

Source Water Assessment

A Hydrogeologic Susceptibility and
Vulnerability Assessment for
Estell Subdivision,
Anchorage, Alaska
PWSID # 216902.001

DRINKING WATER PROTECTION PROGRAM REPORT 805

Alaska Department of Environmental Conservation

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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 Estell Subdivision Source of Public Drinking Water, Anchorage, Alaska

Drinking Water Protection Program Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The public water system for Estell Subdivision is a Class A (community) water system consisting of one well in the Anchorage area. Identified potential and existing sources of contaminants for Estell Subdivision include: sewer lines, residential areas, roads, scrap/salvage yards, recreational trails, underground fuel tanks, Leaking Underground Storage Tank (LUST) sites, recognized contaminated sites and various commercial and industrial activities. 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, Estell Subdivision received a vulnerability rating of **Medium** for bacteria and viruses, nitrate/nitrites and **High** for volatile organic chemicals, inorganic chemicals, synthetic organic chemicals and other organic chemicals.

INTRODUCTION

The Alaska Department of Environmental Conservation (ADEC) is completing source water assessments for all public drinking water sources in the State of Alaska. The purpose of this 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. The results of this source water assessment can be used to decide where voluntary protection efforts are needed and feasible, and what efforts will be most effective in reducing contaminant risks to your water system.

This source water assessment combines a review of the natural conditions at the site and the potential and existing contaminant risks. These are combined to determine the overall vulnerability of the drinking water source to contamination.

DESCRIPTION OF THE ANCHORAGE AREA, ALASKA

Location

Anchorage, located in south-central 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 at elevations exceeding 3,700 feet in elevation above sea level.



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

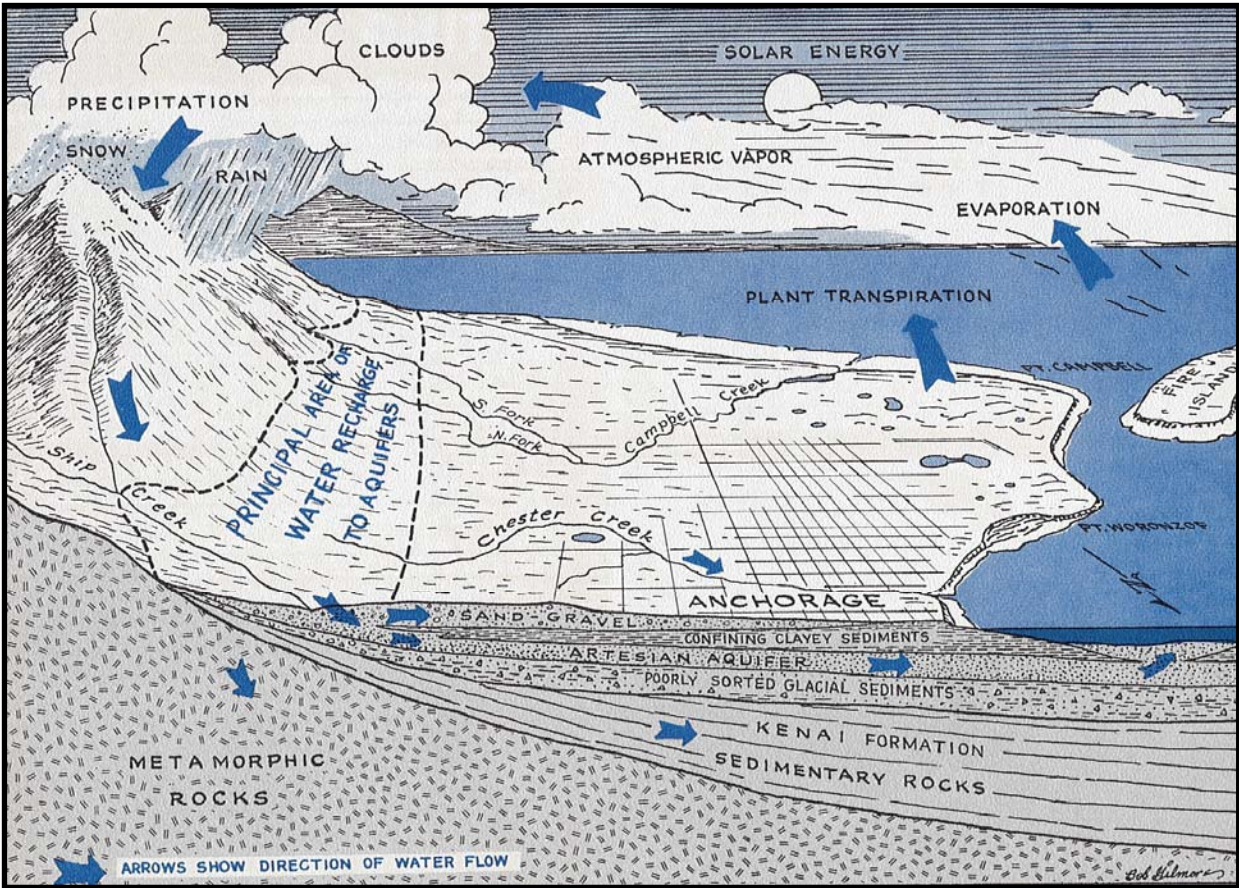


Figure 2. Generalized hydrologic cycle in the Anchorage area [Barnwell, George, Dearborn, Weeks, and Zenone, 1972].

Climate

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

Physiography and Groundwater Conditions

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

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

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

Water enters or recharges these two aquifer systems in several different ways. Along the front of the Chugach Mountains, groundwater seeps from fractures in

bedrock into the sediments. At these higher elevations, rain and snowmelt also 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.

ESTELL SUBDIVISION PUBLIC DRINKING WATER SYSTEM

Estell Subdivision is a Class A (community) water system. The system consists of one well in the Anchorage area. (See Map 1 of Appendix A).

The well is located near Spenard Road and Chugach Way, at an elevation of approximately 75 feet above sea level.

The 2002 Sanitary Survey indicates that the wellhead is located in a pit below surface grade and had standing stagnant water surrounding the wellhead. Although the wellhead appears to have a properly installed sanitary seal, the well casing has not been properly grouted. This may provide a direct route for contaminants to enter and travel along the well casing.

Records indicate that the well depth is 107 feet deep. The well log is unavailable. However, logs of nearby wells indicate that there is a confining layer near the surface to 133 feet below the surface. This confining layer may provide protection from contaminants entering the aquifer. However, the protectiveness of the clay layers tend to thin out towards the mountains allowing contaminants that enter the subsurface near the base of the mountains to enter the confined aquifer uninhibited by the absence of any protective layer. In addition, wells penetrating the confining layer can further reduce the protectiveness.

This system operates 365 days per year and serves 70 residents and 20 non-residents through 3 service connections.

ESTELL SUBDIVISION PROTECTION AREA

In order to evaluate whether a drinking water source is at risk, we must first evaluate what are the most likely pathways for surface contamination to reach the groundwater. Some areas are more likely to allow contamination to reach the well than others. These areas are determined by looking at the characteristics of the soil, groundwater, aquifer, and well.

The most probable area for contamination to reach the drinking water well is the area that contributes water to the well, the groundwater recharge area. This area is designated as the Drinking Water Protection Area (DWPA). Because releases of contaminants within the DWPA are most likely to impact the drinking water well, this area will serve as the focus for voluntary protection efforts.

An outline of the immediate watershed was used to determine the size and shape of the DWPA for Estell Subdivision. Available geology was also considered to take into account any uncertainties in groundwater flow and aquifer characteristics to arrive at a meaningful DWPA (Please refer to the Guidance Manual for Class A Public Water Systems for additional information).

The DWPAs established for wells by the ADEC are usually separated into four zones, limited by the watershed. These zones correspond to differences in the time-of-travel (TOT) of the water moving through the aquifer to the well. An analytical calculation was used to determine the size and shape of the DWPA. 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*), and State of Alaska Department of Water Resources (*Jokela et. al., 1991*).

The time of travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant. The following is a summary of the four DWPA zones and the calculated time-of-travel for each:

Table 1. Definition of Zones

Zone	Definition
A	¼ the distance for the 2-yr. TOT
B	Less than the 2 year TOT
C	Less Than the 5 year TOT
D	Less than the 10 year TOT

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

The Drinking Water Protection Program has completed an inventory of potential and existing sources of contamination within Estell Subdivision DWPA. This inventory was completed through a search of agency records and other publicly available information. Potential sources of contamination to the drinking water aquifer include 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 all Class A public water system assessments, six categories of drinking water contaminants were inventoried. They include:

- Bacteria and viruses;
- Nitrates and/or nitrites;
- Volatile organic chemicals
- Heavy metals, cyanide, and other inorganic chemicals,
- Synthetic organic chemicals, and
- Other organic chemicals.

The sources are displayed on Maps 2 -5 in Appendix C and summarized in Table 1 of Appendix B.

RANKING OF CONTAMINANT RISKS

Once the potential and existing sources of contamination have been identified, they are assigned a ranking according to what type and level of risk they represent. Ranking of contaminant risks for a “potential” or “existing” source of contamination is a function of toxicity and volumes of specific contaminants associated with that source.

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, volatile organic chemicals, heavy metals, synthetic organic chemicals, and other organic chemicals.

VULNERABILITY OF ESTELL SUBDIVISION DRINKING WATER SOURCE

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

- Natural susceptibility; and
- Contaminant risks.

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

Natural Susceptibility (0 – 50 points)

$$\begin{aligned}
 &+ \\
 &\text{Contaminant Risks (0 – 50 points)} \\
 &= \\
 &\text{Vulnerability of the} \\
 &\text{Drinking Water Source to Contamination (0 – 100).} \\
 &\text{A score for the Natural Susceptibility is achieved by} \\
 &\text{analyzing the properties of the well and the aquifer.} \\
 &\text{Susceptibility of the Wellhead (0 – 25 Points)} \\
 &+ \\
 &\text{Susceptibility of the Aquifer (0 – 25 Points)} \\
 &= \\
 &\text{Natural Susceptibility (Susceptibility of the Well)} \\
 &\text{(0 – 50 Points)}
 \end{aligned}$$

Table 2 shows the Susceptibility scores and ratings for the well serving Estell Subdivision.

Table 2. Susceptibility of the well

	Score	Rating
Susceptibility of the Wellhead	10	Medium
Susceptibility of the Aquifer	7	Low
Natural Susceptibility	17	Low

Contaminant risks to a drinking water source depend on the type, number or density, and distribution of contaminant sources. This data has been derived from an examination of existing and historical contamination that has been detected at the drinking water source through routine sampling. It also evaluates potential sources of contamination. Table 3 summarizes the Contaminant Risks for each category of drinking water contaminants.

Table 3. Contaminant Risks

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

Appendix D contains fourteen charts, which together form the ‘Vulnerability Analysis’ for a source water assessment for a public drinking water source. Chart 1 analyzes the ‘Susceptibility of the Wellhead’ to contamination by looking at the construction of the well and its surrounding area. Chart 2 analyzes the ‘Susceptibility of the Aquifer’ to contamination by looking at the 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 Analyses for nitrates and nitrites, volatile organic chemicals, heavy metals, synthetic organic chemicals, and other organic chemicals, respectively. Table 4 contains the overall vulnerability scores (0 – 100) and ratings for each of the six categories of drinking water contaminants. Note: scores are rounded off to the nearest five.

Table 4. Overall Vulnerability

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

Bacteria and Viruses

The contaminant risk for bacteria and viruses is medium with sewer lines, residential area and roads presenting the most significant risk to the drinking water well (See Chart 3 – Contaminant Risks for Bacteria and Viruses in Appendix D).

Recent sampling of the well indicates that no bacteria and viruses have been detected. .

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

Nitrates and Nitrites

The contaminant risk for nitrates and nitrites is medium with sewer lines, residential areas and parks, presenting the most significant risk to the drinking water well.

Sampling history indicates that concentrations of nitrates have not been detected in source waters. (See Chart 5 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D).

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

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is very high with residential areas, sewer lines, roads, motor vehicle shops and furniture manufacturing shops, print shops, electrical/computer manufacturing and recognized contaminated sites presenting the most significant risk to the drinking water source. (See Chart 7 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

Recent sampling indicates that no volatile organic chemicals have been detected in the source waters.

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

Heavy Metals, Cyanide, and Other Inorganic Chemicals

The contaminant risk for heavy metals, cyanide and other inorganic chemicals is very high with sewer lines, scrap/salvage, residential areas, motor vehicle repair shops and the presence of existing contamination presenting the most significant risk to the drinking water source (See Chart 9 – Contaminant Risks for

Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

Sampling on 11/27/95 indicates that arsenic was detected in the source waters at 0.015 mg/l. This level exceeds the current MCL of 0.01 mg/l (See Chart 9 – Contaminant Risks for Heavy Metals and Other Inorganic Chemicals in Appendix D). The MCL for arsenic has recently been lowered from 0.050 mg/l to 0.01 mg/l. At the time of sampling in 1995, the levels detected did not exceed the MCL of 0.050 mg/l.

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.” (USEPA, 2001). It is likely that the arsenic detected is from natural sources.

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 0.050 mg/l. (USEPA, 2001).

In addition, very low levels of barium have been detected in source waters. These levels are likely to be from natural sources and are considered safe with respect to human consumption.

Combining the contaminant risk with the natural susceptibility of the well, leads to an overall vulnerability to heavy metals and other inorganic chemical contamination of high.

Synthetic Organic Chemicals

The contaminant risk for synthetic organic chemicals is very high with sewer lines, residential areas, agricultural sale/storage, orchards/nurseries and furniture manufacturing/repair shops presenting the most significant risk. (See Chart 11 – Contaminant Risks for Synthetic Organic Chemicals in Appendix D, respectively).

Sampling of synthetic organic chemicals has not occurred. After combining the contaminant risk with the natural susceptibility of the well, the overall vulnerability to synthetic organic chemicals is high.

Other Organic Chemicals

The contaminant risk for other organic chemicals is very high with sewer lines, residential areas, roads, scrap/salvage yards and furniture manufacturing/repair shops presenting the most significant risk.

Sampling of other organic chemicals has not occurred. After combining the contaminant risk with the natural susceptibility of the well, the overall vulnerability to other organic chemicals is high. (See Chart 13 – Contaminant Risks for Other Organic Chemicals in Appendix D, respectively).

SUMMARY

A *Source Water Assessment* has been completed for the source of public drinking water serving Estell Subdivision. The overall vulnerability of this source to contamination is **Medium** for bacteria and viruses and nitrate/nitrites and **High** for volatile organic chemicals, inorganic chemicals, synthetic organic chemicals and other organic chemicals. This assessment of contaminant risks can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of Estell Subdivision 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 Estell Subdivision public drinking water source.

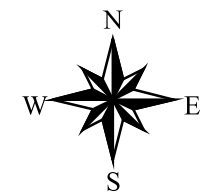
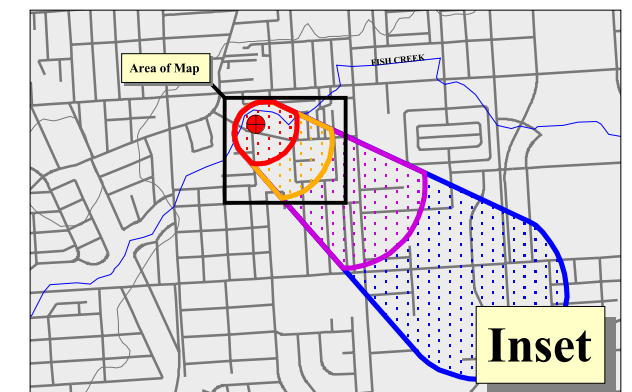
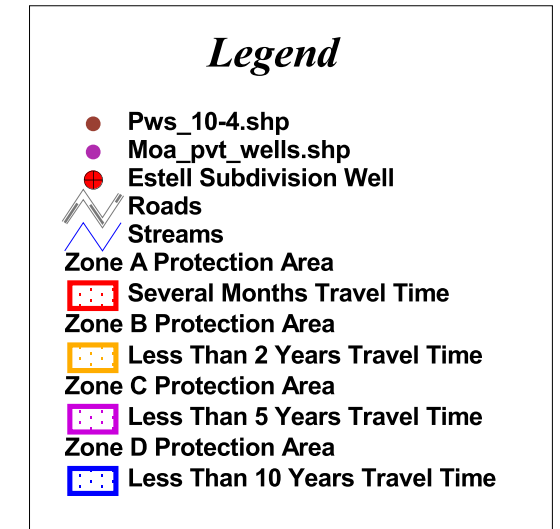
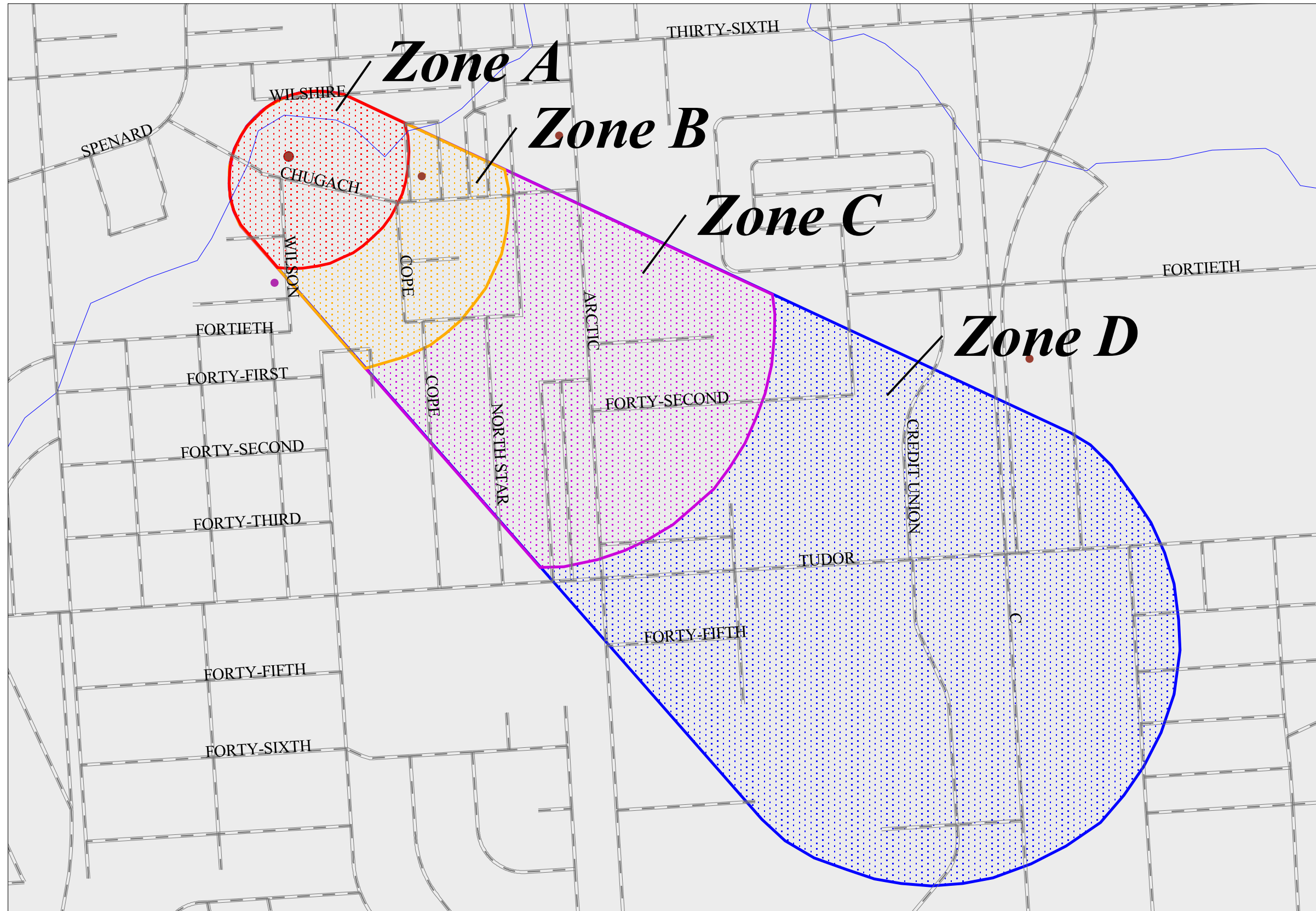
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APPENDIX A

Estell Subdivision Drinking Water Protection Area Location (Map 1)

Drinking Water Protection Area for Estell Subdivision



1:8400

Map 1

APPENDIX B

Contaminant Source Inventory and Risk Ranking for Estell Subdivision (Tables 1-7)

Table 1

**Contaminant Source Inventory for
Estell Subdivision**

PWSID 216902.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Map Number	Comments
Body shops (automotive)	C05	C5-1	A	3	
Construction trade areas and materials	C09	C9-1	A	3	
Construction trade areas and materials	C09	C9-2	A	3	
Lawn and garden supplies/services	C23	C23-1	A	3	
Motor /motor vehicle repair shops	C31	C31-1	A	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-1	A	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-2	A	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-3	A	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-4	A	2	
Scrap, salvage, or junk yards	D59	D59-1	A	3	
Residential Areas	R01	R1-1	A	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	2	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	B	3	
Lawn and garden supplies/services	C23	C23-2	B	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-5	B	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-6	B	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-7	B	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-8	B	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-9	B	2	
Residential Areas	R01	R1-2	B	3	
Closed tanks, diesel (underground)	T09	T9-1	B	3	

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Map Number</i>	<i>Comments</i>
Municipal or city parks (with green areas)	X04	X4-1	B	3	
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	2	
Orchards or nurseries	A10	A10-1	C	4	
Agricultural chemical sales/storage	C02	C2-1	C	4	
Construction trade areas and materials	C09	C9-3	C	4	
Construction trade areas and materials	C09	C9-4	C	4	
Construction trade areas and materials	C09	C9-5	C	4	
Construction trade areas and materials	C09	C9-6	C	4	
Construction trade areas and materials	C09	C9-7	C	4	
Construction trade areas and materials	C09	C9-8	C	4	
Florists	C12	C12-1	C	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	C	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-2	C	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-3	C	4	
Hardware stores	C17	C17-1	C	4	
Hardware stores	C17	C17-2	C	4	
Heavy equipment rental/storage	C18	C18-1	C	4	
Heavy equipment rental/storage	C18	C18-2	C	4	
Motor vehicle dealerships - cars, trucks, motor cycles, ATV's, snow machines, boats (with service department)	C27	C27-2	C	4	

