

Wellhead Protection Plan Unit Well 26 City of Madison, Wisconsin

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EXECUTIVE SUMMARY

This report is a Wellhead Protection Plan (WHPP) for the City of Madison Unit Well 26. The purpose of this plan is to establish specific criteria for protection of the Well 26 recharge area. This WHPP was prepared for Unit Well 26 to conform with the requirements of the Wisconsin Administrative Code, Chapter NR 811, Section 16(5), for wellhead protection (WHP) planning.

Unit Well 26 is located on High Point Road in the western part of the City of Madison. Construction of Unit Well 26 was completed in 1987. Unit Well 26 is 1,129 feet deep, is open to the lower bedrock (sandstone) aquifer and has a design capacity of approximately 2,200 gallons per minute (gpm).

Land use in the vicinity of Unit Well 26 is primarily agricultural, with some residential and planned unit development. The land in the vicinity of Unit Well 26 primarily is zoned agricultural.

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). This model was used to develop the 5-, 50- and 100-year timed travel for Unit Well 26. ZOCs extend west southwest of Unit Well 26 in the simulated upgradient groundwater flow direction.

Figure 3-4 shows the wellhead protection area (WHPA) for Unit Well 26. 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 26. 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 26 area during the first quarter of 2003. Potential and existing contaminant sources within a half-mile radius of Unit Well 26 include agricultural chemical and fertilizer use, potential spills along roads and main transportation corridors, active and closed underground storage tank (UST) sites, road salt use, and pesticide, herbicide and nutrient loading on commercial and residential lawns.

Programs and activities to be used by the City of Madison and others for WHPA management at Unit Well 26 can be found in the Wellhead Protection Plan for Unit Well 28, City of Madison, prepared by EarthTech, Inc., in April of 2002.

The Madison Water Utility has an existing water conservation program and Public Education and Awareness program. The Utility has formulated a contingency plan for providing water in the event that Unit Well 26 or one or more of the City's other water supply wells becomes contaminated or removed from service.

A copy of the City of Madison's WHP ordinance is included in the Appendix to this report. The City of Madison is developing an overlay-zoning district to add the WHPA for Unit Well 26. The WHP ordinance will help ensure that other potential contaminant sources are not located in the Unit Well 26 WHPA.

1.0 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This report is a WHPP for the City of Madison Unit Well 26. The purpose of this plan is to establish specific criteria for protection of the local recharge area in the vicinity of Unit Well 26.

This WHPP was prepared for Unit Well 26 to conform with the requirements of the Wisconsin Administrative Code, Chapter NR 811, Section 16(5), 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 26.
3. Coordinate with Dane County Regional Planning Commission (DCRPC) for previously delineated 5-year TOT capture zones for Unit Well 26.
4. Perform a CSI to identify and characterize existing and potential contamination sources within the 5-year TOT capture zone and within a ½-mile radius of Unit Well 26.
5. Assist with the determination of a WHPA for Unit Well 26.

1.2 LOCATION AND BACKGROUND

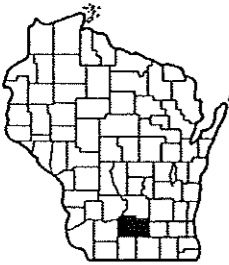
Unit Well 26 is located on High Point Road in the western part of the City of Madison. The site is in the NW ¼ of the NW ¼ of Section 35, Township 7 North, Range 8 East, Dane County, Wisconsin. Figure 1-1 shows the location of Unit Well 26 and other water system facilities in the City of Madison. A portion of the survey plat showing the well site is in Appendix B. Construction of Unit Well 26 was completed in 1987.

The City water system serves approximately 215,000 people and consists of 24 active wells, 28 booster pumping facilities, 24 ground storage reservoirs, 5 elevated water storage tanks, and approximately 777 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 26 is located in the City's West Pressure Zone. Unit Well 26 is located approximately 7,000 feet southwest of Unit Well 16 and 11,500 feet northeast of Unit Well 20.

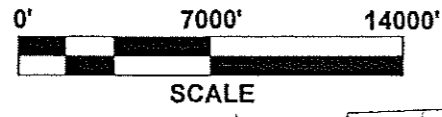
1.3 UNIT WELL 26

Unit Well 26 was constructed to a depth of 1,129 feet. The well is cased with 36-inch OD steel casing driven to a depth of 30 feet below ground. A 35-inch open hole extends from the bottom of the 36-inch casing to a depth of 450 feet below ground. A 30-inch OD steel casing is grouted in from the surface to a depth of 450 feet below ground. A 29-inch diameter open borehole extends from 450 to 650 feet in depth, and a 24-inch diameter open borehole extends from 650 to 1,129 feet below ground. The well construction report for the well reported encountering the top of sandstone at a depth of 124 feet. Unit Well 26 was test

