Wellhead Protection Plan
Unit Well – 16

City of Madison, Wisconsin

Madison Water Utility
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Madison, Wisconsin 53713

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LIST OF ACRONYMS

Acronym	
AST	Above Ground Storage Tank
BRRTS	Bureau for Remediation and Redevelopment Tracking System
CCR	Customer Confidence Report
CSI	Contaminant Source Inventory
DCRPC	Dane County Regional Planning Commission
DNR	Department of Natural Resources
EPA	Environmental Protection Agency
IOC	Inorganic Compound
LUST	Leaking Underground Storage Tank
MGD	Million Gallons per Day
MMSD	Madison Metropolitan Sewerage District
MSL	Mean Sea Level
PHMDC	Public Health Madison and Dane County
UST	Underground Storage Tank
USGS	United States Geological Survey
SOC	Synthetic Organic Compound
TOT	Time of Travel
VOC	Volatile Organic Compound
WHPP	Well Head Protection Plan
WHPA	Well Head Protection Area
WHP	Well Head Protection
WGNHS	Wisconsin Geological and Natural History Survey
ZOC	Zone of Capture
ZOI	Zone of Influence

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EXECUTIVE SUMMARY

This report is a Wellhead Protection Plan (WHPP) for City of Madison Unit Well 16. The primary purposes of this WHPP are to define the wellhead protection area (WHPA) for Unit Well 16 and establish specific criteria for protection of Unit Well 16 and groundwater resources in the WHPA including management strategies to maintain a high quality water supply, free of contamination. The primary goal of wellhead protection (WHP) planning is to protect water supply wells from contamination and, thereby, protect people who obtain their water supply from those wells. This WHPP was prepared for Unit Well 16 to conform to the requirements of the Wisconsin Administrative Code, Chapter NR 811, Section 12(6), for wellhead protection (WHP) planning.

Unit Well 16 is located at 6706 Mineral Point Road in the western part of the City of Madison. Construction of Unit Well 16 was completed in 1967. Unit Well 16 is 1004 feet deep, is open to both the upper and the lower bedrock (sandstone) aquifer, and has a design capacity of approximately 2,400 gallons per minute (gpm).

Land use in the vicinity of Unit Well 16 is primarily residential, commercial, and institutional.

As part of the Dane County regional hydrologic study, a regional groundwater flow model was prepared for Dane County and was used to delineate time-related (5-, 50-, and 100-year time of travel (TOT)) zones of contribution (ZOCs) for municipal wells (Krohelski et. al., 2000). The TOT ZOCs documented in this report for Unit Well 16 were modeled 03/18/2008 by the Wisconsin Geological and Natural History Survey (WGNHS)/University of Wisconsin Extension (UWEX) office in Madison, WI. ZOCs primarily extend northwest, west, and south, and partially north and east of Unit Well 16 in the simulated upgradient groundwater flow directions.

Figure 3-5 shows the wellhead protection area (WHPA) for Unit Well 16. Two zones of protection are within the WHPA. Zone A is defined by the 5-year TOT ZOC. Zone B is defined by a 1,200-foot fixed radius around Unit Well 16. The WHPA will provide a conservative protection zone to account for changes in pumping rates, pumping duration, and interference drawdown from other existing and future wells.

A contaminant source inventory (CSI) was performed for the Unit Well 16 area during June and July 2008 by Environmental FirstSearch (EFS), Inc. Known potential and existing contaminant sources within the Unit Well 16 WHPA include storm and sanitary sewers; spill sites; active and closed underground storage tank (UST) sites; closed leaking underground storage tank (LUST) sites; road salt use; and probable use of pesticide, herbicide, and nutrients on residential and commercial lawns. Several other potential and existing contaminant sources were identified in the 50 year and 100 year ZOCs.

Programs and activities to be used by the City of Madison and others for WHPA management at Unit Well 16 are grouped into five principal categories as follows:

1. Existing Programs

    a. Clean Sweep Collection Program
    b. On-site waste disposal system maintenance
    c. Well abandonment
    d. Land application of sludge and septage
    e. Spill notification and awareness of remedial investigation and cleanup

2. Land Use Controls

    a. Existing zoning/WHP overlay zoning and ordinance

3. Intergovernmental Cooperation

    a. Land use planning and site plan review

4. Monitoring

    a. CSI maintenance
    b. Water quality monitoring

5. Public Education and Awareness

    a. Availability of WHPP
    b. Public informational meeting
    c. News releases
    d. Informational materials distributed to residents in WHPA
    e. Land use and contamination source awareness
    f. School programs

Some of these programs and activities are currently being performed, while others are new and will be implemented immediately to help protect Unit Well 16.

The Madison Water Utility has an existing water conservation program and encourages water conservation. The Utility has formulated a contingency plan for providing water in the event that Unit Well 16, or one or more of the City's other water supply wells became contaminated or removed from service. Well 16 is part of the Northwest Zone (Pressure Zone 8). In the event of a Well 16 failure, Well 28 (also in the Northwest Pressure Zone), Well 26 (bordering the Northwest Pressure Zone), or water from Zones 6 and 7, can serve this area.

The City of Madison has a WHP ordinance and overlay-zoning district. The WHP ordinance helps ensure that other potential contaminant sources are not located in the Unit Well 16 WHPA.

1.0 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This report is a WHPP for City of Madison Unit Well 16. The primary purposes of this WHPP are to define the WHPA for Unit Well 16 and establish specific criteria for protection of Unit Well 16 and groundwater resources in the WHPA including management strategies to maintain a high quality water supply, free of contamination. The primary goal of wellhead protection (WHP) planning is to protect water supply wells from contamination and, thereby, protect people who obtain their water supply from those wells.

This WHPP was prepared for Unit Well 16 to conform to the requirements of the Wisconsin Administrative Code, Chapter NR 811, Section 12(6), for WHP planning. A copy of this section of the code is in Appendix A. The project scope included the following:

1. Research available information regarding the geology and hydrogeology of the well sites and aquifer parameters.

2. Research well construction and operation of Unit Well 16.

3. Coordinate with Dane County Regional Planning Commission (DCRPC) for previously delineated 5-year TOT capture zones for Unit Well 16.

4. Perform a CSI to identify and characterize existing and potential contamination sources within a ½-mile radius and within the recharge area equivalent to the 100-year TOT capture zone for Unit Well 16.

5. Assist with the determination of a WHPA for Unit Well 16.

6. Assist with the development of WHP management strategies.

1.2 LOCATION AND BACKGROUND

Unit Well 16 is located at 6706 Mineral Point Road in the western part of the City of Madison. The site is in the SW¼ of the SW¼, of Section 24, Township 7 North, Range 8 East, Dane County, Wisconsin. Figure 1-1 shows the location of Unit Well 16 and other water system facilities in the City of Madison. Property land records for the well site are in Appendix B. Construction of Unit Well 16 was completed in 1967.

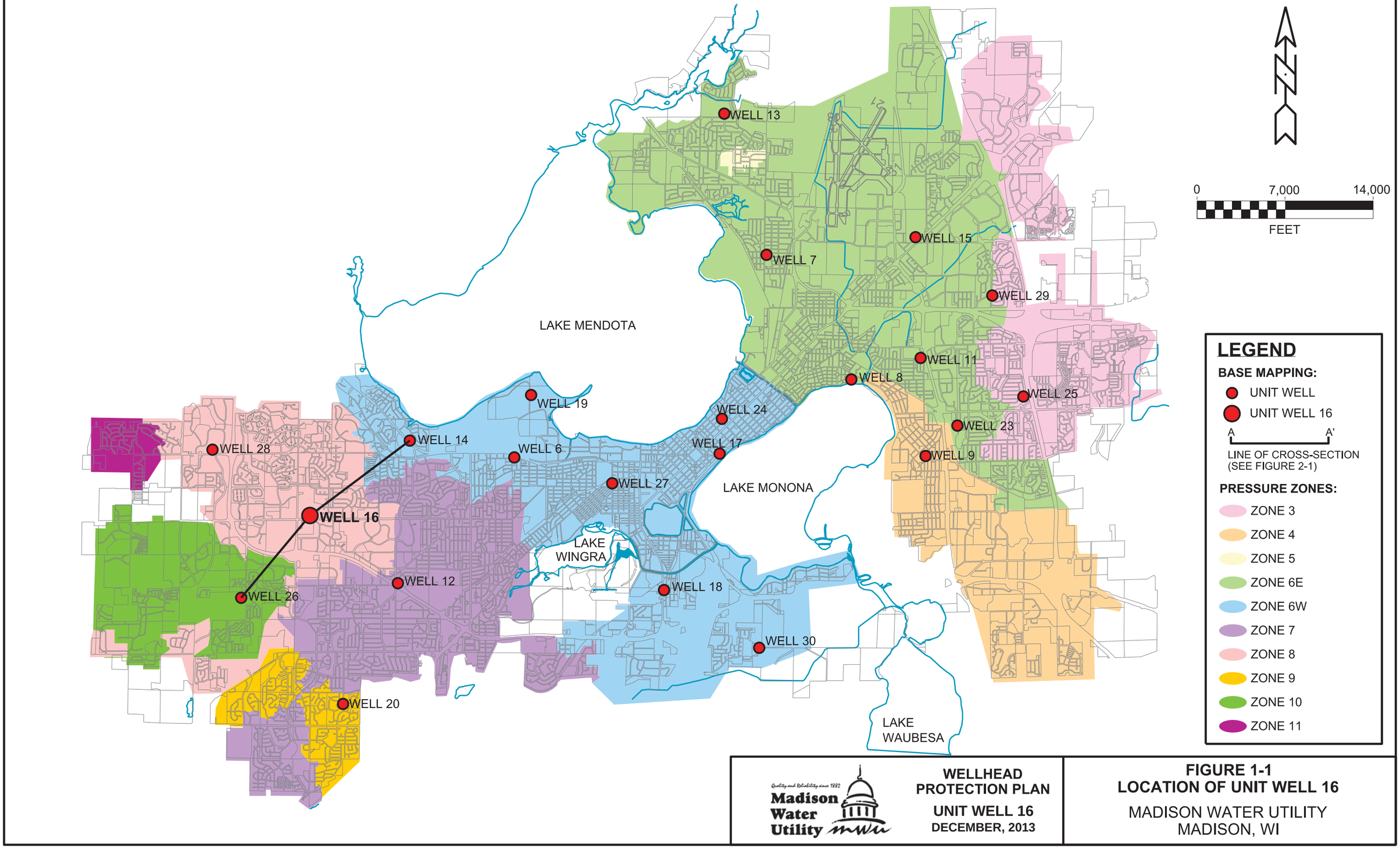
The City water system serves approximately 235,000 people and consists of 22 active wells, 29 booster pumping facilities, 25 ground storage reservoirs, 5 elevated water storage tanks, and approximately 840 miles of water transmission and distribution mains. Because of the varying topography in the Madison area, the water system is divided

into 10 separate pressure zones. Unit Well 16 is located near the center of Pressure Zone 8. Unit Well 16 is located approximately 1.3 miles northeast of Unit Well 26 and 1.6 miles northwest of Unit Well 12.

1.3 UNIT WELL 16

Unit Well 16 was constructed to a depth of 1004 feet. The well is cased with 24-inch OD steel casing grouted to a depth of 300 feet below ground. A 22-inch diameter open borehole extends from 300 feet to the bottom of the well. Sandstone bedrock was encountered at a depth of 275 feet. Thin beds of shale were encountered over the intervals of 435 to 465 feet, and 855 to 865 feet. Unit Well 16 was test pumped at a rate of 2,400 gpm and had a specific capacity of 19.3 gallons per minute per foot of drawdown (gpm/ft).

At the time of the original test pumping the static (non-pumping) water level in Unit Well 16 was 163.9 feet below ground. In November 2013, the static water level averaged 175.2 feet below ground. A construction report and formation log prepared by the WGNHS is in Appendix C.



Madison Water Utility MWU

WELLHEAD PROTECTION PLAN

UNIT WELL 16

DECEMBER, 2013

FIGURE 1-1
LOCATION OF UNIT WELL 16

MADISON WATER UTILITY
MADISON, WI

2.0 HYDROGEOLOGIC CONDITIONS

2.1 LAND USE, TOPOGRAPHY, AND DRAINAGE

Land use in the vicinity of Unit Well 16 is primarily residential, commercial, and institutional. Zoning immediately around Unit Well 16 is institutional, commercial and multi-family residential. A portion of the City of Madison zoning map for the Unit Well 16 area is in Appendix D.

Unit Well 16 is located in a till covered area approximately 11,000 feet (2.1 miles) southwest of Lake Mendota. At Well 16 the land slopes from the northeast to the southwest toward a closed depression that is currently used as for storm water detention. The surrounding land is hummocky. A north-south trending, low relief moraine ridge is located approximately 1,000 feet east of Unit Well 16. The ground surface elevation at Unit Well 16 is approximately 1037 feet above mean sea level (MSL). Locally, drainage from Unit Well 16 is southeast toward the storm water detention basin.

2.2 GEOLOGY

The area surrounding Unit Well 16 was glaciated by the Green Bay Lobe during the Wisconsin Stage. The rocks and unlithified deposits in the area range from Precambrian basement rocks to recent soils. The bedrock from oldest to youngest includes Precambrian granite and Cambrian age bedrock consisting of sandstone, dolomite, and shale.

A geological cross-section through Unit Wells 26, 16, and 14 is illustrated on Figure 2-1. A construction report and formation log for strata encountered at Unit Well 16 is in Appendix C. The stratigraphic sequence encountered in the wells is briefly described in the following.

2.2.1 Precambrian Basement Bedrock

Precambrian bedrock was encountered in Unit Well 16 at a depth of 1000 feet below ground surface. The Precambrian bedrock encountered in Unit Well 16 is granite (Wisconsin Geological and Natural History Survey (WGNHS) well log DN-947).

2.2.2 Cambrian Bedrock

Cambrian age rocks encountered in Unit Well 16 include, in ascending order, Mount Simon Formation, Eau Claire Formation, Wonewoc Formation, the Tunnel City Group and the Trempealeau Group.

Cambrian age rocks are relatively flat lying in the Madison area in the east-west direction and dip slightly to the south. The cross-section shows a gentle southwest slope

through Unit Well 16. The thickness of deep rock units appears to be relatively consistent in the Madison area, although there are textural and compositional changes, laterally.

The Mount Simon Formation is 535 feet thick in Unit Well 16, and primarily consists of quartzose sandstone with fine to very coarse grains, and occasional thin dolomite, shale and conglomerate layers. The Eau Claire Formation is encountered at a depth of 430 feet in Unit Well 16 and consists of 30 feet of olive-green-gray dolomitic shale and 5 feet of overlying dolomite. The Eau Claire shale is laterally extensive throughout the Unit Well 16 area.

The overlying Wonewoc Formation and Tunnel City Group strata consists of medium to coarse-grained sandstone, and medium to fine grained sandstone, respectively. The Trempealeau Group bedrock is the upper bedrock at Unit Well 16 and consists of 14 feet of dolomite and sandy dolomite. The thickness of the Trempealeau Group bedrock varies across the area, because it is the upper erosional surface.

2.2.3 Unlithified Deposits

At Unit Well 16, the bedrock is overlain by 156 feet of unlithified material. Three feet of clay directly overlies the bedrock, followed by 143 feet of sand gravel and silt layers. The upper 10 feet of unlithified material consists of stoney, gravelly clay. Clayton and Attig (1997) classify the near surface unlithified deposits in the immediate vicinity of Unit Well 16 as part of the Horicon Member of the Holy Hill Formation and describe the materials as non-uniform, collapsed, supraglacial till, and sorted supraglacial debris; and collapsed melt-water stream sediment that was deposited on stagnant ice.

Soils in the immediate vicinity of Unit Well 16 are classified as the Batavia silt loam, Dresden silt loam, Troxel silt loam, Virgil silt loam, and Gravel Pit (Hole, 1968; USDA, 2008). The Batavia, Dresden, Troxel soils have good contaminant attenuation potential. Virgil soils have fair contaminant attenuation potential, and gravel pit soil has poor contaminant attenuation potential. The DCRPC assigned a risk classification of low to moderate from surface activities in the Unit Well 16 area on the basis of several factors including soil properties (DCRPC, 1999).

2.3 HYDROGEOLOGY

In the study area, groundwater occurs within the lower bedrock aquifer, the upper bedrock aquifer, and the unlithified aquifer. Locally, the upper bedrock aquifer and unlithified aquifer are used for private domestic supplies. Municipal and industrial wells are constructed into the lower bedrock aquifer. Following is a brief discussion about the aquifers:

2.3.1 Lower Bedrock Aquifer

The lower bedrock aquifer occurs in the Mount Simon Formation and lower part of the Eau Claire Formation beneath the shale layer. The Precambrian bedrock is the base of the lower bedrock aquifer and the shale layer in the Eau Claire Formation is the upper confining unit. Water occurs within horizontal and vertical fractures, along bedding planes, and between sand grains in the aquifer. The saturated thickness of the lower bedrock aquifer is approximately 535 feet thick in Unit Well 16. The hydraulic conductivity of the lower bedrock aquifer is estimated to be 10 feet per day (ft/day) (Krohelski et. al., 2000).

Unit Well 16 is cased to a depth of 300 feet, which is 135 feet above the Eau Claire shale confining layer. Unit Well 16 is open and rapidly hydraulically connected to both the lower and upper aquifers. Water levels measured in Unit Well 16 are representative of the composite upper and lower bedrock aquifers.

