

Attachment 8

MANAGEMENT STRATEGIES

8.1 Introduction

The potential contaminant inventory and risk assessment provide the starting point for identifying options for managing a WHPA. With an emphasis on the higher-risk activities, the plan addresses the specific potential contaminants found within the WHPAs. Full implementation of a WHPP begins with the selection of specific methods for protecting groundwater in a WHPA. Typically, a WHPP management plan would include:

1. Public Education to increase awareness of the need for protection of groundwater supplies, and to encourage voluntary modifications and activities that may threaten the groundwater quality;
2. Use of non-regulatory methods for increasing the area of the WHPA devoted to land uses that protect rather than degrade groundwater quality; and
3. Where non-regulatory approaches are not adequate, regulate land use and other human activities that could pose a significant threat to groundwater quality.

Wellhead protection management options or tools can be generally classified as regulatory or non-regulatory. At the local level, regulatory approaches generally involve the use of some form of zoning ordinances, subdivision or individual lot controls, or promulgation of local health and environmental regulations designed to directly or indirectly protect groundwater within the WHPA. Many of state and federal regulations also address wellhead protection. Non-regulatory controls involve voluntary actions taken on the part of the public and private sector to enhance groundwater protection.

Wellhead protection management options can also be classified as technical and non-technical. Technical options generally involve controls based on some understanding of the relationship between contaminant characteristics and the hydrogeology of the WHPA. An example of a technical option for a management plan is a groundwater monitoring plan.

Non-technical options are generally not directly related to scientific considerations, although indirect relationships exist to the extent that WHPA delineation and contaminant risk assessment processes are scientifically based. An example of a non-technical management option is a hazardous waste collection program.

Management Committee

The Management Committee of the Local Planning Team (LPT) has worked to develop a management plan that is appropriate to the Louisville and Prospect communities. While many local, state, and federal rules, regulations, ordinances, and laws exist that either directly or indirectly protect the groundwater supply, the Management Committee has developed strategies to effectively manage the potential contaminants found within the WHPA.

The Management Committee members included representatives from the Louisville/Metro Planning Commission, the Metropolitan Sewer District, the State Transportation Cabinet, the Kentucky Resource Council, the Metro Works Department, the Division of Water, the Louisville Development Authority, the Metro Environmental Health Department, Metro Waste Management, Jefferson County Attorney, the Louisville Homebuilders Association, River Fields, Inc., and Harrods Creek Task Force. These members provided additional information to the committee, based on their unique perspectives.

The Louisville Water Company would like to express our appreciation to the Management Committee for their efforts in developing the Management Plan.

Additional sources of information and/or advice were provided, on a subject-by-subject basis, from the US EPA, Region 4, UIC Class V Injection Well Section in Atlanta, GA, the Federal Emergency Management Agency, the US EPA Envirofacts, Office of Non-point Source Pollution, Office of Water, Small Business Gateway, and the National Pesticide Information Center. These agencies provided services, advice and free educational materials.

Services provided to the LPT from the state level include the KY Cabinet for Health Services Department of Public Health, the KY Department of Natural Resources Division of Fish and Wildlife, the KY Environmental Quality Commission, the KY Department of Environmental Protection Division of Waste Management, the University of Kentucky, the Department of Agriculture Division of Environmental Services, and the KY Division of Water. These agencies answered questions, provided free educational materials, and discussed existing rules and regulations.

The Louisville Water Company would like to express our appreciation to those state and federal agencies who offered additional assistance during the development of the Management Plan.

Specific questions and advice were discussed with members of the community who were not members of the LPT or the Management Committee, but who volunteered their time and efforts to assist the Management Committee in the development of the plan. The Louisville Water Company would like to express our appreciation to Ms. Ann Simms of the City of Prospect for her participation in our discussions. We would also like to thank Mr. Bruce McKinney, Ms. Pat Keefe, and Ms. Brenda Taylor of the KY Division of Water, Groundwater Branch for their advice and sources of information.

8.2 General Management Strategies

The Management Committee investigated many types of management strategies during the development of the Management Plan. While some strategies listed and discussed in the EPA’s guidebooks on Wellhead Protection are in place and in operation, additional management options were developed. A listing of the various options discussed and considered for use by the Management Committee is shown below in Table 8.2.1. Records of Management Committee meetings may be found in the Phase 1 submittal of the WHPP.

