

HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD COVER SHEET

Name of Site: North 5th Street Groundwater Contamination

U.S. EPA ID No.: INN000510667

Contact Persons

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Pathways, Components, or Threats Not Scored

The Surface Water Migration Pathway, Soil Exposure and Subsurface Intrusion Pathway, and Air Migration Pathway were not scored as part of this Hazard Ranking System (HRS) documentation record evaluation. These pathways were not included because a release to these media does not significantly affect the overall score for this site and because the Groundwater Pathway produces an overall score above the minimum requirement for the North 5th Street Groundwater Contamination Site to qualify for inclusion on the National Priorities List (NPL).

HRS Documentation Record

Name of Site: North 5th Street Groundwater Contamination

Date Prepared: September 2021

EPA Region: 5

Street Address*: The center of the known groundwater plume is west of North 5th Street, east of North Main St., south of the Maple City Greenway/Pumpkinvine Nature Trail and north of the Norfolk Southern Railroad line (see Figure 3 of this HRS Documentation Record)

City, County, State, Zip Code: Goshen, Elkhart County, Indiana, 46528

General Location in the State: The North 5th Street Groundwater Contamination Site is situated in Elkhart County in Northern Indiana, in the City of Goshen (see Figure 1 of this HRS Documentation Record)

Topographic Map: U.S. Geological Survey 7.5-Minute Topographic Map, Goshen Quadrangle, Indiana-Elkhart County (Ref. 4, p. 1; Figure 2)

Latitude: 41.590439

Longitude: -85.833834

Reference Point: Center of Groundwater Plume
(Figure 3 of this HRS Documentation Record)

Congressional District: 2

*The street address, coordinates, and contaminant locations presented in this HRS Documentation Record identify the general area the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, disposed, or placed, or has otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under CERCLA. Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

**"Ground water" and "groundwater" are synonymous; the spelling is different due to "ground water" being codified as part of the HRS, while "groundwater" is the modern spelling.

Pathway Scores for North 5th Street Groundwater Contamination Site

Air Migration Pathway:	Not Scored
Surface Water Migration Pathway:	Not Scored
Soil Exposure and Subsurface Intrusion Pathway:	Not Scored
Ground Water Migration Pathway **:	100.00

HRS Site Score:	50.00
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WORKSHEET FOR COMPUTING HRS SITE SCORE

		<u>S</u>	<u>S²</u>
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	100.00	10,000.00
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	NS	NS
2b.	Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	NS	NS
2c.	Surface Water Migration Pathway Score (S_{sw}) (enter the larger of lines 2a and 2b as the pathway score)	NS	NS
3.	Soil Exposure and Subsurface Intrusion Pathway Score (S_{sessi}) (from Table 5-1, line 22)	NS	NS
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	NS	NS
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_{sessi}^2 + S_a^2$	10,000.00	
6.	HRS Site Score (divide the value on line 5 by 4 and take the square root)	50.00	

Notes: NS = Not Scored

HRS Table 3-1 – Ground Water Migration Pathway Scoresheet

Factor Categories and Factors	Maximum Value	Value Assigned
Likelihood of Release to an Aquifer:		
1. Observed Release	550	550.00
2. Potential to Release:		
2a. Containment	10	NS
2b. Net Precipitation	10	NS
2c. Depth to Aquifer	5	NS
2d. Travel Time	35	NS
2e. Potential to Release [(lines 2a x (2b + 2c + 2d))]	500	NS
3. Likelihood of Release (higher of lines 1 and 2e)	550	550.0
Waste Characteristics:		
4. Toxicity/Mobility	(a)	10,000.0
5. Hazardous Waste Quantity	(a)	100.0
6. Waste Characteristics	100	32.0
Targets:		
7. Nearest Well	(b)	45.0
8. Population:		
8a. Level I Concentrations	(b)	NS
8b. Level II Concentrations	(b)	14,340.0
8c. Potential Contamination	(b)	734
8d. Population (lines 8a + 8b + 8c)	(b)	15,074.0
9. Resources	5	NS
10. Wellhead Protection Area	20	20.0
11. Targets (lines 7 + 8d + 9 + 10)	(b)	15,139.0
Ground Water Migration Score For An Aquifer:		
12. Aquifer Score [(lines 3 x 6 x 11)/82,500] ^c	100	100.0
Ground Water Migration Pathway Score:		
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated) ^c	100	100.00

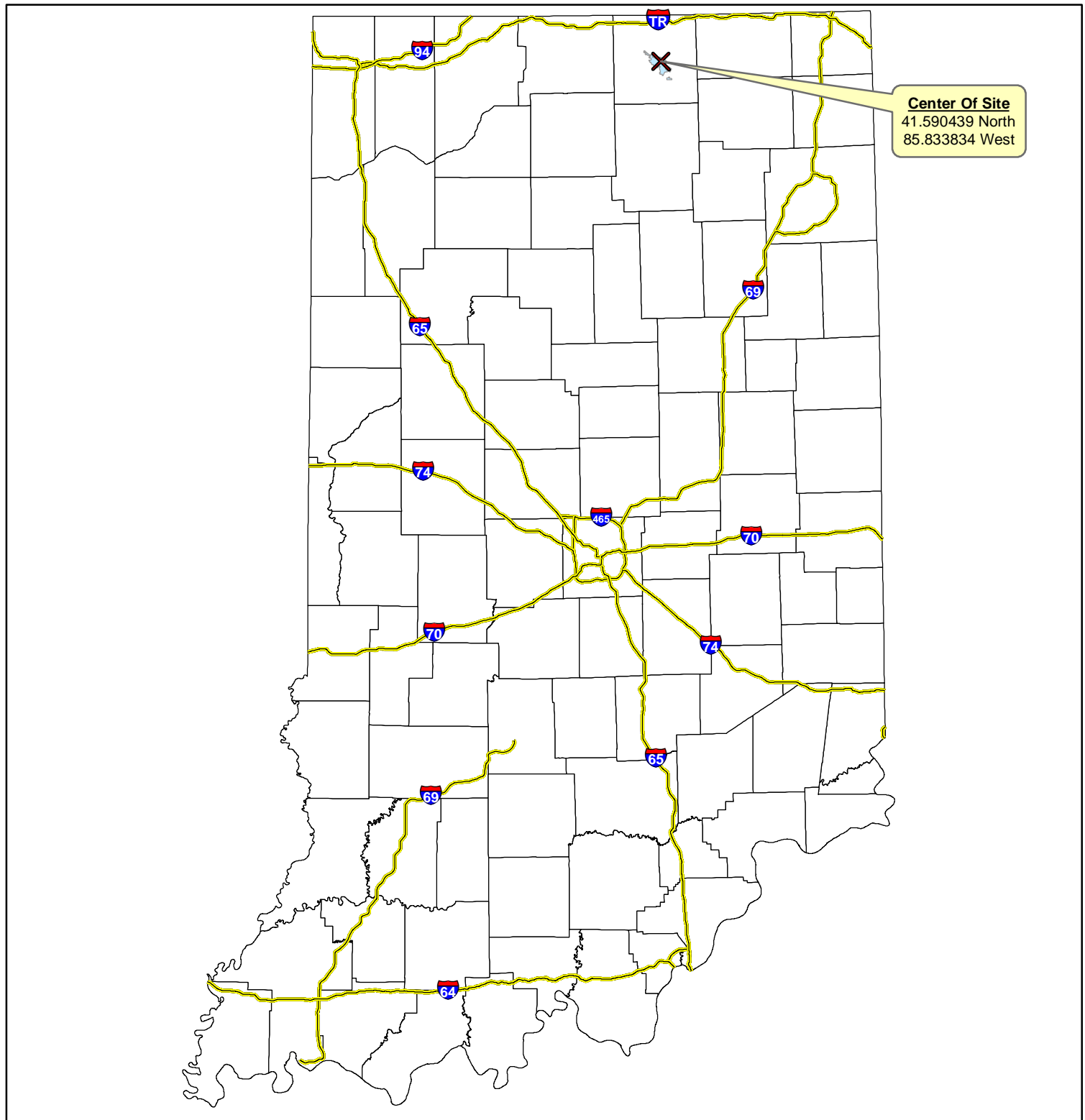
(a) Maximum value applies to waste characteristics category

(b) Maximum value not applicable

(c) Do not round to nearest integer

NS - Not Scored

Figure 1
North 5th Street Groundwater Contamination Site Location Map (EPA ID INN000510667)



Mapped By: Shane Moore, IDEM, Office of Land Quality, Science Services Branch, Engineering and GIS Services, Jan. 11, 2021

Source Info: Non-Orthophotography data obtained from the State of Indiana Geographical Information Office library

Map Projection: UTM Zone 16 N

Disclaimer: This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

	Site Location
	City of Goshen
	County Boundary

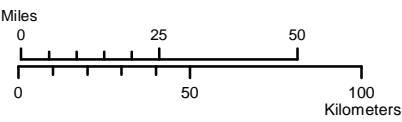
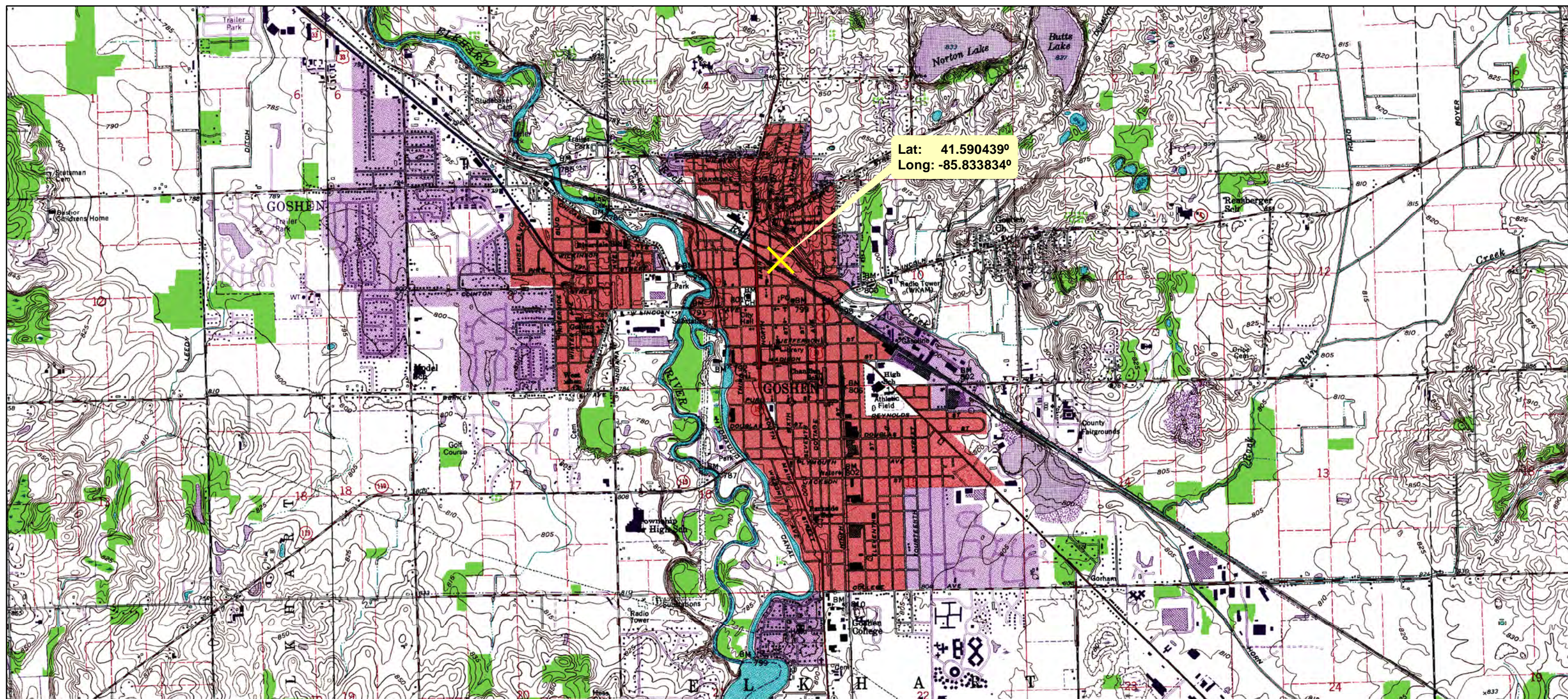


Figure 2
North 5th Street Groundwater Contamination Site Topographic Map
Goshen Quadrangle, Indiana - Elkhart County



Mapped By: Shane Moore, IDEM, Office of Land Quality, Science Services Branch, Engineering & GIS Services, January 21, 2021

Sources:
 -Site boundary obtained from Elkhart County parcels, State of Indiana Geographic Information Officer (GIO) Database.
 -Digital USGS 7.5' Topographic Quadrangle

Disclaimer: This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purpose.