Based on the Wisconsin DNR Well Pumping Report prepared by the Madison Water Utility, the static water level in Unit Well 16 during November 2013 averaged 175.2 feet below ground level. Figure 4 in Appendix E shows the simulated year 2000 potentiometric surface in the lower bedrock (Mount Simon) aquifer and shows the groundwater flow direction toward Unit Well 16 is from northwest, west and southwest (DCRPC, 2004). Figure 4 shows the potentiometric surface elevation in the vicinity of Unit Well 16 at approximately 890 feet MSL, which is higher than the composite water level measured in Well 16. The storativity of the lower bedrock aquifer is estimated to be approximately 0.0003, and the porosity is estimated to be approximately 30 percent (Bradbury, 2001). The porosity of the Eau Claire Formation is estimated to be 5 percent (Bradbury, 2001).

2.3.2 Upper Bedrock Aquifer

The upper bedrock aquifer occurs in the upper part of the Eau Claire Formation above the shale and within the Wonewoc Formation, Tunnel City Group and Trempealeau Group. Water occurs within fractures, along bedding planes, and between sand grains in the sandstone.

At Unit Well 16, the thickness of the bedrock formation above the shale confining layer is 279 feet. The saturated thickness of the upper bedrock aquifer at the time of well construction in 1967 was 271 feet. Figure 3 (DCRPC, 2004) in Appendix F shows the simulated year 2000 potentiometric (water table) surface in the upper bedrock aquifer and unlithified (sand and gravel) aquifer. Figure 3 in Appendix F shows the elevation of the simulated water table surface in the vicinity of Unit Well 16 at approximately 910 feet above MSL.

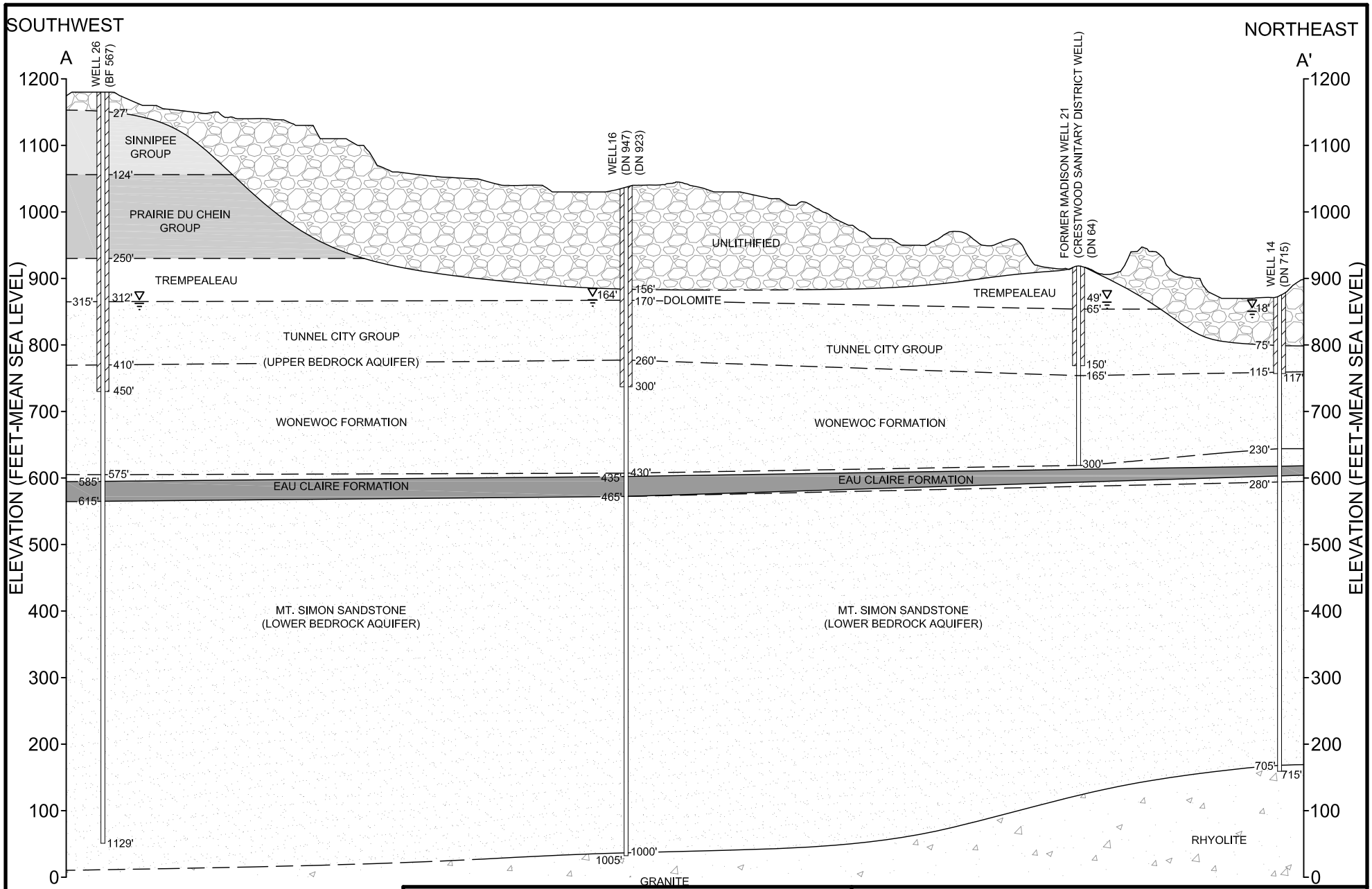
The hydraulic conductivity of the upper bedrock aquifer is estimated to be 5 ft/day (Krohelski et. al., 2000). The porosity of the formations is estimated to be 5 percent (Bradbury, 2001).

2.3.3 Unlithified (Sand and Gravel) Aquifer

The unlithified aquifer occurs in the sand and gravel deposits above the bedrock. The thickness of the unlithified materials is 156 feet in the vicinity of Unit Well 16. In 1965, the driller of a test well at the Well 16 site reported the water table to be at a depth of 130 feet in the unlithified deposits and the saturated thickness was approximately 23 feet. The hydraulic conductivity of the sand and gravel aquifer varies. For modeling purposes, Krohelski et. al., 2000, assumed a hydraulic conductivity of 7 ft/day and a porosity of 20 percent for the sand and gravel aquifer.

2.3.4 Groundwater Flow System

Average annual precipitation in the City of Madison area is reported to be approximately 30 to 30.5 inches per year. It is also estimated that the amount of recharge to the groundwater reservoir in the Upper Yahara River basin was approximately 6 inches/year (in/yr) (Cline, 1965). Swanson (1996) estimated that the recharge rate in Dane County ranges from 0.3 to 6.7 in/yr and has an average value of 2.6 in/yr. Precipitation infiltrates through the till layer, and recharges the unlithified and shallow bedrock aquifers. In some areas, a small percentage of water moves downward from the upper bedrock aquifer through the Eau Claire confining layer and into the lower bedrock aquifer. Figure E-2 in Appendix E illustrates the location of Well 16, and areas of recharge to and discharge from the lower bedrock (Mount Simon) aquifer (Bradbury et. al, 1999; DCRPC 1999). Unit Well 16 is located in a recharge area. Discharge from the lower bedrock aquifer is primarily to pumping wells such as Unit Well 16.



LEGEND

- WELL
- CASING/LINER
- POTENTIOMETRIC SURFACE DEPTH (FEET) (AT TIME OF CONSTRUCTION)
- OPEN BOREHOLE
- 1129' WELL DEPTH (FEET)

SCALE
HORIZONTAL: 1"=2,000'
VERTICAL: 1"=200'

A A'
(SEE FIGURE 1-1 FOR LINE OF CROSS-SECTION)

Madison Water Utility MWU

WELLHEAD PROTECTION PLAN

UNIT WELL 16

FIGURE 2-1
GEOLOGICAL CROSS-SECTION THROUGH MADISON UNIT WELLS 26, 16 AND 14
MADISON, WISCONSIN

3.0 WELLHEAD PROTECTION AREA DELINEATION

This chapter describes methodologies used to define the Zone of Influence (ZOI) and the Zone of Capture (ZOC) for Unit Well 16.

3.1 Zone of Influence (ZOI)

The ZOI for Unit Well 16 was estimated in accordance with Wisconsin Department of Natural Resources (DNR) requirements based on 30 days of continuous pumping at the rated pump capacity, assuming no aquifer recharge. The ZOI was determined using the Theis equation. The estimated ZOI for Unit Well 16 to a radius where there is 1-foot of drawdown, is approximately 9.81 miles. The estimated ZOI to a radius of zero drawdown is approximately 25.9 miles. These estimated ZOI are believed to be conservatively large, because the Theis equation does not incorporate aquifer recharge or the effects of potential hydraulic boundaries. For the calculation, it was assumed that the majority of the open borehole, open to both the lower and upper bedrock aquifers, supplies water to Unit Well 16. Distance–drawdown calculations are in Appendix G.

3.2 GROUNDWATER MODEL DEVELOPMENT AND ZOC DELINEATION

As part of the Dane County regional hydrologic study, a regional groundwater flow model was prepared for Dane County and was used to delineate time-related ZOCs for municipal wells (Krohelski et. al., 2000) including Unit Well 16. The Dane County regional hydrologic study was conducted cooperatively by the WGNHS, DCRPC, and the United States Geological Survey (USGS). The USGS modular groundwater modeling code (MODFLOW (McDonald& Harbaugh, 1988)) was used to simulate groundwater flow. After the calibrated groundwater flow model was prepared, PATH3D (Zheng, 1991) was used to determine time-related ZOCs. The TOT ZOCs documented in this report for Unit Well 16 were modeled 03/18/2008 by the Wisconsin Geological and Natural History Survey (WGNHS)/University of Wisconsin Extension (UWEX) office in Madison, WI.

The model domain covers an area of 50 by 60 miles and is divided into 144,000 nodes. Each node has regular spacing of 1,312.4 feet (400 meters) on a side. The grid has 200 rows and 240 columns (Krohelski et. al., 2000).

In 2002, the original groundwater flow model was converted from a three-layer model to a four-layer model. The sand and gravel aquifer is Layer 1. The upper bedrock aquifer is Layer 2. The Eau Claire Formation is layer 3, and the lower bedrock aquifer is Layer 4. The model was recalibrated and various boundary conditions were modified (DCRPC, 2001). Other aquifer parameters input into the model were as previously described in Chapter 2 and in Krohelski et. al., 2000.

Four groundwater flow simulations were performed using the calibrated model and different pumping rates for existing and known future municipal supply wells in Dane

County (Bradbury, 1998). Simulation No. 1 was performed using the projected pumping rates from municipal wells for the year 2030. Total City of Madison 2030 pumping is projected to be 44 million gallons per day (MGD). For Simulation No. 1, the projected 2030 pumping rate at Unit Well 16 was for an average of 1.24 MGD. This rate is equivalent to pumping continuously at approximately 859 gallons per minute (gpm).

Simulation No. 2 was performed using the "maximum sustained pumping rate" or "one-half design capacity" (Bradbury, 1998). The maximum sustained pumping rate (one-half design capacity) for Unit Well 16 is 1.73 MGD. This rate is equivalent to pumping continuously at 1,200 gpm.

Simulation No. 3 was performed using full design capacity. Full capacity for Unit Well 16 is 3.46 MGD. Pumping at a rate of 3.46 MGD is equivalent to 2,400 gpm.

Simulation No. 4 was performed using the average pumping rate for Unit Well 16 for the maximum year. The maximum pumpage year for Unit Well 16 was 2001 when Unit Well 16 was pumped at an average rate of approximately 1.43 MGD. This rate is equivalent to pumping continuously at 995 gpm.

PATH3D (Zheng, 1991) was used to determine the time-related ZOCs for Unit Well 16. Particles were input in the model around Unit Well 16 and then tracked backward from the well to points where they enter the groundwater flow system.

3.3 Zone of Capture (ZOC)

The area that recharges or contributes water to Unit Well 16 is defined as the ZOC. The areal extent of the ZOC (capture zone) depends on the pumping rate, amount of horizontal and vertical recharge, aquifer characteristics, pumping duration, and other stresses such as other pumping wells. It is beneficial to know the well capture zone, because contaminants introduced within the zone could reach Unit Well 16.

Figure 3-1 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 16 based on the projected 2030 pumping rate (Simulation No. 1). Figure 3-2 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 16 based on the one-half design capacity pumping rate (Simulation No. 2). Figure 3-3 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 16 based on the full design capacity pumping rate (Simulation No. 3). Figure 3-4 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 16 based on the average pumping rate for Unit Well 16 for the maximum year (Simulation No. 4).

The capture zones primarily extend northwest, west, and south, and partially north and east of Unit Well 16 in the simulated upgradient groundwater flow directions. Table 3-1 summarizes the upgradient and downgradient extent of capture zones for the various pumping simulations. The ZOCs delineated using the Simulation No. 3 pumping rates are generally more conservatively large compared to the ZOCs delineated using the Simulations Nos. 1, 2, and 4 pumping rates.

Figure 16 in Appendix H shows ultimate regional ZOCs for Unit Well 16 and for other wells in Dane County. Groundwater flow pathlines extend upgradient from Well 16 to the groundwater divide located approximately 7 to 8 miles west-southwest of Well 16 and are located entirely within Dane County.

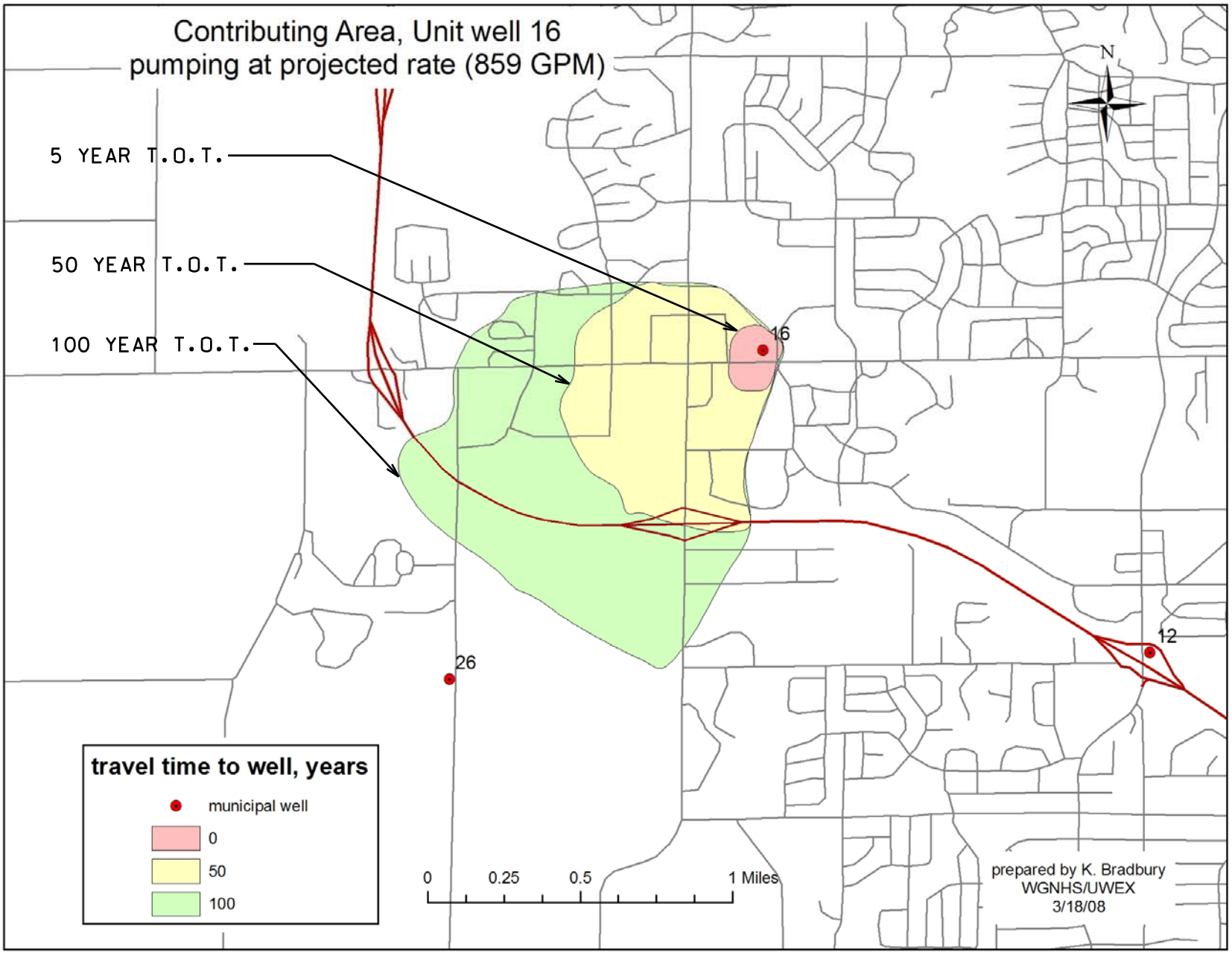
3.4 WELLHEAD PROTECTION AREA

The Wisconsin Administrative Code (Chapter NR 811.12 (6)) requires that a WHPA for municipal water supply wells "encompass, at a minimum, that portion of the recharge area equivalent to a 5-year TOT to the well." Any of the four simulations described above could be used to model the 5-year TOT ZOC for Unit Well 16. It is possible that Unit Well 16 could be pumped at maximum capacity without interruption. Therefore, Simulation No. 3 provides a realistic, but very conservative model of well capture zones for Unit Well 16. Simulation No. 3 was used to generate the long-term capture zones and WHPA for Unit Well 16.

