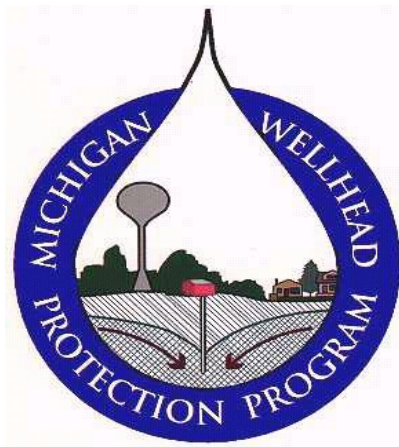


# Little Traverse Township

**EMMET COUNTY, MICHIGAN**

## *Wellhead Protection Program Plan*



*September 2004*

*PROJECT # 24263*



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**LITTLE TRAVERSE TOWNSHIP  
WELLHEAD PROTECTION PROGRAM PLAN  
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**FIGURES (attached)**

1. Wellhead Protection Area

**ATTACHMENTS**

- A Contaminant Source Inventory – Environmental Data Resources, Inc. (EDR) Report
- B Public Participation/Education
- C Environmental Permit Checklist  
Contaminant / Land Use Restriction Notification Forms
- D Transmittals  
Township Goals  
United States Environmental Protection Agency Source Water Protection National  
Vision Statement
- E State Resources for Wellhead Protection
- F Water Supply Emergency Contingency Plan
- G Glossary of Terms
- H Reserved for future use

## **LITTLE TRAVERSE TOWNSHIP WELLHEAD PROTECTION PROGRAM PLAN**

### **EXECUTIVE SUMMARY**

Throughout the State of Michigan, areas of polluted groundwater are present in almost every urbanized area. When contamination in groundwater becomes significant, human health and economic activities may be effected. As a result, communities have recognized the need for a systematic program of groundwater quality management. A Wellhead Protection Program develops long-term strategies to protect a community's drinking water supply. The long-term management of groundwater quality is endorsed at both the federal and state level. Specifically, the federal Safe Drinking Water Act was amended in 1986 to include wellhead protection. Additionally, the State of Michigan provides financial and technical resources for communities to develop a wellhead protection program. Little Traverse's Wellhead Protection Plan is a "living" document that details action being taken to ensure the long-term integrity of the Township's water supply system.

Several years ago, Little Traverse Township recognized the importance of protecting the wells that supply drinking water to the Township residents. In 2002, the Township selected Fleis & VandenBrink Engineering, Inc. (F&V) to assist in developing a formal Wellhead Protection Program based on guidelines provided by the Michigan Department of Environmental Quality (MDEQ).

Subsequent development of the Township's Wellhead Protection Program included public meetings that were held quarterly during active work periods beginning in 2002. These meetings provided an opportunity for Township residents and elected officials to discuss the general nature of the Wellhead Protection Plan. Additionally, detailed explanations of the Wellhead Protection Area delineation and specific options in developing and implementing management strategies were discussed.

The overall goals of the Township's program are included in this Plan. Previous reports detail the collection of available information on the hydrogeology of the Little Traverse area, including the interpretation of numerous depth to water measurements and results from aquifer performance testing. The collected information was used to develop a groundwater model that was used to delineate the 10 year groundwater contribution zone for the Township's well fields. These areas are known as the Wellhead Protection Areas.

Upon defining the Wellhead Protection Areas, sites of environmental contamination listed on state and federal databases as located within the Wellhead Protection Area were identified. Documenting these sites is important for several reasons, including identifying immediate risk to drinking water. This documentation is referred to as a Contaminant Source Inventory.

Collected information was used to analyze the "sensitivity" and determine "susceptibility" of the township's drinking water wells to potential sources of contamination. MDEQ has defined the aquifer supplying the Township's wells as having a "moderate" geologic sensitivity to potential contamination. After review of the Contaminant Source Inventory information included in this Plan, a susceptibility determination will be made by the MDEQ.

Based on the Township's goals, and on the delineated Wellhead Protection Areas, the Township reviewed numerous options to manage the wellhead protection areas. Options reviewed included both regulatory (e.g. ordinances, site review criteria, existing programs) and non-regulatory options (e.g. public education).

**LITTLE TRAVERSE TOWNSHIP  
WELLHEAD PROTECTION PROGRAM PLAN**

**ACTION PLAN SUMMARY**

The Little Traverse Township Wellhead Protection Program Plan is a written compilation of numerous concepts, which, when implemented, are designed to protect the integrity of the Township's well field and distribution system. Several strategies have already been implemented. However, the development of this plan has resulted in additional strategies that are discussed throughout this written plan. The following Action Plan Summary is a quick reference guide for the additional strategies listed in the plan. The Action Plan Summary will be updated periodically as the Township completes future reviews of their Wellhead Protection Program.

**Little Traverse Township Wellhead Protection Program Action Plan**

<b>Action (page discussed in plan)</b>	<b>Next Due Date</b>	<b>Frequency</b>	<b>Lead Team Member</b>	<b>Team Member Assistance</b>
Susceptibility Determination. (III-10)	Early 2005	Once		
Review options to address abandoned home heating oil tanks		Annual	Township Supervisor	
Contaminant Source Inventory Maintenance. (III-13)	Winter 2006/7	Every 3 years	Township Supervisor	
Purchase and install "Wellhead Protection Area" road signs. (IV-5)		Once	Township Supervisor	
Prepare and distribute informational wellhead protection brochure. (IV-5)	Fall 2004	Once	Township Supervisor	
Provide Township office with written Wellhead Protection Plan for public review. (IV-5)	Winter 2004/2005	Once	F&V	
Use Consumer Confidence Reports to provide public awareness of WHP. (IV-5)	Summer 2005	Annual	Dean Morford	
Identify and publicize used oil recycling centers. (IV-5)	Winter 2004/2005	Every 3 years	Township Supervisor	
Township review/adoption of the Environmental Permit Checklist. (IV-7)	Winter 2004/2005	Once	Township Supervisor	
Abandoned Well Program. (IV-5)	None	Review Annually	Township Supervisor	
Link WHP Plan to other Township Plans. (IV-6)	Ongoing	Review Annually	Township Supervisor	
Review and update Water Supply Emergency Contingency Plan. (V-1)	Fall 2005	Every 3 years	Township Supervisor	
Periodic WHPP review and update. (VII-1)	Summer 2005	Review Annually	Township Supervisor	
Copy of MDEQ approved WHPP to County. (IV-6)	Winter 2004/2005	Once	F&V	
Periodic contact with County Sanitarian in regards to water well and septic permits within the WHPA. (IV-6)		Ongoing	Township Supervisor	

## **LITTLE TRAVERSE TOWNSHIP WELLHEAD PROTECTION PROGRAM PLAN**

### **I. PURPOSE AND SCOPE**

The purpose of the Little Traverse Area Wellhead Protection Program is to protect the Township's public water supply system from contamination. This protection is provided by determining the groundwater areas that contribute to the existing municipal wells. This area is called the wellhead protection area (WHPA). Once the wellhead protection area is defined, existing and potential sources of groundwater contamination within the area are identified. Finally, methods to manage the wellhead protection area and minimize the threat to existing and future municipal water supply wells are considered and implemented if appropriate.

The MDEQ's Wellhead Protection Program was developed in response to the 1986 Amendments to the Federal Safe Drinking Water Act. This Wellhead Protection Program is voluntary and is implemented on a local level through coordination of a Wellhead Protection Team consisting of local representatives.

Guidelines have been established for the Wellhead Protection Program by the Water Division of the MDEQ. The Wellhead Protection Program (WHPP) being developed for Little Traverse Township is based on these MDEQ guidelines.

MDEQ WHPP guidelines include the following seven major elements, which are detailed in this written plan:

- Wellhead protection area delineation
- Potential sources of groundwater contamination
- Wellhead protection area management
- Contingency plans
- New wells evaluation
- Roles and responsibilities
- Public participation and education

The lead agency for the WHPP is Little Traverse Township. The Township has been actively pursuing wellhead protection activities since 2002, when a formal wellhead protection program was initiated by completing an investigation of its existing municipal well fields, compiling data which described hydrogeologic conditions and groundwater flow directions, and identifying existing and potential sources of contamination upgradient of its existing well field location. In 2002, the Township completed the delineation of the wellhead protection areas for the Township's four production wells, which are located within two separate well fields.

The location of the Township's Wellhead Protection Areas are illustrated in Figure 1. As illustrated in Figure 1, the WHPAs extend to the north, into Pleasantview Township. A map of the WHPA is located at the MDEQ Water Division, Wellhead Protection Unit website ([www.michigan.gov/deq](http://www.michigan.gov/deq) and search for "Wellhead Protection Maps").

This written plan also identifies several known and potential sources of contamination within and near the WHPA. Since the 10-year delineated wellhead protection area is located, in part, in Pleasantview Township, the implementation and long-term success of the program will depend on the inter-governmental cooperation of the adjacent communities, and on the voluntary assistance of landowners within the WHPA.

## II. WELLHEAD PROTECTION AREA DELINEATION

The goal of this element of the WHP plan is to define the WHPA. The Federal Safe Drinking Water Act defines a wellhead protection area as “...*the surface and subsurface area surrounding a water well or well field, supplying a public water system, through which contaminants are reasonably likely to move towards and reach such water well or well field*”. The remaining 6 elements of the WHP plan are all based on the results of this key element.

In 2002, Little Traverse Township completed a hydrogeological study to identify groundwater areas that move towards and reach the Township’s water supply wells. The study included reviewing existing background information on the regional geologic formations, reviewing the results of several pump tests that were conducted on Township production wells and a City of Harbor Springs production well, and surveying groundwater elevations in several residential wells in the vicinity of the well field to determine groundwater gradients and directions of flow. Computer groundwater flow modeling and particle tracking was used to delineate the groundwater area surrounding the municipal well fields through which contaminants could reasonably move towards and reach the wells. The pump test analysis conducted on the Township production wells determined that the water supply is obtained from two separate, confined or leaky confined aquifers.

The MDEQ Guidelines for establishing a wellhead protection area are based on a groundwater time of travel of 10 years. This means that the area delineated for the Wellhead Protection Program needs to encompass groundwater areas which contribute to the Township’s well fields at a distance of 10 years groundwater travel time. A 10-year time of travel is used to provide a reasonable length of time for addressing environmental problems within the wellhead protection area, while limiting the size to an area which can be reasonably managed by the Township’s existing water operations, land planning and zoning ordinances.

The 10 year WHPA delineation for Little Traverse Township is illustrated in Figure 1. The previously completed Delineation Report includes the methodology used to develop the WHPA including maps, figures, and geological cross-sections used for the modeling.

### III. POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION

The goal of this element is to identify existing and potential sources of contamination within the previously determined WHPA. Contamination has several possible pathways to reach groundwater including direct spills, interior floor drains which discharge to the ground, septic systems, leaking underground storage tanks, storm water runoff, or dry and abandoned wells. In certain hydrogeologic settings, even very small amounts of a hazardous substance can contaminate large areas of groundwater.

