Wellhead Protection Plan

Sturgeon Bay Utilities Municipal Wells

City of Sturgeon Bay
County of Door
Township of Nasewaupee
Township of Sevastopol
Township of Sturgeon Bay

Prepared by:
Sturgeon Bay Utilities and
Soil & Water Conservation Department

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CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Wellhead protection has become a crucial aspect of municipal planning in Wisconsin. Amendments to the federal Safe Drinking Water Act in 1986 incorporated wellhead protection programs. Wisconsin State Statute 160 *Groundwater Protection Standards* establishes the goals to form the base of Wisconsin's Wellhead Protection Program. Wisconsin Administrative Code NR 811.16(5) identifies the requirements of a Wellhead Protection Plan for community water systems.

The most significant natural resource issue facing the residents and visitors of Door County is a safe drinking water supply. Groundwater pollution was repeatedly identified as the county's greatest natural resource concern (DCSWCD, 1999). The sensitivity of Door County's aquifer has been documented and the risk to public health is of great concern. Wells in Door County have a high incidence of bacteria, nitrate and, in some portions of the county, lead.

The aquifer providing most of Door County's drinking water is made up of highly fractured Silurian dolomite. Vertical fractures as well as horizontal bedding planes provide the primary pathway for a relatively rapid flow of groundwater through this aquifer. The soils that overlie this bedrock are generally thin and provide limited attenuation of pollutants in the surface water as it recharges the aquifer. This condition is worsened by the presence of karst features, which pertains to the dissolution of the bedrock to form conduits that allow surface water to flow directly to groundwater.

Door County's groundwater resources are recharged from water that infiltrates through the land surface and not from waters of Lake Michigan and the Bay of Green Bay. Therefore, activities on the land surface have a large impact on the groundwater quality of Door County.

The Wellhead Protection Plan for the City of Sturgeon Bay municipal wells will not only provide protection for groundwater supplies of the municipal wells, but will also provide protection for private wells located in the Wellhead Protection Area.

1.2 BACKGROUND

The following evidence of well water contamination and degradation shows the necessity for the protection of the City of Sturgeon Bay's aquifer. Nine of eleven municipal wells in the city have had bacterial contamination, six of which were abandoned. Currently, three of the five active wells require ozone-disinfecting treatment for bacterial contamination (Table 1-1).

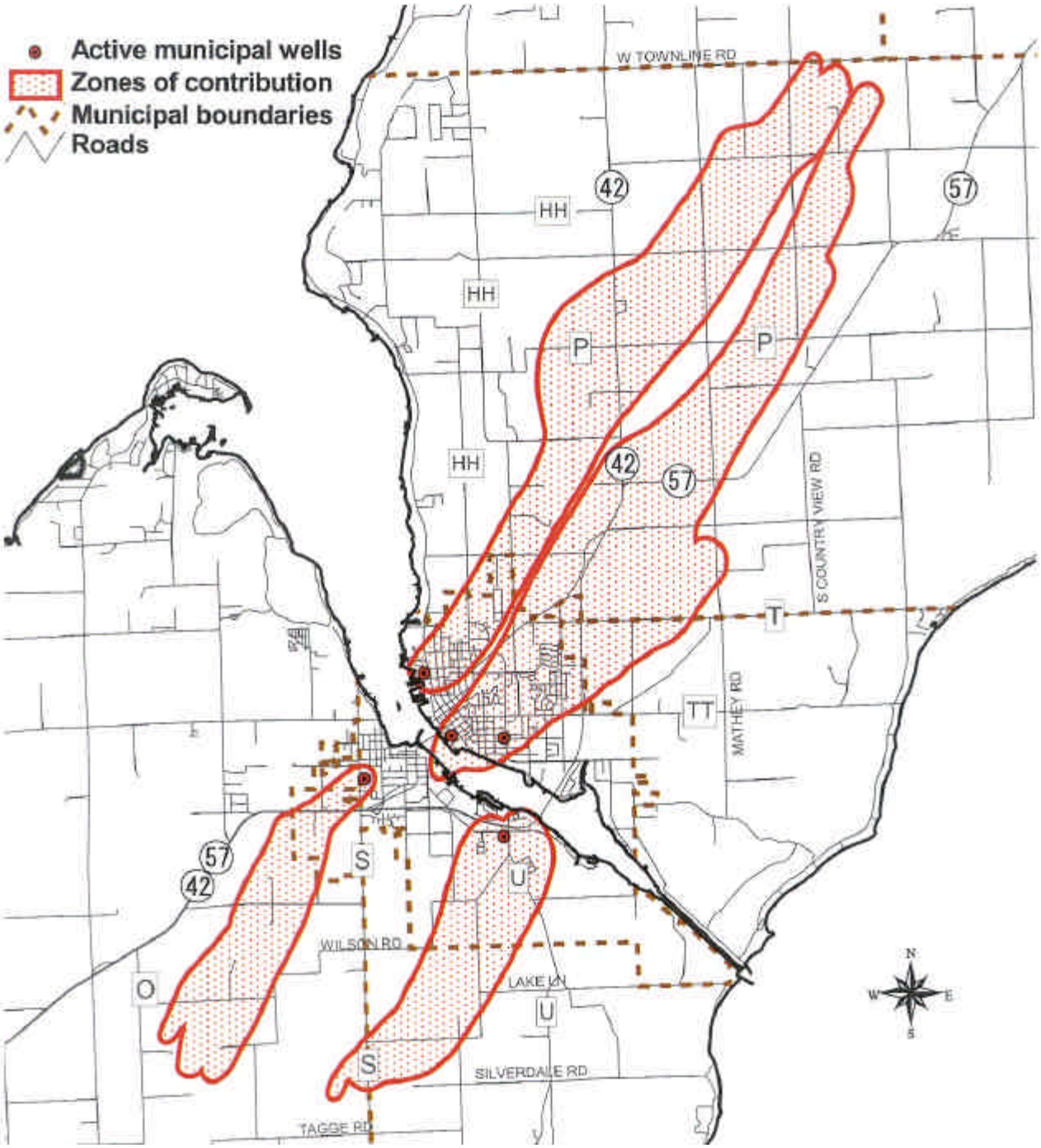
Table 1-1. Details of municipal wells and test wells within the City of Sturgeon Bay limits. Red indicates wells currently in service.

City Well #			Capacity (gpm)	Diam (in)	Total Depth (ft)	Casing Depth (ft)	
1	Redwood St	1918	375	9	1178	139	contaminated; abandoned 1996
3	N 3rd Ave	1935	1710	12	286	148	in service; no contamination
6	N 12th Ave	1951	710	15	425	212	in service; requires ozone treatment
7	Martin Park	1960	880	15	425	155	in service; no contamination
8	Duluth Ave	1966	660	17	452	150	in service; requires ozone treatment
9	S Neenah Ave	1972	n/a	17	507	150	contaminated; never used
10	Tacoma Beach Rd	1977	700	13	447	170	in service; requires ozone treatment
11	N 1st Ave	1984	650	12	228	200	contaminated; abandoned 1996

The Wisconsin Geological and Natural History Survey completed a study to research the boundaries of the Sturgeon Bay Municipal Wellhead Zone of Contribution (ZOC) in 1996 with funding and assistance from the Sturgeon Bay Utilities (SBU), the Wisconsin Department of Natural Resources (WDNR), and the Door County Soil & Water Conservation Department (SWCD). This study delineated the area on the land surface where precipitation infiltrates to replenish groundwater that supplies the five active municipal wells that provide drinking water to the residences and businesses of Sturgeon Bay (Figure 1-1). More information on the delineation of these boundaries can be found in Chapter 3 of this document.

The study also determined the travel times of the groundwater from the water table until it reached any one of the five wells. Due to the unique fractured bedrock aquifer, the mean travel time was approximately 5 months; with a minimum travel time of 14 days and a maximum travel time of 729 days. In comparison to sand and gravel aquifers or the sandstone aquifers used by the City of Madison, Wisconsin, travel times to municipal wells range from hundreds to thousands of years (Bradbury and others, 1996). This comparison is evidence to the short travel time in Door County aquifers, which is one of the primary risks of groundwater pollution in Door County.

Figure 1-1. Municipal wells and zones of contribution for the City of Sturgeon Bay.



CHAPTER 2: GROUNDWATER CONDITIONS

2.1 GEOLOGY

The geology of Door County presents many challenges in groundwater protection. The uppermost bedrock unit is Silurian-aged dolomite, a calcareous rock with high concentrations of magnesium. Below the Silurian dolomite lie Ordovician-aged dolomites and shales (Figures 2-1 and 2-2). Underlying the Ordovician units are the sandstones of the Cambrian.

The dolomite is highly fractured and modified through dissolution by water. Solution activity has produced enlarged vertical crevices and horizontal bedding planes as well as a prominent karst features. Karst features such as sinkholes, swallets, and collapse features, are numerous throughout the county and are potential conduits for surface water to enter the aquifer with little filtration or attenuation of contaminants (Figure 2-3).

The aquifer in the Silurian dolomites can be divided into two hydrologically connected subaquifers: the upper or Niagaran aquifer and the lower or Alexandrian aquifer. The Ordovician-aged Maquoketa Formation consists of a layer of shale beneath the Alexandrian. The shale acts as a confining unit, or aquatard, between the Silurian aquifers and the Ordovician aquifer below (Figures 2-1 and 2-2).