The 5-year TOT ZOC for Unit Well 16 extends up to 1,670 feet upgradient of the well in the southerly direction, and approximately 840 feet downgradient from the well. The 100-year TOT ZOC extends approximately 9,920 feet upgradient from Unit Well16 in the westerly direction. Protecting the entire 100-year TOT ZOC from Unit Well 16 to the upgradient boundary at the same level of protection, as the area within the 5-year TOT ZOC is likely too severe.

Figure 3-5 shows the WHPA for Unit Well 16. Two zones of protection are within the WHPA. Zone A is the area around Unit Well 16 that is defined by the 5-year TOT ZOC delineated for Simulation No. 3 (full design capacity pumping rate). Zone B is the area around Unit Well 16, beyond Zone A, which is defined by a 1,200-foot fixed radius around Unit Well 16. This radius is selected because the Wisconsin Administrative Code Chapter NR 811.12(6)(d) requires a 1,200-foot separation distance between a municipal water supply well and certain contamination sources.

The boundary of Zone B is slightly larger than the 5-year TOT ZOC delineated for Unit Well 16 in the downgradient direction from the well, but is absent on the upgradient side in the westerly direction. The WHPA will provide a conservative protection zone to account for changes in pumping rates, pumping duration, and interference drawdown from other existing and future wells. The WHPA is located entirely within the City of Madison.



T.O.T. - TIME OF TRAVEL
Z.O.C.s - ZONES OF CONTRIBUTION

Madison Water Utility MWU

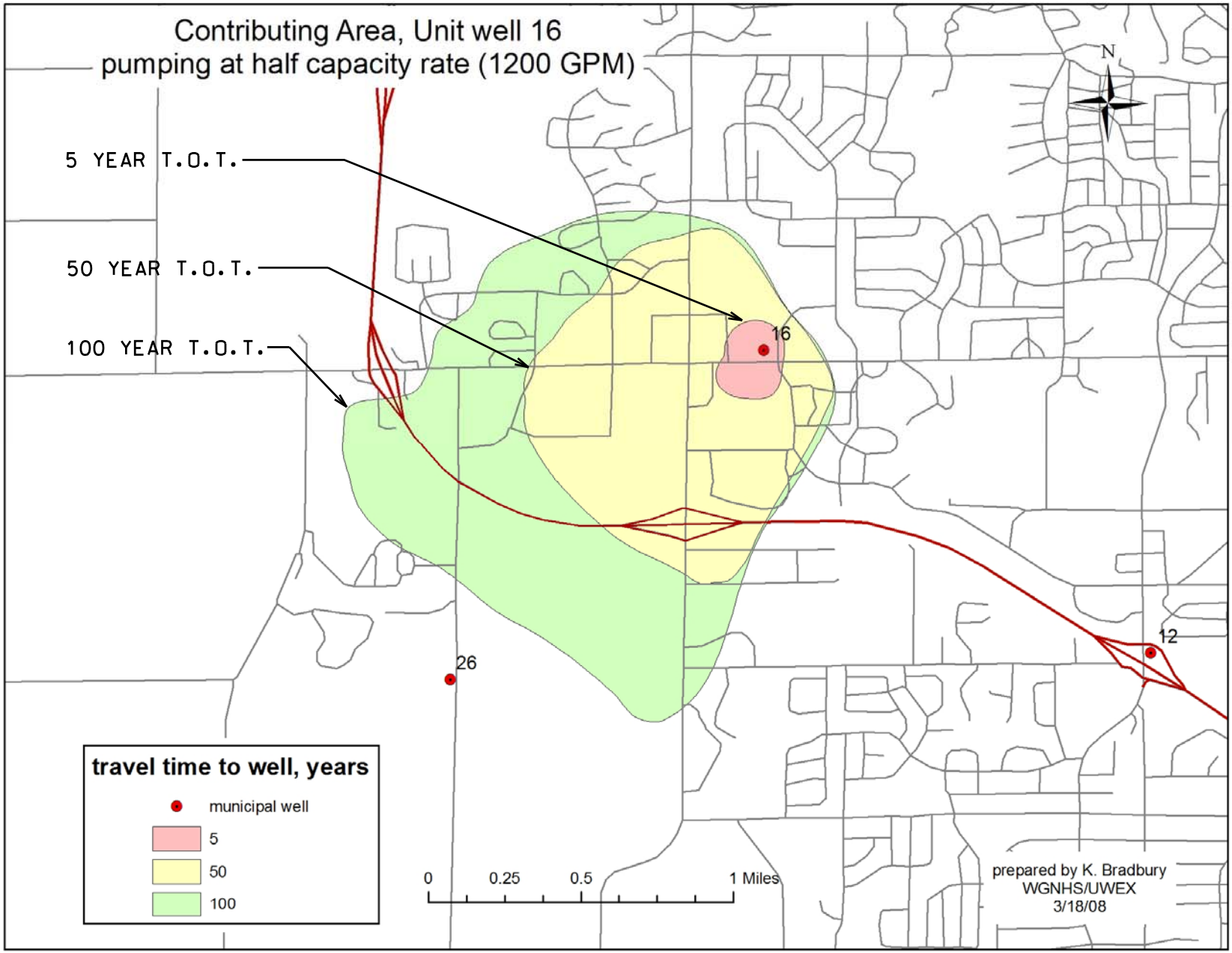
WELLHEAD PROTECTION PLAN

UNIT WELL 16

FIGURE 3-1

5, 50, 100 YEAR T.O.T. Z.O.C.s ASSUMING PROJECTED 2030 PUMPING RATE

MADISON, WISCONSIN
OCTOBER 2011



T.O.T. - TIME OF TRAVEL
Z.O.C.s - ZONES OF CONTRIBUTION

Madison Water Utility

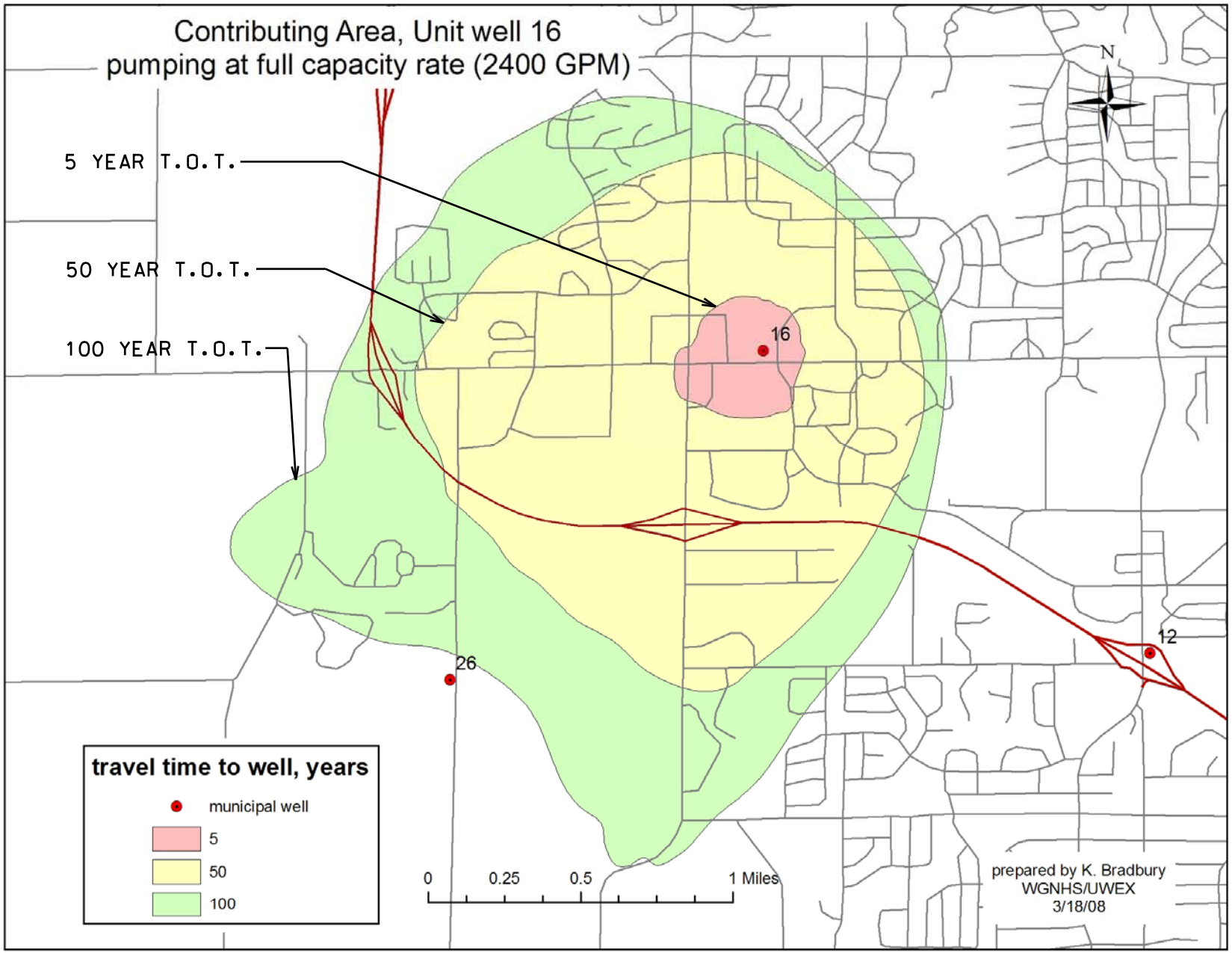
WELLHEAD PROTECTION PLAN

UNIT WELL 16

FIGURE 3-2

5, 50, 100 YEAR T.O.T. Z.O.C.s ASSUMING 50 PERCENT CAPACITY PUMPING RATE

MADISON, WISCONSIN
OCTOBER 2011



T.O.T. - TIME OF TRAVEL
Z.O.C.s - ZONES OF CONTRIBUTION

Madison Water Utility

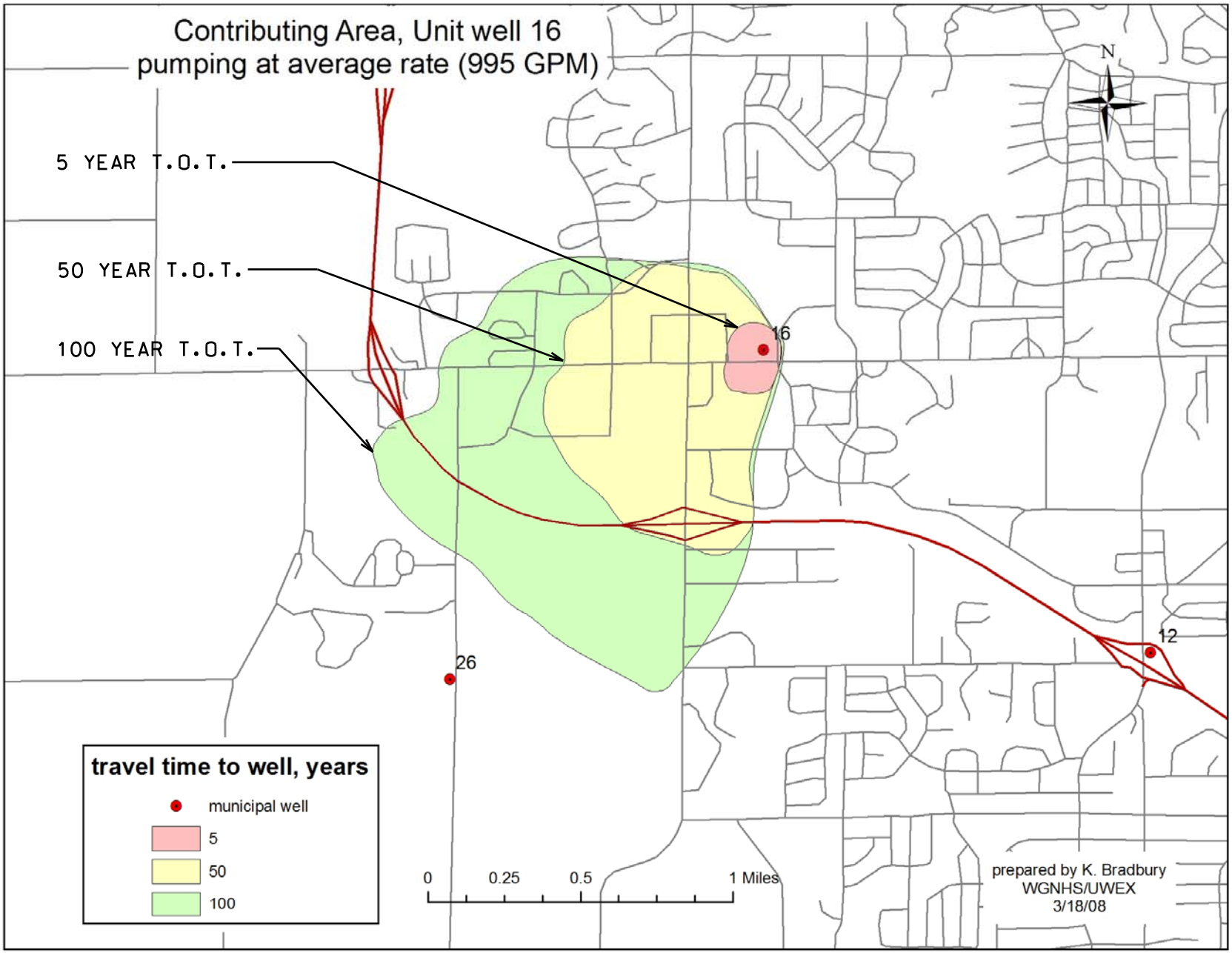
WELLHEAD PROTECTION PLAN

UNIT WELL 16

FIGURE 3-3

5, 50, 100 YEAR T.O.T. Z.O.C.s ASSUMING FULL CAPACITY PUMPING RATE

MADISON, WISCONSIN
OCTOBER 2011



T.O.T. - TIME OF TRAVEL
Z.O.C.s - ZONES OF CONTRIBUTION

Madison Water Utility MWU

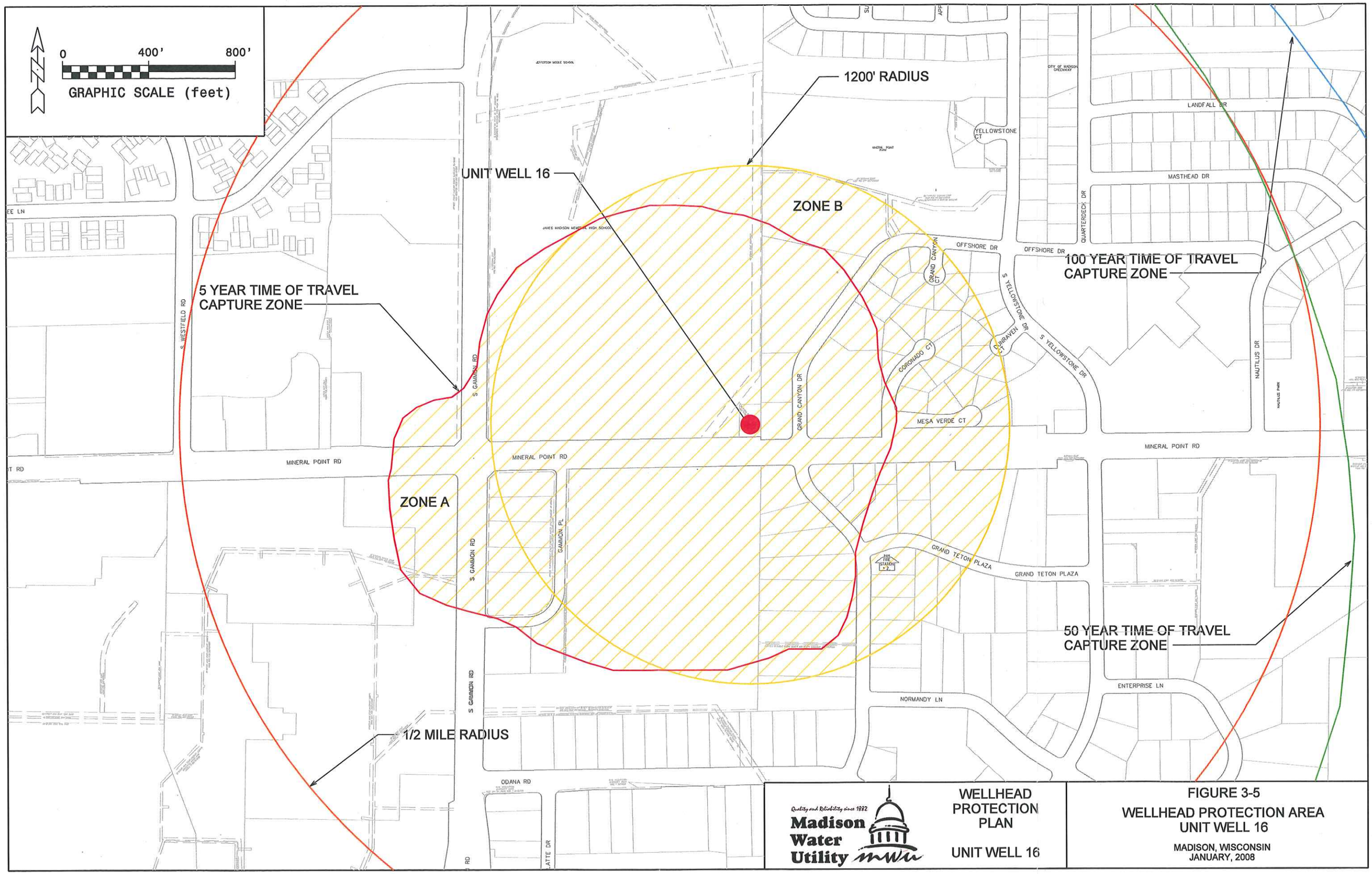
WELLHEAD PROTECTION PLAN

UNIT WELL 16

FIGURE 3-4

5, 50, 100 YEAR T.O.T. Z.O.C.s ASSUMING PUMPING AT AVERAGE RATE DURING MAX YEAR

MADISON, WISCONSIN
OCTOBER 2011



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Madison Water Utility MWU

WELLHEAD PROTECTION PLAN

UNIT WELL 16

FIGURE 3-5
WELLHEAD PROTECTION AREA
UNIT WELL 16

MADISON, WISCONSIN
JANUARY, 2008

TABLE 3-1
SUMMARY OF EXTENT OF ZOCs (CAPTURE ZONE)
WELLHEAD PROTECTION UNIT WELL 16
MADISON, WISCONSIN

Item	Simulation No. 1 (Projected 2030 Pumping Rates)	Simulation No. 2 (One-Half Design Capacity Pumping Rates)	Simulation No. 3 (Continuous Pumping at Full Capacity)	Simulation No. 4 (Average Pumping Rate During Maximum Pumpage Year)
Simulated Pumping Rate (MGD) / (GPM)	1.2370 859 GPM	1.7280 1200 GPM	3.4560 2400 GPM	1.4328 995 GPM
Upgradient Extent of ZOC (feet)				
5-Year TOT	770	970	1,670	880
50-Year TOT	3,220 - 3,670	4,060 - 4,250	5,600 - 6,050	3,520 - 3,900
100-Year TOT	5,920 - 6,570	6,250 - 7,530	7,340 - 9,920	6,160 - 6,910
Downgradient Extent of ZOC (feet)				
5-Year TOT	390	400	840	290

Notes:
MGD = Million Gallons per Day
ZOC = Zone of Contribution
TOT = Time of Travel

4.0 POTENTIAL CONTAMINANT SOURCES

4.1 CONTAMINANT SOURCE INVENTORY

A CSI was performed for the Unit Well 16 area during June and July 2008. The CSI consisted of a search of government records, interviews, and a reconnaissance survey of the area within a ½-mile radius and the recharge area equivalent to the delineated 100-year TOT of Unit Well 16. General land use observations and reconnaissance were made in August 2008 and July 2012.

