Source Water Assessment for Sherwood Estates Addition #2 Wasilla Area, Alaska

A Hydrogeologic Susceptibility and Vulnerability Assessment

DRINKING WATER PROTECTION PROGRAM REPORT 192
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CONTENTS

	Page
Executive Summary	1
Introduction	1
Description of the Meadow Creek Watershed, Alaska	1
Sherwood Estates Addition #2 Public Water Source	3
Assessment/Protection Area for Sherwood Estates Addition #2 Drinking Water Source	3
Inventory of Potential and Existing Contaminant Sources	4
Ranking of Contaminant Risks	4
Vulnerability of Sherwood Estates Addition #2 Drinking Water Source	4
Summary	6
References Cited	7

TABLES

		Page
TABLE 1.	Natural Susceptibility - Susceptibility of the Wellhead and Aquifer to Contamination	5
2.	Contaminant Risks	5
3.	Overall Vulnerability of Sherwood Estates Addition #2 Public Drinking Water Source to Contamination	6

ILLUSTRATIONS

		Page
FIGURE 1.	Index map showing the location of Matanuska-Susitna Valley and the Meadow Creek Watershed	1
2.	Map showing groundwater flow in the Matanuska-Susitna Valley	2

APPENDICES

APPENDIX A. Sherwood Estates Addition #2 Drinking Water Protection Area (Map 1)

B. Contaminant Source Inventory for Sherwood Estates Addition #2 (Table 1)
Contaminant Source Inventory and Risk Ranking for Sherwood Estates Addition #2 – Bacteria and Viruses (Table 2)
Contaminant Source Inventory and Risk Ranking for Sherwood Estates Addition #2 – Nitrates/Nitrites (Table 3)
Contaminant Source Inventory and Risk Ranking for Sherwood Estates Addition #2 – Volatile Organic Chemicals (Table 4)
Contaminant Source Inventory and Risk Ranking for Sherwood Estates Addition #2 - Heavy Metals, Cyanide and Other Inorganic Chemicals (Table 5)
Contaminant Source Inventory and Risk Ranking for Sherwood Estates Addition #2 - Synthetic Organic Chemicals (Table 6)
Contaminant Source Inventory and Risk Ranking for Sherwood Estates Addition #2 - Other Organic Chemicals (Table 7)

C. Sherwood Estates Addition #2 Drinking Water Protection Area and Potential and Existing Contaminant Sources (Maps 2 and 3)

D. Vulnerability Analysis for Contaminant Source Inventory and Risk Ranking for Sherwood Estates Addition #2 Public Drinking Water Source (Charts 1 – 14)

Source Water Assessment for Sherwood Estates Addition #2 Source of Public Drinking Water,
Wasilla Area, Alaska

By Sarah A. Bendewald

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The Public Water System for Sherwood Estates Addition #2 is a Class A (non-transient/non-community) water system consisting of two wells approximately six miles northwest of Wasilla. Identified potential and current sources of contaminants for Sherwood Estates Addition #2 include: large capacity and residential septic systems, highways and roads, and residential areas. These identified potential and existing sources of contamination are considered sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, synthetic organic chemicals, and other organic chemicals. Overall, the public water sources for Sherwood Estates Addition #2 received a vulnerability rating of **Medium** bacteria and viruses, and **Low** for nitrates and nitrites, volatile organic chemicals, heavy metals, synthetic organic chemicals and other organic chemicals.

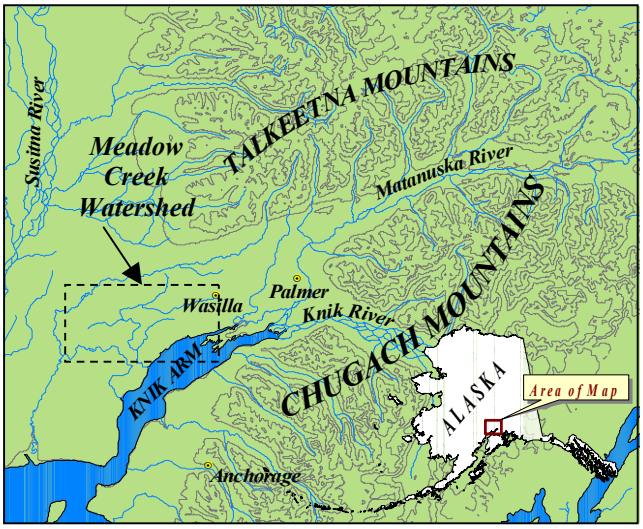


Figure 1. Index Map showing the location of the Matanuska-Susitna Valley and the Meadow Creek Watershed.

INTRODUCTION

The purpose of this environmental assessment is to provide public water system owners and/or operators, communities, and local governments with information they can use to preserve the quality of Alaska's public drinking water supplies. This assessment was completed for the source of public drinking water serving Sherwood Estates Addition #2. This water system consists of two wells approximately six miles northwest of Wasilla. This assessment, known under the Alaska Drinking Water Protection Program as the *Source Water Assessment*, has combined a review of the natural hydrogeologic sensitivity with potential and existing contaminant risks to arrive at an overall vulnerability of the drinking water source to contamination. This assessment has been completed as a basis for local voluntary protection efforts and to assist agencies in their efforts to reduce risk to this public drinking water supply.

DESCRIPTION OF THE MEADOW CREEK WATERSHED, ALASKA

Location

The Meadow Creek watershed is located within the Matanuska-Susitna Borough in southcentral Alaska. The Borough encompasses a total of 24,694 square miles supporting a population of approximately 60,000. It is contained within the watersheds of the Matanuska and Susitna Rivers which flow from the glacier melt waters in the Alaska Range, Talkeetna Mountains, and the Chugach Mountains to tidewater in the Knik Arm of Upper Cook Inlet *(Jokela, Munter and Evans, 1991).* This area between the Matanuska and Susitna Valleys is commonly referred to as the Mat-Su Valley. The Meadow Creek watershed extends from an area northwest of Wasilla to the west end of Big Lake, and contains 115 lakes, including Big Lake *(Jokela, Munter and Evans, 1991)* (see Figure 1). The towns of Wasilla, Big Lake, and Houston lie on the outskirts of its boundaries.

Climate

The climate in the Mat-Su Valley is considered transitional between the extreme temperature fluctuations of Interior Alaska and the wet conditions of the coastal areas.

The Meadow Creek watershed is less than 15 miles from Knik Arm and less than 75 miles from Prince William Sound. Summer temperatures are more moderate than those in the Interior due to the proximity to the coast. The Chugach and Talkeetna Mountains and the Alaska Range also protect the area from the frigid cold of the Interior Alaska winter and act to break up strong storm fronts *(Brabets, 1997), (Western Regional Climate Center, 2000)*.

The Mat-Su Valley area averages about 18 inches of precipitation per year, including about 59 inches of snowfall. Winter thaws can decrease snow cover to a few inches. Mean monthly high temperatures range from about 22 degrees Farenheight in December and January to 69 degrees in July. The frost-free period in spring and summer averages 115 days, with the first frost usually arriving by September 1.

The record low for Wasilla was –50 degrees in January 1947. The highest recorded temperature was 90 degrees in 1969 *(Wickersham Alaska Corporation, 1986)*.

Physiography and Groundwater Conditions

Glacial forces during the end of the last ice age shaped the Mat-Su Valley. Several glacial advances and retreats left a complex system of hills, ridges, lakes, and lowlands that define the topography of today. Surface elevations in the Mat-Su Valley range from sea level where the Knik and Matanuska Rivers enter the Cook Inlet to well over 6,000 feet in the peaks that bound the area. Landforms in the area consist of undulating ridges of glacial till and flat benches of sand and gravel outwash *(Matanuska-Susitna Borough)*. The Meadow Creek watershed lies in relatively flat area of the Matanuska River valley.

The regional geology and ground water conditions of the Mat-Su Valley vary greatly by location. Glacial advances and retreats also formed a fluctuating subsurface system of unconsolidated layers comprised of fine- to coarse-grained particles (clay to boulders) and consolidated confining layers. The majority of wells in the Mat-Su Valley are located in unconsolidated layers consisting of relatively well-sorted sands and gravels. These unconsolidated layers vary substantially in size and distribution throughout the Valley. In general, the unconsolidated layers increase in thickness moving towards Cook Inlet *(Jokela, Munter and Evans, 1991)*. The numerous confining layers in the area, ranging in thickness from

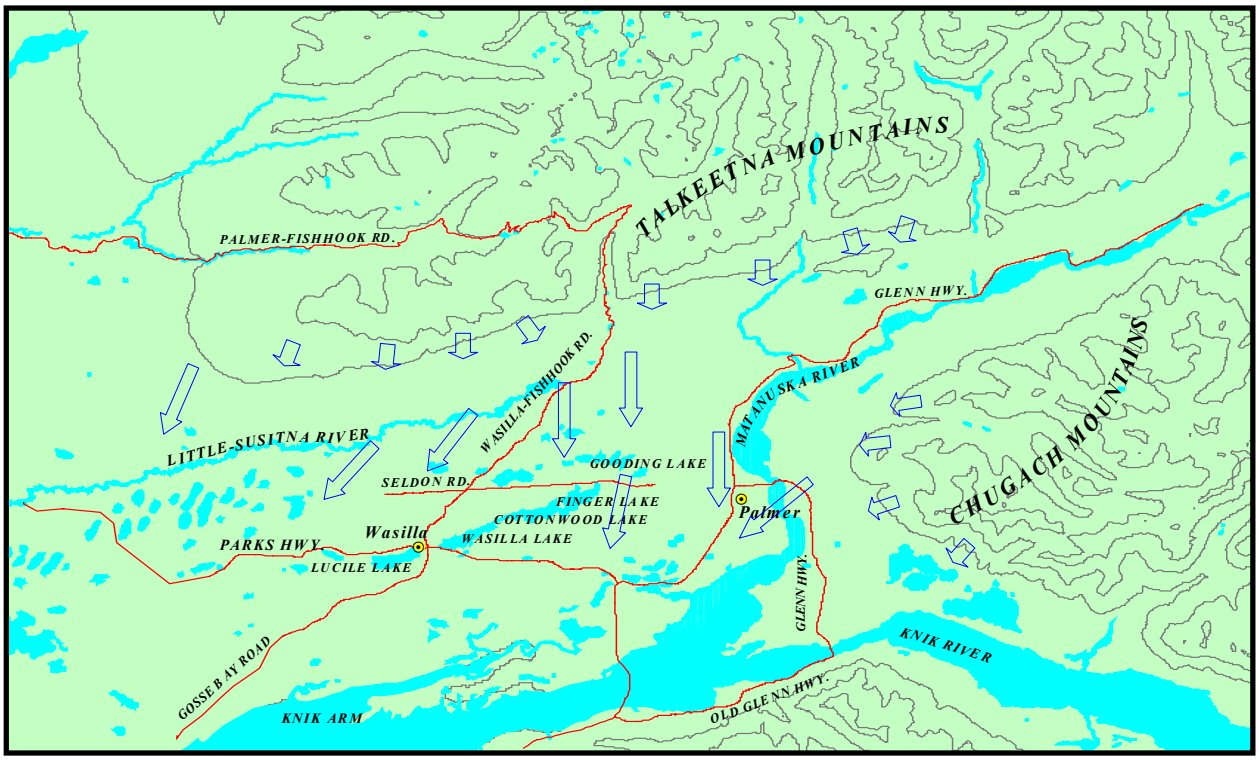


Figure 2. Map showing groundwater flow in the Matanuska-Susitna Valley (Jokela, Munter and Evans, 1991).

less than 1 foot to 60 feet, divide the unconsolidated layers.

Groundwater flow in the deeper confined aquifers of the Mat-Su Valley is generally north to south in the central region of the valley flowing toward the Matanuska River and gradually becoming more northeast to southwest in the western region. The direction of groundwater flow in the upper unconfined aquifers are more variable due to the influence from surficial topography as well as its close connection with surface water bodies *(Jokela, Munter and Evans, 1991)* (Figure 2). The groundwater flow direction of the Meadow Creek watershed was generally found to be northeast to southwest in both the unconfined and confined aquifers.

In the Mat-Su Valley, groundwater is primarily recharged by snowmelt and precipitation infiltrating both directly and also from the infiltration into the foothill slopes of the Talkeetna and Chugach Mountains.

SHERWOOD ESTATES ADDITION #2 PUBLIC DRINKING WATER SYSTEM

Sherwood Estates Addition #2 public water system is a Class A (non-transient/non-community) water system. The system consists of two wells near the intersection of the Parks Highway and Pittman Road on Locksley Loop (T18N, R2W, Section 34). This area is at an elevation of approximately 100 feet above sea level.

The two wells are located approximately fourteen feet apart and draw water from the same unconfined aquifer. The depth of both wells is 60 feet below ground surface. One well was installed on July 3, 1986, and the other on April 11, 1984. The two wells were installed with a cap providing a sanitary seal. A properly installed sanitary seal may provide protection against contaminants from entering the source waters at the well casing. A locking cap was also recently installed on both well casings to prevent tampering. The land surface is also appropriately sloped away from both wells providing surface water drainage away from each well. Neither well was grouted according to ADEC regulations. Proper grouting provides added protection against contaminants travelling along the well casing and into source waters.

This water system operates year-round and serves approximately 50 residents through 16 service connection.

ASSESSMENT AND PROTECTION AREA FOR SHERWOOD ESTATES ADDITION #2 DRINKING WATER SOURCE

The Drinking Water Protection and Assessment Area that has been established for the Sherwood Estates Addition #2 source of drinking water is the area that is most sensitive to contamination. This area has served 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 through infiltration of direct precipitation within the area and also from the infiltration into the foothill slopes of the Talkeetna Mountains. 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. The Drinking Water Protection Area for Sherwood Estates Addition #2 contains six zones, Zone A through Zone E and Zone G (See Map 1 in Appendix A). Zones A through D describe the areas contributing groundwater to the well, while Zones E and F describe the areas contributing surface water to the well.

The groundwater 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. Zone A corresponds to the area between the well and the distance equal to ¼ of the distance of the 2-year time-of-travel. Depending on where a contaminant source is located within Zone A, travel time for a contaminant to the wells may be several hours to several days. 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.

The Sherwood Estates Addition #2 wells were determined by the ADEC to be under the direct influence of surface water. This means contaminants entering the surface water could also potentially enter the wells. The surface water protection areas surround the surface water bodies in the immediate watershed upgradient of the well. Zone E encompasses a 1000-foot radius around Kalmbach Lake and the stream flowing out from it, within the immediate watershed of the wells. Zone F would normally encompass a 1-mile radius around the same area, but because of the small size of the immediate watershed, this zone is omitted for this water system. Zone G encompasses the entire immediate watershed upgradient of the wells.

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 Sherwood Estates Addition #2. 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 and 3 in Appendix C depict the Contaminant Source Inventory for Sherwood Estates Addition #2. Table 1 in Appendix B lists the inventoried potential sources of contamination within Zones A through G. Below is a summary of the contaminant sources inventoried within the Drinking Water Protection Area for Sherwood Estates Addition #2:

- Residential septic systems;
- an outhouse;
- highways and roads, and
- approximately 54 acres of residential area.

These potential and existing contaminant sources present risk for all six categories of drinking water contaminants for Sherwood Estates Addition #2 source of public drinking water.

RANKING OF CONTAMINANT RISKS

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

VULNERABILITY OF SHERWOOD ESTATES ADDITION #2 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 ultimately assigned:

Natural Susceptibility (0 – 50 points)

+

Contaminant Risks (0 – 50 points)

=

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

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

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

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

The wells serving Sherwood Estates Addition #2 were completed in an unconfined aquifer. The depth to static water surface is approximately 8 feet below land surface. The saturated thickness of the aquifer in which the well is screened in is approximately 45 feet and composed of silty sand and gravel and coarse gravel. The absence of a confining layer allows contaminants that enter the subsurface within the vicinity of the well and Drinking Water Protection Area to migrate to the screened portion of the well uninhibited.

Combining the susceptibility of the wellhead and the aquifer to contamination leads to a score (0 – 50 points) and rating of overall Susceptibility of the well to contamination (See Appendix D). Table 1 depicts the overall Susceptibility score and rating for the sources of public drinking water serving Sherwood Estates Addition #2.