Table 8.2.1

Management Strategies Discussed by the Management Committee

Regulatory Options	Non-regulatory Options	Technical Options
<p>Zoning Ordinances:</p> <ul style="list-style-type: none"> Overlay groundwater protection districts Land use prohibitions Special permitting Large-lot zoning Transfer of development rights Cluster/PUD design Growth controls/timing <p>Subdivision/Lot Controls</p> <ul style="list-style-type: none"> Subdivision ordinances Site plan review <p>Health & Environmental Regulations</p> <ul style="list-style-type: none"> Prohibit or additional UST regulations Other source prohibitions Inspection & testing Prohibition/regulation small sewer plants Phosphorous buffer zone Septic cleaner ban Septic system maintenance/upgrades Registration/inspection businesses w/toxic chemicals Regulation of agricultural chemicals Regulation of private wells, permits, pump & water quality testing 	<p>Non-technical Options</p> <ul style="list-style-type: none"> Land acquisition by purchase or donation Purchase of development rights Taxation deferments for non-development Conservation easements Voluntary limits to development Land banking/transfer taxes Contingency planning Hazardous waste collection program Public education Training & demonstration Waste reduction Water conservation 	<p>General</p> <ul style="list-style-type: none"> Wellhead protection zones Groundwater monitoring Performance standards Operating standards Design standards Best management practices, (BMPs) Capture zone management <p>Subdivision Controls</p> <ul style="list-style-type: none"> Nitrogen/phosphorous loading standards Drainage requirements <p>Non-point Source Pollution Controls</p> <ul style="list-style-type: none"> Agricultural BMPs Construction site BMPs

While many of these management strategies are already in place, or in use within Jefferson County, the Management Committee was able to focus on the WHPA in Prospect, KY, and develop additional management options specifically tailored to the area's needs. Specific management tactics were added to existing policies, programs, and activities pertaining to the WHPA.

Based on the special needs of the WHPA, the Management Committee focused their efforts on developing a plan with the following elements:

1. Enforcement of existing regulations, ordinances, laws, and rules to insure compliance with current environmental standards;
2. Updating or upgrading existing systems within WHPA-1, the area of highest concern;
3. Voluntary use of Best Management Practices (BMPs) by residential, commercial, agriculture, and government sites within the WHPA; and
4. Public Outreach and Education developed specifically for the people that live and work within the WHPA.

Other management options may be used at a later date, as problems arise or situations change.

8.3 Existing Contaminant Source Management Programs

Many management strategies are already in place and in operation, while additional plans, policies, and programs will be implemented as a part of the Management Plan. The general types of management strategies that are currently in use are listed in Table 8.3.1.

In many cases, enforcement of these existing programs, rules, regulations, laws, and ordinances will serve as the management plan designed to protect the groundwater from contamination. Enforcement and compliance will have to be accomplished on a case-by-case basis, and will require the assistance of many diverse government elements.

Table 8.3.1

Current Regulations or Practices Operating to the Benefit of the WHPP

Regulation, Ordinance, or Practice	Applicability to Wellhead Protection	Land Use Practice	Legal Considerations	Administrative Considerations
Special Permitting	Used by various state and local agencies to regulate specific activities, examples include NPDES permits, licenses for pesticide applicators, septic system inspections	General permitting for various activities that may be found within the WHPAs	Well-organized method of requiring specialized licenses and/or education to protect groundwater and public safety. Requires case-by-case analysis	Requires KY and local enforcement of special permit requirements and onsite investigation.
Underground Fuel Storage Systems	Used to regulate USTs within WHPAs	KY has adopted special permit and performance standards for the use of USTs throughout the state.	Well-accepted regulatory option	Regulating USTs requires KY administrative support and inspection.
Privately Owned Wastewater Treatment Plants	Used to prohibit the construction of small sewage treatment plants within the county.	Louisville/Metro government has adopted health/zoning ordinances to prohibit the construction of additional small sewage treatment plants in Jefferson County.	Well-accepted regulatory option	Prohibition requires little local administrative support.
Septic System Design Criteria	Used to require inspection of new septic system installations and water quality testing	Louisville/Metro government has adopted a health/zoning ordinance requiring inspection	Well-accepted purview of government to ensure protection of groundwater.	Significant administrative resources required for this option from Local Health Department