Figure 4-1 shows the location of potential, existing, and former contaminant sources in the WHPA within a ½-mile radius and the recharge area equivalent to the delineated 100-year TOT of Unit Well 16. Table 4-1 summarizes potential contaminant sources that were identified and/or reported to be within the WHPA and review area.

Potential, existing, and former contaminant sources within the WHPA and ZOCs for Unit Well 16 include former spills and potential spills along roads and main transportation corridors; active above ground storage tank (AST) sites; active and closed underground storage tank (UST) sites; closed leaking underground storage tank (LUST) sites; drycleaners; road salt use; and probable use of pesticide, herbicide, and nutrients on commercial and residential lawns.

Based on the available information, the following are descriptions of known potential, existing, and former contaminant sources located within the WHPA, with reference to sites in a ½ mile radius or within the delineated 100 year TOT of Unit Well 16:

The nearest storm sewer is located in Mineral Point Road, approximately 125 feet south of Unit Well 16.

The nearest sanitary sewer main is located under Grand Canyon Drive, approximately 225 feet southeast of Unit Well 16.

There are no known private wells located within the wellhead protection area for Well 16. However, there are two areas with private wells within the 50-year TOT of Well 16; they are both located in sections of the Town of Middleton. One well is located at 7718 Mineral Point Road, approximately 5000' west of Well 16 (CSI Site ID 74). Several Transient Non-Community Wells (TNC) are also located on Seybold Road and Watts Road between S. Gammon Road and Struck Street, approximately 3000' to 4000' south of Unit Well 16 (CSI Site ID's 43 -59). The TNC wells are monitored by Public Health Madison Dane County (PHMDC).

There are no apparent private sewage disposals systems in the vicinity of Unit Well 16.

Based on the site investigation and a review of the Wisconsin registered storage tank list, three active UST sites are located within 1,200 feet of Unit Well 16. A 490-gallon diesel

fuel tank serves the emergency generator at Unit Well 16. Approximately 150 feet east, the adjacent gas station contains two unleaded gasoline tanks that are currently in use. Two fuel oil tanks are in use at Madison Memorial High School approximately 1500 feet northwest of Unit Well 16.

Two properties located directly south on Mineral Point Road were active UST sites until redeveloped in 2011. The gas station, located approximately 260 feet south, contained three unleaded gas tanks; the automotive service center, located approximately 850 feet south, contained a waste motor oil tank. The three USTs and the waste motor oil tank were removed prior to redevelopment. The gas station and automotive service center were replaced by a retail pharmacy and retail grocery store, respectively.

Two closed LUST sites are located within 600 feet of Unit Well 16. The first site is located approximately 150 feet east of Unit Well 16 and is an active gas station. The second site is located approximately 260 feet southeast of Unit Well 16 and was a former gas station. Two additional closed LUST sites are reported within 1,200 feet Unit Well 16 - One 850 feet southeast at 430 Grand Canyon Drive, and another located 900 feet southeast at 421 Grand Canyon Drive.

Based on the review of Wisconsin spills, no active spills are located within 1,200 feet of Unit Well 16. Five historic or closed spill incidents are documented within the WHPA.

A dry cleaning business is located approximately 320 feet east of Unit Well 16.

There are no golf courses within the WHPA for Unit Well 16.

There are no apparent active solid waste storage sites in the Unit Well 16 WHPA. A former City of Madison landfill is located approximately 1,300 feet northeast of Unit Well 16. The landfill operated between 1967 and 1971 and contains hazardous waste, trash, and garbage (DCRPC, 1999). The landfill contains an estimated 400,000 cubic yards of waste on a 14-acre (10.9-acre waste) site. An NR500 cap with geomembrane was installed in 1994. Leachate from the bottom of the landfill is removed via eight leachate extraction wells and through landfill gas extraction wells.

A supplemental hydrogeological investigation of the Mineral Point Landfill was conducted by RMT, Inc. during 1993 – 1994. The investigation incorporated a 29 day pump test conducted during September and October 1993. The main findings and conclusion of the investigation are summarized as follows:

1. Horizontal groundwater flow at the water table is generally from west to east beneath the Mineral Point Landfill under pumping and non pumping conditions. The configuration of the water table in the vicinity of the landfill did not significantly change from pre-pumping conditions to steady-state pumping conditions.

2. A leaky confining layer apparently exists between the water table aquifer and the deep sandstone aquifer. The effect of the leaky layer is to impede, but not to prevent, groundwater flow from the water table aquifer to the deep sandstone aquifer. If Unit Well No. 16 is brought on line and run continuously, the

amount of leakage induced through the leaky confining layer would increase, and groundwater affected by the Mineral Point landfill could begin to migrate toward Unit well No. 16.

3. Well GW-11C is screened in the upper portion of the deep sandstone aquifer. This well is located in a good position to detect groundwater that might be affected by the Mineral Point Landfill before the affected groundwater would reach Unit Well NO. 16.

Additional data regarding the supplemental hydrogeological investigation of the Mineral Point Landfill is located in Appendix I (RMT, Inc. 1993 – 1994).

There are no apparent cemeteries in the WHPA of Unit Well 16. There is one active cemetery within the estimated 50-year capture zone approximately 0.63 miles west of Unit Well 16. There is also one active cemetery within the estimated 100-year capture zone approximately 1.53 miles southwest.

A large, unlined retention pond system is located approximately 360 feet southwest of Unit Well 16. The 7.4-acre permanent pond is capable of expanding to nearly 23 acres during flood events (Fries, 2013). The northern boundary of this pond system is under the minimum separation distance specified in Table 4.2.

There are no sludge or septage spreading areas in the Unit Well 16 WHPA. The vicinity of Unit Well 16 is classified as low risk to groundwater contamination from septage application (DCRPC, 1999).

According to the DNR Bureau for Remediation and Redevelopment Tracking System (BRRTS) website, there are no properties in the vicinity of Unit Well 16 with residual groundwater contamination exceeding Ch. NR 140 enforcement standards recorded on the GIS registry.

No bulk salt storage sheds or bulk pesticide, fertilizer storage, and/or mix-load sites were identified within the ½-mile radius or the recharge area equivalent to the delineated 100-year TOT of Unit Well 16.

The separation distances between Unit Well 16 and potential contaminant sources identified in Wisconsin Administrative Code NR 811.12 are summarized in Table 4-2. The minimum separation distances between Unit Well 16 and potential contaminant sources are currently being met with the exceptions of (1) the retention pond system which does not meet the 400-foot requirement and (2) a gasoline or fuel oil tank (adjacent gas station) located less than the 600-foot separation distance.

4.2 UNIT WELL 16 WATER QUALITY

Raw groundwater extracted from Unit Well 16 is tested four times per year while chlorinated water is tested weekly for coliform bacteria. These bacteria function as indicators to evaluate source water quality and the effectiveness of chlorination and to confirm drinking water safety. None of the samples tested positive for the presence of coliform bacteria.

Table 4-3
SUMMARY OF WATER QUALITY DATA BASED ON FIVE-YEAR AVERAGE FROM 2009 THROUGH 2013
WELLHEAD PROTECTION PLAN, UNIT WELL 16
MADISON, WISCONSIN

Parameter	Average Concentration 2009-2013	Maximum Contaminant Limit (MCL) Or Secondary Standard
Alkalinity (mg/L)	288	None
Hardness (mg/L)	344	None
pH	7.7	6.5 - 8.5
Iron (mg/L)	<0.01	0.3
Manganese (µg/L)	<0.001	0.05
Chloride (mg/L)	47	250
Nitrate - Nitrogen (mg/L)	2.7	10.0
Sulfate (mg/L)	12	250
Barium (µg/L)	0.019	2
Conductivity (unhos/cm)	702	None

Based on annual water quality samples collected from Unit Well 16 during the period of 2009 through 2013, water pumped from Unit Well 16 is hard (336 - 353 milligrams per liter (mg/L)); contains low levels of manganese (Non Detect - 0.6 µg/L), chloride (39 - 53 mg/L), sulfates (10 - 14.7 mg/L), iron (Non Detect - 0.006 mg/L); and moderate levels of nitrate-nitrogen (2.5 - 2.8 mg/L). Table 4-3 contains a summary of the Well 16 inorganic data based on the five year average during the period from 2009 through 2013.

In 2009, water from Well 16 was tested for radium-226, radium-228 and uranium in addition to other gross measures of radiation in the water. Combined radium measured 0.4 picocuries per liter (pCi/L) while uranium tested at 1.5 micrograms per liter (µg/L). These levels are below the maximum contaminant level (MCL) of 5 pCi/L combined radium and 30 µg/L uranium.

Samples are analyzed annually for volatile organic compounds (VOC), man-made contaminants including chemical solvents and cleaners derived from petroleum products, which may be present in groundwater. For the period 2009 through 2013, no VOCs were detected at Unit Well 16. A single disinfection by-product (bromoform) was detected in 2009.

Synthetic organic compounds (SOC) include herbicides, pesticides, and other chemicals that come from agriculture, urban storm water runoff, or industrial activities. Regular testing has not detected the presence of nearly forty SOCs. However, trace amounts of alachlor ESA [0.14 µg/L] were found during an investigative test in 2007. The parent compound, alachlor, has not been detected.

4.3 LAND USES AND WELLHEAD PROTECTION PLANNING

Existing land uses in the vicinity of Unit Well 16 are generally compatible with WHP planning. As stated previously, the fuel storage tanks at the adjacent gas station and a nearby retention pond pose a significant risk to ground water quality. Land uses summarized in Table 4-4 should be prohibited in the vicinity of Unit Well 16, within the respective minimum separation distances shown. Also, it is not desirable to have commercial, manufacturing, or industrial districts located in WHPAs. Land uses summarized in Table J-1 in Appendix J should be prohibited from WHPA Zones A and B. Where any of the uses listed in Table J-1 currently exist within Zones A and B, owners should be allowed to upgrade the facilities to facilitate or enhance groundwater protection.

Tables 4-4 and 4-5 in Appendix J summarize several potential sources of groundwater contamination and land uses, and their relative risk to groundwater, respectively.

TABLE 4-1
CONTAMINANT SOURCE INVENTORY SUMMARY
WELLHEAD PROTECTION UNIT WELL 16
MADISON, WI
JULY 2012

Map Site ID No.	FirstSearch Map ID No.	Owner/Location	Database or Reference Source	Existing, Potential, or Former Contaminant Sources	Reported Status	Approximate Distance to Unit Well 16	Location Within Capture Zone	Estimated Threat to Supply Wells
1	N/A	Madison Water Utility Unit Well 16 6706 Mineral Point Road Madison, WI	Site Investigation / City Maps	Hydrofluosilicic acid storage and use	Active	0.0 MI	Zone A	Moderate
2	1	Madison Gas & Electric 6706 Mineral Point Road Madison, WI	FirstSearch Report - WI - Registered UST (Facility ID 664708)	UST - Diesel, 490 gallon, in use	Active	0.02 MI SW	Zone A	Moderate
3	N/A	City of Madison Streets Throughout Area	Site Investigation / City Maps	Storm Sewer / Stormwater retention area	Active	0.03 MI S	Zone A	High
4	N/A	City of Madison Streets Throughout Area	Site Investigation / City Maps	Sanitary Sewer	Active	0.03 MI E	Zone A	High
5	2	Citgo Quick Mart 6702 Mineral Point Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-002732) b - EPA - RCRA GEN / NLR(ID: WIR000015081) c - WI - Spills (Old Spill ID: 930608-02) (Old Spill ID: 850921-01) (Old Spill ID: 850131-01) d - WI - Registered UST (ID No. 112043)	a - LUST discovered 09/25/95, closed 04/07/99 b - Small Quantity Generator, No Longer Regulated c - Historic Spill 06/08/93, unknown extent Historic Spill 09/25/85, unknown extent Historic Spill 01/31/85, unknown extent d - 9 Tanks (2 unleaded gas in use, 7 gas/fuel/oil closed/removed)	a - Closed b - SGN/NLR c - Historic Spill d - In Use	0.03 E	Zone A	High
6	3	a,b,d - West Towne Amoco (former) c - (BP) Lucky Redheads LLC 6701 Mineral Point Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-002092) b - EPA - RCRA GEN/NLR (ID: 988599577) c - WI - Registered UST (WI ID No. 52866) d - WI - LUST (DNR Activity No. 03-13-558028)	a - LUST discovered 11/17/93, closed 07/11/00 b - Small Quantity Generator c - 9 Tanks (3 unleaded gas in use, 1 waste motor oil in use, 5 gas/fuel/oil closed/removed d - LUST discovoered 11/18/2011, closed 12/14/2011	a - Closed b - SGN / NLR c - Closed/Removed d - Closed	0.05 MI SE	Zone A	High
7	4	Klinke Cleaners 6602 Mineral Point Road Madison, WI 53705	FirstSearch Report - EPA - RCRA GEN / NLR (ID: WID988611471)	Small Quantity Generator	SGN / NLR	0.06 MI E	Zone A	Low
8	5	Mansfield Stadium Mineral Point Road Madison, WI	FirstSearch Report - WI - Spills (Old Spill ID: 940714-02)	Spill Incident Occurred, 07/14/94, unknown extent	Closed	0.13 MI NW	Zone A	Low
9	6	Zimbrick Honda Service Center 430 Grand Canyon Drive Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-543086) b - EPA - RCRA GEN / NLR (ID: WID988611646) c - WI - Registered UST (WI ID No. 157077)	a - LUST discovered 02/11/05, closed 03/27/06 b - Small Quantity Generator c - 500 gal waste motor oil in use, 1000 gal waste motor oil closed/removed	a - Closed b - VGN / NLR c - In Use	0.16 MI SE	Zone A	Moderate
10	7	Madison Fire Station No. 2 421 Grand Canyon Drive Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-206383) b - WI - Registered UST (WI ID No. 77905)	a - LUST discovered 11/02/98, closed 11/25/98 b - Diesel tank closed/removed as of 10/05/98	a - Closed b - Closed / Removed	0.17 MI SE	Zone A	Moderate
11	8	Mineral Point Rd. & Gammon Rd. Madison, WI	FirstSerach Report - WI - Spills - (Old Spill ID: 911101-01)	Spill incident occurred 11/01/91, unknown extent	Historic Spill	0.19 MI SW	Zone A	Low
12	9	TGIF Restaurant (former) 420 Gammon Place Madison, WI	FirstSerach Report - WI - Spills - (DNR Activity No. 04-13-281177)	Antifreeze spill incident occurred 08/30/01, unknown extent	Closed	0.21 MI SW	Zone A / Zone B	Low