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Map Number</i>	<i>Comments</i>
Motor/motor vehicle supplies stores	C28	C28-1	C	4	
Photography supplies/photo processing laboratories	C36	C36-1	C	4	
Printers, publishers, copiers	C37	C37-1	C	4	
Printers, publishers, copiers	C37	C37-2	C	4	
Printers, publishers, copiers	C37	C37-3	C	4	
Printers, publishers, copiers	C37	C37-4	C	4	
Printers, publishers, copiers	C37	C37-5	C	4	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-10-15	C	2	Zone C has 6 sewer lines
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-1	C	4	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-2	C	4	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-3	C	4	
Sign manufacturing	I39	I39-1	C	4	
Residential Areas	R01	R1-3	C	4	
Closed tanks, gasoline (underground)	T13	T13-2	C	4	
Municipal or city parks (with green areas)	X04	X4-2	C	4	
Highways and roads, paved (cement or asphalt)	X20	X20-10-17	C	2	Zone C has 8 roads
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	C	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	C	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-3	C	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-4	C	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-5	C	4	
Dog walking areas/foot trails	X46	X46-1	C	4	
Dog walking areas/foot trails	X46	X46-2	C	4	
Gasoline stations (without repair shop)	C15	C15-1	D	5	

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Map Number</i>	<i>Comments</i>
Gasoline stations (with repair shop)	C16	C16-1	D	5	
Printers, publishers, copiers	C37	C37-6	D	5	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	D	5	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-4	D	5	
Lumber processing and preservation	N04	N4-1	D	5	
Tanks, diesel (underground)	T08	T8-1	D	5	
Tanks, diesel (underground)	T08	T8-2	D	5	
Tanks, gasoline (underground)	T12	T12-1	D	5	
Tanks, gasoline (underground)	T12	T12-2	D	5	
Tanks, gasoline (underground)	T12	T12-3	D	5	
Tanks, gasoline (underground)	T12	T12-4	D	5	
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U4-1	D	5	File No. CS92.30 AFSC Pipeline Tudor & Arctic.. Free product jet diesel fuel discovered at the Texaco station. Source of jet fuel is from pipeline located along Arctic Blvd. Remediation and monitoring in process. Priority: High
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U4-2	D	5	CS100.158 Tudor Road Dimond Z. Surface staining observed during property transfer. Minor groundwater contamination. Remediation completed. Priority: Medium
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U7-1	D	5	File No. L25.09 810 W. Tudor Rd. Line failure between trubine pump and dispenser. Contaminated soils removed and monitoring wells in place. Remediation is in process. Priority: High
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U7-2	D	5	L69.43 4333 Bering Street. Waste oil soil contamination from underground storage tanks. Priority: Medium
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U7-2	D	5	File No. L30.12 150 W. Tudor Rd. Petroleum contamination of soil and groundwater encountered in 1987. Site remediation removed soil and monitoring wells are in place. Extent of remaining contamination is unknown. Priority: High
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U8-1	D	5	File No. L55.96 4300 B Street. Alaska Energy Building. Soil contamination discovered during the removal of underground storage tanks. Soil removed. Levele and extent of contamination is unknown. No further action needed. Priority: Low

Table 2

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Bacteria and Viruses*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-1	A	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-2	A	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-3	A	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-4	A	Medium	2	
Residential Areas	R01	R1-1	A	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-5	B	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-6	B	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-7	B	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-8	B	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-9	B	Medium	2	
Residential Areas	R01	R1-2	B	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	Low	2	

Table 2 (continued)

Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Bacteria and Viruses

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	Low	2	
Municipal or city parks (with green areas)	X04	X4-1	B	Medium	3	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	C	Medium	4	

Table 3

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Nitrates/Nitrites*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-1	A	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-2	A	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-3	A	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-4	A	Medium	2	
Residential Areas	R01	R1-1	A	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-5	B	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-6	B	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-7	B	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-8	B	Medium	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-9	B	Medium	2	
Residential Areas	R01	R1-2	B	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	Low	2	

Table 3 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Nitrates/Nitrites*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	Low	2	
Municipal or city parks (with green areas)	X04	X4-1	B	Medium	3	
Orchards or nurseries	A10	A10-1	C	Medium	4	
Florists	C12	C12-1	C	Low	4	
Hardware stores	C17	C17-1	C	Low	4	
Hardware stores	C17	C17-2	C	Low	4	
Agricultural chemical sales/storage	C02	C2-1	C	High	4	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-10-15	C	Medium	2	Zone C has 6 sewer lines
Residential Areas	R01	R1-3	C	Low	4	
Highways and roads, paved (cement or asphalt)	X20	X20-10-17	C	Low	2	Zone C has 8 roads
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-3	C	Low	4	
Municipal or city parks (with green areas)	X04	X4-2	C	Medium	4	
Dog walking areas/foot trails	X46	X46-1	C	Low	4	

Table 3 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Nitrates/Nitrites*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Dog walking areas/foot trails	X46	X46-2	C	Low	4	

Table 4

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Volatile Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Motor /motor vehicle repair shops	C31	C31-1	A	Medium	3	
Body shops (automotive)	C05	C5-1	A	Medium	3	
Construction trade areas and materials	C09	C9-1	A	Low	3	
Construction trade areas and materials	C09	C9-2	A	Low	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-1	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-2	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-3	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-4	A	Low	2	
Scrap, salvage, or junk yards	D59	D59-1	A	Low	3	
Residential Areas	R01	R1-1	A	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low	2	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	B	High	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-5	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-6	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-7	B	Low	2	

Table 4 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Volatile Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-8	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-9	B	Low	2	
Residential Areas	R01	R1-2	B	Low	3	
Closed tanks, diesel (underground)	T09	T9-1	B	Medium	3	
Closed tanks, diesel (underground)	T09	T9-1	B	Medium	3	
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	Low	2	
Orchards or nurseries	A10	A10-1	C	Low	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	C	Medium	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-2	C	High	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-3	C	High	4	
Hardware stores	C17	C17-1	C	Low	4	
Hardware stores	C17	C17-2	C	Low	4	

Table 4 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Volatile Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Heavy equipment rental/storage	C18	C18-1	C	Medium	4	
Heavy equipment rental/storage	C18	C18-2	C	Medium	4	
Motor vehicle dealerships - cars, trucks, motor cycles, ATV's, snow machines, boats (with service department)	C27	C27-2	C	Medium	4	
Motor/motor vehicle supplies stores	C28	C28-1	C	Low	4	
Photography supplies/photo processing laboratories	C36	C36-1	C	Medium	4	
Printers, publishers, copiers	C37	C37-1	C	High	4	
Printers, publishers, copiers	C37	C37-2	C	High	4	
Printers, publishers, copiers	C37	C37-3	C	High	4	
Printers, publishers, copiers	C37	C37-4	C	High	4	
Printers, publishers, copiers	C37	C37-5	C	High	4	
Construction trade areas and materials	C09	C9-3	C	Low	4	
Construction trade areas and materials	C09	C9-4	C	Low	4	
Construction trade areas and materials	C09	C9-5	C	Low	4	
Construction trade areas and materials	C09	C9-6	C	Low	4	
Construction trade areas and materials	C09	C9-7	C	Low	4	
Construction trade areas and materials	C09	C9-8	C	Low	4	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-10-15	C	Low	2	Zone C has 6 sewer lines
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-1	C	Very High	4	

Table 4 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Volatile Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-2	C	Very High	4	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-3	C	Very High	4	
Sign manufacturing	I39	I39-1	C	Medium	4	
Residential Areas	R01	R1-3	C	Low	4	
Closed tanks, gasoline (underground)	T13	T13-2	C	Medium	4	
Highways and roads, paved (cement or asphalt)	X20	X20-10-17	C	Low	2	Zone C has 8 roads
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-3	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-4	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-5	C	Low	4	
Gasoline stations (without repair shop)	C15	C15-1	D	High	5	
Gasoline stations (with repair shop)	C16	C16-1	D	High	5	
Printers, publishers, copiers	C37	C37-6	D	High	5	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	D	High	5	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-4	D	Very High	5	
Lumber processing and preservation	N04	N4-1	D	Medium	5	

Table 4 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Volatile Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Tanks, gasoline (underground)	T12	T12-1	D	High	5	
Tanks, gasoline (underground)	T12	T12-2	D	High	5	
Tanks, gasoline (underground)	T12	T12-3	D	High	5	
Tanks, gasoline (underground)	T12	T12-4	D	High	5	
Tanks, diesel (underground)	T08	T8-1	D	High	5	
Tanks, diesel (underground)	T08	T8-2	D	High	5	
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U4-1	D	High	5	File No. CS92.30 AFSC Pipeline Tudor & Arctic.. Free product jet diesel fuel discovered at the Texaco station. Source of jet fuel is from pipeline located along Arctic Blvd. Remediation and monitoring inprocess. Priority: High
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U4-2	D	High	5	CS100.158 Tudor Road Dimond Z. Surface staining observed during property transfer. Minor groundwater contamination. Remediation completed. Priority: Medium
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U7-1	D	High	5	File No. L25.09 810 W. Tudor Rd. Line failure between trubine pump and dispenser. Contaminated soils removed and monitoring wells in place. Remediation is in process. Priority: High
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U7-2	D	High	5	L69.43 4333 Bering Street. Waste oil soil contamination from underground storage tanks. Priority: Medium
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U7-2	D	High	5	File No. L30.12 150 W. Tudor Rd. Petroleum contamination of soil and groundwater encountered in 1987. Site remediation removed soil and monitoring wells are in place. Extent of remaining contamination is unknown. Priority: High

Table 5

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Motor /motor vehicle repair shops	C31	C31-1	A	Medium	3	
Body shops (automotive)	C05	C5-1	A	Medium	3	
Construction trade areas and materials	C09	C9-1	A	Low	3	
Construction trade areas and materials	C09	C9-2	A	Low	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-1	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-2	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-3	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-4	A	Low	2	
Scrap, salvage, or junk yards	D59	D59-1	A	High	3	
Residential Areas	R01	R1-1	A	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low	2	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	B	Low	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-5	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-6	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-7	B	Low	2	

Table 5 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-8	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-9	B	Low	2	
Residential Areas	R01	R1-2	B	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	Low	2	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	C	Low	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-2	C	Low	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-3	C	Low	4	
Hardware stores	C17	C17-1	C	Low	4	
Hardware stores	C17	C17-2	C	Low	4	
Heavy equipment rental/storage	C18	C18-1	C	Low	4	
Heavy equipment rental/storage	C18	C18-2	C	Low	4	
Agricultural chemical sales/storage	C02	C2-1	C	Low	4	

Table 5 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Motor vehicle dealerships - cars, trucks, motor cycles, ATV's, snow machines, boats (with service department)	C27	C27-2	C	Low	4	
Photography supplies/photo processing laboratories	C36	C36-1	C	Medium	4	
Printers, publishers, copiers	C37	C37-1	C	Medium	4	
Printers, publishers, copiers	C37	C37-2	C	Medium	4	
Printers, publishers, copiers	C37	C37-3	C	Medium	4	
Printers, publishers, copiers	C37	C37-4	C	Medium	4	
Printers, publishers, copiers	C37	C37-5	C	Medium	4	
Construction trade areas and materials	C09	C9-3	C	Low	4	
Construction trade areas and materials	C09	C9-4	C	Low	4	
Construction trade areas and materials	C09	C9-5	C	Low	4	
Construction trade areas and materials	C09	C9-6	C	Low	4	
Construction trade areas and materials	C09	C9-7	C	Low	4	
Construction trade areas and materials	C09	C9-8	C	Low	4	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-10-15	C	Low	2	Zone C has 6 sewer lines
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-1	C	High	4	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-2	C	High	4	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-3	C	High	4	
Sign manufacturing	I39	I39-1	C	Medium	4	

Table 5 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Residential Areas	R01	R1-3	C	Low	4	
Highways and roads, paved (cement or asphalt)	X20	X20-10-17	C	Low	2	Zone C has 8 roads
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-3	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-4	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-5	C	Low	4	
Municipal or city parks (with green areas)	X04	X4-2	C	Low	4	
Gasoline stations (without repair shop)	C15	C15-1	D	Low	5	
Gasoline stations (with repair shop)	C16	C16-1	D	Low	5	
Printers, publishers, copiers	C37	C37-6	D	Medium	5	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	D	High	5	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-4	D	High	5	
Lumber processing and preservation	N04	N4-1	D	Medium	5	
Tanks, gasoline (underground)	T12	T12-1	D	Medium	5	
Tanks, gasoline (underground)	T12	T12-2	D	Medium	5	
Tanks, gasoline (underground)	T12	T12-3	D	Medium	5	
Tanks, gasoline (underground)	T12	T12-4	D	Medium	5	

Table 5 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

PWSID 216902.001

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

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Synthetic Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Lawn and garden supplies/services	C23	C23-1	A	Medium	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-1	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-2	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-3	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-4	A	Low	2	
Scrap, salvage, or junk yards	D59	D59-1	A	Medium	3	
Residential Areas	R01	R1-1	A	Low	3	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	B	Medium	3	
Lawn and garden supplies/services	C23	C23-2	B	Medium	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-5	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-6	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-7	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-8	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-9	B	Low	2	
Residential Areas	R01	R1-2	B	Low	3	
Municipal or city parks (with green areas)	X04	X4-1	B	Low	3	
Orchards or nurseries	A10	A10-1	C	High	4	

Table 6 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Synthetic Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Furniture manufacturing, repair, and finishing shops	C14	C14-1	C	Medium	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-2	C	Medium	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-3	C	Medium	4	
Agricultural chemical sales/storage	C02	C2-1	C	High	4	
Photography supplies/photo processing laboratories	C36	C36-1	C	Low	4	
Printers, publishers, copiers	C37	C37-1	C	Low	4	
Printers, publishers, copiers	C37	C37-2	C	Low	4	
Printers, publishers, copiers	C37	C37-3	C	Low	4	
Printers, publishers, copiers	C37	C37-4	C	Low	4	
Printers, publishers, copiers	C37	C37-5	C	Low	4	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-10-15	C	Low	2	Zone C has 6 sewer lines
Residential Areas	R01	R1-3	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-1	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-2	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-3	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-4	C	Low	4	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-5	C	Low	4	
Municipal or city parks (with green areas)	X04	X4-2	C	Low	4	

Table 6 (continued)

Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Synthetic Organic Chemicals

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Printers, publishers, copiers	C37	C37-6	D	Low	5	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	D	Low	5	
Lumber processing and preservation	N04	N4-1	D	Medium	5	

Table 7

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Other Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Motor /motor vehicle repair shops	C31	C31-1	A	Medium	3	
Body shops (automotive)	C05	C5-1	A	Medium	3	
Construction trade areas and materials	C09	C9-1	A	Low	3	
Construction trade areas and materials	C09	C9-2	A	Low	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-1	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-2	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-3	A	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-4	A	Low	2	
Scrap, salvage, or junk yards	D59	D59-1	A	High	3	
Residential Areas	R01	R1-1	A	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low	2	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	B	Medium	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-5	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-6	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-7	B	Low	2	

Table 7 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Other Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-8	B	Low	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-9	B	Low	2	
Residential Areas	R01	R1-2	B	Low	3	
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	Low	2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	Low	2	
Orchards or nurseries	A10	A10-1	C	Low	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-1	C	Medium	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-2	C	Medium	4	
Furniture manufacturing, repair, and finishing shops	C14	C14-3	C	Medium	4	
Hardware stores	C17	C17-1	C	Low	4	
Hardware stores	C17	C17-2	C	Low	4	
Heavy equipment rental/storage	C18	C18-1	C	Medium	4	
Heavy equipment rental/storage	C18	C18-2	C	Medium	4	

Table 7 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Other Organic Chemicals*

PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Motor vehicle dealerships - cars, trucks, motor cycles, ATV's, snow machines, boats (with service department)	C27	C27-2	C	Medium	4	
Photography supplies/photo processing laboratories	C36	C36-1	C	Low	4	
Construction trade areas and materials	C09	C9-3	C	Low	4	
Construction trade areas and materials	C09	C9-4	C	Low	4	
Construction trade areas and materials	C09	C9-5	C	Low	4	
Construction trade areas and materials	C09	C9-6	C	Low	4	
Construction trade areas and materials	C09	C9-7	C	Low	4	
Construction trade areas and materials	C09	C9-8	C	Low	4	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D1-10-15	C	Low	2	Zone C has 6 sewer lines
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-1	C	Very High	4	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-2	C	Very High	4	
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-3	C	Very High	4	
Residential Areas	R01	R1-3	C	Low	4	
Highways and roads, paved (cement or asphalt)	X20	X20-10-17	C	Low	2	Zone C has 8 roads
Gasoline stations (without repair shop)	C15	C15-1	D	Low	5	
Gasoline stations (with repair shop)	C16	C16-1	D	Medium	5	
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-1	D	High	5	

Table 7 (continued)

*Contaminant Source Inventory and Risk Ranking for
Estell Subdivision
Sources of Other Organic Chemicals*

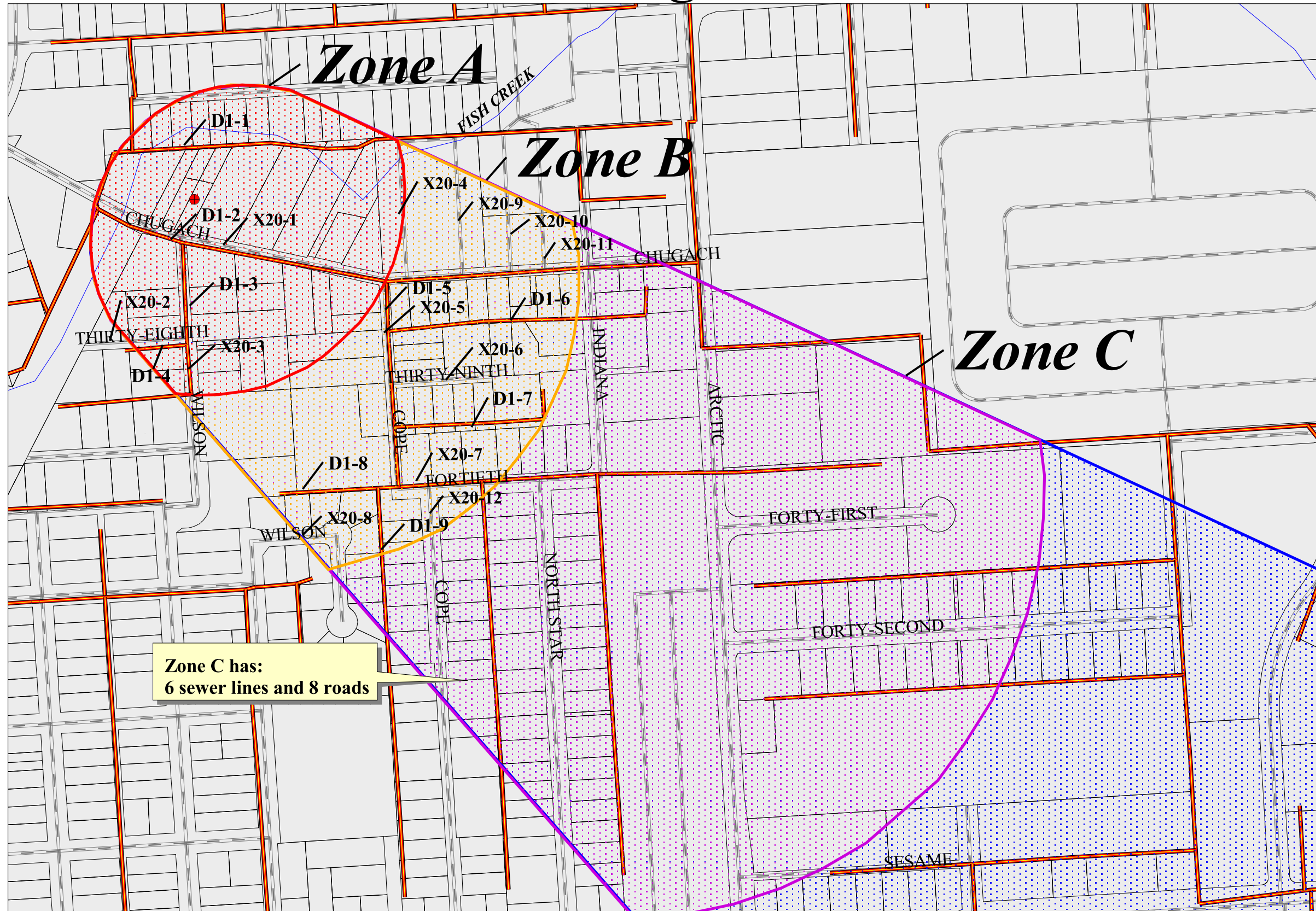
PWSID 216902.001

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Electrical, electronic, computer, and communications equipment/component manufacturing	I13	I13-4	D	Very High	5	
Lumber processing and preservation	N04	N4-1	D	Medium	5	

APPENDIX C

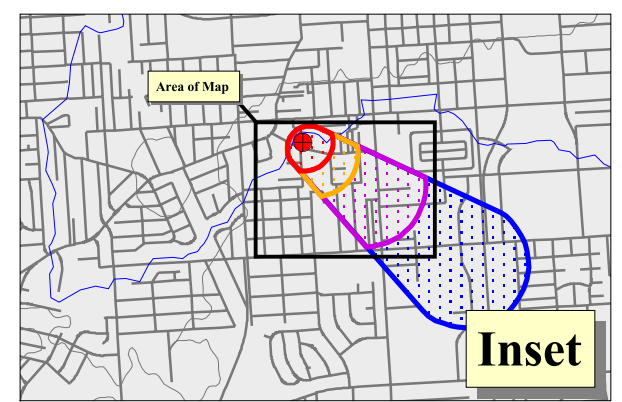
Estell Subdivision Drinking Water Protection Area and Potential and Existing Contaminant Sources (Maps 2-5)

Drinking Water Protection Area for Estell Subdivision with Potential and Existing Sources of Contamination