The federal Safe Drinking Water Act also requires that a WHP plan "...will identify within each wellhead protection area all potential anthropogenic sources of contaminants which may have any adverse effect on the health of persons". An anthropogenic source is any activity, performed by or caused by human actions, that is, or potentially can be a source of contamination to groundwater, including human actions affecting natural contaminants. The releases can be either from *point* sources, such as leaking tanks or impoundments, or from *non-point* sources, such as the application of agricultural chemicals or releases from areas containing septic tank/leachfield systems.

A contaminant is defined in this WHPP as an organic, inorganic or microbiological substance that is regulated under Federal, State or local environmental programs.

Applicable Federal and State-related environmental laws and hazardous material regulations to control the use of potential contaminants generally include the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA or "Superfund"), Safe Drinking Water Act (SDWA), Clean Water Act (CWA), Toxic Substances Control Act (TSCA), and the Federal, Insecticide, Fungicide and Rodenticide Act (FIFRA). Although these regulations have imposed controls on a wide range of industries and hazardous material treatment, storage and disposal practices, they have tended to focus only on the larger manufacturing industries which manage the majority of hazardous wastes and hazardous materials in this country. Other smaller industries and businesses are not as stringently controlled (if controlled at all) either because the Federal and State statutes focus on industries that manage wastes or materials above a threshold amount, or because the materials managed by the smaller industries are not considered "hazardous". As a result, materials and wastes that are not generally regarded or regulated as "hazardous" still have the potential to contaminate groundwater supplies.

Identifying the location and types of potential sources of contamination is essential in the development and implementation of effective management and public education strategies within the local wellhead protection program.

#### A. CATEGORIES OF POTENTIAL CONTAMINATION SOURCES

As part of this WHP Plan, categories of sources or activities having the potential to contaminate groundwater have been identified in Table 1. The table is intended to provide a general overview of environmental risks associated with various activities. The categories have been grouped according to the type of activity (i.e. agricultural, residential, governmental, commercial and industrial) with which the source is commonly associated. The type(s) of contaminant(s) commonly associated with the various types of sources and the relative risk to groundwater quality are also provided.

**TABLE 1**  
**CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

**AGRICULTURAL SOURCES (K)<sup>5</sup>**

<b>TYPE OF SOURCE</b>	<b>HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT<sup>1,2,3</sup></b>
Animal feedlots (0006) <sup>4</sup> and burial areas (0007)	Livestock sewage wastes; nitrates; phosphates; chloride; chemical sprays and dips for controlling insect, bacterial, viral, and fungal pests on livestock; coliform <sup>6</sup> and noncoliform bacteria; viruses
Manure spreading areas (0008) and storage pits (0009)	Livestock sewage wastes; nitrates
Livestock waste disposal areas (0010)	Livestock sewage wastes; nitrates
Crop areas and irrigation sites (0011)	Pesticides; <sup>7</sup> fertilizers; <sup>8</sup> gasoline and motor oils from chemical applicators
Chemical storage areas and containers (0012)	Pesticide <sup>7</sup> and fertilizer <sup>8</sup> residues
Farm machinery areas (0013)	Automotive wastes; <sup>9</sup> welding wastes
Agricultural drainage wells (0014) and canals (0015)	Pesticides; <sup>7</sup> fertilizers; <sup>8</sup> bacteria; salt water (in areas where the fresh-saltwater interface lies at shallow depths and where the water table is lowered by channelization, pumping, or other causes)

**RESIDENTIAL SOURCES (D)**

<b>TYPE OF SOURCE</b>	<b>HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT<sup>1,2,3</sup></b>
Common household maintenance and hobbies (0016)	<u>Common Household Products:</u> <sup>10</sup> Household cleaners; oven cleaners; drain cleaners; toilet cleaners; disinfectants; metal polishes; jewelry cleaners; shoe polishes; synthetic detergents; bleach; laundry soil and stain removers; spot removers and dry cleaning fluid; solvents; lye or caustic soda; household pesticides; <sup>11</sup> photochemicals; printing ink; other common products; <u>Wall and Furniture Treatments:</u> Paints; varnishes; stains; dyes; wood preservatives (creosote); paint and lacquer thinners; paint and varnish removers and deglossers; paint brush cleaners; floor and furniture strippers; <u>Mechanical Repair and Other Maintenance Products:</u> Automotive wastes; <sup>9</sup> waste oil; diesel fuel; kerosene; #2 heating oil; grease; degreasers for driveways and garages; metal degreasers; asphalt and roofing tar; tar removers; lubricants; rustproofers; car wash detergents; car waxes and polishes; rock salt; refrigerants
Lawns and gardens (0017)	Fertilizers; <sup>7</sup> herbicides and other pesticides used for lawn and garden maintenance <sup>12</sup>
Swimming pools (0018)	Swimming pool maintenance chemicals <sup>13</sup>
Septic systems (0019), cesspools (0020), and sewer lines (0021)	Septage; coliform and noncoliform bacteria; <sup>6</sup> viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides; <sup>11, 12</sup> paints; paint thinner; photographic chemicals; swimming pool chemicals; <sup>11</sup> septic tank/cesspool cleaner chemicals; <sup>14</sup> elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate
Underground storage tanks (0022)	Home heating oil
Apartments and condominiums (0023)	Swimming pool maintenance chemicals; <sup>13</sup> pesticides for lawn and garden maintenance and cockroach, termite, ant, rodent, and other pest control; <sup>11,12</sup> wastes from on-site sewage treatment plants; household hazardous wastes <sup>10</sup>

**TABLE 1 (cont.)  
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

**GOVERNMENT SOURCES (E)**

<b>TYPE OF SOURCE</b>	<b>HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT<sup>1,2,3</sup></b>
Schools (0024) and government offices and grounds (0025)	Solvents; pesticides; <sup>11,12</sup> acids; alkalis; waste oils; machinery/vehicle servicing wastes; gasoline and heating oil from storage tanks; general building wastes <sup>15</sup>
Park lands (0026)	Fertilizers; <sup>8</sup> herbicides; <sup>12</sup> insecticides <sup>11</sup>
Public and residential areas infested with mosquitoes, gypsy moths, ticks, ants, or other pests (0027)	Pesticides <sup>7,11</sup>
Highways, road maintenance depots, and deicing operations (0028)	Herbicides in highway rights-of-way; <sup>7,12</sup> road salt (sodium and calcium chloride); road salt anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); automotive wastes <sup>9</sup>
Municipal sewage treatment plants and sewer lines (0029)	Municipal wastewater; sludge; <sup>16</sup> treatment chemicals <sup>17</sup>
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments (0030)	Sewage wastewater; nitrates; other liquid wastes; microbiological contaminants
Land areas applied with wastewater or wastewater byproducts (0031)	Organic matter; nitrate; inorganic salts; heavy metals; coliform and noncoliform bacteria; <sup>6</sup> viruses; nitrates; sludge; <sup>16</sup> nonhazardous wastes <sup>18</sup>
Storm water drains and basins (0032)	Urban runoff; gasoline; oil; other petroleum products; road salt; microbiological contaminants
Combined sewer overflows (municipal sewers and stormwater drains) (0033)	Municipal wastewater; sludge; <sup>16</sup> treatment chemicals; <sup>17</sup> urban runoff; gasoline; oil; other petroleum products; road salt; microbial contaminants
Recycling/reduction facilities (0034)	Residential and commercial solid waste residues
Municipal waste landfills (0035)	Leachate; organic and inorganic chemical contaminants; wastes from households <sup>10</sup> and businesses; <sup>15</sup> nitrates; oils; metals
Open dumping and burning sites (0036), closed dumps (0037)	Organic and inorganic chemicals; metals; oils; wastes from households <sup>10</sup> and businesses <sup>15</sup>
Municipal incinerators (0038)	Heavy metals; hydrocarbons; formaldehyde; methane; ethane; ethylene; acetylene; sulfur and nitrogen compounds
Water supply wells, monitoring wells, older wells, domestic and livestock wells (0039), unsealed and abandoned wells (0040), and test hole/wells (0041)	Surface runoff; effluents from barnyards, feedlots, septic tanks, or cesspools; gasoline; used motor oil; road salt
Sumps and dry wells (0042)	Storm water runoff; spilled liquids; used oil; antifreeze; gasoline; other petroleum products; road salt; pesticides; <sup>7</sup> and a wide variety of other substances
Drainage wells (0043)	Pesticides; <sup>11,12</sup> bacteria
Well pumping that causes interaquifer leakage, induced filtration, landward migration of sea water in coastal areas; etc. (0044)	Saltwater; excessively mineralized water
Artificial groundwater recharge (0045)	Storm water runoff; excess irrigation water; stream flow; cooling water; treated sewage effluent; other substances that may contain contaminants, such as nitrates, metals, detergents, synthetic organic compounds, bacteria, and viruses

**TABLE 1 (cont.)  
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

**COMMERCIAL SOURCES (C)**

<b>TYPE OF SOURCE</b>	<b>HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT<sup>1,2,3</sup></b>
Airports (0046), abandoned airfields (0047)	Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes; <sup>9</sup> heating oil; building wastes <sup>15</sup>
Auto repair shops (0048)	Waste oils; solvents; acids; paints; automotive wastes; <sup>9</sup> misc. cutting oils
Barber and beauty shops (0049)	Perm solutions; dyes; miscellaneous chemicals contained in hair rinses
Boat yards and marinas (0050)	Diesel fuels; oil; septage from boat waste disposal areas; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes <sup>9</sup>
Bowling alleys (0051)	Epoxy; urethane-based floor finish
Car dealerships (especially those with service depts.) (0052)	Automotive wastes; <sup>9</sup> waste oils; solvents; miscellaneous wastes
Car washes (0053)	Soaps; detergents; waxes; miscellaneous chemicals
Camp grounds (0054)	Septage; gasoline; diesel fuel from boats; pesticides for controlling mosquitoes, ants, ticks, gypsy moths, and other pests; <sup>7,11</sup> household hazardous wastes from recreational vehicles (RVs) <sup>10</sup>
Carpet stores (0055)	Glues and other adhesives; fuel from storage tanks if forklifts are used
Cemeteries (0056)	Leachate; lawn and garden maintenance chemicals <sup>12</sup>
Construction trade areas and materials (plumbing, heating and air conditioning, painting, paper hanging, decorating, drywall and plastering, acoustical insulation, carpentry, flooring, roofing and sheet metal, wrecking and demolition, etc.) (0057)	Solvents; asbestos; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes
Country clubs (0058)	Fertilizers; <sup>8</sup> herbicides; <sup>7,12</sup> pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests; <sup>11</sup> swimming pools chemicals; <sup>13</sup> automotive wastes
Dry cleaners (0059)	Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate)
Funeral services and crematories (0060)	Formaldehyde; wetting agents; fumigants; solvents
Furniture repair and finishing shops (0061)	Paints; solvents; degreasing and solvent recovery sludges
Gasoline services stations (0062)	Oils; solvents; miscellaneous wastes
Hardware/lumber/parts stores (0063)	Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks; wood-staining and treating products such as creosote
Heating oil companies, underground/above ground storage tanks (0064)	Heating oil; wastes from truck maintenance areas <sup>9</sup>
Horticultural practices, garden nurseries, florists (0065)	Herbicides, insecticides, fungicides, and other pesticides <sup>12</sup>
Jewelry/metal plating shops (0066)	Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid; chromic acid
Laundromats (0067)	Detergents; bleaches; fabric dyes
Medical institutions (0068)	X-ray developers and fixers; <sup>19</sup> infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; dental acids; miscellaneous chemicals
Office buildings and complexes (0069)	Building wastes; <sup>15</sup> lawn/garden maintenance chemicals; <sup>12</sup> gasoline; motor oil