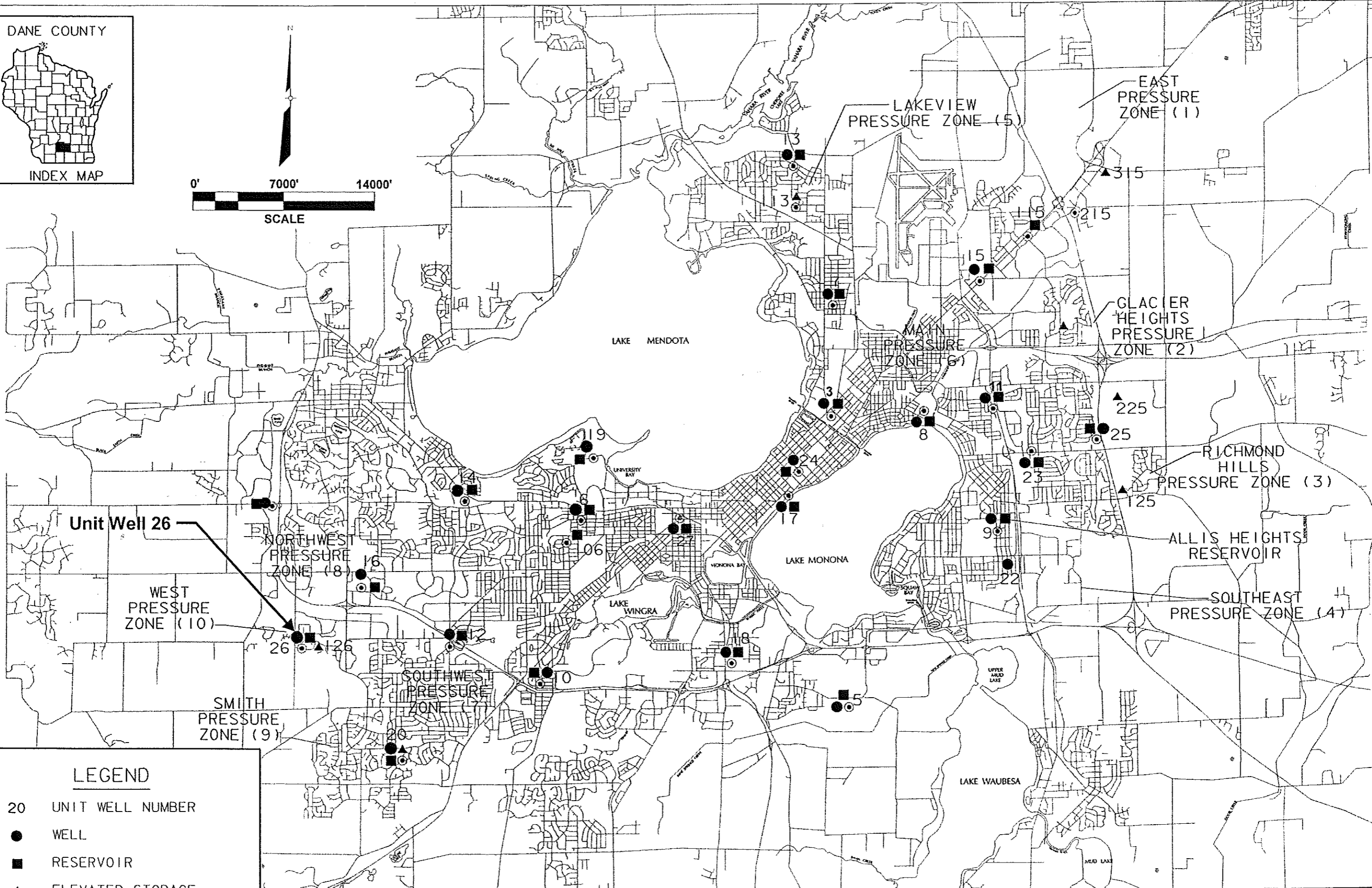
DANE COUNTY



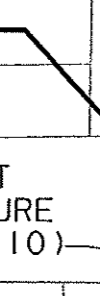
INDEX MAP



SCALE



Unit Well 26



LEGEND

- 20 UNIT WELL NUMBER
- WELL
- RESERVOIR
- ▲ ELEVATED STORAGE
- ⊙ BOOSTER PUMP STATION



Base Map Obtained from EARTH TECH

FIGURE 1-1 LOCATION OF UNIT WELL 26 & OTHER WATER SYSTEM FACILITIES

MADISON WATER UTILITY MADISON, WISCONSIN

APRIL 2002

D:\stps01\proj\work\projects\4694\proj\FIG-1.DGN

2.0 HYDROGEOLOGIC CONDITIONS

2.1 LAND USE, TOPOGRAPHY, AND DRAINAGE

Land use in the area is primarily agricultural and residential. Current zoning immediately around Unit Well 26 is Agricultural, (A), single-family residential (R1), and planned unit development (PUD). Other zoning in the area is planned community development (PCD) and general residential (R4).

The topography in the area of the well generally slopes from the southwest toward the northeast. The surface elevation at Unit Well 26 is approximately 1,180 feet MSL. Unit Well 26 lies approximately on the divide between the Sugar-Pecatonia Drainage Basin and the Yahara River Drainage Basin. Surface drainage to the southwest of the well flows southwestward toward the Sugar River, while surface drainage to the northeast of the well flows northeastward toward the Madison lakes.

2.2 GEOLOGY

The area 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 crystalline rocks and Cambrian and Ordovician age bedrock consisting of sandstone, dolomite, and shale.

No formation log could be found for strata encountered at Unit Well 26. The stratigraphic sequence expected to be encountered in the well, based upon logs for nearby Unit Wells 16 and 20, is briefly described in the following:

2.2.1 Precambrian Basement Bedrock

Precambrian bedrock was not encountered. Based upon the construction log for nearby Well 16, the anticipated depth of the top of the Precambrian bedrock is estimated to be at least 1,000 feet below grade.

2.2.2 Cambrian and Ordovician Bedrock

Cambrian and Ordovician age rocks expected to be encountered in Unit Well 26 include in ascending order the Mount Simon Formation, the Eau Claire Formation, Galesville Member, Ironton Member and Franconian Formation. Sandstone was encountered from 124 feet below ground, according to the well construction report. Cambrian and Ordovician rocks are relatively flat-lying in the Madison area in the east-west direction and dip slightly to the south. The thickness of deep rock units appears to be relatively consistent in the Madison area, although there are textural and compositional changes, laterally.

2.2.3 Unlithified Deposits

No samples were analyzed from the drilling of Unit Well 26. The Well 26 construction report shows that glacial drift was encountered from 0 feet to 27 feet below the surface, with limestone between 27 and 124 feet below ground.

Soils in the immediate vicinity of Unit Well 26 are classified as the Plano, Dodge, Ringwood, Dresden, and Saint Charles silt loams. These soils have good attenuation potential. The DCRPC assigned a risk

classification of moderate to high from surface activities in the Unit Well 26 area on the basis of several factors including soil properties (DCRPC, 1999).

2.3 HYDROGEOLOGY

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

2.3.1 Bedrock Aquifer

The bedrock aquifer occurs in the Mount Simon Formation and lower part of the Eau Claire Formation. The Precambrian bedrock is the base of the bedrock aquifer. Water occurs within horizontal and vertical fractures, along bedding planes, and between sand grains in the aquifer. Mount Simon Sandstones typically yield the greatest amount of water, while Eau Claire Sandstone yields moderate amounts of water. In general, hydraulic characteristics for an aquifer may be represented by two values – hydraulic transmissibility and storage coefficient. Transmissibility is expressed as the rate of flow of water at the prevailing water temperature, in gallons per day, through a vertical strip of the aquifer one foot wide, under a hydraulic gradient of 1 foot per foot. Storage coefficient is defined as the volume of water released from or taken into storage per unit surface area of the aquifer per unit change in the component of head normal to that surface. Previous studies of Dane County groundwater determined that the typical coefficient of transmissibility for Cambrian sandstones is greater than 45,000 gpd per foot, and the typical storage coefficient is approximately 0.0004 (Cline, 1965). Examination of wells in the area suggests that the coefficient of transmissibility for this region is approximately 38,500 gpd per foot, and the storage coefficient is approximately 0.0003.

The grouted casing in Unit Well 26 extends into the Franconian layer. Therefore, water levels measured in Unit Well 26 are believed to be representative of the bedrock aquifer and are unaffected by the sand and gravel aquifer.

2.3.2 Sand and Gravel Aquifer

The sand and gravel aquifer occurs in sand and gravel deposits near the surface. The unlithified materials are thin near Unit Well 26. Construction logs for Unit Well 26 indicate that deposits are supplanted by sandstone by a depth of 124 feet below the surface. No water is withdrawn from the sand and gravel aquifer by Unit Well 26, since the well is cased to a depth of 450 feet below ground.

