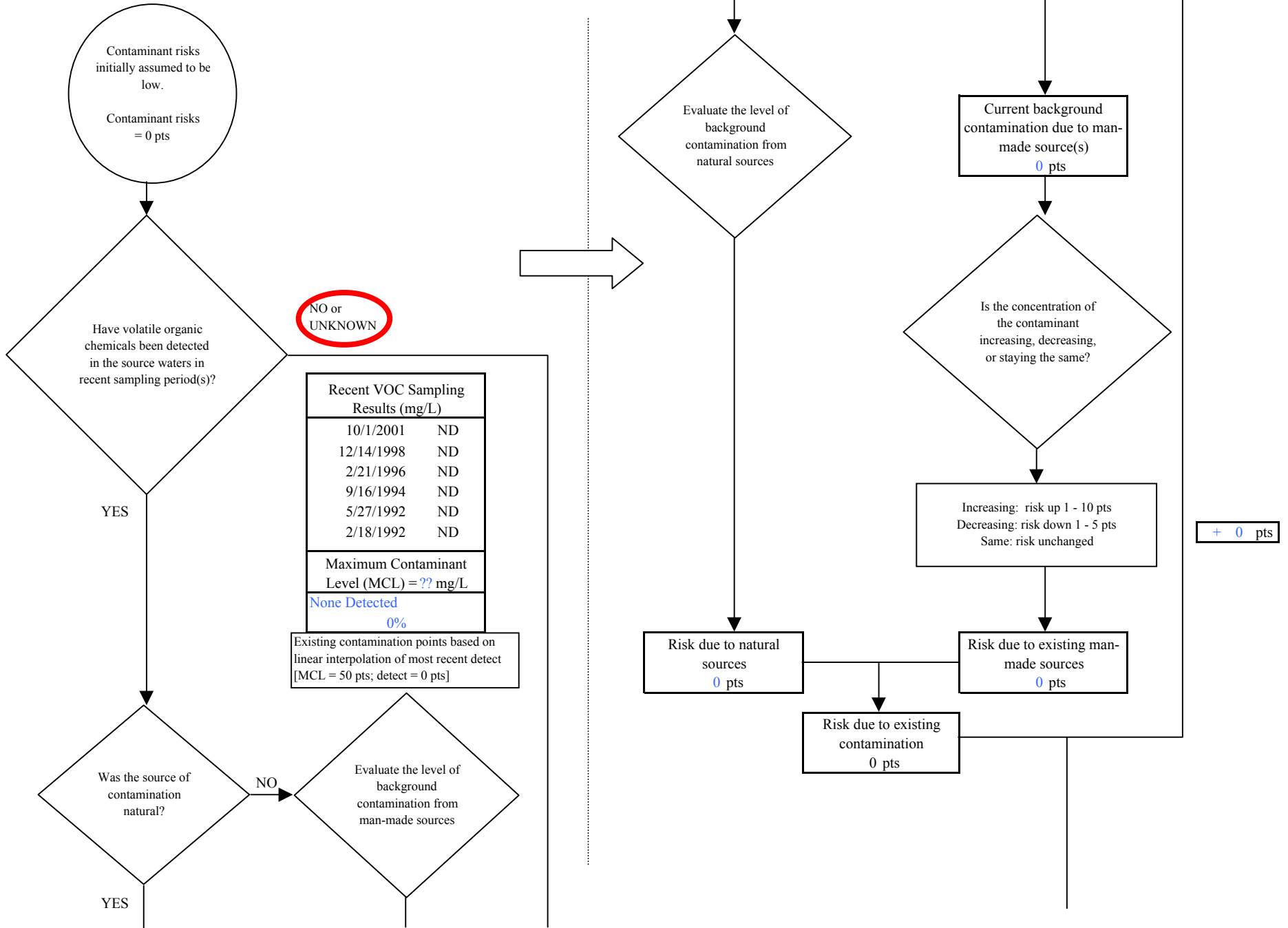
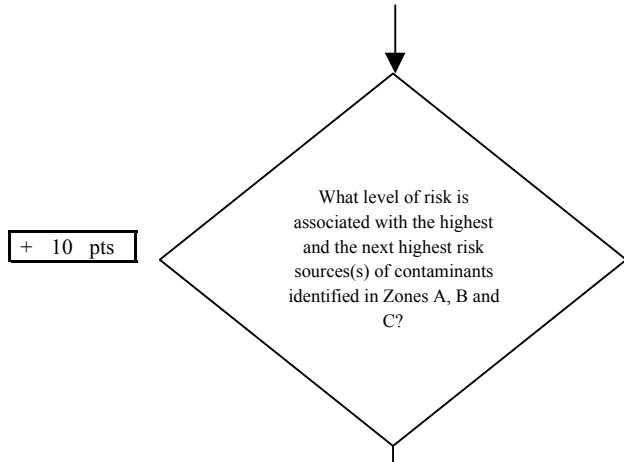


Chart 7. Contaminant risks for Sand Lake Services - Well 3 - Volatile Organic Chemicals



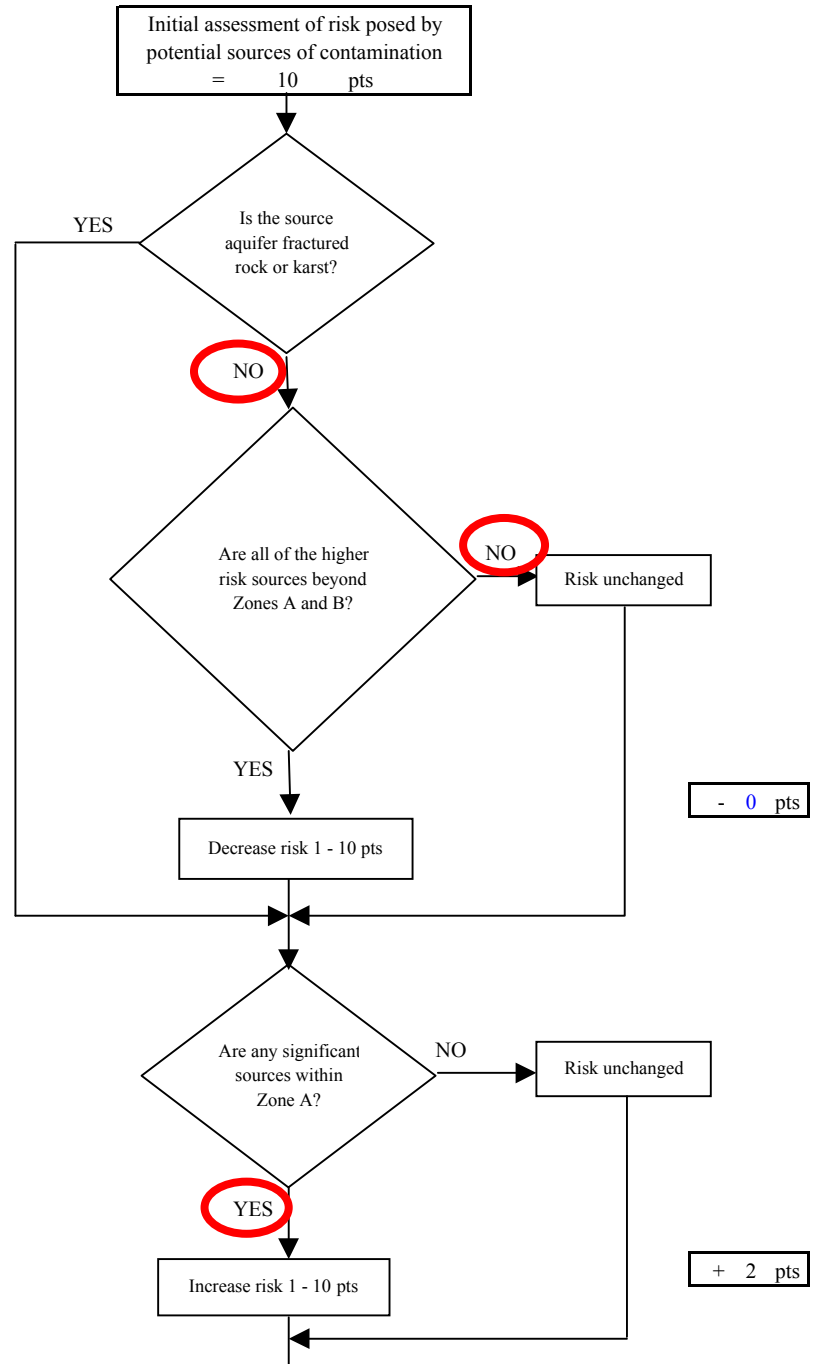
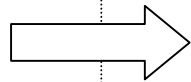
+ 10 pts

| 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) | 6 | 6 | 12 |

| | 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.