**TABLE 1 (cont.)  
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

**COMMERCIAL SOURCES (C) - continued**

<b>TYPE OF SOURCE</b>	<b>HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT<sup>1,2,3</sup></b>
Paint stores (0070)	Paints; paint thinners; lacquers; varnishes; other wood treatments
Photography shops, photo processing laboratories (0072)	Biosludges; silver sludges; cyanides; miscellaneous sludge
Print shops (0073)	Solvents; inks; dyes; oils; photographic chemicals
Railroad tracks and yards (0074)	Diesel fuel; herbicides for rights-of-way; creosote for preserving wood ties
Research laboratories (0075)	X-ray developers and fixers; <sup>19</sup> infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; solvents; infectious materials; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade; bleach); miscellaneous chemicals
Scrap and junk yards (0076)	Any wastes from businesses <sup>15</sup> and households; <sup>10</sup> oils
Sports and hobby shops (0077)	Gunpowder and ammunition; rocket engine fuel; model airplane glue
Aboveground and underground storage tanks (0078)	Heating oil; diesel fuel; gasoline; other petroleum products; other commercially used chemicals
Pharmacies (0071)	Spilled and returned products
Transportation services for passenger transit (local and interurban) (0079)	Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes <sup>9</sup>
Veterinary services (0080)	Solvents; infectious materials; vaccines; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade, bleach); x-ray developers and fixers <sup>19</sup>

**INDUSTRIAL SOURCES (B)**

<b>TYPE OF SOURCE</b>	<b>HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT<sup>1,2,3</sup></b>
Material stockpiles (coal, metallic ores, phosphates, gypsum) (0081)	Acid drainage; other hazardous and nonhazardous wastes <sup>18</sup>
Waste tailing ponds (commonly for the disposal of mining wastes) (0082)	Acids; metals; dissolved solids; radioactive ores; other hazardous and nonhazardous wastes <sup>17</sup>
Transport and transfer stations (trucking terminals and rail yards) (0083)	Fuel tanks; repair shop wastes; <sup>9</sup> other hazardous and nonhazardous wastes <sup>17</sup>
Aboveground and underground storage tanks and containers (0084)	Heating oil; diesel and gasoline fuel; other petroleum products; hazardous and nonhazardous materials and wastes <sup>18</sup>
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments (0085)	Hazardous and nonhazardous liquid wastes; <sup>18</sup> septage; sludge <sup>16</sup>
Chemical landfills (0086)	Leachate; hazardous and nonhazardous wastes; <sup>18</sup> nitrates
Radioactive waste disposal sites (0087)	Radioactive wastes from medical facilities, power plants, and defense operations; radionuclides (uranium, plutonium)
Unattended wet and dry excavation sites (unregulated dumps) (0088)	A wide range of substances; solid and liquid wastes; oil-field brines; spent acids from steel mill operations; snow removal piles containing large amounts of salt
Operating and abandoned production and exploratory wells (for gas, oil, coal, geothermal, and heat recovery); test hole wells; monitoring and excavation wells (0089)	Metals; acids; minerals; <sup>18</sup> sulfides; other sulfides; other hazardous and nonhazardous chemicals <sup>18</sup>
Dry wells (0090)	Saline water from wells pumped to keep them dry
Injection wells (0091)	Highly toxic wastes; hazardous and nonhazardous industrial wastes; <sup>18</sup> oil-field brines
Well drilling operations (0092)	Brines associated with oil and gas operations

**TABLE 1 (cont.)  
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

**INDUSTRIAL PROCESSES (B) (PRESENTLY OPERATED OR TORN-DOWN FACILITIES)<sup>20</sup>**

<b>TYPE OF SOURCE</b>	<b>HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT<sup>1,2,3</sup></b>
Asphalt plants (0093)	Petroleum derivatives
Communications equipment manufacturers (0094)	Nitric, hydrochloric, and sulfuric acid wastes; heavy metal sludges; copper-contaminated etchant (e.g., ammonium persulfate); cutting oil and degreasing solvent (trichloroethane, Freon, or trichloroethylene); waste oils; corrosive soldering flux; paint sludge; waste plating solution
Electric and electronic equipment manufacturers and storage facilities (0095)	Cyanides; metal sludges; caustics (chromic acid); solvents; oils; alkalis; acids; paints and paint sludges; calcium fluoride sludges; methylene chloride; perchloroethylene; trichloroethane; acetone; methanol; toluene; PCBs
Electroplaters (0096)	Boric, hydrochloric, hydrofluoric, and sulfuric acids; sodium and potassium hydroxide; chromic acid; sodium and hydrogen cyanide; metallic salts
Foundries and metal fabricators (0097)	Paint wastes; acids; heavy metals; metal sludges; plating wastes; oils; solvents; explosive wastes
Furniture and fixtures manufacturers (0098)	Paints; solvents; degreasing sludges; solvent recovery sludges
Machine and metalworking shops (0100)	Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (TCE); metal marking fluids; mold-release agents
Mining operations (surface and underground) (0101)	Mine spoils or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides
Unsealed abandoned mines used as waste pits (0102)	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals <sup>18</sup>
Paper mills (0103)	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals; <sup>18</sup> organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide
Petroleum production and storage companies, secondary recovery of petroleum (0104)	Hydrocarbons; oil-field brines (highly mineralized salt solutions)
Industrial pipeline (0105)	Corrosive fluids; hydrocarbons; other hazardous and nonhazardous materials and wastes <sup>18</sup>
Photo processing laboratories (0106)	Cyanides; biosludges; silver sludges; miscellaneous sludges
Plastics materials and synthetics producers (0107)	Solvents; oils; miscellaneous organics and inorganics (phenols, resins); paint wastes; cyanides; acids; alkalis; wastewater treatment sludges; cellulose esters; surfactant; glycols; phenols; formaldehyde; peroxides; etc.
Primary metal industries (blast furnaces, steel works, and rolling mills) (0108)	Heavy metal wastewater treatment sludge; pickling liquor; waste oil; ammonia scrubber liquor; acid tar sludge; alkaline cleaners; degreasing solvents; salt; metal dust
Publishers, printers, and allied industries (0109)	Solvents; inks; dyes; oils; miscellaneous organics; photographic chemicals
Public utilities (phone, electric power, gas) (0110)	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Sawmills and planers (0111) and gluing wastes	Treated wood residue (copper quinolate, mercury, sodium bazide); tanner gas; paint sludges; solvents; creosote; coating
Stone, clay, and glass manufacturers (0112)	Solvents; oils and grease; alkalis; acetic wastes; asbestos; heavy metal sludges; phenolic solids or sludges; metal-finishing sludge
Welders (0113)	Oxygen, acetylene
Wood preserving facilities (0114)	Wood preservatives; creosote

**TABLE 1 (cont.)**  
**CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

**Key to footnotes**

<sup>1</sup>In general, groundwater contamination stems from the misuse and improper disposal of liquid and solid wastes; the illegal dumping or abandonment of household, commercial, or industrial chemicals; the accidental spilling of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the improper siting, design, construction, operation, or maintenance of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from atmospheric pollutants, such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, fall as acid rain, and percolate through the soil. When the sources listed on this table are used and managed properly, groundwater contamination is not likely to occur.

<sup>2</sup>Contaminants can reach groundwater from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.

<sup>3</sup>This table lists most common wastes, but not all potential wastes. For example, it is not possible to list all potential contaminants contained in storm water runoff or research laboratory wastes.

<sup>4</sup>Contaminant WHPP Number.

<sup>5</sup>Facility WHPP Code.

<sup>6</sup>Coliform bacteria can indicate the presence of pathogenic (disease-causing) microorganisms that may be transmitted in human feces. Diseases such as typhoid fever, hepatitis, diarrhea, and dysentery can result from sewage contamination of water supplies.

<sup>7</sup>Pesticides include herbicides, insecticides, rodenticides, fungicides, and avicides; many are highly toxic and quite mobile in the subsurface. An EPA survey found that the most common pesticides found in drinking water wells were DCPA (dacthal) and atrazine (EPA, 1990b), which EPA classifies as moderately toxic (class 3) and slightly toxic (class 4) materials, respectively (Meister Publishing Company, 1991).

<sup>8</sup>The EPA National Pesticides Survey (EPA, 1991) found that the use of fertilizers correlates to nitrate contamination of groundwater supplies.

<sup>9</sup>Automotive wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.

<sup>10</sup>Toxic or hazardous components of common household products are noted on the attached table (EPA 1990c).

<sup>11</sup>Common household pesticides for controlling pests such as ants, termites, bees, wasps, flies, cockroaches, silverfish, mites, ticks, fleas, worms, rats, and mice can contain active ingredients including naphthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.

<sup>12</sup>Common pesticides used for lawn and garden maintenance (i.e., weed killers, and mite, grub, and aphid controls) include such chemicals as 2,4-D; chlorpyrifos; diazinon; benomyl; captan; dicofol; and methoxychlor.

<sup>13</sup>Swimming pool chemicals can contain free and combined chlorine; bromine; iodine; mercury-based, copper-based, and quaternary algaecides; cyanuric acid; calcium or sodium hypochlorite; muriatic acid; sodium carbonate.

<sup>14</sup>Septic tank/cesspool cleaners include synthetic organic chemicals such as 1,1,1 trichloroethane, tetrachloroethylene, carbon tetrachloride, and methylene chloride.

<sup>15</sup>Common wastes from public and commercial buildings include automotive wastes (see above definition); rock salt; and residues from cleaning products that may contain chemicals such as xlenols, glycol esters, isopropanol, 1,1,1-trichloroethane, sulfonates, chlorinated phenols, and cresols.

**TABLE 1 (cont.)**  
**POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

**Key to footnotes (cont.)**

<sup>16</sup>Municipal wastewater treatment sludge can contain organic matter; nitrates; inorganic salts; heavy metals; coliform and noncoliform bacteria (see above definition); and viruses.

<sup>17</sup>Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum, carbon, and silica; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

<sup>18</sup>The Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste that may cause an increase in mortality or serious illness or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed. A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. Not covered by RCRA regulations are domestic sewage; irrigation waters or industrial discharges allowed by the Clean Water Act; certain nuclear and mining wastes; household wastes; agricultural wastes (excluding some pesticides); and small quantity hazardous wastes (i.e., less than 220 pounds per month) discharged from businesses.