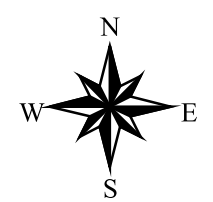


Legend

- Estell Subdivision Well
- Zone A Protection Area
- ▨ Several Months Travel Time
- Zone B Protection Area
- ▨ Less Than 2 Years Travel Time
- Zone C Protection Area
- ▨ Less Than 5 Years Travel Time
- Zone D Protection Area
- ▨ Less Than 10 Years Travel Time
- Sewers (D1)
- Streams
- Roads
- ▭ MOA Land Parcels

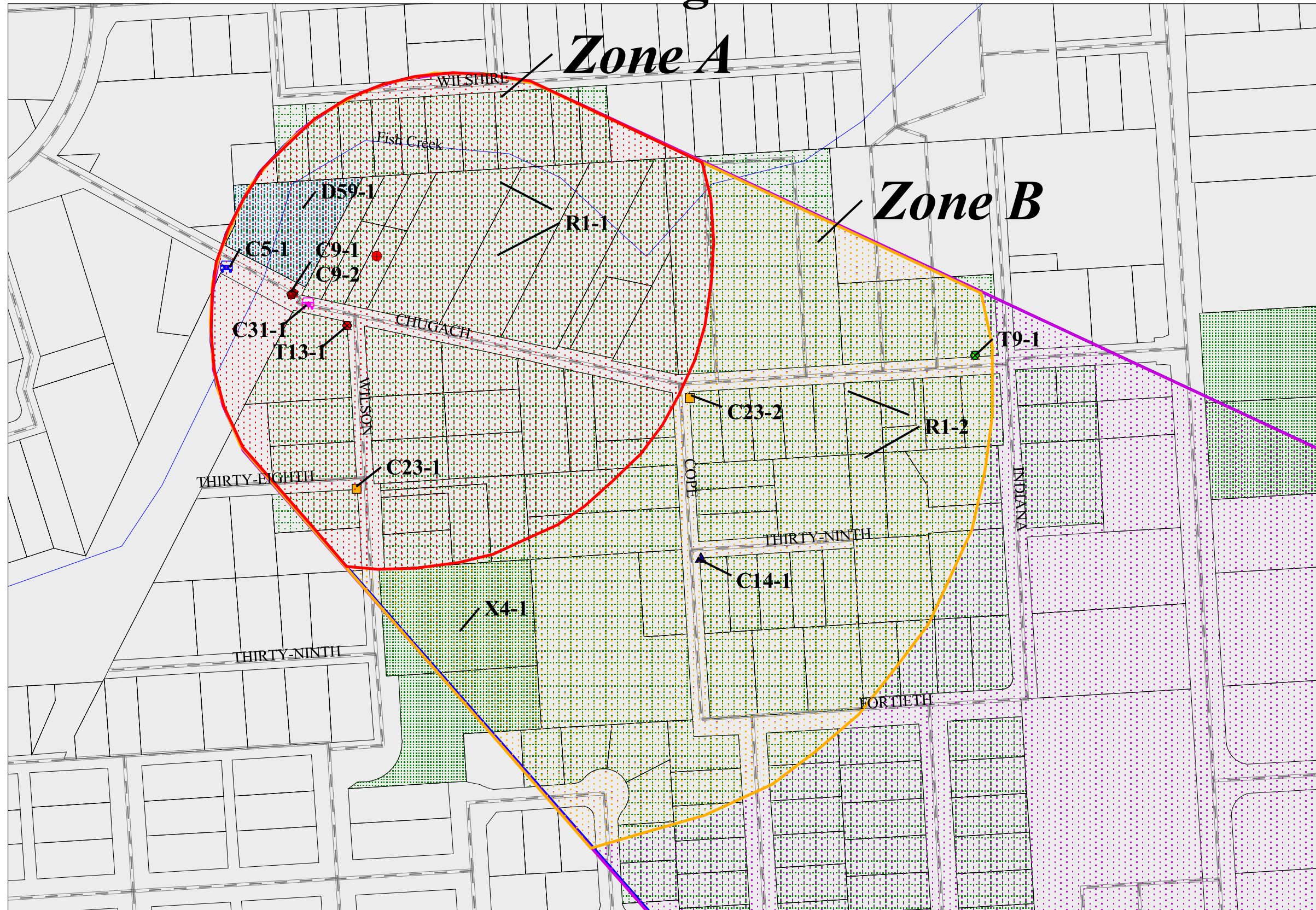


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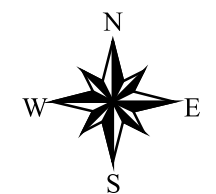
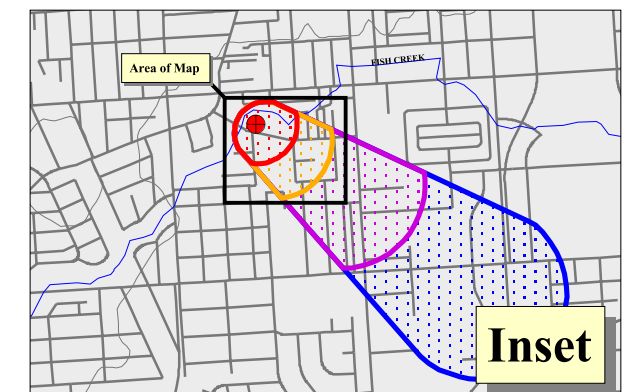
Map 2

Drinking Water Protection Area for Estell Subdivision with Potential and Existing Sources of Contamination



Legend

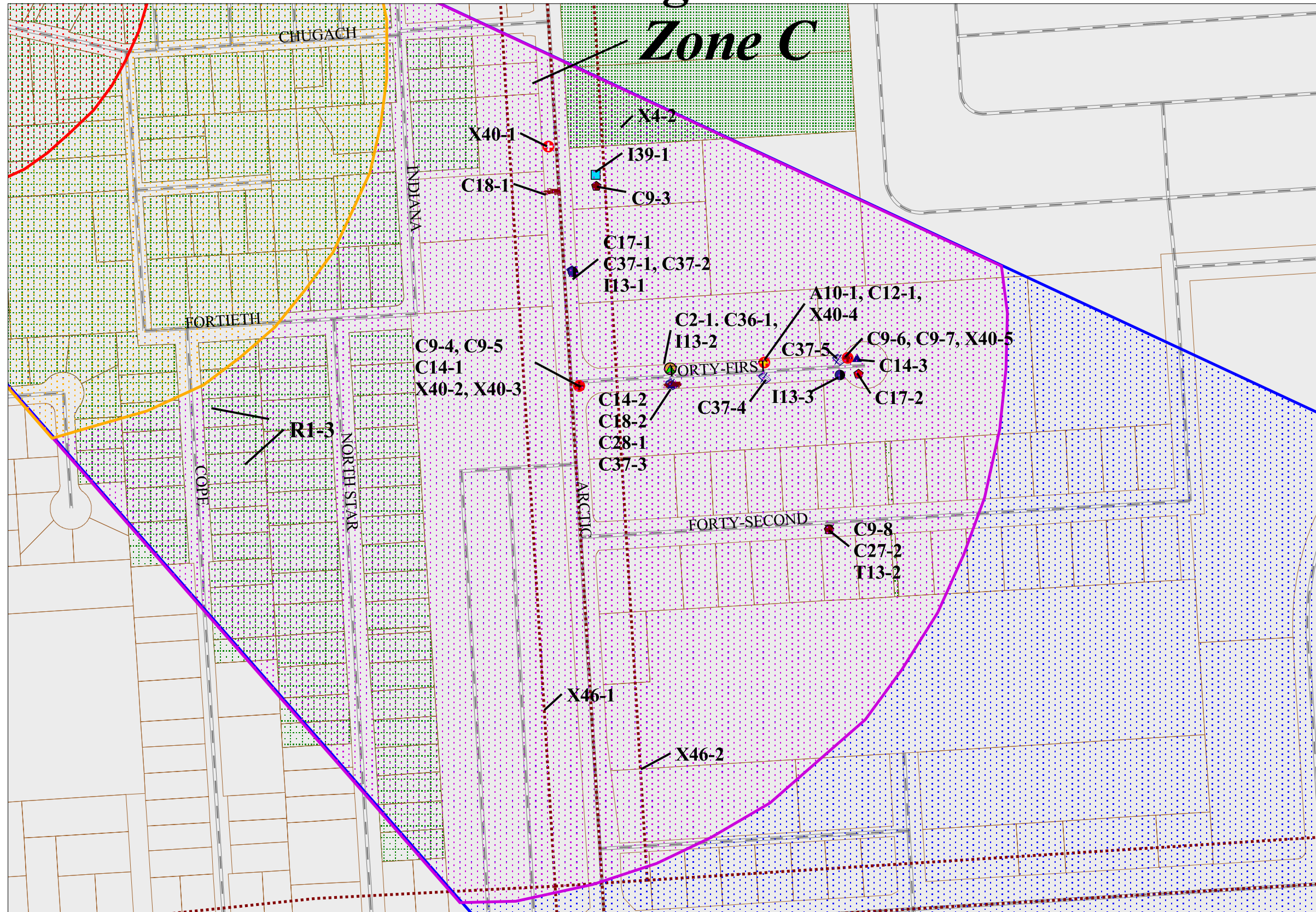
- Estell S/D Well
- Zone A Protection Area
- ▭ Several Months Travel Time
- Zone B Protection Area
- ▭ Less Than 2 Years Travel Time
- Zone C Protection Area
- ▭ Less Than 5 Years Travel Time
- Zone D Protection Area
- ▭ Less Than 10 Years Travel Time
- Contaminant Sources
- ▲ Furniture manufacturing, repair, refinishing (C14)
- Lawn and garden supplies/service (C23)
- Motor vehicle repair shop (C31)
- Body shops (automotive) (C5)
- Construction trade areas (C9)
- Closed tanks, gasoline (underground) (T13)
- Closed tanks, diesel (underground) (T9)
- ▭ Roads
- ▭ Streams
- ▭ MOA Land Parcels
- ▭ Scrap, salvage, and junk yards (D59)
- ▭ Lawns and gardens (R1)
- ▭ Parks (X4)



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Map 3

Drinking Water Protection Area for Estell Subdivision with Potential and Existing Sources of Contamination

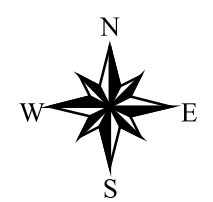
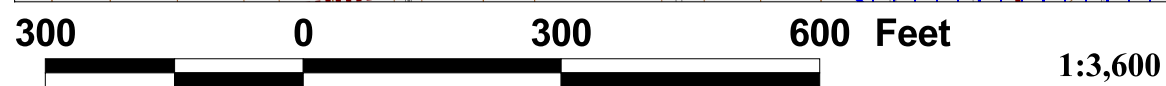
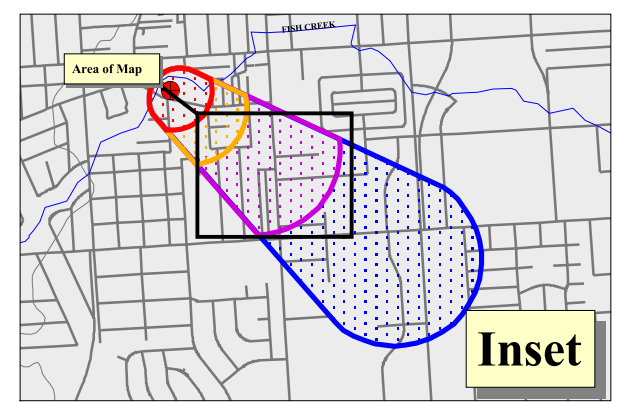


Legend

- 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

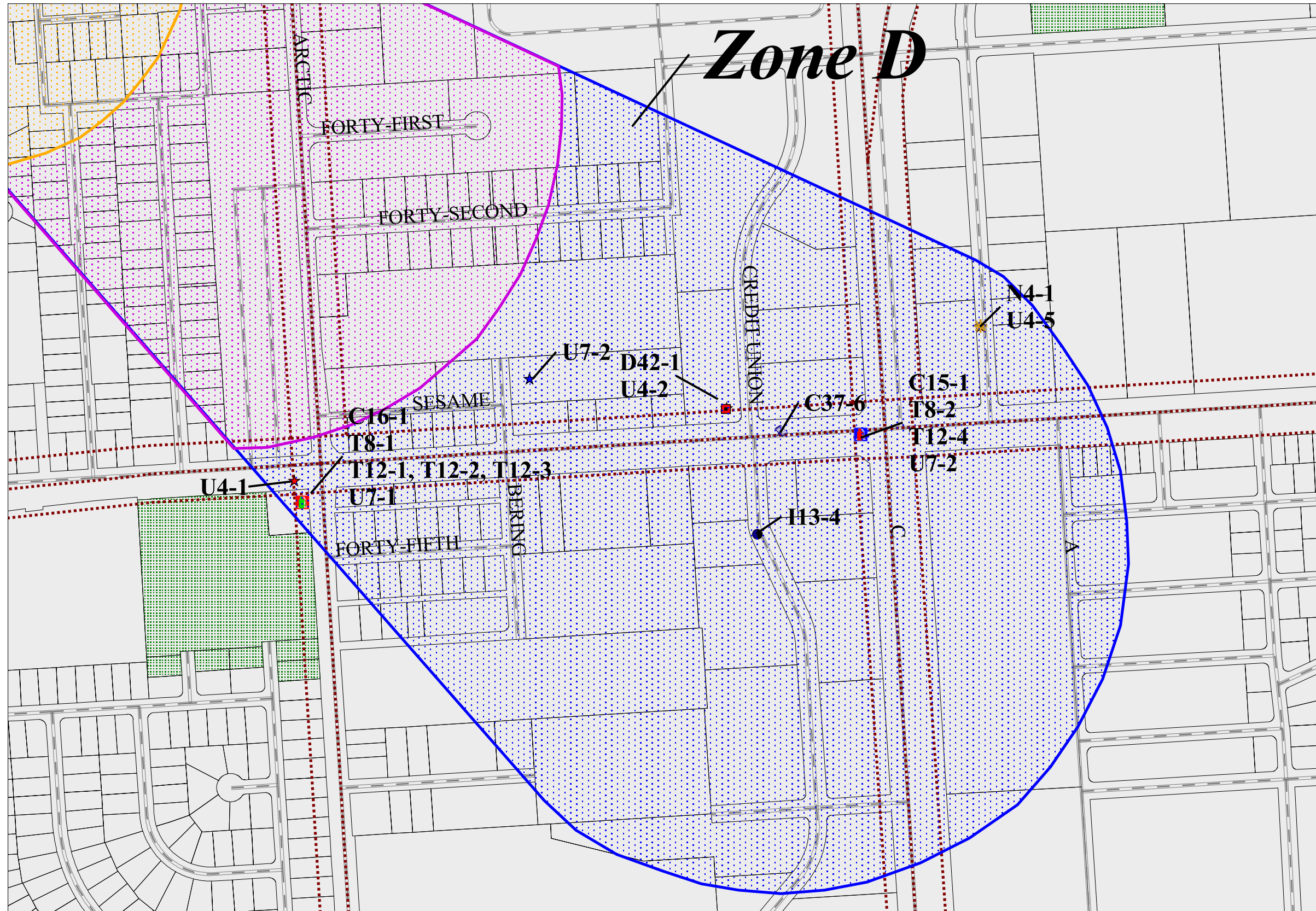
Contaminant Sources

- Orchards or nurseries (A10)
- Florists (C12)
- Furniture manufacturing, repair, refinancing (C14)
- Hardware stores (C17)
- Heavy equipment rental/storage (C18)
- Agricultural chemical sales/storage (C2)
- Motor vehicle supplies store (C28)
- Photography supplies/photo processing (C36)
- Printers, publishers, copiers (C37)
- Construction trade areas (C9)
- Electrical/electronic/computer component manufacturing (I13)
- Asphalt and tar processing (I3)
- Sign manufacturing (I39)
- Closed tanks, gasoline (underground) (T13)
- Medical/veterinary facilities (X40)
- Trails (X46)
- Roads
- MOA Land Parcels
- Lawns and gardens (R1)
- Parks (X4)



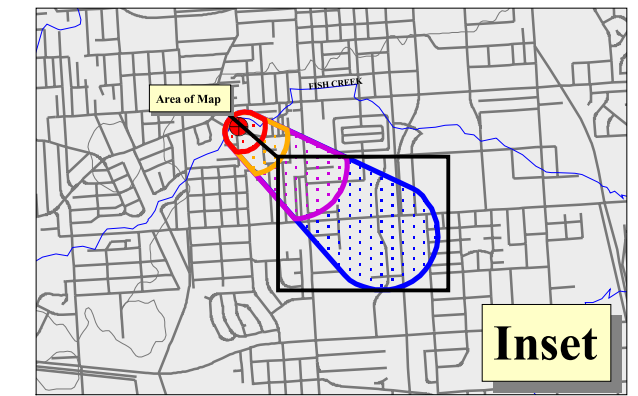
Map 4

Drinking Water Protection Area for Estell Subdivision with Potential and Existing Sources of Contamination

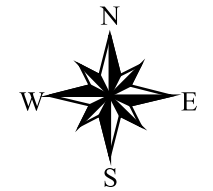


Legend

- 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
- Contaminant Sources
- Gasoline stations (without repair shop) (C15)
- Gasoline stations (with repair shop) (C16)
- Printers, publishers, copiers (C37)
- Injection wells (Class V) Motor vehicle waste (D42)
- Electrical/electronic/computer component manufacturing (I13)
- Lumber processing and preservation (N4)
- Tanks, gasoline (underground) (T12)
- Tanks, diesel (underground) (T8)
- Contaminated site, DEC recognized (U4)
- Leaking Underground Storage Tanks (U7)
- Trails (X46)
- Roads
- MOA Land Parcels
- Parks (X4)



1:6,000

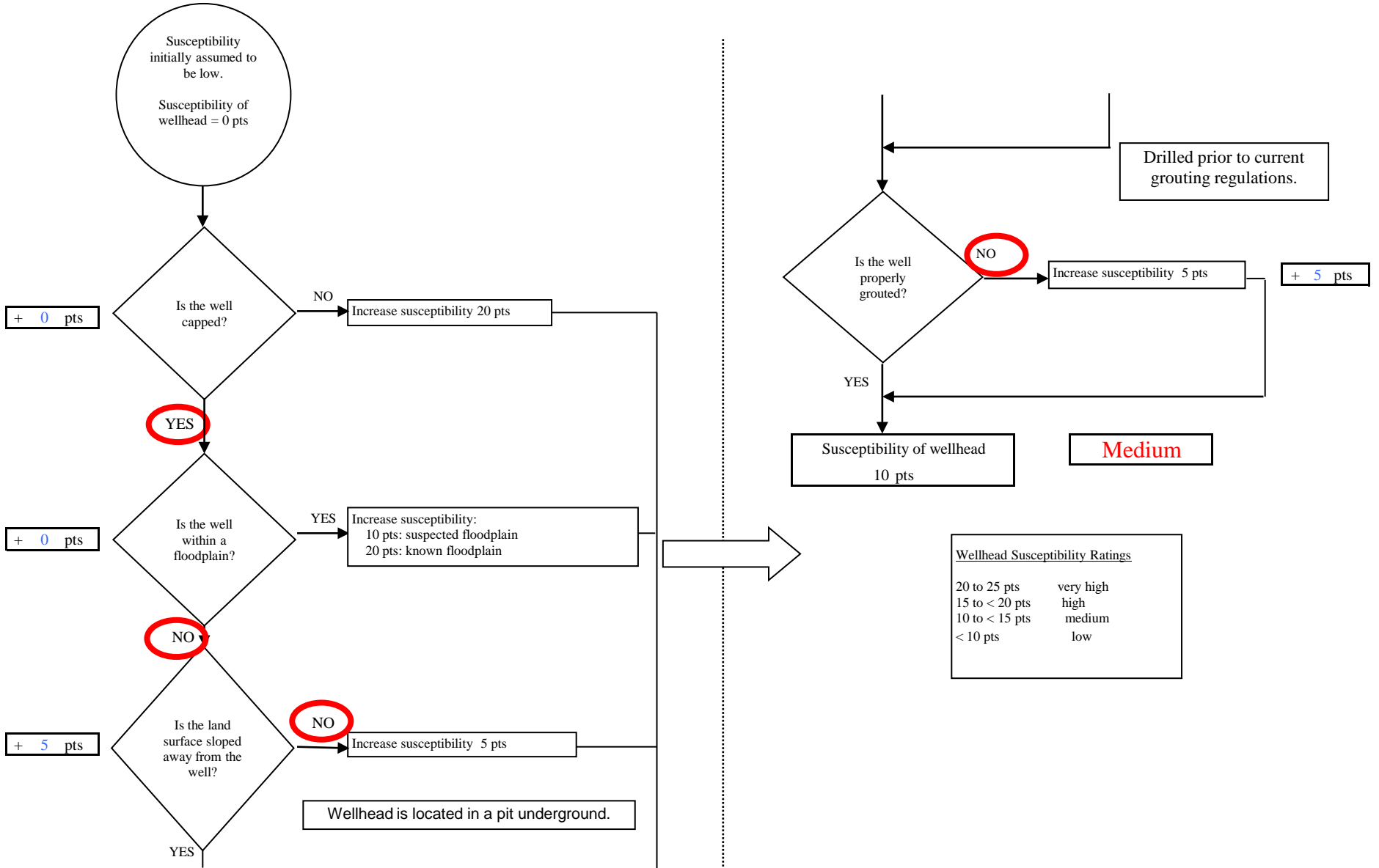


Map 5

APPENDIX D

Vulnerability Analysis for Estell Subdivision (Charts 1-14)