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

	Score	Rating
Susceptibility of the Wellheads	5	Low
Susceptibility of the Aquifer	18	High
Natural Susceptibility	23	Medium

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

Table 2. Contaminant Risks of Sherwood Estates Addition #2 Public Drinking Water Source to Contamination by Category

Contaminant Risks	Score	Rating
Bacteria and Viruses	25	Medium
Nitrates and/or Nitrites	15	Low
Volatile Organic Chemicals	10	Low
Heavy Metals, Cyanide, And Other Inorganic Chemicals	10	Low
Synthetic Organic Chemicals	10	Low
Other Organic Chemicals	10	Low

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

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

Table 3. Overall Vulnerability of Sherwood Estates Addition #2 Public Drinking Water Source to Contamination by Category

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

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

The outhouse and the density of septic systems represents the greatest risk for all six contaminant categories. Septic systems are designed to leach domestic wastewater in the subsurface. If engineered and operating properly, leach fields for septic systems should filter and stop the migration of microorganisms in the subsurface soils. However, failure of a septic system can result in the migration of contaminants away from the leach field, sometimes to great distances, especially in highly transmissive soils.

Only a small amount of bacteria and viruses is required to endanger public health. Bacteria and viruses have not been detected during recent water sampling of the Sherwood Estates Addition #2 water system.

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 the Sherwood Estates Addition #2 wells indicates that a low concentration of nitrates has recently been detected at approximately 0.6 mg/L (See Chart 5 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D) or 6% of the Maximum Contaminant Level (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. Though existing nitrate contamination was detected at the site, concentrations remain at safe levels with respect to human health.

SUMMARY

A *Source Water Assessment* has been completed for the sources of public drinking water serving Sherwood Estates Addition #2. The overall vulnerability of this source to contamination is **Medium** for bacteria and viruses, and **Low** for nitrates and nitrites, volatile organic chemicals, heavy metals, 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 Sherwood Estates Addition #2 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 Sherwood Estates Addition #2 public drinking water source.

REFERENCES CITED

Alaska Department of Community and Economic Development, 2001 [WWW document]. URL http://www.dced.state.ak.us/mra/CF_BLOCK.cfm.

Alaska Department of Labor, State of Alaska 2001 [WWW document]. URL http://146.63.75.45/census2000/.

Brabets, T., 1997, Precipitation map of Alaska, Web extension to the U.S. Geological Survey Water Resources for Alaska GIS datasets. <URL:http://agdc.usgs.gov/data/usgs/water> .

Jokela, J.B., Munter, J.A., and Evans, J.G., 1991, Ground-water resources of the Plamer-Big Lake area, Alaska: a conceptual model. Division of Geological &Geophysical Surveys Reports of Investigations 90-4, State of Alaska Department of Natural Resources, Fairbanks, AK.

Matanuska-Susitna Borough, 1985, Knik-Matanuska-Sisitna: A Visual History of the Valleys, Wasilla, AK.

Patrick, L.D., Brabets, T.P., and Glass, R.L., 1989, Simulation of ground-water flow at Anchorage, Alaska: US Geological Survey Water-Resources Investigations Report 88-4139, 41p.

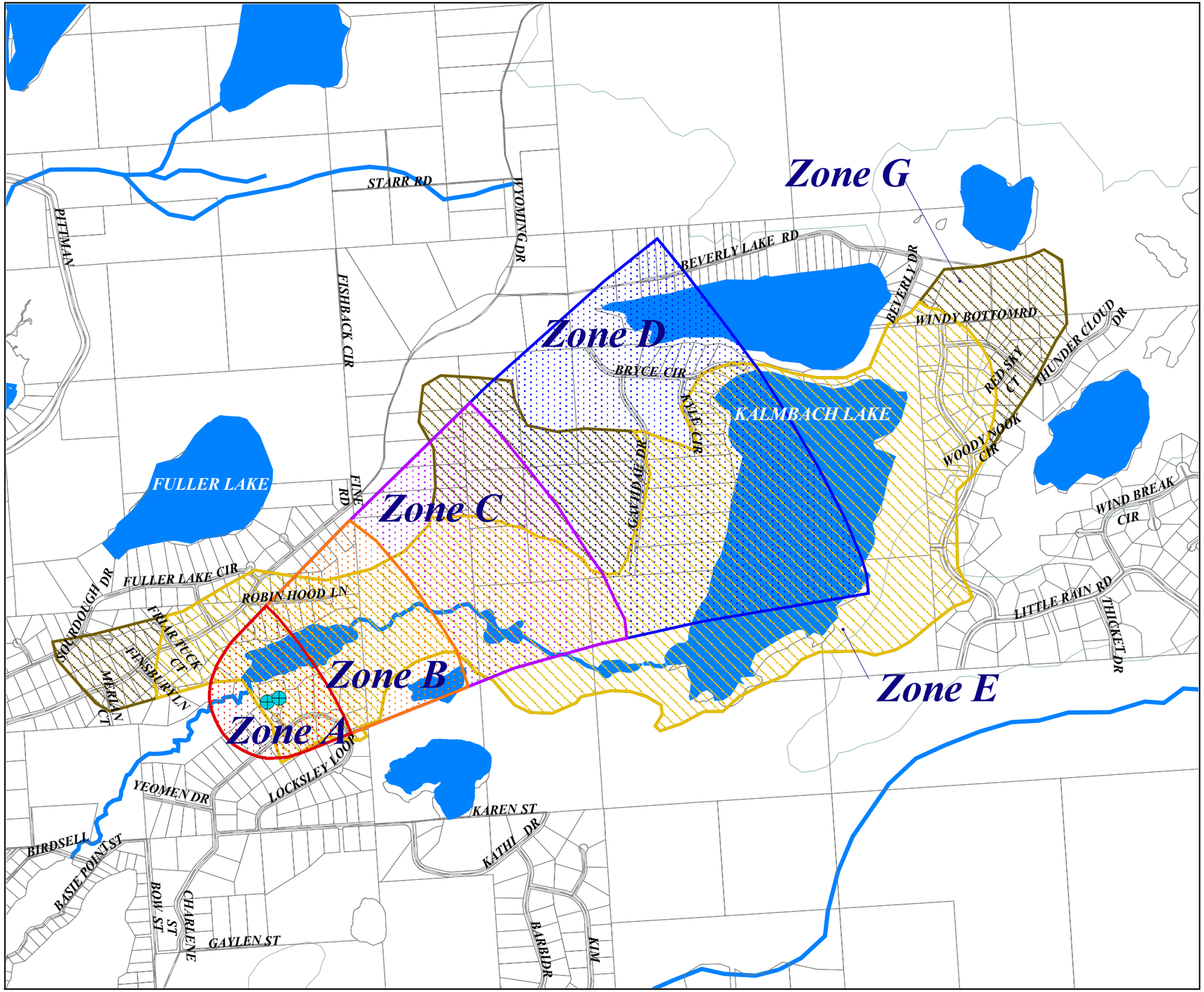
Western Regional Climate Center, 2000, August 24, Web extension to the *Western Regional Climate Center* [WWW document]. URL http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?akmatv

Wickersham Alaska Corporation, 1986, Wasilla Comprehensive Plan, Anchorage, AK.

APPENDIX A

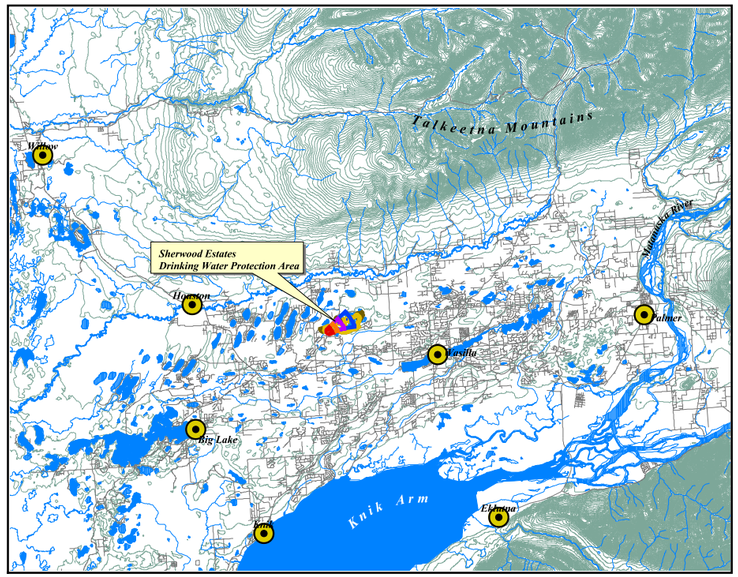
Sherwood Estates Addition #2
Drinking Water Protection Area

Sherwood Estates Addition #2 Drinking Water Protection Areas



Legend

- Sherwood Estates Wells
- Zone A Groundwater Protection Area
  - Several Months Travel Time
- Zone B Groundwater Protection Area
  - Less Than 2 Years Travel Time
- Zone C Groundwater Protection Area
  - Less Than 5 Years Travel Time
- Zone D Groundwater Protection Area
  - Less Than 10 Years Travel Time
- Zone E Surface Water Protection Area
  - Within 1000 Feet of Surface Water Bodies
- Zone G Surface Water Protection Area
  - Immediate Watershed of Surface Water Bodies
- Lakes
- Parcels
- Roads
- Streams and Rivers
- Elevation Contours



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Map 1

APPENDIX B

Contaminant Source Inventory and Risk Ranking for Sherwood Estates Addition #2

Table 1

Contaminant Source Inventory for ***Sherwood Estates #2***

PWSID 224078.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Location*	*Map Number*	*Comments*
Outhouses	R05	R05-01	A	Locksley Loop	2	
Residential Areas	R01	R1-1	A	Locksley Loop area and part of Robin Hood Ln area	2	22 acres of residential area in zone A
Highways and roads, dirt/gravel	X24	X24-1	A	Locksley Loop	2	
Septic systems (serves one single-family home)	R02	R02-02	B	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-03	B	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-04	B	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-05	B	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-06	B	end of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-07	B	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-08	B		2	
Residential Areas	R01	R1-2	B	Robin Hood Ln area	2	15 acres of residential area in zone B
Highways and roads, dirt/gravel	X24	X24-2	B	Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-10	C	east side of Beverly Lake Rd	2	
Septic systems (serves one single-family home)	R02	R02-11	C	east side of Beverly Lake Rd	2	
Residential Areas	R01	R1-3	C	Beverly Lake Rd area	2	17 acres of residential area in zone C

Table 2

Contaminant Source Inventory and Risk Ranking for Sherwood Estates #2 Sources of Bacteria and Viruses

PWSID 224078.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Locksley Loop	2	
Residential Areas	R01	R1-1	A	Low	3	Locksley Loop area and part of Robin Hood Ln area	2	22 acres of residential area in zone A
Septic systems (serves one single-family home)	R02	R02-02	B	Low	4	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-03	B	Low	5	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-04	B	Low	6	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-05	B	Low	7	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-06	B	Low	8	end of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-07	B	Low	9	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-08	B	Low	10		2	
Outhouses	R05	R05-01	A	Medium		Locksley Loop	2	
Residential Areas	R01	R1-2	B	Low		Robin Hood Ln area	2	15 acres of residential area in zone B
Highways and roads, dirt/gravel	X24	X24-2	B	Low		Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-10	C	Low		east side of Beverly Lake Rd	2	
Septic systems (serves one single-family home)	R02	R02-11	C	Low		east side of Beverly Lake Rd	2	
Residential Areas	R01	R1-3	C	Low		Beverly Lake Rd area	2	17 acres of residential area in zone C

Table 3

Contaminant Source Inventory and Risk Ranking for Sherwood Estates #2 Sources of Nitrates/Nitrites

PWSID 224078.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Locksley Loop	2	
Residential Areas	R01	R1-1	A	Low	3	Locksley Loop area and part of Robin Hood Ln area	2	22 acres of residential area in zone A
Septic systems (serves one single-family home)	R02	R02-02	B	Low	4	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-03	B	Low	5	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-04	B	Low	6	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-05	B	Low	7	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-06	B	Low	8	end of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-07	B	Low	9	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-08	B	Low	10		2	
Outhouses	R05	R05-01	A	Low		Locksley Loop	2	
Residential Areas	R01	R1-2	B	Low		Robin Hood Ln area	2	15 acres of residential area in zone B
Highways and roads, dirt/gravel	X24	X24-2	B	Low		Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-10	C	Low		east side of Beverly Lake Rd	2	
Septic systems (serves one single-family home)	R02	R02-11	C	Low		east side of Beverly Lake Rd	2	
Residential Areas	R01	R1-3	C	Low		Beverly Lake Rd area	2	17 acres of residential area in zone C

Table 4

Contaminant Source Inventory and Risk Ranking for Sherwood Estates #2 Sources of Volatile Organic Chemicals

PWSID 224078.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Locksley Loop	2	
Residential Areas	R01	R1-1	A	Low	3	Locksley Loop area and part of Robin Hood Ln area	2	22 acres of residential area in zone A
Septic systems (serves one single-family home)	R02	R02-02	B	Low	4	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-03	B	Low	5	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-04	B	Low	6	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-05	B	Low	7	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-06	B	Low	8	end of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-07	B	Low	9	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-08	B	Low	10		2	
Outhouses	R05	R05-01	A	Low		Locksley Loop	2	
Residential Areas	R01	R1-2	B	Low		Robin Hood Ln area	2	15 acres of residential area in zone B
Highways and roads, dirt/gravel	X24	X24-2	B	Low		Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-10	C	Low		east side of Beverly Lake Rd	2	
Septic systems (serves one single-family home)	R02	R02-11	C	Low		east side of Beverly Lake Rd	2	
Residential Areas	R01	R1-3	C	Low		Beverly Lake Rd area	2	17 acres of residential area in zone C

Table 5

Contaminant Source Inventory and Risk Ranking for Sherwood Estates #2

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 224078.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Locksley Loop	2	
Residential Areas	R01	R1-1	A	Low	3	Locksley Loop area and part of Robin Hood Ln area	2	22 acres of residential area in zone A
Septic systems (serves one single-family home)	R02	R02-02	B	Low	4	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-03	B	Low	5	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-04	B	Low	6	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-05	B	Low	7	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-06	B	Low	8	end of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-07	B	Low	9	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-08	B	Low	10		2	
Outhouses	R05	R05-01	A	Low		Locksley Loop	2	
Residential Areas	R01	R1-2	B	Low		Robin Hood Ln area	2	15 acres of residential area in zone B
Highways and roads, dirt/gravel	X24	X24-2	B	Low		Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-10	C	Low		east side of Beverly Lake Rd	2	
Septic systems (serves one single-family home)	R02	R02-11	C	Low		east side of Beverly Lake Rd	2	
Residential Areas	R01	R1-3	C	Low		Beverly Lake Rd area	2	17 acres of residential area in zone C

Table 6

Contaminant Source Inventory and Risk Ranking for Sherwood Estates #2 Sources of Synthetic Organic Chemicals

PWSID 224078.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Residential Areas	R01	R1-1	A	Low	2	Locksley Loop area and part of Robin Hood Ln area	2	22 acres of residential area in zone A
Septic systems (serves one single-family home)	R02	R02-02	B	Low	3	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-03	B	Low	4	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-04	B	Low	5	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-05	B	Low	6	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-06	B	Low	7	end of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-07	B	Low	8	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-08	B	Low	9		2	
Residential Areas	R01	R1-2	B	Low		Robin Hood Ln area	2	15 acres of residential area in zone B
Septic systems (serves one single-family home)	R02	R02-10	C	Low		east side of Beverly Lake Rd	2	
Septic systems (serves one single-family home)	R02	R02-11	C	Low		east side of Beverly Lake Rd	2	
Residential Areas	R01	R1-3	C	Low		Beverly Lake Rd area	2	17 acres of residential area in zone C

Table 7

Contaminant Source Inventory and Risk Ranking for Sherwood Estates #2
Sources of Other Organic Chemicals