TABLE 4-1
CONTAMINANT SOURCE INVENTORY SUMMARY
WELLHEAD PROTECTION UNIT WELL 16
MADISON, WI
JULY 2012

Map Site ID No.	FirstSearch Map ID No.	Owner/Location	Database or Reference Source	Existing, Potential, or Former Contaminant Sources	Reported Status	Approximate Distance to Unit Well 16	Location Within Capture Zone	Estimated Threat to Supply Wells
13	11	Mineral Point Landfill (Former) 6600 Mineral Point Road Madison, WI	FirstSearch Report - WI DNR Remediation & Redevelopment / Waste & Materials Management (DNR ID: 02-13-001350)	Landfill Operated between 1967-1971 and contains 400,000 CY of waste in the 14 acre (10.9 acre of waste) landfill. NR500 cap with geomembrane installed in 1994. Leachate from the bottom of the landfill is removed via 8 leachate extraction wells or landfill gas extraction wells. Groundwater samples have shown levels of barium, cadmium, chromium, lead, trichloroethylene, and tetrachloroethylene at levels which exceed the current Wisconsin Groundwater Standards.	Category 1	0.25 MI NE	Zone A	High
14	13	7100 Block of Mineral Point Road Madison, WI	FirstSearch Report - WI - Spills - (Old Spill ID: 851129-01)	Spill incident occurred 11/29/85, unknown extent	Closed	0.30 MI SW	Zone B	Low
15	12	Memorial High School, MMSD 201 S. Gammon Road Madison, WI	FirstSearch Report a - WI - Spills - (Old Spill ID: 810331-03) b - WI - Registered UST (WI ID No. 678227, 606222, 109930, 153616)	a - Spill incident occurred 03/31/81, unknown extent b - 5 tanks (2 fuel oil tanks in use, 3 fuel oil/waste oil closed/removed)	a - Historic Spill b - In Use	0.30 MI NW	Zone A / Zone B	Moderate
16	N/A	A Breed Apart Animal Hospital 202 S. Gammon Road Madison, WI	Site Investigation	Storage and use of potentially hazardous fluids Animal waste	Active Veterinary	0.33 MI NW	Sidegradient Within 1/2 MI Radius	Low
17	14	Bridgestone / Firestone Inc. 7105 Mineral Point Road Madison, WI	FirstSearch Report a - WI - Registered UST (WI ID No. 77924) b - EPA - RCRA NLR (ID No. WIR000030080)	a - 6 Tanks (1 waste motor oil in use, 5 gas, waste oil closed/removed b - Hazardous waste information no longer reporting.	a - In Use b - NLR	0.31 MI SW	Sidegradient Within 1/2 MI Radius	Low
18	17	McDonalds 6910 Odana Road Madison, WI	FirstSearch Report - WI - Spills - (Old Spill ID: 840927-01)	Spill incident occurred 09/27/84, unknown extent	Historic Spill	0.37 MI SW	Upgradient Within 1/2 MI Radius	Low
19	25	Monona Tire Co. - West 453 S. Gammon Road Madison, WI	FirstSearch Report a - EPA - RCRA GEN / NLR (ID: WID062083035) b - WI - Spills - (Old Spill ID: 920225-02) - WI - Spills - (Old Spill ID: 901023-01) c - WI - Registered UST (WI ID No. 582853) d - WI - LUST (DNR Activity No. 03-13-001511)	a - Small Quantity Generator b - Soil spill incident occurred 02/25/92, unknown extent - Spill incident occurred 10/23/90, unknown extent c - 5 Tanks (2 gas in use, 3 gas closed/removed) d - LUST discovered 05/11/92, closed 10/22/99	a - VGN / NLR b - Historic Spill c - In Use d - Closed	0.39 MI SW	Upgradient Within 1/2 MI Radius	Moderate
20	N/A	Camera Co. 6742 Odana Road Madison, WI	Site Investigation	Storage and use of potentially hazardous fluids Photo Processing	Active Photo Processing	0.31 MI S	Upgradient Within 1/2 MI Radius	Low
21	21	Jefferson Middle School, MMSD 101/201 S. Gammon Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-000040) b - EPA - RCRA NLR (ID: WID100584465) c - WI - Registered UST (WI ID No. 93055)	a - LUST discovered 05/31/88, closed 07/07/94 b - No Longer Reporting c - 2 Tanks (4000 gal fuel oil in use, 5000 gal fuel oil closed/removed)	a - Closed b - NLR c - In Use	0.38 MI NW	Sidegradient Within 1/2 MI Radius	Moderate
22	16	K-Mart (former) 6905 Odana Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 98116)	1000 gallon waste/used motor oil tank closed/removed	Closed	0.35 MI S	Upgradient Within 1/2 MI Radius	Low
23	27	Gordie Boucher Lincoln-Mercury 6601 Odana Road Madison, WI	FirstSearch Report a - EPA - RCRA GEN/NLR (ID: WID102222163) b - WI - Spills (Old Spill ID: 940518-06) - WI - Spills (Old Spill ID: 941221-01) c - WI - Registered UST (WI ID No. 83960) d - WI - DNR Registered SWL (ID: 11-31-36540)	a - Conditionally exempt small quantity generator b - Spill incident occurred 05/18/94, unknown extent - Soil spill incident occurred 12/21/94, unknown extent c - 4 waste/used motor oil tanks closed/removed d - Operating solid waste landfill	a - VGN / NLR b - Closed c - Closed/Removed d - Operating	0.40 MI SE	Sidegradient Within 1/2 MI Radius	Low
24	28	Mermaid Car Wash - West 526 Grand Canyon Drive Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-002824) b - WI - Registered UST (WI ID No. 679677)	a - LUST discovered 09/27/96, closed 03/14/97 b - 2 Unleaded gasoline tanks (8000, 12000 gal) in use	a - Closed b - In Use	0.43 MI S	Upgradient Within 1/2 MI Radius	Moderate

TABLE 4-1
CONTAMINANT SOURCE INVENTORY SUMMARY
WELLHEAD PROTECTION UNIT WELL 16
MADISON, WI
JULY 2012

Map Site ID No.	FirstSearch Map ID No.	Owner/Location	Database or Reference Source	Existing, Potential, or Former Contaminant Sources	Reported Status	Approximate Distance to Unit Well 16	Location Within Capture Zone	Estimated Threat to Supply Wells
25	26	Russ Darrow Madison, Inc. 6525 Odana Road Madison, WI	FirstSearch Report a - EPA - RCRA GEN (ID: WID063504856) b - WI - Registered UST (WI ID No. 129072)	a - Conditionally exempt small quantity generator b - 4 gas, waste/used motor oil tanks closed/removed	a - VGN b - Closed/Removed	0.40 MI SE	Sidegradient Within 1/2 MI Radius	Low
26	34	Silver Line Studio 550 Grand Canyon Drive Madison, WI	FirstSearch Report - EPA - RCRA GEN / NLR (ID: WIR000026302)	Conditionally exempt small quantity generator	VGN / NLR	0.49 MI S	Upgradient Within 1/2 MI Radius	Low
27	31	Odana Tire & Muffler 517 S. Yellowstone Drive Madison, WI	FirstSearch Report a - WI - DNR RR (DNR Activity No. 02-13-304902) b - WI - Registered UST (WI ID No. 83940)	a - Contamination discovered 02/26/02, closed 05/17/02 b - 2 Tanks (500 gal waste oil in use, 550 waste oil closed)	a - Closed b - In Use	0.45 MI SE	Sidegradient Within 1/2 MI Radius	Low
28	29	JC Penny Co, Inc. 23 West Towne Mall Madison, WI	FirstSearch Report a - WI - Spills - (DNR Activity No. 04-13-042984) b - WI - Registered UST (WI ID No. 77921) c - EPA - RCRA VGN (ID: WIR000131458)	a - 5 gal hydraulic oil spilled on soil 8/03/88, no action taken b - (2) 10,000 gal tanks closed (unleaded & leaded gasoline) c - Conditionally exempt small quality generator	a - Open b - Closed Filled c - VGN	0.45 MI SW	Upgradient Within 1/2 MI Radius	Low
29	32	Frank G. Werner Property 10 S. Yellowstone Drive Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-466773) b - WI - Registered UST (WI ID No. 663538)	a - LUST discovered 05/29/03, closed 11/21/03 b - 550 gal fuel oil tank closed/removed	a - Closed b - Closed / Removed	0.46 MI NE	Downgradient Within 1/2 MI Radius	Low
30	20	Uhaul 522 West Platte Drive Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 139353)	3 Tanks (550 gal waste oil, 10000 gal unleaded gasoline, 10000 gal diesel, all closed/removed)	Closed / Removed	0.50 MI SW	Upgradient Within 1/2 MI Radius	Low
31	35	Thomas McGann, Inc. 6509 Odana Road Madison, WI	FirstSearch Report a - WI - Registered UST (WI ID No. 680311, 584519) b - WI - OTHER (DNR Activity No. 02-13-001590)	a - 4 Tanks (Waste/Used motor oil, all closed/removed) b - Contamination discovered 07/21/94, unknown extent	a - Closed / Removed b - Closed	0.51 MI S	50-Year Capture Zone	Low
32	36	U S Geological Survey (former) 6417 Normandy Lane Madison, WI	FirstSearch Report - EPA - RCRA VGN/SGN/NLR (ID: WID056060692)	Conditionally exempt, small quantity generator, no longer regulated.	VGN / SGN / NLR	0.51 MI SE	50-Year Capture Zone	Low
33	37	a - O'Brien Mazda Kia (former) b - Abra Auto Body And Glass 6505 Odana Road Madison, WI	FirstSearch Report a - WI LUST (DNR Activity No. 03-13-270858) b - EPA - RCRA GEN / NLR (ID: WI0000491894)	a - LUST discovered 03/09/01, closed 03/26/01 b - Conditionally exempt small quantity ignitable waste generator, no longer regulated	a - Closed b - VGN / NLR	0.55 MI S	50-Year Capture Zone	Low
34	38	6209 Mineral Point Road Madison, WI	FirstSearch Report - WI - Spills (DNR Activity No. 04-13-049412)	Spill incident occurred 03/29/94, unknown extent	Closed	0.56 MI E	50-Year Capture Zone	Low
35	40	Sears Roebuck & Co. 522 S. Gammon Road Madison, WI	FirstSearch Report a - WI - OTHER (DNR Activity No. 02-13-188156) b - EPA - RCRA GEN (ID: WID066882002) c - WI - Registered UST (WI ID No. 166142, 677127) d - WI - Registered UST (WI ID No. 130861, 130862)	a - Contamination discovered 02/22/99, unknown extent b - Conditionally exempt small quantity generator c - One 300 gal waste/used motor oil tank in use d - One 1000 gal waste/used motor oil tank closed/removed	a - Closed b - VGN c - In Use d - Closed / Removed	0.59 MI SW	50-Year Capture Zone	Low
36	41	Tire America (former) West Town Mall Madison, WI	FirstSearch Report a - WI - Spills (Old Spill ID: 920729-07) b - WI - Spills (Old Spill ID: 840719-01)	a - Spill incident occurred 07/29/92, unknown extent b - Spill incident occurred 07/19/84, unknown extent	a - Historic Spill b - Historic Spill	0.60 MI SW	50-Year Capture Zone	Low
37	50	Wisconsin Cemeteries Holdings 7302 Mineral Point Road Madison, WI	a - Site Investigation FirstSearch Report b - WI - Registered UST (WI ID No. 134899)	a - Cemetery, hazardous and/or toxic materials storage b - One 1000 gal leaded gasoline tank closed/removed	a - Active Cemetery b - Closed / Removed	0.63 MI W	50-Year Capture Zone	Moderate
38	33	7144 Tree Lane Madison, WI	FirstSearch Report - ERNS - (ID: 431524)	Vehicle leaking oil/gas onto asphalt parking lot for approximately 3 months, reported 04/18/95	Highway Related	0.55 MI NW	50-Year Capture Zone	Low

TABLE 4-1
CONTAMINANT SOURCE INVENTORY SUMMARY
WELLHEAD PROTECTION UNIT WELL 16
MADISON, WI
JULY 2012

Map Site ID No.	FirstSearch Map ID No.	Owner/Location	Database or Reference Source	Existing, Potential, or Former Contaminant Sources	Reported Status	Approximate Distance to Unit Well 16	Location Within Capture Zone	Estimated Threat to Supply Wells
39	42	Tamarack Trails 110 S. Westfield Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 137894)	Two tanks, (500 gal leaded gasoline, 550 gal unleaded gasoline), both closed/removed	Closed / Removed	0.60 MI NW	50-Year Capture Zone	Low
40	44	John Thurber 102 S. Westfield Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 135456)	Unknown tank information	Closed / Removed	0.61 MI NW	50-Year Capture Zone	Low
41	45	Bernard Malveg 117 N. Gammon Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 56550)	One 550 gal fuel oil tank, closed/removed	Closed / Removed	0.61 MI NW	50-Year Capture Zone	Low
42	46	West Beltline & Gammon Road Madison, WI	FirstSearch Report a - WI - Spills (DNR Activity No. 04-13-197789) b - WI - Spills (DNR Activity No. 04-13-543498) c - WI - Spills (DNR Activity No: 04-13-223313)	a - Spill incident on the south side of the beltline highway at the intersection of Gammon Road on 02/05/96, unknown extent b - Spill incident occurred 07/05/92, unknown extent c - Spill incident occurred 05/28/97, unknown extent	a - Closed b - Closed c - Closed	0.62 MI SW	50-Year Capture Zone	Low
43	51	FE Seybold, Inc. 6702 Seybold Road Madison, WI	FirstSearch Report a - EPA - RCRA GEN / VGN (ID: WID988631545) b - WI - Registered UST (WI ID No. 77257) c - WI - DNR Registered SWL (ID: 11-32-37960)	a - Conditionally exempt small generator, no longer regulated b - 2 Tanks (1000 gal unleaded gas, 1000 gal misc.) closed/removed. c - Operating solid waste landfill	a - VGN / NLR b - Closed / Removed c - Operating	0.65 MI S	50-Year Capture Zone	Low
44	52	West Park Professional Offices 6606 Seybold Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 81717)	2 Tanks (1000 gal leaded gasoline, 1000 gal fuel oil) both closed/removed	Closed / Removed	0.65 MI S	50-Year Capture Zone	Low
45	53	Jaguar / Land Rover Dealership 6624 Seybold Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 694885)	One 640 gallon waste/used motor oil tank in use	In Use	0.65 MI S	50-Year Capture Zone	Low
46	54	Impala Homes 6617 Seybold Road Madison, WI	FirstSearch Report a - EPA - PRP (ID No. 5274808) (Site ID: WID980610604) b - WI - Registered UST (WI ID No. 89639)	a - Refuse hideaway landfill discovered b - 2 Tanks (1000 gal diesel, 1500 gal unleaded gasoline) both closed/removed	a - PRP b - Closed / Removed	0.66 MI S	50-Year Capture Zone	Low
47	55	National Screen-print, Inc. 6701 Seybold Road Madison, WI	FirstSearch Report a - EPA - RCRA NLR (ID: WID038975009) b - EPA - RCRA VGN (ID: WIR000130625)	a - Ignitable waste, no longer regulated b - Conditionally exempt small quality generator	a - NLR b - VGN	0.66 MI S	50-Year Capture Zone	Low
48	56	All Channel Electronics 6621 Seybold Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 51717)	One 500 gallon leaded gasoline tank, closed / removed	Closed / Removed	0.67 MI S	50-Year Capture Zone	Low
49	57	Arrow Electric, Inc. 6719 Seybold Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-001697) b - WI - Registered UST (WI ID No. 54193)	a - LUST discovered 11/17/92, closed 04/09/99 b - One 1000 gallon leaded gasoline tank, closed / removed	a - Closed b - Closed / Removed	0.67 MI S	50-Year Capture Zone	Low
50	60	The Glidden Co. DBA ICI Paints 6909 Seybold Road Madison, WI	FirstSearch Report - EPA - RCRA LGN / NLR (ID: WIR000121939)	Large quantity generator (more than 1000 kg/month of hazardous waste). No longer regulated	LGN / NLR	0.69 MI SW	50-Year Capture Zone	Low
51	61	Paul McDermott 6525 Seybold Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 175681)	One 500 gallon waste / used motor oil tank in use	In Use	0.69 MI S	50-Year Capture Zone	Low