Figure 2-1. Generalized geologic map of Door County.

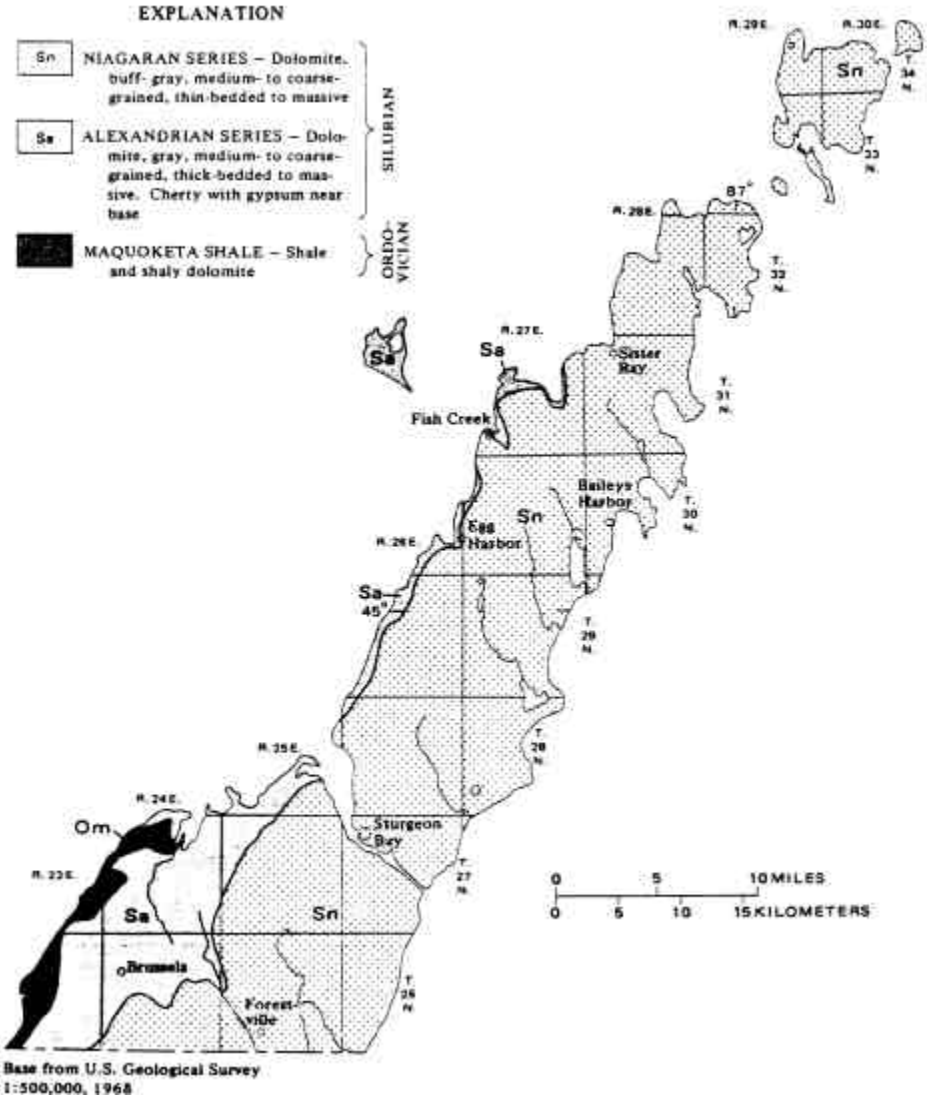


Figure 2-2. Bedrock geology cross section in northern Door County.

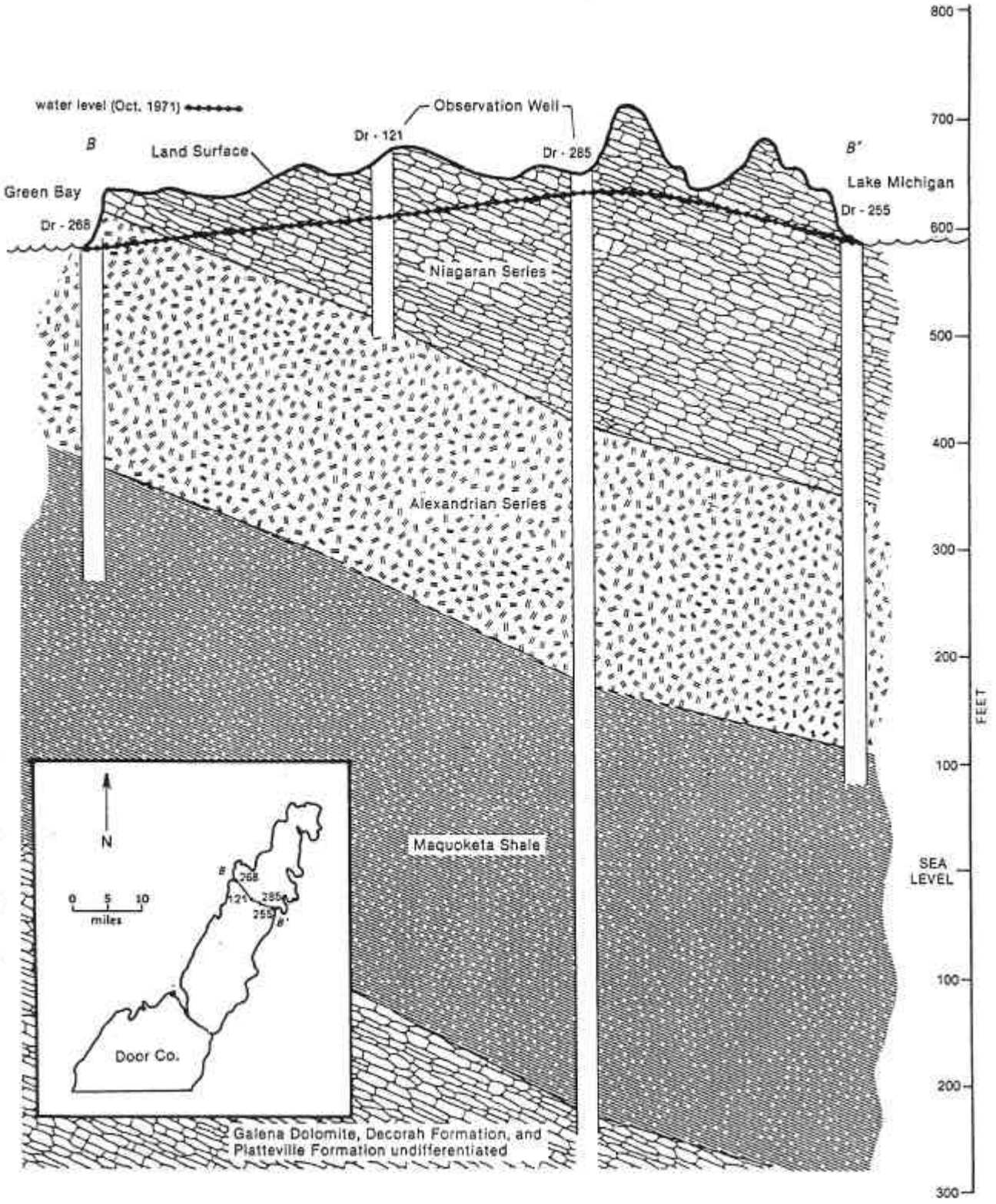
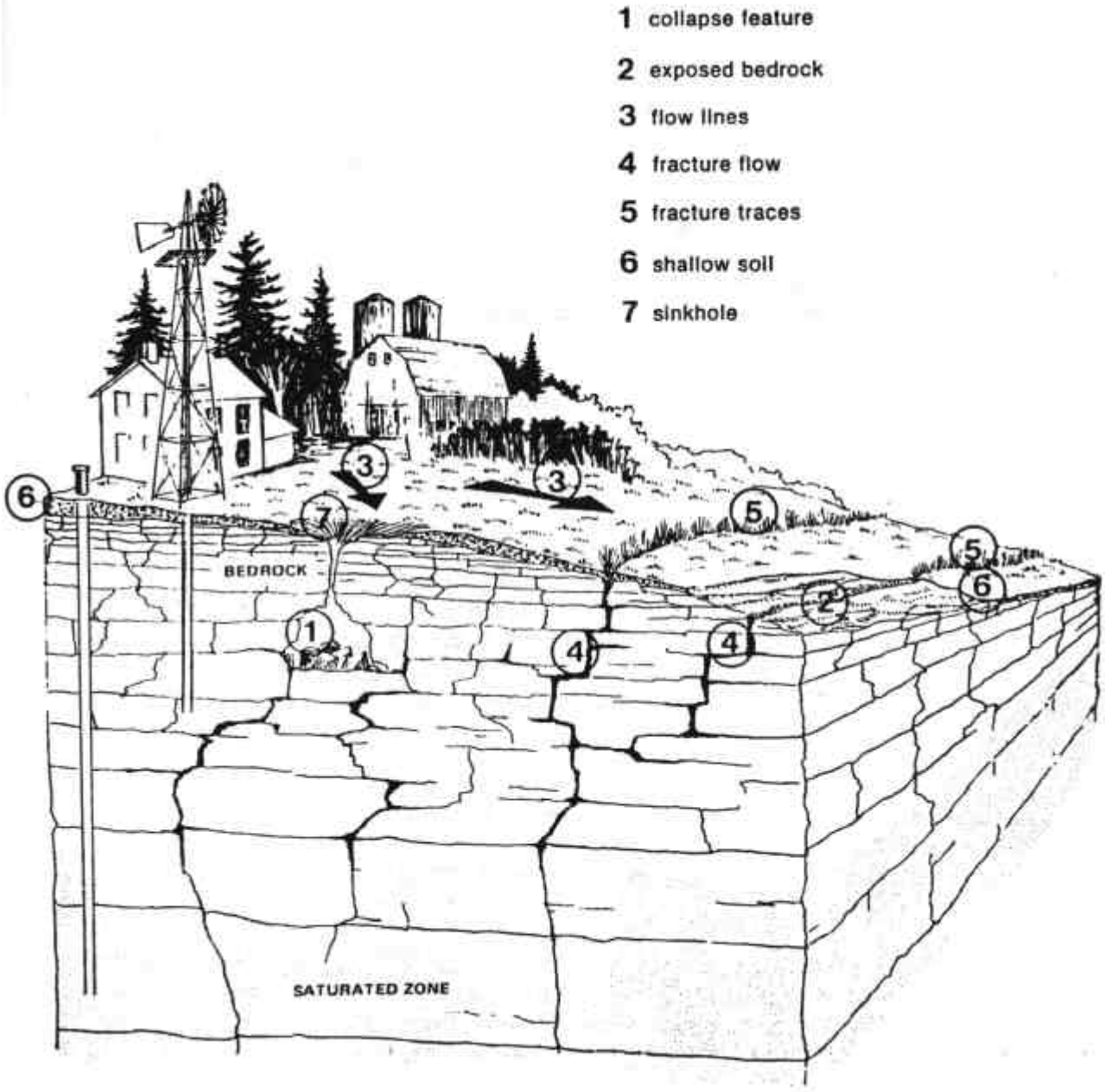