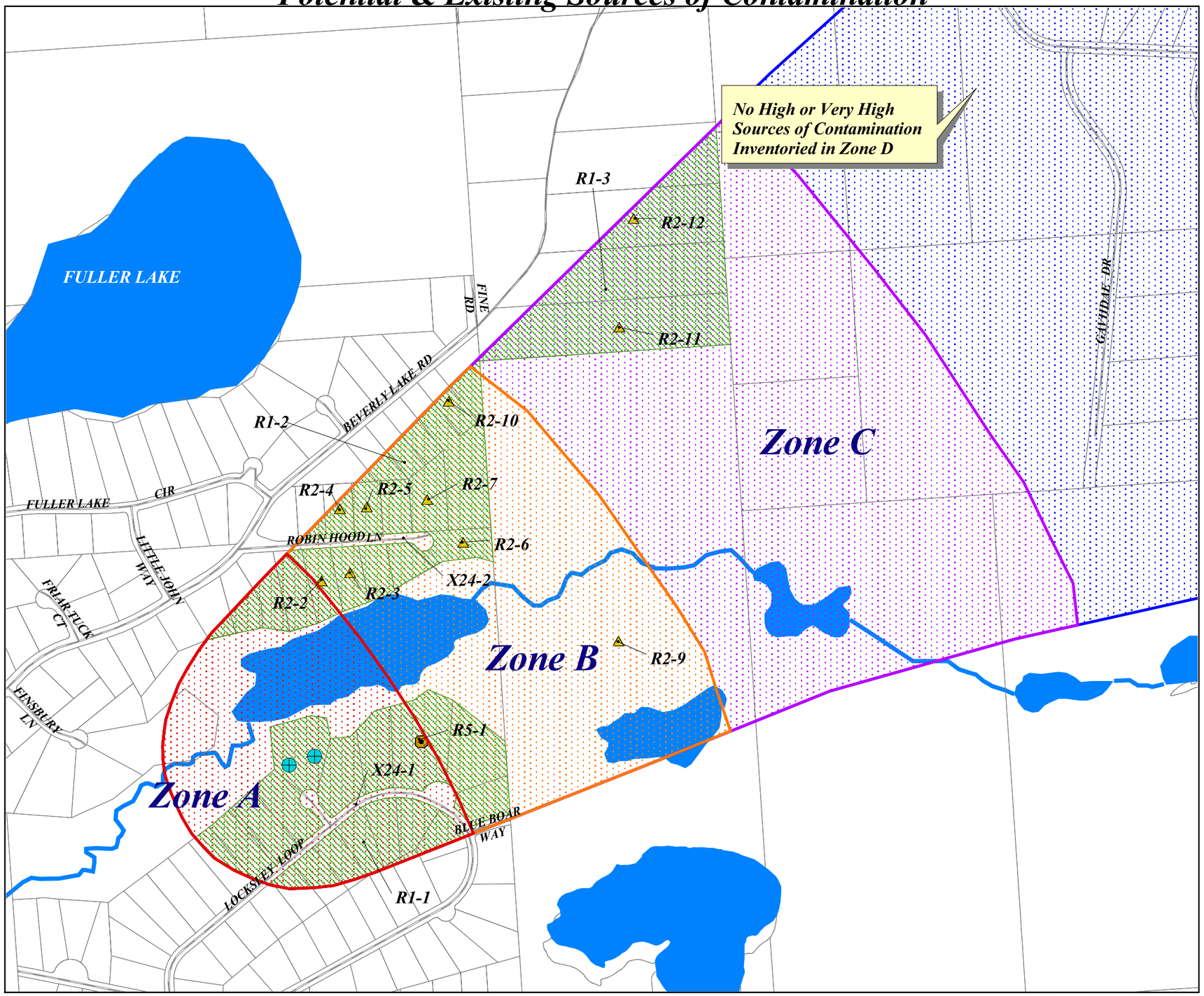
PWSID 224078.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Overall Rank after Analysis*	*Location*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-1	A	Low	2	Locksley Loop	2	
Residential Areas	R01	R1-1	A	Low	3	Locksley Loop area and part of Robin Hood Ln area	2	22 acres of residential area in zone A
Septic systems (serves one single-family home)	R02	R02-02	B	Low	4	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-03	B	Low	5	south of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-04	B	Low	6	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-05	B	Low	7	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-06	B	Low	8	end of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-07	B	Low	9	north of Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-08	B	Low	10		2	
Residential Areas	R01	R1-2	B	Low		Robin Hood Ln area	2	15 acres of residential area in zone B
Highways and roads, dirt/gravel	X24	X24-2	B	Low		Robin Hood Ln	2	
Septic systems (serves one single-family home)	R02	R02-10	C	Low		east side of Beverly Lake Rd	2	
Septic systems (serves one single-family home)	R02	R02-11	C	Low		east side of Beverly Lake Rd	2	
Residential Areas	R01	R1-3	C	Low		Beverly Lake Rd area	2	17 acres of residential area in zone C

APPENDIX C

Sherwood Estates Addition #2
Drinking Water Protection Area
and Potential and Existing Contaminant Sources

Sherwood Estates Addition #2 Groundwater Drinking Water Protection Area with Potential & Existing Sources of Contamination



PWSID 224078.001
224078.002

Legend

- Sherwood Estates Wells

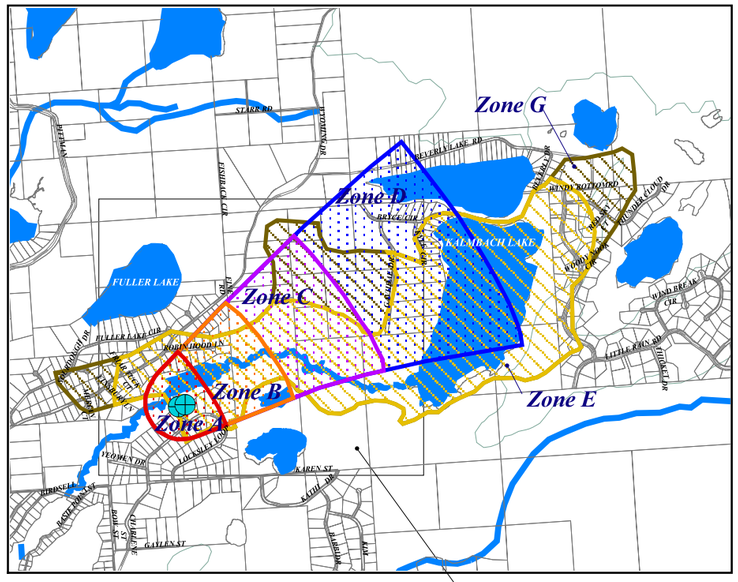
Zone A Groundwater Protection Area
- Several Months Travel Time

Zone B Groundwater Protection Area
- Less Than 2 Years Travel Time

Zone C Groundwater Protection Area
- Less Than 5 Years Travel Time

Zone D Groundwater Protection Area
- Less Than 10 Years Travel Time

Potential Contaminant Sources
- Residential Septic Systems (R2)
- Outhouses (R5)
- Residential Areas (R1)
- Roads (X24)
- Lakes
- Parcels
- Streams and Rivers

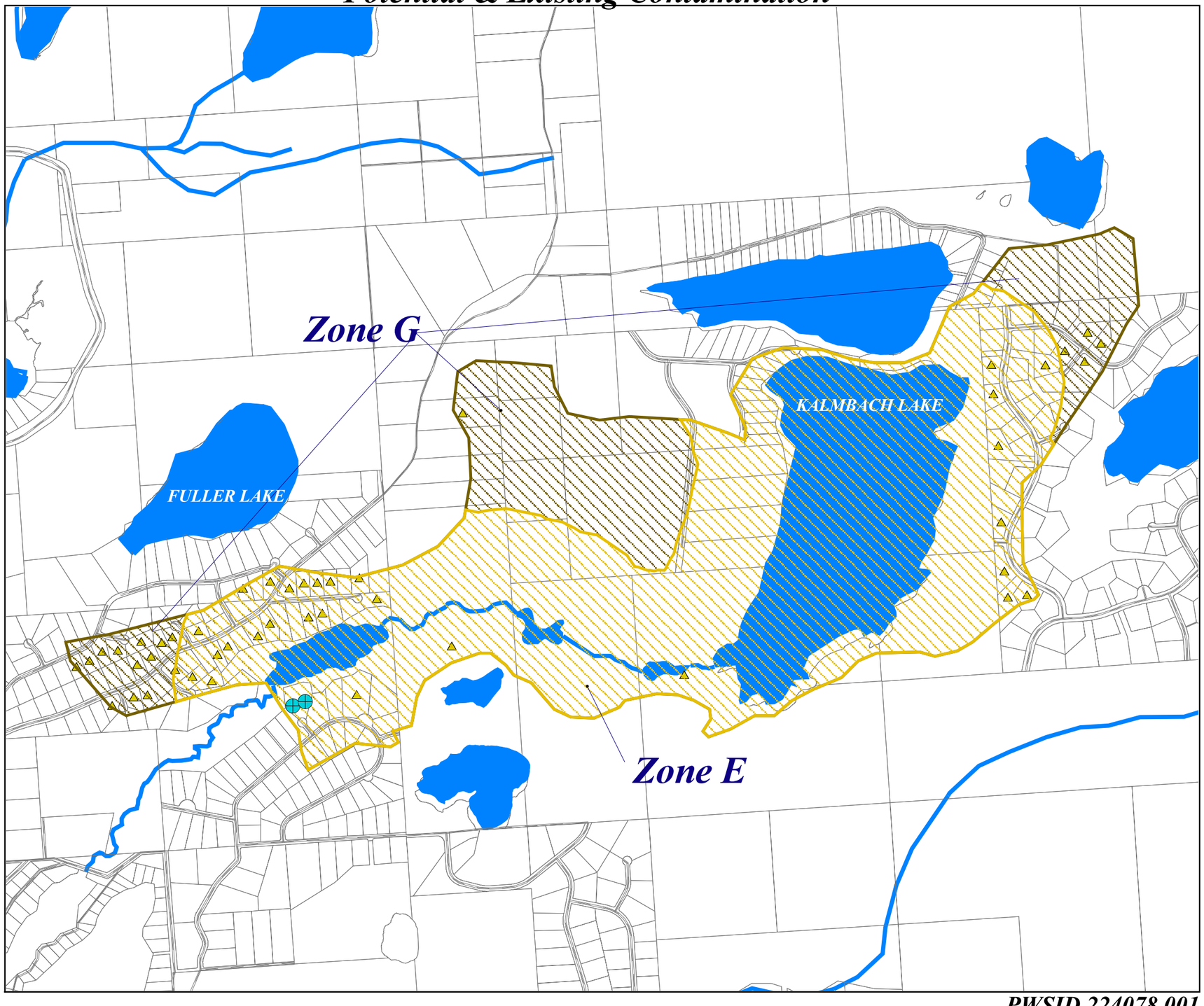


Area of Map

N
W
E
S

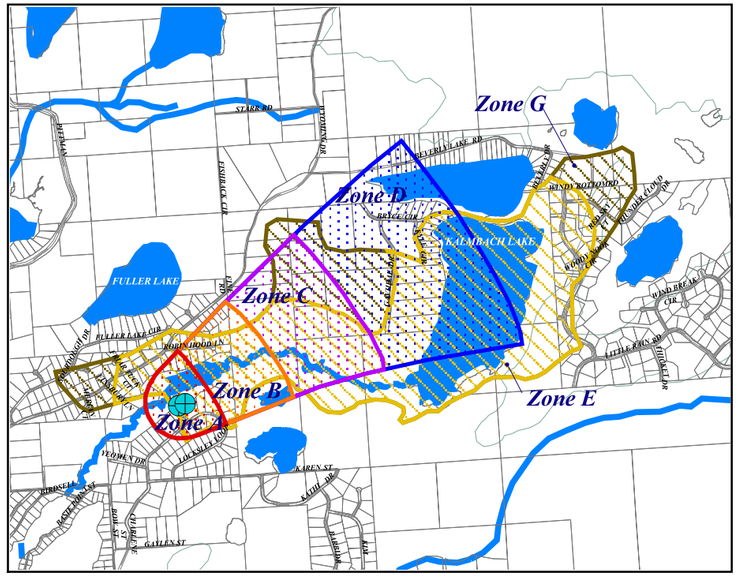
Map 2

Sherwood Estates Addition #2 Surface Water Drinking Water Protection Areas with Potential & Existing Contamination



Legend

- *Sherwood Estates Wells*
- *Zone E Surface Water Protection Area*
- *Within 1000 Feet of Surface Water Bodies*
- *Zone G Surface Water Protection Area*
- *Immediate Watershed of Surface Water Bodies*
- *Septic Systems*
- *Residential Septic Systems (R2)*
- *Roads*
- *Lakes*
- *Parcels*
- *Streams and Rivers*



0.5 0 0.5 1 Miles

PWSID 224078.001
224078.002

N
W E
S

Map 3

APPENDIX D

Vulnerability Analysis for Sherwood Estates Addition #2
Public Drinking Water Source