2.3.3 Groundwater Flow System

Average annual precipitation in the City of Madison area is reported to be approximately 30 to 30.5 inches per year (Cline, 1965; Cotter et. al., 1969). Cline (1965) estimated that the amount of recharge to the groundwater reservoir in the Upper Yahara River basin was approximately 6 in/yr. More recently Swanson (1996) estimated that the recharge rate in Dane County ranges from 0.3 to 6.7 inches per year (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. Map 7 in Appendix D shows areas of recharge to and discharge from the lower bedrock (Mount Simon) aquifer (Bradbury et. al, 1999; DCRPC 1999). Discharge from the unlithified and shallow

bedrock aquifers is to pumping wells and/or to surface waters (lakes, streams and wetlands) in the area. Locally, discharge from the lower bedrock aquifer is primarily to pumping wells.

3.0 WELLHEAD PROTECTION AREA DELINEATION

This chapter describes methodologies used to define the Zone of Influence (ZOI) and Zone of Contribution (ZOC) for Unit Well 26.

3.1 ZOI

The ZOI for Unit Well 26 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, which assumes uniform conditions throughout an aquifer media and no recharge. The estimated ZOI for Unit Well 26 to a radius where there is 1 foot of drawdown is approximately 9.5 miles. Groundwater modeling performed by the Dane County Regional Planning Commission, as described in detail in Section 3.2 below, estimates the ZOI for Unit Well 26 to have a radius of 13.1 miles. The disparity in ZOI size estimates may be due to non-uniform soil conditions, which are considered in the DCRPC modeling but ignored when using the Theis equation. For this reason, the DCRPC groundwater modeling estimate of the ZOI size will be assumed to be more accurate.

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 26. 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 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 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. The lower bedrock aquifer is Layer 4. The model was recalibrated and various boundary conditions modified (DCRPC, 2001). Other aquifer parameters input into the model were as previously described in Chapter 2 and in Krohelski et. al., 2000.

Three 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 2025. The projected pumping rate for Unit Well 26 is 1.383 million gallons per day (MGD). Pumping at a rate of 1.383 MGD is equivalent to pumping continuously at a rate of approximately 960 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 26 is 1.584 MGD. The design capacity of Unit Well 26 is approximately 2,200 gpm (3.17 MGD), and city data indicates that in 2002, the well was pumping at 1,922 gpm (2.77 MGD). Pumping at

a rate of 1.584 MGD is equivalent to pumping continuously at a rate of 1,100 gpm, or half the well's nominal capacity. Simulation No. 3 was performed using full design capacity. Full capacity for Unit Well 26 is 3.168 MGD. Pumping at a rate of 3.168 MGD is equivalent to pumping continuously at a rate of 2,200 gpm.

3.3 ZOC

The area that recharges or contributes water to Unit Well 26 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 26.

Figure 3-1 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 26 based on the projected 2025 pumping rates (Simulation No. 1). Figure 3-2 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 26 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 26 based on the full-capacity pumping rate (Simulation No. 3). The capture zones extend west southwest in the simulated upgradient groundwater flow direction. 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 more conservative in length and width compared to the ZOCs delineated using Simulation Nos. 1 and 2 pumping rates.

The ZOCs estimated for Simulation Nos. 1, 2 and 3 are representative of anticipated pumping conditions. Maps 21 and 22 and Figure 2 in Appendix G show regional and local ZOCs for municipal wells in Dane County. Figure 2 in Appendix G shows ultimate ZOCs for municipal wells in Dane County. The ZOCs for Unit Well 26 are located entirely within Dane County.