Figure 2-3. Common karst features found in Door County which affect groundwater.



2.2 SOILS

The unique qualities of the soils of Door County result in many land use and water quality concerns. Many of the soils of the county are very shallow due to glaciation which removed much of the soil and left a thin soil layer with bedrock exposed in many areas. Within the ZOC for the City of Sturgeon Bay municipal wells: 6% of the soils have an average depth of 9 inches or less, 12 % have average depths of 15 inches, and 13% have average depths of 30 inches. The shallow depth of soil to the underlying fractured bedrock presents many problems relative to suitability of septic system absorption fields, agricultural practices, and construction development.

In addition to being thin, many of the soils in the ZOC have a low attenuation potential and thus are not very effective at removing contaminants as water flows through the soil. In the ZOC,

32% of theland surface is comprised of soils with a low attenuation potential. The ZOC also has 12% of the land surface covered by hydric soils which have a high potential to pollute surface waters due to high water table and/or slow infiltration rate. The contaminated surface waters from these hydric soils may then flow to karst features or soils with a low attenuation potential and recharge the groundwater with little or no removal of the contaminants.

CHAPTER 3: WELLHEAD PROTECTION AREA DELINEATION

3.1 INTRODUCTION

The goal of the wellhead protection program is to protect the groundwater resources used for public water supplies by managing potential sources of contamination within the land area that supplies water to the municipal well(s). The initial step in any wellhead protection program is to identify the areas on the land surface, or zone of contribution (ZOC) of a well, where recharging precipitation enters a groundwater system and eventually flows to the well.

A wellhead protection area (WHPA) is then established to protect the land surface. A WHPA is defined by the federal Safe Drinking Water Act as the " surface and subsurface area surrounding a well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water or well field" (USEPA, 1987). The WHPA is then managed to minimize the potential of groundwater contamination by human activities that occur on the land surface or subsurface.

3.2 ZONE OF CONTRIBUTION DELINEATION

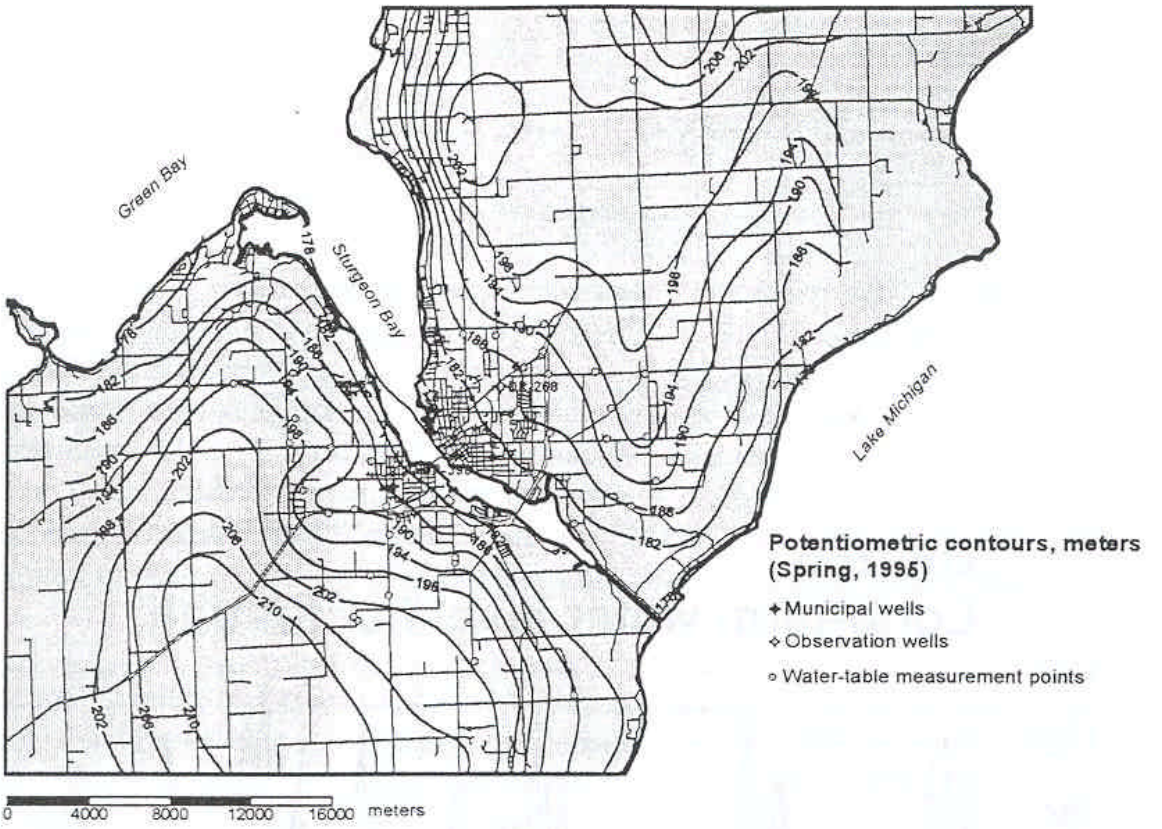
The technical methods used for ZOC delineation range from simple to complex based on aquifer composition and accuracy required in ZOC boundary determination. Since the aquifer which supplies the City of Sturgeon Bay municipal wells is comprised of fractured dolomite rock, it is difficult to delineate ZOC's due to the non-uniform fractures and flow paths through the rock. Therefore, a complex model with a number of modeling phases was required to delineate the ZOC for the City of Sturgeon Bay municipal wells.

Due to the large water level fluctuations, cause by rapid recharge rates and low effective porosity of the fractured rock aquifer, a transient model was used to most accurately represent the aquifer. Water levels in the aquifer have been shown to seasonally fluctuate over 30 meters. The observation well on Figure 3-1 has shown annual water level fluctuations of nearly 10 meters.

A numerical model (MODFLOW) was combined with a particle tracking code (MODPATH) to simulate the regional groundwater system in the saturated zone of the aquifer, or more commonly referred to as the area below the water table (Figure 3-2).

The final extent of the calculated capture zone at the saturated region of the aquifer was then extended horizontally 100 meters in every direction to account for lateral spreading in the unsaturated zone to make the final ZOC as indicated on Figure 1-1.

Figure 3-1. Potentiometric maps for Spring 1995 and Fall 1994 based on field-measured water levels.