Chart 1. Susceptibility of the wellhead - Sherwood Estates

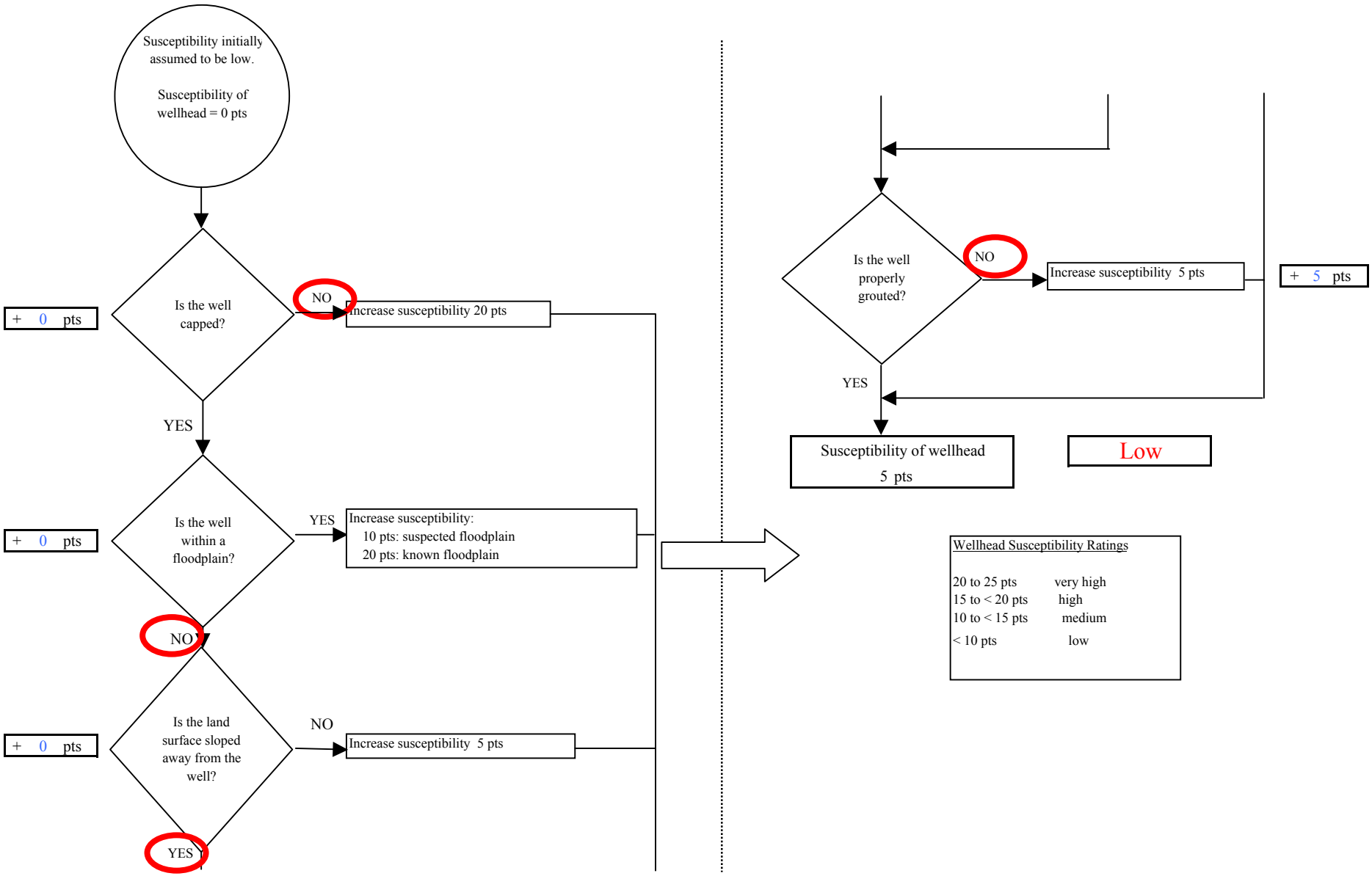


Chart 2. Susceptibility of the aquifer - Sherwood Estates

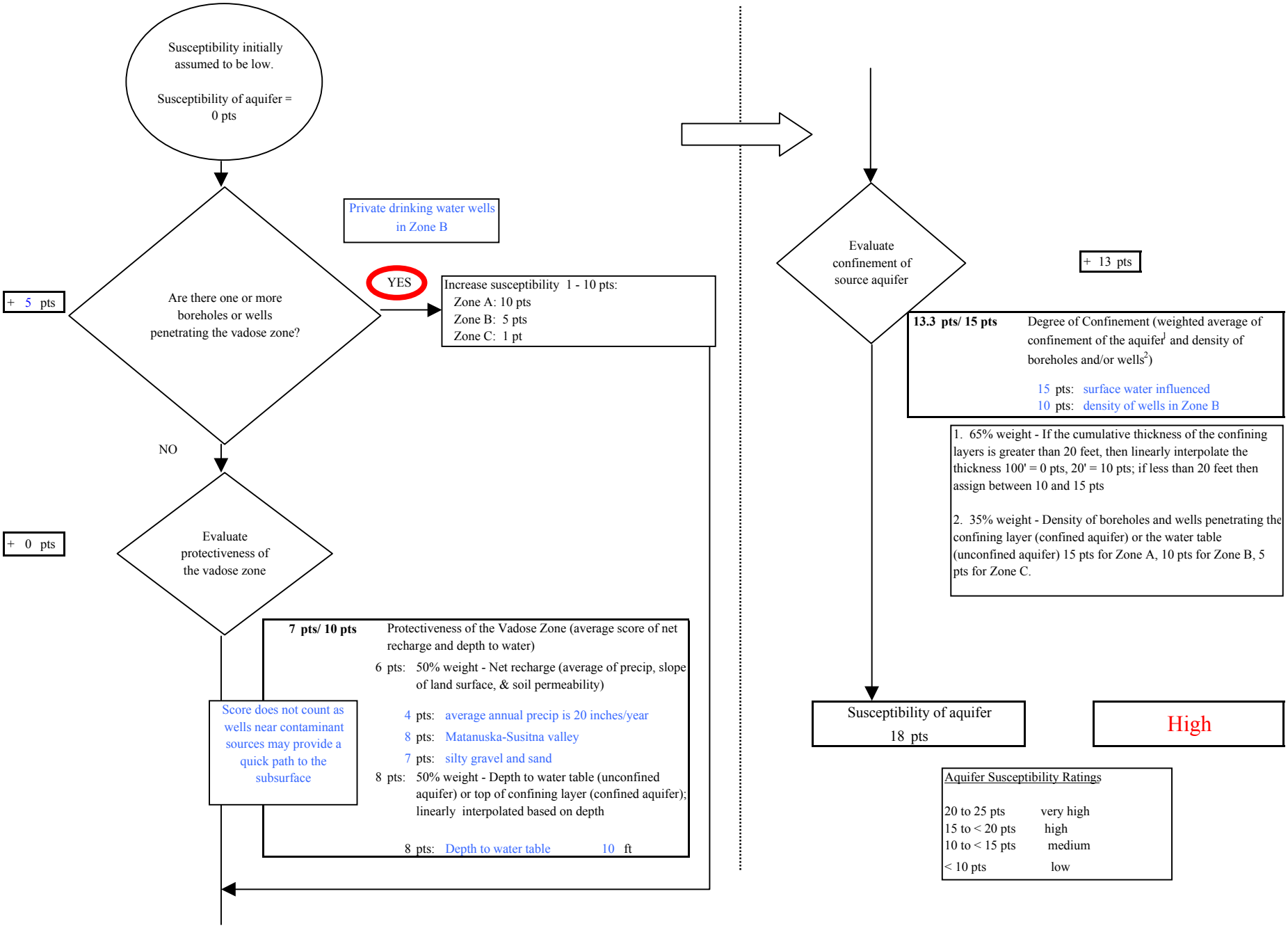
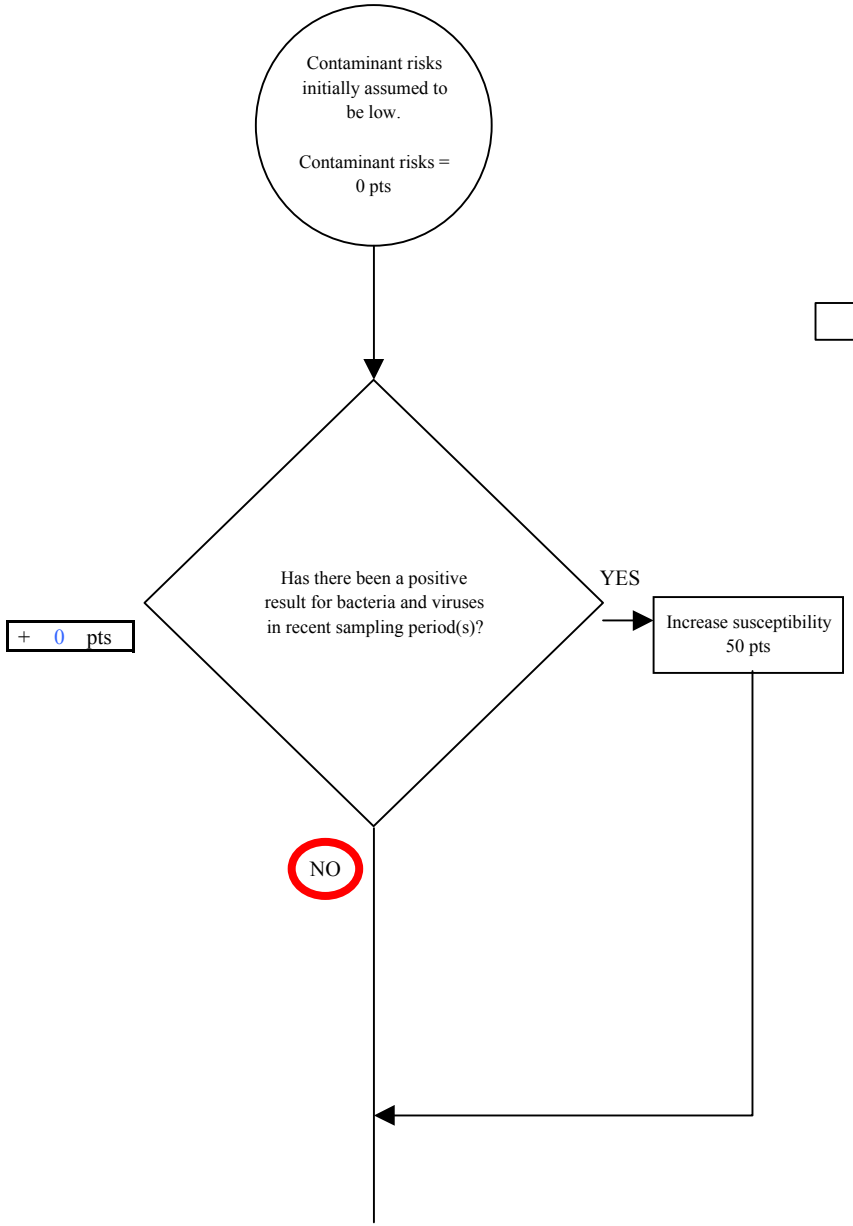
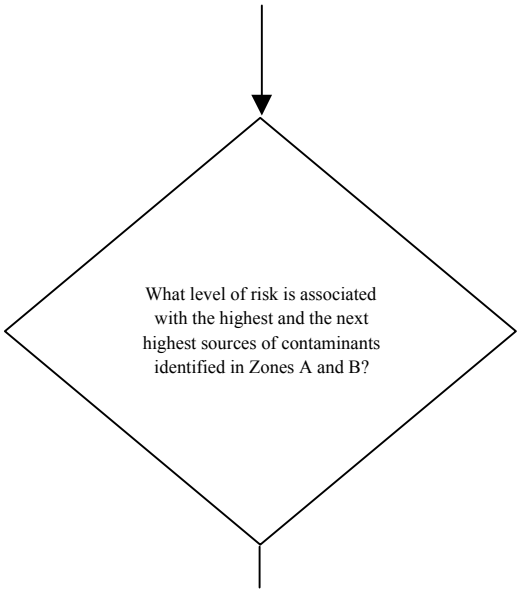


Chart 3. Contaminant risks for Sherwood Estates - Bacteria & Viruses





+ 20 pts

Risk Rankings for Contaminant Sources Identified in Zones A and B

	Zone A	Zone B	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	1	0	1
Low(s)	2	3	5