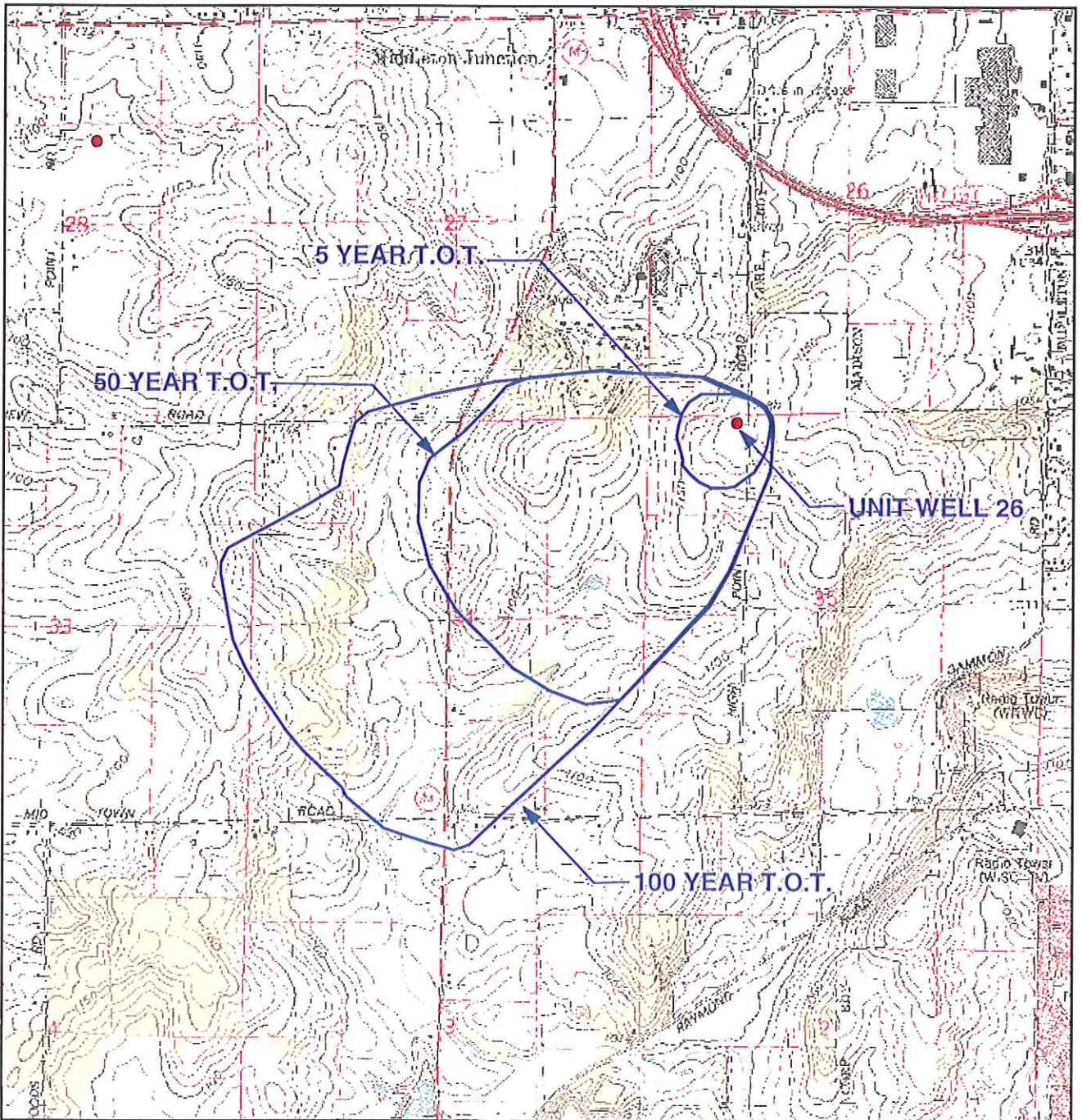
3.4 WELLHEAD PROTECTION AREA

The Wisconsin Administrative Code (Chapter NR811.16(5)(e)) requires that a WHPA for municipal water supply wells "encompass, at a minimum, that portion of the recharge area equivalent to a 5-year time of travel to the well." Any of the three simulations described above could be used to model the 5-year TOT ZOC for Unit Well 26. For the city's Unit Well 28, the half-capacity pumping level (Simulation No. 2) was used to represent the most likely scenario under which water would be withdrawn from the aquifer over the next five years. For Unit Well 26, however, Simulation No. 3 provides a more realistic, albeit conservative, model of actual water withdrawal. City pumping logs indicate that Unit Well 26 historically has run near full capacity without interruption, suggesting that half-capacity withdrawals might be insufficient to model the zone of capture. For this reason, the results of Simulation No. 3 are used to generate the 5-year TOT ZOC for Unit Well 26.

The 5-year TOT ZOC is irregular in shape and extends more than 1,600 feet on the upgradient side of the well. Downgradient, the 5-year TOT ZOC extends up to 800 feet from the well, depending upon direction.

The 100-year TOT ZOC extends up to 11,500 feet upgradient from Unit Well 26. However, protecting the entire 100-year TOT ZOC from Unit Well 26 to the upgradient boundary at the same level of protection as the area within the 5-year TOT ZOC is likely too severe.

Figure 3-4 shows the WHPA for Unit Well 26. Two zones of protection are within the WHPA. Zone A is the area around Unit Well 26 that is defined by the 5-year TOT ZOC delineated for Simulation No. 3



SOURCE: USGS 7.5 MINUTE QUADRANGLE,
MIDDLETON, WISCONSIN, 1982

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

SCALE 1 : 24,000

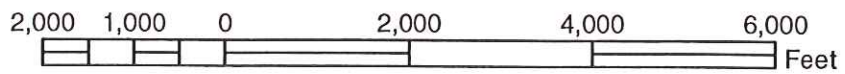
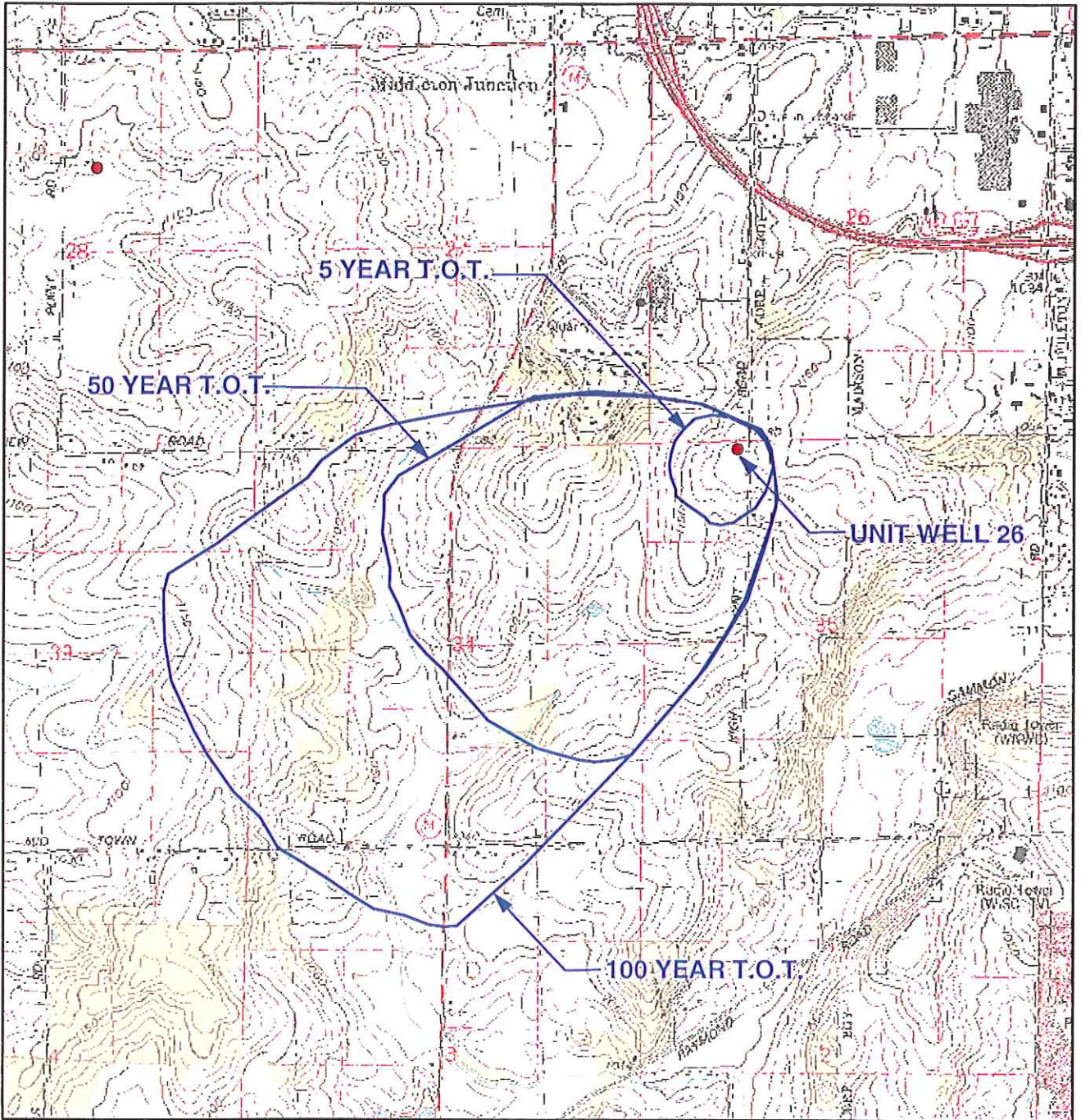