Table 8.3.1 Current Regulations or Practices Operating to the Benefit of the WHPP (continued)

Regulation, Ordinance, or Practice	Applicability to Wellhead Protection	Land Use Practice	Legal Considerations	Administrative Considerations
Toxic & Hazardous Materials Handling Regulations	Used to ensure proper handling and disposal of toxic materials/wastes.	Louisville/Metro government ordinances mirroring state regulations requiring registration and inspection of all businesses using toxic/hazardous materials above certain quantities	Well-accepted purview of government to ensure protection of groundwater.	Requires KY and MSD administrative support and onsite inspections.
Private Well Permitting	Used to protect private, onsite water supply wells	KY has adopted regulation to require permits for new private wells and ensure appropriate well-to-septic setbacks. Also requires pump and water quality testing	Well-accepted purview of government to ensure protection of groundwater.	Requires KY administrative support and onsite inspections.
Conservation Easements	Can be used to limit development within WHPAs	Generally obtained with the assistance of non-profit land conservation organization. i.e. River Fields, Inc. acquired a conservation easement on the Henry Wallace property.	Many legal considerations, most of which involve liability.	Few administrative requirements.
Groundwater Monitoring	Used to monitor groundwater quality or other aspects within the WHPA	Monitoring program currently in place is completed by the USGS. Other than initial water quality testing, water quality is not tested on a regular basis.	Accepted method of ensuring groundwater quality.	Requires USGS moderate administrative staffing to ensure routine sampling and response if sampling indicates contamination.
Contingency Plans	Used to ensure appropriate response in cases of contaminant release or other emergencies within the WHPA	Louisville/Metro government has developed an Emergency Operations Plan.	None.	Requires significant up-front planning to anticipate and prepare for emergencies.

Table 8.3.1 Current Regulations or Practices Operating to the Benefit of the WHPP (continued)

Regulation, Ordinance, or Practice	Applicability to Wellhead Protection	Land Use Practice	Legal Considerations	Administrative Considerations
Hazardous Waste Collection	Used to reduce accumulation of hazardous materials within the county.	Louisville Metro government operates Haz Bin, a hazardous waste collection area for residential properties.	Several legal issues are raised by the collection, transport, and disposal of hazardous waste.	Sponsored by Louisville/Metro Solid Waste.
Public Education	Used to inform community residents of the connection between land use and the environment.	Metro government offers some education via their web site and other community programs.	No outstanding legal considerations	Requires some degree of local administration.
Hazardous Materials Use and Spill Prevention Control, (HMPC) Plans	Used to maintain an inventory of hazardous materials located within the Louisville/Metro area.	MSD administers and coordinates the efforts of the plan. Businesses operating in the area that have over 55 gallons of a hazardous substance are required to have a plan.	Accepted method of ensuring groundwater quality.	Requires some degree of local administration.
Groundwater Protection Plans	Used to maintain an inventory of hazardous materials, encourage the development of contingency plans on a site-by-site basis, and to raise awareness of specific groundwater issues.	KY Division of Water administers and coordinates the plan. Both commercial and residential properties are required to submit a plan, depending on the type of activity and the amounts of hazardous materials stored or used.	Accepted method of ensuring groundwater quality.	Requires KY administrative support.
UIC Class V Injection Well Program	Used by the US EPA, Region 4 to regulate septic systems that qualifies as a Class V Injection Well.	Both the Louisville/Metro Health Department and US EPA Region 4 administer and coordinate the program.	Accepted method of ensuring groundwater quality.	Requires administrative support from local and federal officials.

Table 8.3.1 Current Regulations or Practices Operating to the Benefit of the WHPP (continued)

Regulation, Ordinance, or Practice	Applicability to Wellhead Protection	Land Use Practice	Legal Considerations	Administrative Considerations
Marina/Recreational Boating Regulations	Used by the KY Dept. of Fish and Wildlife to regulate recreational boating and marinas. Regulations both prohibit dumping of raw sewage into waterways and require marinas to provide pump-out stations.	KY Dept. of Fish and Wildlife administers state regulations that are in place. Local River Patrol police also may be contacted for enforcement, as well as the US Coast Guard.	Accepted method of ensuring groundwater quality.	Requires administrative support from local, state, and federal officials.
Zoning Ordinances	Used by the Louisville/Metro Planning Commission to restrict certain types of land uses within the WHPA	Louisville/Metro Planning Commission administers the ordinances.	Accepted method of ensuring groundwater quality.	Requires administrative support from local and federal officials.