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52	62	Rayovac Corporate Print Shop 6501 Seybold Road Madison, WI	FirstSearch Report a - EPA - RCRA NLR (ID: WID982206732) b - Public Health Madison and Dane County	FirstSearch Report a - EPA - RCRA NLR (ID: WID982206732) b - Public Health Madison and Dane County	FirstSearch Report a - EPA - RCRA NLR (ID: WID982206732) b - Public Health Madison and Dane County	0.69 MI S	50-Year Capture Zone	Low
53	63	a,b - Madison Steel Building Co. c,d - Theo Kupfer Iron Works, Inc. e - Bunbury Painting Co. 6817 Seybold Road Madison, WI	FirstSearch Report a - EPA - RCRA NLR (ID: WID023322506) b - WI - Registered UST (WI ID No. 106815) c - WI - LUST (DNR Activity No. 03-13-000042) d - WI - Registered UST (WI ID No. 106816) e - EPA - RCRA GEN (ID: WID988595526)	a - Unknown, no longer reporting b - 2 tanks (350 gal diesel, 750 gal leaded gasoline), both closed/removed c - LUST discovered 09/18/86, closed 08/07/87 d - 2 tanks (1000 gal leaded gasoline, 300 gal diesel), both closed/removed e - Conditionally exempt small quantity generator	a - NLR b - Closed / Removed c - Closed d - Closed / Removed e - VGN	0.70 MI SW	50-Year Capture Zone	Low
54	65	Mr. Ramos 6600 Watts Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 52551)	500 gallon leaded gasoline, closed/removed as of 1986.	Closed / Removed	0.76 MI S	50-Year Capture Zone	Low
55	66	Right Touch Drycleaners 6790 Watts Road Madison, WI	FirstSearch Report - EPA - RCRA GEN / NLR (ID: WID98263159)	Conditionally exempt small quantity generator, no longer regulated	VGN / NLR	0.76 MI S	50-Year Capture Zone	Low
56	67	Finishmaster, Inc. 6626 Watts Road Madison, WI	FirstSearch Report a - WI - OTHER (DNR Activity No. 02-13-248325) b - EPA - RCRA SGN (ID: WI0000329896)	a - Contamination discovered 10/31/98, activity closed 3/27/06 b - Small quantity ignitable waste generator (100-1000 kg/month of hazardous waste)	a - Closed b - SGN	0.76 MI S	50-Year Capture Zone	Low
57	68	United Brick and Tile 6634 Watts Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No. 139577)	4 tanks ((2) 1200 gallon unleaded gasoline, (2) 500 gallon leaded gasoline), all closed / removed	Closed / Removed	0.76 MI S	50-Year Capture Zone	Low
58	N/A	Companion Animal Hospital 660 S. Gammon Road Madison, WI	Site Investigation	Storage and use of potentially hazardous fluids Animal waste	Active Veterinary	0.78 MI S	50-Year Capture Zone	Low
59	71	West Town Food Shop Lakeside Oil Co. 699 S. Gammon Road Madison, WI	FirstSearch Report a - EPA - RCRA VGN (ID: WID988617031) b - WI - Registered UST (WI ID No. 52876)	a - Conditionally exempt small quantity generator, generates less than 100 kg/month of hazardous waste b - 3 tanks, each 12000 gallon unleaded gasoline	a - VGN b - In Use	0.80 MI SW	50-Year Capture Zone	Low
60	72	USDA WI State Farm Services 6515 Watts Road Madison, WI	FirstSearch Report - EPA - RCRA VGN / NLR (ID: WI5120090183)	Conditionally exempt small quantity generator, no longer regulated	VGN / NLR	0.80 MI S	50-Year Capture Zone	Low
61	64	Pilgrim Cleaners, Inc. 7475 Mineral Point Road Madison, WI	FirstSearch Report - EPA - RCRA VGN (ID: WID981195464)	Conditionally exempt small quantity generator	VGN	0.72 MI W	50-Year Capture Zone	Low
62	69	PDQ Stores # 120 7502 Mineral Point Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No. 03-13-000785) b - EPA - RCRA VGN (ID: WID988637260) c - WI - Spills - Old Spill ID: 870503-01 d - WI - Registered UST (WI ID No. 117507)	a - LUST discovered 04/05/91, closed 01/06/98 b - Conditionally exempt small quantity generator c - Spill incident occurred 5/3/87 on soil, unknown extent d - 4 Tanks ((3) 12000 gallon unleaded gasoline, (1) 6000 gallon diesel) in use.	a - Closed b - VGN c - Historic Spill d - In Use	0.78 MI W	50-Year Capture Zone	Moderate
63	N/A	Pet Care Clinics SC. 7530 Mineral Point Road Madison, WI	Site Investigation	Storage and use of potentially hazardous fluids Animal waste	Active Veterinary	0.80 MI W	50-Year Capture Zone	Low
64	76	Along Mineral Point Road 7627 Mineral Point Road Madison, WI	FirstSearch Report - WI - Spills - Old Spill ID: N/A ; DNR Activity No: 04-13-214411	Spill incident occurred 12/12/96, unknown extent. Absorbent clean-up method, noted: scrape up fuel in snow	Closed	0.84 MI W	50-Year Capture Zone	Low

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65	77	Sam's Club Store No. 8255 7050 Watts Road Madison, WI	FirstSearch Report - EPA - RCRA VGN (ID: WIR000019901)	Conditionally exempt small quantity generator	VGN	0.85 MI SW	50-Year Capture Zone	Low
66	81	701 S. Gammon Road Madison, WI	FirstSearch Report - WI - Spills - Old Spill ID: 950407-01	Spill incident occurred 04/07/95, unknown extent	Historic Spill	0.86 MI SW	50-Year Capture Zone	Low
67	88	Woodman's Food Market Woodman's Gas Station 725 S. Gammon Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No: 03-13-002719) b - WI - Registered UST (WI ID No: 551099, 678694, 146932)	a - LUST discovered 10/16/95, closed 12/04/03. b - 4 tanks ((3) 12000 gallon unleaded gasoline, (1) 12000 gallon diesel), in use.	a - Closed b - In Use	0.89 MI S	50-Year Capture Zone	Moderate
68	89	Kline Cleaners 728 S. Gammon Road Madison, WI	FirstSearch Report - EPA - RCRA SGN / NLR (ID: WID988575809)	Small quantity generator (100-1000 kg/month of hazardous waste), no longer regulated	SGN / NLR	0.90 MI SW	50-Year Capture Zone	Low
69	91	Valvoline Instant Oil Change 732 S. Gammon Road Madison, WI	FirstSearch Report a - EPA - RCRA VGN / NLR (ID: WID988640009) b - WI - Registered UST (WI ID No: 156465)	a - Conditionally exempt small quantity generator, no longer regulated b - (4) 500 gallon waste/used motor oil tanks, in use	a - VGN / NLR b - In Use	0.91 MI SW	50-Year Capture Zone	Low
70	85	Wal-Mart Store No. 1138 7202 Watts Road Madison, WI	FirstSearch Report - EPA - RCRA VGN / NLR (ID: WIR000003673)	Conditionally exempt small quantity generator, no longer regulated	VGN / NLR	0.88 MI SW	50-Year Capture Zone	Low
71	95	David Shea 809/811 S. Gammon Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 68084)	3 tanks (8000 gallon unleaded gasoline, 9000 gallon unleaded gasoline, 10000 gallon leaded gasoline), all tanks closed/filled with inert material as of 1988	Closed / Filled	0.96 MI S	50-Year Capture Zone	Low
72	116	Capitol One Real Estate, llc 901 S. Gammon Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 101075)	3 tanks ((2) 10000 gallon unleaded gasoline, (1) 12000 gallon unleaded gasoline), in use	In Use	1.09 MI S	50-Year Capture Zone	Low
73	128	Ford Ballantyne 918 S. Gammon Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 78463)	One 150 gallon diesel tank, closed / removed.	Closed / Removed	1.15 MI S	50-Year Capture Zone	Low
74	94	Town of Middleton Garage 7722 Mineral Point Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No: 03-13-000722) b - WI - Registered UST (WI ID No: 138536) c - WI - Registered UST (WI ID No: 138537)	a - LUST discovered 10/13/89, closed 02/28/05 b - One, 1000 gallon leaded gasoline tank, closed / removed c - 2 tanks ((1) 550 gallon leaded gasoline, (1) 1500 gallon diesel), both closed / removed	a - Closed b - Closed / Removed c - Closed / Removed	0.95 MI W	50-Year Capture Zone	Low
75	92	PDQ Stores # 124 7717 Mineral Point Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No: 03-13-002767) b - WI - Registered UST (WI ID No: 117512)	a - LUST discovered 12/12/95, closed 08/14/96 b - 4 tanks ((3) 12000 gallon unleaded gasoline tanks, (1) 6000 gallon diesel), in use	a - Closed b - In Use	0.94 MI W	50-Year Capture Zone	Low
76	102	MCI Telecommunications 575 Donofrio Drive Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 682087)	One, 275 gallon diesel tank, in use	In Use	1.01 MI SW	50-Year Capture Zone	Low
77	103	Dowelaco 579 Donofrio Drive Madison, WI	FirstSearch Report - EPA - RCRA VGN / NLR (ID: WIR000007708)	Conditionally exempt small quantity generator, no longer regulated	VGN / NLR	1.02 MI SW	50-Year Capture Zone	Low
78	112	Badger State Cleaners 7850 Mineral Point Road Madison, WI	FirstSearch Report - EPA - RCRA VGN / NLR (ID:WIR000017012)	Conditionally exempt small quantity generator, no longer regulated	VGN / NLR	1.07 MI W	50-Year Capture Zone	Low
79	109	Mid Plains Telephone, Inc. 7843 Mineral Point Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 110983)	One, 4000 gallon fuel oil tank, closed / removed	Closed / Removed	1.06 MI W	50-Year Capture Zone	Low

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80	144	Department of Natural Resources 7984 Mineral Point Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 87181)	2 tanks ((1) 265 gallon diesel, (1) 1000 gallon fuel oil), both closed / removed	Closed / Removed	1.24 MI W	50-Year Capture Zone	Low
81	124	TDS Metrocom 7905 Mineral Point Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 657337)	One, 250 gallon diesel tank, in use	In Use	1.13 MI W	50-Year Capture Zone	Low
82	N/A	Alliant Energy Substation 7301 West Town Way Madison, WI	Site Investigation	Active electric insulator oil tanks, potential UST	In Use	0.76 MI SW	50-Year Capture Zone	Low
83	39	Oakwood Lutheran Homes, Inc. 6201 Mineral Point Road Madison, WI	FirstSearch Report a - WI - Spills (DNR Activity No. 04-13-455481) b - WI - Registered UST (WI ID No: 115110) c - WI - Registered UST (WI ID No: 680796)	a - Spill incident occurred 10/30/02, excavated & disposed in drums, unknown extent b - 2 tanks (1111 gallon empty, 2500 gallon fuel oil), closed / removed c - 3 tanks (1500 gallon diesel, 2500 gallon fuel oil, 1000 gallon fuel oil), all in use	a - Closed b - Closed / Removed c - In Use	0.57 MI E	100-Year Capture Zone	Low
84	43	Madison Gas & Electric 6185 Mineral Point Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 670605)	One, 1500 gallon diesel tank for back-up generator	In Use	0.60 MI E	100-Year Capture Zone	Low
85	48	300 Block Island Drive Madison, WI	FirstSearch Report - WI - Spills - Old Spill ID: 850508-01	Spill incident occurred 5/8/1985, unknown extent	Historic Spill	0.63 MI E	100-Year Capture Zone	Low
86	80	Verizon Wireless 615 Forward Drive Madison, WI	FirstSearch Report a - WI - Spills - Old Spill ID: 890829-04 b - WI - Registered UST (WI ID No: 684235)	a - Spill incident occurred 08/29/89, storm sewer drained, unknown extent b - 2 tanks (132 gallon diesel, 700 gallon diesel), in use	a - Historic Spill b - In Use	0.86 MI SE	100-Year Capture Zone	Low
87	90	Rayovac Corporation 601 Rayovac Drive Madison, WI	FirstSearch Report - EPA - PRP (ID No. 5274667) (Site ID: WID980610604)	Refuse hideaway landfill discovered, settled 08/31/01	PRP	0.90 MI SE	100-Year Capture Zone	Low
88	107	a - TDS Metrocom b - Nicollet Inst. Co. Mass Spec 6416 Schroeder Road Madison, WI	FirstSearch Report a - EPA - RCRA SGN / NLR (ID: WID982609927) b - WI - Registered UST (WI ID No. 77257)	a - Small generator, no longer regulated b - 2 Tanks (500 gallon diesel, 600 gallon diesel), in use	a - SGN / NLR b - In Use	1.06 MI SE	100-Year Capture Zone	Low
89	110	Rayovac Corporation 6414 Schroeder Road Madison, WI	FirstSearch Report - EPA - RCRA NLR (ID:WID076151356)	Hazardous material generator, no longer regulated	NLR	1.06 MI SE	100-Year Capture Zone	Low
90	137	Intersection of S. Gammon & Park Ridge Drive Madison, WI	FirstSearch Report - WI - Spills (DNR Activity No: 04-13-052099)	Spill incident occurred 07/09/1988, diesel spill onto soil, unknown extent, and no action was taken.	Open	1.19 MI S	100-Year Capture Zone	Low
91	171	Coventry Village Retirement 7710 South Brookline Drive Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 693182)	One, 200 gallon diesel tank for back up generator	In Use	1.40 MI SW	100-Year Capture Zone	Low
92	197	Holy Name Catholic Center 3577 South High Point Road Madison, WI	FirstSearch Report a - WI - LUST (DNR Activity No: 03-13-002485) b - WI - LUST (DNR Activity No: 03-13-002382) c - WI - Registered UST (WI ID No: 152632)	a - LUST discovered 11/22/94, closed 10/23/97 b - LUST discovered 10/03/94, closed 03/05/96 c - 3 tanks (7000 gallon fuel oil, 550 gallon unleaded gasoline, 4000 gallon fuel oil), only the 4000 gallon tank is currently in use	a - Closed b - Closed c - In Use	1.53 MI SW	100-Year Capture Zone	Low
93	142	7525 Welton Drive Madison, WI	FirstSearch Report - WI - Spills - Old Spill ID: 931209-03	Spill incident occurred 12/9/93 on soil, unknown extent	Historic Spill	1.23 MI SW	100-Year Capture Zone	Low
94	139	Kenneth Welton 7555 Welton Drive Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 99584)	One, 1000 gallon fuel oil tank, closed / removed	Closed / Removed	1.19 MI SW	100-Year Capture Zone	Low

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95	N/A	New Start Outpatient Clinic 1015 Gammon Ln Madison, WI	FirstSearch Report - EPA - RCRA VGN (ID: WIR000137240)	Conditionally exempt small quantity generator	VGN	1.24 MI SW	100-Year Capture Zone	Low
96	169	Tires Plus 458 Commerce Drive Madison, WI	FirstSearch Report a - EPA - RCRA VGN / NLR (ID: WIR000033761) b - WI - Registered UST (WI ID No. 724612)	a - Conditionally exempt small generator, no longer regulated b - 4 tanks (190 gallon waste / used motor oil, 285 gallon waste / used motor oil, (2) 250 gallon tanks), in use	a - VGN / NLR b - In Use	1.37 MI W	100-Year Capture Zone	Low
97	172	Goodyear Tire & Rubber Co 437 Commerce Drive Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 647913)	One, 245 gallon waste / used motor oil tank, in use	In Use	1.40 MI W	100-Year Capture Zone	Low
98	149	Mineral Point Road and eastbound ramp of Hwy 12/18 Madison, WI	FirstSearch Report - WI - Spills - Old Spill ID: 900118-03	Spill incident on soil occurred 01/18/90, unknown extent	Historic Spill	1.27 MI W	100-Year Capture Zone	Low
99	150	Taco Bell 421 Commerce Drive Madison, WI	FirstSearch Report - WI - Spills - DNR Activity No: 04-13-275023	Spill incident on soil occurred 03/01/01, unknown extent	Closed	1.30 MI W	100-Year Capture Zone	Low
100	156	Nonns Grocery 8101 Mineral Point Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 113976)	2 tanks (550 gallon unleaded gasoline, 550 gallon leaded gasoline), closed / removed	Closed / Removed	1.32 MI W	100-Year Capture Zone	Low
101	173	Olberg, Inc. 8215 Mineral Point Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 150122)	One, 550 gallon waste / used motor oil tank, in use	In Use	1.41 MI W	100-Year Capture Zone	Low
102	N/A	TLC Dry Cleaning Inc 668 N High Point Rd Madison, WI	FirstSearch Report - WI - DNR - Other (ID:02-13-552185)	Regulatory Obligations	Open	1.41 MI NW	100-Year Capture Zone	Low
103	158	Menards, Inc. 8115 Mineral Point Road Madison, WI	FirstSearch Report a - EPA - RCRA SGN (ID: WID988638474) b - WI - Registered UST (WI ID No: 153851, 505479)	a - Small quantity generator (100-1000 kg/month of hazardous waste) b - One, 300 gallon diesel tank, in use	a - SGN b - In Use	1.33 MI W	100-Year Capture Zone	Low
104	178	Checker Auto Parts Store: 4561 416 Commerce Drive Madison, WI	FirstSearch Report - EPA - RCRA SGN (ID: WIR000051078)	Small quantity generator (100-1000 kg/month of hazardous waste)	SGN	1.43 MI W	100-Year Capture Zone	Low
105	N/A	Safety Kleen Systems Inc 416 Commerce Dr Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 751658)	One, 120 gallon tank, waste/used motor oil, in use	In Use	1.43 MI SW	100-Year Capture Zone	Low
106	143	Kelley Williamson, Co. 8230 Watts Road Madison, WI	FirstSearch Report - WI - Registered UST (WI ID No: 162192, 681393)	3 tanks ((2) 8000 gallon unleaded gasoline, (1) 12000 gallon unleaded gasoline), in use	In Use	1.24 MI W	100-Year Capture Zone	Low

Notes:
Map Site ID numbers correspond to numbers shown on Figure 4-1.
Environmental FirstSearch Map ID No.s pertain to the associated Environmental Firstsearch Report and Map. They are listed for cross-reference purposes.