X Site Location

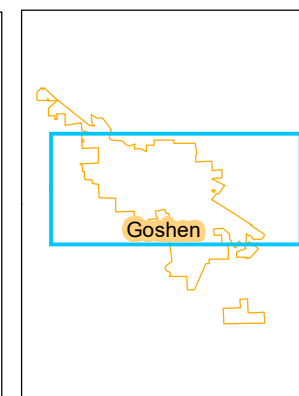
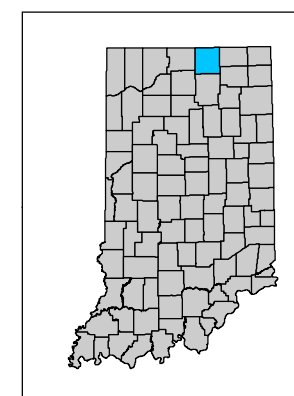
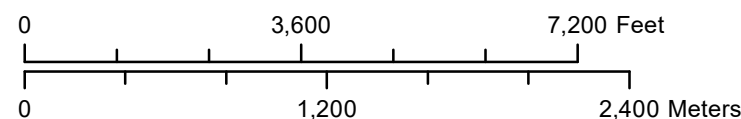
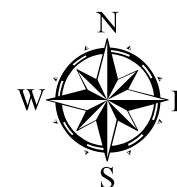
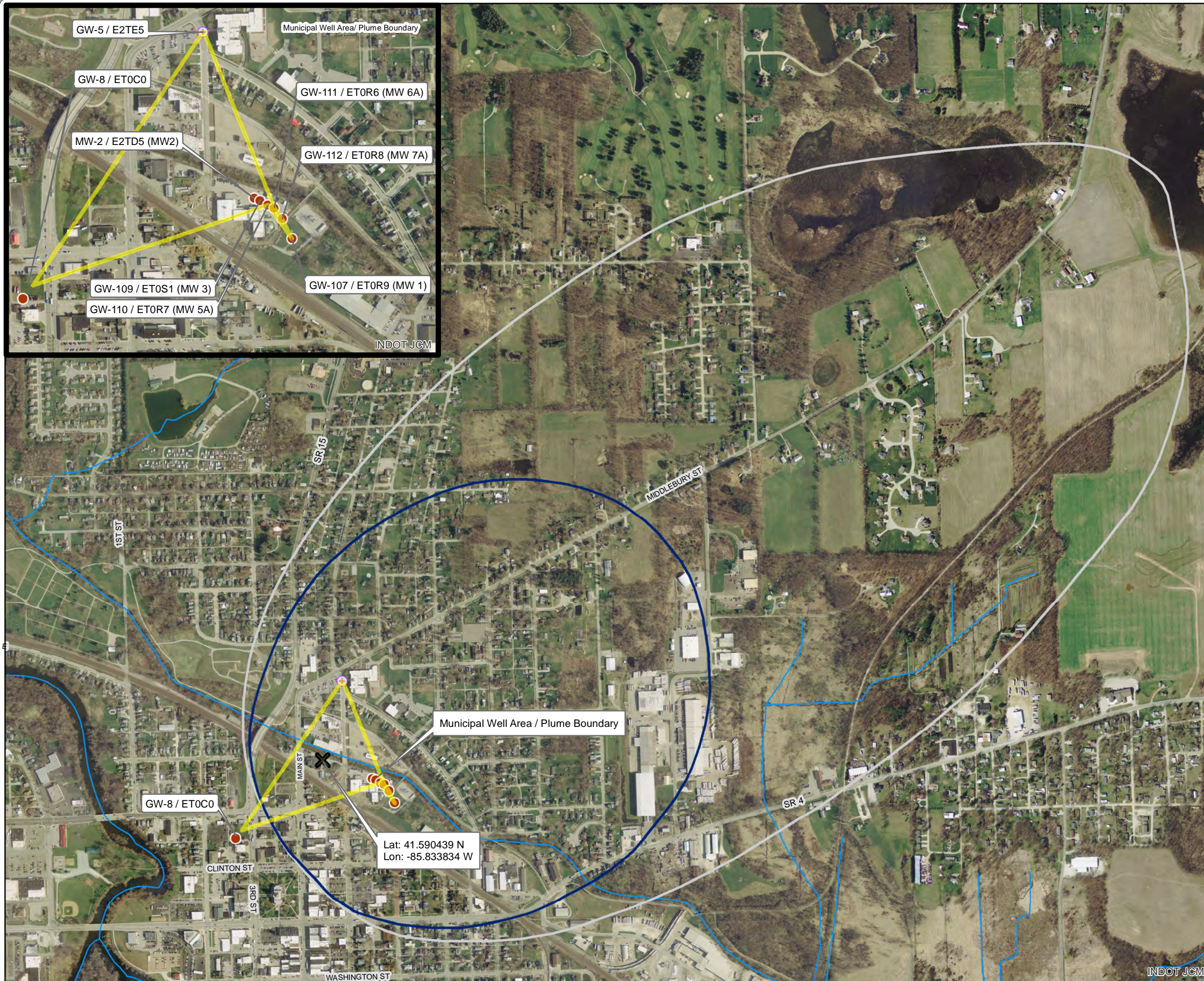


Figure 3
North 5th Street
Groundwater Contamination
Site Location Map Showing
Groundwater Plume Boundary and
Wellhead Protection Area
Goshen
Elkhart County, Indiana



- Plume Boundary
- + SI Groundwater Sample Location (June 2015)
- Municipal Well
- X Site Location
- Wellhead Protection Area (1yr)
- Wellhead Protection Area (5yr)



Mapped By: Shane Moore, IDEM, Office of Land Quality, Science Services Branch, Engineering & GIS Services, Jan. 11, 2021

Sources: - Non orthophotography data obtained from the State of Indiana Geographic Information Office Library
 - Orthophotography obtained from State of Indiana Best Available Orthophotography various years 2013 to 2018

Projection: UTM Zone 16 N

Datum: NAD83

Disclaimer: This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.



Figure 4
North 5th Street
Groundwater Contamination
Sample Locations and Results Map
With Plume
Goshen
Elkhart County, Indiana

- Plume Boundary
- SI Groundwater Sample Location and Results (June 2015)
- ESI Groundwater Sample Location and Results (September 2017)
- Supplemental ESI Groundwater Sample Location and Results (September 2018)
- Wellhead Protection Area (1yr)
- Wellhead Protection Area (5yr)

All units measured in Micrograms Per Liter (µg/L)

ND = Non-Detect

J = Estimated

* Above 3X CRQL's (Contract Required Quantitation Limits) and 3X background

**Concentrations of cis-1,2-DCE in samples E2TD8 and E2TE0 exceed the instrument's calibration range. Samples were reanalyzed using dilution factor and the result and CRQL for cis-1,2-DCE are reported from the diluted analysis (E2TD8DL and E2TE0DL).



Mapped By : Shane Moore , IDEM, Office of Land Quality, Science Services Branch, Engineering & GIS Services, Jan. 11, 2021

Sources: - Non orthophotography data obtained from the State of Indiana Geographic Information Office Library

- Indiana orthophotography including best available data from statewide survey in 2011, 2012 and 2013 as well as county updates (Harrison, Monroe, Vanderburgh, Wabash) from 2014.

- Sample locations and results obtained from IDEM OLQ Sampling Database

Documents : Ref. 6, pp. 11 -12; Ref. 12, pp. 26 103-105; Ref. 13, pp. 47-48, 50-51

Projection: UTM Zone 16 N

Datum: NAD83

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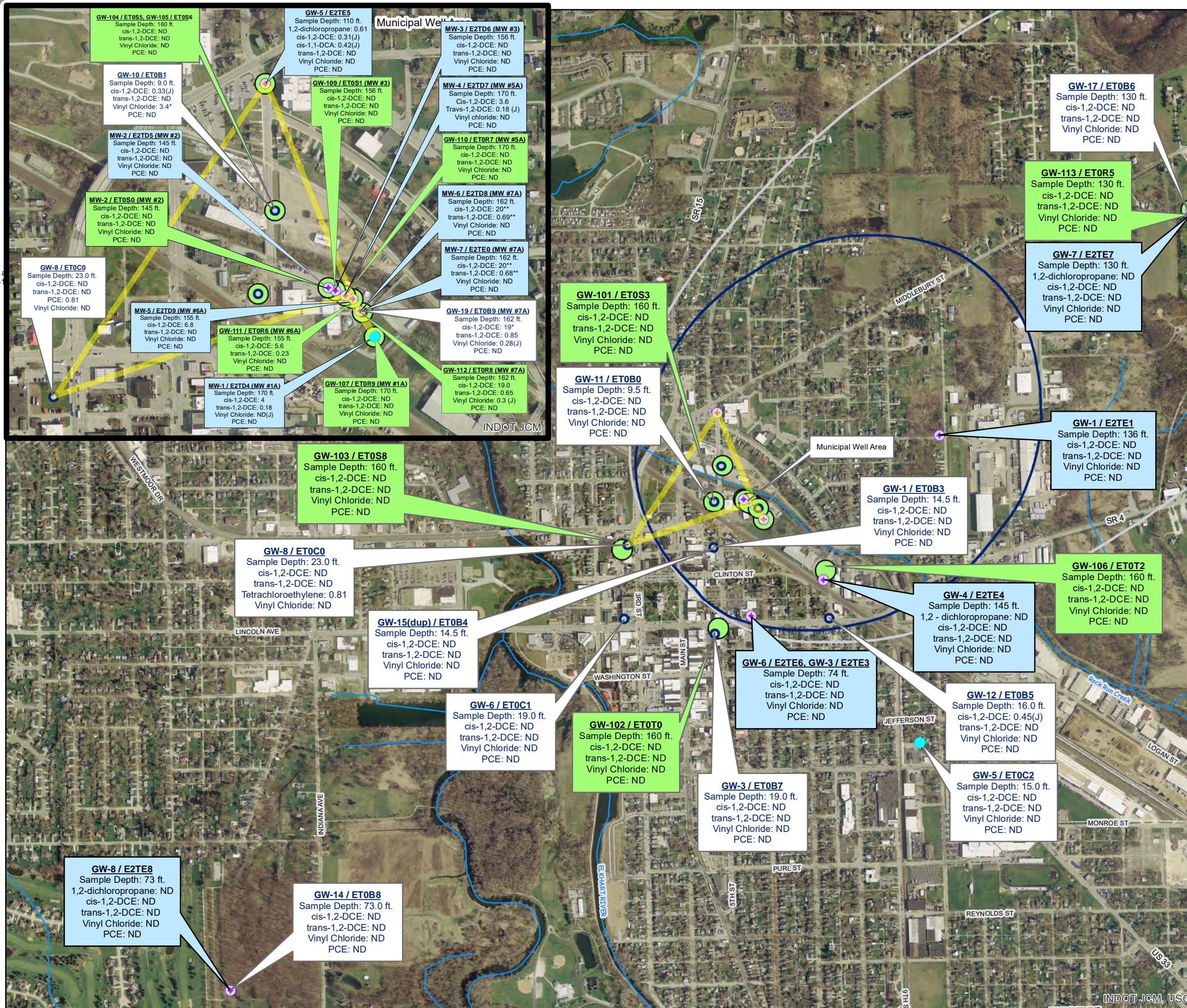
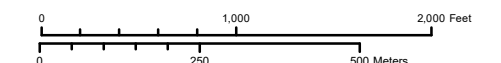
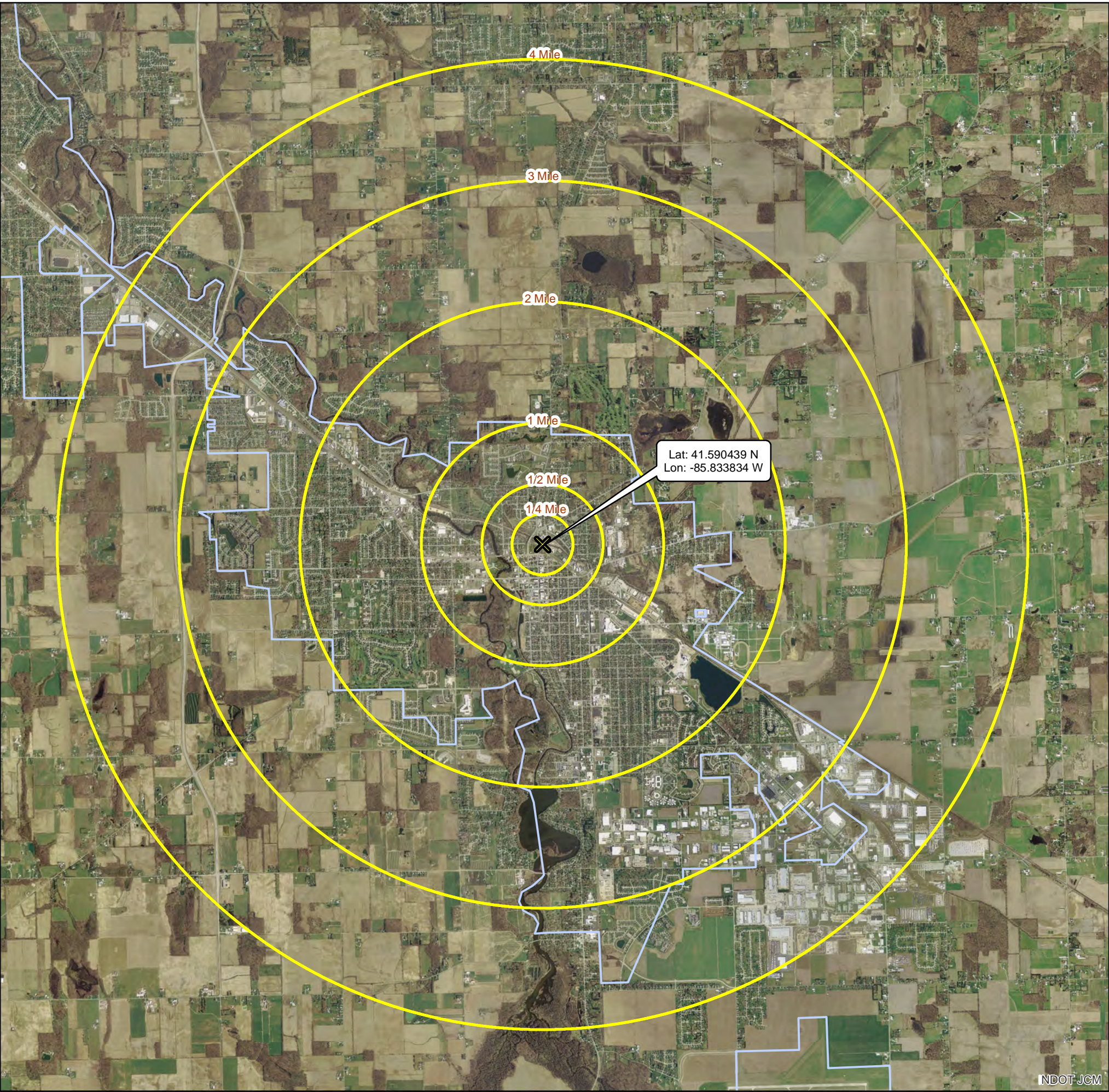
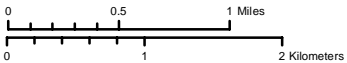
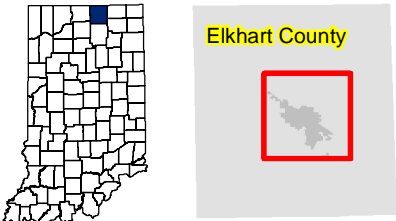


Figure 5
North 5th Street Groundwater Contamination
4-Mile Radius Map
Goshen
Elkhart County, Indiana



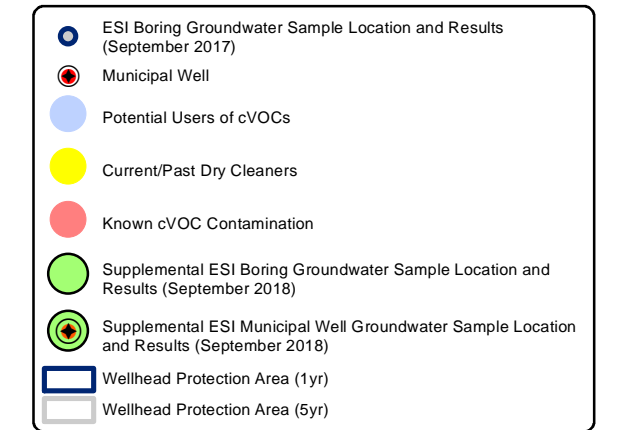
✕ Center Of Site
Buffer Radius
Goshen Municipal Boundary



Mapped by:
Shane Moore, IDEM, Office of Land Quality,
Science Services Branch, Engineering & GIS Services Jan. 11, 2021

Sources:
IDEM 4 Mile Mapper Application
Indiana Geographic Information Officer (GIO) Data Library
National Geographic Society, i-cubed topographic map (2013)
Census block group 2010 total population

Figure 6
North 5th Street
Groundwater Contamination Site
Possible Responsible Party,
Sample Location and Results,
and Wellhead Protection Area
Goshen
Elkhart County, Indiana



All units measured in Micrograms Per Liter (µg/L)
 ND = Non-Detect
 J = Estimated

* Above 3X CRQL's (Contract Required Quantitation Limits) and 3X background



Goshen

Mapped By: Shane Moore, IDEM, Office of Land Quality, Science Services Branch, Engineering & GIS Services, Jan. 13, 2021