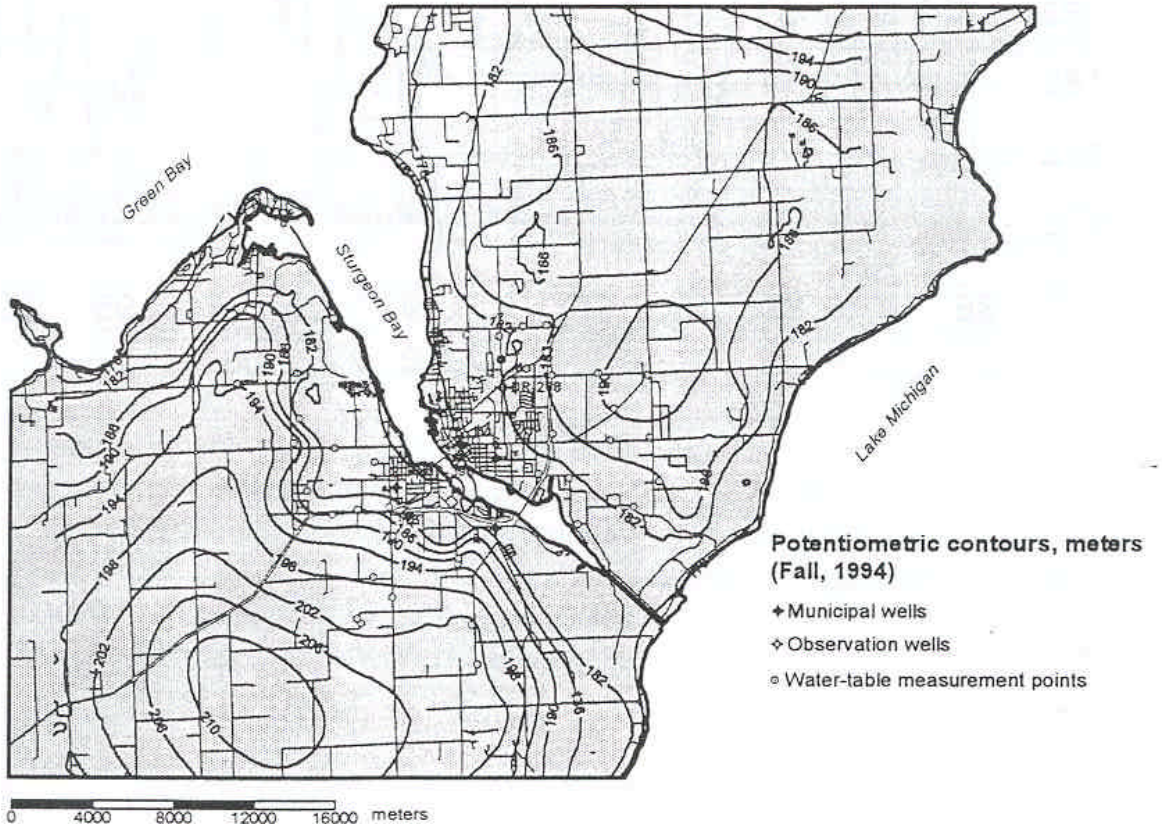
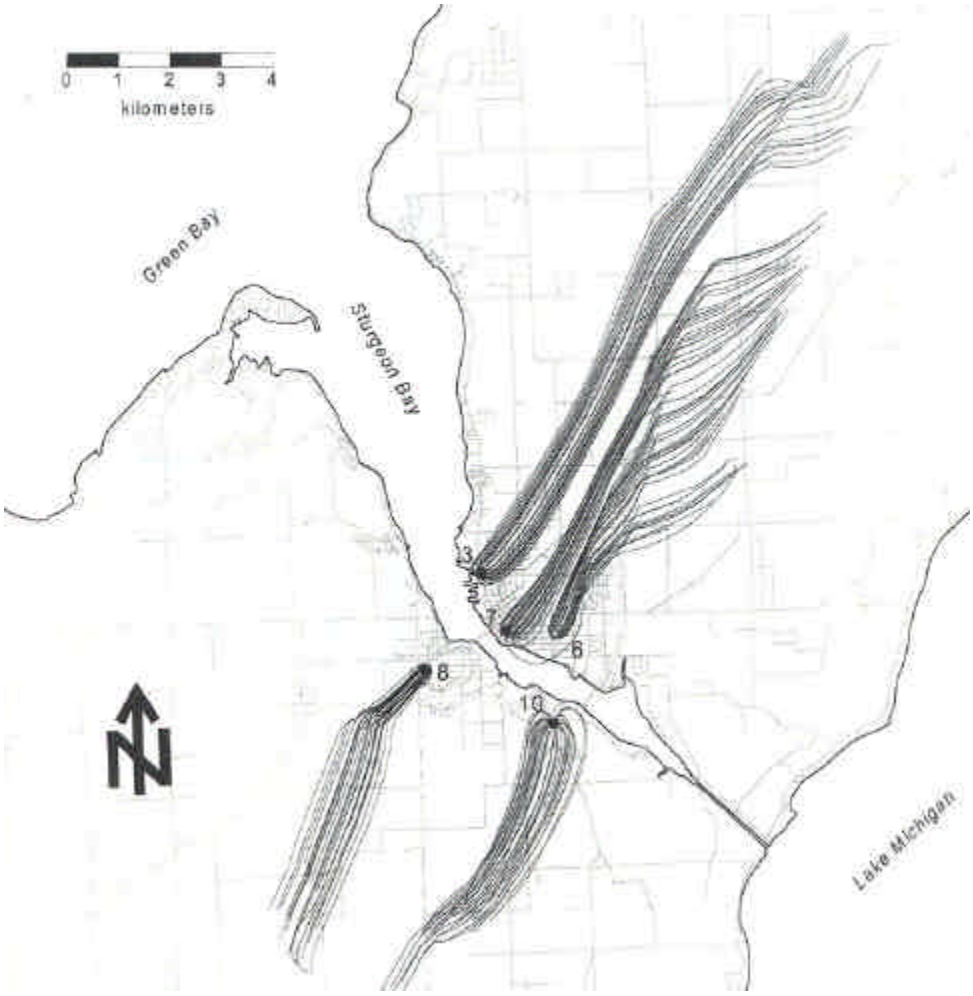


Figure 3-2. MODPATH-generated particle paths for the five active municipal wells.



3.3 ADDITION OF SURFACE WATER IMPACT ZONE FOR SURFACE WATER MOVEMENT INTO THE ZOC

Although the study that delineated the ZOC extended the ZOC boundaries outward 100 meters to account for spreading in the unsaturated zone, the study did not take into account surface water flow paths into the ZOC. These surface waters which flow across the land surface and flow into the ZOC, are a transport path for contaminants to be deposited into the ZOC from areas outside the delineated ZOC boundaries. Therefore, these areas must be added to the WHPA to ensure protection of the water supplies for the City of Sturgeon Bay municipal wells.

3.3.1 Criteria for Establishment of ZOC Surface Water Impact Zone

To ensure the protection of waters flowing into the ZOC from areas exterior of delineated ZOC boundaries, a Surface Water Impact Zone will be added to the delineated ZOC boundaries to comprise the final WHPA. To define the Surface Water Impact Zone, a set of three criteria were established:

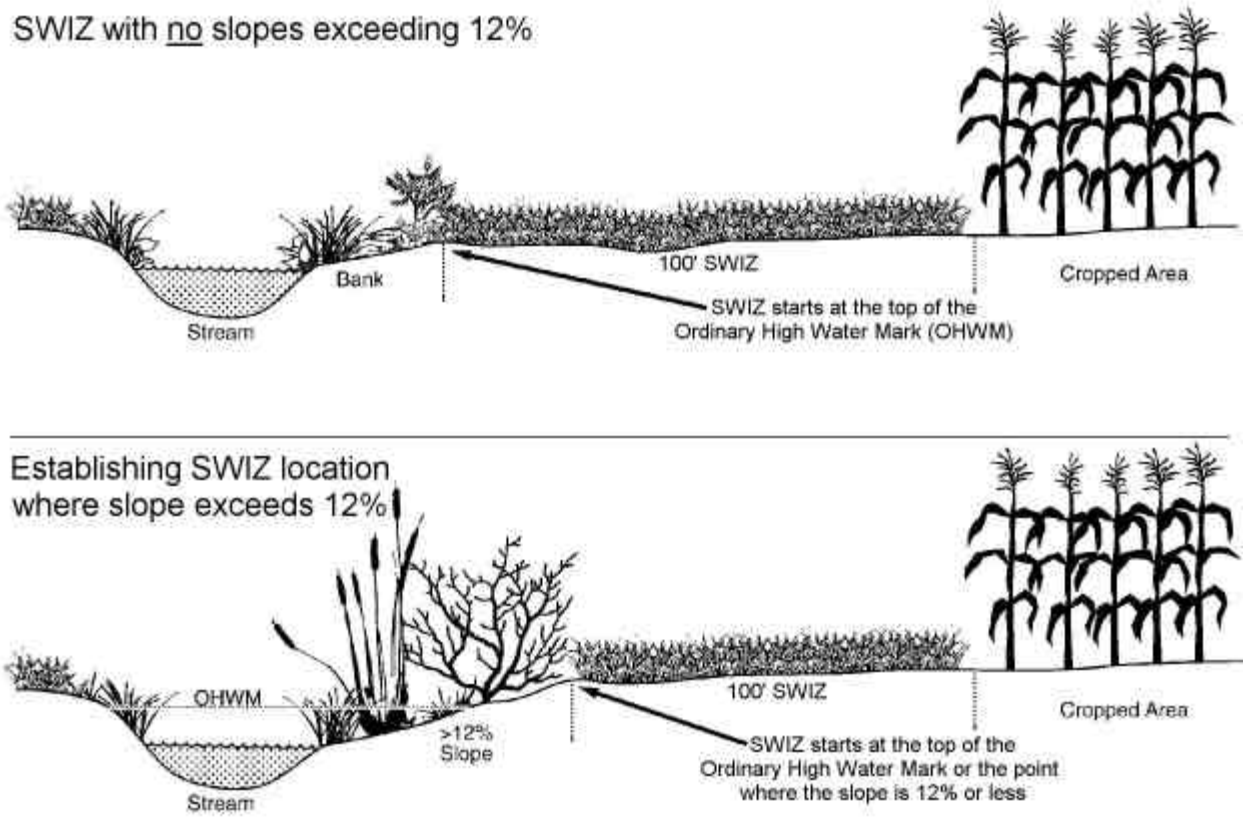
1. **The inclusion of all closed depressions with a sinkhole which lies within the delineated boundaries of ZOC. It must be shown that water flows towards the sinkhole for the closed depression to be included in the Surface Water Impact Zone.** Closed depressions funnel surface waters to a central location(s). Often times a sinkhole is created due to the large volume of surface water infiltrating a small area on the land surface. If the sinkhole lies within the delineated boundaries of the ZOC, the closed depression may transport and deposit contaminated surface waters to the ZOC with little or no filtration.