FIGURE 3-1
5, 50 & 100 YEAR T.O.T. Z.O.C.s ASSUMING
PROJECTED 2025 PUMPING RATE
MADISON, WISCONSIN
APRIL 2003



SOURCE: USGS 7.5 MINUTE QUADRANGLE,
MIDDLETON, WISCONSIN, 1982

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

SCALE 1 : 24,000

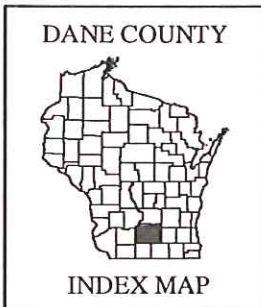
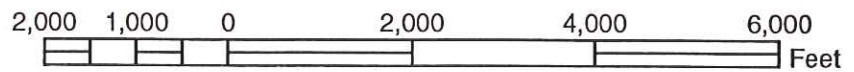
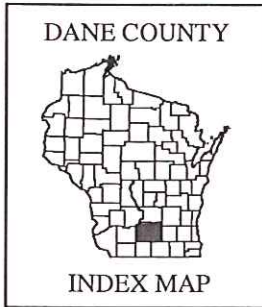
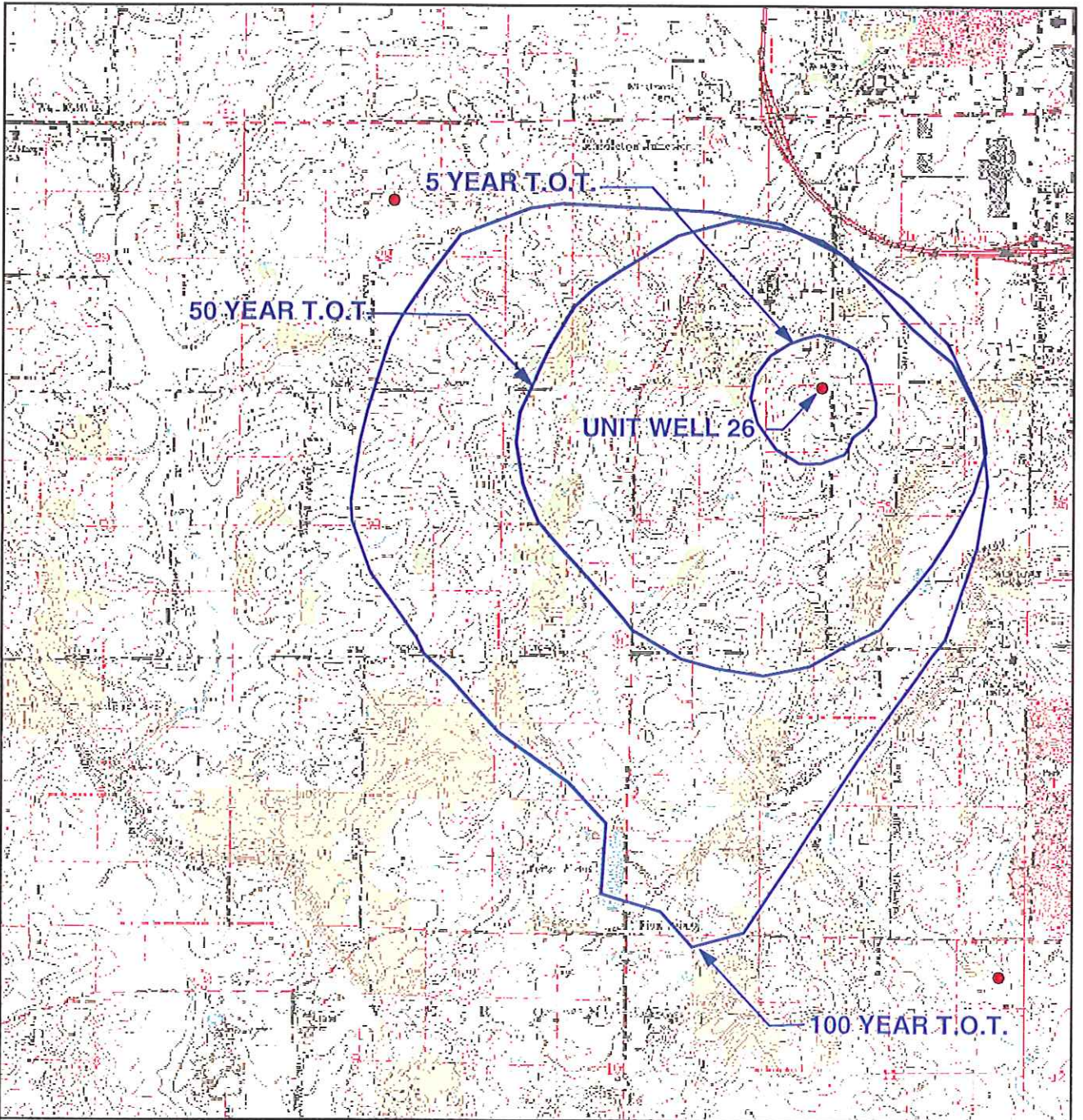


FIGURE 3-2

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

MADISON, WISCONSIN

APRIL 2003



SOURCE: USGS 7.5 MINUTE QUADRANGLE,
MIDDLETON, WISCONSIN, 1982

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

SCALE 1 : 36,000

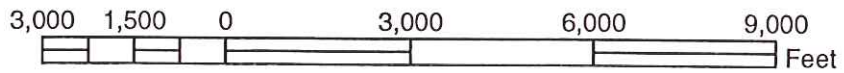


FIGURE 3-3
5, 50 & 100 YEAR T.O.T. Z.O.C.s ASSUMING
ASSUMING 100 PERCENT CAPACITY (3MGD)
MADISON, WISCONSIN

APRIL 2003

**TABLE 3-1
SUMMARY OF EXTENT OF ZOCs (CAPTURE ZONE)
WELLHEAD PROTECTION UNIT WELL 26
MADISON, WISCONSIN**

Item	Simulation No. 1 (projected 2025 pumping rates)	Simulation No. 2 (one-half design capacity pumping rates)	Simulation No. 3 (continuous pumping at maximum capacity)
Simulated Pumping Rate (MGD)	1.383	1.584	3.168
Upgradient Extent of ZOC (feet)			
5-year TOT	800	1,000	1,500
50-year TOT	4,300	4,800	6,000
100-year TOT	7,200	7,900	11,250
Downgradient Extent of ZOC (feet)			
5-year TOT	400	450	800

Notes:

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

(full design capacity pumping rate). Zone B is the area that is defined by a 1,200-foot fixed radius around Unit Well 26. This radius is selected because the Wisconsin Administrative Code, Chapter NR811.16(4) requires a 1,200-foot minimum 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 26 on the downgradient side of the well, but is smaller on the upgradient side. 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.