Citation: -Ref. 57, p. 1 for a corresponding list of facilities shown in the map

Sources: - Non orthophotography data obtained from the State of Indiana Geographic Information Office Library

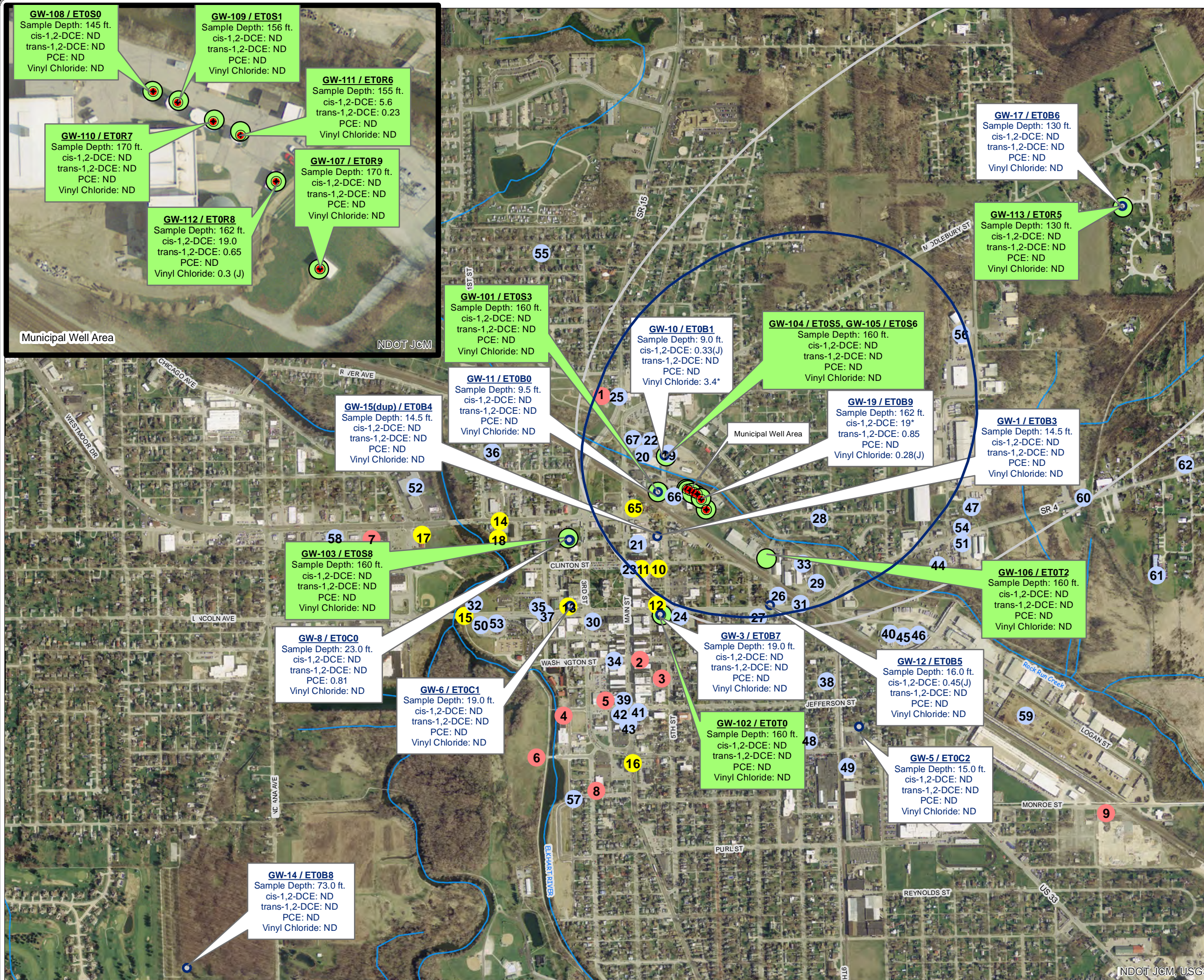
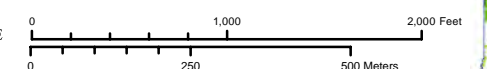
- Indiana orthophotography including best available data from statewide survey in 2011, 2012 and 2013 as well as county updates (Harrison, Monroe, Vanderburgh, Wabash) from 2014.

- Sample locations and results obtained from IDEM OLQ Sampling Database

Projection: UTM Zone 16 N

Datum: NAD83

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NORTH 5th STREET GROUNDWATER CONTAMINATION SITE HISTORY

The North 5th Street Groundwater Contamination Site consists of a groundwater plume with no identified source. Chlorinated solvents, principally cis-1,2-dichloroethylene (cis-1,2-DCE), have been detected in the groundwater of the City of Goshen's Municipal Wells #1A, #5A, #6A and #7A located in Goshen, Indiana (Ref. 12, p. 26; Ref. 13, pp. 47-48, 50-51; Ref. 19, pp. 1-8; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197, 273). Trans-1,2-dichloroethylene (trans-1,2-DCE) has also been detected in low quantities in the City of Goshen Municipal Wells #1A, #5A, #6A and #7A (Ref. 12, p. 26; Ref. 13, pp. 47-48, 50-51; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197, 273). Trichloroethylene (TCE), 1,1-dichloroethane (1,1-DCE), and vinyl chloride (VC) have been detected in the City of Goshen Municipal Well #7A (Ref. 12, pp. 42, 46; Ref. 13, pp. 18, 50, 55; Ref. 119, pp. 18, 22, 152, 197). In addition, vinyl chloride was detected in groundwater that was collected via a direct-push drill rig boring near the municipal wellfield (Ref. 13, pp. 14, 47, 87). The Goshen Water Utility operates the groundwater wells that supply drinking water to the City of Goshen (Ref. 6, pp. 3, 4; Ref. 23, pp. 1, 2). The Goshen Water Utility supplies drinking water to 32,267 people (Ref. 23, p. 2). Four (4) municipal wells (#1A, #5A, #6A and #7A) located in the North Wellfield have Level II contamination. Two (2) municipal wells (#2 and #3) in the North Wellfield and three (3) municipal wells in the Kercher Wellfield (#12, #13 and #14) are subject to potential contamination (Ref. 6, p. 4).

The City of Goshen provides water to its residents through the Goshen Water Utility's nine (9) groundwater supply wells (Ref. 6, p. 3; Ref. 23, pp. 1, 2; Ref. 24, p. 2). According to historical sampling results submitted by the City of Goshen to IDEM, cis-1,2-DCE and vinyl chloride have been detected in the city's municipal water since March 15, 1993 (Ref. 11, pp. 1, 16, 30; Ref. 12, pp. 5-6; Ref. 13, pp. 9-10; Ref. 19, pp. 1, 3, 5, 7).

The Goshen Water Utility operates nine (9) wells in two (2) wellfields (Ref. 6, p. 3; Ref. 23, pp. 1, 2; Ref. 24, p. 2). Three (3) of the wells are located in the Kercher Wellfield in the southern part of Goshen (Ref. 6, p. 3; Ref. 24, p. 2). These wells have not been impacted by the contamination. Six (6) of the wells are located in the Goshen North Wellfield in the northern part of Goshen (Ref. 6, p. 3; Ref. 24, p. 2). The Goshen North Wellfield is the wellfield that has been contaminated by a groundwater plume of chlorinated solvents, principally cis-1,2-DCE (Ref. 7, pp. 25, 106; Ref. 8, pp. 66, 87, 724, 726, 884, 886; Ref. 12, p. 26; Ref. 13, pp. 13, 17, 48, 50-51; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197; Table 6A and Figure 4 of this HRS Documentation Record). The Goshen North Wellfield's six (6) wells pump, on average, 1.7 million gallons per day (Ref. 24, p. 2). The North Wellfield and Kercher Wellfield treatment plants pump into a common distribution system with one 0.5 million gallon elevated storage tank (Clinton Tower), one 1.5 million gallon elevated storage tank (Sherck Tower) and one 0.5 million gallon ground storage tank that supports an independent pressure zone serving the upper elevation of the north and east portions of the City (Ref. 24, p. 2).

The six (6) wells in Goshen Water Utility's North Wellfield are known as Well #1A, Well #2, Well #3, Well #5A, Well #6A and Well #7A (Ref. 6, p. 3; Ref. 23, p. 2). Well #1A has a total depth of 170 feet below ground surface (bgs); Well #2 has a total depth of 145 feet bgs; Well #3 has a total depth of 156 feet bgs; Well #5A has a total depth of 169 feet bgs; Well #6A has a total depth of 152 feet bgs; and Well #7A has a total depth of 161 feet bgs (Ref. 6, p. 4). Refer to Figure 3 and Ref. 6, p. 11 for the location of the Goshen Water Utility North Wellfield. Wells #1A, #5A, #6A and #7A have been impacted by cis-1,2-DCE (Ref. 7, pp. 25, 106; Ref. 8, pp. 66, 87, 724, 726, 884, 886; Ref. 12, pp. 26; Ref. 13, pp. 13, 17, 48, 50-51); Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197). Additional detections of cis-1,2-DCE have been present in combined entry point samples and reported to IDEM by the Goshen Water Utility (Ref. 19, pp. 1, 3, 5, 7). Vinyl chloride was also documented in groundwater obtained from a temporary boring near the Goshen North Wellfield (Ref. 7, pp. 11, 73; Ref. 13, pp. 14, 47). Both cis-1,2-DCE and vinyl chloride are degradation products of tetrachloroethylene (PCE) (Ref. 14, pp. 2, 3).

The U.S. EPA Drinking Water Maximum Contaminant Level (MCL) for cis-1,2-DCE is 70 ppb (Ref. 27, p. 11). The U.S. EPA Drinking Water MCL for vinyl chloride is 2.0 ppb (Ref. 27, p. 15). As a Community Water System, the Goshen Water Utility is required to sample for contaminants on a three (3)-year schedule. Cis-1,2-DCE has been detected by the City in the North Wellfield since 1993 (Ref. 11, p. 30; Ref. 19, pp. 1, 3, 5, 7). Sample detections of cis-1,2-DCE from the Goshen Water Utility wells in the North Wellfield have ranged from non-detect to 4.8 µg/L in the system's blended water samples (Ref. 11, p. 30; Ref. 19, pp. 1, 3, 5, 7). Individual well sample detections of cis-1,2-DCE from the Goshen Water Utility wells in the North Wellfield have been as high as 21 µg/L (Ref. 12, pp. 9, 26, 42; Ref. 119, pp. 18, 22, 152, 197).

This Site is being scored as a groundwater plume with no identifiable source due to not being able to demonstrate attribution of the release of solvents to a possible source. All groundwater samples discussed in Section 3.1.1 under the Background and Contaminated Samples and Attribution sections of this HRS Documentation Record are located in equivalent geologic materials (sand and gravel) (Ref. 26, p. 2; Ref. 6, pp. 3, 4). Groundwater samples collected during the SI (Ref. 12) and the ESI/Supplemental ESI (Ref. 13) were collected from both shallow aquifer depths and from the same aquifer at similar depths as the contamination identified in the Goshen Water Utility wells (Section 3.1.1 of this HRS Documentation Record; Figure 4).

Groundwater is pumped from Goshen Municipal Wells #1A, #2, #3, #5A, #6A and #7A. The water is treated with chlorine and fluoride at the water treatment plant, and then the water is distributed to the residents served by the municipality (Ref. 25, p. 2).

The extent of the groundwater plume as depicted by samples from the Goshen municipal wells and other samples collected during the SI, ESI and Supplemental ESI investigations meeting observed release criteria is shown in Figures 3 and 4 of this HRS Documentation Record. The approximate size of the plume, as measured by samples that meet the criteria for an observed release, is 15.14 acres (Ref. 98, p. 1; Figures 3 and 4 of this HRS Documentation Record). The plume is measured by connecting

sample locations that contain concentrations of chlorinated solvents (Ref. 98, p. 1; Table 6A; Figures 3 and 4 of this HRS Documentation Record). The plume has not been completely delineated at this time.

Past Investigations

The **Pre-CERCLIS Screening (PCS)** was completed by IDEM in 2010 after the IDEM Site Investigation Program received a referral from the IDEM Ground Water Program regarding contamination in the City of Goshen's wellfield (Ref. 10, pp. 3, 6).

The **Preliminary Assessment (PA)** was completed by IDEM in 2013 to provide a basic overview of the Site and the associated contamination (Ref. 11, pp. 15-20). No samples were collected, but it was noted that there were several possible sources that may have impacted the groundwater (Ref. 11, pp. 17-18).

The **Site Inspection (SI)** for this Site was completed by IDEM in 2016 (Ref. 12). Sampling for the **SI** was conducted on June 16, 2015, to collect groundwater samples from the Goshen Water Utility municipal wells and other nearby groundwater wells (Ref. 12, pp. 8-10). For the SI, IDEM staff collected a total of 17 groundwater samples (Ref. 12, pp. 8-10). This included seven (7) raw municipal water supply samples (including one [1] duplicate groundwater grab sample), two (2) municipal test wells, four (4) irrigation well samples (including one [1] duplicate), one (1) background groundwater grab sample from an existing residential well, one (1) rinse water sample, and two (2) water trip blanks (Ref. 12, pp. 8-10, 26). Cis-1,2-DCE was detected in four (4) of the six (6) municipal well samples (E2TD4, E2TD7, E2TD8, E2TD9, E2TE0 [dup of E2TD8]) located in the Goshen Water Utility's North Wellfield (Ref. 12, pp. 9, 26; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197; Table 6A of this HRS Documentation Record). Cis-1,2-DCE, 1,2-Dichloropropane and 1,2-dichloroethane were detected in one sample taken at a school (E2TE5) (Ref. 12, p. 9, 56; Ref. 119, pp. 32, 273-274). There were no detections of volatile organic compounds in any of the other private wells that were sampled (Ref. 12, pp. 9-10, 103-104).

The **Expanded Site Inspection (ESI)/Supplemental ESI** report was completed in 2019 (Ref. 13) (the ESI/Supplemental ESI report was a compilation report from two [2] separate sampling events that occurred in September 2017 and September 2018).

Sampling for the **ESI** was conducted on September 12 and 13, 2017 (Ref. 13, pp. 1, 11). For the ESI, IDEM staff collected a total of 14 groundwater samples. This included nine (9) groundwater grab samples from direct-push drill rig borings (including one [1] duplicate groundwater grab sample), one (1) raw municipal water supply sample, two (2) background groundwater grab samples from existing wells, and two (2) water trip blanks (Ref. 13, p. 11). The raw groundwater sample was collected from one (1) municipal well to confirm that the municipal water supply continued to be impacted by cis-1,2-DCE and other VOCs (Ref. 13, p. 11). The groundwater grab samples collected from the direct-push drill rig borings were collected from shallow depths (9 ft. to 23 ft.) (Ref. 13, pp. 14-16, 46, 1566-1580). The initial Sampling Work Plan called for groundwater grab samples to be collected from direct-push drill rig borings at both a shallow depth and a deeper depth; however, the deeper samples were not able to be collected due to refusal at a clay layer at depths between nine (9) and nineteen feet (Ref. 13, p. 11). Cis-1,2-DCE was detected in the municipal water supply groundwater sample (ET0B9) that was collected from the Municipal Well #7A (Ref. 7, pp. 25, 106; Ref. 13, pp. 13, 48; Table 6A of this HRS Documentation Record). Low levels of trans-1,2-DCE and vinyl chloride (estimated) were also detected in this sample (Ref. 7, pp. 25, 106; Ref. 13, pp. 14-15, 48). Vinyl chloride and cis-1,2-DCE (estimated) were also detected in a groundwater grab sample (ET0B1) from a direct-push drill rig boring located just to the northwest of the municipal wellfield (Ref. 7, pp. 11, 73; Ref. 13, pp. 14, 47). Chlorinated solvents were not detected in any other groundwater samples collected for the ESI (Ref. 13, pp. 47-48).