2. **Surface water channels that terminate in the ZOC.** Streams, road ditches and other surface water channels can transport contaminants from long distances. Those surface water channels that terminate in the delineated boundaries of the ZOC may introduce contaminated water from areas outside the ZOC. A Surface Water Impact Zone distance of 1000 feet upstream and 200 feet adjacent to the channel shall be established along surface water channels that terminate in the ZOC.

3. **Surface water channels that flow though the ZOC.** Since the streams, road ditches and other surface water channels that flow through the ZOC are "losing" streams the majority of the year, contaminants introduced from upstream may infiltrate into the ZOC as the water flows through the delineated ZOC. A losing stream is a stream which has the water table adjacent to the stream lower than the water surface in the stream, causing infiltration from the stream channel, recharging the groundwater and decreasing the stream flow. It is necessary to include upstream areas along permanent or intermittent surface water channels, that contribute water to the ZOC, to ensure contaminants are not introduced to the ZOC. A Surface Water Impact Zone distance of 500 feet upstream and 100 feet adjacent to the channel shall be established along surface water channels that flow through the ZOC.

The Surface Water Impact Zone boundary along permanent or intermittent surface water channels shall be determined in accordance with NRCS Filter Strip Standard 393 (1/01). This Standard will be used as a guideline to determine the starting point for the 100-foot Surface Water Impact Zone boundary (Figure 3-3).

Figure 3-3. Surface Water Impact Zone (SWIZ) boundary determination along permanent or intermittent surface water channels.



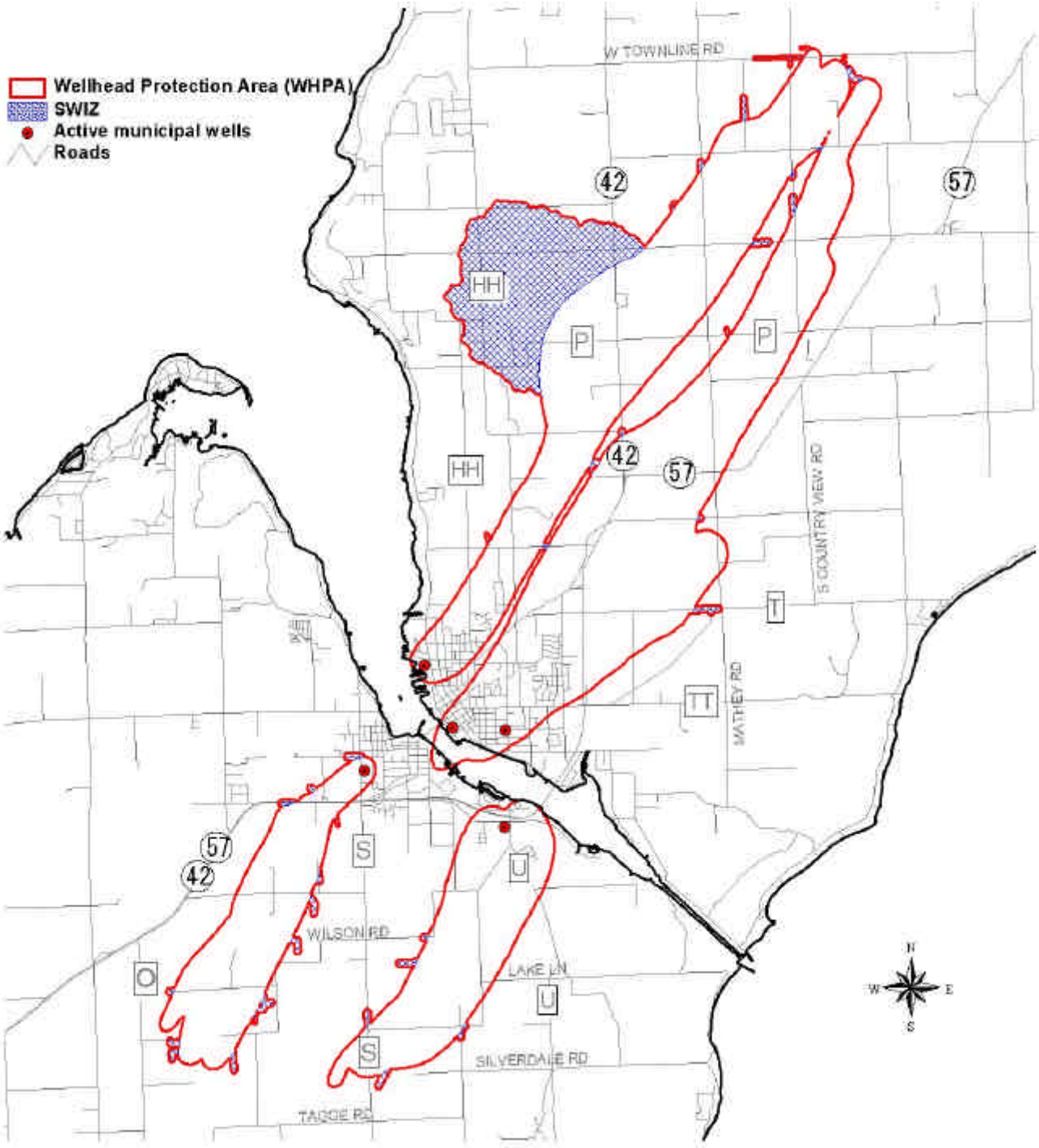
3.3.2 ZOC Surface Water Impact Zone Mapping

In order to effectively and accurately delineate the ZOC Surface Water Impact Zone, a number of field surveys and computer mapping projects were completed. Field surveys were performed of all surface water channels flowing into the ZOC to determine where the channels originated. This field data take by GPS receiver was then verified by 2-foot contour interval topographical data from the County Geographical Information System (GIS).

The 2-foot contour interval topographical data for the county was then converted into a Digital Elevation Model (DEM) by Watershed Modeling Software version 6.1. Flow analysis of all sinkholes in closed depressions within the boundaries of the ZOC were modeled via the DEM to determine if waters in the closed depression area flow to the sinkhole. Areas in the closed depressions that were shown to flow to sinkholes within the ZOC were added to the Surface Water Impact Zone.

Areas on the land surface which satisfy one of the three criteria established for the Surface Water Impact Zone, were added to the ZOC to form the final Wellhead Protection Area.

Figure 3-3. Final boundaries of the Wellhead Protection Area (WHPA) with addition of Surface Water Impact Zone (SWIZ).



CHAPTER 4: CONTAMINATION SOURCE INVENTORY

4.1 CONTAMINANT SOURCE INVENTORY

Pollutants from a variety of activities on the land can seep into groundwater and be carried to the municipal wells. If not managed properly, many land use activities can have an adverse effect on groundwater. Therefore, it's important to inventory the existing and potential sources of groundwater contamination within the WHPA.

A few of the many potential sources of pollutants are listed here with the associated regulatory/inventory organization(s):

Potential contaminant sources	**Regulatory/inventory organization(s)**
Chemical storage	WEM
Land spreading of sewage treatment plant sludge	DNR
Road salt usage and storage	DNR
Animal feedlots	SWCD, DNR
Use and spillage of fertilizers and pesticides	DATCP
Accidental spills	DNR
Septic tanks and drain fields	Sanitarian's Dept.
Underground storage tanks	DNR, DOC
Underground pipelines and sewers	WPS, SBU
Landfills	DNR
Mines, pits and quarries	SWCD, DNR

Potential contaminant sources have been identified with the cooperation of Door County Emergency Government, area Fire Departments, and through various other organizations and public input. This information has been assembled in a database that SBU will update annually, on sale/transfer of property or as other forms of verified information is received.

Due to security policies and confidentiality issues, the information will not be presented to the public. If a formal request for the information is made, the administrators of the WHPA will advise the parties making the request of the necessary procedure to obtain the information. The information gathered for the contaminant source inventory for this document shall only be used for wellhead protection planning and emergency response measures.