- 0 pts

+ 2 pts

Chart 7. Contaminant risks for Sand Lake Services - Well 3 - Volatile Organic Chemicals

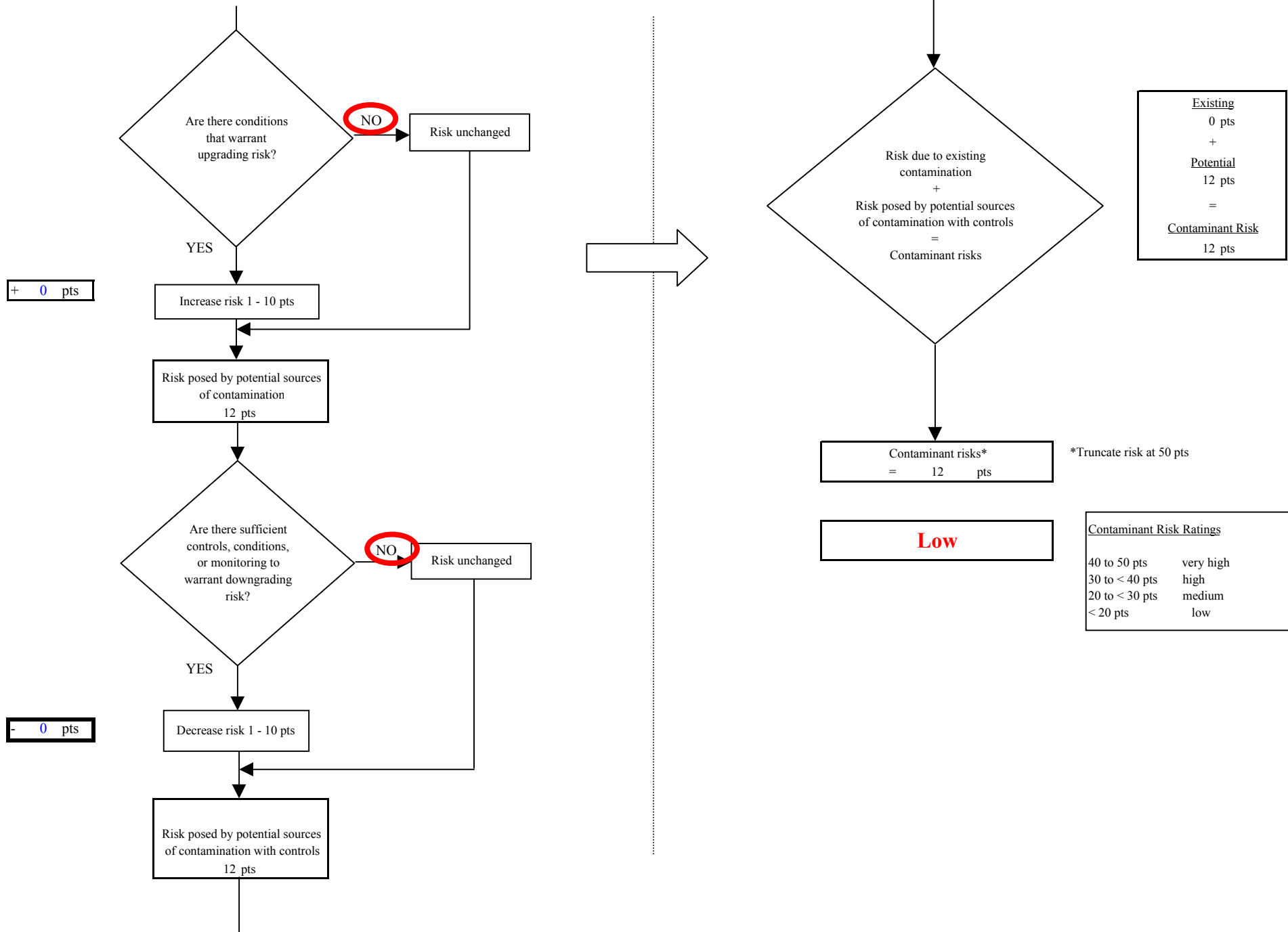


Chart 8. Vulnerability analysis for Sand Lake Services - Well 3 - Volatile Organic Chemicals

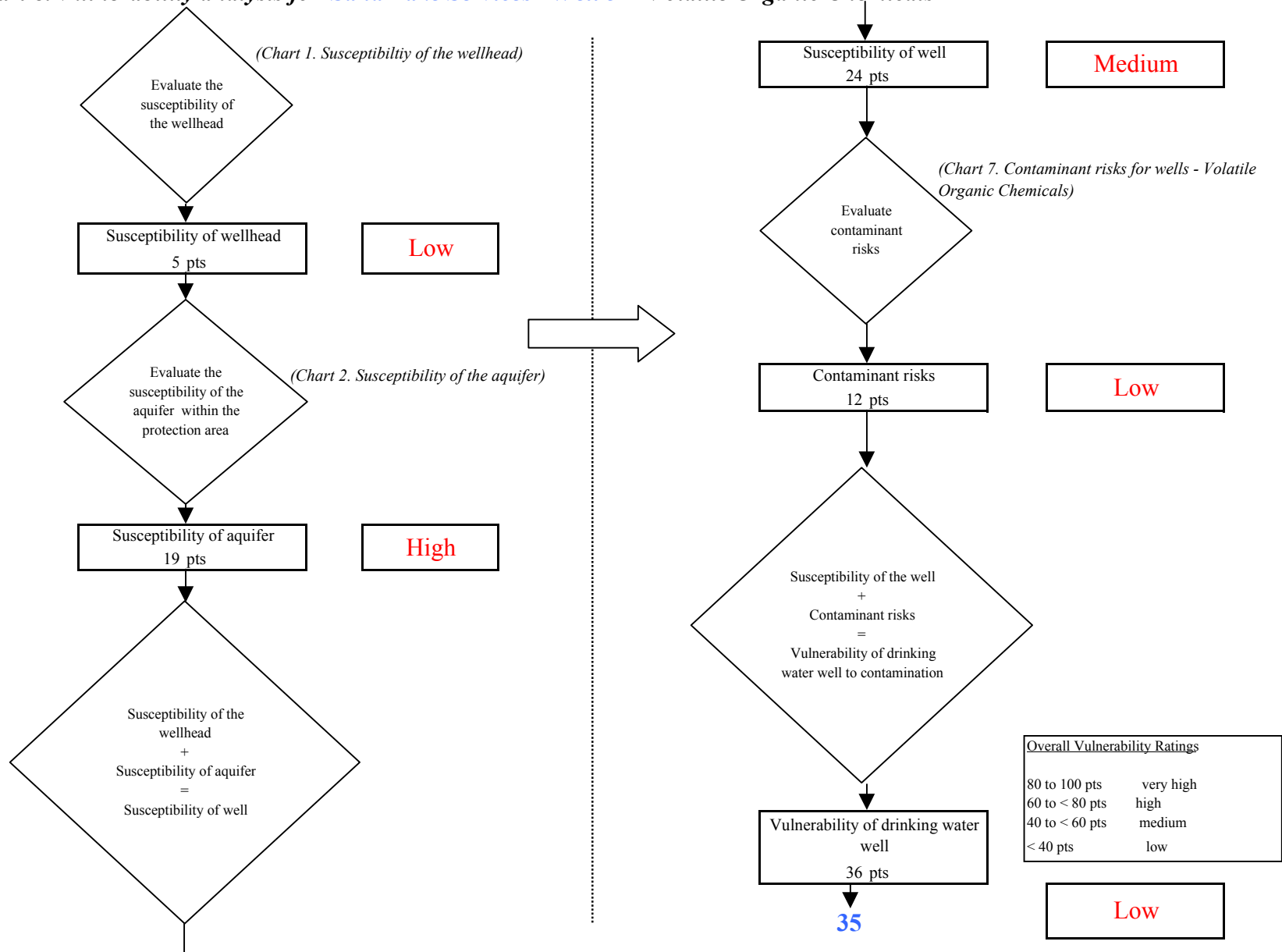


Chart 9. Contaminant risks for *Sand Lake Services - Well 3 - Heavy Metals, Cyanide and Other Inorganic Chemicals*