The activities and practices that are currently operating within the WHPA will be of great assistance in managing known specific potential contaminants. Many committee members, who serve in key positions within the Louisville/Metro government, have become better educated about the potential for groundwater contamination and the need for the community to protect the groundwater reservoir. Their participation in the committee’s discussions will likely make at least some contribution toward the development of ordinances, practices, and design considerations that will also protect the groundwater in Jefferson County. In this single area, the development of the Wellhead Protection Plan has served the purpose of the Wellhead Protection Program promulgated by the State of Kentucky and by the US EPA.

Development of the Management Plan has also served to bring to light areas where regulations are lacking, information is sparse, and/or additional needs must be met. The Management Plan that has been developed has sought to maintain a balance between the health and safety needs for the entire community, as well as financial and private needs of the specific commercial and residential property owners within the Prospect community.

8.4 Current Zoning within the WHPA

Land use within the WHPA has been mapped to depict the general types of zoning ordinances in place (Figure 7.2.3). Current usage includes:

1. Single Family Residence – includes lots <1/2 acre, as well as lots >1/2 acre in size. Additional zoning per subdivision is in place, specifying square footage of homes, setbacks from roads, etc.
2. Multifamily Residential – includes condominiums found in and near Harrods Landing Community and Harrods Landing Townhomes.
3. General Commercial and Office – includes the commercial sections of the WHPA, along with many government offices (i.e. the US Postal Service).
4. Parks, Cemeteries, etc. – includes public parks within the WHPA. There are no cemeteries within the WHPA.
5. Industrial – includes the Louisville Water Company property within the WHPA.
6. Public and Semi-public – includes areas designated as public use areas (i.e. Wallace Farm petting zoo, churches, etc.)
7. Vacant and Undeveloped – includes most of the agricultural properties within the area (i.e. Wallace Farms, etc.)

At the present time, the map shows that the majority of the area is single family residence, vacant and undeveloped, parks, or the industrial section of the Louisville Water Company. Most of the vacant and undeveloped land will likely remain so for some time in the future. The Wallace property, the largest agricultural site in the area, is a part of a conservancy easement with River Fields, an environmental group that owns property within the WHPA.

Land use zoning of areas within the WHPA may, of course, change through time, as development occurs throughout the area. The Louisville/Metro Planning Commission provided several team members to the Local Planning Team, and the commission is aware that the area is a WHPA. These members will continue to provide assistance to the Management Committee in future land use development.

8.5 WHPA Protection Levels

The goal of the WHPP is to protect the groundwater supplying the collector well by delineating multiple WHPAs and applying different management strategies within each area. Protection areas are established to protect the well from unexpected contaminant releases, and to minimize the likelihood by locating potentially high-risk potential contaminants within the WHPA. By incorporating different management strategies within the WHPA, the aquifer can be protected without placing unnecessary controls on activities within each area.

The KY Division of Water (KY DOW) has defined three separate WHPAs, based on different criteria, as mandated by the US EPA. Two of the WHPA zones are defined by a concept known as a Time of Travel (TOT). The TOT refers to the distance between the well and a potential contaminant, and the time required for the contaminant to enter the wellhead.

WHPA-1 encompasses the area directly adjacent to the well, and is designed to prevent direct introduction of contaminants at the wellhead. The distance from the well was calculated so that a contaminant would require 180 days to travel into the well. WHPA-2 is designed to prevent contamination from entering the groundwater that supplies the well. The outer boundary of this area is based on a ten year TOT. WHPA-3 is equal to the boundary marking the outer limits of the groundwater divide, which would represent, in many cases, more than ten years for a contaminant travel to the wellhead.

As previously noted, WHPA-2 has been subdivided into two areas, WHPA-2A and WHPA-2B. WHPA-2A denotes the area of wellhead protection where it would take five years for a potential contaminant to enter the well, while WHPA-2B denotes the area where it would take ten years for a contaminant to enter the well. This subdivision of the WHPA was designed to allow for a greater degree of protection in the area nearest the well.