CHAPTER 5: MANAGEMENT STRATEGIES

5.1 EDUCATION PROGRAM

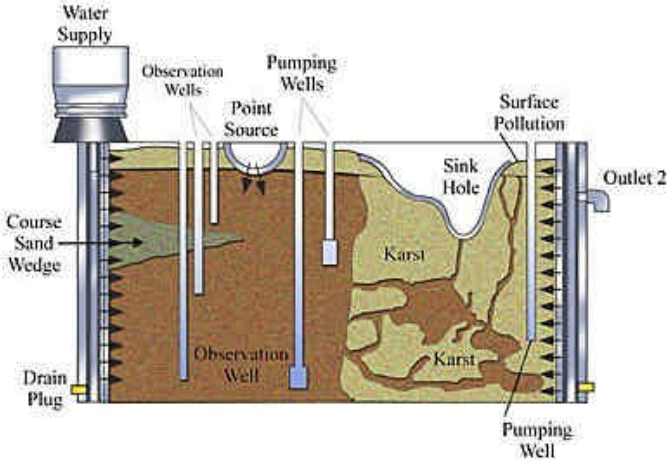
5.1.1 Public Education Program

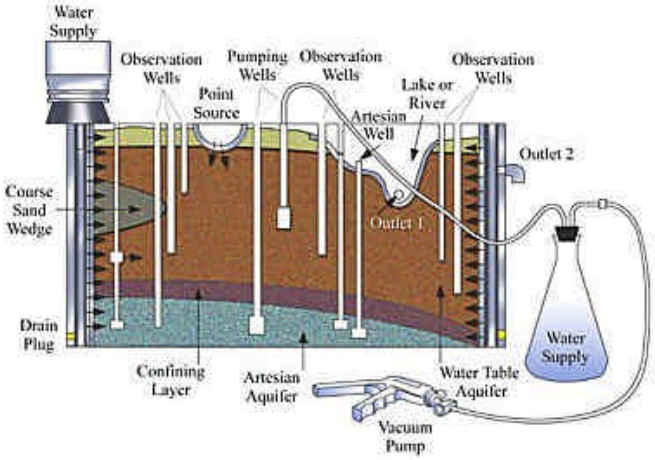
One of the most crucial and effective aspects of any Wellhead Protection Plan is public education. Sturgeon Bay Utilities, Door County Soil and Water Conservation Department and University of Wisconsin Extension will implement an education program to inform area residents of the need to protect the public water supplies. The public education program will consist of printed educational materials as well as the use of press releases, presentations, and tours to stress the importance of wellhead protection.

Copies of this document will be made available at Sturgeon Bay Utilities and the Door County Soil and Water Conservation Department. In addition, four Wisconsin DNR publications will be available at the two locations. These publications include: "Wellhead Protection - An Ounce of Prevention" (WDNR, 1999), "Answers to Your Questions About Groundwater" (WDNR, 1998), "Better Homes and Groundwater" (WDNR, 1995) and "How to be a Clean Bay Backer" (WDNR, 1994). In addition, the Door County Library have a 16 minute video, "An Ounce of Prevention" available to check out.

Sturgeon Bay Utilities and the Door County Soil and Water Conservation Department will also make staff time available to give wellhead protection speeches and presentations to schools and the general public. Sturgeon Bay Utilities also plans to purchase a 3-dimensional groundwater model which simulates many of the aquifer dynamics such as:

- Cone of depression
- Principles of artesian flow
- Well interference effects
- Two directional flow to a river
- Rain recharge effects on contaminant depth
- Groundwater movement through two textures of material and through an artesian aquifer
- Contaminant dispersion and dilution in an aquifer
- Groundwater inflow and outflow in a seepage lake
- The piezometric surface above a zone of saturation
- Leakage of lagoons, landfills or similar structures into groundwater
- Water quality stratification in the aquifer with narrow zones of contamination
- One directional groundwater flow with a change in water level over the length of the model





Please contact Eric Cooley at the Soil and Water Conservation Department: (920) 746-2214 or Tod Maurina at Sturgeon Bay Utilities: (920) 746-2820 to schedule an educational event.

5.1.2 Governmental Education Program

To effectively implement the Wellhead Protection Plan, as well as gain public support, Sturgeon Bay Utilities and Door County Soil and Water Conservation Department will work with County, City, and Township boards to supply information on the programs, incentives, and components of the Wellhead Protection Program. Assistance will also be made available to aid municipalities in applying for grants and programs to address groundwater quality.

5.2 INCENTIVE PROGRAMS

The goal of this Wellhead Protection Plan is to encourage the development and implementation of management practices that will minimize potential groundwater contaminant sources. To most effectively encourage residents, property owners, and local governments to participate in programs, an incentive-based approach will be the main focus.

The administrators of the Plan will continually identify, evaluate, and prioritize potential cost-effective remediation and management practice alternatives as identified in Appendix A of this document. In conjunction, funding for economic incentives will be solicited from all available resources. Funding will be made available for specific projects as they are prioritized and the funds are available. Projects to be included within these incentive programs may include, but not be limited to, clean sweep programs, well abandonment, septic system upgrades, deferred assessment for low income property owners and storm water management.

To insure maximum success of the incentives offered the programs will be marketed to the public through mailings, media advertising, and through promotion by City and County agencies.

Attached as Appendix A are incentive programs that are currently in place as well as programs that are proposed.

5.3 SANITARY SURVEY AND REMEDIATION IN WHPA

Failing septic systems have a high potential to contaminate groundwater. Some of these contaminants include fecal coliform, pathogens, and household chemicals that are dumped into household drains. Failing septic systems may introduce these contaminants into groundwater with little to no filtration or decomposition.

Due to the shallow soil depths and the age of many of the septic systems in the ZOC, it is estimated from current trends that a large percentage of installed systems are failing. Since it is hard to ascertain accurate values and locations for failing septic systems within the ZOC, a comprehensive sanitary survey will be completed to identify failing systems. Once failing systems are identified for the entire ZOC, remedial actions and funding sources will be evaluated to determine the best options and remedial actions for the failing systems.

It is the intent of this plan to identify all failing septic systems within the ZOC then present options and funding sources to municipalities and individuals so that they may best determine the remedial actions that best suit them. The sanitary survey will only be completed in the ZOC instead of the entire WHPA because failing systems do not pose a threat to surface water contamination.

The work plan and timeline for the sanitary survey of the ZOC and remedial options are outlined in Appendix B.

5.4 WATER MONITORING PROGRAM

5.4.1 Municipal Wells

Sturgeon Bay Utilities currently monitors its wells as required by the Wisconsin Department of Natural Resources. The results of these monitoring efforts are made available to the public annually in SBU's *Quality on Tap* report and on the WDNR web-site at http://prodmtex00.dnr.state.wi.us/pls/inter1/pws2$.startup. The following parameters are included within these monitoring requirements. WDNR frequency requirements are presented for comparison with SBU's current monitoring practices:

Description	WDNR (minimum)	SBU (performed)
Nitrates	Annually	Quarterly
Chlorides	3 year	Annually
Coliform Bacteria	10 samples/month	24 samples/month
Gross Alpha	Annually	Annually
Volatile Organic Compounds	Annually	Quarterly
Synthetic Organic Compounds (pesticides)	3 year	3 year
Fluoride	10 samples/month	24 samples/month
Lead and Copper (distribution)	5 year	3 year
Inorganics (Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Mercury, Nickel, Nitrate-Nitrate, Nitrite, Selenium & Thallium)	3 year	Annually
Mtbe *	Not required	Annually

* Mtbe is a compound found in the production of unleaded gasoline. This contaminant has been found in ground water in many metropolitan areas around the country.

5.4.2 Private Wells

Sturgeon Bay Utilities will provide water sampling kits to homeowners with private wells within the WHPA, at no cost, in conjunction with National Water Quality Week. A limited number of sample kits will be provided on a first come first serve basis during the annual event.

Sturgeon Bay Utilities reserves the right to use the data collected from these tests to track elevated levels of test results within the WHPA, but the identity of the homeowner will not be released or used for any other purpose.

5.5 AGRICULTURAL STATE STANDARDS AND PROHIBITIONS

To improve the protection of water resources from nonpoint source pollution, 1997 Wisconsin Act 27 modifies Sections 92 and 281 of Wisconsin Statutes requiring the development of performance standards for agricultural and non-agricultural nonpoint source water pollution. The statewide standards and any county developed standards must address the Animal Waste Advisory Committee Prohibitions (281.16(3)).

Due to the possible implications of groundwater contamination in the WHPA, the WHPA will receive the highest prioritization to implement the Agricultural State Standards and Prohibitions. The Door County Land and Water Resource Management Plan (LWRMP) is designed to follow the guidelines of the prohibitions as well as the minimum standards outlined in the current draft of the statewide performance standards. The LWRMP will undergo a biannual revision in the fall of 2002, at which time the LWRMP shall reflect the prioritization of the WHPA, to be presented to the Land Conservation Committee for approval.

As stated in the LWRMP, both cost-share and technical assistance funding will be made available to implement the standards and prohibitions when they are in place.

5.6 WELLHEAD PROTECTION AREA CONSTRUCTION PLAN REVIEW

Sturgeon Bay Utilities and the Door County Soil & Water Conservation Department shall develop a program to perform a higher level of review of proposed construction projects that alter the surface or subsurface land area within the WHPA.

The intent of this program will be to ensure that structures built or activities which modify the land surface or subsurface, do not pose an elevated threat to recharge waters in the WHPA. This program shall be designed to evaluate components such as: storm water runoff, construction site erosion, hazardous material storage facilities, and other components to ensure established guidelines are followed.

Possible vehicles for this program are NR811, which gives the Utilities the authority to oversee construction site issues within the WHPA; a County Ordinance or a modification to Zoning Overlay. The program should be designed to allow for a rapid response time so as not to hinder the permit process.

Any program established shall follow the minimum setback requirements between public wells and potential contamination sources as established by NR 811.

Setbacks required by NR 811:

MINIMUM SEPARATION REQUIREMENTS BETWEEN PUBLIC WELLS AND POTENTIAL CONTAMINATION SOURCES	
Potential Contamination Source	Minimum Distance
Storm Sewer	50 feet
Sanitary Sewer Main	200 feet *1
Sanitary Sewer Manhole	200 feet
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	1.200 feet
Bulk Fuel Storage Facilities	1,200 feet
Pesticide or Fertilizer Handling or Storage Facilities	1,200 feet

*1: A lesser separation distance may be allowed for sanitary sewer mains where the sanitary sewer main is constructed of water main materials and joints and pressure tested in place to meet current AWWA C600 specifications. In no case may the separation distance between a well and a sanitary sewer main be less than 50 feet.