Definitions:
DNR: Wisconsin Department of Natural Resources
EPA: Environmental Protection Agency
ERNS: Emergency Response Notification System
LUST: Leaky Underground Storage Tank
NLR: No longer regulated
OTHER: Additional Database Maintained By DNR
PRP: Potentially Responsible Parties

Definitions:
RCRA: Resource Conservation and Recovery Act
SGN: Small Quantity Generator
TOT: Time of Travel
UST: Underground Storage Tank
VGN: Conditionally Exempt Small Quantity Generator
Zone A: Within the 5-Year Capture Zone
Zone B: Beyond Zone A, Within 1200 Foot Radius

TABLE 4-2
MINIMUM SEPARATION REQUIREMENTS
BETWEEN MUNICIPAL WELLS AND
POTENTIAL CONTAMINANT SOURCES
WELLHEAD PROTECTION PLAN, UNIT WELL 16
MADISON, WISCONSIN

Potential Contamination Source	Minimum Separation Distance
– Emergency or Standby Power System for Well	10 feet
– Storm Sewer – Sanitary Sewer (Constructed from Pressure Pipe Materials)	50 feet
– Sanitary Sewer, Manhole, or Liftstation – One or Two Family Residential Fuel Oil Tank – Private Onsite Wastewater Treatment System (Tank, Holding Tank, or Piping)	200 feet
– Double-Wall Underground Storage Tank (Gasoline, Diesel, Bio-Diesel, Ethanol, Other Alternative Fuel, Fuel Oil, Petroleum Product, Motor Fuel, Burner Fuel, Lubricant, Waste Oil, or Hazardous Substances)	300 feet
– Private Onsite Wastewater Treatment System (Dispersal Component with Capacity Less Than 12,000 gpd) – Cemetery – Stormwater Retention or Detention Pond	400 feet
– Double-Wall Above Ground Storage Tank (Gasoline, Diesel, Bio-Diesel, Ethanol, Other Alternative Fuel, Fuel Oil, Petroleum Product, Motor Fuel, Burner Fuel, Lubricant, Waste Oil, or Hazardous Substances)	600 feet
– Land Application of Municipal, Commercial, or Industrial Waste – Boundaries of Land-Spreading Facility – Agricultural, Industrial, Commercial, Municipal Waste Water Treatment Plant Units, Lagoons, or Storage Structures. – Manure Stacks or Storage Structures – Private Onsite Wastewater Treatment System (Dispersal Component with Capacity Greater Than 12,000 gpd)	1,000 feet
– Solid Waste Storage, Transportation, Incineration, Air Curtain Destructor, Processing, Wood Burning, One-Time Disposal or Demolition Facility – Sanitary Landfill – Property with Residual Groundwater Contamination Exceeding NR 140 Enforcement Standards – Coal, Salt, or De-Icing Material Storage – Any Single-Wall Underground or Above Ground Storage Tank (Gasoline, Diesel, Bio-Diesel, Ethanol, Other Alternative Fuel, Fuel Oil, Petroleum Product, Motor Fuel, Burner Fuel, Lubricant, Waste Oil, or Hazardous Substances) – Pesticide or Fertilizer Handling or Storage Facilities – Gasoline or Fuel Oil Storage Tanks Not Constructed Per Comm 10.260/Not Approved by Comm 10.110	1,200 feet

Reference: Wisconsin Administrative Code, NR 811, February 2012.

Footnote:

1 Lesser separation for sanitary sewer may be allowed if the sewer is constructed of water main materials and pressure tested. Less than 50 feet separation is not allowed.

5.0 MANAGEMENT STRATEGIES

5.1 ALTERNATIVE MANAGEMENT STRATEGIES

Table 5-1 summarizes key elements of a management plan developed for the City of Madison. Activities were identified for resource management within the delineated WHPA and within far upgradient ZOCs.

The various activities can be grouped into five principal categories as follows:

1. Existing programs
2. Land use controls
3. Intergovernmental cooperation
4. Monitoring
5. Public education and awareness

All landowners within the WHPA rely on groundwater resources for water supply. Emphasis should be placed on management activities that will provide a mutual benefit to the City of Madison residents and other property owners located within the WHPA and other ZOCs.

5.1.1 Category 1 - Existing Programs

5.1.1.1 Hazardous Waste Collection/Disposal Program (Clean Sweep)

Public Health Madison and Dane County operates the Clean Sweep Program. The program involves collection and disposal of residential, agricultural, and small business hazardous chemicals and wastes. There is a $10 per trip fee for Dane County households and farms. Small quantities of hazardous materials and wastes from small businesses are accepted by appointment and there is a per pound charge for materials.

The facility is located at 7102 US Hwy 12, Madison, WI 53718, (Beltline/12/18 East toward Cambridge) and across from the Yahara Hills Golf Course at the Dane County Landfill. A map is provided in Appendix K.

Information about the Clean Sweep Program can be found at www.danecountycleansweep.com, by calling (608) 838-9555 / (608) 243-0368 or by contacting Dave Radisewitz at (608) 243-0347 or Radisewitz.david@countyofdane.com.

The Clean Sweep Program is advertised using public service announcements and materials distributed by municipalities. Funding for the program is provided by a percentage of tipping fees collected at local landfills and support from the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP). Additional information about the Clean Sweep Collection Program is in Appendix K.

The Clean Sweep Program will be coupled with the City of Madison's WHP planning efforts. The following will be completed for this management activity:

1. Madison Water Utility will send information about the Clean Sweep Program to property owners in the WHPA, to encourage participation in the program.

5.1.1.2 On-Site Waste Disposal System Maintenance

The nearest private sewage disposal system is located 4,000 ft south-southeast of Unit Well 16 at 6510 Watts Rd and is the only identified septic system within the 100-year TOT ZOC for Well 16. The site is likely low risk to Unit Well 16.

Public Health Madison and Dane County has an existing program for maintenance of private on-site waste disposal systems and maintains an inventory of septic systems located within Dane County.

Public Health Madison and Dane County investigates complaints about non-complying sewage disposal systems and issues replacement orders to owners of failing systems.

For this management activity, the City will perform the following:

1. MWU will request that Public Health Madison and Dane County provide information to owners of private sewage disposal systems located within the ultimate well capture zones, about sewage system maintenance, and the types of waste that should not be disposed of in a septic system.

5.1.1.3 Well Abandonment

The proposed strategies under this category for WHP include public education and private well inventory maintenance. Education will improve awareness on the part of private well owners of the importance of proper well abandonment. There are a few private and TNC wells located in the ZOC for Unit Well 16 but outside the WHPA. Existing private wells are owned by private residents and are likely terminated in the upper bedrock aquifer, or sand and gravel aquifer.

The City of Madison (General Ordinance Section 13.21) and Dane County (Chapter 45) have well abandonment ordinances for non-complying, unsafe, and unused wells. A copy of the City of Madison Well Abandonment Ordinance and the Dane County ordinance "Relating to Private Water Systems" are in Appendix L. Other information about wells and well abandonment is in Appendix M. As of June 1, 2008, only licensed well drillers and pump installers can fill and seal wells in Wisconsin (Wisconsin DNR, 2010).

Private wells are allowed in the City of Madison provided a well operation permit is obtained by the private well owner from the Madison Water Utility. The permit is valid for a period not to exceed 5 years and is issued only after the well and pump are shown to meet Wisconsin Administrative Code Chapter NR 812, there are no cross-connections between the well and the municipal water system, and the well produces bacteriologically safe water. The Madison Water Utility oversees inspection of the well and collection of the water samples to ensure the well produces bacteriologically safe water. If the well does not meet these minimum requirements, the well owner must either abandon the well or make corrections to bring the well into compliance before a permit will be issued.

Madison Water Utility witnesses the abandonment of unsafe, unused, or non-complying wells that are located in the City of Madison. The City currently runs a reimbursement program that provides financial assistance to City of Madison property owners to help offset the cost of well abandonment. The program reimburses 50% of the cost, up to a maximum of $1000, to abandon a well. Funds are limited and restrictions may apply. Details about the program are available on the Madison Water Utility website, www.madisonwater.org/programs/privateWells.cfm.

Dane County oversees the abandonment of unsafe, unused, or non-complying wells that are located in the County. Public Health Madison & Dane County Environmental Health Division administers a county reimbursement program for abandoning wells. Dane County residents may be eligible for a grant up to $350 to help with well abandonment costs. More information about financial grants can be obtained by calling (608) 242-6515. Finally, the Wisconsin DNR also offers a State grant based reimbursement program to help offset the well abandonment costs. Property owners should contact the DNR at (608) 267-7152 or (608) 267-9350 for program details.

The following will be completed for this management activity:

1. Public Health Madison & Dane County Environmental Health Division will continue to review well applications and require construction permits for new private water supply wells.

2. Madison Water Utility will continue to require a well operation permit for private wells located in the City of Madison.

3. Madison Water Utility will determine the location of other private water supply wells that may be located within the City and which are not recorded in the City or County databases.

4. Madison Water Utility will send information to property owners located within the Unit Well 16 WHPA about proper abandonment procedures in the event the property owners have an unused well on their property.

5. Madison Water Utility will maintain a private well inventory for active and abandoned wells located in the City of Madison.

6. The City of Madison and Dane County will enforce the existing City and Dane County well abandonment ordinances, to ensure that all private wells are properly abandoned if unused or not permitted for use.

7. Madison Water Utility will request that Dane County consider proximity and depth of proposed private wells relative to Unit Well 16 prior to issuing permits for construction of new private water supply wells.

8. Madison Water Utility will direct residents to the DNR private well code (Chapter NR 812) or to the Wisconsin DNR private well section (608-266-0821) when questions arise about private water supply wells.

9. Madison Water Utility will provide information on its website about requirements relating to private wells including well operation permits, routine testing, and proper well abandonment procedures.

5.1.1.4 Land Application of Sludge and Septage

Active septage application sites are located west of Unit Well 16 beyond the 100-year TOT capture zone. The sites are likely low risk to Unit Well 16. The Wisconsin DNR issues permits for septage and sludge disposal sites in Wisconsin.

The following will be completed for this management activity:

1. Madison Water Utility will provide a copy of the WHPA and recharge area maps to the MMSD and request that sludge and septage not be spread in the Unit Well 16 recharge area equivalent to the 100-year TOT capture zone.

2. Madison Water Utility will provide a copy of the WHPA and recharge area maps to the DNR Watershed Management office (608-267-7694 (central office) 608-275-3325 (Fitchburg office)) and request that new permits for sludge and septage spreading not be issued for properties located in the Unit Well 16 recharge area equivalent to the 100-year TOT capture zone.

3. Madison Water Utility will encourage development of additional authorized septage discharge points in the City of Madison wastewater treatment system.

5.1.1.5 Spill Notification and Awareness of Remedial Investigation and Cleanup

There are four closed LUST sites, and five closed or historic spill sites within the Unit Well 16 WHPA. The following will be completed for this management activity:

1. Madison Water Utility will request that Madison Police and Fire, DNR, and the Dane County Emergency Management Office inform the Utility about future events (spills, leaks, investigations, etc.) that occur in the Unit Well 16 WHPA or in upgradient recharge areas.

2. Madison Water Utility will monitor the status of existing and potential contamination sources in the WHPA and upgradient recharge areas, investigations regarding nature and extent of releases, and the status of cleanup activities.

3. Madison Water Utility will provide the DNR a map showing the location of the Unit Well 16 WHPA and request that contaminated sites located in the WHPA be carefully reviewed before being granted closure.

5.1.2 Category 2 - Land Use Controls

5.1.2.1 Existing Zoning/Wellhead Protection Overlay Zoning and Ordinance

The City of Madison and Dane County have land subdivision and zoning ordinances to control and direct development. Land subdivision and zoning ordinances are used to safeguard flood plains, wetlands, shore lands, highway access, air quality, surface water, and other concerns. Existing zoning regulations will be enforced to help protect municipal well recharge areas and groundwater.

The City of Madison has a WHP ordinance. The ordinance prohibits incompatible development with the establishment of an overlay district for the 5-year TOT ZOC (Zone A) and the 1,200-foot radius ZOC (Zone B). The WHP ordinance helps ensure that future potential contamination sources are not located in the Unit Well 16 WHPA. A copy of the WHP ordinance is in Appendix N.

The following will be completed for this management activity:

1. The City of Madison will amend Section 28.102 of the Madison General Ordinances and update Wellhead Protection District No. 16 boundaries.

2. The City of Madison will provide Dane County with a copy of the WHP ordinance and Unit Well 16 WHPA map.

5.1.3 Category 3 - Intergovernmental Cooperation

5.1.3.1 Land Use Planning and Site Plan Review

Land use planning is performed to control and direct development. Land use planning and site plan review should also be used to help protect WHPAs. The following will be completed for this management activity:

1. The City of Madison will provide Dane County and the Wisconsin DNR with a copy of:

    a. The WHPP and maps showing the Unit Well 16 WHPA and recharge areas.

    b. A summary of separation distances required between municipal water supply wells and potential contamination sources (Wisconsin Administrative Code, Chapter NR 811.12 (5)(d)).

    c. A list of potential contamination sources that can threaten groundwater.

    d. A list of high-risk land uses that should be prohibited from WHPAs.

2. The City of Madison Planning and Development Department and Madison Water Utility will ensure that development complies with separation distances required between municipal water supply wells and potential contamination sources (Wisconsin Administrative Code, Chapter NR 811.12 (5)(d)).

3. The City of Madison will encourage neighboring municipalities (i.e. Town of Middleton) to help protect the Unit Well 16 recharge area when evaluating proposed development.

4. The City of Madison Planning and Development Department will use an Environmental Permits Checklist for site plan review for proposed development in the Unit Well 16 recharge area. The checklist will help ensure compliance with local, county, and state permits, and will raise awareness about groundwater protection.

5. The City of Madison Planning and Development Department will provide a copy of the WHPA map and Site Plan Review Environmental Permits Checklist to developers and property owners and require that the developer indicate on the environmental permits checklist and hazardous substances reporting form whether the proposed development is in a WHPA.

5.1.4 Category 4 - Monitoring

5.1.4.1 CSI Maintenance

As part of this study, a CSI was conducted within the delineated WHPA and ZOCs. It will be important to maintain current knowledge of land use, potential contamination sources, and development within the WHPA. The following will be completed for this management activity:

1. Madison Water Utility will update the CSI by conducting a windshield survey of properties located in the WHPA and by performing State and Federal database checks on an interval of once every five years.

5.1.4.2 Water Quality Monitoring

Currently, each City of Madison supply well is tested at least annually for volatile organic compounds (VOCs) and inorganic contaminants. Synthetic organic compounds (SOCs) are tested every six years. Microbiological tests for total coliform bacteria are conducted weekly. Results are summarized and reviewed for conformance with regulatory drinking water standards, for comparison to previous results, and to identify potential trends in contaminant concentrations.

City of Madison property owners and residents can go to the Madison Water Utility's website at www.madisonwater.org/water/waterQuality/mywells.cfm and look up the wells that serve their address, and can review the water quality data for the previous year for the well(s) of interest.

The following will be completed for this management activity:

1. Madison Water Utility will perform water quality monitoring as required by DNR and as otherwise needed.

2. Madison Water Utility will continue to post water quality data online for public review.

5.1.5 Category 5 - Public Education and Awareness

The City of Madison will implement an education program to inform area residents of the need to protect the public water supply. Education is the best way to help people understand that what they apply on or dispose in their land today may be what they or their neighbors drink tomorrow. The public education program will consist of the following:

1. Make available copies of the WHPP
2. Public Informational Meeting
3. News releases and social media
4. Make available and distribute information materials
5. Land Use and Contaminant Source Awareness
6. School programs

5.1.5.1 Availability of WHPP

The following will be completed for this management activity:

1. The City of Madison will provide hard copies of the WHPP for review by the public at the Water Utility Office (119 E Olin Avenue), Madison Public Library, and City Hall. In addition, an electronic copy will be posted to the City website www.madisonwater.org/water/programs/wellheadprotectionprogram.cfm.

2. The City of Madison will provide copies of the WHPP to the Town of Middleton, Dane County and the Wisconsin DNR.

3. Madison Water Utility will communicate the availability of the plan through a press release or various methods of social media.

5.1.5.2 Public Informational Meeting

The purpose of a public informational meeting will be to inform residents of the WHPP, and provide an opportunity for public education and awareness.

The following will be completed for this management activity:

1. The City of Madison will conduct a public informational meeting as part of a City committee meeting or the Common Council meeting during the review phase of the WHPP.

2. The City of Madison will provide WHPA maps available for public review and an information sheet or brochure available for public use.

5.1.5.3 News Releases

The purposes of news releases are to elevate public awareness, educate the public on the need for WHP, and provide examples of prudent WHP measures. Initially, a news release will inform the public that a WHPP has been developed for Unit Well 16 and will indicate the locations where the WHPP will be available for review.

The following will be completed for this management activity:

1. Madison Water Utility will announce the completion of the plan and its availability through a press release or various methods of social media.

5.1.5.4 Informational Materials Distributed to Residents in WHPA

Informational materials will be prepared and distributed to residents living within the WHPA to educate and inform property owners about various topics such as WHP planning activities, and best waste management procedures.

The following will be completed for this management activity:

1. Madison Water Utility will prepare informational materials and/or obtain from the Wisconsin DNR Bureau of Drinking Water and Groundwater, Dane County or UW Extension fliers, brochures, and pamphlets, including:

    a. Information about hazardous waste collection/disposal program (Clean Sweep) activities

    b. Materials describing the proper use and application of lawn fertilizers and pesticides

    c. WHP planning

    d. Annual Consumer Confidence Report (CCR) containing information about WHP planning.

2. Madison Water Utility will continue to add information to its website www.madisonwater.org/water/programs/wellheadprotectionprogram.cfm.

5.1.5.5 Land Use and Contaminant Source Awareness

During the CSI, properties were identified with land uses and existing or potential contaminant sources that pose, or may pose, a risk to groundwater. To increase awareness and minimize risk to groundwater and Unit Well 16, it is important to inform

property owners about existing and potential contaminant sources on their properties. An initial mailing will be made at the beginning of the WHP program. In this mailing, property owners will be advised to contact the City if they have questions, or require additional information.

The following will be completed for this management activity:

1. Madison Water Utility will provide information to owners of property with existing or potential contaminant sources located within the WHPA to emphasize the importance of awareness of the WHPA, the owner's location with respect to the WHPA, and potential contaminant source(s) of concern. Specific information to be provided includes:

    a. Leaking underground and aboveground storage tanks

    b. Upgrading existing underground and aboveground storage tanks

    c. Materials describing the proper use and application of lawn fertilizers and pesticides

5.1.5.6 School Programs

The City of Madison will participate in school education programs. The following will be completed for this management activity:

1. Madison Water Utility will inform schools about the availability of tours at water supply facilities. During tours, students will be exposed to important concepts related to groundwater and WHP.