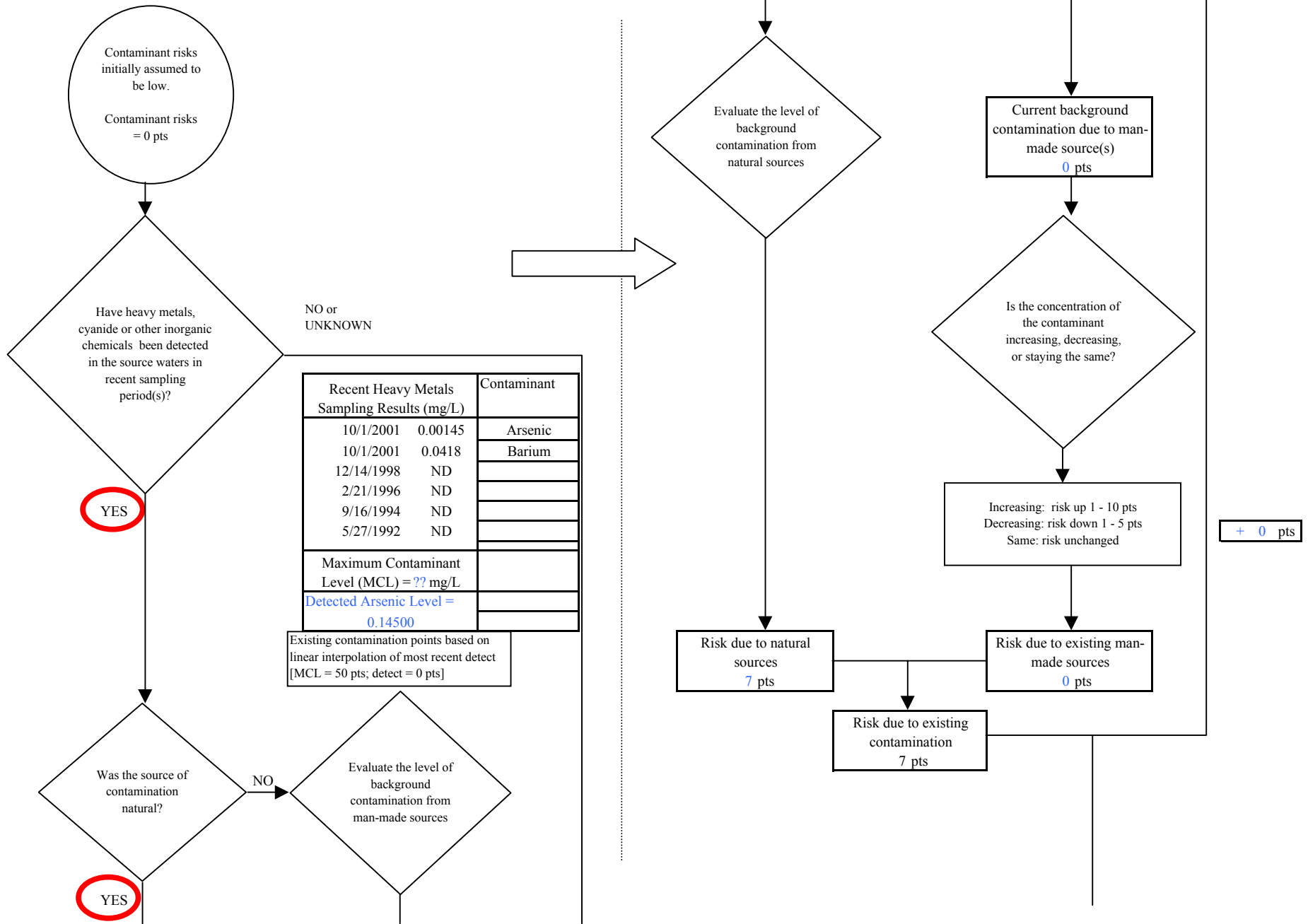
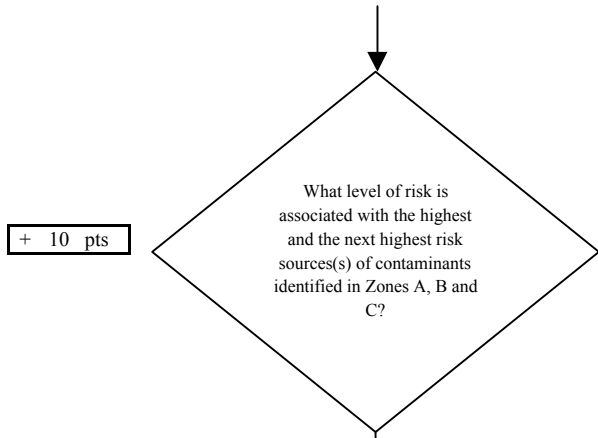


Chart 9. Contaminant risks for Sand Lake Services - Well 3 - Heavy Metals, Cyanide and Other Inorganic Chemicals



+ 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) | 5 | 6 | 11 |

| | 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.

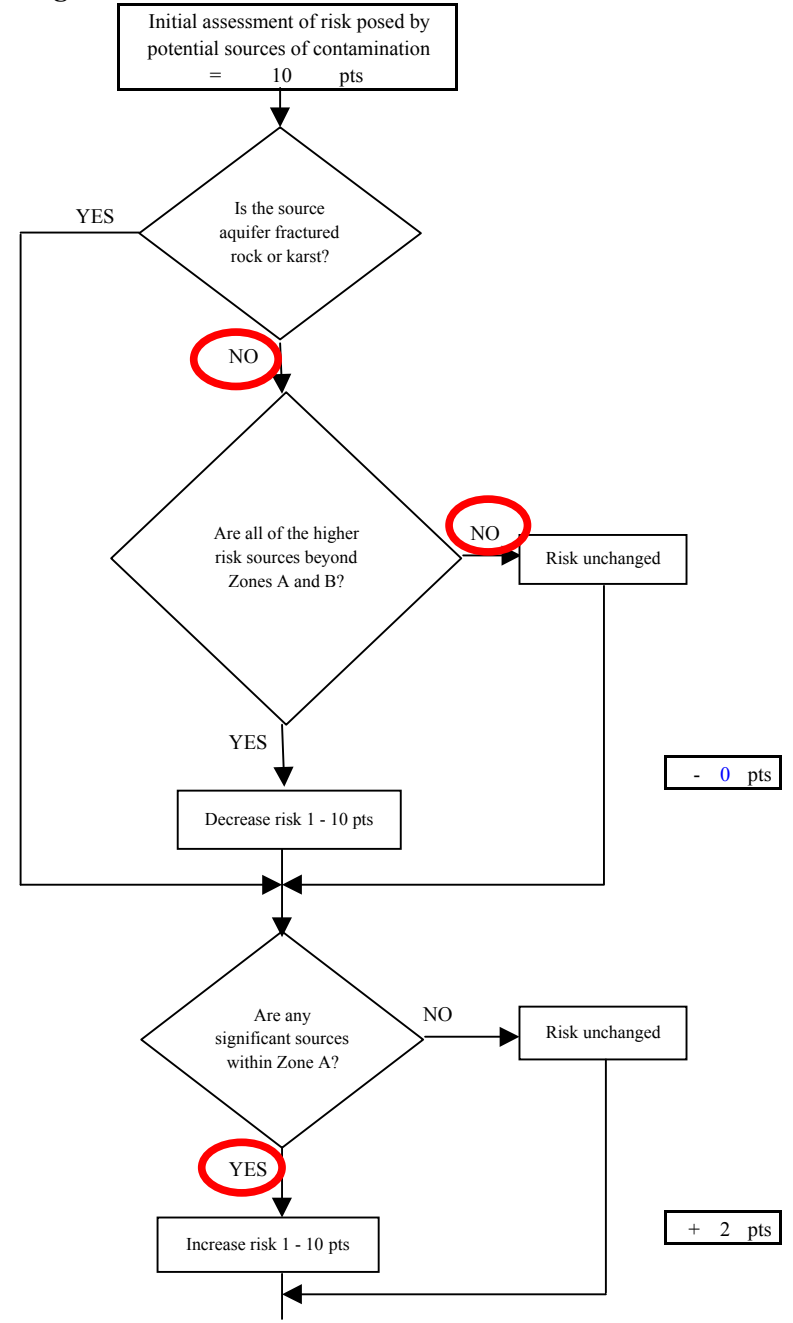
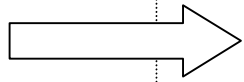