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 20

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

Chart 3. Contaminant risks for Sherwood Estates - Bacteria & Viruses

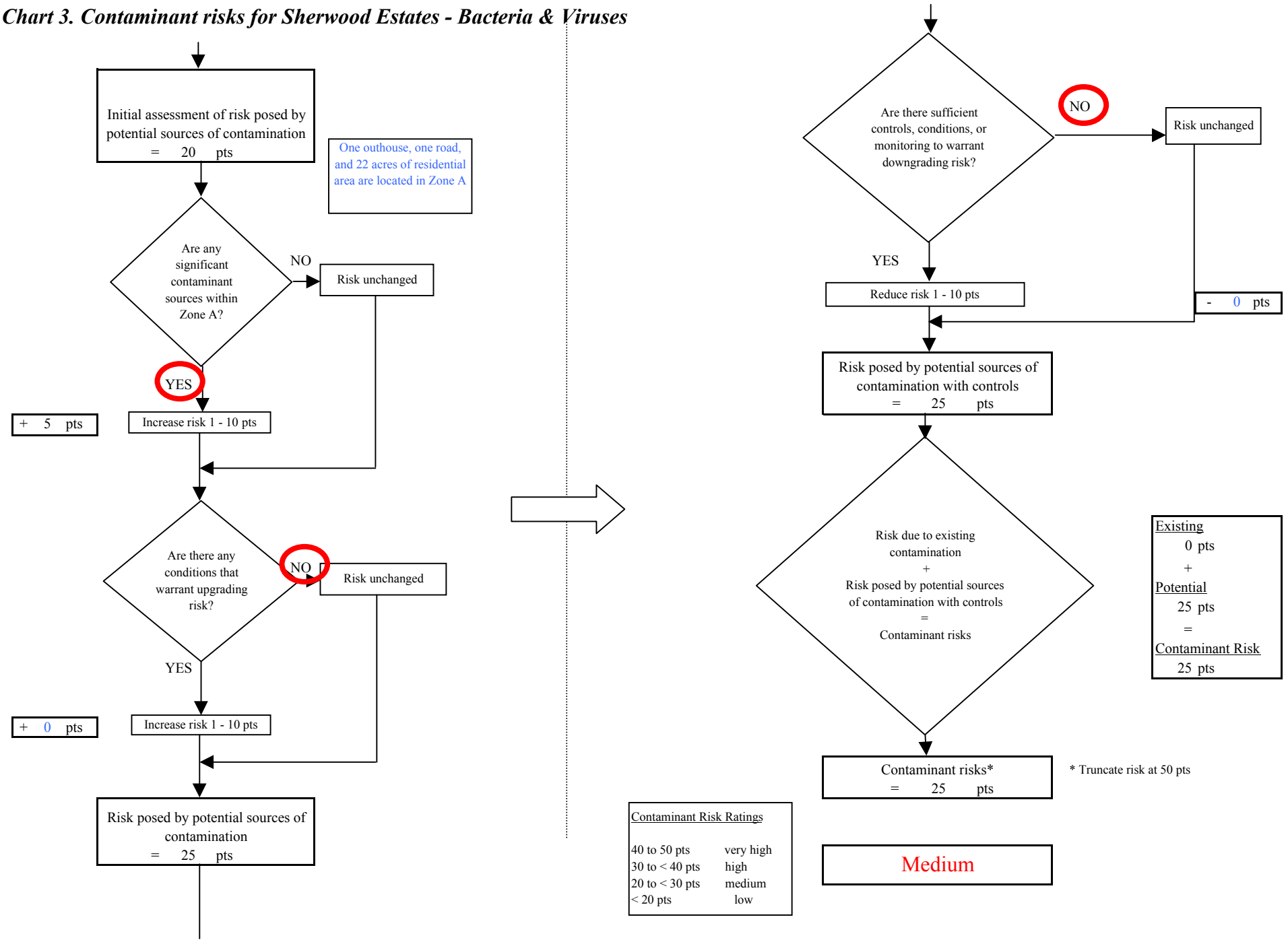


Chart 4. Vulnerability analysis for Sherwood Estates - Bacteria & Viruses

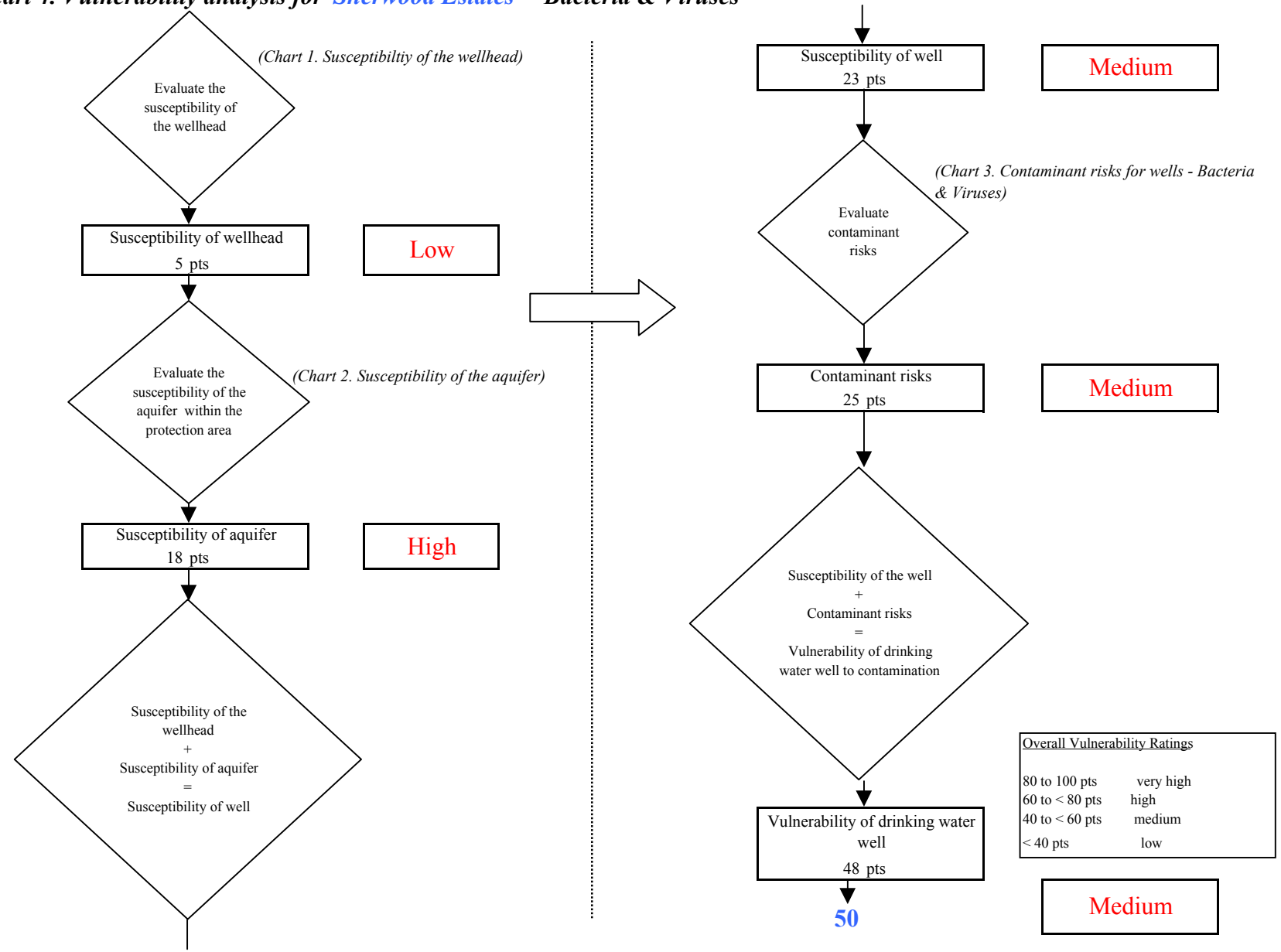


Chart 5. Contaminant risks for Sherwood Estates - Nitrates and Nitrites

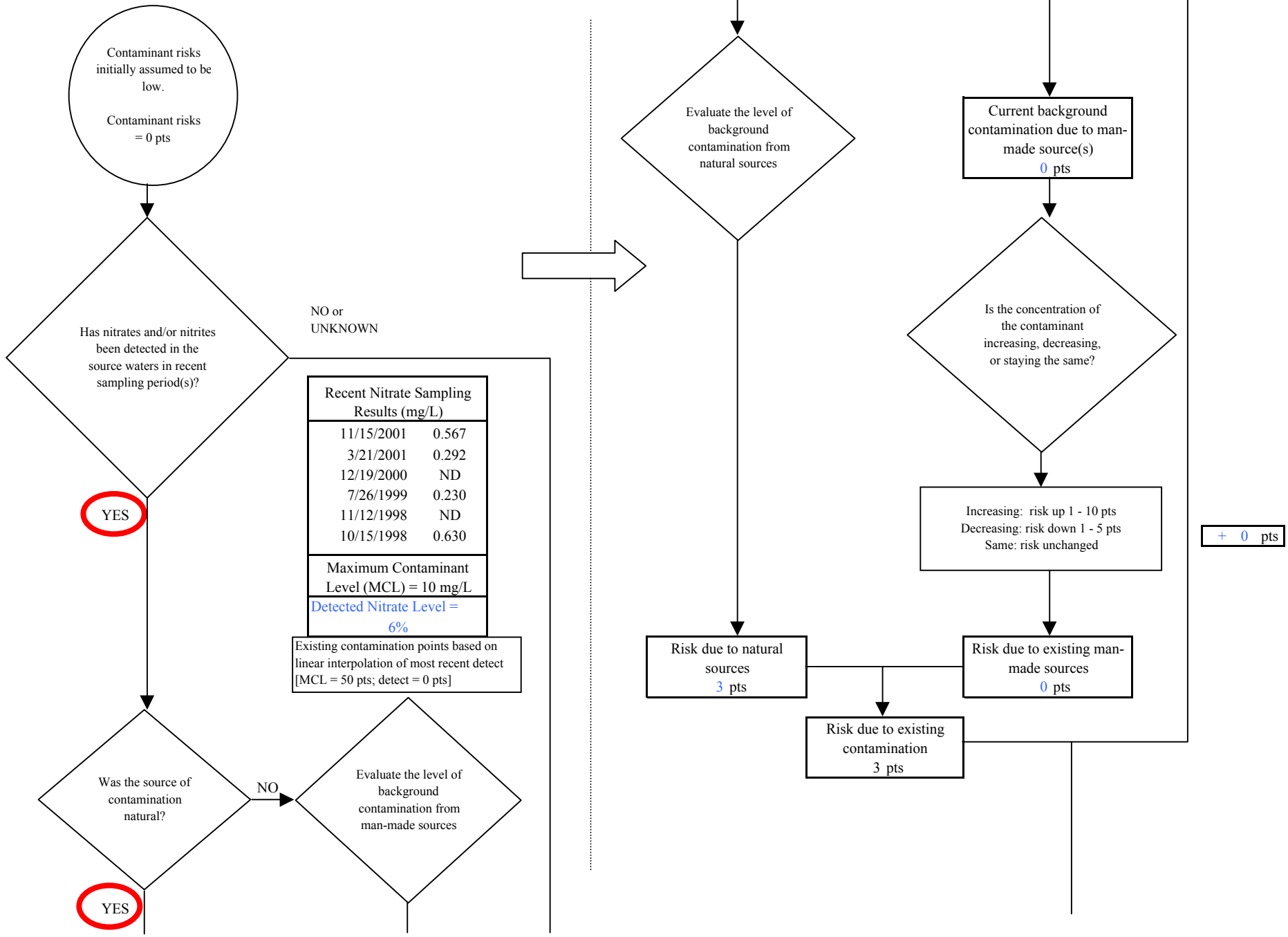


Chart 5. Contaminant risks for Sherwood Estates - Nitrates and Nitrites

+ 10 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

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

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	3	3	6

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 10

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

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

Is the source aquifer fractured rock or karst?

YES

NO

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

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

Risk unchanged

One outhouse, one road, and 22 acres of residential area are located in Zone A

YES

Increase risk 1 - 10 pts

+ 2 pts

Chart 5. Contaminant risks for Sherwood Estates - Nitrates and Nitrites

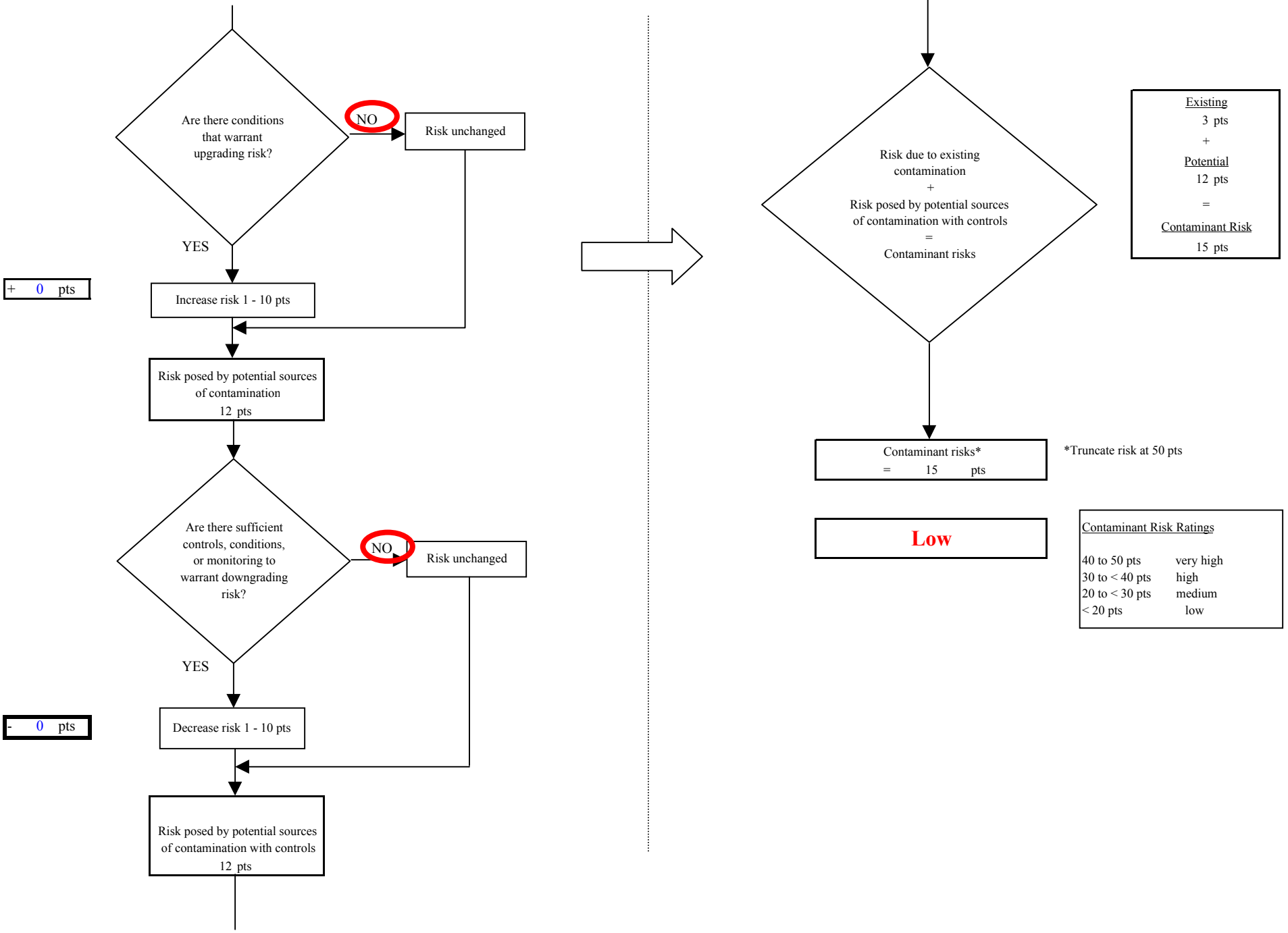


Chart 6. Vulnerability analysis for Sherwood Estates - Nitrates and Nitrites

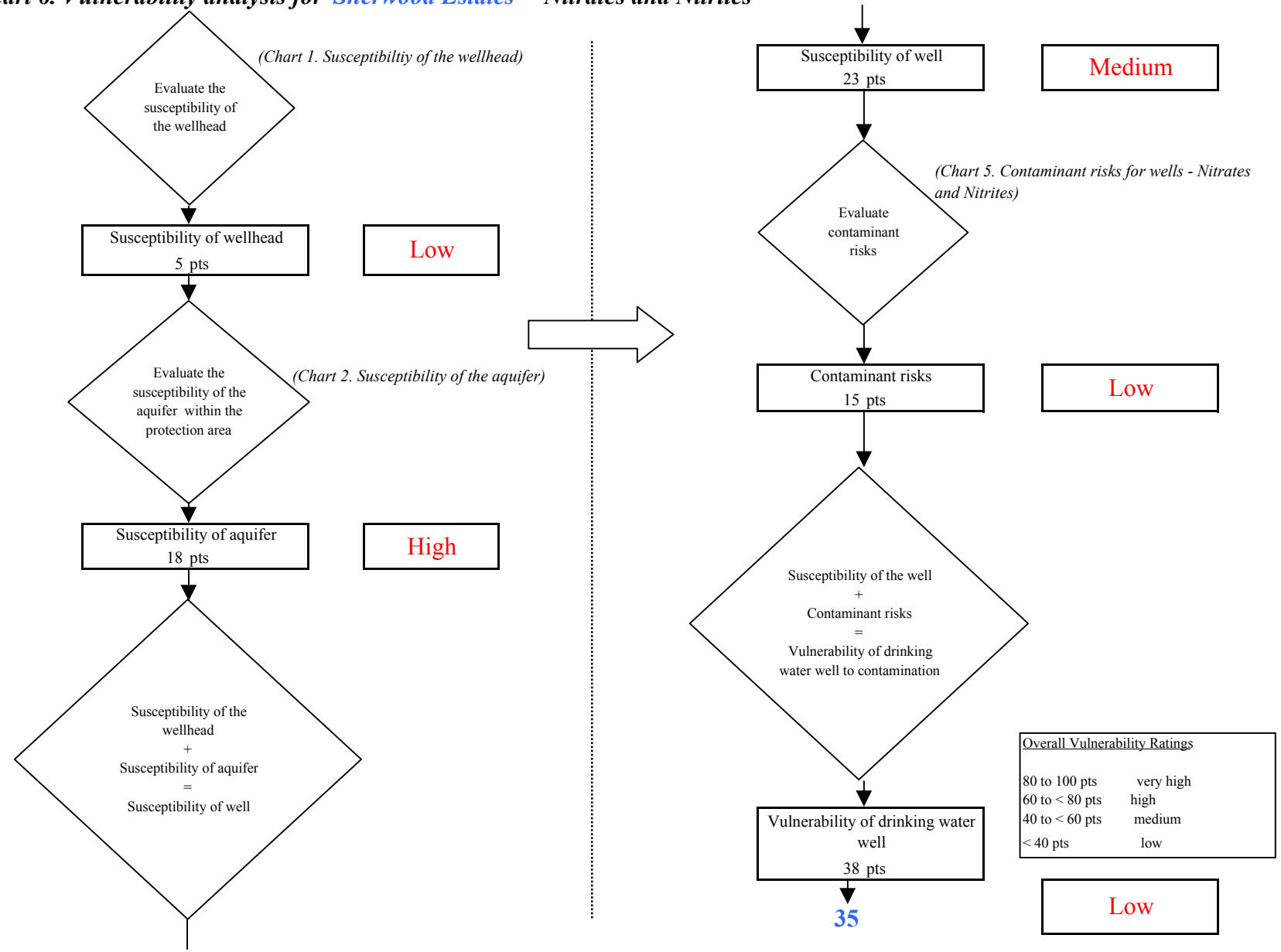


Chart 7. Contaminant risks for Sherwood Estates - Volatile Organic Chemicals

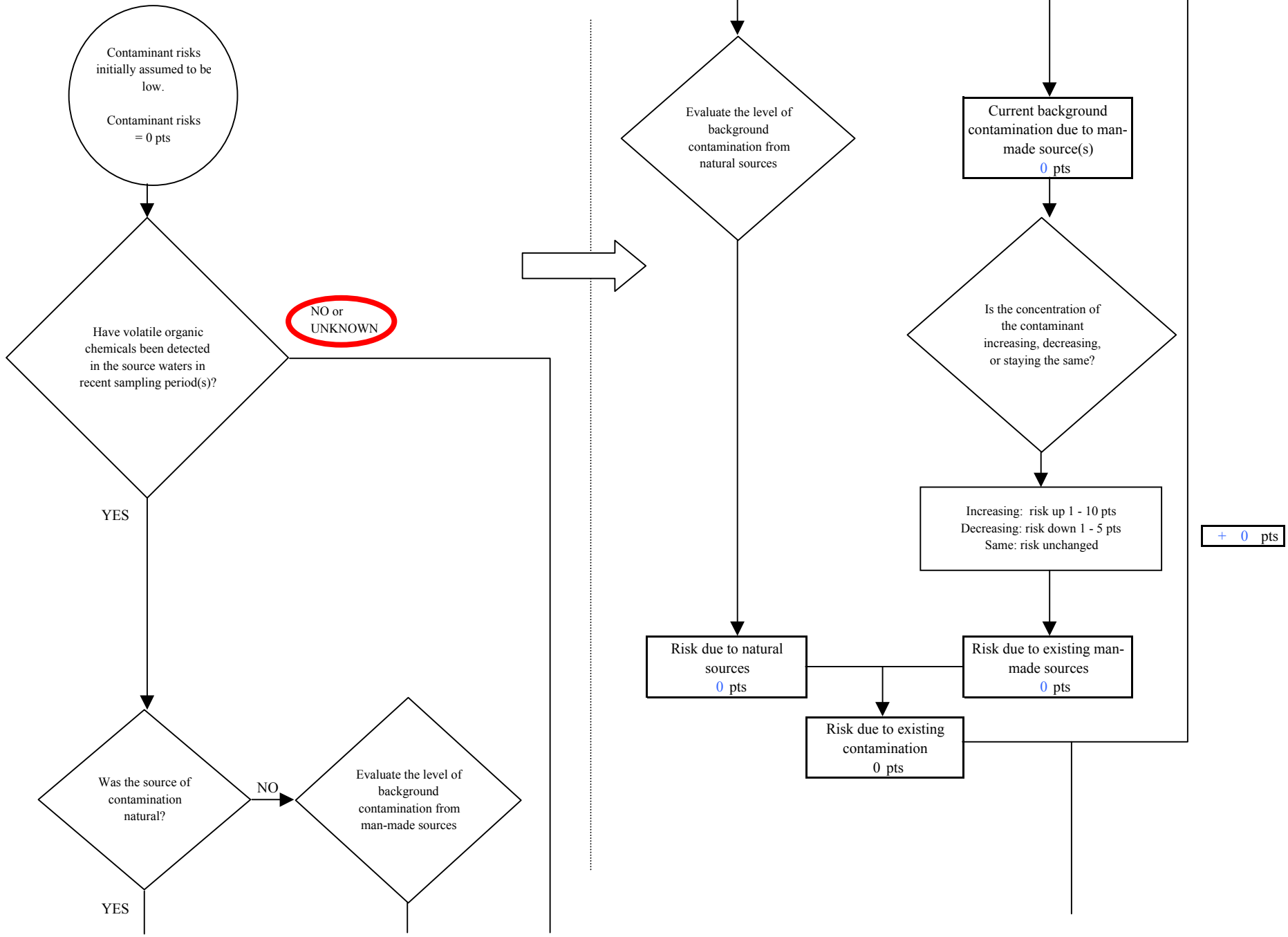


Chart 7. Contaminant risks for Sherwood Estates - Volatile Organic Chemicals

+ 10 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

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

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	3	3	6

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 10

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

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

Is the source aquifer fractured rock or karst?