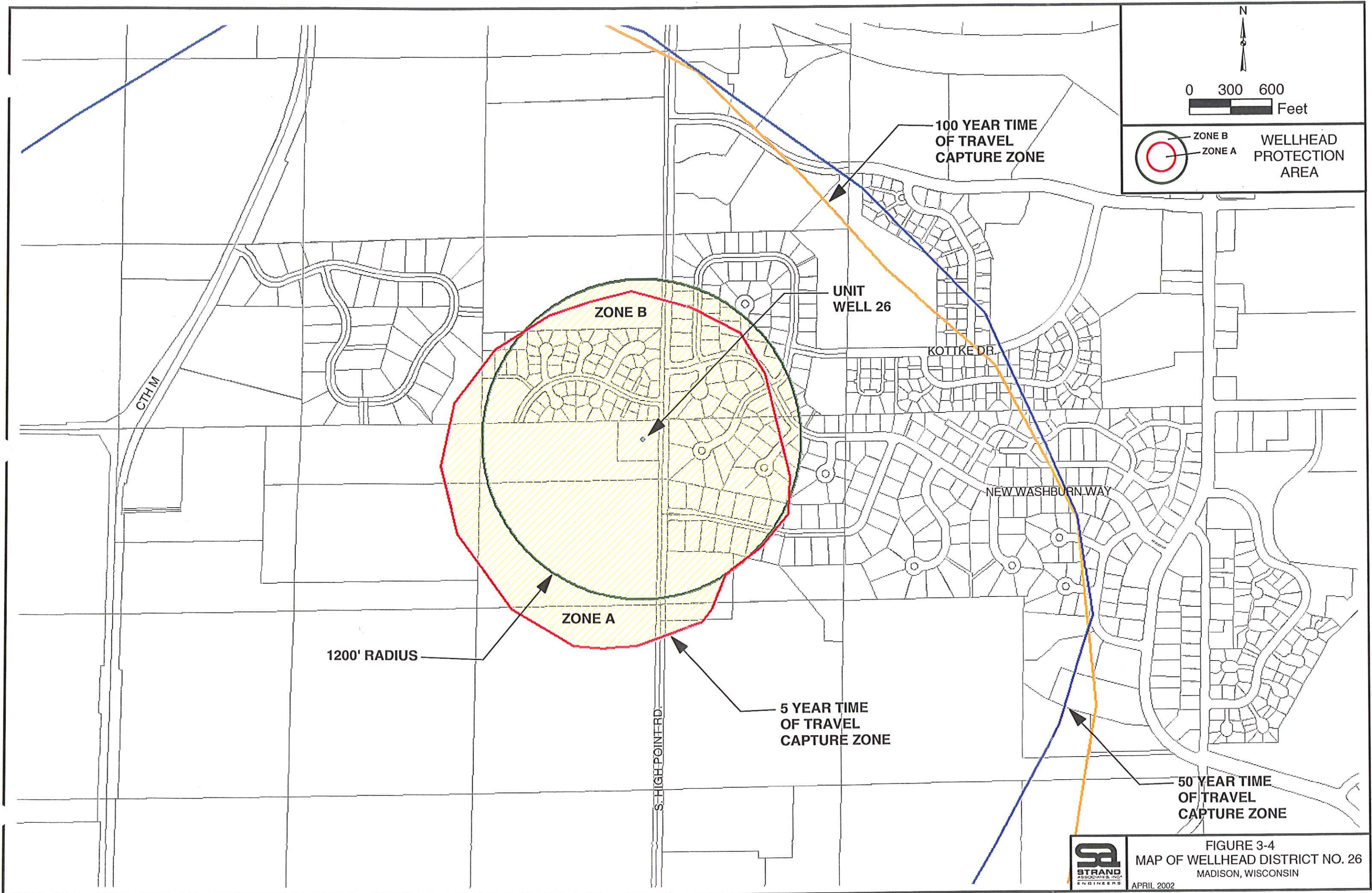


FIGURE 3-4
MAP OF WELLHEAD DISTRICT NO. 26
 MADISON, WISCONSIN
 APRIL 2002

4.0 POTENTIAL CONTAMINANT SOURCES

4.1 CONTAMINANT SOURCE INVENTORY

A CSI was performed for the Unit Well 26 area during the first quarter of 2003. The CSI consisted of a search of government records, interviews, review of aerial photographs, and a reconnaissance survey completed March 25, 2003, of the area within a ½-mile radius of Unit Well 26. A copy of the CSI is in Appendix H.

Figures 4-1 and 4-2 show the location of potential and existing contaminant sources in the WHPA and within a ½-mile radius of Unit Well 26. Figure 4-1 shows the topography of the area, and Figure 4-2 shows the land subdivisions. Table 4-1 summarizes potential contaminant sources that were identified and/or reported to be within the WHPA and review area.

Potential and existing contaminant sources within the WHPA for Unit Well 26 include agricultural chemical and fertilizer use, potential spills along roads and main transportation corridors, active and closed underground storage tank (UST) sites, possible manure and sludge spreading areas on agricultural fields, closed and active private sewage disposal systems, road salt use, and pesticide, herbicide, and nutrient loading on commercial and residential lawns.

On the basis of available information, following are descriptions of known existing or potential contaminant sources in the WHPA and/or within a 1/2-mile radius of Unit Well 26:

The nearest private sewage disposal system is located outside the WHPA.

The nearest private water supply well is located outside the WHPA.

The nearest storm sewer is located on South High Point Road, approximately 200 feet north of Unit Well 26, and is constructed of reinforced concrete pipe materials.

The nearest sanitary sewer main is located on Lois Lowry Lane approximately 250 feet north of Unit Well 26. The lateral extending from the sewer main to Unit Well 26 is constructed of PVC pipe materials.

On the basis of the site reconnaissance and a review of the Wisconsin registered storage tank list, the nearest USTs are reported to be located at the Holy Name Seminary located approximately 2500 feet northwest of Unit Well 26. The nearest reported leaking underground storage tank was identified as the same location. DNR reports indicate the tank activity is closed.