Sampling for the **Supplemental ESI** was conducted from September 17 through September 26, 2018 (Ref. 13, pp. 1, 12; Ref. 122, pp. 1-8). The purpose of this sampling was to obtain the deeper groundwater samples utilizing a sonic-drill rig that the direct-push drill rig was unable to obtain during the 2017 sampling (Ref. 13, pp. 10, 12). For the Supplemental ESI, IDEM staff collected a total of 19 groundwater samples. This sampling included six (6) groundwater grab samples from sonic drill rig borings (including one [1] duplicate groundwater grab sample), six (6) raw municipal water supply samples, one (1) background groundwater grab sample from an existing well, and six (6) water trip blanks (Ref. 13, p. 12). The raw groundwater samples were collected from six (6) municipal wells to confirm that the municipal water supply continued to be impacted by cis-1,2-DCE and other VOCs (Ref. 13, p. 12). The samples obtained from the sonic drill rig were collected at a depth similar to the municipal well depths (Ref. 6, p. 4; Ref. 13, pp. 16-18, 49, 1599-1638, 1640-1649). Cis-1,2-DCE and low levels of trans-1,2-DCE (estimated) were detected in the groundwater obtained from Municipal Well #6A (ET0R6) (Ref. 8, pp. 66, 724, 884; Ref. 13, pp. 17, 50-51). Cis-1,2-DCE and low levels of trans-1,2-DCE and vinyl chloride (estimated) were also detected in the groundwater obtained from Municipal Well #7A (ET0R8) (Ref. 8, pp. 87, 726, 886; Ref. 13, pp. 17, 50-51).

2.2 SOURCE CHARACTERIZATION

2.2.1 Source Identification

Number of Source: 1

Source Type: Other: Groundwater Plume with No Identified Source

Source Name: Groundwater Plume with No Identified Source

Description and Location of Source: Figure 3 of this HRS Documentation Record

This source is a contaminated groundwater plume with no identified source. The North 5th Street Groundwater Contamination Site is a contaminated groundwater plume originating from unknown sources where hazardous substances have been released and seeped through the ground to the aquifer.

Investigations (PCS, PA, SI and ESI/Supplemental ESI) conducted under CERCLA by IDEM staff could not identify a source area (Ref. 10; Ref. 11; Ref. 12; Ref. 13). During the **SI**, groundwater samples (E2TE6, E2TE8, E2TE1, E2TE4) collected from existing municipal test wells and private irrigation wells in various directions in relation to the Goshen North Wellfield, were non-detect for all VOCs of concern (Ref. 12, pp. 103, 104; Ref. 119, pp. 24, 30, 32, 34, 38, 221, 243, 273, 285, 306). During the **ESI**, shallow groundwater samples (ET0B3, ET0B4, ET0C1, ET0B0, ET0B7, ET0B5) collected from direct-push drill rig borings in various directions in relation to the Goshen North Wellfield, were non-detect for all VOCs of concern (Ref. 13, pp. 47-48), except for sample ET0B1 that had a detection of vinyl chloride less than one-quarter mile from the nearest municipal well (Ref. 13, p. 47). During the **Supplemental ESI**, deep groundwater samples (ET0S3, ET0S6, ET0S8, ET0T0, ET0T2) collected from sonic drill rig borings in various directions in relation to the Goshen North Wellfield, were non-detect for all VOCs of concern (Ref. 13, pp. 50-51). Samples E2TE7 and E2TE8 (2015 SI), samples ET0B6, ET0B7, ET0C1 and ET0B8 (2017 ESI), and samples ET0R5 and ET0T2 (2018 Supplemental ESI) were taken as background samples and were all non-detect for the contaminants of concern at the site.

Groundwater flow direction from previous investigations conducted at facilities that are considered to be possible sources varies. An investigation at Jaxon Cleaners (located approximately 1/3 mile south of the Goshen North Wellfield) shows flow direction to the northwest (Ref. 26, p. 2; Ref. 33, p. 2). An investigation at Eagle Uniform (located approximately 1/2 mile south of the Goshen North Wellfield) shows flow direction to the west and northwest (Ref. 26, p. 2; Ref. 30, pp. 15, 16). An investigation at Johnson Controls (located approximately 1 mile southeast of the Goshen North Wellfield) shows flow direction to the northwest initially but starts to take a more northerly direction as it continues (Ref. 26, p. 2; Ref. 34, p. 8). All three (3) of the facilities mentioned above are located outside of the Goshen North Wellfield 5-year time-of-travel (TOT) (Ref. Figure 6 of this HRS Documentation Record). The direction of this groundwater flow indicates that it generally flows toward the Elkhart River (to the west of these facilities) and Rock Run Creek (to the north of these facilities) (Ref. Figure 6 of this HRS Documentation Record). The City of Goshen Wellhead Protection Plan's 1-year and 5-year TOT wellhead protection areas indicate that groundwater flow direction in the area is primarily from the northeast to southwest in the vicinity of the wellhead protection area (Ref. 5, pp. 320, 321). The WHPA report for the City of Goshen's North Wellfield provides the one-year and five-year TOT (Ref. 5, p. 34; Ref. 6, p. 14). For information concerning the geology of the plume area and a description of the aquifer please see the Geology/Aquifer Section in Section 3.0 (Ground Water Migration Pathway).

The plume is identified where cis-1,2-DCE, 1,2-dichloropropane and tetrachloroethylene was detected in the groundwater of Goshen Water Utility Wells #1A (E2TD4), #5A (E2TD7), #6A (E2TD9, ET0R6) and #7A (E2TD8, E2TE0, ET0B9, ET0R8), GW-8 (ET0C0) and GW-5 (E2TE5) (Ref. 7, pp. 25, 26, 106-108, 109-111; Ref. 8, pp. 884, 886; Ref. 12, p. 9, 56; Ref. 13, pp. 48, 50; Table 6A; Ref. 119, pp. 8, 16, 18, 20, 22, 32, 110, 141, 152, 175, 197, 273-274; Figure 4 of this HRS Documentation Record). In addition, a release of vinyl chloride to groundwater was also observed in a groundwater sample collected from a direct-push drill rig (sample ET0B1) located less than one-quarter mile northwest of the municipal wells (Ref. 7, pp. 11, 73-75; Ref. 13, p. 47; Table 6B; Figure 4 of this HRS Documentation Record). The groundwater plume is depicted by groundwater samples having concentrations of cis-1-2-DCE, 1,2-dichloropropane and tetrachloroethylene meeting observed release criteria (Table 6A, Table 6B, and Figure 4 of this HRS Documentation Record).

The plume encompasses approximately 15.14 acres and the plume resides in the Goshen Water Utility Wellhead Protection Area (WHPA) (Ref. 98, p. 1; Figure 4 of this HRS Documentation Record). The wellfield is located in the northern part of the City of Goshen; approximately 50 feet to 250 feet south of Rock Run Creek and approximately 2,500 feet east of the Elkhart River (Figure 4 of this HRS Documentation Record).

The specific sources of the contamination impacting the Goshen Water Utility wells cannot be determined with the currently available information. A description of possible facilities containing possible sources that have been identified during the PA, SI and ESI/Supplemental ESI investigations can be found in Figure 6 of this HRS Documentation Record and Ref. 57. Refer to Section 3.1.1 (Attribution) for a further discussion of the sampling events conducted to locate a source of the groundwater contamination. IDEM staff have conducted an SI and an ESI/Supplemental ESI to document a release of cis-1,2-DCE to Goshen Water Utility Wells #1A, #5A, #6A, and #7A. In addition, a release to groundwater was also observed in a shallow groundwater sample collected from a direct-push drill rig (sample ET0B1) northwest of the municipal wells.

2.2.2 Hazardous Substances Associated with the Source

Cis-1,2-dichloroethylene (cis-1,2-DCE), trans-1,2-dichloroethylene (trans-1,2-DCE), 1,2-dichloropropane, tetrachloroethylene (PCE), and vinyl chloride are the hazardous substances associated with the unknown source.

Cis-1,2-DCE and trans-1,2-DCE are degradation products of tetrachloroethylene (PCE) (Ref. 14, pp. 1-3). These hazardous substances are manufactured and do not occur naturally in the environment (Ref. 15, p. 1; Ref. 17, p. 1; Ref. 18, p. 1). 1,2-Dichloropropane is a VOC that is known to be used as a chemical intermediate in the manufacture of chlorinated solvents, as an industrial solvent, and as an intermediate in rubber processing (Ref. 16, p. 1). 1,2-Dichloropropane is also known to be commonly used in facilities that utilize tetrachloroethylene and its degradation products (cis-1,2-DCE and trans-1,2-DCE) (Ref. 16, p. 1).

Concentrations of cis-1,2-DCE were detected in the Goshen Water Utility Wells #1A, #5A, #6A, and #7A (Ref. 7, pp. 25, 106-108; Ref. 8, pp. 884, 886; Ref. 12, p. 9; Ref. 13, pp. 48, 50; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197; Table 6A; Figure 4 of this HRS Documentation Record). In addition, a release to groundwater of vinyl chloride was also observed in a shallow groundwater sample collected from a direct-push drill rig (sample ET0B1) northwest of the municipal wells (Ref. 7, pp. 11, 73-75; Ref. 13, p. 47; Table 6B; Figure 4 of this HRS Documentation Record).

The plume is depicted and measured by connecting locations of groundwater samples that contain concentrations of cis-1,2-DCE, trans-1,2-DCE, 1,2-dichloropropane and tetrachloroethylene (PCE) (Figure 4 of this HRS Documentation Record). See Table 5 of this HRS Documentation Record for a summary of background groundwater samples collected during the SI and ESI/Supplemental ESI investigations. See Tables 6A and 6B of this HRS Documentation Record for a full summary of groundwater samples collected during the SI and ESI/ Supplemental ESI investigations that had detections of cis-1,2-DCE and other chlorinated solvents meeting observed release criteria.

2.2.3 Hazardous Substances Available to a Pathway

Table 1

Containment Description	Containment Factor Value	References
<p>Release to ground water:</p> <p>The containment factor of 10 is assigned based on analytical evidence of hazardous substances in groundwater samples from municipal well and grab groundwater samples (see Tables 6A and 6B of this HRS Documentation Record). Therefore, based on evidence of release (evidence of hazardous substance migration from a source area), the highest Groundwater Migration Pathway Containment Factor Value of 10 was assigned to Source No. 1.</p>	10	<p>Ref. 1, Section 3.1.2.1, Table 3-2.</p> <p>See Section 3.1.1 of this HRS Documentation Record</p>

2.4.2 Hazardous Waste Quantity

2.4.2.1 Source Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity (Tier A)

The Hazardous Constituent Quantity for Source No. 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances in the source and releases from the sources is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (manifests, possible responsible party [PRP] records, state records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous constituent quantity for Source No. 1 with reasonable confidence. As a result, the evaluation of hazardous waste quantity proceeds to the evaluation of Tier B, Hazardous Waste Stream Quantity (Ref. 1, Section 2.4.2.1.1).

Hazardous Constituent Quantity Assigned Value: Not Scored

2.4.2.1.2. Hazardous Waste stream Quantity (Tier B)

The Hazardous Waste Stream Quantity for Source No. 1 could not be adequately determined according to the HRS requirements; that is, the total mass of the hazardous waste streams plus the mass of any additional CERCLA pollutants and contaminants in the source and releases from the source are not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.2). There are insufficient historical and current data (manifests, potentially responsible party (PRP) records, state records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of the hazardous waste streams plus the mass of all CERCLA pollutants and contaminants in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the Hazardous Waste Stream Quantity for Source No. 1 with reasonable confidence. As a result, the evaluation of hazardous waste quantity proceeds to the evaluation of Tier C, Volume (Ref. 1, Section 2.4.2.1.2).

Hazardous Waste Stream Quantity Assigned Value: Not Scored

2.4.2.1.3. Volume (Tier C)

Since the vertical extent of the plume could not be determined based on available sampling data, the source volume is unknown but greater than zero. Therefore, the source volume is unknown, but greater than zero (0) (Ref. 1, Section 2.4.2.1.3).

Table 2

Source Type	Description (# drums or dimensions)	Units (yd ³ /gal)	References
Other	Unknown	>0	Ref. 1, Table 2-5

Sum (yd³/gal): > 0

Equation for Assigning Value (Ref. 1, Table 2-5): Volume (V) / 2.5 > 0

Volume Assigned Value: Unknown, but > 0

2.4.2.1.4. Area (Tier D)

The area measure (Tier D) is not evaluated for source type "Other" (Ref. 1, Table 2-5).

Area Assigned Value: 0

2.4.2.1.5. Source Hazardous Waste Quantity Value

Volume of ground water plume: Unknown, but > 0.
Highest assigned value assigned from Ref. 1, Table 2-5: > 0.
Source Hazardous Waste Quantity Value: > 0. (Ref. 1, Section 2.4.2.1.5)

SUMMARY OF SOURCE DESCRIPTIONS

Table 3

Source No.	Source Haz. Waste Quantity Value	Source Haz. Constituent Quantity Complete? (Y/N)	Containment Factor Value by Pathway				
			Ground Water (GW) (Ref. 1, Table 3-2)	Surface Water (SW)		Air	
				Overland/ flood (Ref. 1, Table 4-2)	GW to SW (Ref. 1, Table 3-2)	Gas (Ref. 1, Table 6-3)	Particulate (Ref. 1, Table 6-9)
1	> 0	NS	10	NS*	NS*	NS*	NS*

*NS (Not Scored)

3.0 GROUNDWATER MIGRATION PATHWAY

3.0.1 GENERAL CONSIDERATIONS

Groundwater Migration Pathway Description:

Since all of the Goshen Water Utility wells are screened in the unconsolidated materials above bedrock (Ref. 6, p. 3; Ref. 13, pp. 1640-1649) the bedrock aquifer was not used for HRS scoring purposes.

Regional Geology/Aquifer Description:

The Site is within the Northern Moraine and Lake Region physiographic unit of the St. Joseph River Basin (Ref. 20, p. 36). The unconsolidated surface soils were formed by a series of Pleistocene-age drift deposits that are 100 to 500 feet thick (Ref. 20, p. 37). The upper aquifer is underlain by the Mississippian Shale Bedrock aquifer (Ref. 20, p. 27). Please see the Aquifer/Stratum 3 description below for additional information on this aquifer.