Chart 1. Susceptibility of the wellhead -Estell Subdivision



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 -Estell Subdivision

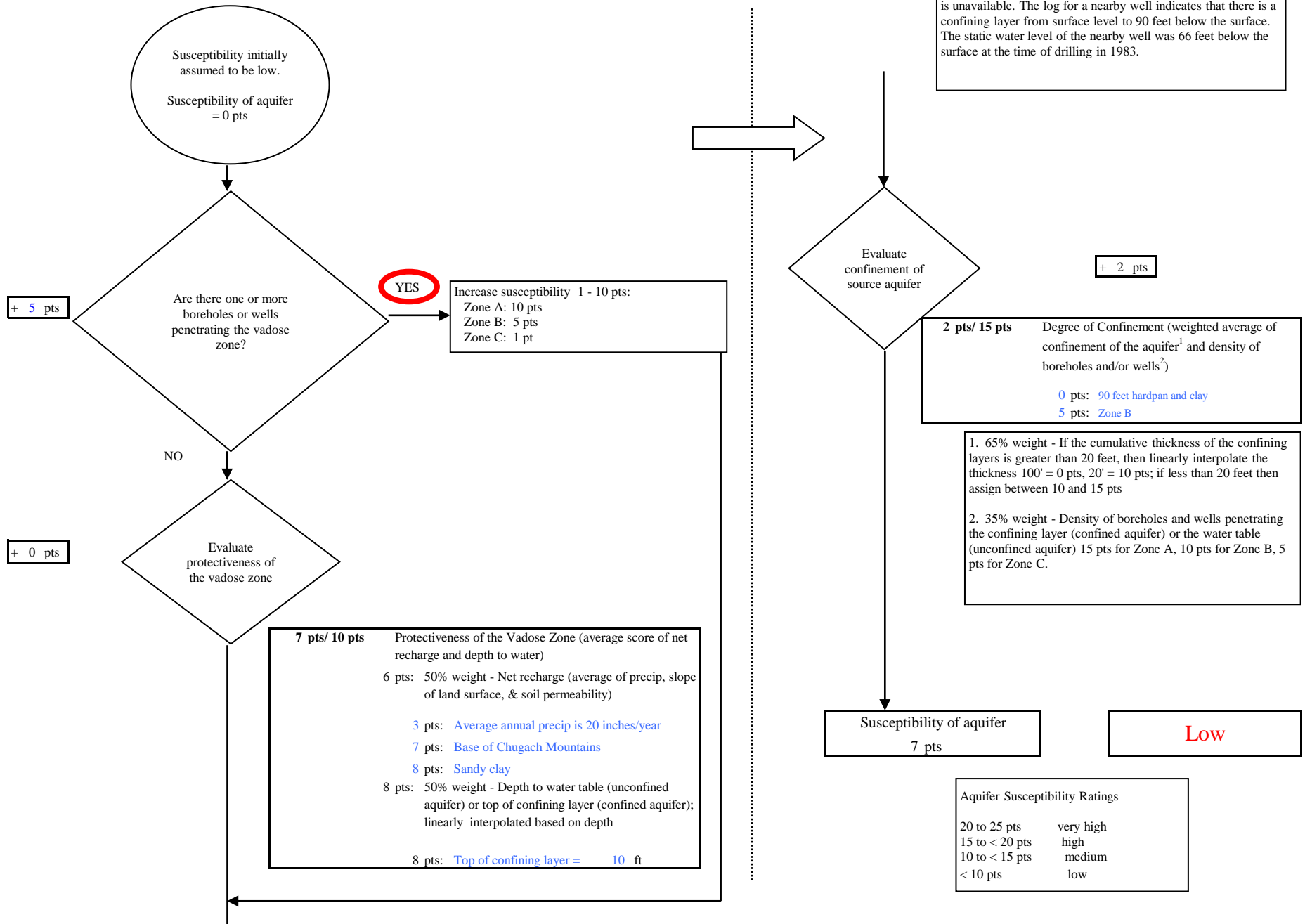
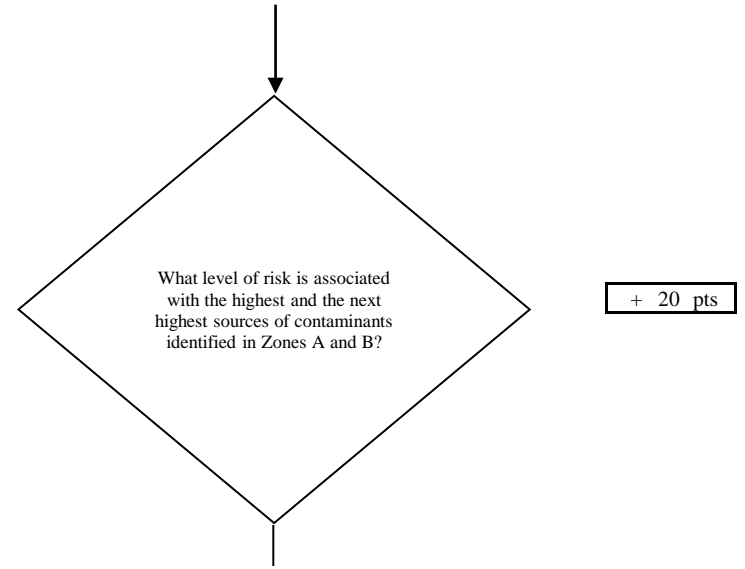
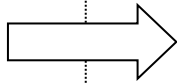
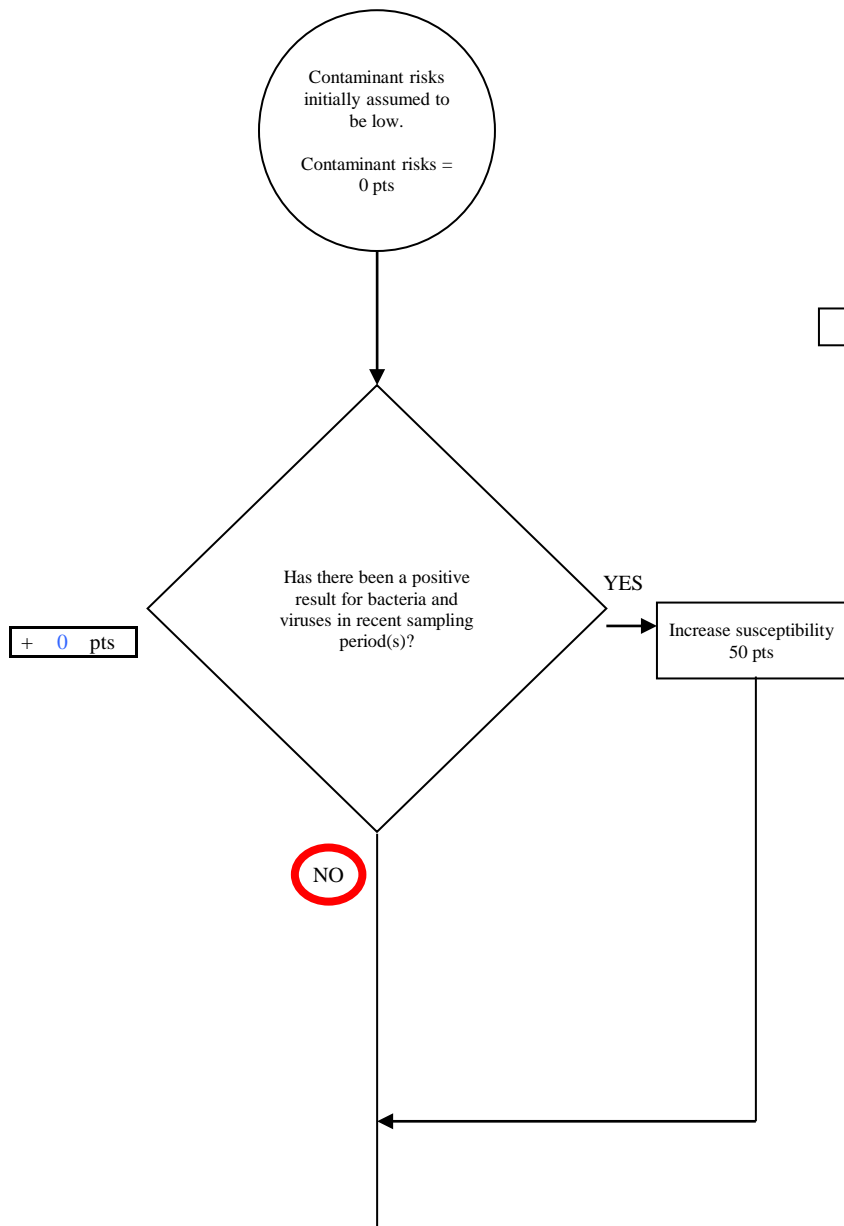


Chart 3. Contaminant risks for Estell Subdivision- Bacteria & Viruses



Risk Rankings for Contaminant Sources Identified in Zones A and B

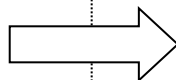
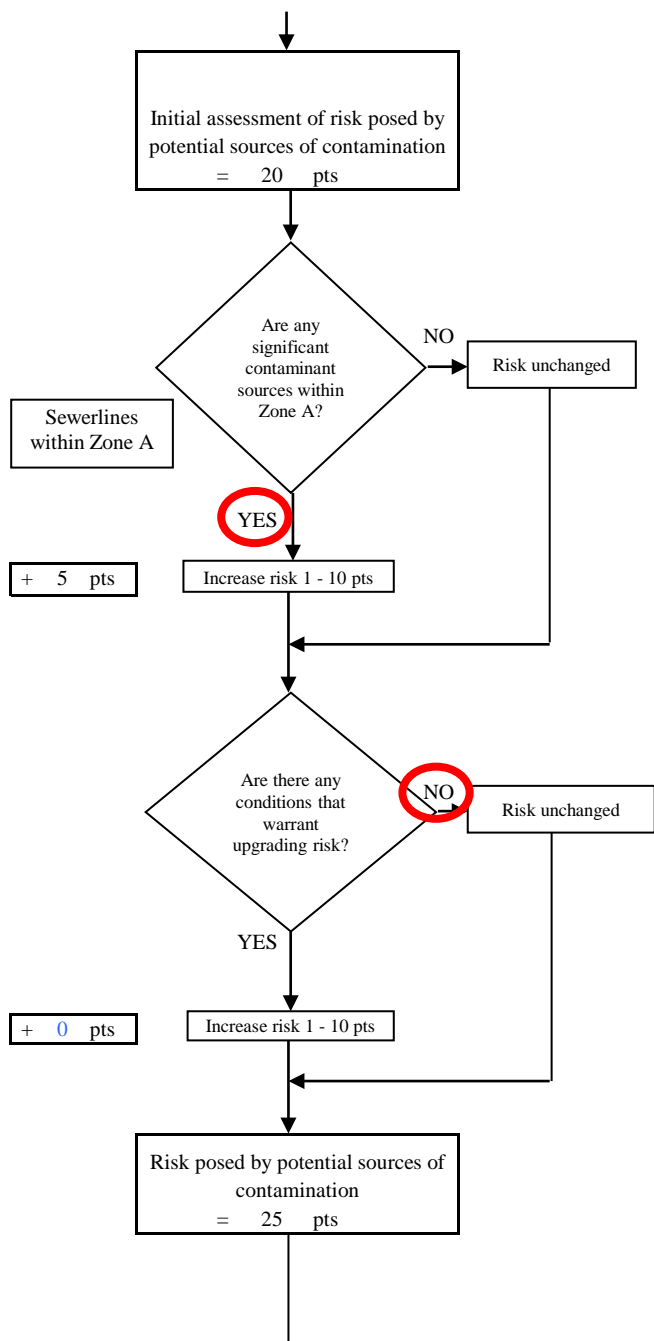
	Zone A	Zone B	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	1	1	2
Low(s)	2	2	4

	LOW	MEDIUM	HIGH	VERY HIGH
LOW	≥ 10 sources	≥ 10 sources	≥ 20 sources	----
MEDIUM	----	≥ 2 sources	≥ 5 sources	≥ 10 sources
HIGH	----	----	≥ 1 source	≥ 2 sources
VERY HIGH	----	----	----	≥ 1 source

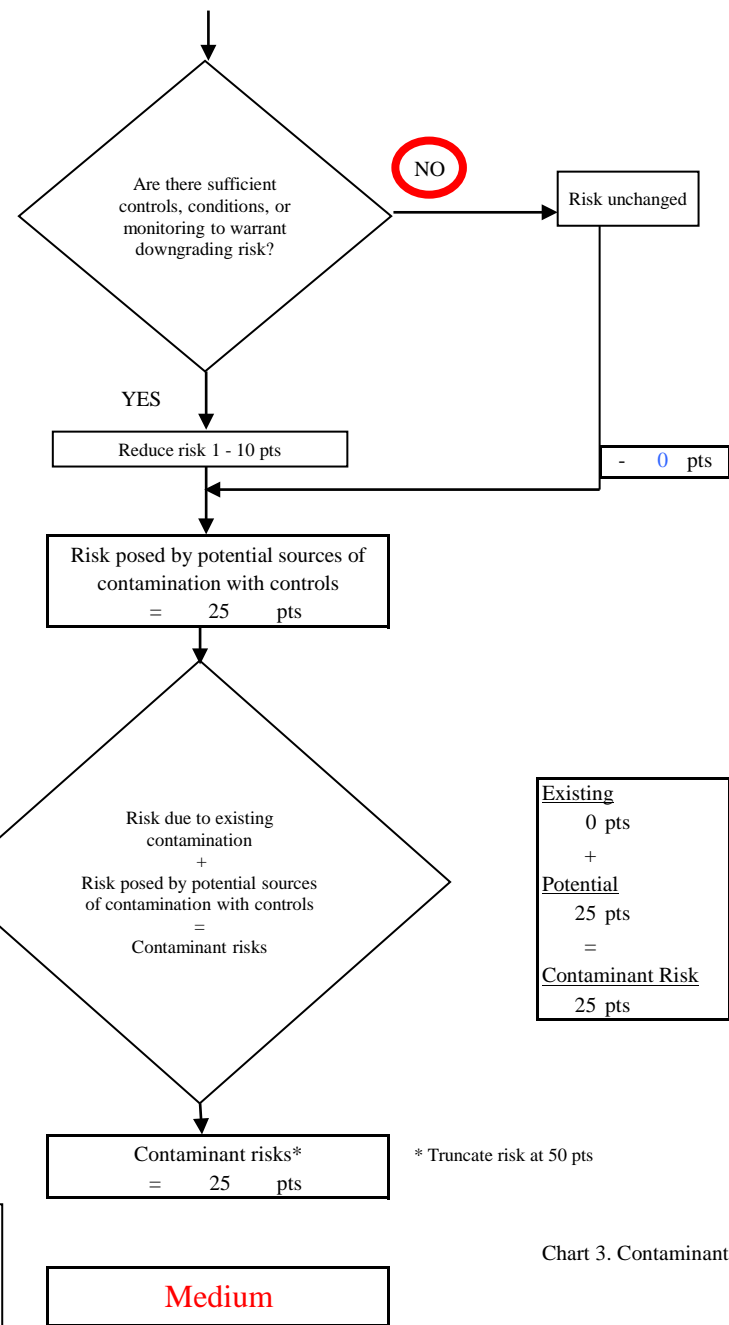
Matrix Score 20

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 Estell Subdivision- Bacteria & Viruses