<sup>19</sup>X-ray developers and fixers may contain reclaimable silver, glutaldehyde, hydroquinone, phenedone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

<sup>20</sup>This table lists potential groundwater contaminants from many common industries, but it does not address all industries.

*Source: Wyoming Department of Environmental Quality*

## B. CONTAMINATION SOURCE INVENTORY

An initial inventory was completed in September 2004 to develop and confirm a list of existing and potential sources of contamination within the WHPA. As summarized in Table 2 below, several database sources were used to identify and locate existing sites of contamination. The identification of existing sources of contamination have been compiled using information from various state agencies and programs which include Sites of Environmental Contamination (under Part 201 of Michigan Act 451), the Underground Storage Tank list (under Part 211, Act 451), and the Leaking Underground Storage Tank Site list (under Part 213 of Act 451).

For this WHPP, '*existing*' sources are those which are known to have caused, or threaten to cause groundwater contamination; regulatory agencies may have information pertaining to existing sources. '*Potential*' sources are those which may or may not have caused groundwater contamination, but have the potential to do so; regulatory agencies may, or may not have knowledge and/or information available relating to potential sources.

Environmental Data Resources, Inc. (EDR) was retained to conduct a search of federal and state environmental records to identify existing or potential sources of contamination within the WHPA. A copy of EDR's resulting report is included in Attachment A. The search identified two sites of contamination, or sites that are documented as using hazardous or polluting materials during facility operations, within or immediately adjacent to the WHPA.

One site of existing or known contamination was identified as located within the 10-year capture zone for the municipal wells, as follows:

- Boyne Highlands, 600 Highlands Dr. (Site ID 1)

The location of the above site is illustrated in EDR's report (Attachment A).

**TABLE 2  
DATABASE SOURCES FOR CONTAMINATION INFORMATION**

<b>Database (Source)</b>	<b>Information Provided</b>
LUST: Leaking Underground Storage Tanks (MDEQ)	State's inventory of confirmed releases from underground storage tanks. Open denotes a site that is still being remediated. Closed denotes a site that has met MDEQ criteria for protecting human health and the environment.
NPL: Natural Priority List "Superfund" sites (EPA)	EPA's Superfund cleanup sites.
Delisted NPL: Natural Priority List Deletions (EPA)	The National Oil and Hazardous Substance Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.
NPL: Natural Priority List Lines (EPA)	Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.
NPL: Proposed Natural Priority List sites (EPA)	Proposed sites.
CERCLIS: Comprehensive Environmental Response, Compensation and Liability Information System (EPA)	Sites either proposed to or on National Superfund (NPL) List.
NFRAP: CERCLIS sites where "No Further Remedial Action Planned" (EPA)	Sites where investigations revealed impacts not significant to be placed on Superfund site (NPL sites).
CORRACTS: RCRA Corrective Action Activity (EPA)	Sites where corrective action has occurred under the Federal Resource Conservation and Recovery Act, RCRA.
RCRIS: Resource Conservation and Recovery Act (EPA)	Sites that generate, store, treat or dispose of hazardous waste. CESQG - Conditionally exempt small quantity generator SQG - Small quantity generator LQG - Large quantity generator TRANS - Transporter NFD - No further details
PADS: PCB Activity Database (EPA)	Sites that generate, transport, commercial storers and/or brokers and disposers of PCB's.
TRIS: Toxic Chemical Release Inventory System (EPA)	Sites that release toxic chemicals to the air, water, and land in reportable quantities under SARA Title III, Section 3.3.
ERNS: Emergency Response Notification System (USCG)	Sites that have had a reported release of oil and/or hazardous substances.
CONSENT: Superfund (CERCLA) Consent Database (EPA)	Sites that have major legal settlements that establish responsibility and standards for cleanup at NPL sites.
TSCA: Toxic Substances Control Act (EPA)	Facilities that manufacture and import chemical substances on the TSCA Chemical Substance Inventory List.
MLTS: Material Licensing Tracking System (NRC)	Sites that possess or use radioactive materials and which are subject to NRC licensing requirements.
MINES: Mines Master Index File (Department of Labor)	Mines

**TABLE 2 (Continued)**  
**DATABASE SOURCES FOR CONTAMINATION INFORMATION**

<b>Database (Source)</b>	<b>Information Provided</b>
FINDS: Facility Index System (EPA)	Federally owned and operated hazardous waste treatment, storage, or disposal facilities.
BRS: Biennial Reporting System (EPA)	National reporting system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators and Treatment, Storage and Disposal Facilities.
FFTS: FIFRA/TSCA Tracking System (EPA)	System tracks administrative cases and pesticides enforcement actions and compliance activities related to federal insecticide, fungicide and rodenticide Act (FIFRA) and Toxic Substance Control Act (TSCA) and Emergency Planning and Community Right-to-know Act (EPCRA)..
FFTS INSP: FIFRA/TSCA Tracking System (EPA)	System tracks federal insecticide, fungicide and rodenticide Act (FIFRA) and Toxic Substance Control Act (TSCA) Sites.
RAATS: RCRA Administrative Action Tracking System (EPA)	System contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA prior to September 30, 1995.
UST: Underground Storage Tank (MDEQ)	Property includes an Underground Storage Tank (UST) that is registered with the State of Michigan. Current denotes a UST is currently present at the property. Removed denotes a UST was historically present at the property.
AST: Aboveground storage tanks (MDEQ)	Property includes an Above Ground Storage Tank (AST) that is registered with the State of Michigan. Current denotes an AST is currently present at the property. Removed denotes an AST was historically present at the property.
SHWS: Contaminated Sites (MDEQ)	Priority sites planned for cleanup using state funds are identified along with sites where cleanup will be paid for by potentially responsible parties.
BEA: Baseline Environmental Assessment Database (MDEQ)	Tracks sites with completed Baseline Environmental Site Assessments (BEAs).
SSTS: Section Seven Tracking System (EPA)	Tracks registration of all pesticide-producing establishments and tracks types, amounts and active ingredients sold or distributed.
Former Manufactured Gas Sites (EDR)	Tracks the existence and location of Coal Gas sites.
SWF/LF: Solid Waste Facilities Database (MDEQ)	Sites listed by the MDEQ to be active or inactive solid waste landfills.
GWD (MDEQ): Groundwater Discharge (MDEQ)	Sites listed by the MDEQ to discharge treated water to the ground or groundwater.
OGC (MDEQ): Oil & Gas Contamination Sites (MDEQ)	Sites listed by MDEQ as being contaminated by Oil & Gas production operations.
O&G: Oil and Gas Well Sites (MDEQ)	Oil and Gas wells and associated soil borings.
HMRIS: Hazardous Materials Information Reporting System (USDOT)	Sites that have had hazardous material spill incidents reported to USDOT.
ROD: Records of Decision	ROD documents mandate a permanent remedy at an NPL site containing technical and health information to aid in the cleanup.
Misc: Windshield Survey & Local Knowledge	Information provided by Local Wellhead Protection Team Members.

**C. TRANSPORTATION ROUTES**

No interstate highways are not present within the Township's WHPA. However, state highway M-119 runs west-east through the southern, downgradient end of the WHPA, near the well fields. Groundwater quality degradation may occur as the result of significant and sudden releases or spills of hazardous or polluting materials during transit along M-119.

#### **D. SURFACE WATER SOURCES**

The primary surface water source near the Township's wells is a number of small creeks and ponds and lakes. Surface water quality degradation within these surface water bodies can occur through both non-point and point source discharges. Groundwater quality degradation may occur when surface water of lesser quality recharges the aquifer by means of infiltration through the pond/lake/creek beds.

With point source discharges, the contaminant threat is dependent on the volume of the release, the chemical/physical properties of the contaminant, and the surface water velocity. Non-point source contaminants are usually seasonally derived, resulting from the release of fertilizer and pesticide applications in agricultural portions of the watershed and/or storm water runoff from urban areas.

#### **E. ABANDONED WELLS**

Abandoned wells can pose a potential impact to groundwater. Wells which are not properly closed can provide a direct conduit for surface run-off and contaminants to easily reach the groundwater. Abandoned wells may be from oil and gas drilling, water wells, irrigation wells, or dry wells.

The Michigan Department of Agriculture Groundwater Stewardship Program and the MDEQ offer technical and financial assistance in educating the public, especially farmers, in the importance of properly abandoning and plugging wells.

#### **F. SENSITIVITY ANALYSIS**

The 1996 amendments to the federal Safe Drinking Water Act requires that states analyze the "sensitivity" and determine "susceptibility" of a community's source of drinking water to potential sources of contamination.

Sensitivity is determined from the natural setting of the source water (raw water to the Township's wells), and indicates natural protection afforded the source water. Information from the Wellhead Protection Area delineation indicates that the aquifer from which the Township's wells obtain groundwater is "confined" or "leaky confined." This means the overlying drift and depth of the Township's wells provide some protection from polluting materials that may be released to the ground surface. As such, MDEQ has determined the Township's geologic sensitivity to be "moderate."

## **G. SUSCEPTIBILITY DETERMINATION**

Susceptibility identifies factors within the community's wellhead protection area that may pose a risk to the water supply. The susceptibility determination provides information with respect to listed facilities and land areas within the wellhead protection area that should be given greater priority and oversight in implementing a wellhead protection program. After review of the Contaminant Source Inventory information included in this plan, a susceptibility determination will be made by MDEQ.

The susceptibility determination will categorize the Township wells (e.g. moderately susceptible, highly susceptible, or very highly susceptible) to contamination. It is important to understand that a system can have low sensitivity relative to some conditions (e.g., wells located a significant distance from potential contamination sources), and high susceptibility because of other conditions (e.g., the type of contaminant).

## **H. CONTAMINATION SOURCE INVENTORY MAINTENANCE**

All data management systems require some sort of periodic maintenance. Data maintenance for the Township's Contaminant Source Inventory was initiated when the preliminary list of sites was compiled. Specifically, the preliminary site names and mapped locations were confirmed by members of the Team.

Future maintenance of the Contaminant Source Inventory will include updating the existing information and adding any new sites. The simplest way to complete this may be re-inventorying the Little Traverse area at periodic intervals. The Township plans to complete a re-inventory every three years. Additionally, the updates will consider the following items:

- 1) Identification of new categories
- 2) Identification of new sources
- 3) Change in the status of previously inventoried sources.

It is anticipated that future verification and updating of the information will result in additional modifications to increase the effectiveness and efficiency of the system for data retrieval and analysis. This may include merging the information with a County wide Contaminant Source Inventory database, or providing information to limited individuals by internet access.

#### **IV. WELLHEAD PROTECTION AREA MANAGEMENT**

The goal of this element is to provide mechanisms which will prevent existing and potential sources of contamination from reaching the area's municipal water supply wells. Existing regulatory controls that can easily be adapted as WHP management methods have been reviewed and additional management methods were developed by the Wellhead Protection Team.