Soils along the Elkhart River and Rock Run Creek are part of the Oshtemo-Fox Soil Association (Ref. 2, p. 104). This soil association is described as a moderately coarse textured soil. The upper 1 to 2 feet tend to contain clay to sandy clay and grades to mostly sand and gravel by 3 feet (Ref. 2, pp. 20, 21).

Site Geology/Aquifer Description:

The Site is along Rock Run Creek in the City of Goshen, Elkhart County, Indiana (Ref. 13, pp. 9, 42, 44). There are six (6) water supply wells in Township 36N, Range 6E, Section 9 (North Wellfield) that supply the North 5th Street Treatment Plant (PWSID # 5220009) (Ref. 4, p. 1; Ref. 5, pp. 4, 5). The Site is underlain by two (2) aquifers: (1) Upper unconfined Pleistocene-age drift aquifer is divided into an upper and lower water bearing zones by a clay unit/lenses, and (2) Mississippian Shale Bedrock aquifer (Ref. 5, p. 336; Ref. 20, pp. 36-37, 38, 42). There is evidence that this clay unit is locally absent in some areas of the site (Ref. 30, pp. 49-50, 53-93; Ref. 32, pp. 22-23, 24, 39-48). Surface water in the area drains to the Elkhart River, the hydraulic canal, or Rock Run Creek (Ref. 5, p. 321). The WHPA Report lists Norton and Butts Lakes as potential recharge sources for the lower water bearing zone of the upper unconfined aquifer supplying the well field (Ref. 5, p. 321). These lakes are one (1) mile to the northeast of the well field (Ref. 4, p. 1; Ref. 5, p. 321).

Pump tests performed at the Johnson Controls facility showed that Rock Run Creek is hydraulically connected to the upper water bearing zone of the upper unconfined aquifer (Ref. 29, pp. 41-85). Therefore, Rock Run Creek is a potential recharge source for the well field that was not included when developing the WHPA.

Aquifer/Stratum 1 (upper unconsolidated): St Joseph Aquifer System Description

The Goshen North Well Field withdraws water from the St. Joseph Aquifer System, a USEPA-designated Sole Source Aquifer (Ref. 36, p. 88). The Goshen North Wellfield is developed in coarse sand and gravel of the semi-confined aquifer (lower water bearing zone) in an outwash valley train underlying the Elkhart River Valley (Ref. 5, p. 317). A thin discontinuous clay layer/lens in some areas is stated to separate the upper unconsolidated strata from the lower unconsolidated strata (Ref. 5, pp. 317, 335-336). Logs for borings drilled at several identified source areas within 2 miles of the center of the groundwater plume could not confirm the presence of the near surface clay layer:

- Cross-sections constructed at the Eagle Uniform facility (State Cleanup Program) located 0.44 miles to the west/southwest do not show the near-surface clay (Ref. 30, pp. 49, 50, 53-93);
- Cross-sections (Figures 5A and 5B) constructed at the Jaxon Cleaners facility (State Cleanup Program) located 0.38 miles to the south show the presence of a surficial silt that is not continuous across the site (Ref. 31, pp. 24, 25); and
- Cross-sections constructed at the Johnson Controls facility (VRP) located 1.0 mile to the southeast show the lack of a continuous near surface clay as well as gaps in deeper clay units (Ref. 32, pp. 22, 23, 24, 39-48).

The aquifer has an approximate thickness of 140 to 160 feet but may be greater in some areas (Ref. 5, p. 323; Ref. 28, p. 10; Ref. 35, p. 8). The hydraulic conductivity for the sands and gravels is 436 ft/day (Ref. 5, p. 323). Hydrologic properties of the near surface clay were not available. However, the City of Goshen WHPA Report identifies this unit and states that some vertical groundwater migration does occur, though the predominant groundwater flow direction within the aquifer is horizontal (Ref. 5, p. 322). Shale bedrock is present at a depth of 164 feet (Ref. 28, p. 18). The bedrock is not used for water production (Ref. 5, p. 315; Ref. 6, p. 3).

Aquifer/Stratum 2 (lower unconsolidated): St Joseph Aquifer System Description

This aquifer strata is comprised of medium to coarse sand with some gravel and an approximate thickness of 116 feet but may be greater in some areas (Ref. 35, pp. 3-8). There are no HRS qualifying barriers to groundwater flow in this unit (Ref. 35, pp. 1-8). Static water levels for the city wells are between 10 and 20 ft-bgs with draw-downs ranging from 16 to 68 feet (Ref. 5, pp. 342-348). Static water levels recorded from the source area investigations ranged from 14 to 23 ft-bgs (Ref. 30, p. 42; Ref. 31, p. 31; Ref. 32, p. 44). The groundwater flow directions at each of the source area investigations are different:

- Jaxon Cleaners shows flow to the northwest (Ref. 33, pp. 15, 16),
- Eagle Uniform shows flow to the west and northwest (Ref. 30, p. 51), and
- Johnson Controls shows flow to the northwest initially but starts to take a more northerly direction as it crosses under U.S. 33 (Ref. 34, pp. 35-36).

Aquifer/Stratum 3 (deepest) Devonian Shale Bedrock Description

Shale bedrock is present at a depth of 163 ft-bgs (Ref. 28, p. 18). Wellfield supply wells are screened no deeper than 164 ft-bgs (Ref. 28, p. 18). Since the wells are screened above the bedrock interface, the bedrock is not used for water production (Ref. 5, pp. 315-317). In the area, the potential bedrock aquifer is more than 200 ft-bgs (Ref. 5, p. 316). Therefore, aquifers in the unconsolidated drift are more accessible as well as adequate for all uses (Ref. 5, pp. 317-320).

Aquifer Interconnections / Distance from Source Description

Although there is a clay layer/lens present in some areas, studies in the area show that the clay layer/lens between the upper and lower aquifer strata is not continuous within 2-miles of the Site (Ref. 5, pp. 317, 322, 335-336; Ref. 30, pp. 49, 50, 53-93; Ref. 32, pp. 22, 23, 24, 39-48). Further evidence that the clay layer/lens is not continuous across the study area is the documented migration of contamination across any/all clay lenses into the municipal wells in the lower unconsolidated strata. Consistent with the HRS, documenting migration of contamination (i.e., cis-1,2-dichloroethylene, trans-1,2-dichloroethylene and vinyl chloride) to the City of Goshen's municipal wells is sufficient for documenting hydraulic interconnection at the Site (Ref. 1, p. 147; Ref. 12, pp. 26, 42, 46; Ref. 13, pp. 13, 47-48, 50-51; Ref. 19, pp. 1-8; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197, 273).

The lateral flow patterns in the upper sand aquifer and the lower sand aquifer are similar (Ref. 30, p. 49). Comparison of potentiometric heads in adjacent monitoring wells, one (1) screened in the upper aquifer strata (15-25 ft bgs) and one (1) in the lower aquifer strata (50-60 ft-bgs) show very similar potentiometric heads (Ref. 30, p. 49). The groundwater flow based on local data is from west-northwest, toward the Elkhart River and the hydraulic canal to northwest toward and Rock Run Creek to the north (Ref. 30, p. 15; Ref. 34, p. 8).

Aquifer Discontinuities Within the Target Distance Limit Description

Cross-section 2C-2C' from the USGS Hydrogeologic Atlas of Aquifers in Indiana through the area of the Site show that the Elkhart River does not fully transect the St. Joseph Aquifer system (Ref. 20, p. 40). Therefore, the Elkhart River is not considered an aquifer boundary. There are no other aquifer discontinuities or boundaries, such as a mountain range, ocean, etc., within a 4-mile radius of the Site (Ref. 20, pp. 39-41).

Table 4
Summary of Aquifer(s) Being Evaluated

Aquifer No.	Aquifer Name	Is Aquifer Interconnected with Upper Aquifer within 2 miles	Is Aquifer Continuous within 4-mile TDL? (Y/N)	Is Aquifer Karst? (Y/N)
1	Upper unconsolidated / St. Joseph Aquifer System	This is the Upper Aquifer	Yes	No
2	Lower unconsolidated / St. Joseph Aquifer System	Yes	Yes	No
3	Mississippian shale bedrock Aquifer System	No	Yes	No

3.1 LIKELIHOOD OF RELEASE

3.1.1 Observed Release

Aquifer Being Evaluated: Sand and gravel aquifer

Establishing an observed release by chemical analysis requires analytical evidence of a hazardous substance in the media significantly above background level (Ref. 1, Section 2.3). If the background concentration is not detected (or is less than the detection limit), an observed release is established when the sample measurement equals or exceeds its own Sample Quantitation Limit (SQL) and that of the background sample. If the SQL cannot be established, the U.S. EPA Contract-Required Quantitation Limit (CRQL) is used in place of the SQL (Ref. 1, Table 2-3). The limits reported for the investigations supporting this HRS Documentation Record are CRQLs. SQL and CRQL are as defined in HRS Section 1.1 (Ref. 1, p. 6; Ref. 100, pp. 129-130, 169-227).

All samples noted in this HRS Documentation Record were analyzed for volatile organic compounds (VOCs) using Contract Laboratory Program (CLP) Statement of Work (SOW) SOM02.4 (Trace Volatiles) analysis procedure (Ref. 12, pp. 8-10; Ref. 13, pp. 11-13, 80-83; Ref. 119, pp. 2-6; Ref. 100, pp. 169-227). Where applicable, CRQLs were adjusted using CRQL calculations in CLP SOM02.4, Exhibit D, Section 11.2.4 (Ref 100, pp. 203-204).

Chemical Analysis

On June 16, 2015, IDEM staff collected a total of 17 groundwater samples for the **Site Inspection**. This included 11 groundwater grab samples, one (1) duplicate sample, two (2) background groundwater samples, one (1) decontamination sample, and two (2) trip blanks (Ref. 12, p. 8).

On September 12-13, 2017, IDEM staff collected a total of 14 groundwater samples for the **Expanded Site Inspection**. This included nine (9) groundwater grab samples from direct-push drill rig borings (including one [1] duplicate groundwater grab sample), one (1) raw municipal water supply sample, two (2) background groundwater grab samples from existing wells, and two (2) water trip blanks (Ref. 13, p. 11).

From September 17 through 26, 2018, IDEM staff collected a total of 19 groundwater samples for the **Supplemental Expanded Site Inspection**. This sampling included six (6) groundwater grab samples from sonic drill rig borings (including one [1] duplicate groundwater grab sample), six (6) raw municipal water supply samples, one (1) background groundwater grab sample from an existing well, and six (6) water trip blanks (Ref. 13, p. 12).

A full summary of all sampling procedures can be viewed in the inspection reports (Ref. 12, pp. 8-10; Ref. 13, pp. 10-12).

Background Concentrations

A total of 50 groundwater samples were collected during the SI and ESI/ Supplemental ESI investigations. Nine (9) of these groundwater samples have been identified as background samples (Table 5 of this HRS Documentation Record). Three (3) background groundwater samples (E2TE7 [2015 SI], ET0B6 [2017 ESI] and ET0R5 [2018 Supplemental ESI] were collected from the same residential well. The residential well is 130 feet deep (Ref. 13, p. 14; Table 5 of this HRS Documentation Record). Two (2) background groundwater samples (E2TE8 [2015 SI] and ET0B8 [2017 ESI]) were collected from an existing irrigation well at a cemetery during the SI and the ESI. The cemetery irrigation well is approximately 73 feet deep (Ref. 13, p. 14; Table 5 of this HRS Documentation Record). One (1) background groundwater sample (E2TE4 [2015 SI]) was collected from an observation well (OW93C). E2TE4 was approximately 145 feet deep (Ref. 120, pp. 22, 24, 36; Table 5 of this HRS Documentation Record). One (1) background groundwater sample was collected from a boring advanced by a drill rig (ET0T2 [2018 Supplemental ESI]). ET0T2 was approximately 160 feet deep (Ref. 13, pp. 1598, 1631-1638; Table 5 of this HRS Documentation Record). One (1) background groundwater sample (ET0B7 [2017 ESI]) collected from an observation well 19.0 feet deep (Ref. 13, pp. 1559, 1572-1574; Figure 4 of this HRS Documentation Record). One (1) background groundwater sample (ET0C1 [2017 ESI]) collected from an observation well 19.0 feet deep (Ref. 13, pp. 1563, 1577-1578; Figure 4 of this HRS Documentation Record). All background groundwater samples are outside of the identified groundwater plume (Figure 4 of this HRS Documentation Record) and were selected to represent background conditions in the area because of their similarity in depth and geology to the contaminated municipal wells and other samples collected. For additional sample similarity concerns, background groundwater samples from each sampling event (i.e., SI, ESI or Supplemental ESI) are used only for comparison to release samples during the same sampling event to ensure that samples were collected from a similar time period, under similar weather/hydrological conditions, used similar collection methods, from similar types of well constructions, and are collected from similar depths (Ref. 12

and Ref. 13). All background groundwater sample locations and associated contaminants can be seen below in Table 5 of this HRS Documentation Record.

Background groundwater sample E2TE7 was collected from a private residential well located approximately one (1) mile northeast of the municipal wells during the **2015 SI** (Ref. 12, pp. 8-10; Table 5 of this HRS Documentation Record; Figure 4 of this HRS Documentation Record). Although a confining layer was noted in the well log for this well at a depth of 89 feet bgs to 106 feet bgs (Ref. 21, p. 1), it is not consistent throughout the entire area, and the upper and lower sand and gravel aquifer strata are interconnected for HRS purposes and data are considered similar to data from the City of Goshen municipal well samples (Ref. 13, pp. 1640-1649). Background groundwater sample E2TE4 was collected from a city-owned observation well located approximately 1/5 mile of the municipal wells during the **2015 SI** (Table 5 of this HRS Documentation Record; Figure 4 of this HRS Documentation Record). Although clay is identified as being present at various levels in the boring log it is not an HRS qualifying confining layer (Ref. 120, p. 36).

Background groundwater sample ET0B6 was collected from the same private residential well during the **2017 ESI** as the 2015 SI sample E2TE7 (Table 5 of the HRS Documentation Record; Figure 4 of this HRS Documentation Record). Background groundwater sample ET0B8 was collected from an irrigation well located at a city cemetery located approximately one and one-half (1 ½) miles southwest of the Site during the **2017 ESI** (Table 5 of this HRS Documentation Record; Figure 4 of this HRS Documentation Record). The depth of this well extends 73 feet bgs (Ref. 13, pp. 14,). Although a confining layer was noted at a depth of 33 feet bgs to 43 feet bgs (Ref. 21, p. 3), it is not consistent throughout the entire area, and the upper and lower sand and gravel aquifer strata are interconnected for HRS purposes and data are considered similar to data from the City of Goshen municipal well samples (Ref. 13, pp. 1640-1649).

Background groundwater sample ET0R5 was collected from the same private residential well during the **2018 Supplemental ESI** as the 2015 SI sample E2TE7 and the 2017 ESI sample ET0B6 (Table 5 of this HRS Documentation Record; Figure 4 of this HRS Documentation Record). Background groundwater sample ET0T2 was collected from a boring advanced by a drill rig approximately 1/5 mile of the municipal wells during the **2018 Supplemental ESI** (Table 5 of this HRS Documentation Record; Figure 4 of this HRS Documentation Record). Although confining layers were noted in the well log for this well at depths of 9.5 to 17 feet bgs, 25 to 34 feet bgs, and 44.5 to 57 feet bgs (Ref. 13, pp. 1631-1648), they are not consistent throughout the entire area, and the upper and lower sand and gravel aquifer strata are interconnected for HRS purposes and data are considered similar to data from the City of Goshen municipal well samples (Ref. 13, pp. 1640-1649).