YES

NO

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

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

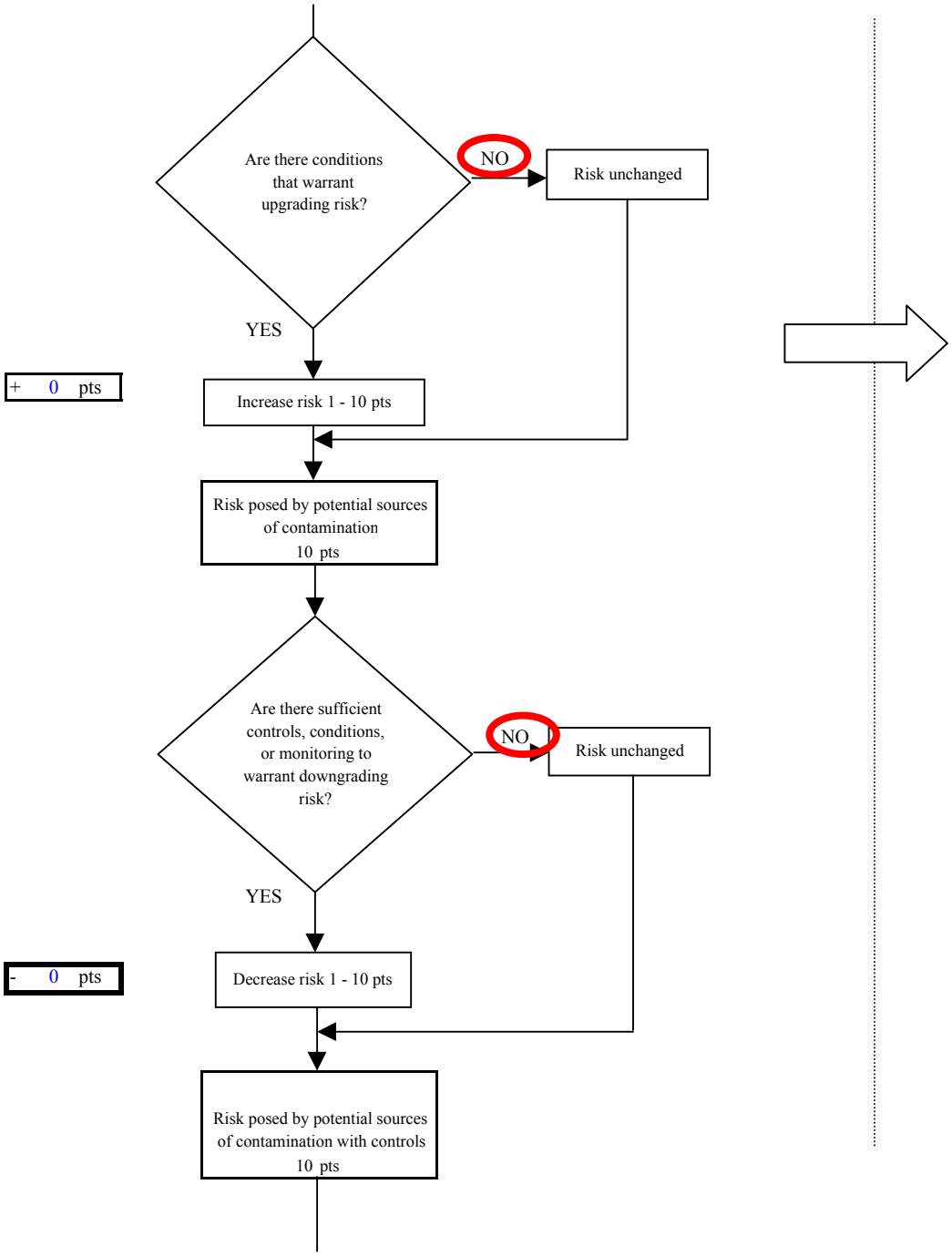
Risk unchanged

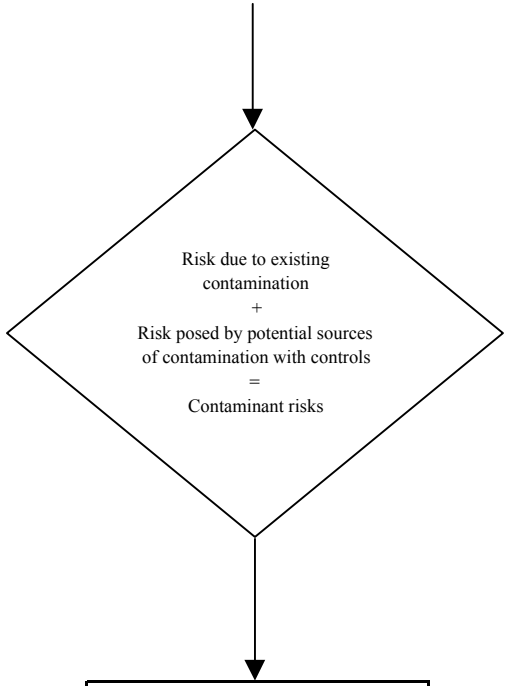
YES

Increase risk 1 - 10 pts

+ 0 pts

Chart 7. Contaminant risks for Sherwood Estates - Volatile Organic Chemicals





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

Contaminant risks*
= 10 pts

*Truncate risk at 50 pts

Low

Contaminant Risk Ratings

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

Chart 8. Vulnerability analysis for Sherwood Estates - Volatile Organic Chemicals

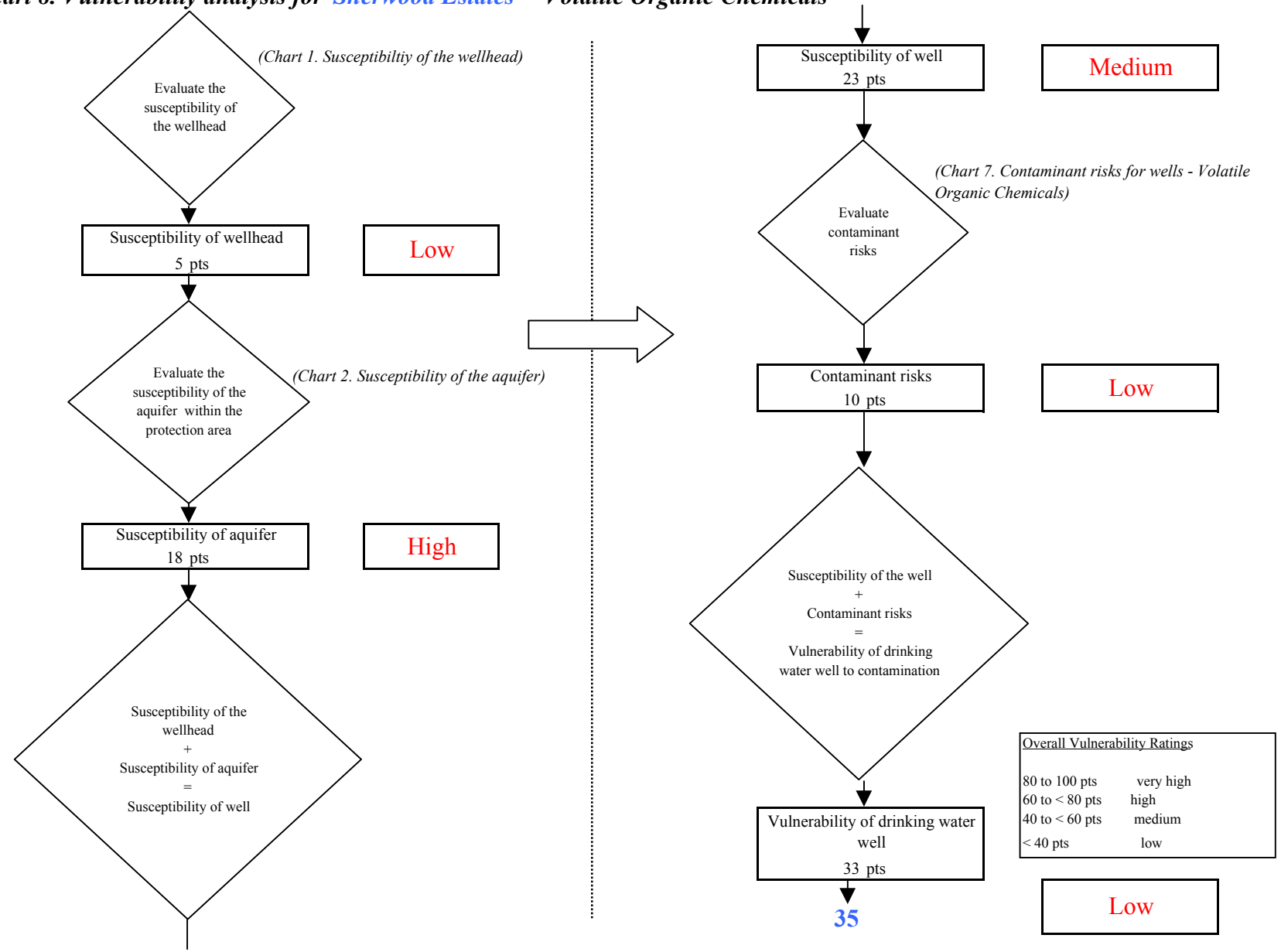


Chart 9. Contaminant risks for Sherwood Estates - Heavy Metals, Cyanide and Other Inorganic Chemicals

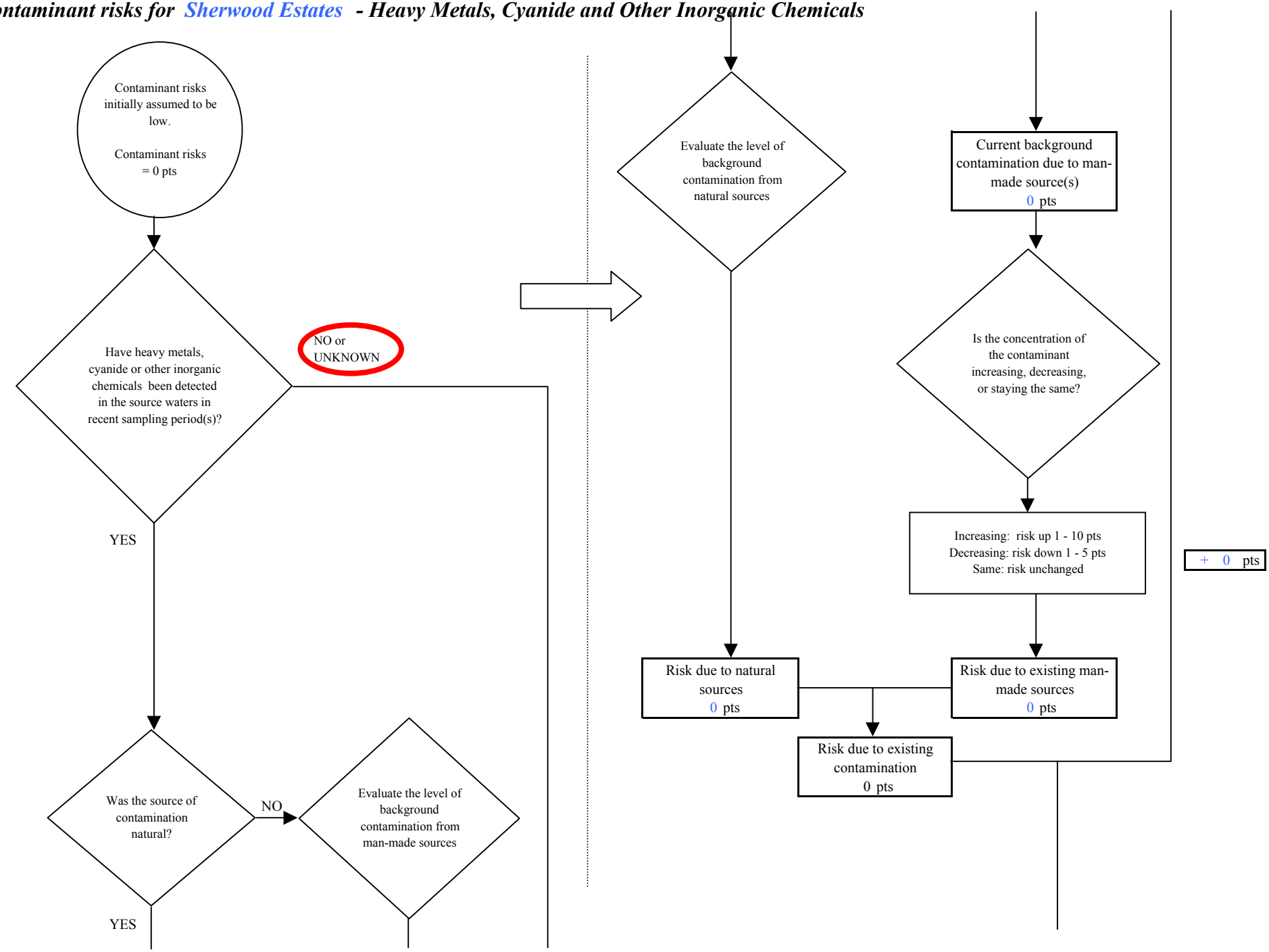


Chart 9. Contaminant risks for Sherwood Estates - Heavy Metals, Cyanide and Other Inorganic Chemicals

+ 10 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

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

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	3	3	6

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 10

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

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

Is the source aquifer fractured rock or karst?

YES

NO

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

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

Risk unchanged

YES

Increase risk 1 - 10 pts

+ 0 pts

Chart 9. Contaminant risks for Sherwood Estates - Heavy Metals, Cyanide and Other Inorganic Chemicals

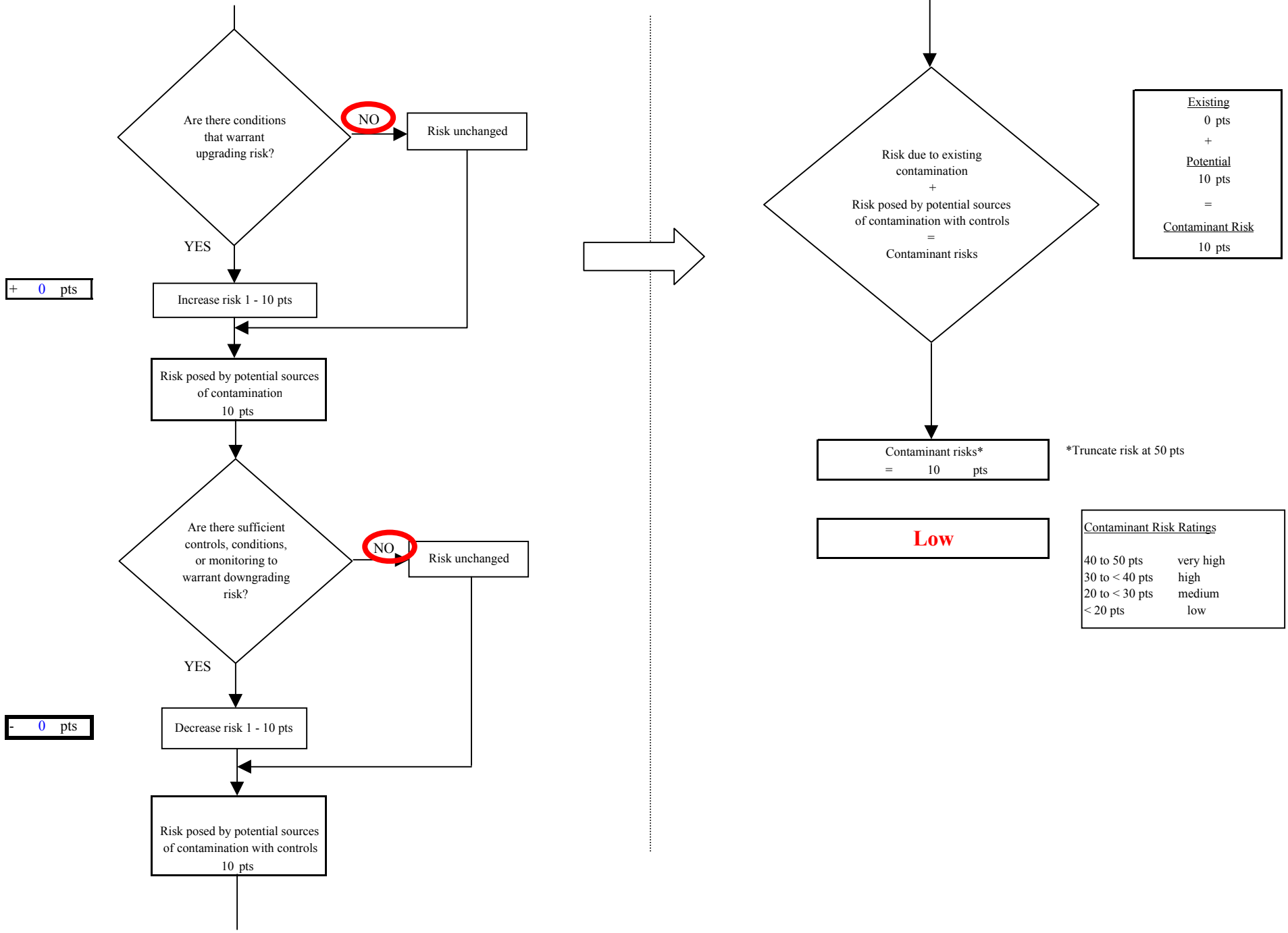


Chart 10. Vulnerability analysis for Sherwood Estates - Heavy Metals, Cyanide and Other Inorganic Chemicals