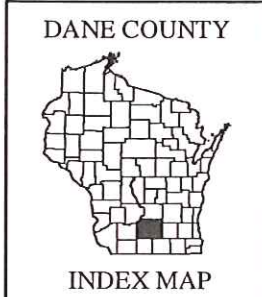
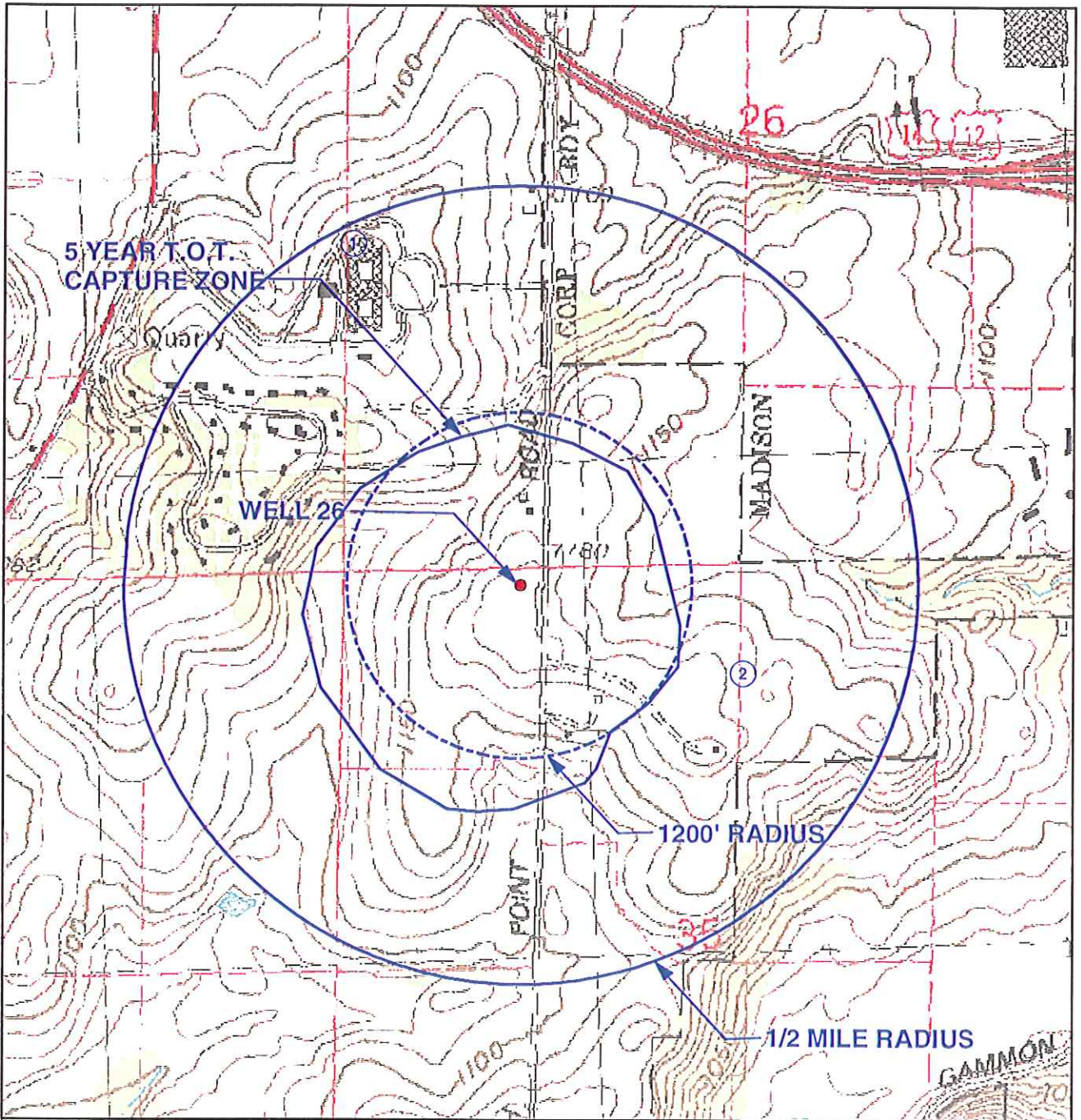
On the basis of site reconnaissance and a review of the Wisconsin registered storage tank list, no above-ground storage tanks could be located within the WHPA.

No dry-cleaning business is located in the vicinity of the Unit Well 26 WHPA.

The nearest golf courses is located approximately 7,500 feet southwest of Unit Well 26.

No solid waste storage site was identified in the vicinity of Unit Well 26.

No cemetery is located in the vicinity of the Unit Well 26 WHP area.



SOURCE: USGS 7.5 MINUTE QUADRANGLE,
MIDDLETON, WISCONSIN, 1982

T.O.T. = TIME OF TRAVEL

③ POTENTIAL CONTAMINANT SOURCE OR ROUTE

SCALE 1 : 12,000

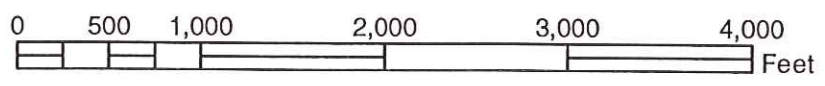
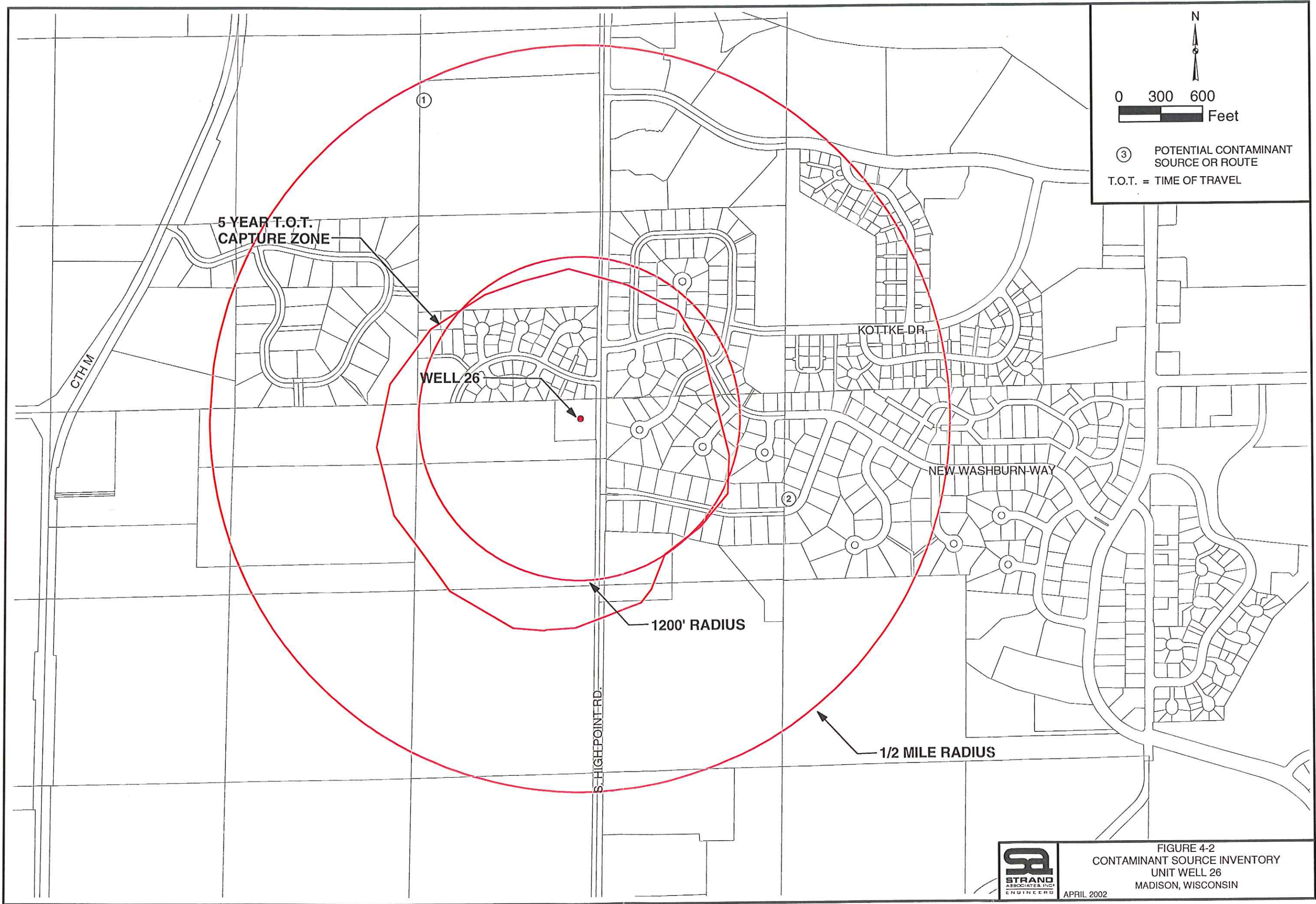