All background groundwater samples were non-detect (below the CRQL) for cis-1,2-DCE, trans-1,2-DCE, 1,2-dichloropropane, tetrachloroethylene and vinyl chloride (Table 5 of this HRS Documentation Record). The samples were obtained from equivalent materials (sand and gravel) at or near the same depths to the contaminated wells (Ref. 6, p. 4; Ref. 12, p. 16; Ref. 13, pp. 1640-1649).

Table 5
Background Groundwater Samples Results
for the SI and ESI/Supplemental ESI Inspections
(Refer to Figure 4 of this HRS Documentation Record for the Location of the Groundwater Samples)

EPA CLP #	Date Collected (Phase)	Depth (feet)	Type of Grab Sample	Hazardous Substance	Hazardous Substance Concentration (µg/L)	CRQL (µg/L)	Reference
E2TE7	6/6/2015 (SI)	130	Residential Well	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 12, pp. 9, 10, 26; ; Ref. 119, pp. 36, 296
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				1,2-dichloropropane	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	
E2TE4	6/6/2015 (SI)	145	Observation (Test) Well	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 12, p. 26; Ref. 119, pp. 30, 243; Ref. 120, p. 36
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				1,2-dichloropropane	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	
E2TE8	6/6/2015 (SI)	73	Irrigation Well	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 12, p. 62, 104; Ref. 13, pp. 14; Ref. 119, pp. 38, 306
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				1,2-dichloropropane	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	
ET0B6	9/12/2017 (ESI)	130	Residential Well	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 7, pp. 19-20; Ref. 13, pp. 14,
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	
ET0B8	9/13/2017 (ESI)	73	Irrigation Well	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 7, pp. 24-25; Ref. 13, pp. 14,
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	
ET0B7	9/13/2017 (ESI)	19.0	Observation Well	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 7, pp. 22-23; Ref. 13, pp. 50, 1572-1574
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	

EPA CLP #	Date Collected (Phase)	Depth (feet)	Type of Grab Sample	Hazardous Substance	Hazardous Substance Concentration (µg/L)	CRQL (µg/L)	Reference
ET0C1	9/13/2017 (ESI)	19.0	Observation Well	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 7, pp.28-29; Ref. 13, pp. 50, 1577-1578
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	
ET0R5	9/18/2018 (Supp. ESI)	130	Residential Well	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 8, pp. 881-882,
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	
ET0T2	9/26/2018 (Supp. ESI)	160	Temporary Boring	Cis-1,2-Dichloroethene	0.50 U	0.50	Ref. 9, pp. 51, 419; Ref. 13, pp. 1631-1638
				Trans-1,2-Dichloroethene	0.50 U	0.50	
				Tetrachloroethylene	0.50 U	0.50	
				Vinyl Chloride	0.50 U	0.50	

U = Compound not detected above the CRQL (Ref. 7, p. 8).

The background groundwater samples were not found to be at or above the CRQL for cis-1,2-DCE, trans-1,2-DCE, tetrachloroethylene, vinyl chloride or 1,2-dichloropropane (Table 5 of this HRS Documentation Record). Since four (4) Goshen Water Utility municipal wells (#1A, #5A, #6A, and #7A) had detections above the CRQL, they meet the observed release criteria with cis-1,2-DCE and trans-1,2-DCE concentrations (Table 6A of this HRS Documentation Record). Also, since two (2) other samples (ET0B1 and ET0C0) had detections of vinyl chloride and tetrachloroethylene respectively above the CRQL, they meet the observed release criteria (Table 6B of this HRS Documentation Record).

Contaminated Municipal Water Samples

During the **SI**, eight (8) groundwater samples were collected from the Goshen North Wellfield's six (6) municipal wells. The samples were designated as E2TD4 (Well #1A), E2TD5 (Well #2), E2TD6 (Well #3), E2TD7 (Well #5A), E2TD8 (Well #7A), E2TD9 (Well #6A), E2TE5 and E2TE0 (duplicate of E2TD8) (Ref. 12, p. 9). Sample results for E2TD4, E2TD7, E2TD8, E2TD9, E2TE5 and E2TE0 indicate that these wells have been contaminated. See Table 6A below for a list of municipal well samples that had detections of contaminants.

During the **ESI**, one (1) groundwater sample was collected from the Goshen North Wellfield's six (6) municipal wells. The sample was designated as ET0B9 (Well #7A) (Ref. 13, pp. 13-14). Sample results for ET0B9 indicate that this well has been contaminated. See Table 6A below for a list of municipal well samples that had detections of contaminants.

During the **Supplemental ESI**, six (6) groundwater samples were collected from the Goshen North Wellfield's six (6) municipal wells. The samples were designated as ET0R9 (Well #1A), ET0S0 (Well #2), ET0S1 (Well #3), ET0R7 (Well #5A), ET0R6 (Well #6A), and ET0R8 (Well #7A) (Ref. 13, pp. 16-17). Sample results for ET0R6 and ET0R8 indicate that these wells have been contaminated. See Table 6A below for a list of municipal well samples that had detections of contaminants.

Table 6A below depicts the municipal well samples that meet the observed release criteria (Ref. 1, p. 58 [Table 2-3]). This table lists the organic hazardous substance with their concentrations and CRQLs for each sample. The locations are depicted on Figure 4 of this HRS Documentation Record.

Table 6A
Municipal Well Groundwater Samples with Detections of VOCs
for the SI and ESI/Supplemental ESI Inspections
(Observed Release Samples)

(Refer to Figure 4 of this HRS Documentation Record for the Location of the Groundwater Samples)

EPA CLP # (Municipal Well #)	Date Collected (Phase)	Depth (feet) ¹	Type of Grab Sample	Hazardous Substance	Hazardous Substance Concentration (µg/L)*	CRQL (µg/L)	Reference
E2TD4 (MW1A)	6/16/15 (SI)	170	Municipal Well	Cis-1,2-DCE	4.0	0.50	Ref. 12, p. 9; Ref. 119, pp. 8, 110
E2TD7 (MW5A)	6/16/15 (SI)	169	Municipal Well	Cis-1,2-DCE	3.6	0.50	Ref. 12, p. 9; Ref. 119, pp. 16, 141
E2TD8 (MW7A)	6/16/15 (SI)	161	Municipal Well	Cis-1,2-DCE Trans-1,2-DCE	20.0 0.69	2.50 0.50	Ref. 12, pp. 9, 103; Ref. 119, pp. 18, 152
E2TD9 (MW6A)	6/16/15 (SI)	152	Municipal Well	Cis-1,2-DCE	6.8	2.50	Ref. 12, pp. 9, 103; Ref. 119, pp. 20, 175
E2TE5 (GW-5)	6/16/15 (SI)	110	Groundwater Well	1,2-Dichloropropane	0.61	0.50	Ref. 12, pp. 9, 56; Ref. 119, pp. 32, 274
E2TE0 (dup of E2TD8) (MW7A)	6/16/15 (SI)	161	Municipal Well	Cis-1,2-DCE Trans-1,2-DCE	20.0 0.68	0.50 0.50	Ref. 12, p. 9; Ref. 119, pp. 22, 197
ET0B9 (MW7A)	9/13/17 (ESI)	161	Municipal Well	Cis-1,2-DCE Trans-1,2-DCE	19.0 0.85	0.50 0.50	Ref. 7, pp. 25, 106; Ref. 13, pp. 13, 48
ET0R6 (MW6A)	9/18/18 (Supp. ESI)	152	Municipal Well	Cis-1,2-DCE	5.6	0.50	Ref. 8, p. 884; Ref. 13, pp. 17, 50
ET0R8 (MW7A)	9/18/18 (Supp. ESI)	161	Municipal Well	Cis-1,2-DCE Trans-1,2-DCE	19.0 (J-) 0.65 (J-)	2.50 0.50	Ref. 8, pp. 886, 917; Ref. 13, pp. 17, 50

¹ Ref. 6, p. 4

CRQL – Contract Required Quantitation Limit

µg/L - micrograms per liter

*Results flagged as J- are estimated and may be biased low (Ref. 8, p. 917; Ref. 121).

Other Contaminated Groundwater Samples

During the **Expanded Site Inspection (ESI)** that was conducted in September 2017 (Ref. 13), one (1) groundwater sample (ET0B1) was collected with vinyl chloride detected above the CRQL from a temporary groundwater boring advanced by a direct-push drill rig. This sample was collected in the city right-of-way on the east side of North 5th Street just northwest of the Goshen North Wellfield at a depth of nine (9) feet (Ref. 7, pp. 11, 73-75; Ref. 13, pp. 47, 1567; Figure 4 of this HRS Documentation Record). This boring was completed to determine if any contamination is migrating to the Goshen North Wellfield from the area north/northwest of the municipal wells. Vinyl chloride was detected in this sample at 3.4 µg/L (Ref. 7, pp. 11, 73-75; Ref. 13, p. 47). Sample ET0B1 was collected from a shallower depth than the contaminated municipal wells (Ref. 13, pp. 1554 1567, 1640-1649).

Also, during the **ESI**, one (1) groundwater sample (ET0C0) was collected that contained tetrachloroethylene above the CRQL from a temporary groundwater boring advanced by the direct-push drill rig. This sample was collected from a parking lot near the intersection of two (2) alleys bounded by W. Clinton St., North 3rd St., W. Pike St. (U.S. 33/Lincoln Highway), and N. 2nd St. southwest of the Goshen North Wellfield at a depth of 23 feet (Ref. 7, pp. 26, 109-110; Ref. 13, pp. 48, 1576; Figure 4 of this HRS Documentation Record). This boring was completed to determine if any contamination is migrating to the Goshen North Wellfield from the area southwest of the municipal wells. Tetrachloroethylene (PCE) was detected in this sample at 0.81 µg/L (Ref. 13, p. 102). Sample ET0C0 was collected from a shallower depth than the contaminated municipal wells (Ref. 13, pp. 1562, 1575-1576, 1640-1649).

Other than the municipal well samples noted in the previous section, there were no detections of VOCs in groundwater samples above CRQLs collected during the **Supplemental ESI** conducted in September 2018 (Ref. 13, p., 50-51; Figure 4 of this HRS Documentation Record).

Table 6B (below) depicts those samples that were collected for the SI, ESI, and Supplemental ESI where VOCs were detected in groundwater other than from the City of Goshen's municipal wells. Samples shown in Table 6B were obtained from equivalent geologic materials (sand and gravel) at depths shallower than the contaminated Goshen North Wellfield wells and are using well/samples GW-6 (ET0C1) and GW-3 (ET0B9) as comparable background samples (Ref. 12, p. 9; Ref. 13, pp. 1554, 1562, 1567, 1575-1576, 1640-1649).

Table 6B
Other Groundwater Samples with Detections of VOCs
for the SI and ESI/Supplemental ESI Inspections
(Observed Release Samples)

(Refer to Figure 4 of this HRS Documentation Record for the Location of the Groundwater Samples)

EPA CLP # (Sample #)	Date Collected (Phase)	Depth (feet)	Type of Grab Sample	Hazardous Substance	Hazardous Substance Concentration (µg/L)	CRQL (µg/L)	Reference
ET0B1 (GW-10)	9/12/17 (ESI)	9	Groundwater Boring	Vinyl chloride	3.4	0.50	Ref. 7, pp. 11, 73-75; Ref. 13, p. 47
ET0C0 (GW-8)	9/13/17 (ESI)	23	Groundwater Boring	Tetrachloroethylene	0.81	0.50	Ref. 7, pp. 26-27, 109- 111; Ref. 13, p. 48

CRQL – Contract Required Quantitation Limit
µg/L - micrograms per liter

The extent of the groundwater plume as depicted by samples from the City of Goshen's municipal wells and a sample collected during the ESI investigation meeting observed release criteria is shown in Figure 4 of this HRS Documentation Record. The acreage of the plume, as measured by samples that meet the criteria for an observed release, is approximately 15.14 acres, or 223,898.4 square feet (Ref. 98, p. 1; Figure 4 of this HRS Documentation Record). The plume is depicted and measured by connecting sample locations that contain concentrations of cis-1,2-DCE, tetrachloroethylene and 1,2-Dichloropropane that meet observed release criteria (Table 6A of this Documentation Record; Table 6B of this Documentation Record; Figure 4 of this HRS Documentation Record; Ref. 1, pp. 40-41 [Section 3.0.1.1]). The plume has not been completely delineated at this time.

Attribution

The North 5th Street Groundwater Contamination Site has a release of cis-1,2-DCE and other VOCs to the groundwater (Table 6A and Table 6B of this HRS Documentation Record). Cis-1,2-DCE is a breakdown product of tetrachloroethylene (PCE), a manufactured chemical that is widely used for dry cleaning of fabrics and as a solvent used to clean machinery and electronic parts (Ref. 14, pp. 2-3). Other common breakdown products of PCE include trichloroethylene (TCE), vinyl chloride, and trans-1,2-DCE (Ref. 14, pp. 2-3). 1,2-Dichloropropane is also an industrial solvent that is known to be used in facilities that utilize PCE and its degradation products (Ref. 16, p. 1). The background groundwater samples shown in Table 5 of this HRS Documentation Record demonstrate that VOCs, including cis-1,2-DCE and 1,2-dichloropropane, were not detected in those samples, and that they are not ubiquitous throughout the study area (Table 5 of this HRS Documentation Record; Figure 4 of this HRS Documentation Record).

During the PA, SI, and ESI/Supplemental ESI activities, staff conducted an extensive level of effort by searching IDEM, county, and EPA records to identify additional possible sources of groundwater contamination. Figure 6 of this HRS documentation record shows the location of facilities identified during the search. Groundwater samples and subsurface soil samples were collected for the SI and ESI/Supplemental ESI to determine possible source areas. Figure 4 of this HRS Documentation Record shows where groundwater samples were obtained.