In developing the management strategy, it was acknowledged that it is highly improbable that all risks in the WHPA can be eliminated, but by applying one or more management tools the likelihood of groundwater contamination impacting the municipal water supply in the future can be reduced.

While some of the proposed management options refer to existing regulatory programs, it was recognized that protection of the WHPA can best be accomplished by developing partnerships with local business, industry, and private property owners and focusing on education/training and pollution prevention concepts. Additionally, it was recognized that the Township's WHPP will require regular review and updates to evaluate the effectiveness and appropriateness of the selected management options.

##### **A. EXISTING REGULATORY PROGRAMS**

The Township's use of the following existing regulatory programs in the Wellhead Protection Program Plan are detailed in the next section.

###### Part 22 of PA 451, Michigan Natural Resources and Environmental Protection Act

Part 22 requires certain notifications be made for groundwater discharges located within a MDEQ approved wellhead protection area. Part 22 also specifies certain isolation distances from water supply wells. This program provides the Local Unit of Government notification of permitted groundwater discharges.

In the future, when a Part 22 related transmittal is received, the Township will contact MDEQ or the Township's Wellhead Protection Program Consultant to determine what action, if any, should be taken.

###### Part 213 of PA 451, Michigan Natural Resources and Environmental Protection Act

Part 213 requires notification be made to the Local Unit of Government if land use restrictions are being implemented as part of a leaking petroleum underground storage tank cleanup. This program will provide the Local Unit of Government notification of petroleum contaminated sites.

Use of this existing program as part of the Township's WHPP is discussed later in this Section.

##### **B. REVIEW OF MANAGEMENT STRATEGY OPTIONS**

Review of the management options was completed by the Wellhead Protection Team. Table 3 outlines the options reviewed and lists the advantages and limitations of each option. The Township's Supervisor was assigned the lead responsibility to recommend what specific WHPA management options should be presented to the Little Traverse Township Board for further consideration.

**TABLE 3  
WELLHEAD PROTECTION AREA MANAGEMENT OPTIONS**

<b>Regulatory: Zoning</b>	<b>Advantages</b>	<b>Limitations</b>
Overlay GW Protection Districts	<ul style="list-style-type: none"> <li>• <i>Similar</i> to other overlay zoning methods familiar to planning commissions.</li> <li>• Targeted to specific wellhead protection areas.</li> <li>• Restricts certain high risk land uses in wellhead protection areas.</li> <li>• WHPAs are identified on practical base/zoning map.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires staff to develop overlay map.</li> <li>• Requires modifying existing zoning ordinance.</li> <li>• Inherent nature of zoning provides "grandfather" protection to pre-existing uses and structures.</li> </ul>
Site Plan Review	<ul style="list-style-type: none"> <li>• Requires developers to design facilities for groundwater protection</li> <li>• Assurance/consistency with County and State permits</li> <li>• Proactive-places community in process of protecting groundwater</li> </ul>	<ul style="list-style-type: none"> <li>• Requires qualified staff or consultants</li> <li>• Administrative cost higher</li> </ul>
Permits Checklist	<ul style="list-style-type: none"> <li>• Alerts businesses to environmental permit requirements</li> <li>• Helps community monitor environmental risks</li> </ul>	<ul style="list-style-type: none"> <li>• Requires staff to develop system</li> </ul>
Prohibition of Various Land Uses	<ul style="list-style-type: none"> <li>• Used within mapped WHPAs to prohibit known groundwater contaminants and processes that generate contaminants.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires amendment to zoning ordinance.</li> <li>• Requires enforcement by both visual inspection and on-site investigations.</li> </ul>
Special Permitting	<ul style="list-style-type: none"> <li>• Used to restrict contaminant uses within WHPAs that may cause groundwater contamination.</li> <li>• Community adopts special permit "thresholds" for various uses and structures within WHPAs. Community grants special permits for "threshold" uses only if groundwater quality will not be compromised</li> </ul>	<ul style="list-style-type: none"> <li>• Requires detailed understanding of WHPAs sensitivity by local permit granting authority.</li> <li>• Requires enforcement of special permit requirements and on-site investigations.</li> <li>• Requires case-by-case analysis to ensure equal treatment of applicants.</li> </ul>
Transfer of Development Rights	<ul style="list-style-type: none"> <li>• Used to transfer development from WHPAs to locations outside WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Cumbersome administrative requirements.</li> <li>• Not well-suited for small communities without significant administrative resources.</li> </ul>
Cluster/PUD Design	<ul style="list-style-type: none"> <li>• Allows for "point source" discharges that are more easily monitored by guiding residential development outside of WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Slightly more complicated to administer than traditional "grid" subdivision.</li> <li>• Enforcement/inspection requirements are similar to "grid" subdivision.</li> </ul>
Growth Controls/Timing	<ul style="list-style-type: none"> <li>• Community imposes growth controls in the form of building caps, subdivision phasing or other limitation tied to planning concerns which allows the community an opportunity to plan WHPA protection.</li> </ul>	<ul style="list-style-type: none"> <li>• Generally complicated administrative process.</li> <li>• Requires administrative staff to issue permits and enforce growth control ordinances.</li> </ul>

**TABLE 3 (cont.)  
WELLHEAD PROTECTION AREA MANAGEMENT OPTIONS**

<b>Regulatory: Health Regulations</b>	<b>Advantages</b>	<b>Limitations</b>
Compliance with existing regulations	<ul style="list-style-type: none"> <li>• Inexpensive/easy to enact and administer</li> <li>• Places burden on applicants to obtain permits/approvals</li> </ul>	<ul style="list-style-type: none"> <li>• Local groundwater may be vulnerable if other permit agencies fail to enforce compliance</li> </ul>
Regulating or prohibiting Underground Fuel Storage Systems	<ul style="list-style-type: none"> <li>• Monitors or eliminates underground fuel storage systems (UST) within WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Prohibition of USTs require little administrative support.</li> <li>• Regulating USTs require moderate amounts of administrative support for inspection follow-up and enforcement.</li> </ul>
Privately Owned Wastewater Treatment Plants (Small Sewage Treatment Plants)	<ul style="list-style-type: none"> <li>• Prohibit Small Sewage Treatment Plants (SSTP) within WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Prohibition of SSTPs require little administrative support.</li> <li>• Regulating SSTPs require moderate amount of administrative support for inspection follow up and enforcement.</li> </ul>
Prohibit Septic Cleaners Containing Solvent Compounds	<ul style="list-style-type: none"> <li>• Prohibits the application of certain solvent septic cleaners within WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult regulation to enforce even with sufficient administrative support.</li> </ul>
Septic System Upgrades	<ul style="list-style-type: none"> <li>• Requires periodic inspection and upgrading of septic systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Significant administrative resources required for this option to be successful.</li> </ul>
Toxic and Hazardous Material Handling Regulations	<ul style="list-style-type: none"> <li>• Promotes proper handling and disposal of toxic materials/waste.</li> <li>• Community knows what is being used and where</li> <li>• Hazardous substance users may have incentive to reduce or eliminate use</li> </ul>	<ul style="list-style-type: none"> <li>• Requires administrative support and on-site inspections.</li> </ul>
<b>Regulatory: Subdivision Control</b>		
Drainage Requirements	<ul style="list-style-type: none"> <li>• Uses advanced engineering designs of subdivision roads within WHPAs to ensure that road drainage is directed outside of WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires moderate level of inspection and enforcement by administrative staff.</li> </ul>

**TABLE 3 (cont.)  
WELLHEAD PROTECTION AREA MANAGEMENT OPTIONS**

<b>Nonregulatory: Land Transfer and Voluntary Restrictions</b>	<b>Advantages</b>	<b>Limitations</b>
Sale/Donation	<ul style="list-style-type: none"> <li>• Provides broad protection to the groundwater supply.</li> </ul>	<ul style="list-style-type: none"> <li>• There are few administrative requirements involved in accepting donations or sales of land from the private sector.</li> <li>• Administrative requirements for maintenance of land accepted or purchased may be substantial, particularly if the community does not have a program for open space maintenance.</li> <li>• Legal consequences of accepting land for donation or sale from the private sector, mostly involving liability.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Monitors groundwater quality within WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires moderate administrative staffing to ensure routine sampling and response if sampling indicates contamination.</li> </ul>
Contingency Plans	<ul style="list-style-type: none"> <li>• Provides appropriate response in cases of contaminant release or other emergencies within WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires significant up-front planning to anticipate and be prepared for emergencies.</li> </ul>
Hazardous Waste Collection	<ul style="list-style-type: none"> <li>• Reduces the accumulation of hazardous materials within WHPAs and the community at large.</li> </ul>	<ul style="list-style-type: none"> <li>• Hazardous waste collection programs are generally sponsored by government agencies, but administered by a private contractor.</li> </ul>
Public Education	<ul style="list-style-type: none"> <li>• Informs community residents of the connection between land use within WHPAs and drinking water quality.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires some degree of administrative support for programs, such as brochure mailing, to more intensive support for seminars and hazardous waste collection days.</li> </ul>
<b>Legislative:</b>		
Regional WHPA Districts	<ul style="list-style-type: none"> <li>• Protects regional aquifer systems by establishing new legislative districts that often transcend existing corporate boundaries.</li> <li>• Provides for protection of areas outside an individual community</li> <li>• Involves many stakeholders.</li> <li>• Efficient use of technical and administrative resources by reducing duplication of tasks.</li> <li>• Increases coordination between communities.</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to develop due to several planning/governmental bodies.</li> <li>• May be perceived as reducing local control on land use/zoning issues.</li> </ul>
Land Banking	<ul style="list-style-type: none"> <li>• Acquires and protects land within WHPAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Land banks require significant administrative support if they are to function effectively.</li> </ul>

## C. SELECTED MANAGEMENT STRATEGIES

After review and discussions of WHPA management options, the Wellhead Protection Team recommended that several options be formally recommended to the Township Planning office for implementation. The Wellhead Protection Team determined that some options were too complex and administratively expensive to administer or were otherwise not appropriate for the local area. Other regional options were perceived to be difficult due to the required coordination of activities between communities, especially in light of the differences in existing land use and zoning administration between Little Traverse and Pleasantview Townships.

These management strategies reflect current concepts, thoughts and experiences from other communities. Since ideas may change as new information becomes available, these management strategies will be regularly reviewed and revised as appropriate.

The following options have been recommended by the Wellhead Protection Team.

### 1) PUBLIC EDUCATION/AWARENESS AND WHPP PLAN MAINTENANCE

It is recognized that public education, awareness and regular maintenance of the WHPP Plan will be a key element of the long-term success of the WHPP. Specific current and future actions include:

- ✓ Installation of “Wellhead Protection Area” road signs at the edge of the Township’s WHPA.
- ✓ Distribution of an informational wellhead protection brochure.
- ✓ Provide Township Offices with a copy of the Wellhead Protection Plan for public review.
- ✓ Develop a web page to provide the public with information and to increase awareness of the Wellhead Protection Area and efforts being conducted by the Township for water quality protection.
- ✓ Conduct meetings with adjacent municipalities and property owners to solicit participation with land use planning for the wellhead protection areas.
- ✓ Use the annual Consumer Confidence Reports to initially introduce the concept of wellhead protection. This will continue in the future and will provide detailed information on various aspects of WHP (i.e. household hazardous waste disposal, water conservation, abandoned wells, etc.).
- ✓ Identify and publicize used oil recycling centers.