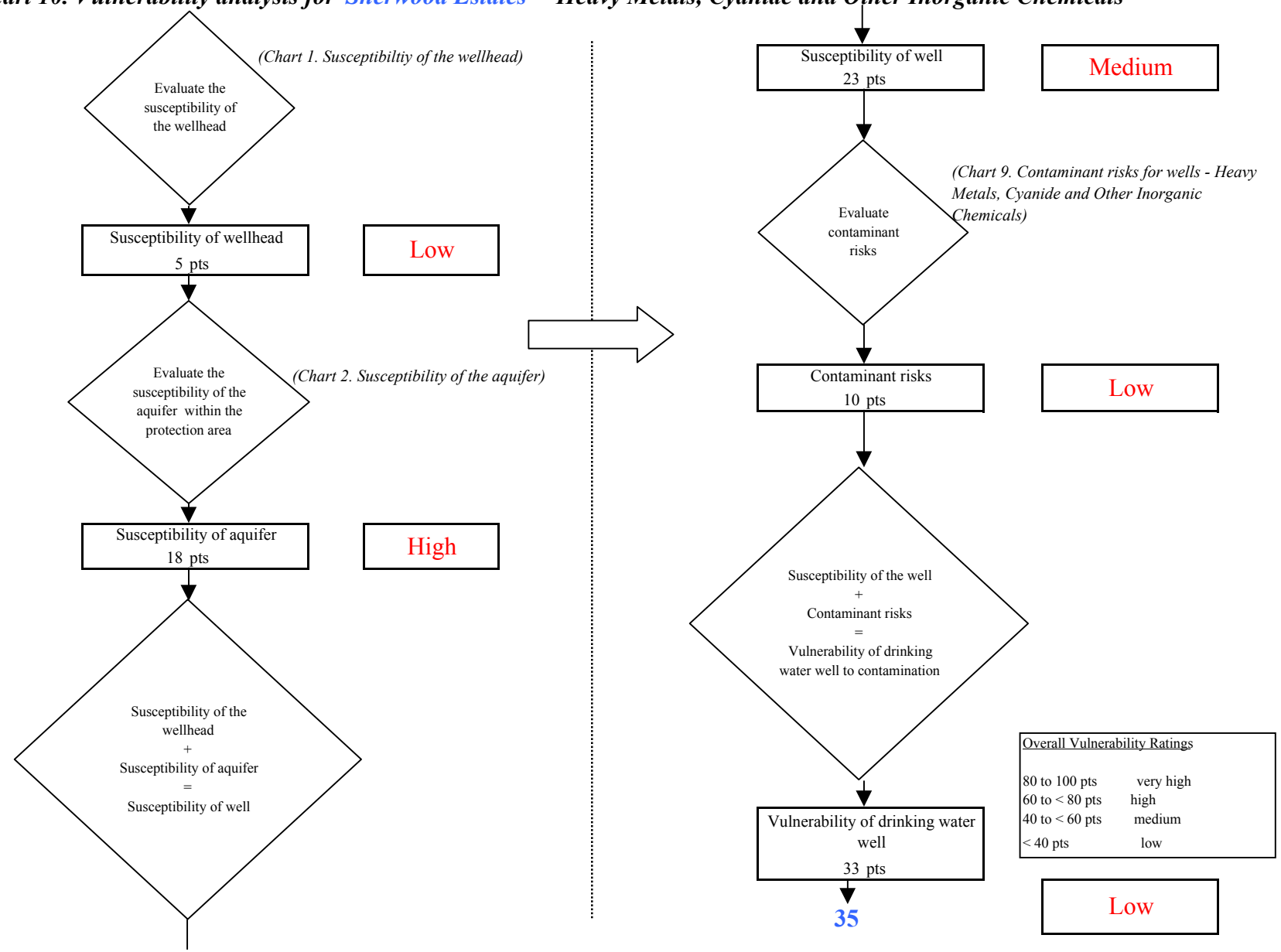


Chart 11. Contaminant risks for Sherwood Estates - Synthetic Organic Chemicals

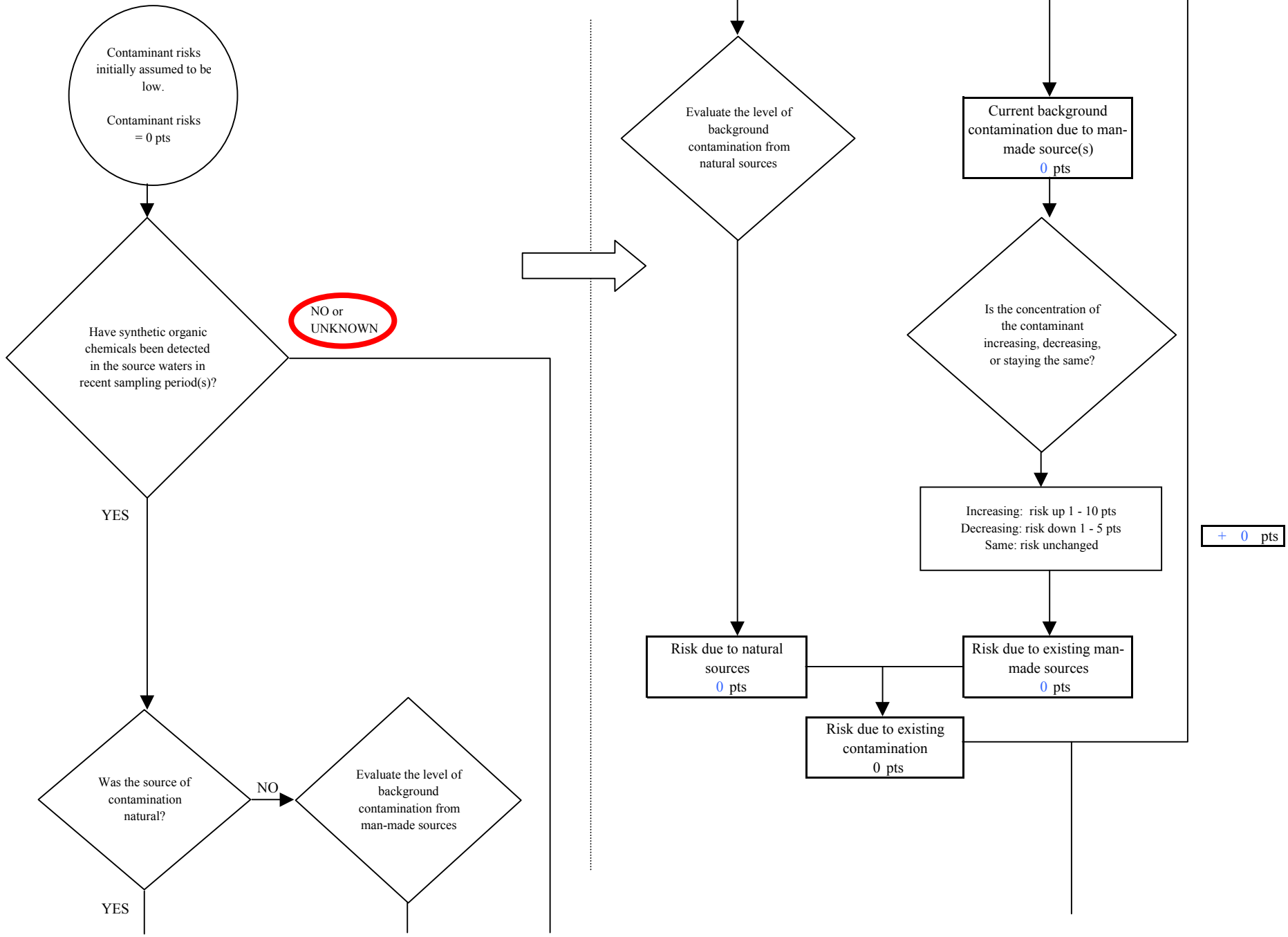
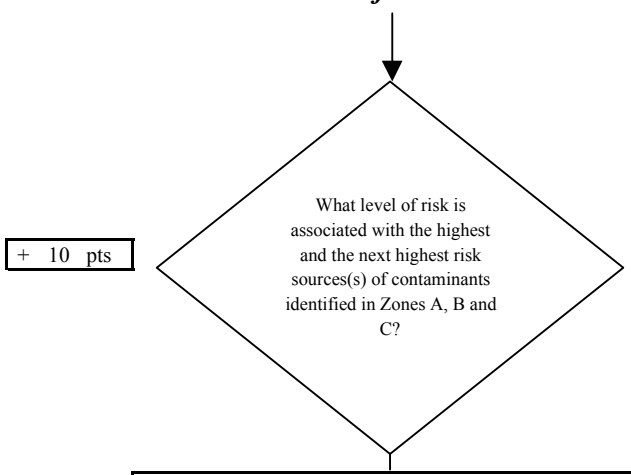


Chart 11. Contaminant risks for Sherwood Estates - Synthetic Organic Chemicals



+ 10 pts

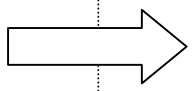
Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	1	2	3

	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.



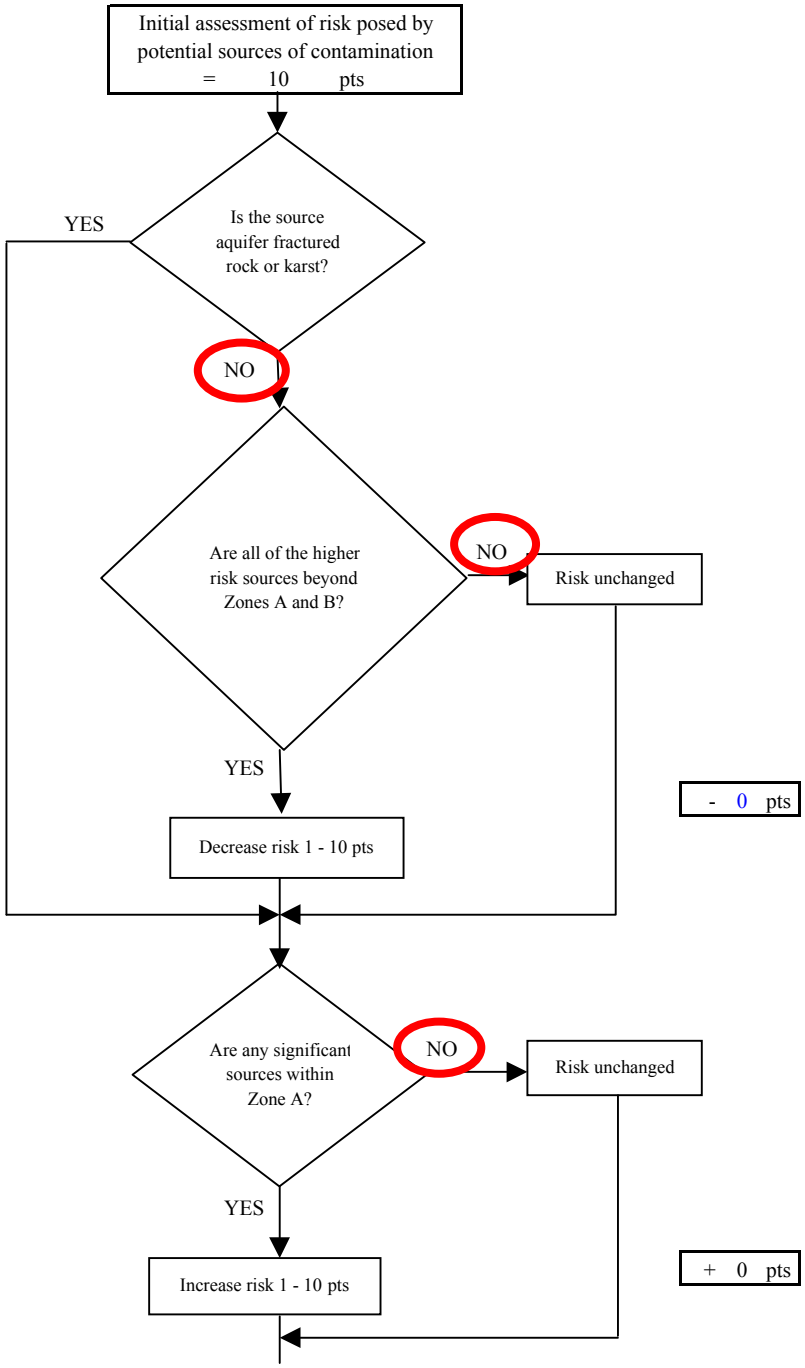
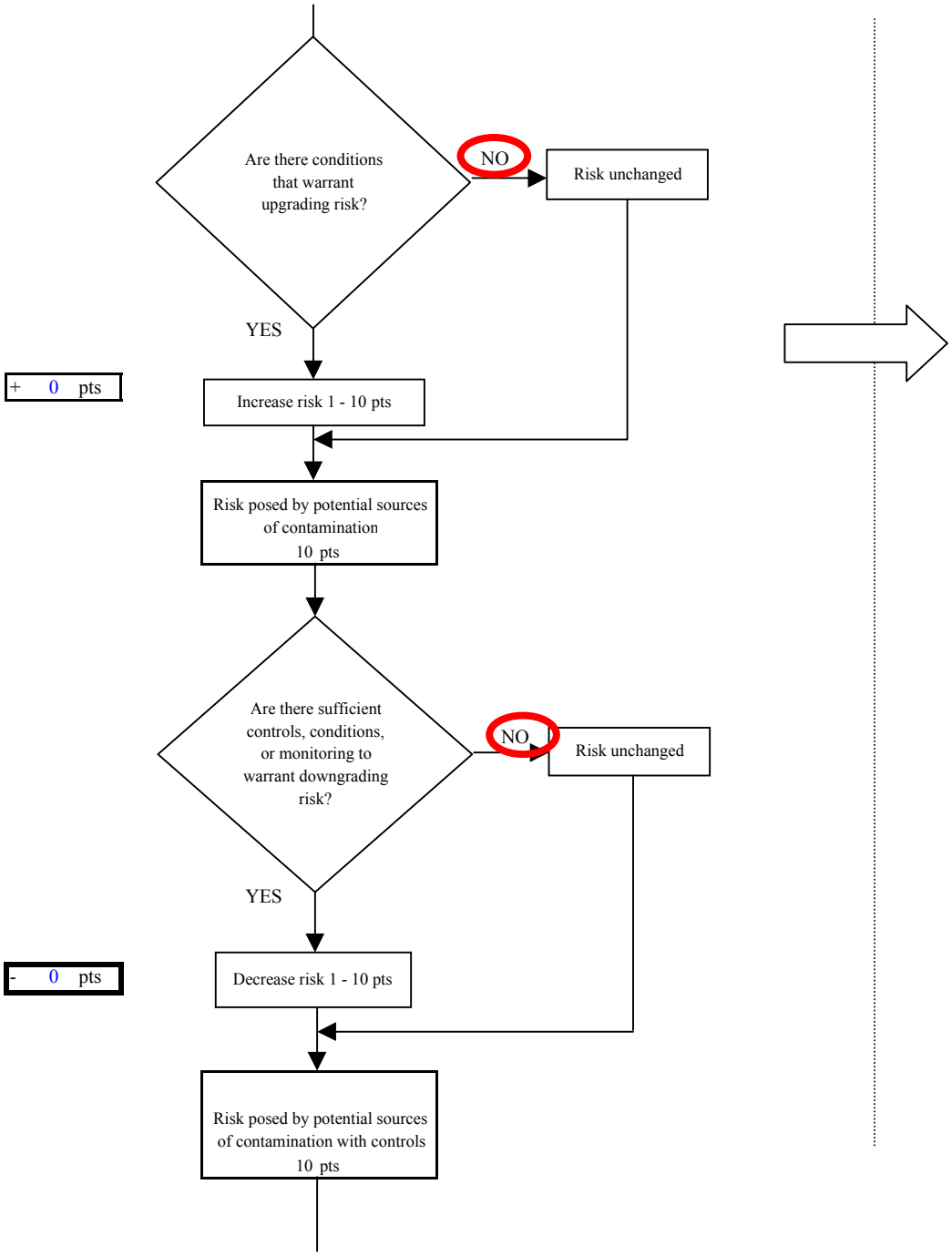
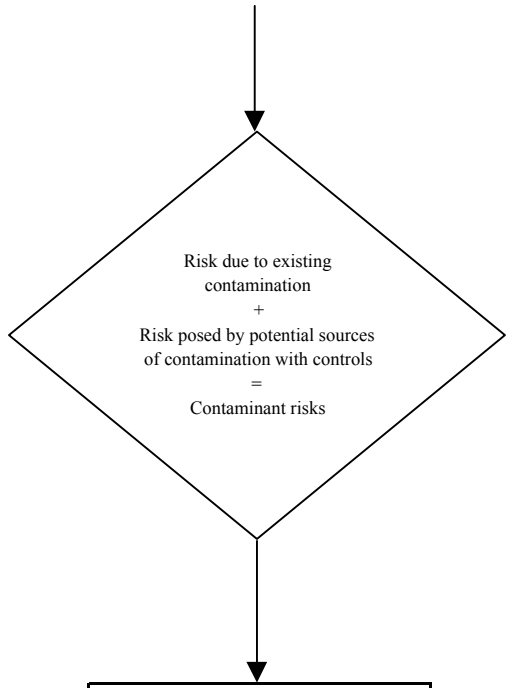