Reference: Wisconsin Administrative Code, NR 811.16(4)(d), December 2000.

5.7 CONTINGENCY PLAN

In order to most effectively provide contingency planning for area groundwater it is necessary to develop a plan that addresses both short and long term planning. With this in mind the Contingency Plan component of the program will address long term management practices as well as deal with emergencies and other more immediate concerns.

In the event of some type of non-preventable, immediate contamination of the groundwater supply a swift deliberate response will be required. It will be the role of the administrators of the WHP to assist area governmental units with the management of delivering potable water supplies to affected areas as well as to take actions to minimize further impacts to the groundwater. To accomplish this the program will augment its efforts by utilizing existing response plans prepared by area emergency government, fire departments, law enforcement, etc. The plan will include a protocol for communication, resource contacts, and remediation procedures.

Long term planning will include WHP managers continually monitoring regulatory and industry advancements so that the most effective management practices are utilized. It will be the goal of this long term planning to position the community to offer the best protection for the area groundwater.

Attached as Appendix C are detailed contingency plans that are currently in place as well as proposed programs.

5.8 ADMINISTRATIVE REVIEW

SBU and SWCD shall review the WHP on a biannual basis or as regulations that impact the Plan change, so that appropriate amendments and updates can be made. In the event that significant changes are made, all involved parties (County Board, City Council, Township Boards, governmental departments, general public, etc) will be advised of the updates and their input sought. All involved parties will be supplied with updated copies of the plan or pen and ink changes.

APPENDIX A

INCENTIVE PROGRAMS

Introduction

Sturgeon Bay Utilities has elected over the years to provide incentives to encourage property owners within the City of Sturgeon Bay and adjacent Towns within the ZOC to take actions that will contribute to the safe guarding of Sturgeon Bay Utilities source of raw water. This document presents current and proposed incentives as a guide to programs that would encourage these practices. Sturgeon Bay Utilities intends to provide funding on an annual basis for incentive programs, however Sturgeon Bay Utilities makes no guarantee that the incentives presented will be appropriate or provided in the future. The actual scope, number, nature, and funding levels of any incentives are provided at the sole discretion of the Sturgeon Bay Utility Commission and will be determined annually based on program need and funding availability.

Existing Programs within the City

Well Abandonment – SBU currently provides 100% of the cost of well abandonment. SBU will determine the appropriateness of the program annually based on need and funding availability.

Municipal Well Water Testing Program – SBU currently provides daily, weekly, monthly, quarterly, and annual testing of all of its Wells and distribution system as required by the WDNR.

Proposed Programs within the City

Clean Sweep Programs – SBU and SWCD will coordinate with the County UW Extension Agent to assist the City in grant writing to secure funding for annual clean sweep program. SBU's participation in this program will be limited to in kind service and will be determined on an annual basis based on need. The cost of the in kind service will be considered in regard to total program funding.

Sink Hole Stabilization/Treatment – SBU to provide piggyback funding with SWCD. The level of funding to be limited to an amount to provide total funding for a project, not to exceed 30% of total project cost or $300 per project for the cost of stabilizing/treating any sinkhole within the WHPA. SBU will determine the appropriateness of the program annually based on need and funding availability.

Fuel and Anti-Freeze Recycling Programs – SBU to assist City in developing program to accept waste fuels and antifreeze from area residents. SBU's participation in this program will be limited to in kind service and will be determined on an annual basis based on need. The cost of the in kind service will be considered in regard to total program funding.

Septic System Upgrade Program – SBU to provide cost share incentive for septic system upgrades that are within the ZOC. Funding for this program is subject to the development of an acceptable utility service surcharge system.

Public Benefits/Sewer and Water Lateral Replacement- SBU to provide funding through its existing Public Benefits Program when the cost of septic system or sewer lateral remediation may cause economic hardship. Program eligibility will be determined by oversight agency selected by SBU.

Private Well Water Testing Program – SBU to provide water sampling to homeowners with private wells, at no cost, in conjunction with National Water Quality Week. A limited number of sample kits will be provided on a first come first serve basis during the annual event. SBU will determine the appropriateness of the program annually based on need and funding availability.

Existing Programs within the WHPA

Well Abandonment – SBU currently provides 10% of the cost of well abandonment in addition to State and County programs. SBU will determine the appropriateness of the program annually based on need and funding availability.

Water Quality Practices – SBU currently provides cost sharing up to 10% with a maximum of $2,500.00 per landowner per year providing that cost sharing from all sources not exceed 90% of the cost of the water quality practice. SBU will determine the appropriateness of the program annually based on need and funding availability.

Proposed Programs within the WHPA

Septic System Upgrade Program – SBU to provide cost share incentive for septic system upgrades. Funding for this program is subject to the development of an acceptable utility service surcharge system.

Well Abandonment – SBU to provide piggyback funding with SWCD. The level of funding to be limited to an amount to provide total funding for a project, not to exceed 30% of total project cost or $300 per project for the cost of any well abandonment within the WHPA. SBU will determine the appropriateness of the program annually based on need and funding availability.

Sink Hole Stabilization/Treatment – SBU to provide piggyback funding with SWCD. The level of funding to be limited to an amount to provide total funding for a project, not to exceed 30% of total project cost or $300 per project for the cost of stabilizing/treating any sinkhole within the WHPA. SBU will determine the appropriateness of the program annually based on need and funding availability.

Deferred Remediation Assessments- County to investigate development of a deferred remediation assessment program to provide funding through a deferred assessment to low income property owners when the cost of a mandated remediation may cause economic hardship. County to determine funding source, eligibility requirements, and program scope.

Private Well Water Testing Program – SBU to provide water sampling to homeowners with private wells in the WHPA, at no cost, in conjunction with National Water Quality Week. A limited number of sample kits will be provided on a first come first serve basis during the annual event. SBU will determine the appropriateness of the program annually based on need and funding availability.

Clean Sweep Programs – SBU and SWCD will coordinate with the County UW Extension Agent to assist the Towns within the WHPA in grant writing to secure funding for annual clean sweep program. SBU's participation in this program will be limited to in kind service and will be determined on an annual basis based on need. The cost of the in kind service will be considered in regard to total program funding.

APPENDIX B

SANITARY SURVEY AND REMEDIAL OPTIONS

Timeline

In the fall of 2002 representatives of the Sturgeon Bay Utilities, Sanitarian Department and Soil and Water Conservation Department will review this plan and make preparations to conduct a sanitary survey of the ZOC in 2003. The Door County Board of Health has given preliminary approval to conduct a sanitary survey in the ZOC in the Spring of 2003 at the January 7, 2002 meeting.

The proposed timeline is as follows:

Fall 2002:	***- Meet and finalize approval and preparations for conducting sanitary survey in ZOC.***
	- Identify sites with septic systems.
	- Continue investigation of options for failing system remediation.
Winter 2002:	- Sanitarian Department performs review of sanitary records for systems on file.
	- Sanitarian Department sends letter informing citizens in ZOC of sanitary survey.
Spring 2003:	- Conduct sanitary survey in ZOC.
Summer 2003:	- Continue sanitary survey in ZOC.
	- Compile and analyze data of failing septic systems and refine options for remediation.
Fall 2003:	- Present failing system data and options for remediation to individuals and communities for decision on remedial action.
Winter 2003:	- Establish deadlines for remediation of failing septic systems.

Failing septic system remediation options and funding sources.

Since it is difficult to estimate the number of failing septic systems and their locations on the landscape, it is impractical to determine a comprehensive plan for remedial actions and funding sources for the update or replacement of the failing systems until the sanitary survey is completed. Many options exist for both funding and remediation of these systems, but the sanitary survey must be completed for the entire ZOC to make effective decisions on the options. Therefore, as the sanitary survey progresses, the Sanitarian Department and Soil and Water Conservation Department will compile and analyze the data on the failing systems to refine the options for funding and remediation.

Some of the options for funding are State funding, Foundation of Rural Housing, Lakeshore Cap, Coastal Zone Management Grants, Veterans Administration, and others. Sturgeon Bay Utilities is also developing a utility service surcharge system to aid in possible loan programs and cost sharing replacement of failing septic systems.

A County cost-sharing program shall be developed and sent to County Board which would allocate monies for the update or replacement of systems deemed failing by the sanitary survey. It is likely that this program would be administered by the Sanitarian Department and based on financial need of the landowners via a means test. The intent of this program would be to offer financial assistance to failing systems determined by the County Sanitary Survey and would not be available to new construction or time of sale inspections. This program shall be developed in a timely manner so as to be placed in the 2004 County fiscal budget. Monies would be used within the ZOC in 2004 to update or replace failing systems that were determined in the 2003 sanitary survey of the ZOC. The Door County Board of Health and Sanitarian Department would likely determine fiscal allocation of this program for subsequent years of the County Sanitary Survey.

There are also many options being investigated for the replacement of the failing systems. These options range from the replacement of a system for a single household, combined systems for clustered developments and extension of municipal sewer for remediation. The formation of a sanitary district(s) may also aid citizens in remediation, funding and maintenance opportunities.

Since it is hard to determine which of these options for funding and remediation would be most feasible and available until the survey is complete, the Sanitarian Department, Sturgeon Bay Utilities and the Soil and Water Conservation Department will work together to investigate, develop and refine these options as the sanitary survey progresses.