During the **Site Inspection**, staff collected groundwater samples downgradient from source areas around the Goshen Water Utility's North Wellfield (Figure 4 of this HRS Documentation Record; Figure 6 of this HRS Documentation Record). The wellhead protection area for the Goshen Water Utility's wells that was provided by the City of Goshen to the IDEM Drinking Water Branch, shows that the capture zone is located predominantly northeast of the municipal wells, though it does extend in all directions from the wellfield (Figure 4 of this HRS Documentation Record). The area to the north/northeast is predominantly residential with very few possible sources (Figure 1 of this HRS Documentation Record). The possible sources lie to the northwest, west, southwest, south, southeast and east (Figure 6 of this HRS Documentation Record). Some of these possible sources lie within the WHPA 1-year and 5-year time-of-travel, while many of the possible source lie outside of the TOT (Figure 6 of this HRS Documentation Record). Samples collected during the SI were taken in locations to the north, south, southeast and northeast (Figure 4 of this HRS Documentation Record). For the SI, IDEM staff collected a total of 17 groundwater samples (Ref. 12, pp. 8-10). This included seven (7) raw municipal water supply samples (including one [1] duplicate groundwater grab sample), two (2) municipal test wells, four (4) irrigation well samples (including one [1] duplicate), one (1) background groundwater grab sample from an existing residential well, one (1) rinse water sample, and two (2) water trip blanks (Ref. 12, pp. 8-10, 26). Cis-1,2-DCE was detected in four (4) of the six (6) municipal well samples (E2TD4, E2TD7, E2TD8, E2TD9, E2TE0 [dup of E2TD8]) located in the Goshen Water Utility's North Wellfield (Ref. 12, pp. 9, 26; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197). Cis-1,2-DCE, 1,2-dichloropropane and 1,2-dichloroethane were detected in one sample taken at a school (E2TE5) (Ref. 12, pp. 9, 56; Ref. 119, pp. 32, 273-274). There were no detections of volatile organic compounds in any of the other private wells that were sampled (Ref. 12, pp. 9-10, 103-104). Since no groundwater sample (other than the groundwater from the municipal wells) were found to contain any significant detection of VOCs, no sources were identified. Refer to Reference 9, pages 9 through 10 for a detailed narrative where each sample was collected. Refer to Reference 12, the Site Inspection Report, for further details regarding the Site Inspection.

Since a source of the contamination was not identified during the Site Inspection, an **Expanded Site Inspection** was conducted in 2017 (Ref. 7; Ref. 13). For the ESI, IDEM staff collected a total of 14 groundwater samples. This included nine (9) groundwater grab samples from direct-push drill rig borings (including one [1] duplicate groundwater grab sample), one (1) raw municipal water supply sample, two (2) background groundwater grab samples from existing wells, and two (2) water trip blanks (Ref. 13, p. 11). The raw groundwater sample was collected from one (1) municipal well to confirm that the municipal water supply continued to be impacted by cis-1,2-DCE and other VOCs (Ref. 13, p. 11). The groundwater grab samples collected from the direct-push drill rig borings were collected from shallow depths (9 ft. to 23 ft.) (Ref. 13, pp. 14-16, 46, 1566-1580). Cis-1,2-DCE was detected in the municipal water supply groundwater sample (ET0B9) that was collected from the municipal well #7A (Ref. 7, pp. 25, 106; Ref. 13, pp. 13-14, , 48). Low levels of trans-1,2-DCE and vinyl chloride (estimated) were also detected in this sample (Ref. 7, pp. 25, 106; Ref. 13, pp. 13-14, , 48). Vinyl chloride and cis-1,2-DCE (estimated) were also detected in a groundwater grab sample (ET0B1) from a direct-push drill rig boring located just to the northwest of the municipal wellfield (Ref. 7, pp. 11, 73; Ref. 13, pp. 14, , 47). Chlorinated solvents were not detected in any other groundwater samples collected for the ESI (Ref. 13, pp., 47-48). Other than the groundwater from the municipal wells, there was only one significant detection of VOCs from a shallow direct-push drill rig sample obtained just to the north/northwest of the Goshen North Wellfield; however, it was inconclusive as to the source of this contamination and if this contamination was impacting the municipal wells. Refer to Reference 13, pages 13 through 18 for a detailed narrative where each sample was collected.

A larger sonic drill rig was utilized during the 2018 **Supplemental ESI** in an effort to obtain deeper groundwater samples at locations similar to where the shallow boring samples were obtained in the 2017 ESI (Ref. 13, pp. 13-18; Figure 4 of this HRS Documentation Record). For the Supplemental ESI, IDEM staff collected a total of 19 groundwater samples. This sampling included six (6) groundwater grab samples from sonic drill rig borings (including one [1] duplicate groundwater grab sample), six (6) raw municipal water supply samples, one (1) background groundwater grab sample from an existing well, and six (6) water trip blanks (Ref. 13, p. 12). The raw groundwater samples were collected from six (6) municipal wells to confirm that the municipal water supply continued to be impacted by cis-1,2-DCE and other VOCs (Ref. 13, p. 12). The samples obtained from the sonic drill rig were collected at a depth similar to the municipal well depths (Ref. 6, p. 4; Ref. 13, pp. 16-18, 49, 1599-1638, 1640-1649). Cis-1,2-DCE and low levels of trans-1,2-DCE (estimated) were detected in the groundwater obtained from municipal well #6A (ET0R6) (Ref. 8, pp. 66, 724, 884; Ref. 13, pp. 17, 50-51). Cis-1,2-DCE and low levels of trans-1,2-DCE and vinyl chloride (estimated) were also detected in the groundwater obtained from municipal well #7A (ET0R8) (Ref. 8, pp. 87, 726, 886; Ref. 13, pp. 17, 50-51). Since no groundwater sample (other than the groundwater from the municipal wells) were found to contain any significant detection of VOCs, no sources were identified. Refer to Reference 13, pages 13 through 18 for a detailed narrative where each sample was collected. Refer to Reference 13, the ESI/ Supplemental ESI report, for further details regarding the Supplemental ESI Inspection.

During the ESI and the Supplemental ESI, sample locations were collected at or near potential sources located in the various directions of the municipal wells (Figure 4 of the HRS Documentation Record; Figure 6 of this HRS Documentation Record). Since no possible sources were identified northeast of the municipal wells, one (1) groundwater sample during each phase of the investigation was collected northeast of the wellfield as a background sample (Figure 6 of this HRS Documentation Record; Table 5 of this HRS Documentation Record).

During the development of the city's Wellhead Protection Plan and during the course of these investigations, numerous possible sources were identified and mapped. The vast majority of possible sources lie to the northwest, west, southwest, south, southeast and east (Figure 6 of this HRS Documentation Record). Some of these possible sources lie within the WHPA 1-year and 5-year time-of-travel (TOT), while many of the possible sources lie outside of the TOT (Figure 6 of this HRS Documentation Record).

As a result, one (1) groundwater sample (ET0B1) located northwest of the municipal wells was found to contain vinyl chloride (Table 6B of this HRS Documentation Record). This was the only groundwater sample other than the groundwater samples from the municipal wells that were found to contain VOCs for the SI, ESI and Supplemental ESI sampling events. Figure 4 shows the concentration of VOCs and the location of all samples collected for the SI, ESI and Supplemental ESI sampling events and Figure 6 shows all the location of possible sources of groundwater contamination that may be attributed to the groundwater contamination.

Facilities Investigated

The Facilities Investigated Section lists all identified facilities that may be possible sources. This section explains in detail how an ESI level of effort has been made in the attempt to document the origin of the groundwater plume with no identified sources. This section explains how possible sources were identified during the previous investigations, where groundwater samples were collected in relation to identified possible sources that may be attributable to the groundwater contamination, the results obtained, and any conclusions regarding possible sources or attribution at each sample location. In conclusion, a specific source(s) for the contamination found in the impacted Goshen municipal wells could not be identified. Refer to the Facilities Investigated document for a list of all identified facilities that may be possible sources (Ref. 57, pp 1-21).

The specific sampling locations chosen for the IDEM Site Investigation Program investigations were based on facilities that have been identified through the PA, SI and ESI investigations and reconnaissance processes. These facilities were identified to be possible contributors to the contamination present in the Goshen municipal wells based on their proximity to the municipal wells and their known use or potential use of associated chemicals. Many of these current or former facilities are located in various directions from the Site. Some are located within the Wellhead Protection area of the municipal wellfield, and many are also located upgradient of the wells. Several of these facilities have documented use of volatile organic compounds and some of these also have documented releases. Other facilities listed do not have any documented use of volatile organic compounds but are of a type of facility that may have possibly used them at some point during their operation. It is possible that there are additional unidentified facilities that have not been discovered.

The subsurface groundwater samples obtained during the IDEM investigations at locations that were selected between the contaminated wells and these facilities were unable to provide evidence of attribution to any facility. Facilities that are located within the boundaries of the groundwater plume, or immediately outside the groundwater plume (i.e., no background well in between the facility and groundwater plume), all have been investigated and evaluated for their possible contribution to the contamination identified in the wells comprising the groundwater plume. These investigations indicate that facilities #19, #20, #22, #65, #66 and #67 (see Figure 6 of this HRS Documentation Record) are all known to not be associated with a release of VOCs and the contamination identified in the municipal wells cannot be reasonably attributed to any one, or combination of, facilities in the immediate area of the plume (Ref. 57, pp. 8-11). At this time the contamination present in the Goshen North Wellfield cannot be attributed to any of the facilities listed.

Hazardous Substances Released:

The contaminants detected in the municipal well and groundwater samples collected for these investigations cannot be directly attributed to any of the facilities identifies as possible contributors.

- Cis-1,2-dichloroethylene (cis-1,2-DCE)
- Trans-1,2-dichloroethylene (trans-1,2-DCE)
- Vinyl Chloride
- Tetrachloroethylene (PCE)
- 1,2-Dichloropropane

Cis-1,2-DCE is a degradation product of tetrachloroethylene (PCE) (Ref. 14, pp. 1-3). PCE is a manufactured chemical that is widely used for dry cleaning of fabrics and as a solvent used to clean machinery and electronic parts and is not thought to occur naturally. Cis-1,2-DCE was detected in eight (8) municipal well groundwater samples (E2TD4, E2TD7, E2TD8, E2TD9, E2TE0, ET0B9, ET0R6, ET0R8) obtained from five (5) separate municipal wells over the course of the three (3) investigations (see Table 6A of this HRS Documentation Record).

Trans-1,2-DCE is also a degradation product of PCE (Ref. 14, pp. 1-3). Trans-1,2-DCE was detected in eight (8) municipal well groundwater samples (E2TD4, E2TD7, E2TD8, E2TD9, E2TE0, ET0B9, ET0R6, ET0R8) obtained from five (5) separate municipal wells (Well #1A, Well #2, Well #5A, Well #6A and Well #7A) over the course of the three (3) investigations (see Table 6A of this HRS Documentation Record).

Vinyl chloride is also a degradation product of PCE (Ref. 14, pp. 1-3). Vinyl chloride was detected in two (2) municipal well groundwater samples (ET0B9 and ET0R8) obtained from one (1) municipal well (Well #7A) over the course of the three (3) investigations (see Table 6A of this HRS Documentation Record).

PCE is a solvent with multiple uses (Ref. 14, pp. 1-3). PCE was detected in one (1) groundwater sample (ET0C0) (see Table 6B of this HRS Documentation Record).

1,2-Dichloropropane is a VOC that is known to be used as a chemical intermediate, in the manufacture of chlorinated solvents, as an industrial solvent, and as an intermediate in rubber processing (Ref. 16, p. 1). 1,2-Dichloropropane was detected in one (1) groundwater well sample (E2TE5) (see Table 6A of this HRS documentation record).

See Table 5 of this HRS Documentation Record for a full summary of background groundwater samples collected during the SI and ESI/Supplemental ESI investigations. See Table 6A and Table 6B of this HRS Documentation Record for a full summary of groundwater samples collected during the SI and ESI/Supplemental ESI investigations that had detections of cis-1,2-DCE and vinyl chloride above CRQLs.

Groundwater Observed Release Factor Value: 550

3.2 WASTE CHARACTERISTICS

3.2.1 Toxicity/Mobility

The following table, the Toxicity/Mobility Table, depicts the toxicity, mobility, and combined toxicity/mobility factor values that have been assigned to those substances present in the observed release and have a containment value greater than 0.

Table 7
Toxicity/Mobility Table

Hazardous Substance	Source No. (and/or Observed Release)	Toxicity Factor Value	Mobility Factor Value*	Does Hazardous Substance Meet Observed Release by chemical analysis? (Y/N)	Toxicity/Mobility (Ref. 1, Table 3-9)	References
Cis-1,2-DCE	Source 1	1,000	1.0	Y	1,000	Ref. 3, p. 1
Vinyl Chloride	Source 1	10,000	1.0	Y	10,000	Ref. 3, p. 20
Trans-1,2-DCE	Source 1	100	1.0	Y	100	Ref. 3, p. 8
PCE	Source 1	100	1.0	Y	100	Ref. 3, p. 14
1,2-Dichloropropane	Source 1	1000	1.0	Y	10,000	Ref. 3, p. 26

*Ref. 1, Section 3.2.1.2 – Mobility factor of 1.0 was assigned based on Section 3.2.1.2. “For any hazardous substance that meets the criteria for an observed release by chemical analysis to one or more aquifers underlying the sources at the site, regardless of the aquifer being evaluated, assign a mobility factor value of 1.

Toxicity/Mobility Factor Value: 10,000
(Ref. 1, Table 3-9)

3.2.2 Hazardous Waste Quantity

Table 8

Source No.	Source Type	Source Hazardous Waste Quantity
1	Other	Unknown, but > 0

The North 5th Street Groundwater Contamination Site has been scored as consisting of a groundwater plume with no identified source. According to Section 2.4.2.2 in the HRS (Ref. 1), if any target for that migration pathway is subject to Level I or Level II concentrations and the hazardous constituent quantity is not adequately determined, assign a value from Table 2-6 or a value of 100 whichever is greater, as the hazardous waste quantity factor value for that pathway. Because Level II concentrations were present in a drinking water well (Table 6A of this HRS documentation record, see Section 3.3.2.3 of this HRS documentation record), a hazardous waste quantity factor value of 100 is assigned for the groundwater pathway.

Hazardous Waste Quantity Factor Value: 100
(Ref. 1, Table 2-6)

3.2.3 Waste Characteristics Factor Category Value

As specified in the HRS (Ref. 1, Section 3.2.3), the Hazardous Waste Quantity Factor Value of 100 was multiplied by the highest Toxicity/Mobility Value of 10,000, resulting in a product of 1,000,000. Based on this product, a Waste Characteristics Factor Category Value of 32 was assigned from Table 2-7 of the HRS (Ref. 1, Section 2.4.3.1).

Toxicity/Mobility Factor Value: 10,000

Hazardous Waste Quantity Factor Value: 100

Toxicity/Mobility Factor Value (10,000) x Hazardous Waste Quantity Factor Value (100)
= 1,000,000

Waste Characteristics Factor Category Value: 32
(Ref. 1, Table 2-7)

3.3 GROUNDWATER PATHWAY TARGETS

Drinking water is supplied to the residents of Goshen, Indiana, by groundwater obtained from the municipal well system (Ref. 6, p. 3; Ref. 24, p. 2). The Goshen Water Utility operates nine (9) wells in two (2) wellfields (Ref. 6, p. 3; Ref. 24, p. 2). Three (3) of the wells are located in the Kercher Wellfield in the southern part of Goshen (Ref. 6, p. 3; Ref. 24, p. 2). These wells have not been impacted by the contamination. Six (6) of the wells are located in the Goshen North Wellfield in the northern part of Goshen (Ref. 6, p. 3; Ref. 24, p. 2). The Goshen North Wellfield is the wellfield that has been contaminated by a groundwater plume of chlorinated solvents, principally cis-1,2-DCE (Ref. 7, pp. 25, 106; Ref. 8, pp. 66, 87, 724, 726, 884, 886; Ref. 12, p. 26; Ref. 13, pp. 13, 17, , 48, 50-51; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197; Table 6A and Figure 4 of this HRS Documentation Record).