2. Madison Water Utility will prepare a water/groundwater fact sheet for school education programs.

5.2 WATER CONSERVATION PROGRAM

The Madison Water Utility has an existing water conservation program that includes addressing the needs for both water accountability in the distribution system and water conservation by the public.

During 2012, the Utility maintained water accountability in the distribution system of 91 percent. The Utility maintains this high level of water accountability by regularly servicing water meters, reviewing water accountability records, and conducting water leak detection surveys when needed.

The Madison Water Utility has a Water Conservation and Sustainability Plan with a goal to reduce per capita water usage 20 percent by the year 2020. Associated resources

available to the public at the Madison Water Utility website www.madisonwater.org/water/sustainability/include:

> The Water Conservation and Sustainability Plan, 2008 (contained in Appendix N).
>
> Water conservation information, information about Project H2O and installing wireless smart meters at residences and businesses, and the toilet rebate Program- replacing high water using toilets with an EPA WaterSense rated High Efficiency Toilet (HET) model.

The Utility currently has brochures available free to the public describing useful water conservation measures. The brochures are also distributed to the public and discussed in speaking engagements with local organizations and schools by Water Utility staff.

The Madison Water Utility also has information about water conservation at its website www.madisonwater.org. Water conservation information is in Appendix O.

The Utility has the authority to impose water use restrictions when necessary.

5.3 CONTINGENCY PLAN

The Utility has formulated a contingency plan for providing water in the event that Unit Well 16 or one or more of the City's other water supply wells became contaminated or removed from service. The plan primarily relies on the capacity of the system without the capacity of any given well or wells to meet the supply needs of the City of Madison.

The City's water system was designed to supply the maximum water demand for an indefinite period with the largest well out of service. As a result, if Unit Well 16, or any other supply well of the water system, is out of service for a short period of time, the reliable water supply capacity is sufficient to meet demands. Unit Well 16 provides reliable supply to the water system and fire protection for the northwest part of the City. In the event of the loss of Unit Well 16, the other wells in Pressure Zone 8, Wells 26 and 28, could be used to serve the area. Interzone transfers can also occur from Pressure Zones 6W and 7.

Additionally, the City's wells and wellfields are widely spaced and generally have different recharge areas, thereby making them less vulnerable to potential localized contamination. Unit Well 16 has a standby diesel generator that can power the pump in the event of a power failure. Several other supply well pumping stations are equipped with standby generators or power plugs for connecting portable generators.

The contingency plan also relies on communication with first responders and a plan of action in the event of a water system emergency. Dane County Emergency Management Office will be requested to notify the Water Utility if there is an occurrence in the vicinity of the Unit Well 16 WHPA.

A list of emergency contact numbers was compiled to provide Utility staff immediate access to the appropriate agencies in the event of an emergency. This list is provided in Table 5-2.

5.4 MANAGEMENT PLAN

A management plan was formulated to help protect the Unit Well 16 WHPA from existing and potential future sources of contamination. Table 5-1 summarizes major elements of the management plan.

Public education is an important element in the management plan. Educational activities will provide a mutual benefit to the City of Madison and other property owners located within the WHPA and ZOCs.

The hazardous waste collection/disposal program (Clean Sweep) will also be an important part of the management plan. The program provides a means for residents and businesses in the WHPA and throughout the area to properly dispose of hazardous chemicals. Residents and producers of agricultural crops and commodities can dispose of hazardous materials and wastes for a nominal fee. Small quantities of commercial wastes from small businesses also can be disposed of for a nominal fee. The City will promote the Clean Sweep programs using the public education activities summarized in this plan.

Local governmental agencies (City, Township, and County) recognize the need for planning to protect WHPAs. Intergovernmental cooperation is an important part of the plan as agencies work together to consider the needs for WHP during planning and permitting processes. The City will provide Dane County and the Wisconsin DNR a copy of the WHPP and maps showing the Unit Well 16 WHPA, the separation distances required between municipal water supply wells and potential contamination sources (Wisconsin Administrative Code, Chapter NR 811.12(5)(d)), and a list of potential contamination sources that can threaten groundwater. The City will encourage county, and other city and village, boards to help protect the WHPA and ZOCs, and upgradient recharge areas when evaluating proposed development.

The City of Madison has a WHP ordinance and overlay zoning district. The WHP ordinance helps ensure that future potential contamination sources located within the City of Madison are not located in the Unit Well 16 WHPA.

TABLE 5-1
SUMMARY OF MANAGEMENT STRATEGIES
WELLHEAD PROTECTION AREA PLAN - UNIT WELL 16
MADISON, WISCONSIN

Program Category	Activity	Description	Responsible Unit(s) of Government	Implementation Schedule	
				Target Date	Action Item
1. Existing Programs	a. Hazardous Waste Collection (CLEAN SWEEP)	• Hazardous waste collection and disposal. Residential, agricultural, and small business hazardous waste. Commercial with small fee. May through October collections in Madison. • Target local property owners and residents to participate.	• Public Health Madison and Dane County (PHMDC) • Public Health Madison and Dane County	**1. 2014** **2. As needed**	**1. Madison Water Utility** to send information about the Clean Sweep Collection Program to property owners in the WHPA to encourage participation in the program. **2. Public Health Madison and Dane County** sponsors advertising and feature articles.
	b. On Site Waste Disposal System (Septic) Maintenance	• Maintenance/servicing contract currently required for system owners on record. • Orders issued to confirmed failing system owners. • Include all property/septic system owners in WHPA in notification database. • Conduct Public Education.	• Public Health Madison and Dane County	**1. 2014, then annually**	**1. Madison Water Utility** request that Public Health Madison and Dane County provide information to owners of private sewage disposal systems about sewage system maintenance, and the types of waste that should not be disposed of in a septic system.

TABLE 5-1 (cont.)

Program Category	Activity	Description	Responsible Unit(s) of Government	Implementation Schedule	
				Target Date	Action Item
1. Existing Programs (cont.)	c. Well Construction and Abandonment	• Review applications and require construction permits for new private water supply wells. • Enforce well abandonment ordinance(s) (Dane County Chapter 45, and City of Madison General Ordinance Sec. 13.21) and review new well construction. • Require proper abandonment of unused and unsafe wells. • Update well inventory in WHPA once every 5 years. • Familiarize with WI Admin. Codes, Chapters NR 141, 811, and 812.	• Wisconsin Department of Natural Resources (DNR) • Public Health Madison and Dane County (PHMDC) • Madison Water Utility	1. **Ongoing**	1. **Public Health Madison & Dane County Environmental Health Division** to review well applications and require construction permits for new private water supply wells.
				2. **Ongoing**	2. **Madison Water Utility** to require a well operation permit for the use or maintenance of a private well located in the City of Madison.
				3. **Ongoing**	3. **Madison Water Utility** to maintain the private well inventory in the City of Madison.
				4. **Ongoing**	4. **Madison Water Utility** determine the location of other private water supply wells that may be located within the WHPA or ZOC and which are not recorded in City or County databases.
				5. **Ongoing**	5. **Madison Water Utility** to provide private well owners within the City, DNR pamphlets about proper well abandonment procedures in the event the owner decides to abandon the wells.
				6. **Ongoing**	6. **City of Madison and Dane County** to enforce the existing private well ordinances, to ensure that all private wells are permitted, or properly abandoned if unused.
				7. **2014**	7. **Madison Water Utility** request that Dane County consider proximity and depth of proposed private wells relative to Unit Well 16 prior to issuing permits for construction of new private water supply wells.
				8. **As needed**	8. **Madison Water Utility** to direct residents to the DNR private well code (Chapter NR 812) or to the Wisconsin DNR private well section, (608) 266-0821, when questions arise about private water supply wells.
				9. **Ongoing**	9. **Madison Water Utility** will provide information on its website about requirements regarding private wells including well operation permits, routine testing, and proper well abandonment procedures.

TABLE 5-1 (cont.)

Program Category	Activity	Description	Responsible Unit(s) of Government	Implementation Schedule	
				Target Date	Action Item
1. Existing Programs (cont.)	d. Land Application of Sludge and Septage	• Enforce existing rules.	• Wisconsin DNR • Public Health Madison and Dane County • Madison Metropolitan Sewerage District (MMSD)	**1. 2014** **2. 2014** **3. Ongoing**	**1. Madison Water Utility** to provide a copy of the WHPA and recharge area maps to the MMSD and request that sludge not be spread in the Unit Well 16 recharge area equivalent to the 100-year TOT capture zone. **2. Madison Water Utility** to provide a copy of the WHPA and recharge area maps to the DNR Watershed Management office (608-267-7694 (central); 608-275-3325 (Fitchburg office) and request that new permits for sludge and septage spreading not be issued for properties located in the Unit Well 16 recharge area equivalent to the 100-year TOT capture zone. **3. Madison Water Utility** to encourage the development of additional authorized septage discharge points in the City of Madison wastewater treatment system.
	e. Spill Notification and Awareness of Remedial Investigation and Cleanup	• Monitor and keep informed of potential contamination sources in the WHPA and recharge areas. • Work with DNR to achieve investigation and cleanup of known contamination sources.	• Wisconsin DNR • Dane County Emergency Management • Wisconsin DATCP and COMM • City of Madison Fire Department	**1. 2014** **2. 2014** **3. 2014, then ongoing**	**1. Madison Water Utility** to request that DNR, Madison Police and Fire, and the Dane County Emergency Management Office inform the utility about future events (spills, leaks, investigations, etc.) that occur in the Unit Well 16 WHPA or in upgradient recharge areas. **2. Madison Water Utility** to monitor the status of existing and potential contamination sources in the WHPA, investigations regarding nature and extent of releases, and the status of cleanup activities, to determine if utility action is needed. **3. Madison Water Utility** will provide the DNR with a map of the Unit Well 16 WHPA and request that contaminated sites located within the WHPA are carefully reviewed before being granted closure.
2. Land Use Controls	a. Existing Zoning/Wellhead Protection Overlay Zoning and Ordinance	• Enforce existing zoning. • Discourage conditional uses or zoning changes that increase risk to groundwater.	• City of Madison • Dane County Planning and Development	**1. 2014** **2. 2014**	**1. City of Madison** to amend WHP ordinance and update WP-16 Wellhead Protection District No.16. **2. City of Madison** to provide Dane County with a copy of the WHP ordinance and WHPA map.

TABLE 5-1 (cont.)

Program Category	Activity	Description	Responsible Unit(s) of Government	Implementation Schedule	
				Target Date	Action Item
3. Intergovernmental Cooperation	a. Land Use Planning and Site Plan Review	• Cooperate in land use planning to protect groundwater resources and WHPAs. • Keep appraised of development in WHPA. • Ensure development complies with separation distances between the well and potential contamination sources as required by WI Admin. Code, Chapter NR 811.12.	• City of Madison Planning and Development Department • Dane County Planning and Development Department • Town of Middleton	**1. 2014** **2. 2014 – Ongoing** **3. 2014 – Ongoing** **4. 2014** **5. 2014 – Ongoing**	**1. City of Madison** to provide Dane County and the Town of Middleton with a copy of: a. The WHPP and maps showing the Unit Well 16 WHPA and ZOCs. b. A summary of separation distances required between municipal water supply wells and potential contamination sources (Wisconsin Administrative Code, Chapter NR 811.16(4)(d)). c. A list of potential contamination sources that can threaten groundwater. d. A list of high risk land uses that should be prohibited in WHPAs. **2. City of Madison Planning and Development Department and Madison Water Utility** to ensure that development complies with separation distances required between municipal water supply wells and potential contamination sources. **3. City of Madison** to encourage the Town of Middleton and Dane County Boards to help protect the Unit Well 16 recharge area when evaluating proposed development. **4. City of Madison Planning and Development Department** to develop an Environmental Permits Checklist for site plan review. The checklist will help ensure compliance with local, County, and State permits and will raise awareness about groundwater protection. **5. City of Madison Planning and Development Department** to provide a copy of the WHPA map and Site Plan Review Environmental Permits Checklist to developers and property owners and require that the developer indicate on the environmental permits checklist and hazardous substances reporting form whether the proposed development is in a WHPA.
4. Monitoring	a. Contaminant Source Inventory (CSI) Maintenance	• Update CSI and conduct windshield survey	• Madison Water Utility	**1. 2016, then every 5 years**	**1. Madison Water Utility** to update the CSI by conducting a windshield survey of properties located in the WHPA and by performing State and Federal database checks.
	b. Water Quality Monitoring	• Conduct sampling of supply wells.	• Madison Water Utility	**1. As required – Ongoing** **2. Ongoing**	**1. Madison Water Utility** to perform water quality monitoring as required by DNR and as otherwise needed. **2. Madison Water Utility to** continue to post water quality data online at madisonwater.org for public review.

TABLE 5-1 (cont.)

Program Category	Activity	Description	Responsible Unit(s) of Government	Implementation Schedule	
				Target Date	Action Item
5. Public Education and Awareness	a. Availability of WHPP	• Provide copies to Water Utility Office, Public Library, City Hall, Town of Middleton and Dane County.	• City of Madison	**1. 2014** **2. 2014** **3. 2014**	**1. City of Madison** to provide copies of the WHPP at Water Utility Office, Madison Central Library, and City Hall for review by the public. **2. City of Madison** to provide copies of the WHPP to the Town of Middleton and Dane County. **3. Madison Water Utility to** communicate the availability of the plan through a news release or other method including social media.
	b. Public Informational Meetings	• Perform as part of a City Committee meeting or Common Council Meeting.	• City of Madison	**1. 2014** **2. 2014**	**1. City of Madison** to conduct a public informational meeting as part of a City committee meeting or the Common Council meeting during the review phase of the WHPP. **2. City of Madison** to provide WHPA maps for public review and an information sheet or brochure available for public use.
	c. News Releases	• Issue early in program implementation and reinforce as necessary.	• City of Madison	**1. 2014**	**1. Madison Water Utility** communicate the availability of the WHPP for Unit Well 16 through a news release or various methods of social media.
	d. Informational Materials Distributed To Residents in WHPA	• Hazardous Waste Collection (Clean Sweep) Program • Materials describing proper use and application of fertilizers and pesticides.	• City of Madison • Wisconsin DNR • University Extension Office	**1. 2014** **2. 2014 – Ongoing**	**1. Madison Water Utility** to prepare informational materials and/or obtain from the Wisconsin DNR Bureau of Drinking Water and Groundwater, Dane County or UW Extension fliers, brochures and pamphlets, including: a. Information about hazardous waste collection/disposal program (Clean Sweep) activities. b. Materials describing the proper use and application of lawn fertilizers and pesticides. c. Wellhead protection planning d. Annual Consumer Confidence Report (CCR) containing information about WHP planning. **2. Madison Water Utility** to update information regarding WHP planning on website (http://www.madisonwater.org).

TABLE 5-1 (cont.)

Program Category	Activity	Description	Responsible Unit(s) of Government	Implementation Schedule	
				Target Date	Action Item
5. Public Education and Awareness (cont.)	e. Land Use and Contaminant Source Awareness	• Notify and offer guidance to owners of potential high risk land uses in WHPA.	• City of Madison	**1. 2014**	**1. Madison Water Utility** to provide information to owners of property with existing or potential contamination sources located within the WHPA to emphasize the importance of awareness of the WHPA, the owner's location with respect to the WHPA, and potential contamination source(s) of concern. Targeted information to include: a. Hazards of leaking USTs and ASTs. b. Upgrading existing ASTs and USTs systems. c. Materials describing the proper use and application of lawn fertilizers and pesticides.
	f. School Programs	• Participate in school programs.	• City of Madison • University Extension Office • Madison Public Schools	**1. 2014** **2. 2014**	**1. Madison Water Utility** to inform schools about the availability of tours at water supply facilities. **2. Madison Water Utility** to prepare a factsheet on water/groundwater school education.

TABLE 5-2
EMERGENCY CONTACT NUMBERS
WELLHEAD PROTECTION PLAN, UNIT WELL 16
MADISON, WISCONSIN

Emergency Contact	Name	Phone No.
Water Utility Emergency Service	On-call 24 Hours	Office: 608-266-4665
General Manager	Tom Heikkinen	Office: 608-266-4652
Water Quality Manager	Joseph Grande	Office: 608-261-9101
Principal Engineer	Alan Larson	Office: 608-266-4653
Civil Engineer	Dennis Cawley	Office: 608-261-9243
Police Department	Emergency Dispatch Non-Emergency	911 608-255-2345
Fire Department	Emergency Dispatch Administration	911 608-266-4420
Dane County Emergency Response	On-Call 24 Hours	911
Dane County Emergency Management	Hazardous Materials Planning Office	608-266-4330
Public Health Madison and Dane County – Environmental Health	Office	608-242-6515
DNR Water Supply Engineer	Dave Barkhahn Fitchburg	608-275-3300
DNR Water Supply - Central Office	Mark Harder Madison	608-267-5762
Well Driller & Pump Installer	Municipal Well & Pump Tracy Greenfield	Office: 920-324-3400 Cellular: 262-424-2328
Well Driller & Pump Installer	Layne Northwest	Office: 262-246-4646 After Hours: 262-246-4646
Town of Middleton, Town Clerk	David Shaw	608-833-5887
State Patrol	Emergency Administration	911 608-266-3212
Hazardous Material Response Team – Wisconsin Division of Emergency Mgmt.	WI DNR Spills Hotline	1-800-943-0003 (Menu)
Electric Utility – Madison Gas & Electric	Emergency Service	608-252-1111