### 2) ABANDONED WELL PROGRAM

The Township will consider developing an abandoned well program to identify and plug unknown abandoned wells.

If developed, the Township will actively solicit property owners to identify abandoned wells. If reported, the Township will record the well location and owner. The township will annually attempt to identify funding sources (County Groundwater Stewardship Program, MDEQ Abandoned Well Management Program) to have the wells properly abandoned.

The Township will also consider confirming that on-site wells be addressed when demolition permits are issued. The intent is to ensure abandoned wells are properly plugged prior to demolition activities occurring, since after demolition activities it is difficult, at best, to locate old wells.

### 3) LINKING THE WHPP TO OTHER TOWNSHIP PLANS

The township recognizes that the long-term success of the Wellhead Program will depend, in part, on a large cross-section of individuals and groups understanding and recognizing the value in the

programs goals. One way to accomplish this is to link the Wellhead Protection Program Plan to other Township plans (e.g. Master Plans, Policy Plans, Strategic Plans, Single-Issue Plans).

Future updates to the Township's Water Supply Master Plan will include consideration of the Wellhead Protection Program Plan. Specifically, the Water Supply Master Plan may be used to budget for long-term Wellhead Protection activities (e.g. public awareness, contaminant source inventory maintenance, contingency plans updates).

#### 4) COUNTY PARTNERSHIP

The Township has delivered a copy of the MDEQ approved delineated Wellhead Protection Area to the Emmet County Health Department, Environmental Health Division.

The County is responsible for issuing on-site septic and water well permits. The Township will request that the County consider the WHPA in future permitting decisions, as appropriate. This will include on-site septic inspections during property transactions. The Township will periodically contact the County to confirm that the Health Department inspector is aware of the location of the Township's WHPA. The intent of staying in contact is to minimize potential disruptions in WHPA inspections as the result of County personnel changes.

The Township will also consider a partnership with the County, Pleasantview Township, the City of Harbor Springs and other entities for future public education efforts (i.e. abandoned wells, small business pollution prevention or waste reduction). The combined Township/City/County efforts to inform small business owners could have a long-term positive impact on groundwater quality.

#### 5) TOWNSHIP COORDINATION OF CONTAMINATED SITE CLEANUPS

Cleanup at leaking underground storage tank properties or other sites of contamination in Michigan is regulated under Part 213 and Part 201 of Michigan's Natural Resource and Environmental Protection Act. Part 213 and Part 201 allow environmental cleanups that leave certain concentrations of contaminants in soil and groundwater. Future land use at the contaminated site is restricted when this approach is taken. Additionally, this approach includes filing the form "Notice to Local Unit of Government of Land Use Restrictions" with the municipality where the restricted land use is being proposed. Various similar notifications are also required of responsible parties if contaminants migrate off of the source site of contamination and impact off-site properties.

If these forms are filed for a property located within Little Traverse Township's portion of the WHPA, the Township (or their representative) will contact MDEQ to review the proposed cleanup approach. However, since the WHPA extends into Pleasantview Township, Little Traverse Township will need to work with Pleasantview Township to develop a mechanism to inform Little Traverse Township if a notification is received for property located within or near the adjacent Township's portions of the WHPA.

Little Traverse and Pleasantview Townships will consider development of a system to notify Little Traverse Township if a "Local Unit of Government" notification of land use restriction is being implemented as part of a contaminated site cleanup, or if another form of contaminant migration notification is received.

If received, Little Traverse Township will contact the MDEQ Cadillac District office to inform that the contaminated property is located in a Delineated Wellhead Protection Area. The Township will request that the MDEQ strongly consider the Wellhead Protection Area when reviewing proposed corrective action activities at the contaminated site.

Copies of the "Notice to Local Unit of Government of Land Use Restrictions" form and other required contaminant notification forms are included in Attachment C.

#### 6) ENVIRONMENTAL PERMIT CHECKLIST

In considering the use of an Environmental Permit Checklist, the Wellhead Protection Team intent was to safeguard the public health, safety and welfare of citizens and institutions that are customers of the Township Water System, by monitoring land development in and around the WHPA. Additionally, the intent of the Permit Checklist is to assist developers in complying with various state and county environmental permit requirements.

A copy of an Environmental Permit Checklist for use in the Township is included in Attachment C.

## V. WATER SUPPLY EMERGENCY CONTINGENCY PLAN

The goal of this element of the Plan is to provide both short-term and long-term protection of the Township's water supply system by identification of personnel, testing equipment, procedures, and materials which can be used for rapid correction or elimination of environmental accidents which might constitute a water supply emergency. The contingency plan, which was prepared under separate cover, also addresses response protocols, notification procedures and methods of containment.

The existing contingency plan outlines the program for the rapid correction or mitigation of water supply emergencies. It contains an inventory of necessary stand-by personnel, equipment, chemicals, and other materials readily available for the correction of water supply problems, including emergency measures in the event of contamination of the municipal wells from an emergency spill within the wellhead protection areas. The means of notification of customers affected by an emergency is also provided, along with a description of the precautions and measures to be taken to protect the health of the affected system's water customers.

Township leaders understand that response to contaminated wells is not entirely a technical problem. Indeed, when a municipal well becomes contaminated, it becomes a technical problem requiring professional knowledge of hydrogeology, engineering and other disciplines. However, financial, legal, public relations and risk assessment problems may also occur. Often, the initial public questions include:

- What is the current water quality?
- What is the source of the contaminants?
- What are the effects of past water usage?
- What action is being taken?

When municipal wells become contaminated, it is usually a surprise. This is especially true for wells located in a Wellhead Protection community. While it is unlikely that any plan will prevent an adverse response from the Township's water customers, this Wellhead Protection Plan suggests:

- Inform residents of the truth as soon as it is known
- Inform residents immediately upon confirmation of contaminants in the water supply
- Continue to inform residents of activities being undertaken

If the wells become contaminated, a previously established, consistent and strong public education program would be invaluable. Such a program would likely provide Township officials with the "benefit of the doubt" when explaining cleanup concentrations goals, how clean is clean, projected schedules, costs and funding.

Future updates to the Contaminant Source Inventory may identify chemicals in groundwater near the Township's wells. The Township may then consider if water testing should be performed more frequently than required by law. The Township will work closely with environmental professionals (State, County and private) to evaluate cost/benefit relationships of any testing beyond what is already completed.

## VI. NEW WELLS EVALUATION

The goal of this element is to provide a mechanism for incorporating new wells or well fields into the WHP program. In the future, the Township may find it necessary, as a result of either existing or projected increased water demand, to explore the development of additional groundwater sources for drinking water. Wellhead protection provides a mechanism that can be used to help select the best site and to identify areas that should be protected now in order that they will provide quality drinking water in the future when they are needed. Additionally, it should be realized that the development of a new groundwater source in the vicinity of existing sources may modify the movement of groundwater in the subsurface, perhaps changing the shape and orientation of the existing WHPA. Evaluation of the significance of those changes is necessary in order to ensure that the management strategy that is in place will continue to protect the community's drinking water supply.

A new groundwater source is defined as either an additional groundwater source, or an existing groundwater source that has been modified in a manner to increase its capacity or discharge to the system. When the Township begins planning the development of a new groundwater source, several steps should be followed. First of all, the Township should conduct a "draft" delineation and preliminary potential contaminant source inventory for each site being considered. "Draft" delineation is defined as applying the existing WHPA delineation to the considered additional well sites.

If the "draft" delineation and potential contaminant source inventory indicate that the considered well site is favorable, the Township would determine the WHPA for the new well using current MDEQ delineation guidance. This may include obtaining sufficient information from existing data sources or from field measurements to complete the delineation using an MDEQ accepted analytical or numerical groundwater modeling method.

If more than one potential site is available for a new source, the Township should proceed in its evaluation of those sites according to the discussions above. If the Township develops a new well, or increases the capacity of an existing well that is within an already delineated WHPA, it is likely that the new or modified source will have a significant impact on the existing WHPA. In all cases, the affect of the new well on the existing WHPA geometry and orientation should be evaluated.

The groundwater models that were used to delineate the WHPA for the existing production wells may also be used to develop a WHPA for a new well. Any new or adjusted WHPA boundaries should be compared to the existing WHPA boundaries. If significant differences are observed, the Township should consider modifying the existing wellhead protection plan to encompass the new delineation.

In summary, the following specific WHP program tasks would be completed when considering a new well location:

- A "draft" delineation area and contaminant source inventory would be completed using existing information.
- If the location were favorable, based on review of the "draft" information, a complete MDEQ WHPA delineation would be completed based on current MDEQ guidance.
- A contaminant source inventory of existing and potential sources of contamination within the WHPA would be completed.
- The processes, procedures and requirements set forth in existing MDEQ guidance and regulations must be applied in the location, selection, well design and system implementation of any new wells.

## VII. ROLES AND RESPONSIBILITIES

The goal of this element is to identify individuals and positions that will help develop and implement the WHPP and outline their responsibilities. This is generally accomplished by creating a local wellhead protection team and establishing the appropriate role and responsibilities for each team member. Given the dynamic nature of wellhead protection, it is important to acknowledge that roles and responsibilities will change over time and that planning for this change is essential.

Although the MDEQ requires that only one person be identified as the WHP contact for the Township, the long term success of the WHPP depends on the effectiveness of the Wellhead Protection Team and the continuing education and awareness of groundwater issues within the local community. Most communities have interested citizens and uniquely qualified individuals who have lived in the area for years and can contribute greatly to the long-term success of the WHPP.

For Little Traverse, a joint Wellhead Protection Team has been established which includes the following representatives:

➤	Rachel Schwarz	Little Traverse Bay Band of Odawa Indians
➤	Bob Morris	HSASDA
➤	William Dohm	Little Traverse Township
➤	Dan Begnoche	Env. Health Dept. Supervisor
➤	Dick Schiller	Fire Chief
➤	Peter Pallas	Northern Diecast Corp.
➤	Joe Chattaway	Zoning Board, Little Traverse Township
➤	Danna Widmar	Harbor, Inc.
➤	Frederick Ward	Harbor Springs Water & Street Superintendent
➤	Ron McRae	Harbor Springs City Clerk
➤	Erik Johnson	Fleis & VandenBrink Engineering, Inc.
➤	Jack Sommerville	Pleasantview Township

The Wellhead Protection Team represents the “stakeholders” of the community and the Team has provided input and guidance on how the area manages its water supply, and how to best implement continuing management strategies to help protect the area’s groundwater. The Team reflects the reality that the groundwater reaching the existing production wells does not recognize property boundaries, and a cooperative effort with the area communities is necessary to effectively manage land uses and development within the wellhead delineation areas.