The six (6) wells in the Goshen Water Utility's North Wellfield are known as Well #1A, Well #2, Well #3, Well #5A, Well #6A and Well #7A (Ref. 6, p. 3; Ref. 23, p. 2). Well #1A has a total depth of 170 feet below ground surface (bgs); Well #2 has a total depth of 145 feet bgs; Well #3 has a total depth of 156 feet bgs; Well #5A has a total depth of 169 feet bgs; Well #6A has a total depth of 152 feet bgs; and Well #7A has a total depth of 161 feet bgs (Ref. 6, p. 4). Refer to Figure 3 and Ref. 6, p. 11 for the location of the Goshen Water Utility North Wellfield. Wells #1A, #5A, #6A and #7A have been impacted by cis-1,2-DCE (Ref. 7, pp. 25, 106; Ref. 8, pp. 66, 87, 724, 726, 884, 886; Ref. 12, p. 26; Ref. 13, pp. 13, 17, , 48, 50-51; Ref. 119, pp. 8, 16, 18, 20, 22, 110, 141, 152, 175, 197). Additional detections of cis-1,2-DCE have been present in combined entry point samples and reported to IDEM by the Goshen Water Utility (Ref. 19, pp. 1, 3, 5, 7). Vinyl chloride was also documented in groundwater obtained from a temporary boring near the Goshen North Wellfield (Ref. 7, pp. 11, 73; Ref. 13, pp. 14, 47). Both cis-1,2-DCE and vinyl chloride are degradation products of tetrachloroethylene (PCE) (Ref. 14, pp. 2, 3).

These nine (9) wells are the primary source of drinking water for residents of Goshen (Ref. 6, p. 3; Ref. 24, p. 2). No one (1) well provides more than 40% of the water distributed to the Goshen Water Utility System (Ref. 6, p. 4).

3.3.1 Nearest Well

Well ID: **Municipal Well #1A** (Sample E2TD4 [2015])

Level of Contamination (I, II, or potential): **II**

If potential contamination, distance from source in miles: N/A

Well ID: **Municipal Well #2** (Sample E2TD5 [2015])

Level of Contamination (I, II, or potential): **Potential**

If potential contamination, distance from source in miles: <1/4 mile

Well ID: **Municipal Well #3** (Sample E2TD6 [2015])

Level of Contamination (I, II, or potential): **Potential**

If potential contamination, distance from source in miles: <1/4 mile

Well ID: **Municipal Well #5A** (Sample E2TD7 [2015])

Level of Contamination (I, II, or potential): **II**

If potential contamination, distance from source in miles: N/A

Well ID: **Municipal Well #6A** (Samples E2TD9 [2015], ET0R6 [2018])

Level of Contamination (I, II, or potential): **II**

If potential contamination, distance from source in miles: N/A

Well ID: **Municipal Well #7A** (Samples E2TD8 [2015], E2TE0 [2015], ET0B9 [2017], ET0R8 [2018])

Level of Contamination (I, II, or potential): **II**

If potential contamination, distance from source in miles: N/A

Well ID: **Municipal Well #12**

Level of Contamination (I, II, or potential): **Potential**

If potential contamination, distance from source in miles: 2-3 miles

Well ID: **Municipal Well #13**

Level of Contamination (I, II, or potential): **Potential**

If potential contamination, distance from source in miles: 2-3 miles

Well ID: **Municipal Well #14**

Level of Contamination (I, II, or potential): **Potential**

If potential contamination, distance from source in miles: 2-3 miles

As specified in the HRS (Ref. 1, Section 3.3.1, Table 3-11), if one or more drinking water wells are subject to Level II concentrations, a Nearest Well Factor Value of 45 is assigned. Level II concentrations of cis-1,2-DCE and trans-1,2-DCE have been documented in the groundwater of the Goshen Water Utility's Municipal wells #1A, #5A, #6A, and #7A (Table 6A and Table 10 of this HRS Documentation Record; Ref. 1, p. 72 [Section 3.3.2.1 of this HRS Documentation Record]).

Nearest Well Factor Value: 45
(Ref. 1, Table 3-11)

3.3.2 Population

Goshen Water Utility Municipal Wells #1A, #2, #3, #5A, #6A and #7A in the Goshen North Wellfield, and Wells #12, #13 and #14 in the Kercher Wellfield serve drinking water to a total of 32,267 individuals (Ref. 23, p. 2). The water from the municipal wells is not blended with surface water (Ref. 23, p. 2; Ref. 24, p. 2). The North Wellfield and the Kercher Wellfield treatment plants pump into a common distribution system with one (1) 0.5 million gallon elevated storage tank, one (1) 1.5 million gallon elevated storage tank, and one (1) 0.5 million gallon ground storage tank (Ref. 24, p. 2). Each of the municipal wells has a well diameter of 12 inches, a well capacity of between 500 and 2,000 gallons per minute (gpm), and a well depth of between 145-225 feet (Ref. 6, p. 4). Using the well capacity of each individual well, it was determined that no single well provides 40% or greater of the city water supply. Therefore, per HRS Section 3.2.2, each well will be considered equal for apportioning the population (see Population Per Well Calculations in Table 9 below). The water from all of the wells is treated with chlorine and fluoride prior to distribution to the public (Ref. 25, p. 2).

The following table documents the level of contamination (Level I, Level II or Potential) in each Goshen Water Utility municipal well and well capacities to determine if any single well contributes 40% or greater of the city water supply. Since no well provides 40% or greater of the city water supply the total population has been apportioned equally to each well.

Table 9
Population per Well Calculation Table

Well ID/ Well Log #	Well Capacity (gpm) ¹	Calculati on (well capacity / total capacity of all wells)	% of Total Capacity	Total Population Served by Logansport Municipal Wells ²	Population per Well Calculation (based on equal apportionm ent)	Population per Well (based on equal apportionment)	Level of Contamination (Level I, Level II, Potential)
Municipal Well #1A	1,200	1,200 / 11,600	10.345%	32,267	=32,267 / 9	3,585	Level II
Municipal Well #2	500	500 / 11,600	4.310%	32,267	=32,267 / 9	3,585	Potential
Municipal Well #3	1,000	1,000 / 11,600	8.621%	32,267	=32,267 / 9	3,585	Potential
Municipal Well #5A	1,200	1,200 / 11,600	10.345%	32,267	=32,267 / 9	3,585	Level II
Municipal Well #6A	1,200	1,200 / 11,600	10.345%	32,267	=32,267 / 9	3,585	Level II
Municipal Well #7A	1,200	1,200 / 11,600	10.345%	32,267	=32,267 / 9	3,585	Level II
Municipal Well #12	1,500	1,500 / 11,600	12.931%	32,267	=32,267 / 9	3,585	Potential
Municipal Well #13	1,800	1,800 / 11,600	15.517%	32,267	=32,267 / 9	3,585	Potential

Well ID/ Well Log #	Well Capacity (gpm) ¹	Calculati on (well capacity / total capacity of all wells)	% of Total Capacity	Total Population Served by Logansport Municipal Wells ²	Population per Well Calculation (based on equal apportionm ent)	Population per Well (based on equal apportionment)	Level of Contamination (Level I, Level II, Potential)
Municipal Well #14	2,000	2,000 / 11,600	17.241%	32,267	=32,267 /9	3,585	Potential
Total	11,600	-	100%	32,267	-	32,267	-

¹ Ref. 6, p. 4

² Ref. 23, p. 2

3.3.2.1 Level of Contamination

The level of contamination per each municipal well is determined by concentration of contaminants found in the drinking water at each well. If the concentration of a contaminant exceeds a benchmark as shown in the Superfund Chemical Data Matrix (Ref. 3) then the Level of Concentration is Level 1. If the concentration of a contaminant is below a benchmark as shown in the Superfund Chemical Data Matrix (Ref. 3) and the concentration is above detection and three (3) times above background, then the Level of concentration is Level II. If no detections of hazardous substances were detected, then it is evaluated under potential contamination in section 3.3.2.4 of this HRS documentation record.

Table 10
Contamination Levels
(Table Lists only Municipal Wells)

EPA CLP #	Well #	Sample Description	Hazardous Substance	Hazardous Substance Concentration (µg/L)	Benchmark Concentration (µg/L)	Health- based Benchmark	Level Concentration	Reference for Benchmark
E2TD4	MW1A	Groundwater	Cis-1,2- DCE	4.0	70.0	MCL	II	Ref. 3, p. 2; Ref. 27, p. 11
E2TD4	MW1A	Groundwater	Trans-1,2- DCE	0.18 J	100.0	MCL	II	Ref. 3, p. 8; Ref. 27, p. 11
E2TD7	MW5A	Groundwater	Cis-1,2- DCE	0.69	70.0	MCL	II	Ref. 3, p. 2; Ref. 27, p. 11
E2TD7	MW5A	Groundwater	Trans-1,2- DCE	0.18 J	100.0	MCL	II	Ref. 3, p. 8; Ref. 27, p. 11
E2TD7	MW5A	Groundwater	PCE	0.11 J	5.0	MCL	II	Ref. 3, p. 14; Ref. 27, p. 15

EPA CLP #	Well #	Sample Description	Hazardous Substance	Hazardous Substance Concentration (µg/L)	Benchmark Concentration (µg/L)	Health-based Benchmark	Level Concentration	Reference for Benchmark
E2TD8	MW7A	Groundwater	Cis-1,2-DCE	20.0	70.0	MCL	II	Ref. 3, p. 2; Ref. 27, p. 11
E2TD8	MW7A	Groundwater	Trans-1,2-DCE	0.69	100.0	MCL	II	Ref. 3, p. 8; Ref. 27, p. 11
E2TD8	MW7A	Groundwater	PCE	0.11 J	5.0	MCL	II	Ref. 3, p. 14; Ref. 27, p. 15
E2TD9	MW6A	Groundwater	Cis-1,2-DCE	6.8	70.0	MCL	II	Ref. 3, p. 2; Ref. 27, p. 11
E2TD9	MW6A	Groundwater	Trans-1,2-DCE	0.32 J	100.0	MCL	II	Ref. 3, p. 8; Ref. 27, p. 11
E2TE0	MW7A	Groundwater	Cis-1,2-DCE	20.0	70.0	MCL	II	Ref. 3, p. 2; Ref. 27, p. 11
E2TE0	MW7A	Groundwater	Trans-1,2-DCE	0.68	100.0	MCL	II	Ref. 3, p. 8; Ref. 27, p. 11
E2TE0	MW7A	Groundwater	PCE	0.13 J	5.0	MCL	II	Ref. 3, p. 14; Ref. 27, p. 15
ET0B9	MW7A	Groundwater	Cis-1,2-DCE	19.0	70.0	MCL	II	Ref. 3, p. 2; Ref. 27, p. 11
ET0B9	MW7A	Groundwater	Trans-1,2-DCE	0.85	100.0	MCL	II	Ref. 3, p. 8; Ref. 27, p. 11
ET0B9	MW7A	Groundwater	Vinyl chloride	0.28 J	2.0	MCL	II	Ref. 3, p. 20; Ref. 27, p. 15
ET0R6	MW6A	Groundwater	Cis-1,2-DCE	5.6	70.0	MCL	II	Ref. 3, p. 2; Ref. 27, p. 11
ET0R6	MW6A	Groundwater	Trans-1,2-DCE	0.23 J	100.0	MCL	II	Ref. 3, p. 8; Ref. 27, p. 11
ET0R8	MW7A	Groundwater	Cis-1,2-DCE	19.0	70.0	MCL	II	Ref. 3, p. 2; Ref. 27, p. 11
ET0R8	MW7A	Groundwater	Trans-1,2-DCE	0.65	100.0	MCL	II	Ref. 3, p. 8; Ref. 27, p. 11
ET0R8	MW7A	Groundwater	Vinyl chloride	0.30 J	2.0	MCL	II	Ref. 3, p. 20; Ref. 27, p. 15

3.3.2.2 Level I Concentrations

Level I Population Targets

No Level I Populations were identified

Sum of Population Served by Level I Wells: Not Scored

Sum of Population Served by Level I Wells X 10: Not Scored

Level I Concentrations Factor Value: 0

3.3.2.3 Level II Concentrations

Level II Population Targets

The “Population per Well Calculations Table” of this documentation record depicts the population calculated for Goshen Water Utility Wells #1A, #5A, #6A, and #7A. Table 10 shows the benchmark used and the groundwater sample results for Goshen Water Utility Wells #1A, #5A, #6A, and #7A that were used to obtain the Level II concentrations. The population served by the Level II contaminated wells, respectively, is $(3,585 + 3,585 + 3,585 + 3,585 = 14,340)$.

Sum of Population Served by Level II Wells: $4 \times 3,585 = 14,340$

Sum of Population Served by Level II Wells X 1 = 14,340

Level II Concentrations Factor Value: 14,340

3.3.2.4 Potential Contamination

There has not been an observed release of VOCs in the groundwater of Municipal Wells #2 and #3. Therefore, potential contamination exists for Municipal Wells #2 and #3 since both are located within the same wellfield as the contaminated wells. As shown in the “Population per Well Calculations” Table (Table 9), Municipal Well #2 serves 3,585 people and Municipal Well #3 serves 3,585 people. Additionally, potential contamination exists for the three (3) municipal wells in the Kercher Wellfield (#12, #13 and #14). The Kercher Wellfield wells are located less than three (3) miles from the North 5th Street Groundwater Contamination Site so they are being scored on potential.

Well #2 and Well #3 are both in the “Other than Karst: 0 to ¼ mile” distance category of the HRS Table 3-12 (Figure 5 of this HRS Documentation Record). Since both wells are in the less than ¼-mile distance category and serve a total of 7,170 people (3,585 people per well), a distance-weighted population value of 5,214 is obtained from HRS Table 3-12 and assigned. Well #12, Well #13 and Well #14 are in the “Other than Karst: 2 to 3 mile” Distance Category of the HRS Table 3-12 (Figure 5 of this HRS Documentation Record). Since all three (3) wells are in the 2 to 3-mile distance category and serve a total of 10,755 people (3,585 people per well), a distance-weighted population value of 2,122 is obtained from HRS Table 3-12 and assigned.

The value assigned total of 7,336 (5,214 + 2,122) is multiplied by 0.1 which equals 733.6 and is rounded to 734 (HRS Section 3.3.2.4).

Potential Contamination Factor Value: 734

3.3.3 Resources

Resource use of the aquifer within the target distance limit does not include any of the Resource Factors. Therefore, a Resource Factor value of 0 is assigned (Ref. 1, Section 3.3.3).

Resources Factor Value: 0

3.3.4 Wellhead Protection Area

The groundwater plume lies within the Goshen Water Utility North Wellfield Wellhead Protection Area (Figure 4 of this HRS Documentation Record). Wellhead Protection Areas are designated by the U.S. EPA in accordance with Section 1428 of the Safe Drinking Water Act (Ref. 99, p. 9). Therefore, the Wellhead Protection Area Factor Value of 20 is assigned (Ref. 1, p. 42 [Section 3.3.4]).

Wellhead Protection Area Factor Value: 20