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



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

Chart 3. Contaminant

Chart 4. Vulnerability analysis for Estell Subdivision- Bacteria & Viruses

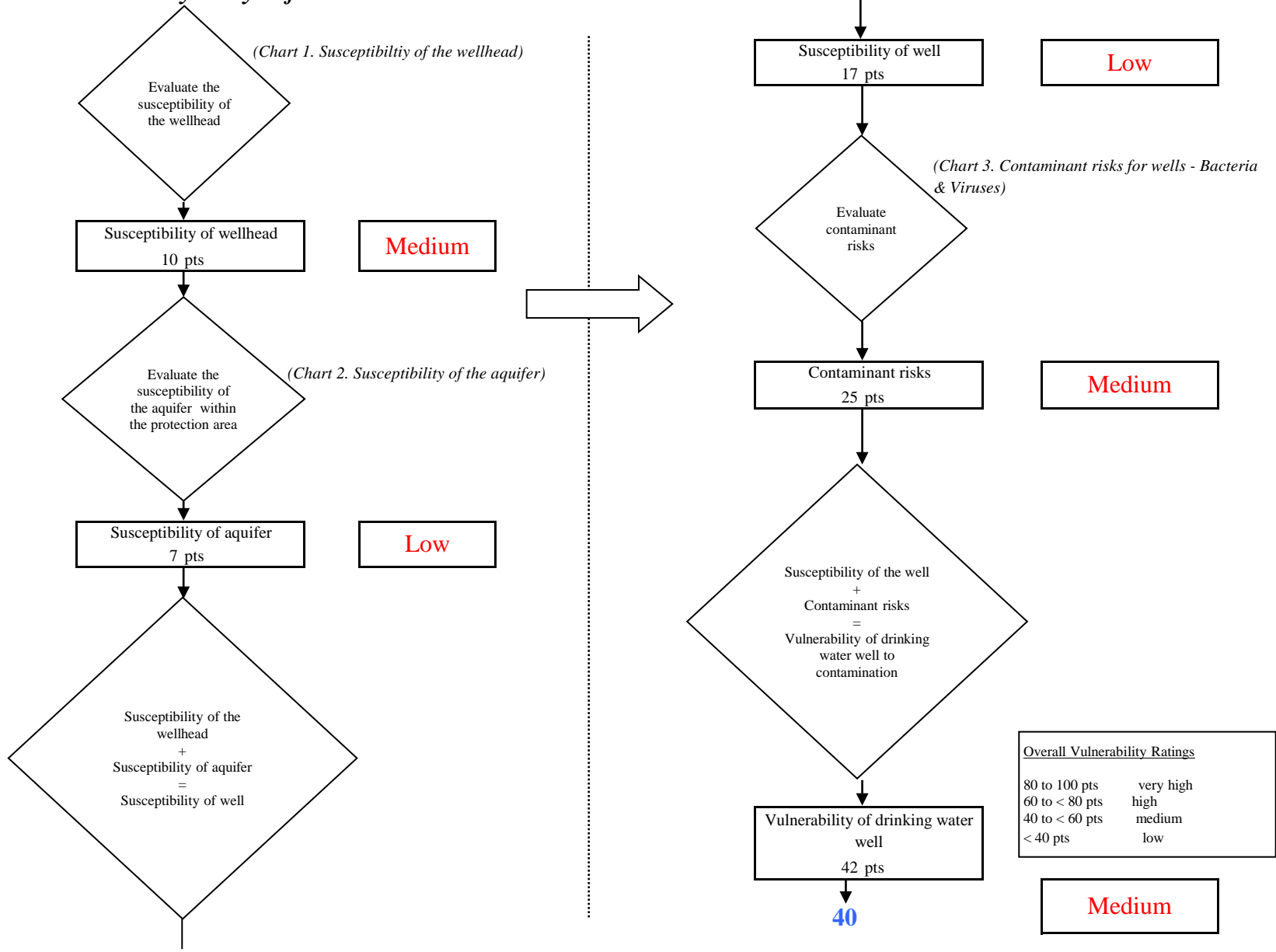


Chart 5. Contaminant risks for Estell Subdivision- Nitrates and Nitrites

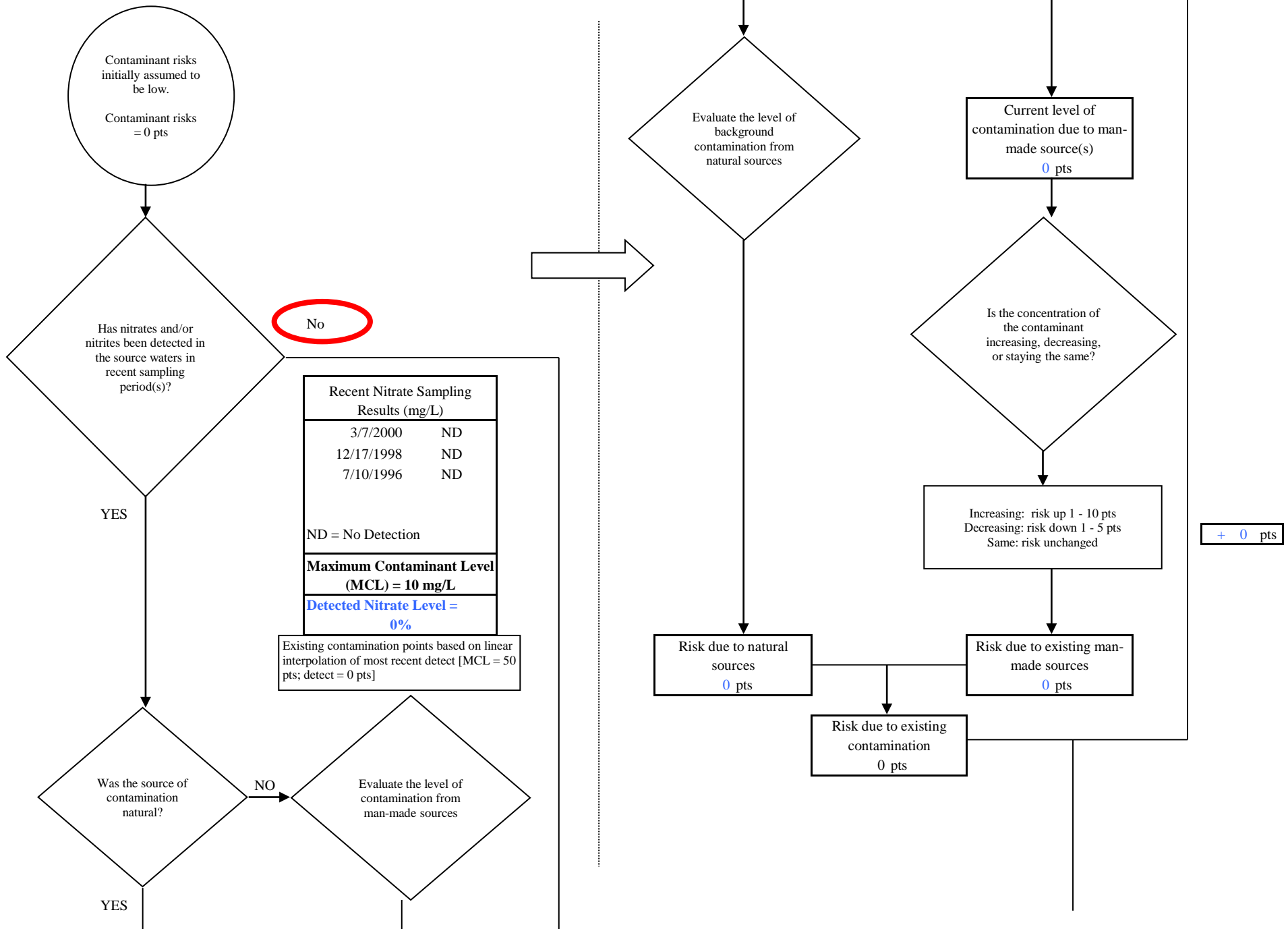


Chart 5. Contaminant risks for Estell Subdivision- Nitrates and Nitrites

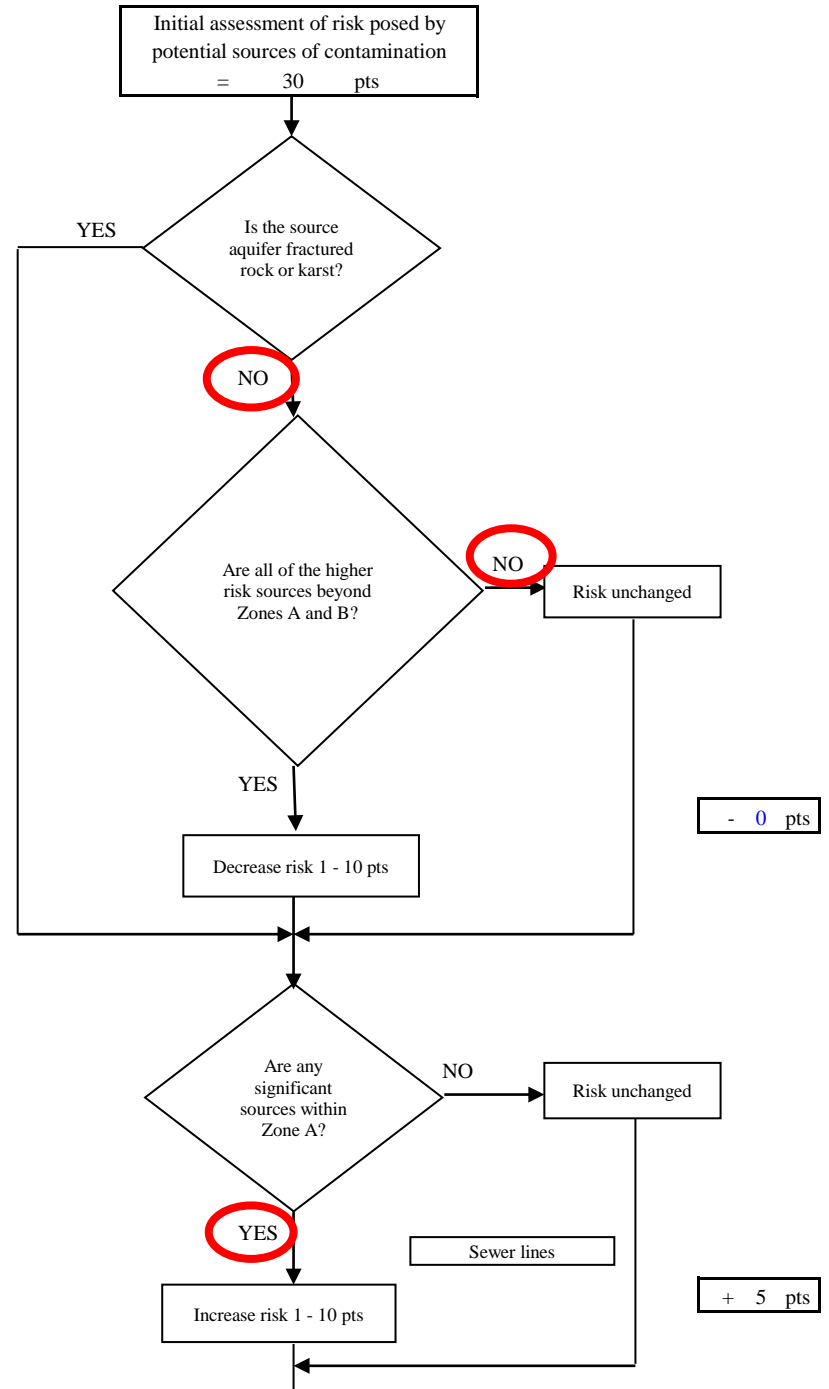
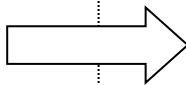
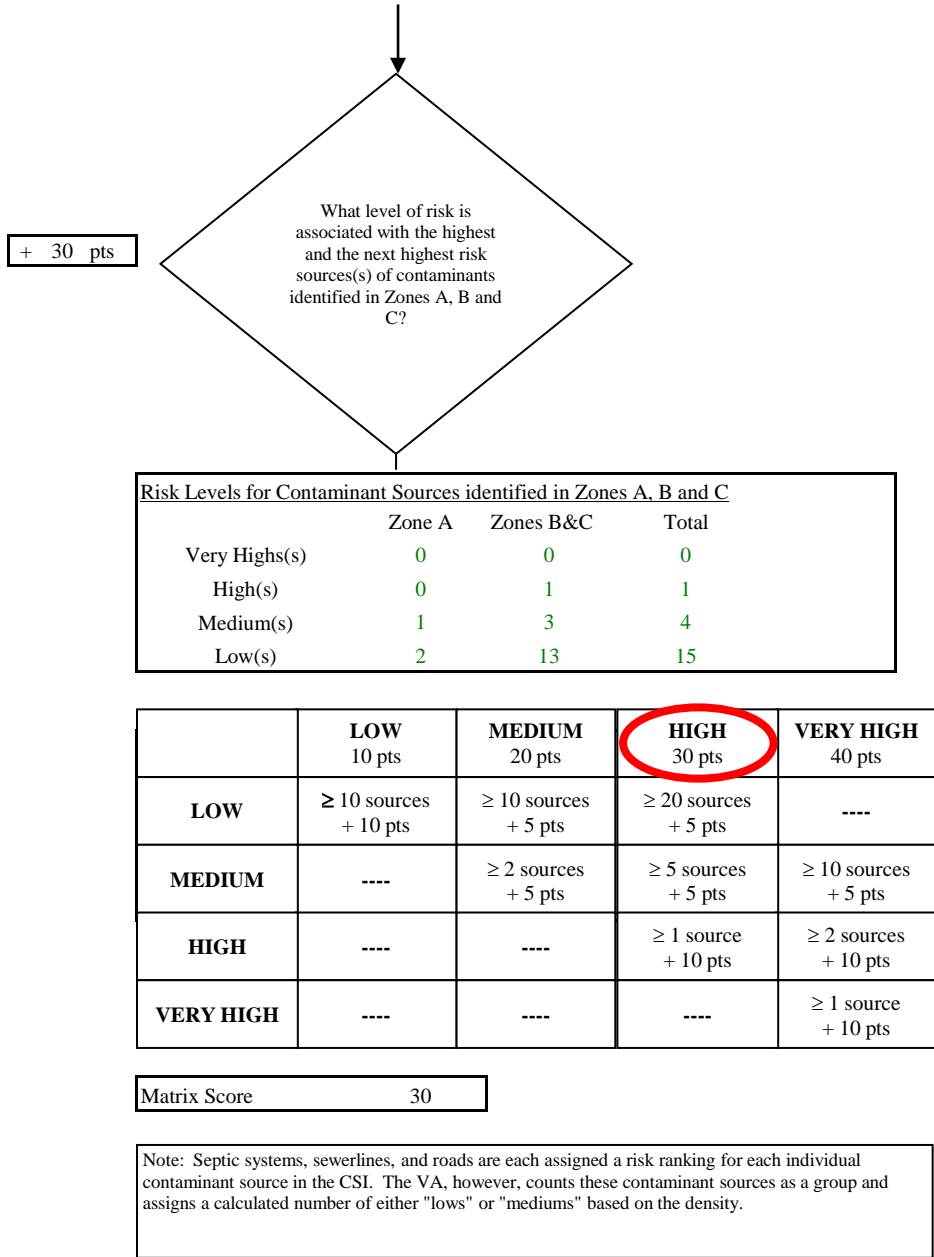