The Wellhead Protection Team members listed above, and others, have been responsible for the development and implementation of the WHPP. The Team has met on numerous occasions to evaluate and develop the elements of the WHPP. Additionally, the Team will be instrumental in future revisions or changes in the program. The Wellhead Protection Team will meet once a year to review the WHPP relative to changes or plans in the community. More frequent meetings will be scheduled if needed. The agenda of the annual Wellhead Protection Team meetings will minimally include a review/update of the contaminant source inventory and a review of the Township’s water production. Additional items that may be addressed include:

- Current wellhead protection education/awareness efforts
- New wellhead protection education/awareness ideas and recommendations
- Other communities’ WHP programs
- Review of any changes in MDEQ WHP guidance
- Abandoned well closures
- Review effectiveness of the WHP management options

At a minimum of every three years, the Wellhead Protection Team will assist in the Contaminant Source Inventory update. Interim updates will be conducted as necessary.

Initial goals of the program were developed by the Wellhead Protection Team to provide guidance for the future management strategies for the implementation of the program. Program goals are included in Attachment D.

Little Traverse's Wellhead Protection Plan specifies certain responsibilities for the long-term implementation of the Program. These responsibilities should be reviewed, the effectiveness evaluated, and appropriate action taken to ensure the long-term success of the Township's Wellhead Protection Program. Specific lead and support responsibilities are identified in the Action Plan presented earlier in this report.

## **VIII. PUBLIC PARTICIPATION AND EDUCATION**

In order for the WHPP to be successful, everyone within the community and especially those who live and conduct their businesses within the Wellhead Protection Area need to be included in the planning process and continuing development and implementation of the Plan. The program developed to be implemented for the Township has involved, and will continue to involve, public participation. Public education and awareness is a key element of the Township's WHPP.

The Wellhead Protection Team members represent a broad cross-section of the community. As a result, the Wellhead Protection Team will be relied upon to inform and educate area residents regarding the WHPP and groundwater awareness. Specific public education items are referenced in Section IV.C.1 of this report.

The Township's WHPP will continue to encourage a program to maximize a "community effort" and a two-way communication with the public to foster community understanding of wellhead protection, and to identify and support the community leaders and volunteers in the implementation of the program.

## IX. SELECT REFERENCES

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USEPA (1994). Ground Water and Wellhead Protection Handbook.

USEPA (1991). Guide for Conducting Contaminant Source Inventories for Public Drinking Water Supplies Technical Assistance Document.

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USEPA (1997). State Source Water Assessment and Protection Programs Guidance Final Guidance.

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USEPA (2001 Draft). Region 5 – Water Division Source Water Protection 5-Year Strategy (2001 – 2005).

USEPA Web Page. (<http://www.epa.gov/safewater/>)

Michigan Department of Natural Resources (1991). Community Planning & Zoning for Groundwater Protection in Michigan: A Guidebook for Local Officials.

Wisconsin Geological and Natural History Survey (1987). A Guide to Groundwater Quality Planning and Management for Local Governments.

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## Wellhead Protection Inventory Form

Survey Conducted by: \_\_\_\_\_ Date: \_\_\_\_\_

Instructions: The attached map illustrates property that is included in the approximate wellhead protection area (WHPA). The following table list possible land uses and their associated risk of environmental contamination. Starting with the number 1, assign a Map ID number for each **high risk (medium and low risk land use will not be tracked)** land use described in the table that is also present in or near the WHPA. Also identify the common name and address of the property on the table and mark the property's location on the attached *Wellhead Protection Inventory Map*. For example, if "Bob's Automotive Body Shop" is located within the WHPA, mark the map to identify the property location and complete the table as follows:

Commercial/Industrial		Map ID	Common Property Name / Address
Automobiles	Body Shops (H)	#1	<i>Bob's Body Shop, 120 Main Street</i>

### Table of Potential Land Use

Commercial/Industrial		Map ID	Common Property Name / Address
Automobiles	Body Shops (High, H)		
	Car Washes (Medium, M)		
	Gas Stations (H)		
	Repair Shops (H)		
Boat Services/Repair/Refinishing (H)			
Cement/Concrete Plants (M)			
Chemical/Petroleum Processing/Storage (H)			
Dry Cleaners (H)			
Electrical/Electronic Manufacturing (H)			
Fleet/Trucking/Bus Terminals (H)			
Food Processing (M)			
Furniture Repair/Manufacturing (H)			
Hardware/Lumber/Parts Stores (M)			
Home Manufacturing (H)			
Junk/Scrap/Salvage Yards (H)			
Machine Shops (H)			
Medical/Vet Offices (M)			
Metal Plating/Finishing/Fabricating (H)			
Mines/Gravel Pits (H)			
Office Buildings/Complexes (Low, L)			
Parking Lots/Malls - >50 Spaces (H)			
Photo Processing/Printing (H)			
Plastics/Synthetics Producers (H)			
Research Laboratories (H)			
RV/Mini Storage (L)			
Wood Preserving/Treating (H)			
Wood/Pulp/Paper Processing or Mills (H)			
Others (list)			

**LEGEND:**

Suggested ranking of potential contaminant sources.  
 H = Higher Risks M = Moderate Risks L = Lower Risks

**Wellhead Protection Inventory Form (Cont.)**

**Table of Potential Land Use**

<b>Agricultural/Rural</b>	<b>Map ID</b>	<b>Common Property Name / Address</b>
Auction Lots (H)		
Boarding Stables (M)		
Concentrated Animal Feeding Operations (CAFOs) (H)		
Crops - Irrigated	Berries, Hops, Mint, Orchards, Greenhouses, Vegetables	
Crops - Nonirrigated	Christmas Trees, Grains, Grass	
Farm Machinery Repair (H)		
Grazing Animals (>5 large animals or equivalent per acre)		
Homesteads - Rural	Machine Shops (H) Septic Systems (L)	
Lagoons/Liquid Wastes (H)		
Land Application Sites (M)		
Pesticide/Fertilizer/Petroleum Storage, Handling, Mixing, Others (list)		

<b>Residential/Municipal</b>	<b>Map ID</b>	<b>Common Property Name / Address</b>
Airports - Maintenance/Fueling Areas (H)		
Apartments and Condominiums (L)		
Campgrounds/RV Parks (L)		
Drinking Water Treatment Plants (M)		
Fire Stations (L)		
Golf Courses (M)		
Housing - High Density - >1 House/0.5 Acres (M)		
Landfills/Dumps (H)		
Motor Pools (M)		
Parks (M)		
Railroad Yards/Maintenance/Fueling Areas (H)		
Schools (L)		
Septic Systems - High Density - >1/Acre (H)		
Utility Stations - Maintenance Areas (H)		
Waste Transfer/Recycling Stations (M)		
Wastewater Treatment Plants/Collection Stations (M)		
Others (list)		

\* Drip - Irrigated crops, such as vineyards and some vegetables, are considered lower risk (L).

**LEGEND:**

Suggested ranking of potential contaminant sources.  
H = Higher Risks M = Moderate Risks L = Lower Risks

**Wellhead Protection Inventory Form (Cont.)**

**Table of Potential Land Use**

<b>Miscellaneous</b>		<b>Map ID</b>	<b>Common Property Name / Address</b>
Above Ground Storage Tanks (M)			
Construction/Demolition Areas (M)			
Historic Gas Stations (H)			
Historic Waste Dumps/Landfills (H)			
Injection Wells/Drywells/Sumps (H)			
Managed Forests (M)			
Military Installations (H)			
Surface Water - Streams/Lakes/Rivers (L)			
Transportation	Freeways/State Highways (M)		
	Railroads (M)		
	Right-of-Ways - Herbicide Use		
Underground Storage	Confirmed Leaking Tanks - DEQ		
	Decommissioned - Inactive (L)		
	Non-Regulated Tanks - <1100		
	Not Yet Upgraded or Registered		
	Upgraded and/or Registered -		
Wells (H)			
Random Dumpsites (M)			
Sludge Disposal Areas (M)			
Others (list)			

\* Drip - Irrigated crops, such as vineyards and some vegetables, are considered lower risk (L).

**LEGEND:**

Suggested ranking of potential contaminant sources.  
 H = Higher Risks M = Moderate Risks L = Lower Risks

## **Little Traverse Township Wellhead Protection Program Goals**

*Mission Statement: Develop a successful long-term program to protect Little Traverse Township's drinking water well fields and to prevent groundwater pollution in the wellhead protection areas through public education and through cooperative management by local government agencies.*

Goal #1 To protect the public drinking water supply by preventing the pollution of surface and groundwater within the Wellhead Protection Areas (WHPA).

**Objective is to maintain a safe drinking water supply and protect the Township's infrastructure investment in the water supply by preventing pollution from entering the groundwater.**

**Methods: - Define the Wellhead Protection Area (WHPA)**  
**- Inventory actual and potential contamination within the WHPA**  
**- Ensure historical wells have been properly abandoned**  
**- Coordinate WHP activities with County and State agencies**

Goal #2 To instill a sense of ownership of the well fields and encourage the local community to recognize that wellhead protection is both worthwhile and necessary.

**Objective is to develop local awareness and support for wellhead protection.**

**Methods: - Develop educational strategies**  
**- Notify property owners located near the well fields**

Goal #3 To clarify the roles and duties of agencies and individuals involved in wellhead protection.

**Objective is to develop a WHP program that will remain effective after initial work is completed.**

**Methods: - Assign municipal staff**  
**- Identify volunteers to assist with various aspects of the program**

Goal #4 To promote inter-governmental and intra-governmental cooperation to assure protection of the water resources within the WHPA.

**Objective is to address groundwater protection on a regional basis.**

Goal #5 To promote the speedy and thorough cleanup of existing contamination within the WHPA.

**Objective is to reduce the likelihood of contaminants migrating into the municipal water supply.**

**Methods: - Document known sites of contaminations**  
**- Develop cleanup and priority and monitoring system**

Goal #6 To plan and prepare for water supply emergencies.

**Objective is to develop a plan for backup water supply in the event of a water supply emergency. Intent is also to develop a contingency plan to respond to potential natural and man-made events including hazardous material spills, vandalism, power loss etc.**

**Methods: - Develop program with local municipal leaders**  
**- Define program in a written plan**

## **Glossary of Terms**

### **Aquifer**

Permeable geologic material, such as rock, sand, or gravel, which contains water in sufficient quantities to supply a well.

### **Confined Aquifer**

1) An aquifer overlain and underlain by impermeable layers, such as clay; or 2) an aquifer in which the groundwater is under pressure greater than atmospheric pressure and which will rise in a well above the point at which it is first encountered.

### **Critical Materials**

Substances that are listed in Michigan's "Critical Materials Register". The Register is a list of chemicals of high environmental concern. Facilities that store critical materials on site must submit a pollution incident prevention plan to the State, and they must provide secondary containment for the materials.

### **Delineation**

The mapping out of the area through which groundwater moves to reach a drinking water supply well(s).