Chart 11. Contaminant risks for Sherwood Estates - Synthetic Organic Chemicals





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

Contaminant risks*
= 10 pts

*Truncate risk at 50 pts

Low

Contaminant Risk Ratings

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

Chart 12. Vulnerability analysis for Sherwood Estates - Synthetic Organic Chemicals

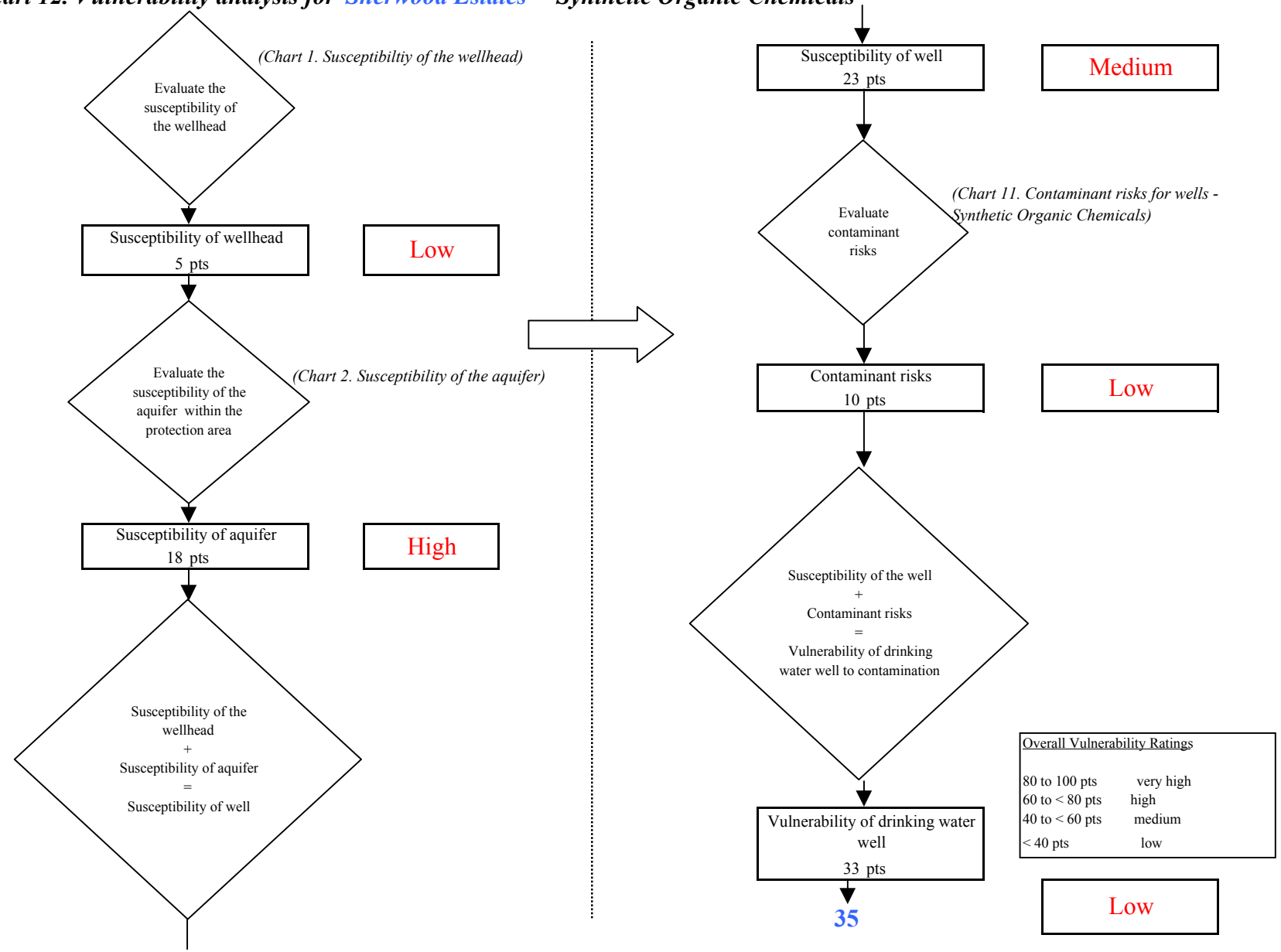


Chart 13. Contaminant risks for Sherwood Estates - Other Organic Chemicals

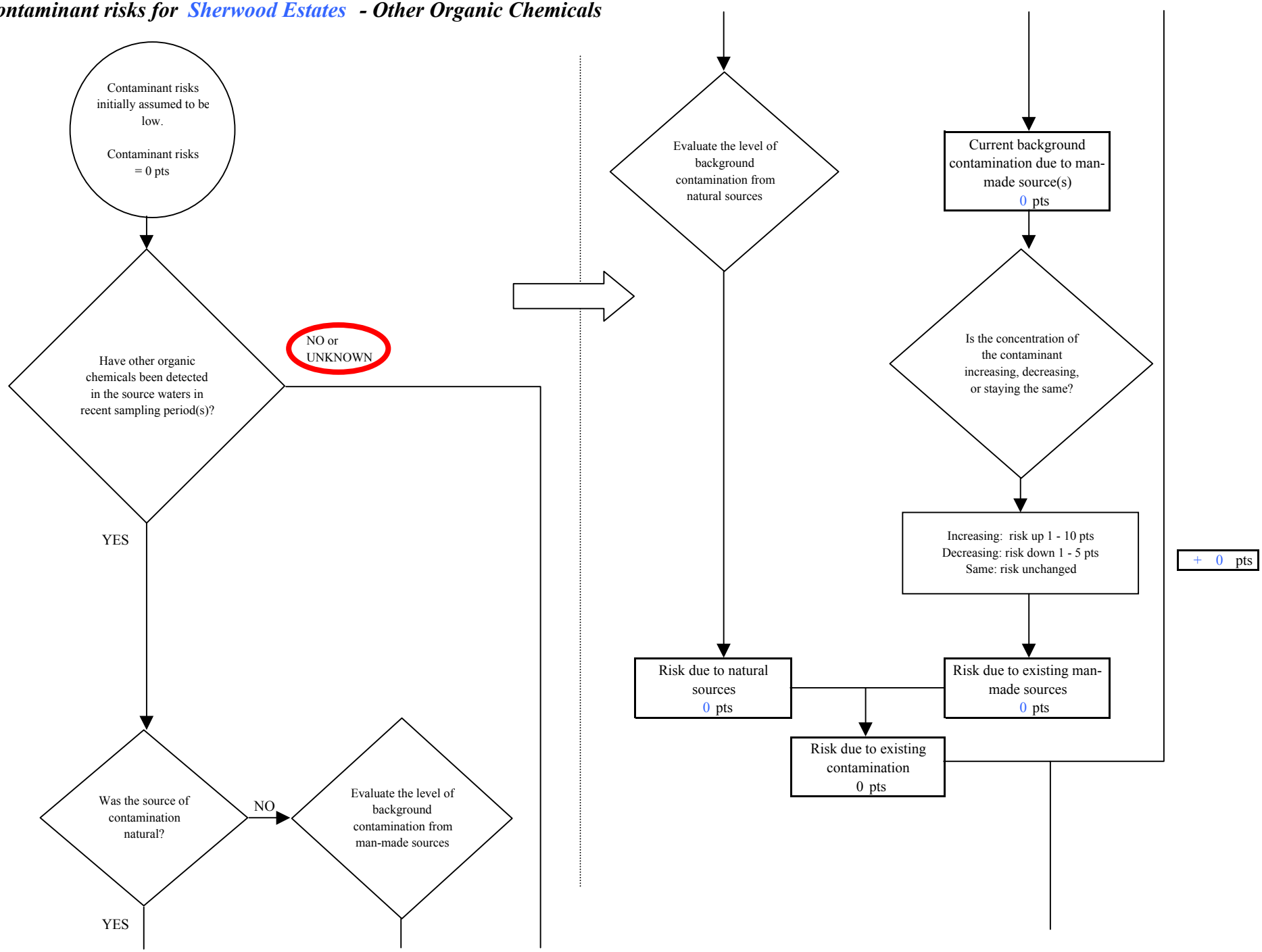


Chart 13. Contaminant risks for Sherwood Estates - Other Organic Chemicals

+ 10 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	2	3	5

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 10

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

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

Is the source aquifer fractured rock or karst?

YES

NO

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

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

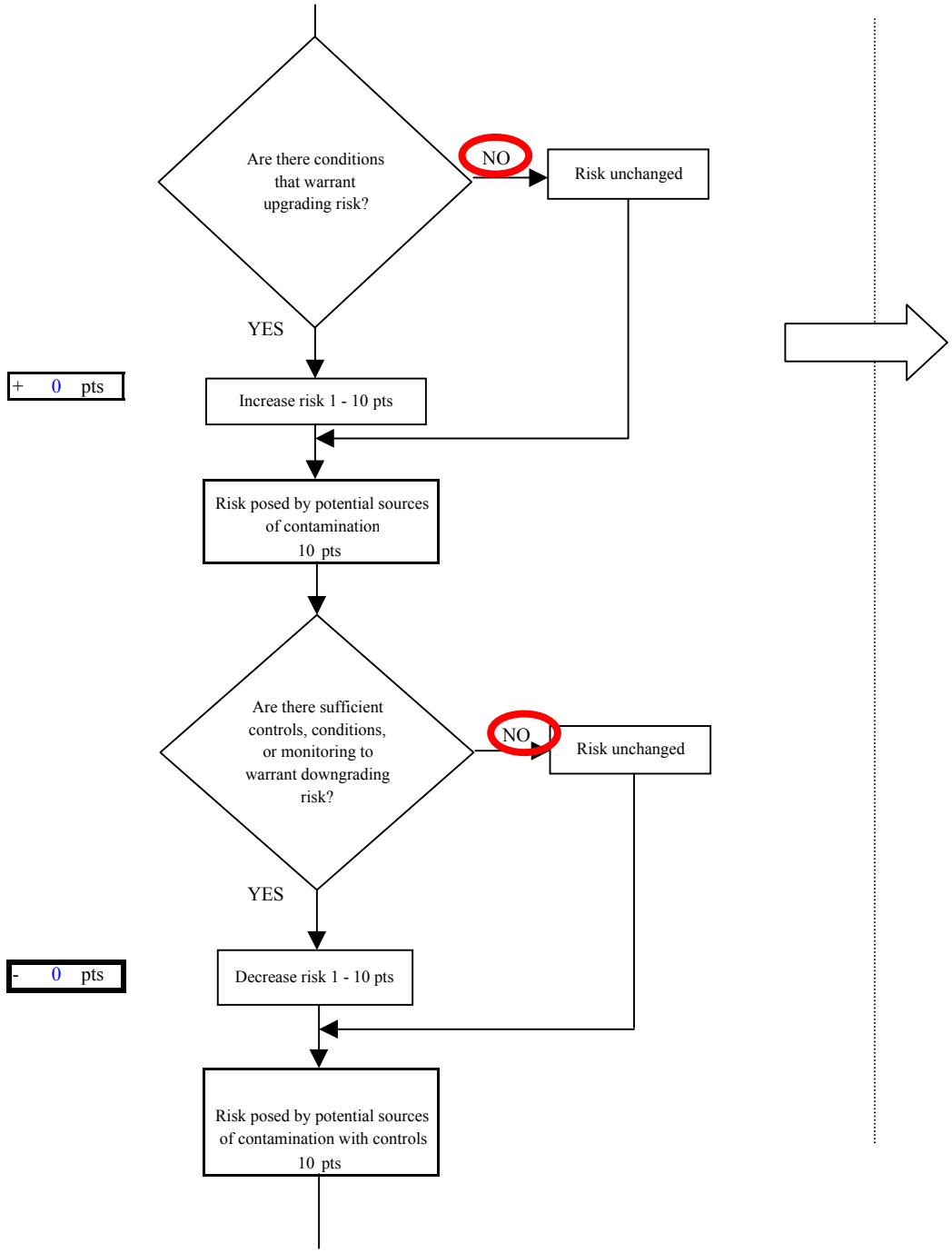
Risk unchanged

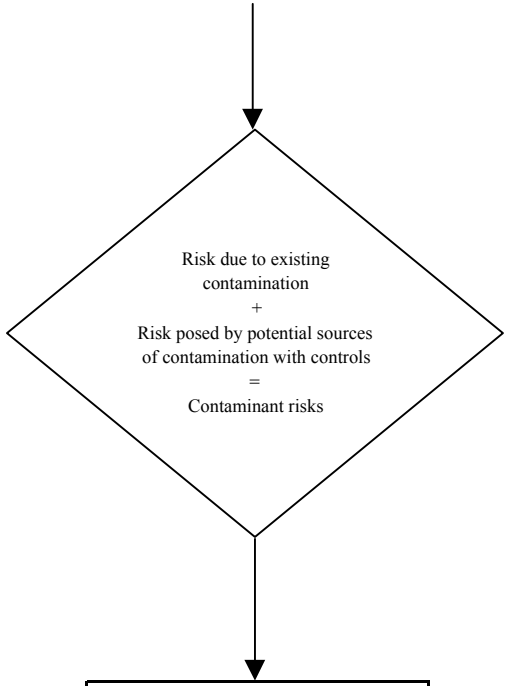
YES

Increase risk 1 - 10 pts

+ 0 pts

Chart 13. Contaminant risks for Sherwood Estates - Other Organic Chemicals





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

Contaminant risks*
= 10 pts

*Truncate risk at 50 pts

Low

Contaminant Risk Ratings

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

Chart 14. Vulnerability analysis for Sherwood Estates - Other Organic Chemicals