Chart 9. Contaminant risks for Sand Lake Services - Well 3 - Heavy Metals, Cyanide and Other Inorganic Chemicals

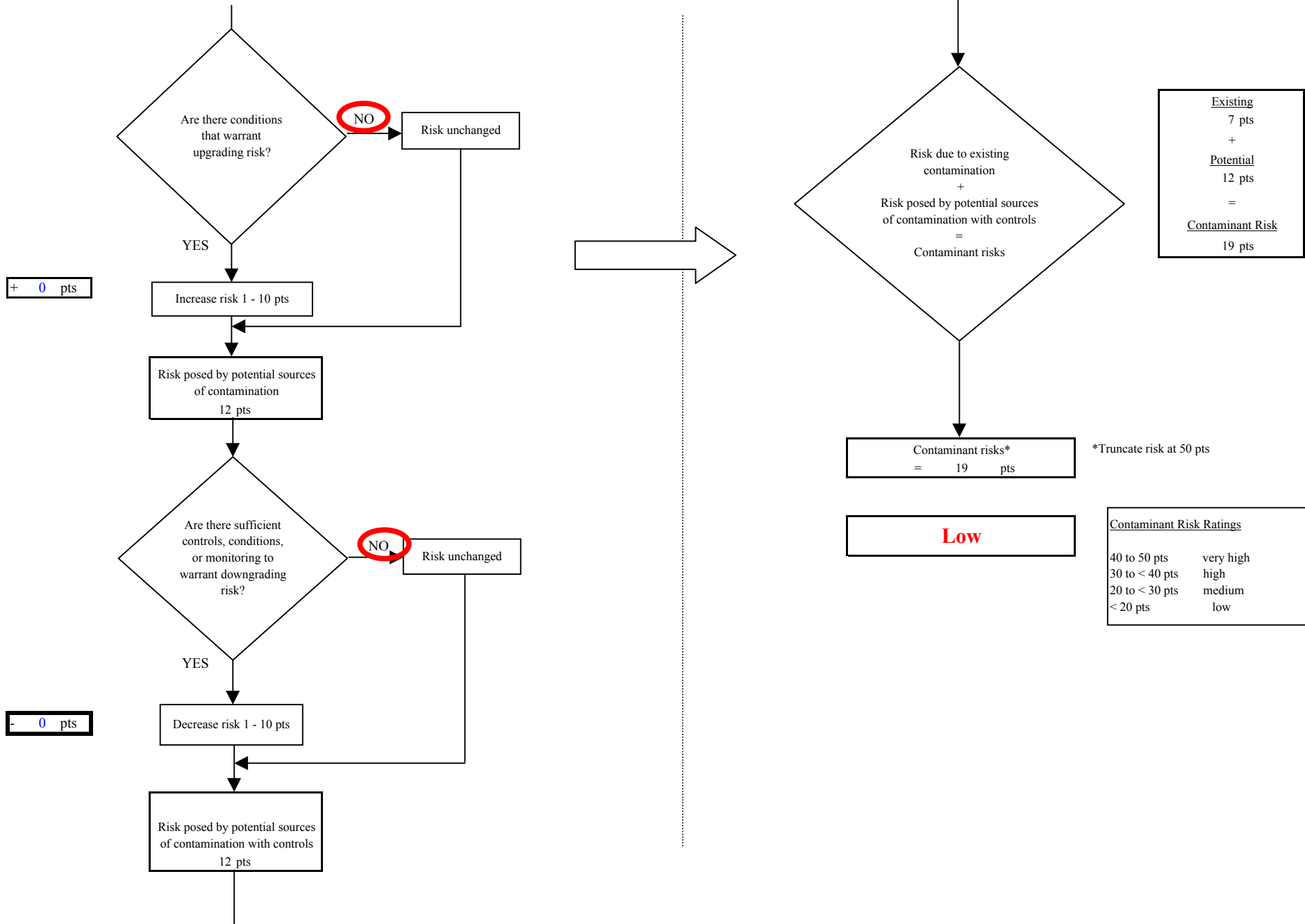


Chart 10. Vulnerability analysis for Sand Lake Services - Well 3 - Heavy Metals, Cyanide and Other Inorganic Chemicals