Chart 5. Contaminant risks for Estell Subdivision- Nitrates and Nitrites

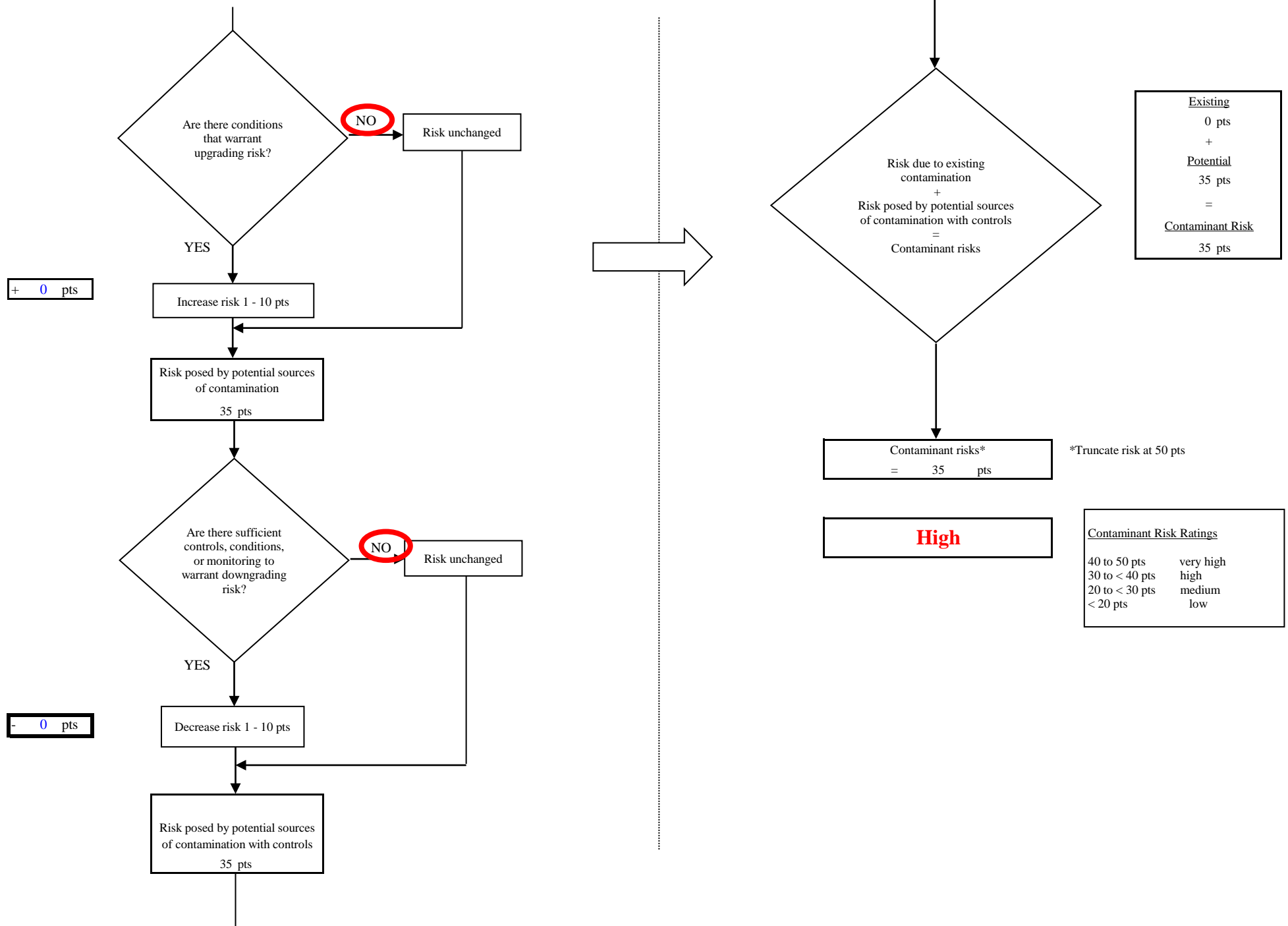


Chart 6. Vulnerability analysis for Estell Subdivision- Nitrates and Nitrites

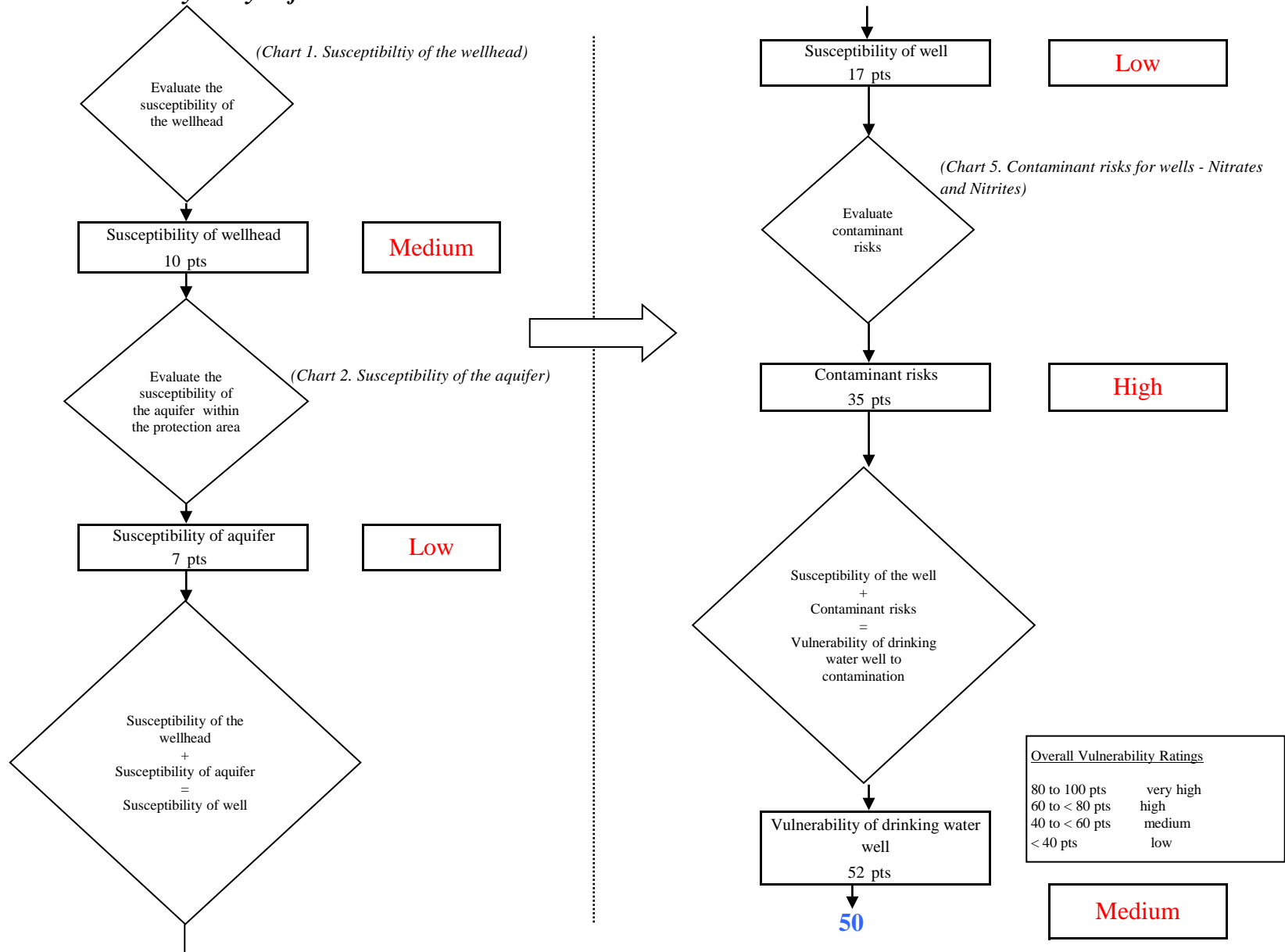


Chart 7. Contaminant risks for Estell Subdivision- Volatile Organic Chemicals

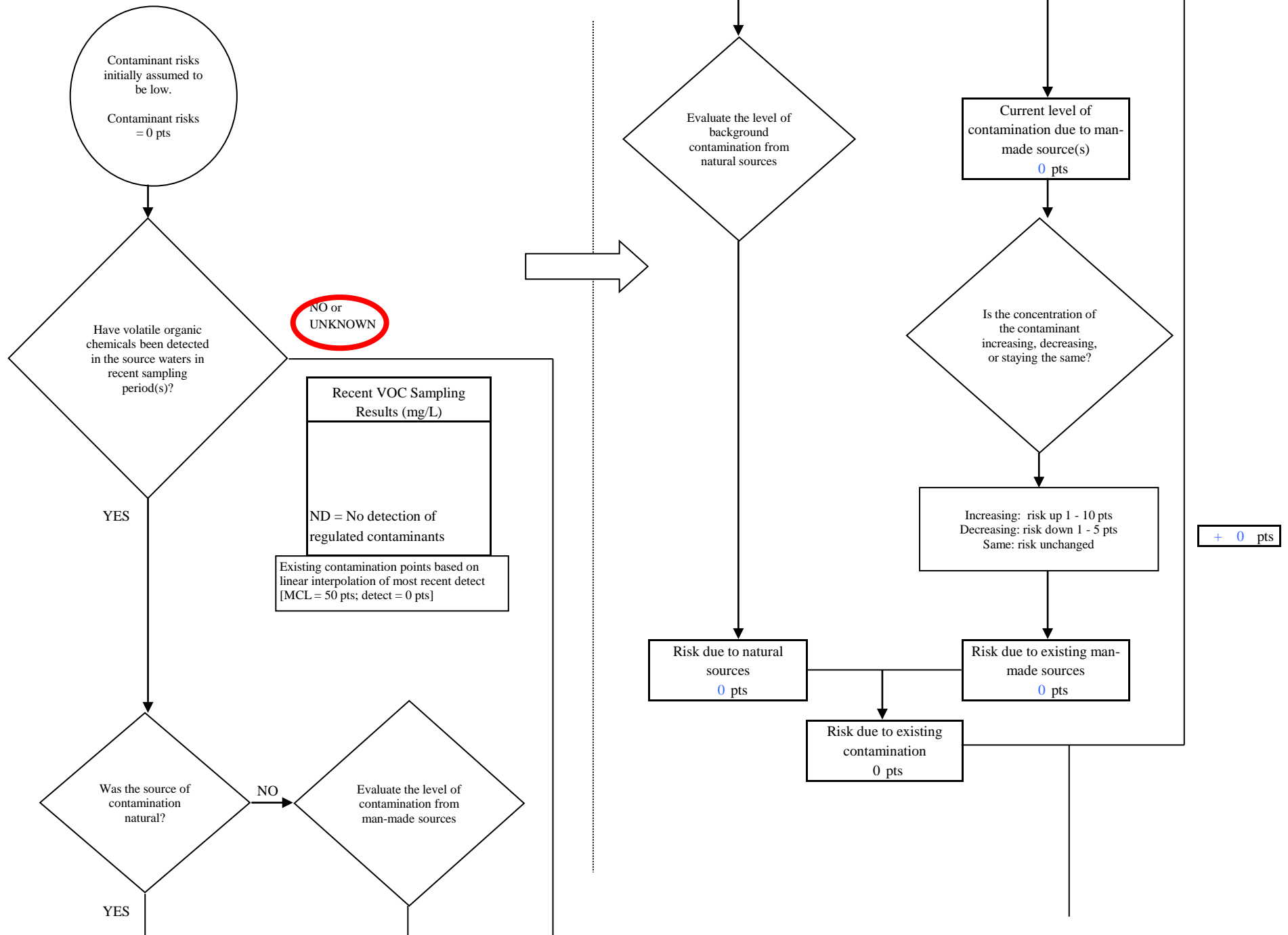


Chart 7. Contaminant risks for Estell Subdivision- Volatile Organic Chemicals

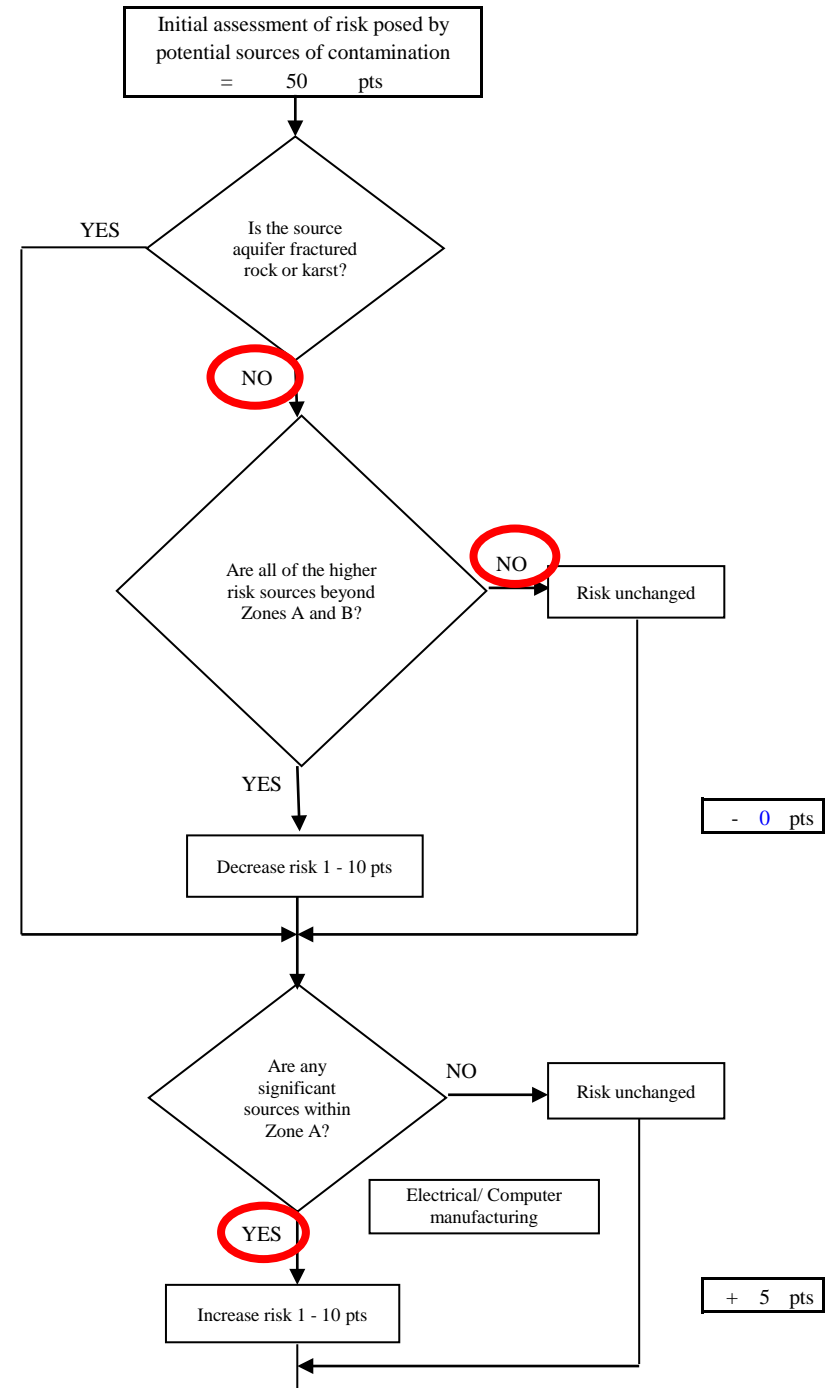
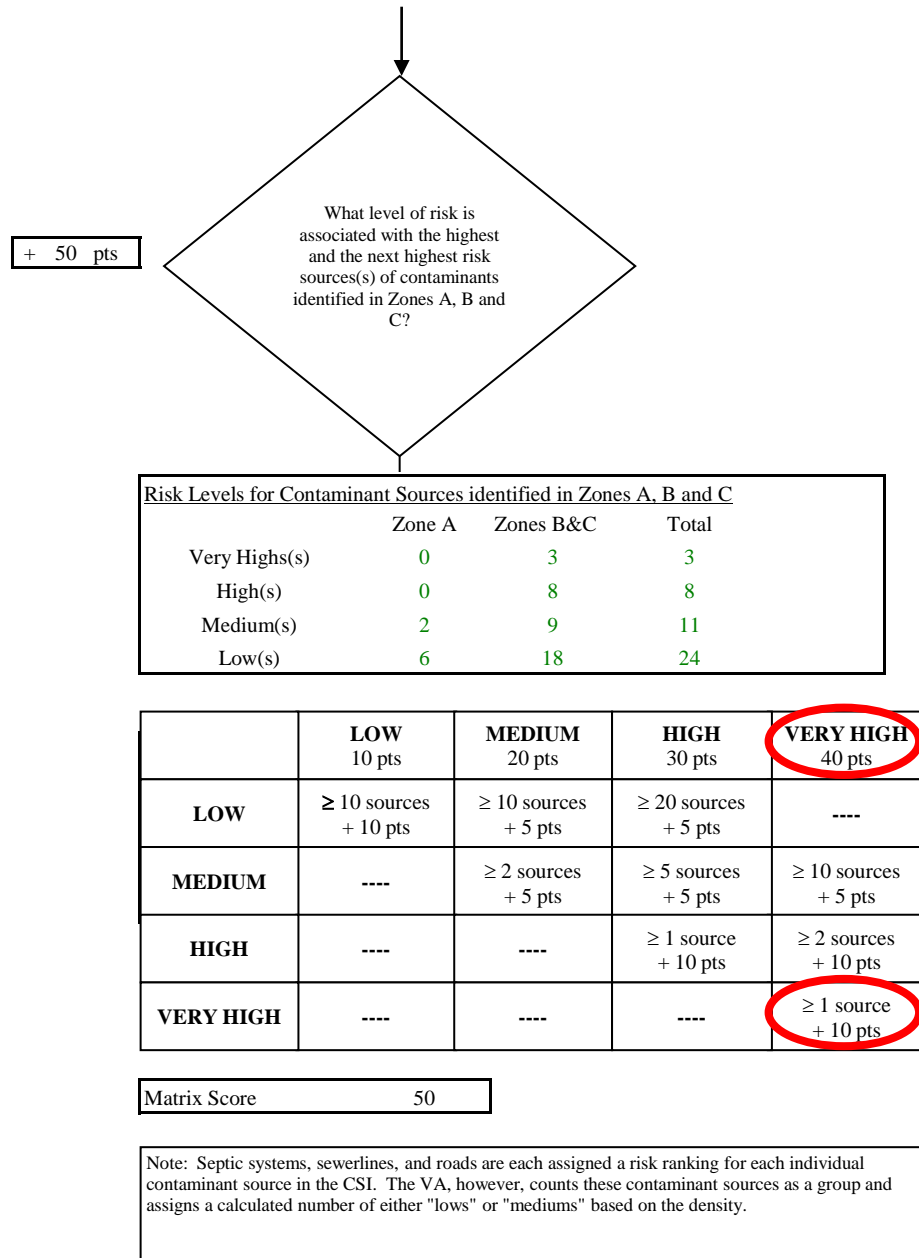
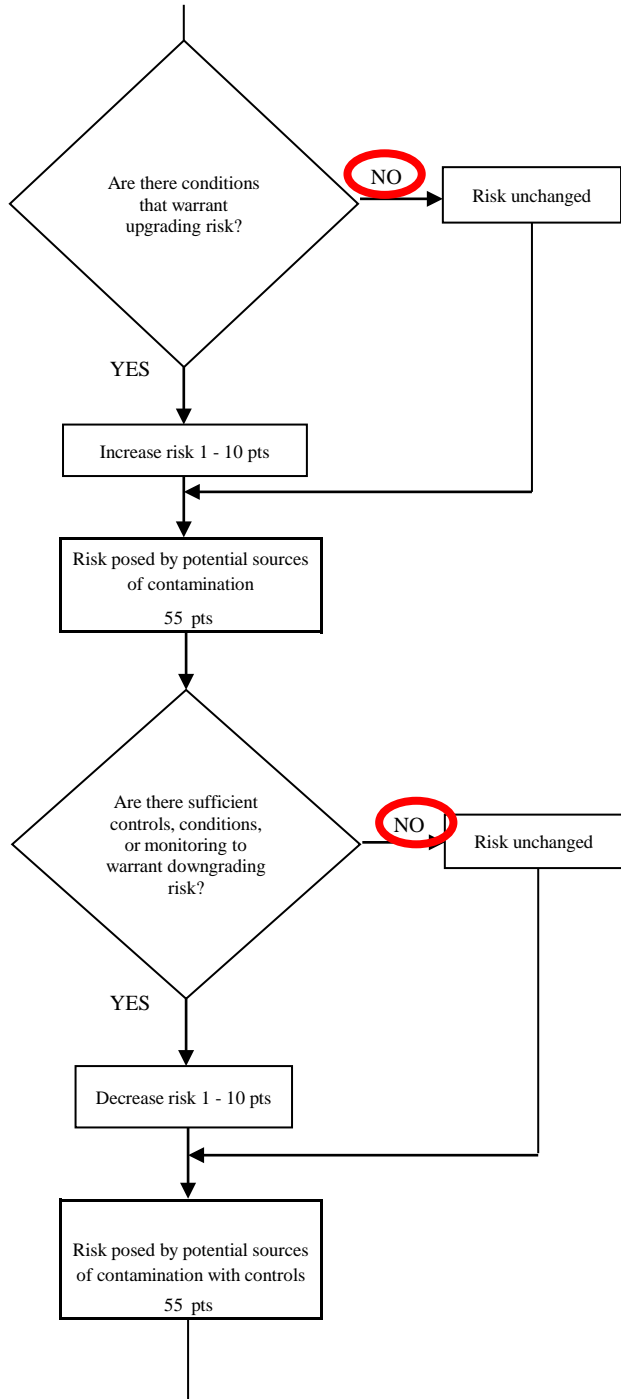


Chart 7. Contaminant risks for Estell Subdivision- Volatile Organic Chemicals

+ 0 pts



- 0 pts

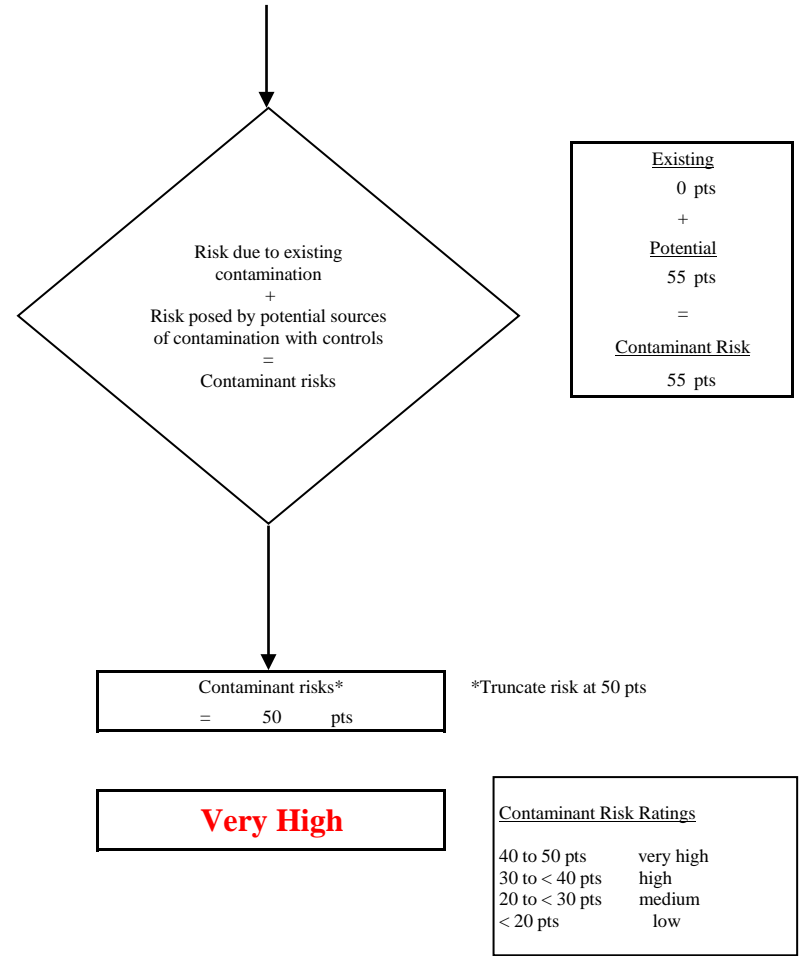
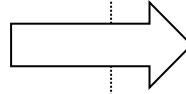


Chart 8. Vulnerability analysis for Estell Subdivision- Volatile Organic Chemicals

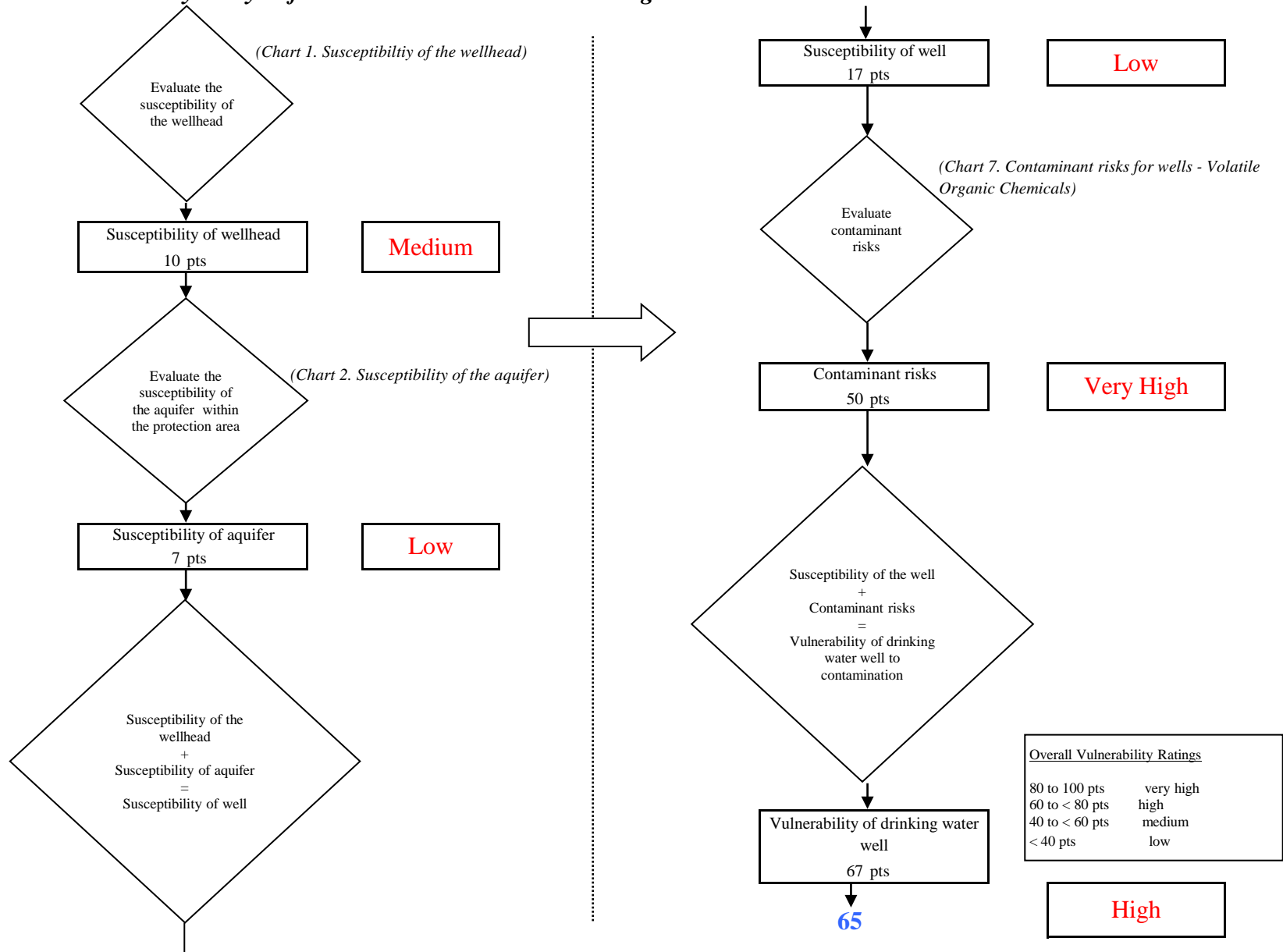


Chart 9. Contaminant risks for Estell Subdivision- Heavy Metals, Cyanide and Other Inorganic Chemicals

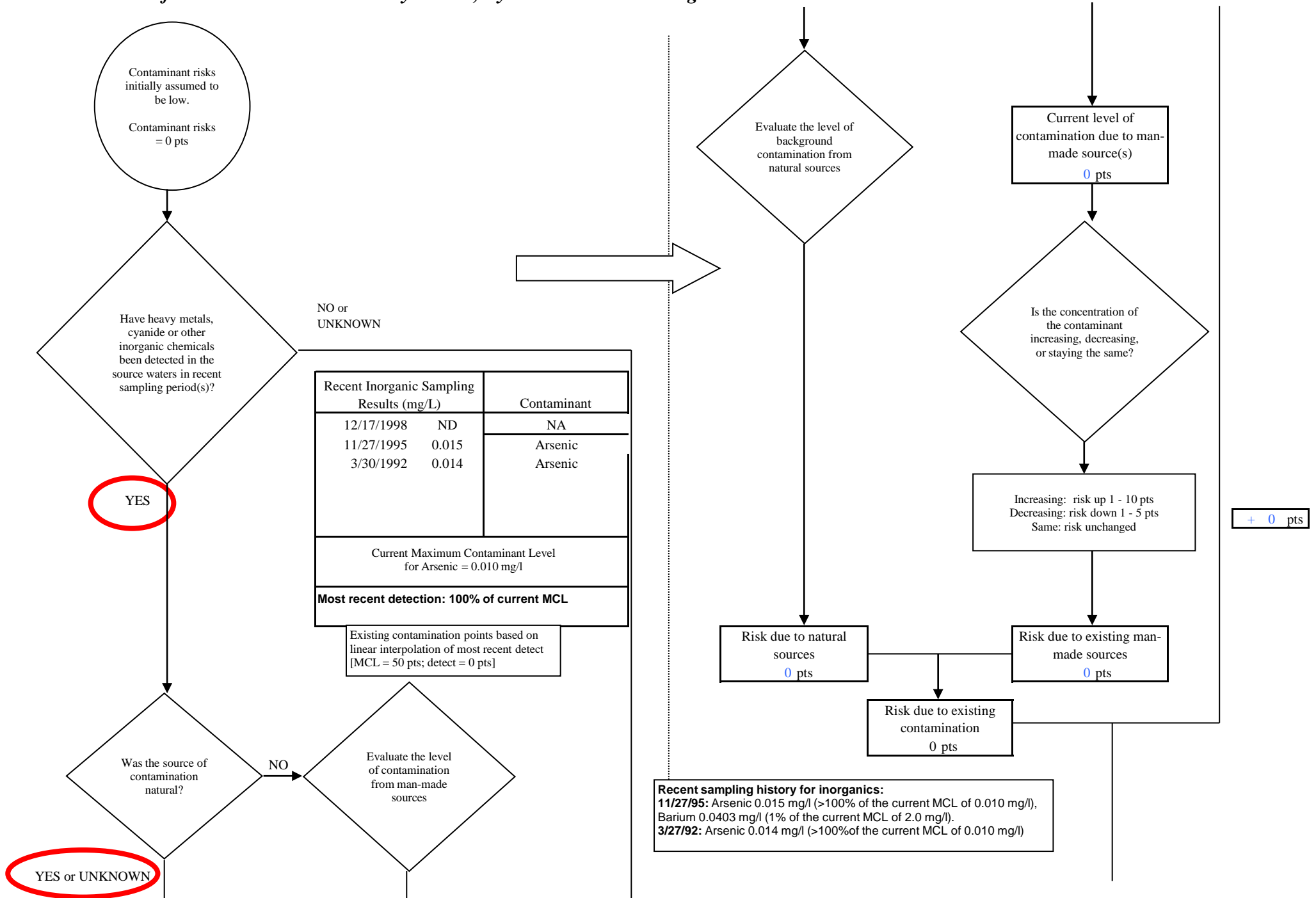


Chart 9. Contaminant risks for Estell Subdivision- Heavy Metals, Cyanide and Other Inorganic Chemicals

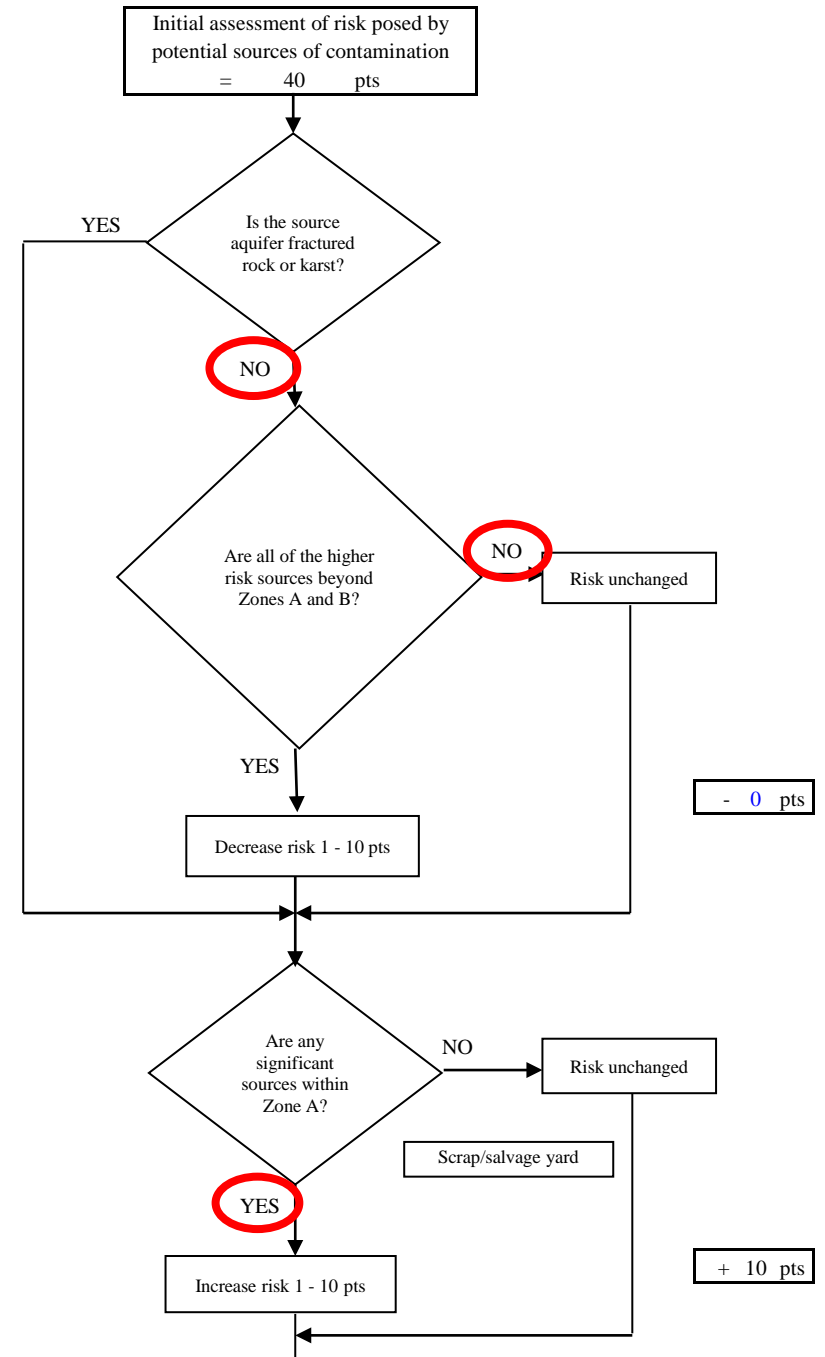
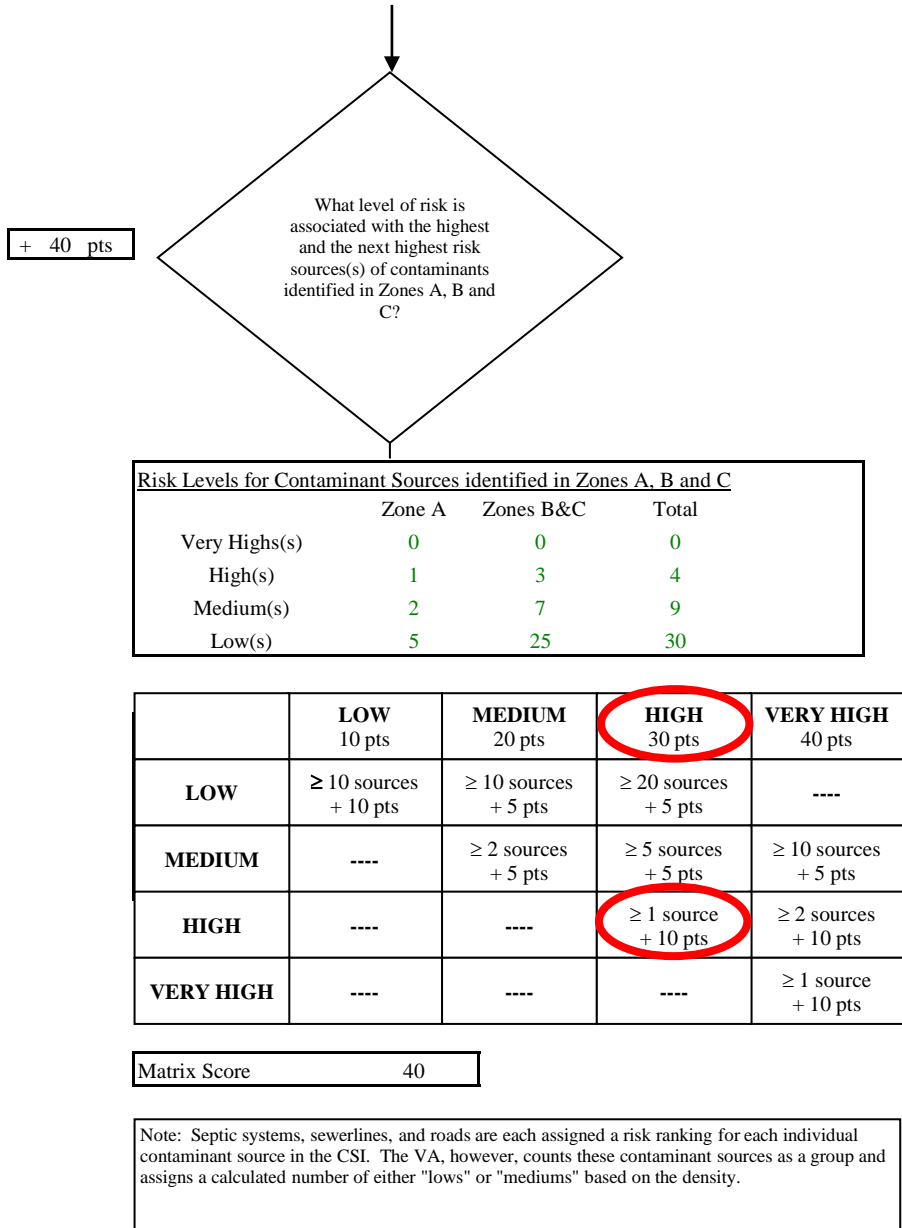