### **Environmental Regulations**

State environmental laws have been codified into one Act, the Natural Resources and Environmental Protection Act (Act 451 of 1994) (NREPA). The following "parts" deal directly with groundwater protection:

#### **Part 201 of NREPA, Environmental Remediation Section**

The State's own "Superfund" law, this section oversees the clean up of contaminated sites in Michigan. The section also provides for the listing and prioritization of contaminated sites.

#### **Part 111 of NREPA, Hazardous Waste Management**

Regulates the storage, treatment, and disposal of hazardous waste. Requires permits for facilities which store, treat, or dispose of hazardous waste. Those that generate more than 1000 kilograms/month of hazardous waste are termed "large quantity generators" (LQG). These generators must report their waste generation to the State and to the EPA, provide secondary containment for liquid wastes, and prepare emergency plans. Those generating between 100 and 1000 kilograms/month are termed "small quantity generators" (SQG). These generators must report their waste generation to the State and the EPA. Those generating under 100 kilograms/month are "conditionally-exempt small quantity generators." They must keep records of their operations.

Part 111 also regulates the siting and operation of hazardous waste landfills.

#### **Part 115 of NREPA, Solid Waste Management**

Regulates the siting and operation of solid waste landfills.

#### **Part 31 of NREPA, Water Resources Protection**

Mandates the protection and conservation of the water resources of the State, including groundwater. Regulates discharges of pollution to ground and surface water. Requires facilities handling "critical materials" to prepare spill response plans and to provide secondary containment. Requires facilities discharging polluting materials to the groundwater (through floor drains or otherwise) to obtain a groundwater discharge permit. Regulates sanitary wastewater discharges of over 10,000 gallons per day.

#### **Part 615 of NREPA, Supervisor of Wells**

Regulates the drilling and operation of oil and gas wells, and the disposal of wastes created from such operations. Well drilling, operation, closure, and waste disposal must be carried out so that damage of fresh water supplies is prevented.

**Part 211 of NREPA, Underground Storage Tank Regulations**

Requires annual registration of underground storage tanks and compliance with leak detection requirements. Regulates response to discovered leaking tanks.

**Part 83 of NREPA, Pesticide Control**

Regulates the use of pesticides for agricultural uses.

**State laws not codified into NREPA:**

**Public Health Code (Act 368 of 1978)**

Regulates construction of private water wells. Part 127 requires that wells that are abandoned be properly plugged to prevent contamination.

**Michigan Safe Drinking Water Act (Act 399)**

Provides for the supervision and control of public water supplies and public health protection.

**Relevant Federal laws:**

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**

Often called the "Superfund Act," it oversees and funds clean up of contaminated sites.

**Underground Injection Control Program**

Regulates the underground injection of toxic waste. Hazardous waste operators injecting waste into wells must obtain a permit from the EPA.

**Safe Drinking Water Act (SDWA)**

A Federal Act designed to protect drinking water. 1986 amendments require States to develop wellhead protection plans "to protect wellhead areas within their jurisdiction from contaminants which may have any adverse effects on the health of persons."

**Superfund Amendments and Reauthorization Act (SARA), Title III, Community Right-to-Know**

Requires facilities using certain amounts of hazardous substances to report their usage to the EPA and to the State. Facilities meeting certain criteria must also prepare emergency response plans.

**Fire Fighter Right to Know Program**

Requires Fire Fighters to survey and inspect all facilities in their community that handle hazardous substances.

**Freedom of Information Act**

States that all information gathered by public agencies must be made available to the public upon request.

**Groundwater**

Freshwater that fills the spaces between sand, gravel, and clay underground.

**Groundwater Impact/Contamination**

The result of the spillage or discharge of hazardous substances or polluting materials into an aquifer.

**Hazardous Substance**

A chemical or other material which is or may become injurious to the public health, safety, or welfare, or to the environment. You can find hazardous substances in small and large businesses, farms, and households.

### **Household Hazardous Waste**

Products used in the household or home garage that, when used, stored, or disposed of improperly, may pose a threat of contamination to the environment.

### **Hydrogeology**

The study of water and geology, and how the two interact.

### **Hydrogeologist**

A person who studies hydrogeology.

### **Leaky Confined Aquifer**

An aquifer that has a confining layer of clay over it that is noncontinuous, allowing for some recharge ("leakage") from the surface.

### **Secondary Containment**

Providing a kind of structure around a storage tank or container so that, if there is a spill, the substance will be contained.

### **Site of Environmental Contamination**

Sites where leakage, spillage, or other discharge of hazardous substances has contaminated the groundwater or soil; and that the State has placed on its list of contaminated sites, under the Environmental Remediation Section (Part 201) of the Natural Resources Environmental Protection Act, PA 451.

### **Superfund Site**

A site listed as contaminated under the Federal Superfund law.

### **Topographic Maps**

Maps produced by the U.S. Geological Survey that show roads, lakes, streams, wetlands, developed areas, municipal boundaries, elevation contours, and other features at a scale of 1:24,000.

### **Tritium**

An isotope of water (a water molecule that has three hydrogen atoms instead of two). Atmospheric testing of nuclear weapons in the 1950's caused tritium levels in water supplies to increase. (Don't worry! Tritium is a harmless substance). Hydrogeologists test the level of tritium in water to measure the age of the water.

### **Unconfined Aquifer**

An aquifer with the water table as its upper boundary. Because the aquifer is not under pressure, the water level in a well is the same as the water table outside the well.

### **Underground Injection Wells**

Wells into which treated water and/or other wastes are injected for disposal.

### **Underground Storage Tanks**

Tanks under the surface of the ground in which gasoline, fuel oil, and other substances are stored.

### **Water Table**

The top of an unconfined aquifer where water pressure is equal to atmospheric pressure. The water table depth fluctuates with climate conditions on the land surface above and is usually gently curved, following a subdued version of the land surface topography.

### **Well Logs**

Records that well drillers complete when they drill a residential or public drinking water well. Well logs contain information such as depth to water table, lithology, the type of well constructed, and the depth of the well.

**Wellhead**

The physical structure at the land surface through which groundwater is withdrawn from an aquifer.

**Wellhead Protection Area (WHPA)**

The surface and subsurface area surrounding a water well or well field through which contaminants are reasonably likely to move toward and reach such well or well field. The WHPA is the "catchment area" of concern for public water supplies dependent on groundwater.

**Wellhead Protection Plan (WHPP)**

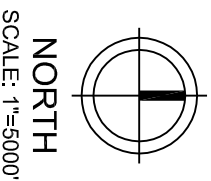
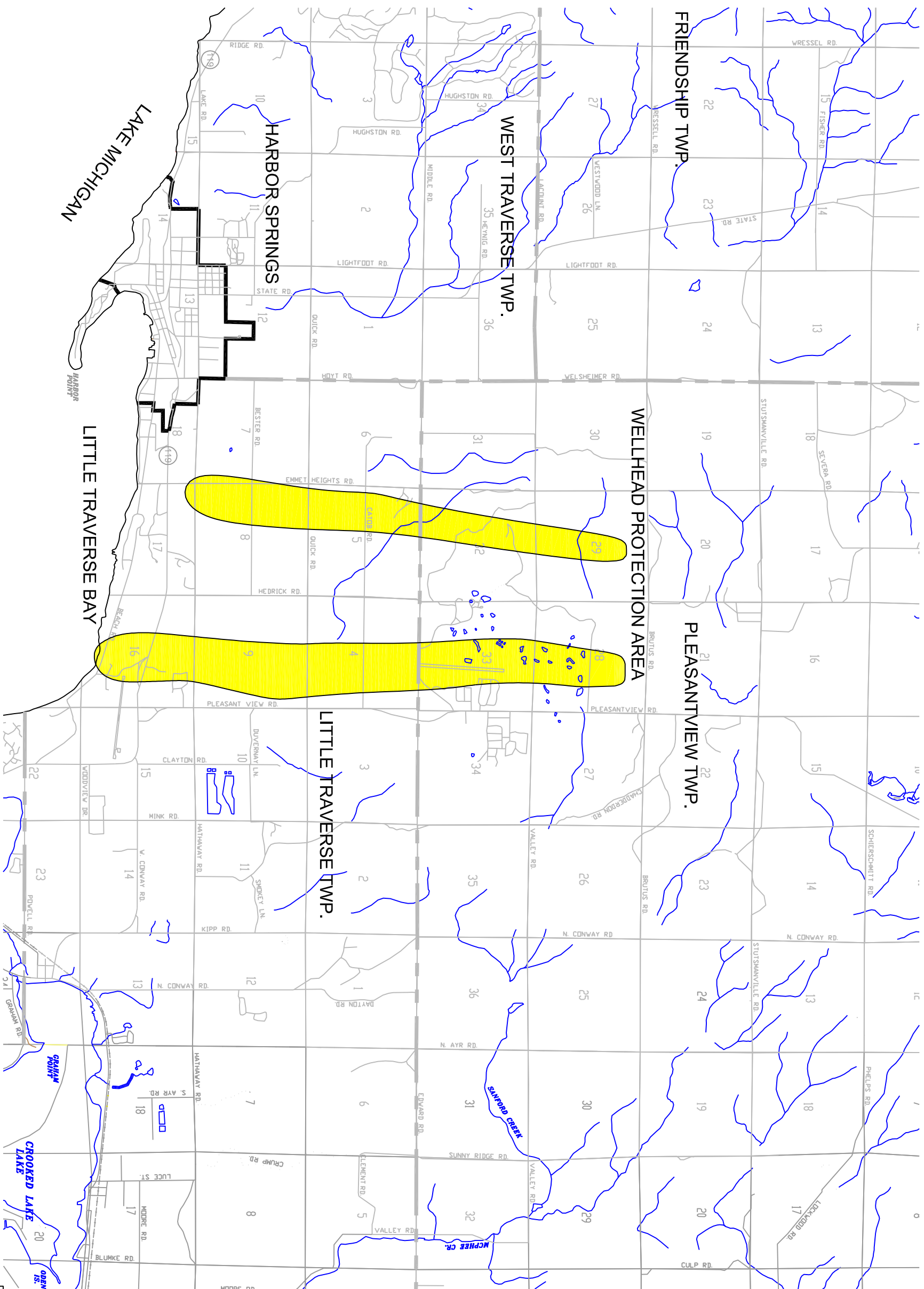
A plan developed by a community operating a public well water supply system that details how the community will work to protect their wells from contamination.

Source: "*Wellhead Protection Community Guide*" Huron River Watershed Council, February, 1997  
pg. 171 - 176.

**United States Environmental Protection Agency Source Water Protection National Vision Statement<sup>1</sup>**

All interested stakeholders utilizing a variety of available tools in a coordinated fashion, establish barriers that significantly lower the risk of contaminants entering current and potential drinking water resources.

<sup>1</sup>*USEPA Region 5 Water Division Source Water Protection 5-Year Strategy (2001 – 2005)  
November 28, 2001 Draft.*



 WELLHEAD PROTECTION AREA

**LEGEND**

**LITTLE TRAVERSE TWP.**  
EMMET COUNTY, MICHIGAN

10 YEAR WELLHEAD  
PROTECTION AREA  
FIGURE 1