FIGURE 4-1
CONTAMINANT SOURCE INVENTORY
UNIT WELL 26
MADISON, WISCONSIN

APRIL 2003



N

0 300 600 Feet

③ POTENTIAL CONTAMINANT SOURCE OR ROUTE
T.O.T. = TIME OF TRAVEL

5-YEAR T.O.T. CAPTURE ZONE

WELL 26

KOTTKE DR.

NEW WASHBURN WAY

1200' RADIUS

1/2 MILE RADIUS

S. HIGHPOINT RD.

CTH M



FIGURE 4-2
CONTAMINANT SOURCE INVENTORY
UNIT WELL 26
MADISON, WISCONSIN
APRIL 2002

**TABLE 4-1
CONTAMINANT SOURCE INVENTORY SUMMARY
WELLHEAD PROTECTION UNIT WELL 26
MADISON, WISCONSIN
APRIL 2003**

Map Site No.	Owner/Location	Database or Reference Source	Existing, Potential, or Former Contaminant Sources	Reported Status	Approximate Distance to Unit Well 20	Location within Capture Zone	Estimated Threat to Supply Wells
1	Holy Name Seminary 3577 S. High Point Road Madison, WI	Wisconsin BRRTS database	Leaking underground storage tank	Activity Closed	2500 ft northwest	Downgradient beyond capture zone	low
2	7525 Welton Drive 7525 Welton Drive Madison, WI	Wisconsin BRRTS database	Spill	Closed	1600 ft southwest	Downgradient beyond capture zone	low
	SE ¼ NW ¼ S35 T7N R8E	Wisconsin DNR Facility's Aproved Sites Report	MMSD sludge spreading site	Unknown			
	NE ¼ NW ¼ S35 T7N R8E	Wisconsin DNR Facility's Aproved Sites Report	MMSD sludge spreading site	Unknown			
	NE ¼ NW ¼ S35 T7N R8E	Wisconsin DNR Facility's Aproved Sites Report	MMSD sludge spreading site	Unknown			
	NW ¼ NE ¼ S35 T7N R8E	Wisconsin DNR Facility's Aproved Sites Report	MMSD sludge spreading site	Unknown			
	NE ¼ S34 T7N R8E	Wisconsin DNR Facility's Aproved Sites Report	MMSD sludge spreading site	Unknown			

The nearest pond is located 4,500 feet southeast of Unit Well 26.

Wisconsin DNR records indicate that five approved septage application sites may be located within the vicinity of the Unit Well 26 WHP area. Sites are located by quarter-quarter section, and DNR records indicate five approved application sites serving the Madison Metropolitan Sewerage District lie within the same quarter-quarter section as Unit Well 26.

No bulk salt storage sheds, or bulk pesticide, fertilizer storage, and/or mix-load sites were identified within a 1-mile radius of Unit Well 26.

The separation distances between Unit Well 26 and potential contaminant sources identified in Wisconsin Administrative Code NR 811.16 are summarized in Table 4-2. It appears that required separation distances from Unit Well 26 and potential contaminant sources, identified in the code, are currently being met.

4.2 LAND USES AND WELLHEAD PROTECTION PLANNING

Existing land uses surrounding Unit Well 26 generally are compatible with WHP planning. However, existing land uses such as retail commercial fuel sales, non-approved USTs and/or ASTs (if any), and dry cleaners are not compatible uses. It is not desirable to have commercial, manufacturing, or industrial districts located in WHPAs.

Land uses summarized in Table 4-2 should be prohibited near Unit Well 26, within the respective minimum separation distances shown. Additionally, we recommend that land uses summarized in Table K-1 in Appendix K be prohibited from WHPA Zones A and B. Where any of the uses listed in Table K-1 currently exist within Zones A and B, owners should be allowed to upgrade the facilities assuming that upgrades include provision to facilitate or enhance groundwater protection. The existing wellhead protection ordinance has provisions for addressing expansion of existing prohibited land uses within the wellhead protection area.

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

**TABLE 4-2
MINIMUM SEPARATION REQUIREMENTS
BETWEEN PUBLIC WELLS AND
POTENTIAL CONTAMINANT SOURCES
WELLHEAD PROTECTION PLAN, UNIT WELL 26
MADISON, WISCONSIN**

Potential Contamination Source	Minimum Separation Distance
Storm Sewer	50 feet
Sanitary Sewer	200 feet ¹
Sanitary Lift Station	200 feet
Single Family Residential Fuel Oil Tank	200 feet
Septic Tank Receiving Less than 8,000 gpd	400 feet
Cemetery	400 feet
Storm Water Drainage Pond	400 feet
Gasoline or Fuel Oil Tank Approved by Comm 10.10	600 feet
Land Application of Municipal, Commercial, or Industrial Waste	1,000 feet
Commercial or Municipal Wastewater Lagoons or Storage Structures	1,000 feet
Manure Stacks or Storage Structures	1,000 feet
Septic Tanks or Soil Absorptive Units Receiving Greater than 8,000 gpd	1,000 feet
Solid Waste Storage, Transportation, Transfer, Incineration, Air Curtain Destructor, Processing, Wood Burning, or One-Time Disposal or Small Demolition Facility	1,200 feet
Sanitary Landfill	1,200 feet
Coal Storage Area	1,200 feet
Salt or Deicing Material Storage	1,200 feet
Gasoline or Fuel Oil Storage Tanks not Approved by Comm 10.10	1,200 feet
Bulk Fuel Storage Facilities	1,200 feet
Pesticide or Fertilizer Handling or Storage Facilities	1,200 feet

Reference: Wisconsin Administrative Code, NR 811, November 2002

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

A full discussion of wellhead protection management strategies may be found in the Wellhead Protection Plan for Unit Well 28, including alternative management strategies, water conservation programs, contingency plan and management plan.