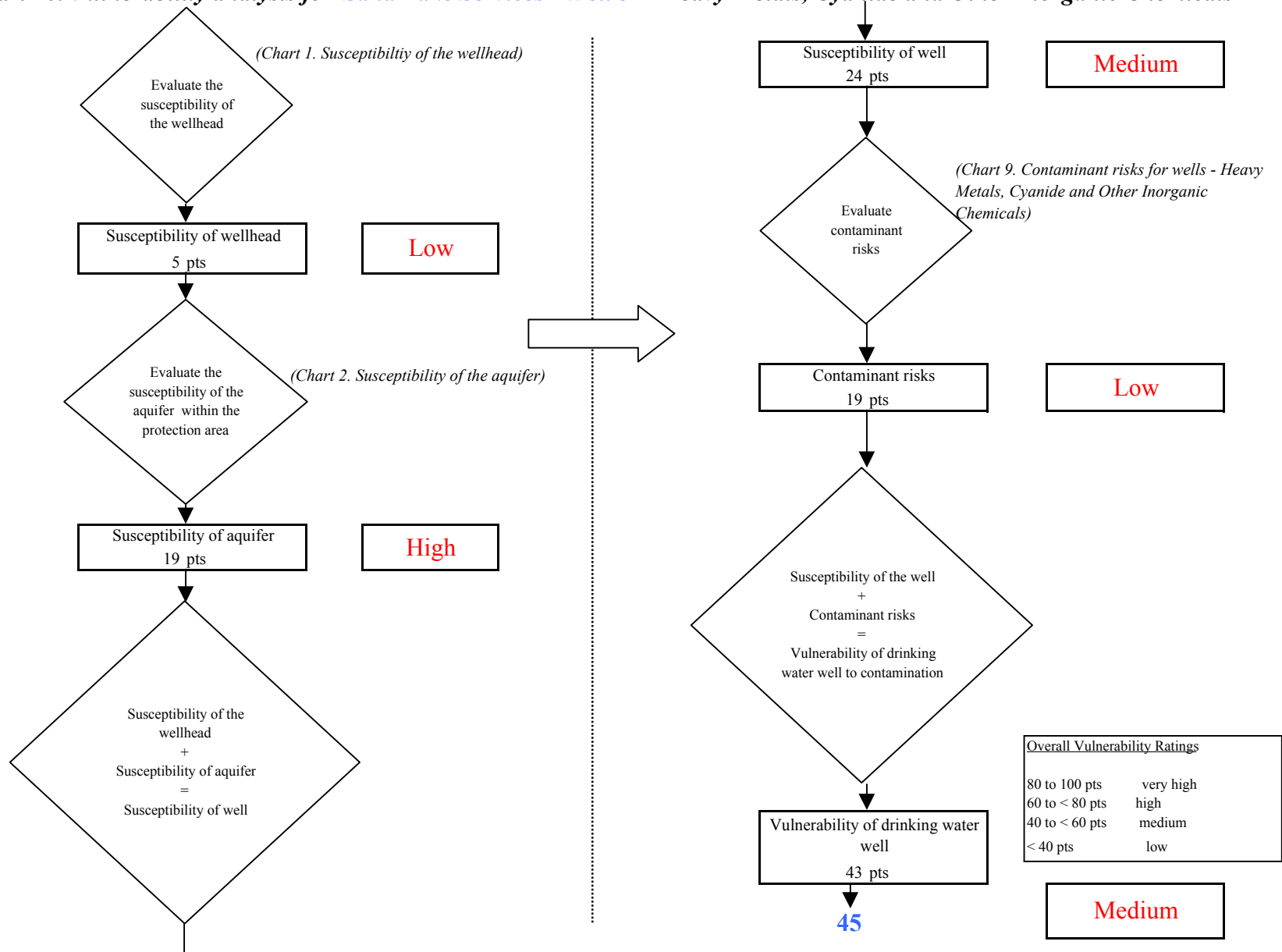


Chart 11. Contaminant risks for Sand Lake Services - Well 3 - Synthetic Organic Chemicals

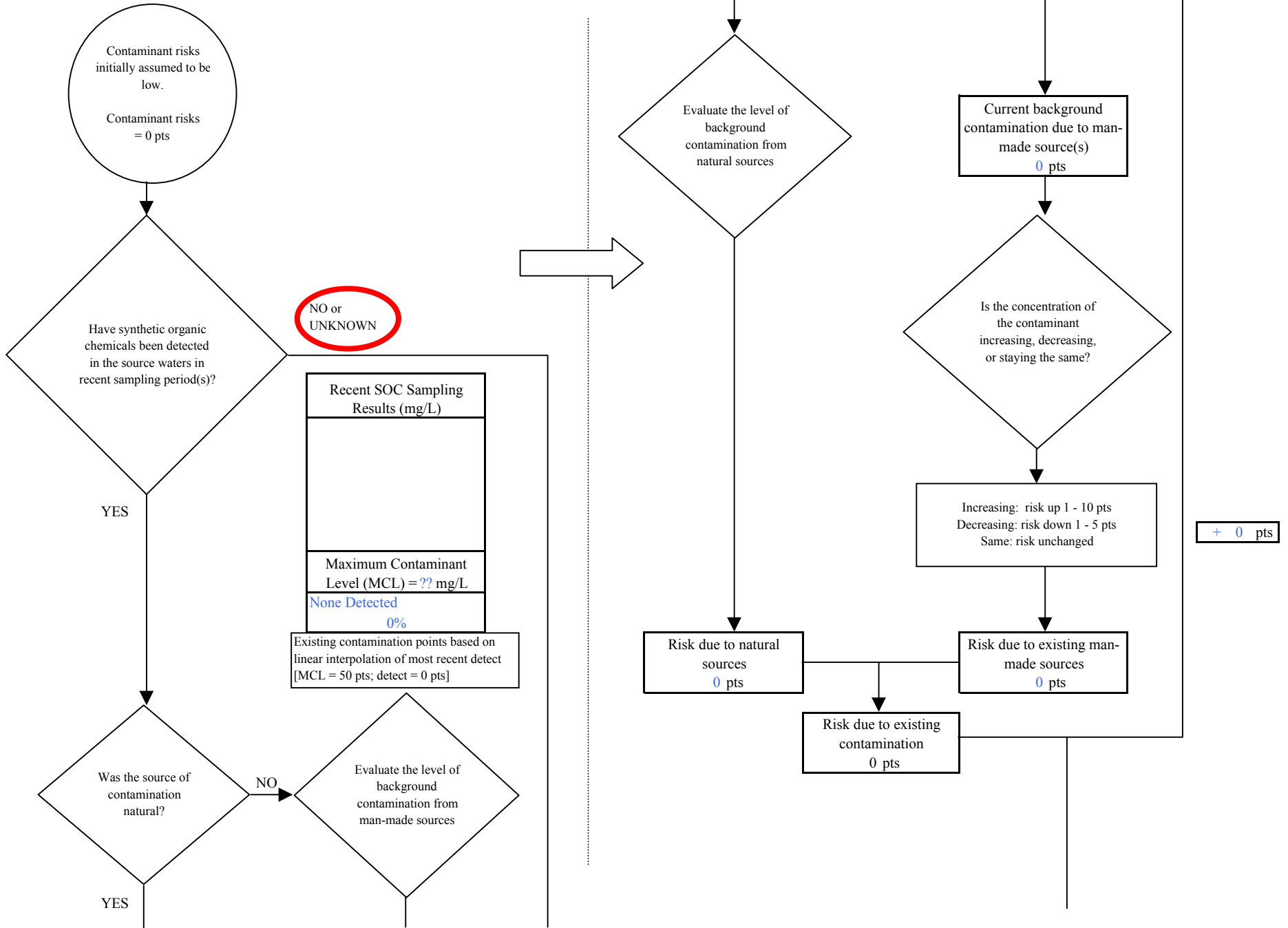
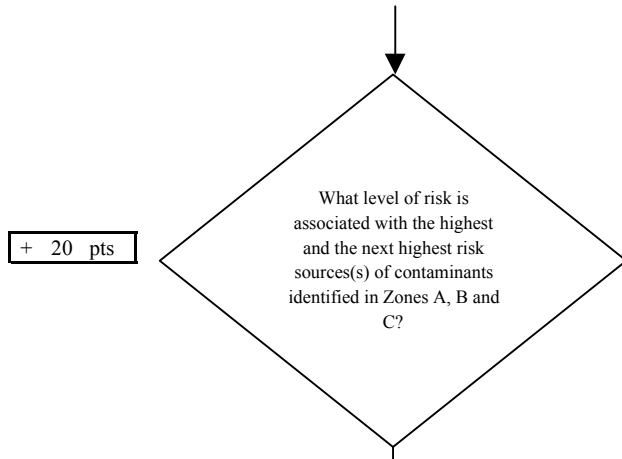


Chart 11. Contaminant risks for Sand Lake Services - Well 3 - Synthetic Organic Chemicals



| Risk Levels for Contaminant Sources identified in Zones A, B and C | | | |
|--|--------|-----------|-------|
| | Zone A | Zones B&C | Total |
| Very Highs(s) | 0 | 0 | 0 |
| High(s) | 0 | 0 | 0 |
| Medium(s) | 0 | 1 | 1 |
| Low(s) | 4 | 4 | 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 20