Once the sanitary survey is completed and options are identified, they will be presented to the individuals and communities for review. Remedial time requirements will then be established for the update and replacement of failing systems.

APPENDIX C

CONTINGENCY PLAN

Introduction

The Contingency Plan is a vital component of the Wellhead Protection Plan (WHP). The WHP is designed to offer protection against contamination of the City wells, however even the most comprehensive program can not guarantee that the ground water will not become contaminated. Contamination could result from flooding, spills, leaks of hazardous materials, or other activities in and around the WHPA. With this in mind the ability to quickly and decisively respond to contamination events is essential.

Water Sources

The City is supplied with potable water from five (5) wells that have four (4) recharge zones. Three (3) of the five (5) wells are equipped with ozone disinfection treatment. The water supply is distributed through three (3) pressure zones. These pressure zones can be supplied from any well with the City. In the event of contamination, a particular recharge zone can be isolated and the system can be supplied from a different well being supplied from a different recharge zone.

Immediate Response Contamination

If contamination is discovered prior to the distribution being affected, the affected recharge area will be isolated and the distribution system will be supplied from a well supplied by a recharge area that is not contaminated. The other City wells have adequate capacity to supply the community until a remediation solution can be implemented.

The following procedures should be followed in the event that contamination is discovered *prior to the distribution system*:

- Contact SBU, WDNR, DATCP, Emergency Government, SWCD, and Health Department
- Identify type and scope of contamination
- Isolate the contaminated recharge area(s)
- Implement necessary system valve changes to alternate recharge area and well
- Initiate water conservation measures if necessary
- Investigate contamination sources and develop Remediation Plan
- Implement Remediation Plan

If it is discovered that the distribution system has been contaminated the affected pressure zones would have to be isolated and decontaminated before an alternate recharge area and well could be utilized for supply purposes.

The following procedures should be implemented in the event that contamination is discovered *in the distribution system*:

If the contamination is bacteriological…

- Contact the WDNR, Emergency Government, SWCD, and Health Department
- Identify type and scope of contamination
- Isolate the contaminated pressure zone(s)
- Notify affected customers and issue "Boil Water" order
- Identify and implement most practical decontamination method
- Implement necessary system valve changes to alternate recharge area and well
- Initiate water conservation measures if necessary
- Investigate contamination sources and develop Remediation Plan
- Implement Remediation Plan

If the contamination is not bacteriological…

- Contact the WDNR, Emergency Government, SWCD, and Health Department
- Identify type and scope of contamination
- Isolate the contaminated pressure zone(s)
- Notify affected customers and issue appropriate use information
- If necessary arrange for distribution of bottled water (from single location at specific times)
- Identify and implement most practical decontamination method
- Implement necessary system valve changes to alternate recharge area and well
- Initiate water conservation measures if necessary
- Investigate contamination sources and develop Remediation Plan
- Implement Remediation Plan

Procedure for Reporting Petroleum, Agrichemical, or Other Hazardous Substance Spills in the WHPA.

1. Call the 24-hour spill hotline **1-800-943-0003**. You will be asked to provide the following information:
   - your name, address, location of the discharge
   - physical state, quantity, chemical characteristics of the discharged substance
   - cause of the discharge
   - destination of the discharged substance
   - actions taken to stop the release/minimize the impact to the environment
   - actual or potential impacts to human health or the environment

2. Contact Ann DeMeuse in County Emergency Management at (920) 746-7101 who will contact the following people/departments:

• Sturgeon Bay Utilities:	Tod Maurina	(920) 495-0299
• Door County SWCD:	Bill Schuster	(920) 746-2214
• DNR Spill Coordinator:	Roxanne Chronert	(920) 492-5592
• DNR:	Kathy Erdmann	(920) 492-5798
• DATCP Office:	Mathew Laak	(608) 224-4518
• DATCP Field:	John Peters	(920) 496-0988
• DHFS:	Jim Drew	(608) 266-2663

- DCOM:* Mike Verhagen (414) 548-8617
  *only if Anhydrous Ammonia spill

Contacts and Procedures

In the event that outside agencies needs to be contacted the appropriate contact person should be contacted by phone as soon as is practical. A follow up letter should be sent within two days. The letter should recap any telephone conversations and provide a detailed account of the situation. A copy of any such letter should be kept on file for future reference.

Wisconsin Department of Natural Resources (920) 448-5144
Ken Scherer (Drinking & Groundwater)

Surgeon Bay Fire Department (920) 746-2915
Terry McDonald

Door County Soil & Water Dept (920) 746-2214
Bill Schuster
421 Nebraska St., P.O. Box 670
Sturgeon Bay, WI 54235

Door County Emergency Government (920) 746-7100
Dick Burress

Door County Health Department (920) 746-2233
Rhonda Kolberg

Sturgeon Bay Utilities (920) 746-2820
230 E. Vine St., P.O. Box 259
Sturgeon Bay, WI 54235
Tod Maurina (920) 495-0299
Stan Hein, Jr. (920) 495-0297

Firefighting/Emergency Spill Response

In the event that the Fire Department is called to a fire or spill scene within the ZOC the presence of potential contaminates will be identified and the most appropriate containment techniques will be utilized. If possible, techniques that will minimize impact to the groundwater will be implemented. The Fire Department will utilize the Contaminant Source Inventory developed for this program to assist in identifying the location of potential contaminants.

Long Term Contingency

Facilities Improvements, Maintenance, and Planning

SBU annually evaluates its facilities and budget funds to provide preventative maintenance and necessary system improvements. SBU has policies and specifications in place that requires evaluation of water system modification or additions to insure that system reliability is not compromised.

As part of a long-term contingency to supply a reliable potable water source SBU has acquired property adjacent to Lake Michigan suitable for a surface water treatment facility.

Increased Testing Frequencies

In order to more effectively safeguard the potable water supply SBU has developed a comprehensive safe water-monitoring schedule. This schedule exceeds the requirements of the US EPA and the WDNR.

Security Procedures

SBU has implemented a security program designed to protect the potable water system. The program includes the following procedures:

- Keys to all facilities are numbered and assigned to authorized personnel only
- All SBU service vehicles will be locked while left unattended
- Electronic surveillance equipment installed at all well and pump house sites
- All employees carry picture ID's
- All outside vendors must have ID, drive a company vehicle, and be on an approved vendor list
- Water System blueprints or drawings will only be released by written request after intended use can be confirmed
- Tours of facilities will only be granted to individuals or groups by written request and after the attendees have been identified.

Technology Review

It is the policy of SBU to continually monitor and evaluate technological advances within the public water industry.

ACRONYMS

DATCP	Department of Agriculture, Trade & Consumer Protection
DEM	Digital Elevation Model
DOC	Department of Commerce
GIS	Global Information System
GPS	Global Position System
LWRMP	Door County Land & Water Resource Management Plan
NRCS	Natural Resources Conservation Service
SBU	Sturgeon Bay Utilities
SWCD	Door County Soil & Water Conservation Department
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WDNR	Wisconsin Department of Natural Resources
WEM	Wisconsin Emergency Management
WGNHS	Wisconsin Geologic & Natural History Survey
WHPA	Wellhead Protection Area
WHP	Wellhead Protection Plan
WPS	Wisconsin Public Service
ZOC	Zone of Contribution

REFERENCES

Bradbury Kenneth, R. Todd W. Rayne, Maureen A. Muldoon and Peter D. Roffers. 1998. *Application of a Discrete Fracture Flow Model for Wellhead Protection at Sturgeon Bay, Wisconsin.*

Door County Planning Department. 2001. *Door County Zoning Ordinance.*

Door County Soil and Water Conservation Department. 1999. *Door County Land & Water Resource Management Plan*.

McMahon Associates, Inc. 2000. *Water Distribution System Modeling & Analysis*, McM No. S007-90533

United States Environmental Protection Agency. 1987. *Guidelines for Delineation of Wellhead Protection Areas.*

United States Environmental Protection Agency. 1991. *Delineation of Wellhead Protection Areas in Fractured Rocks*, EPA 570/9-91-009

Wisconsin Administrative Code. 2000. *Chapter NR811*: *Requirements for the Operation and Design of Community Water Systems*.

Wisconsin Department of Natural Resources. 1993. *Determining Wellhead Protection Area Boundaries – An Introduction*, PUBL-WR313-92.

Wisconsin Department of Natural Resources. 1994. *How to be a Clean Bay Backer*, PUBL-WR374-94.

Wisconsin Department of Natural Resources. 1995. *Better Homes & Groundwater*, PUBL-WR386-95.

Wisconsin Department of Natural Resources. 1998. *Answers to Your Questions About Groundwater*, PUBL-DG-049-98REV.

Wisconsin Department of Natural Resources. 1999. *A Guide for Conducting Potential Contaminant Source Inventories for Wellhead Protection*, PUBL-DG-052-99.

Wisconsin Department of Natural Resources. 1999. *Wellhead Protection - An Ounce of Prevention*, PUBL-DG-039-99REV.

Wisconsin Department of Natural Resources. 1999. *Wisconsin's Source Water Assessment Program Plan.*

Wisconsin Department of Natural Resources. 2000. *A Template for Preparing Wellhead Protection Plans for Municipal Wells*, PUBL-DG-053-00.

Wisconsin State Statutes. 2000. *Chapter 160: Groundwater Protection Standards.*