Chart 9. Contaminant risks for Estell Subdivision- Heavy Metals, Cyanide and Other Inorganic Chemicals

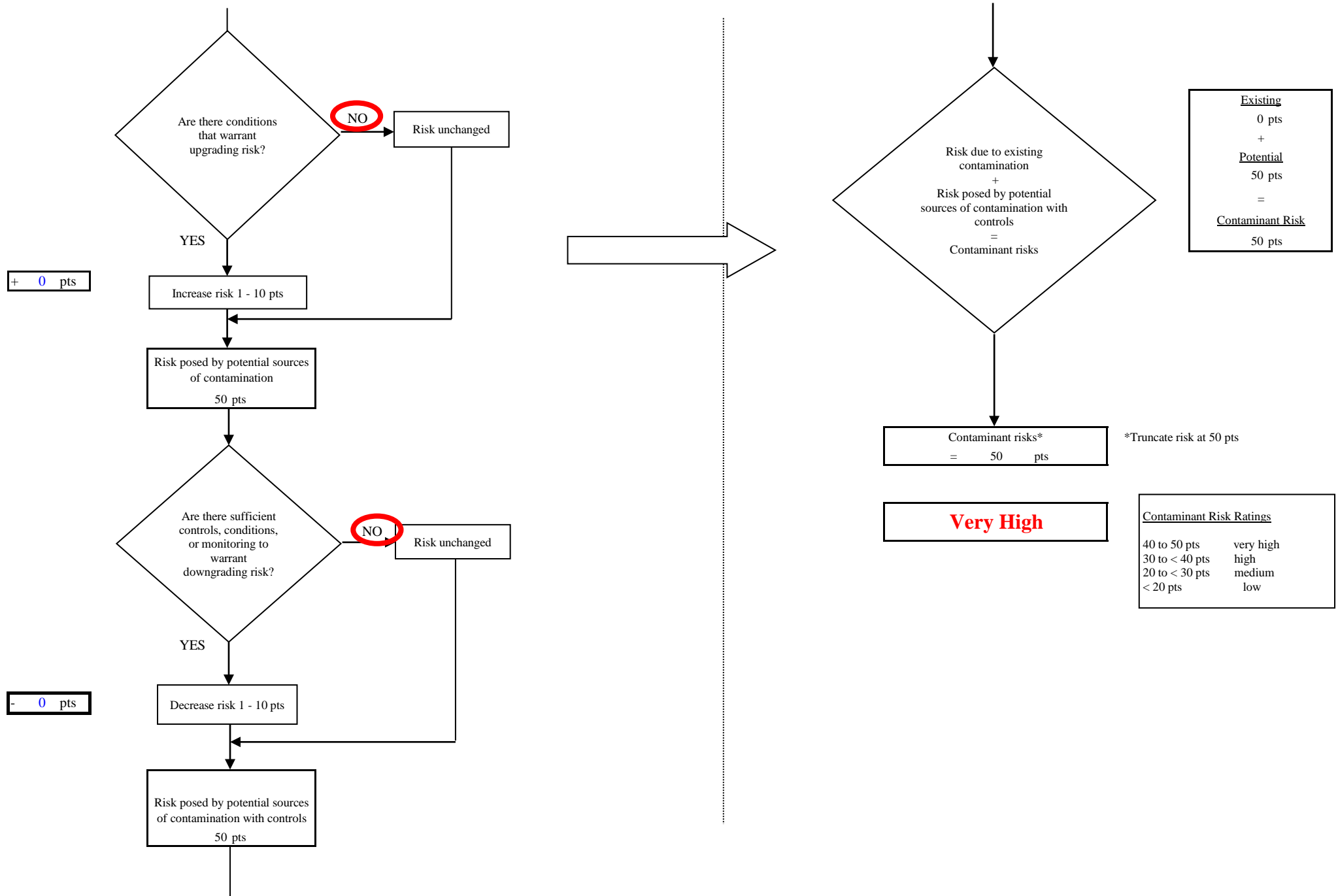


Chart 10. Vulnerability analysis for Estell Subdivision- Heavy Metals, Cyanide and Other Inorganic Chemicals

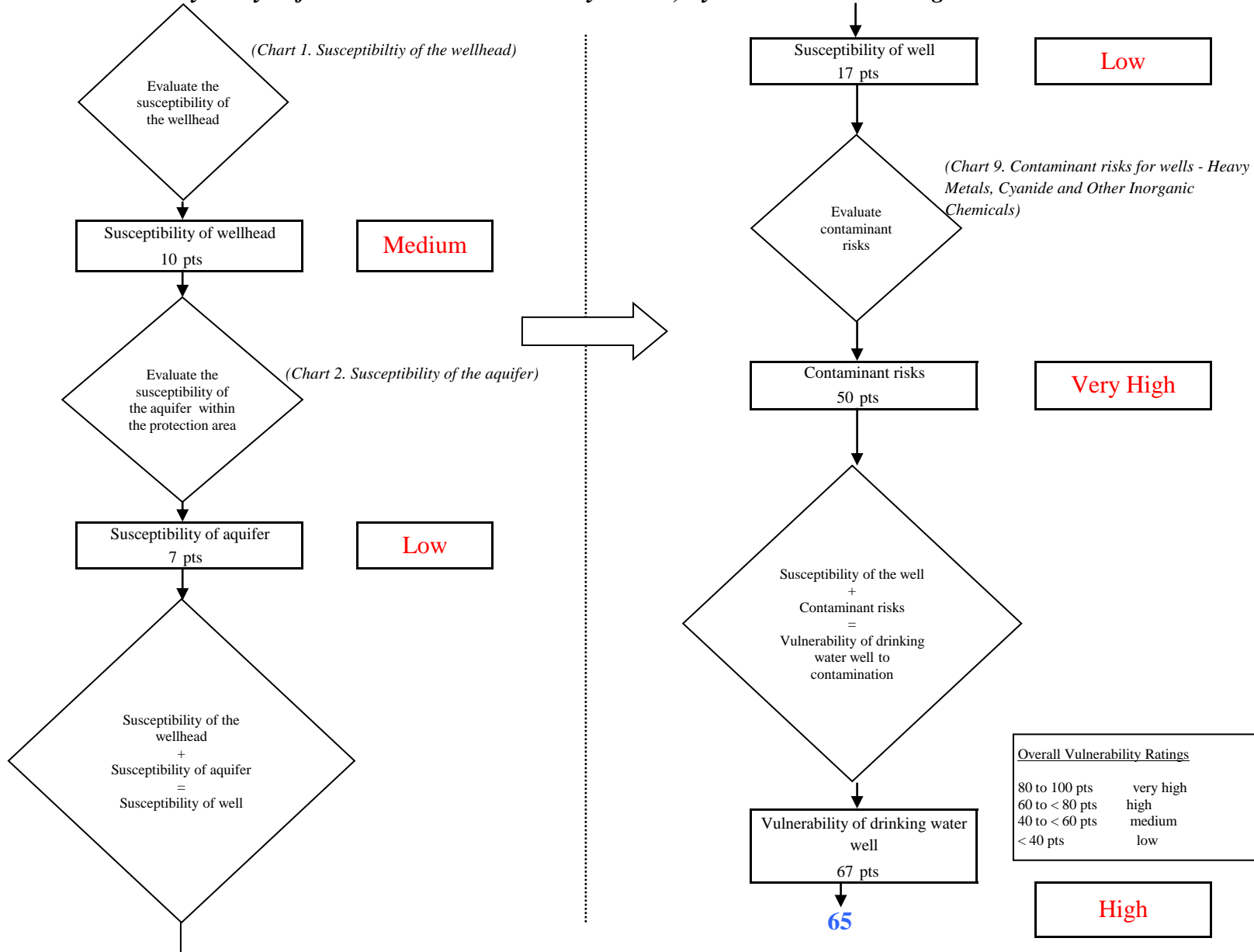


Chart 11. Contaminant risks for Estell Subdivision- Synthetic Organic Chemicals

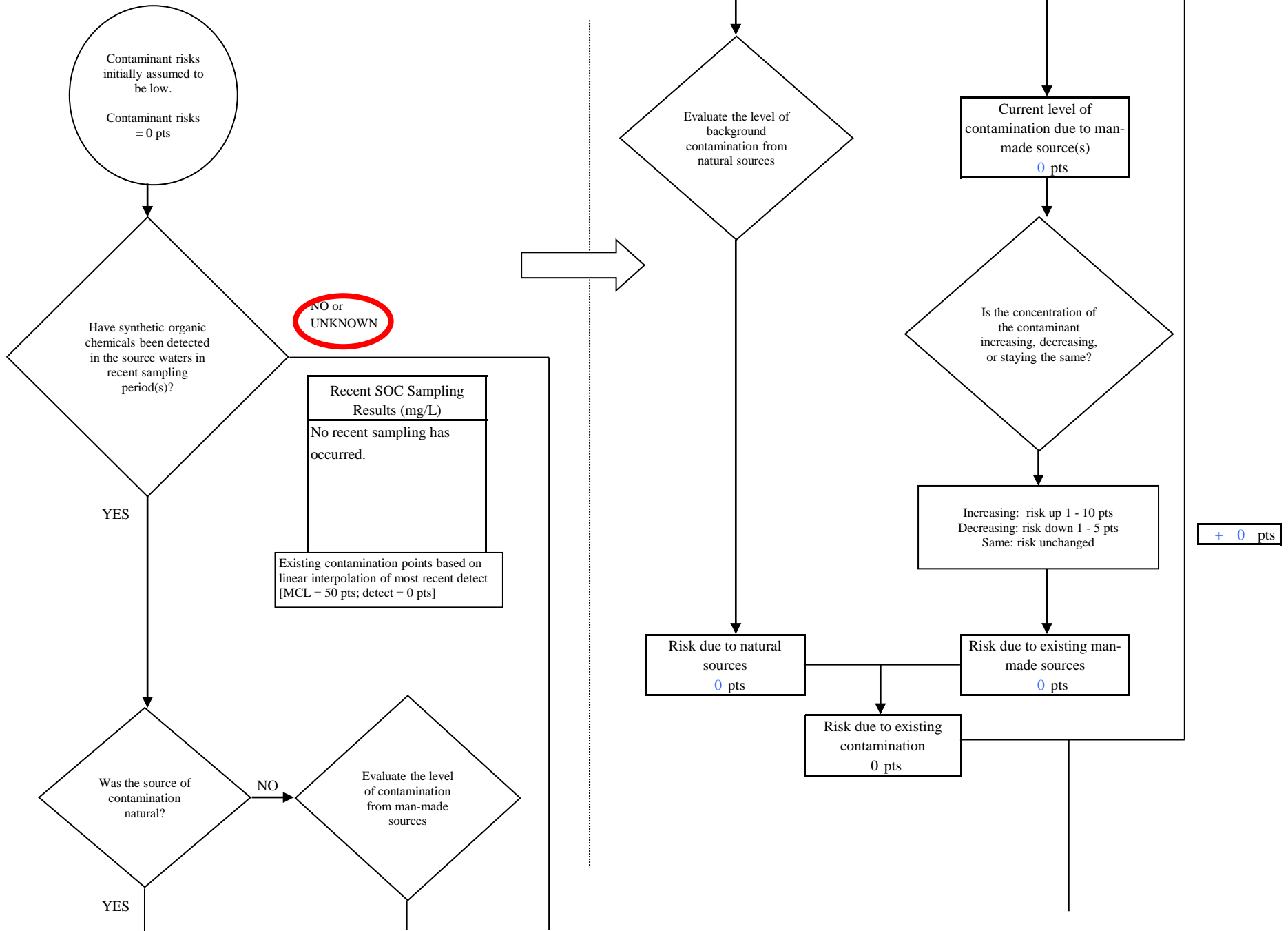


Chart 11. Contaminant risks for Estell Subdivision- Synthetic Organic Chemicals

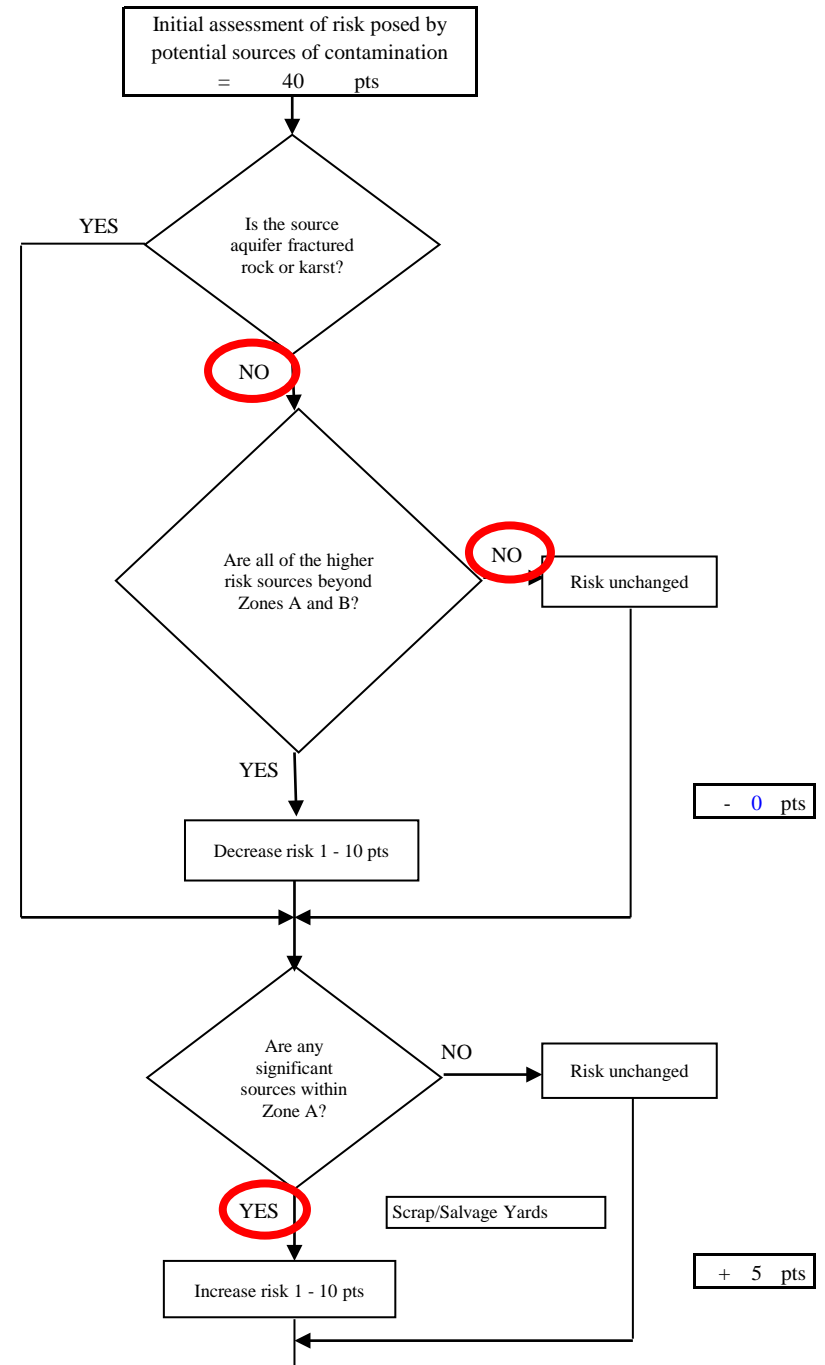
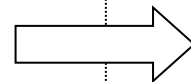
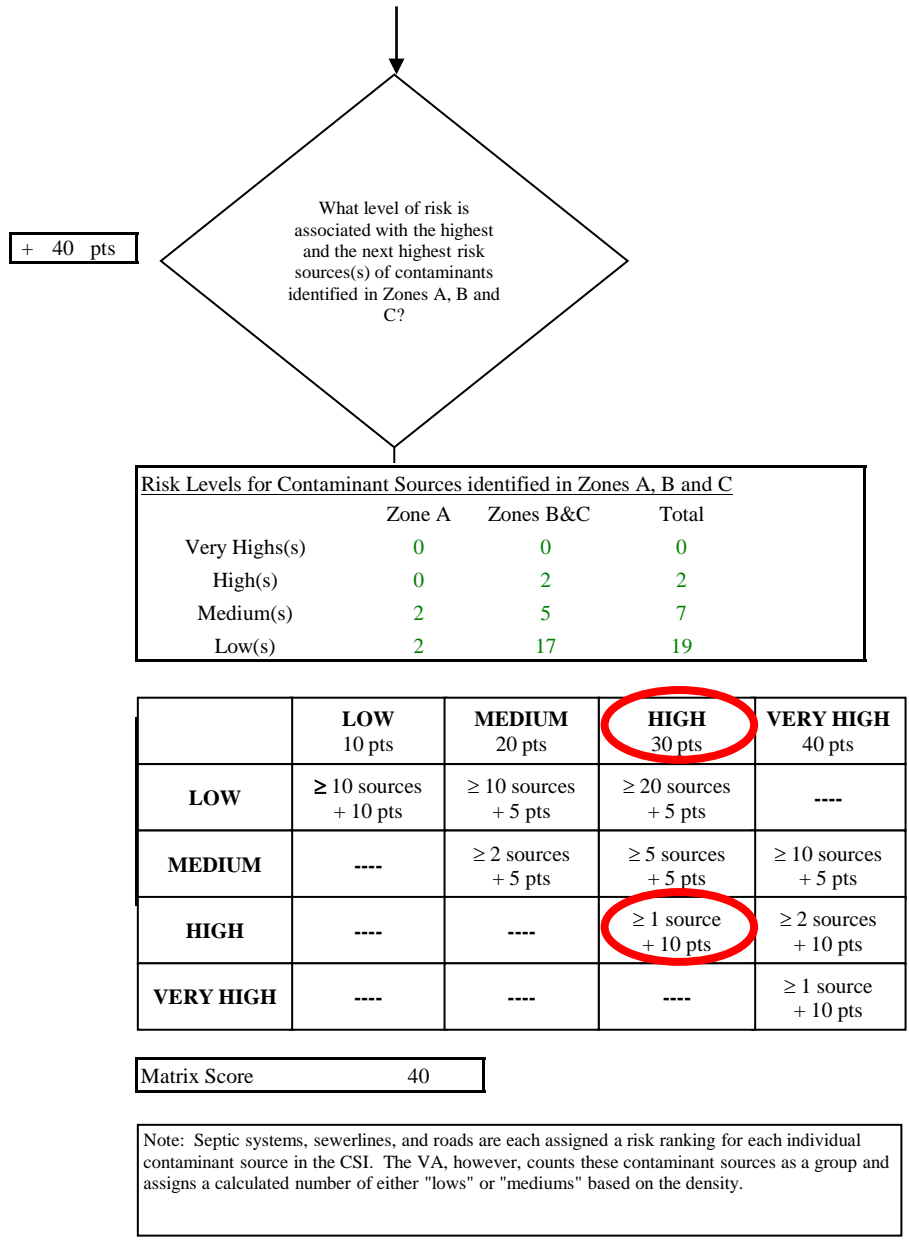