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

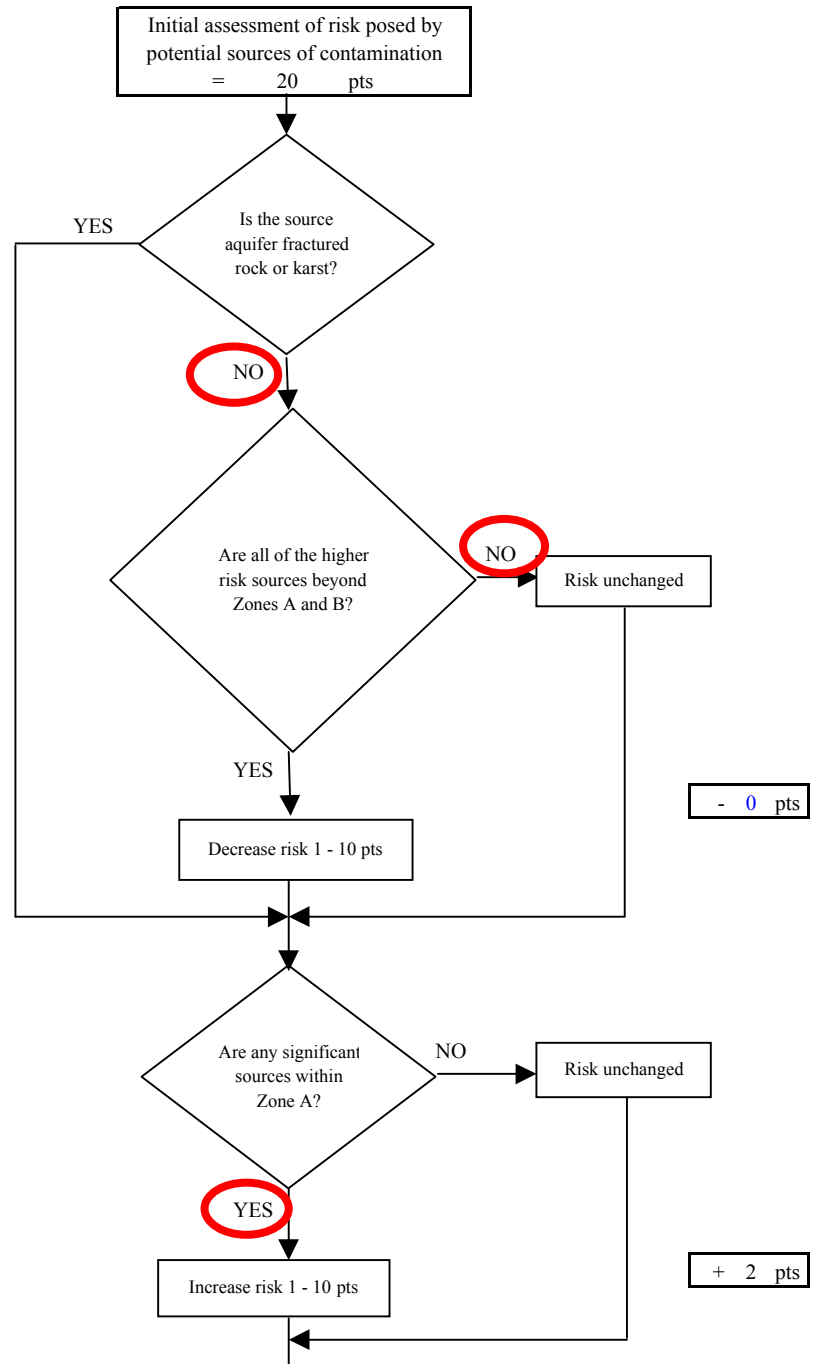
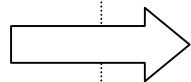


Chart 11. Contaminant risks for Sand Lake Services - Well 3 - Synthetic Organic Chemicals

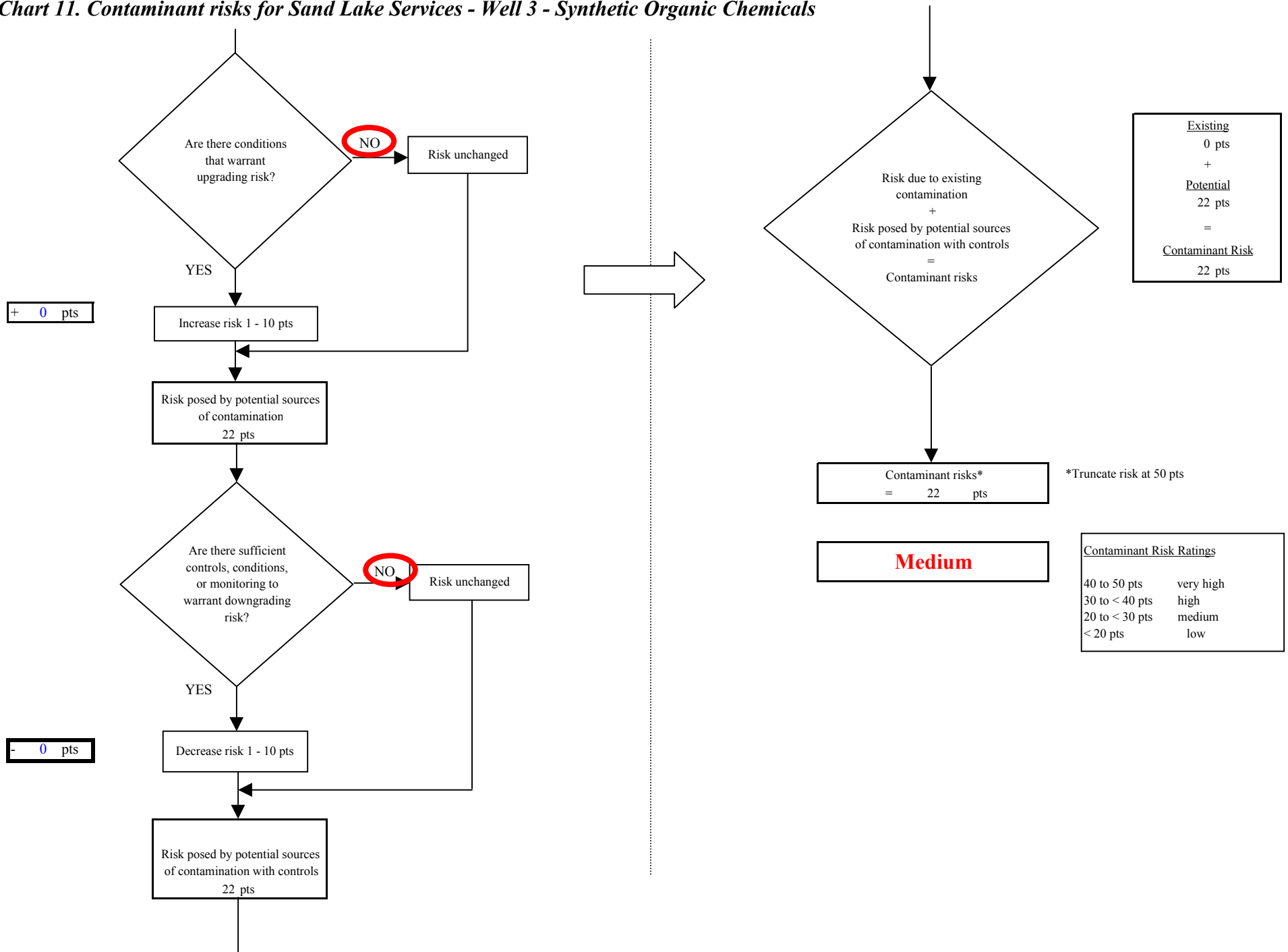


Chart 12. Vulnerability analysis for Sand Lake Services - Well 3 - Synthetic Organic Chemicals