The three general areas also represent different levels of protection. WHPA-1 has the highest level of protection, with lower degrees of protection radiating outward from the wellhead. Table 8.5.1 shows the various levels of protection levels and emergency response times within the WHPAs.

Table 8.5.1

WHPA Protection and Emergency Response Levels

WHPA	Protection Level	Description	Emergency Response Level
WHPA -1	Very High	Very few new potential contaminants allowed within area (which is mostly owned by LWC). Existing potential contaminants to be monitored and equipment updated or upgraded. Best Management Practices required (LWC). Activities that represent a medium to high risk of contamination are to be phased out, if possible. Those representing a low risk must be monitored.	Very High – Response must be immediate, within 12-24 hours of event. Even small amounts of contamination receive high level of treatment, and/or monitoring.
WHPA-2 (2A & 2B)	High	Some potential contaminants allowed in this area. Some BMPs required and other are highly encouraged. Activities that represent a high risk of contamination are to be phased out if possible. Those representing a low to medium risk must be monitored.	High – Response must be soon, within one month of discovery of event, and within 12-48 hours of catastrophic event. Some small amounts, all medium to high amounts of contamination receive high level of treatment and/or monitoring.
WHPA-3	Medium	Some activities that demonstrate a high risk of contamination may be allowed, but must be monitored. Some may be phased out, if possible. BMPs are highly encouraged for all potential contaminants.	Medium – Response may be within one to six months of incident if discovered by monitoring activities, and within 12-48 hours of a more catastrophic event. Some small to medium amounts of contamination to receive high level of treatment and/or monitoring, all larger amounts of contamination to receive high level of treatment and/or monitoring.
Outside Area	Low	LWC strives to increase public awareness about groundwater contamination and BMPs.	Normal response.

8.6 Prioritization of Potential Contaminants

In addition to the completion of the risk susceptibility analysis performed, the results of the potential contaminant survey were also generally grouped by contaminant type, in order to develop specific management plans per contaminant. The results of the individual risk susceptibility analysis per property were considered, as well as general categories of potential contaminants, and KY DOW assessments. The results of the general prioritization may be seen below in Table 8.6.1.

Table 8.6.1
Priority Ranking of General Potential Contaminants

Potential Contaminant	WHPA-1	WHPA-2	WHPA-3	KY DOW Risk Assessment	General Risk Susceptibility Analysis	Priority
Agricultural activities, including runoff, pesticide and fertilizer application, animal burial	Yes	Yes	Yes	High	Low to High	Low, farms are low-impact, horse farms, some cattle, few crops.
Aboveground Storage Tanks, petroleum products	Yes	Yes	Yes	High	Medium to High	High
Aboveground Storage Tanks, non-petroleum products	Yes	No	No	Medium	Medium	Low, all are on LWC property and monitored
Boat repair, storage, salvage	Yes	Yes	Yes	High	Low to Medium	Medium, storage most prevalent
City/Private Parks	No	Yes	Yes	Low	Low	Low
De-icing salts	Yes	Yes	Yes	High	Medium to High	Medium to High
Dry Cleaners	No	Yes	Yes	High	Medium	Medium
Groceries	No	Yes	Yes	Medium	Low	Low, based on site inspections
Home pesticide and fertilizer	Yes	Yes	Yes	Medium	Medium	Medium
Marinas	No	No	Yes	High	Medium	Medium

Table 8.6.1 Priority Ranking of General Potential Contaminants (continued)

Potential Contaminant	WHPA-1	WHPA-2	WHPA-3	KY DOW Risk Assessment	General Risk Susceptibility Analysis	Priority
Materials transport	Yes, limited	Yes	Yes	High	High	High
Medical offices	No	Yes	No	Medium	Low	Low, based on site interviews.
Monitoring wells	Yes	Yes	No	High	High	High
Nail Salons	No	Yes	Yes	Medium	Low	Low, based on site interviews
Outdoor storage of chemicals	No	Yes	Yes	High	Medium	Low to medium, based on site interviews
Parking lots	Yes	Yes	Yes	Medium	Low	Low
Photography labs	No	Yes	Yes	Medium	Low	Low, based on site interviews
Pipelines	No	Yes	No	Medium	Low	Low, based on nature of materials
Poorly constructed water wells	Yes	Yes	Yes	High	High	High
Printer shops	No	Yes	No	Medium	Low	Low, based on site interview
Restaurants	No	Yes	Yes	Medium	Medium	Low to Medium, site interviews
Septic systems	Yes	Yes	Yes	High	High	High
Transformer stations	No	Yes	No	Medium	Low	Low, based on site survey
Underground storage tanks, petroleum products	Yes	Yes	Yes	High	High	Medium