Chart 11. Contaminant risks for Estell Subdivision- Synthetic Organic Chemicals

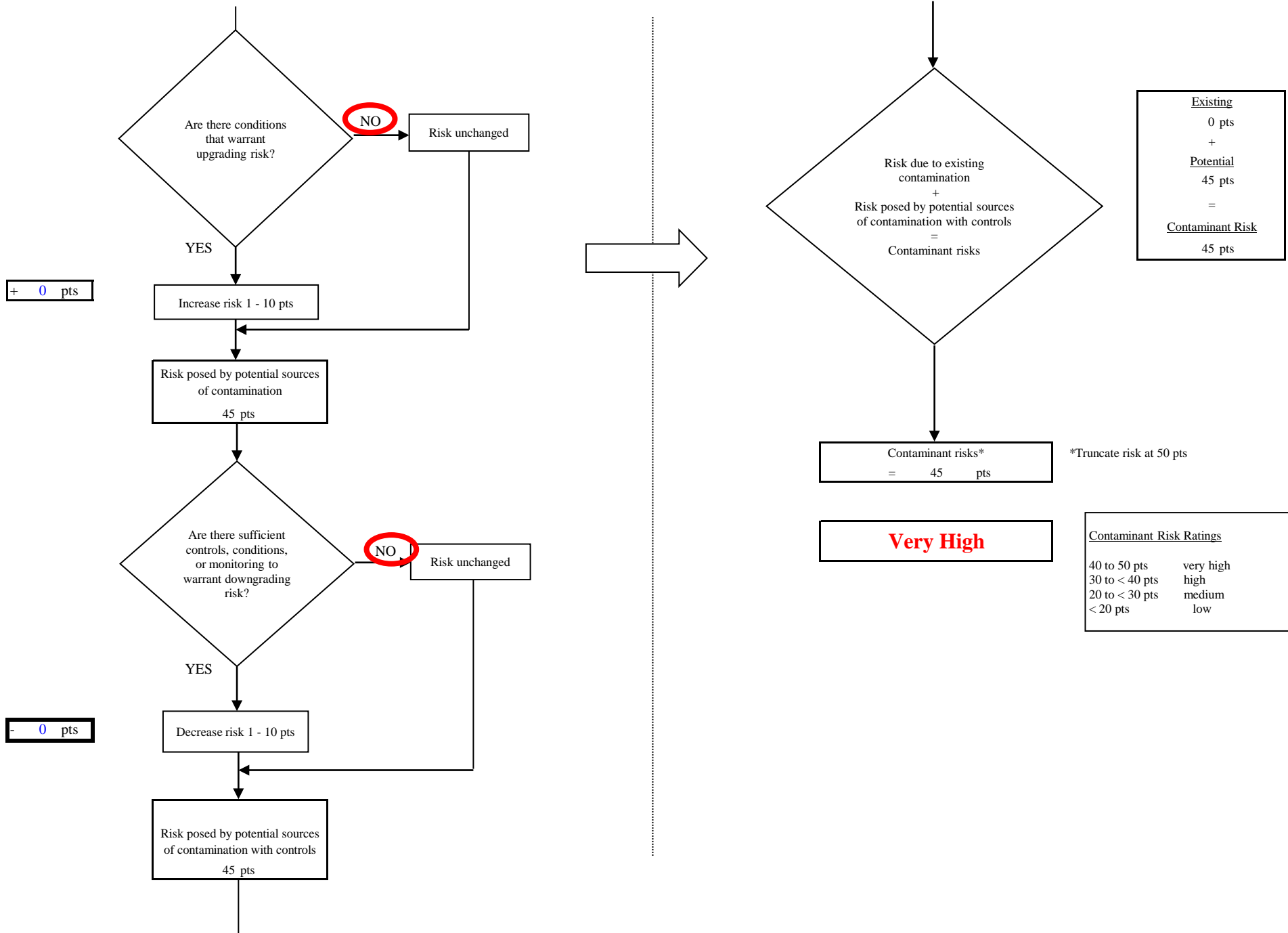


Chart 12. Vulnerability analysis for Estell Subdivision- Synthetic Organic Chemicals

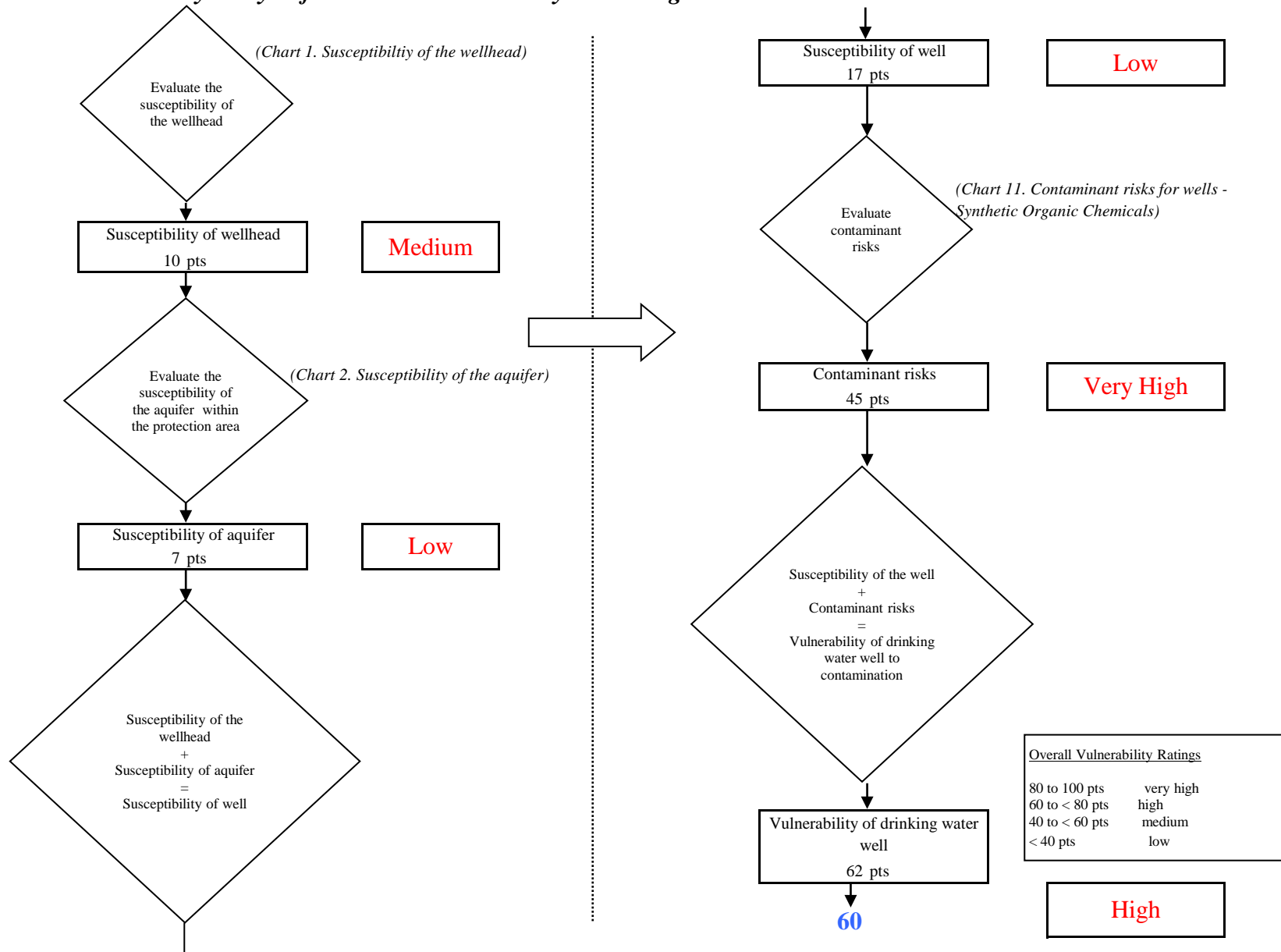


Chart 13. Contaminant risks for Estell Subdivision- Other Organic Chemicals

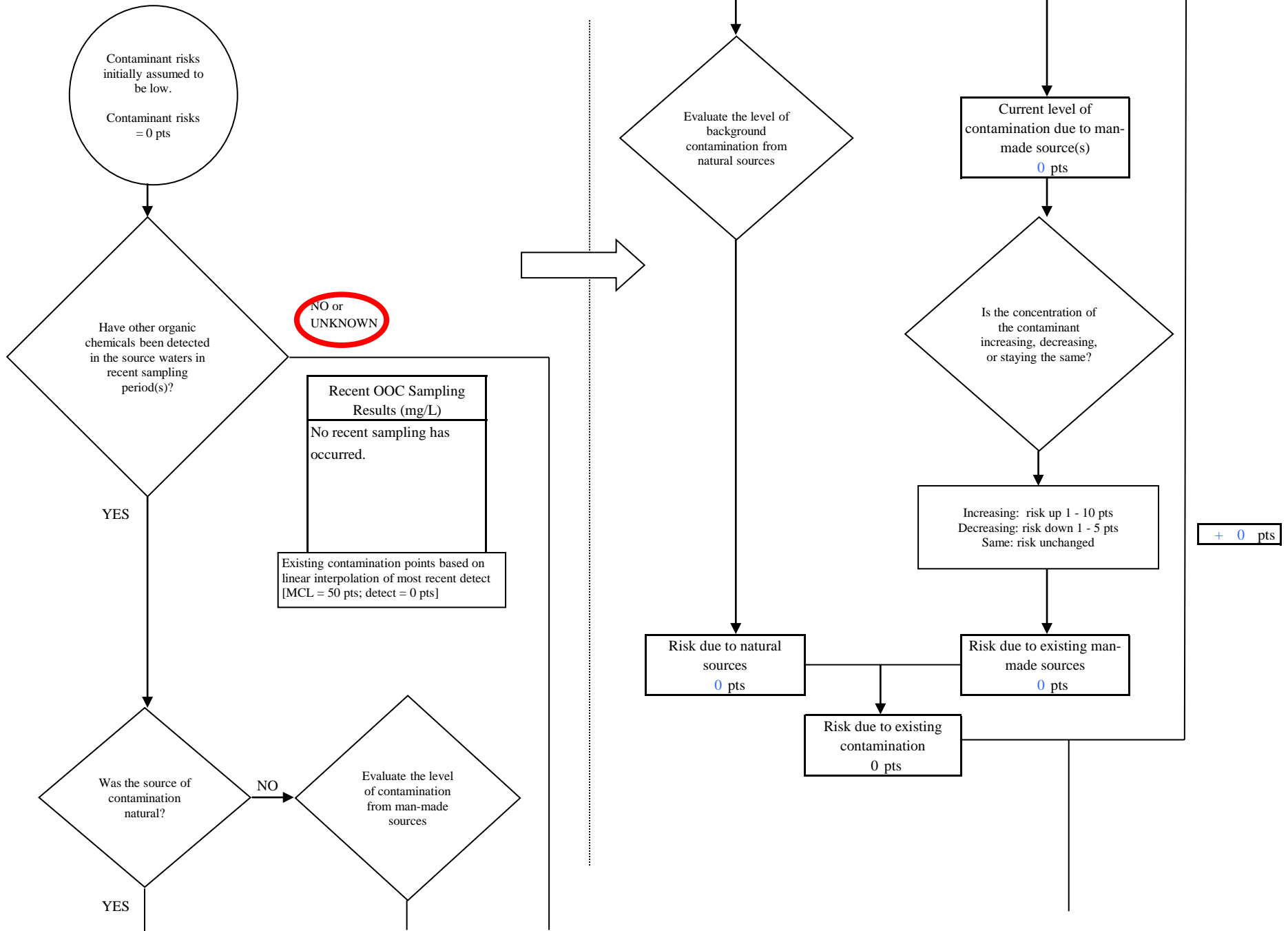


Chart 13. Contaminant risks for Estell Subdivision- Other Organic Chemicals

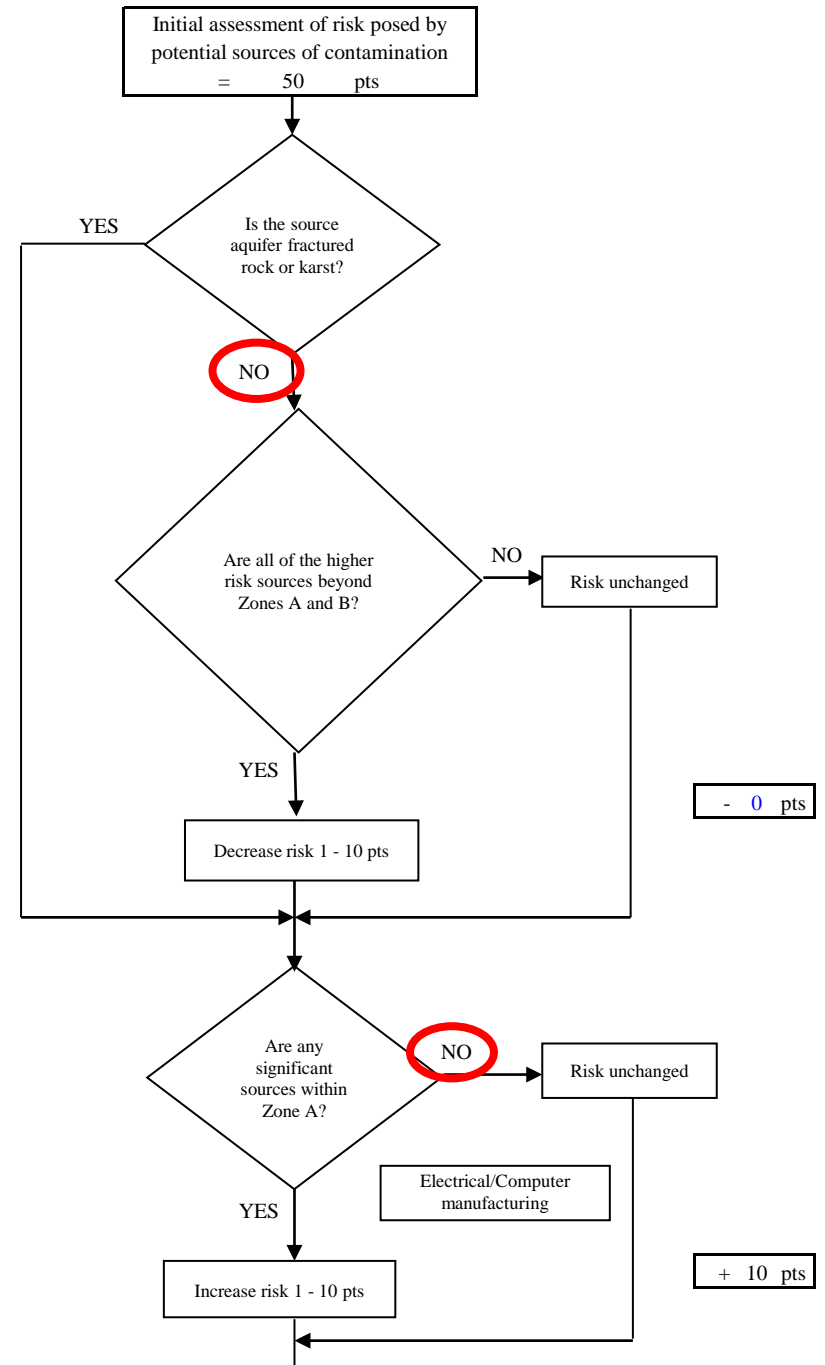
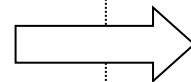
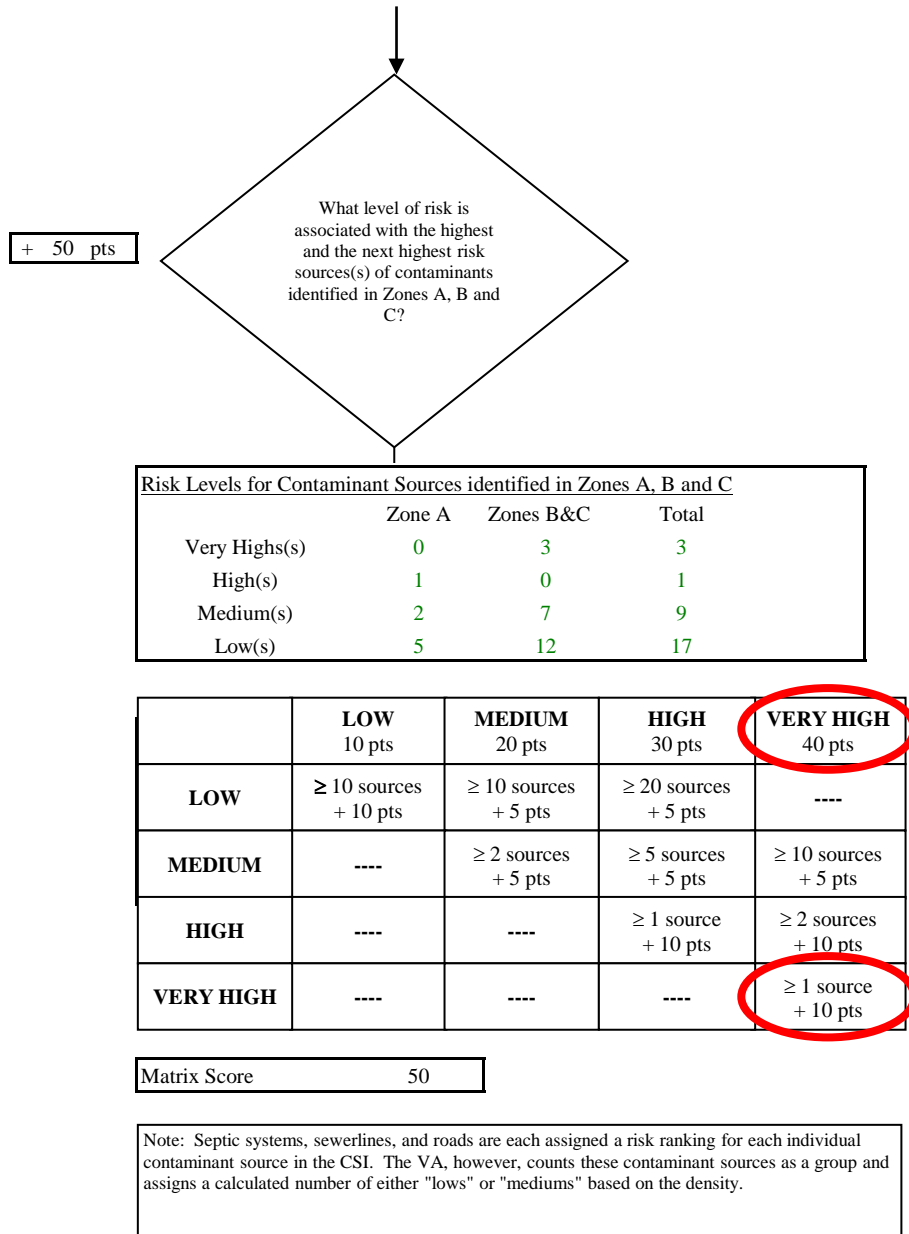


Chart 13. Contaminant risks for Estell Subdivision- Other Organic Chemicals

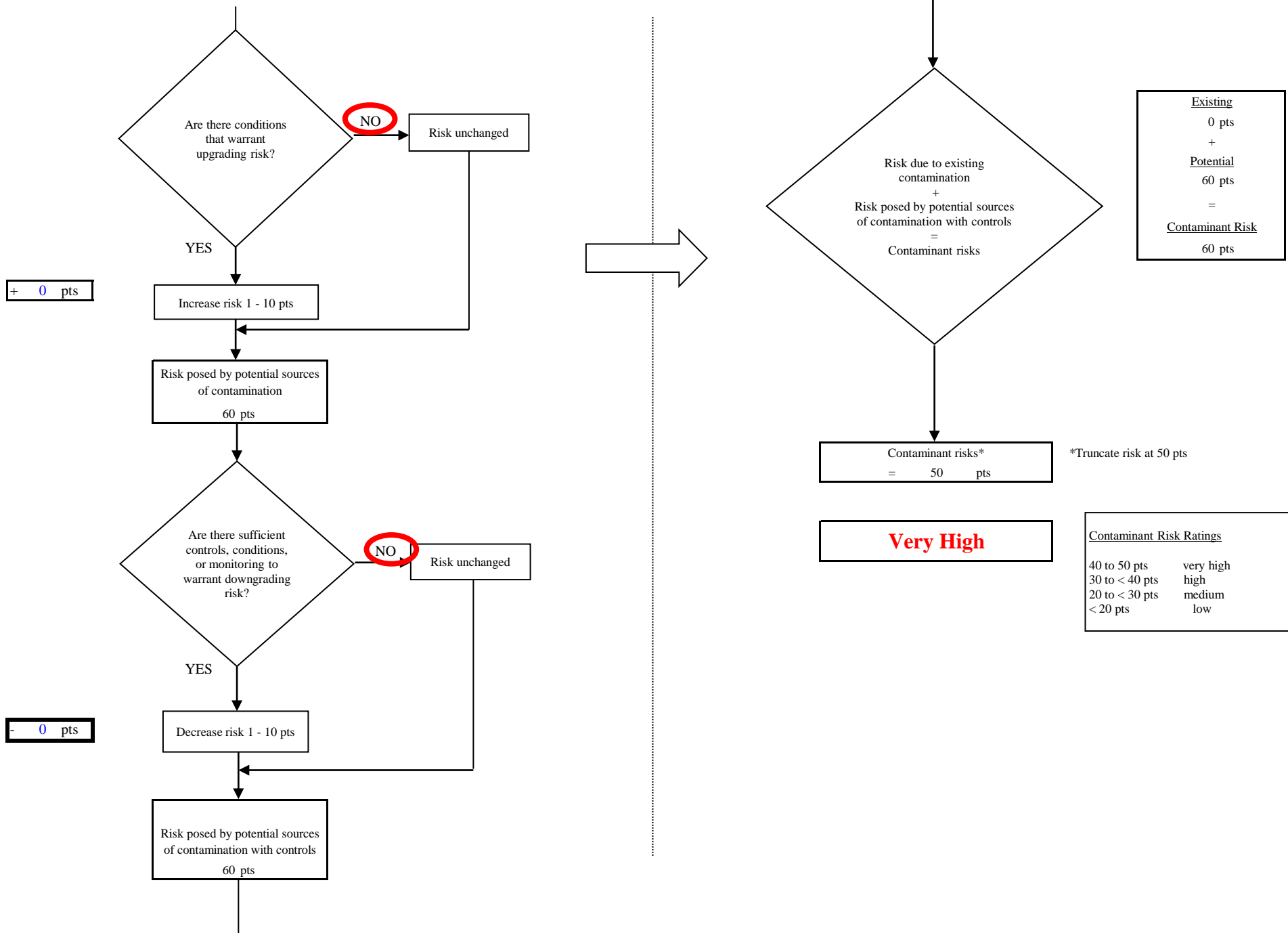


Chart 14. Vulnerability analysis for Estell Subdivision- Other Organic Chemicals