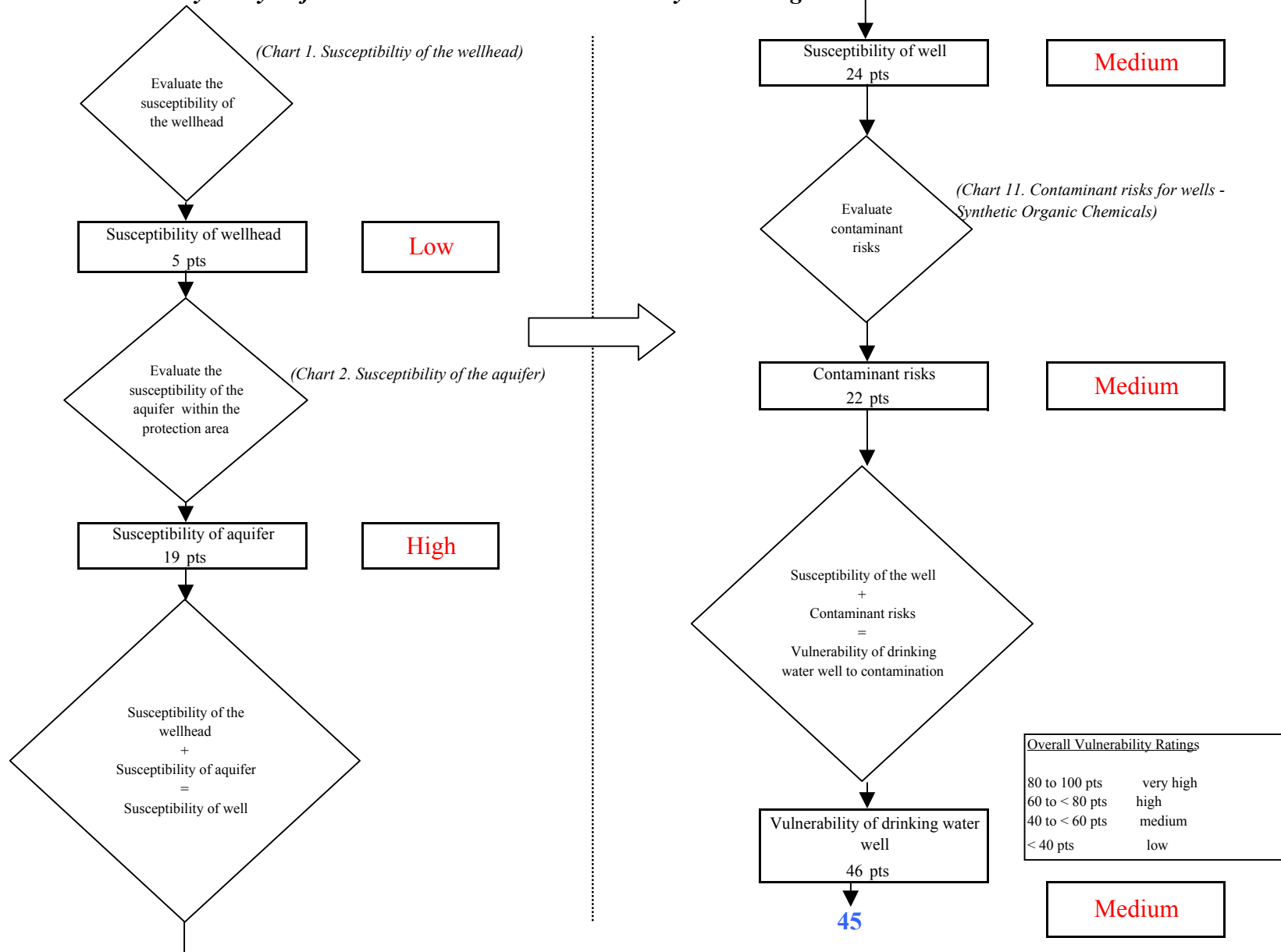


Chart 13. Contaminant risks for Sand Lake Services - Well 3 - Other Organic Chemicals

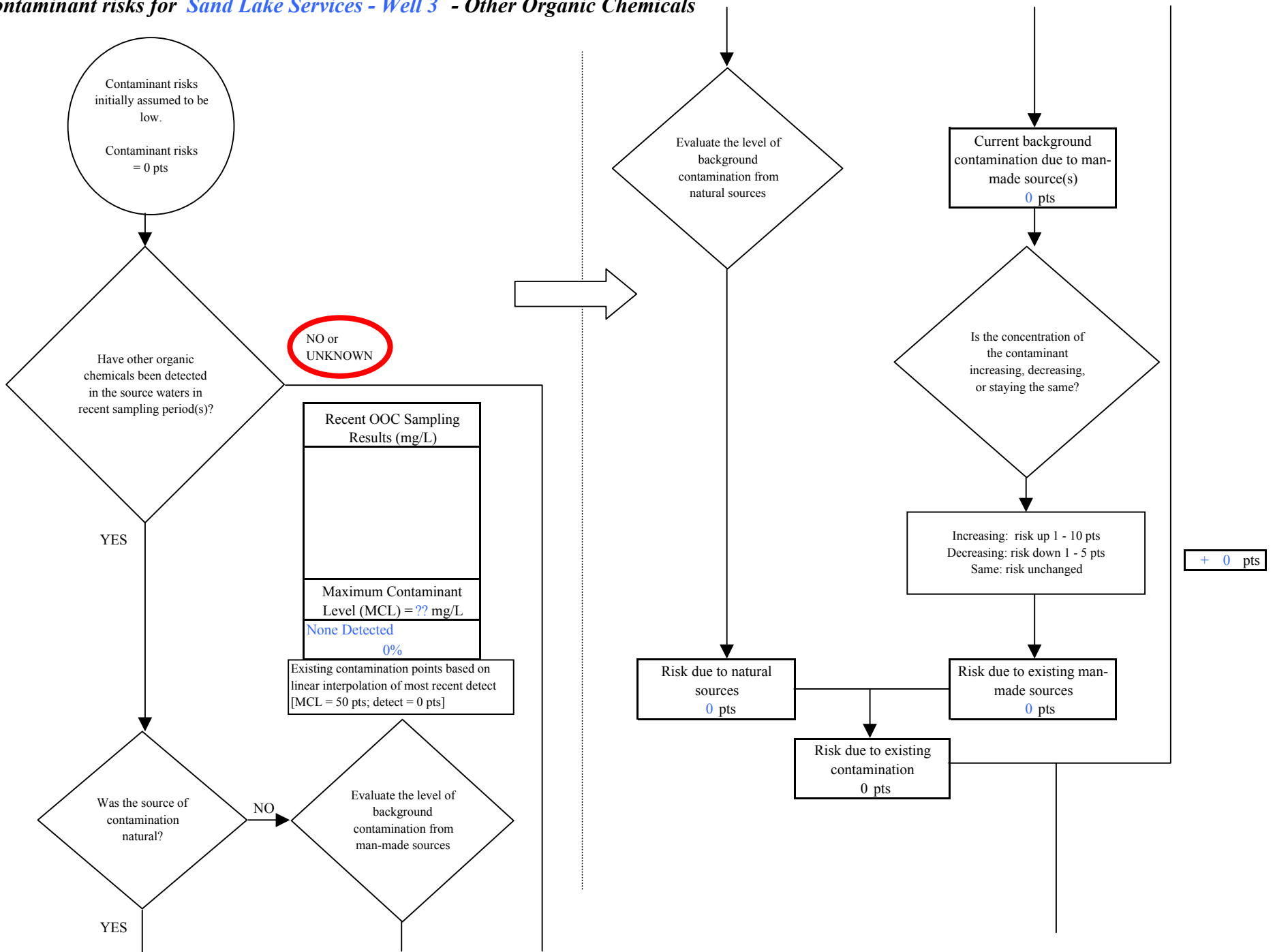
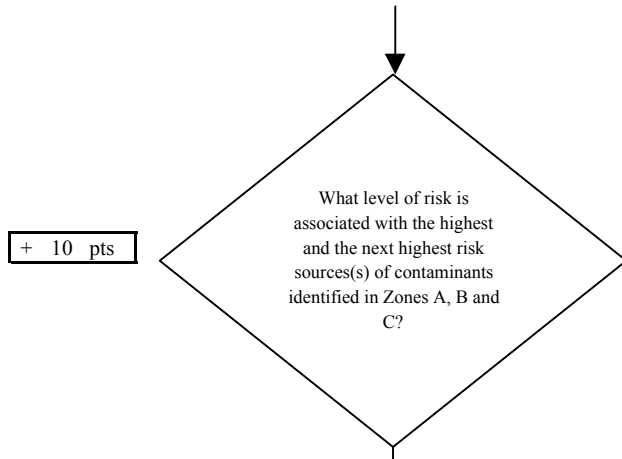


Chart 13. Contaminant risks for Sand Lake Services - Well 3 - Other Organic Chemicals



| 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) | 5 | 4 | 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.

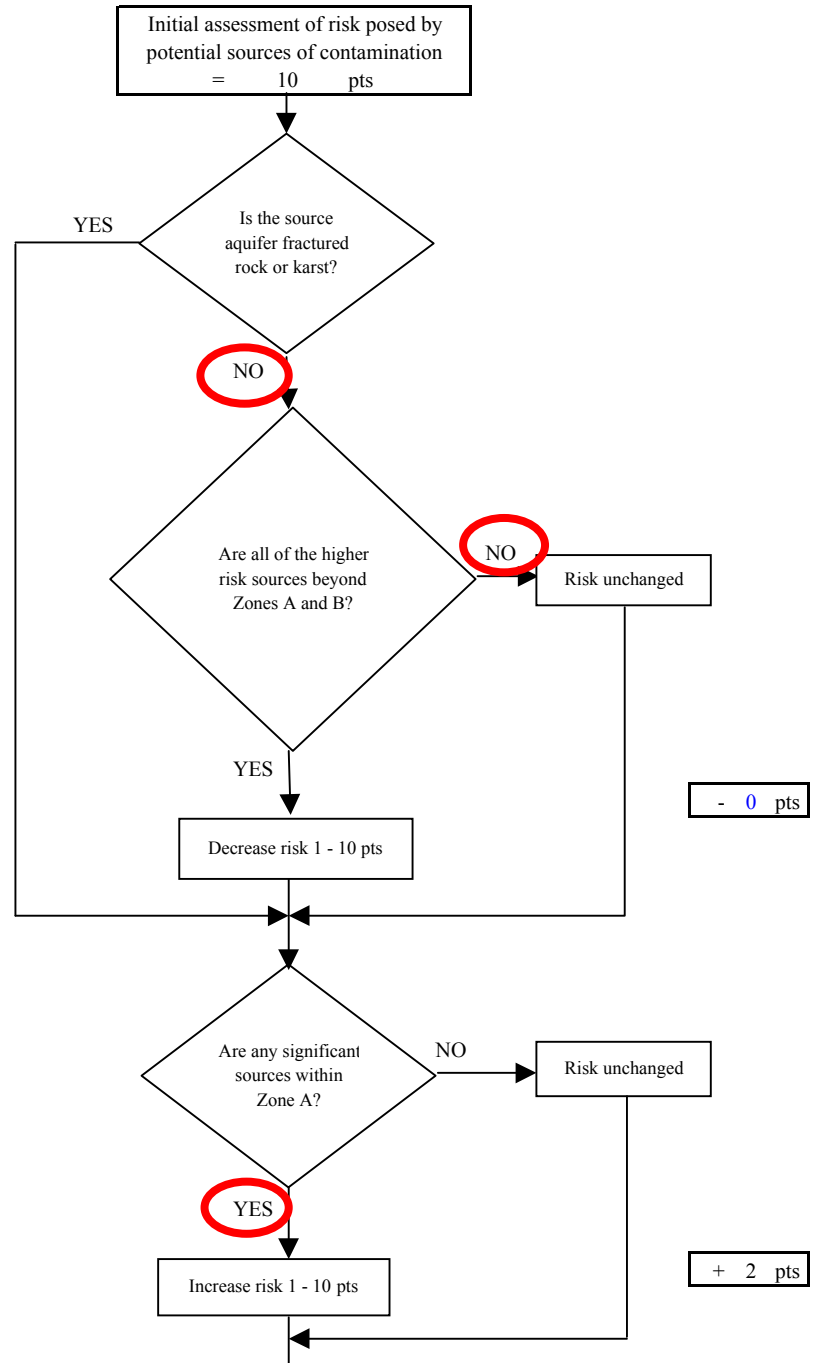
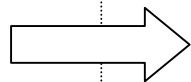


Chart 13. Contaminant risks for Sand Lake Services - Well 3 - Other Organic Chemicals

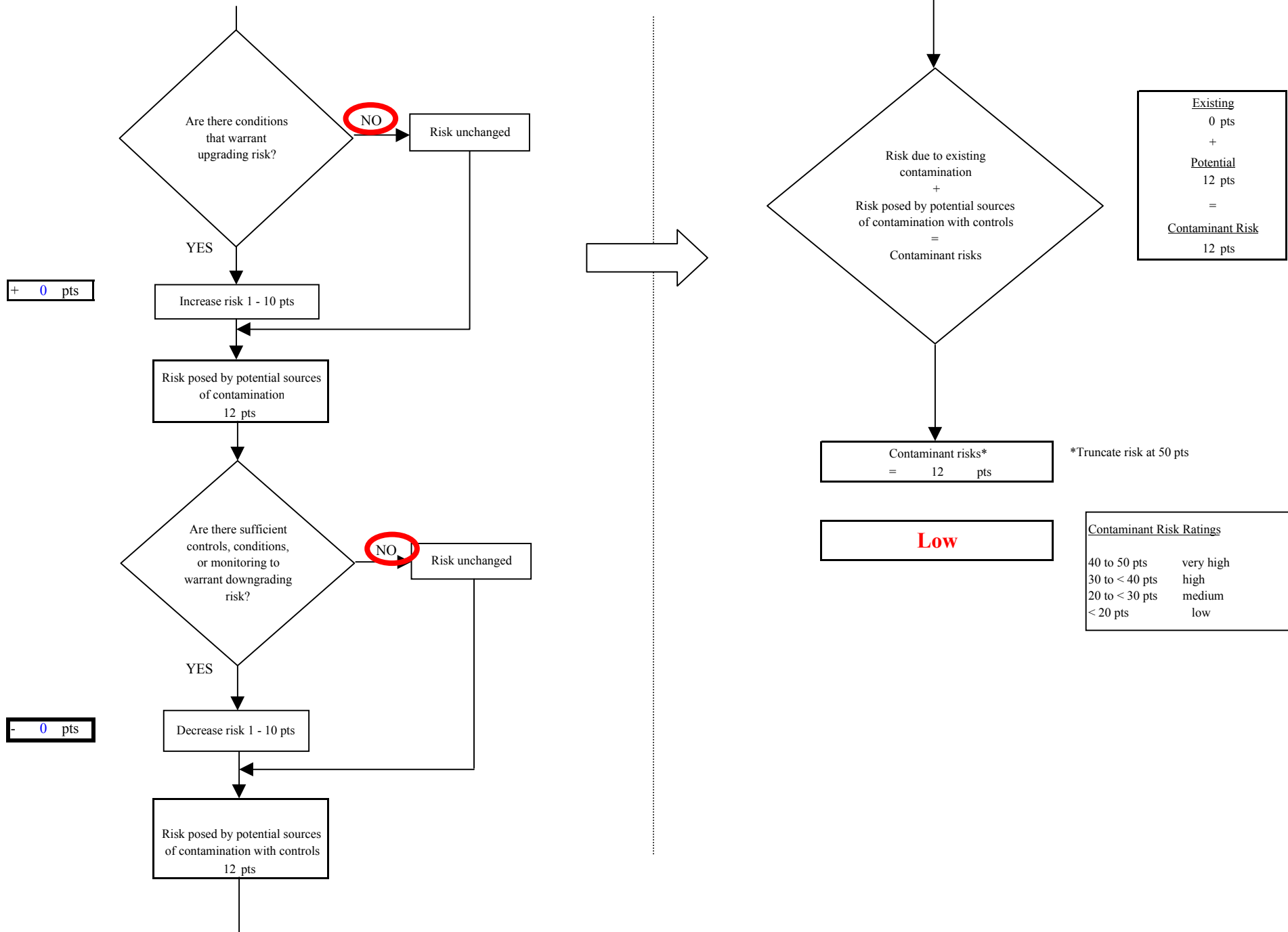


Chart 14. Vulnerability analysis for Sand Lake Services - Well 3 - Other Organic Chemicals