Table 8.6.1 Priority Ranking of General Potential Contaminants (continued)						
Potential Contaminant	WHPA-1	WHPA-2	WHPA-3	KY DOW Risk Assessment	General Risk Susceptibility Analysis	Priority
Waste lagoons	Yes	No	No	High	Low	Low, LWC owns waste lagoons that contain materials from water treatment, low impact
Water wells not in use	Yes	Yes	Yes	High	High	High

Several potential contaminants that would normally have been ranked a high risk and a high priority were ranked at a lower priority, based upon the results of the site interviews or surveys. As an example, Dry Cleaners are ranked as a high risk by the KY DOW, but, based on the site interviews, LWC ranked dry cleaners as a medium risk. Of the dry cleaners in the area, only one performs actual cleaning on site, and stringent regulations exist that control the dry cleaning industry. Therefore, the Management Committee did not feel that this particular potential contaminant was a high priority.

The potential contaminants that are felt to be of high and medium priority are listed below in Table 8.6.2.

**Table 8.6.2
High and Medium Priority Potential Contaminants**

High Priority Potential Contaminants	Aboveground Storage Tanks, heating oil De-icing Salts Materials Transport Monitoring Wells Poorly Constructed Water Wells Septic Systems Underground Storage Tanks, heating oil Inactive Water Wells
Medium Priority Potential Contaminants	Boat repair, storage, and salvage Dry Cleaners Home pesticide and fertilizer application Marinas Outdoor Chemical Storage Underground Storage Tanks

Based on the prioritization of the potential contaminants, the Management Committee developed specific management plans for the potential contaminants. The Public Outreach and Education Committee contributed to the Management Committee's efforts, as public education about the specific contaminants is an integral portion of the plan. In addition, the Compliance Committee also contributed to the plan, during discussions on enforcing existing regulations.

8.7 Aboveground and Underground Heating Oil Tanks

Several homes within the WHPA use heating oil as a source of fuel for furnaces. The heating oil is stored either in an underground storage tank or an aboveground storage tank on the property to provide a constant source of fuel during the winter.

There are approximately 28 known heating oil tanks located within the WHPA. These homes, which range from approximately 30 to 50 years of age, rely on heating oil for their source of heat during the winter. As a rule, the tanks are full during the early fall, and the supply is gradually used up during the winter, so that the late spring and following summer the tanks are relatively empty.

More homes within the area may have heating oil tanks either buried or located within the basement, but some are likely not in use. LG & E has installed natural gas pipelines to many of the older neighborhoods, and many homes have likely converted to natural gas from heating oil. However, the true extent of the presence of active and inactive tanks cannot be determined:

1. Neither MSD, the Fire Marshall, nor the state keep a listing of heating oil tanks, as they are considered to be small tanks by gas station standards (550 gallons or less);
2. No heating oil tank release listing is available from any state or local department; and
3. No heating oil supplier or tank installer will provide a customer list to LWC.

For these reasons, the discovery of heating oil tanks was made more difficult, and relied heavily on actual tank or fill pipe sightings during the Windshield Survey and word of mouth by Potential Contaminant Survey Committee members.

In some cases, homeowners will voluntarily remove a heating oil tank, either during the change to another type of heat or during a property transfer. According to the local Realtors' Association, banks will not finance a loan on a home with an abandoned heating oil tank, due to liability issues. Other homeowners may voluntarily change the type of heat used in order to make a home more saleable, or to save money on heating expenses.

Home heating oil tanks that are not in use may be abandoned in place, by using the methods required by state law. Most heating and air-conditioning services will follow these guidelines for in-home tank abandonment:

1. Confirm that there have been no leaks of materials from the tank;
2. Pump out the remaining fluid in the tank;
3. Clean the tank;
4. Fill the tank with a clean, inert materials;
5. Remove the intake and fill lines; and
6. Seal all ports.

Table 8.7.1 shows the locations of heating oil tanks per WHPA.

Table 8.7.1
Location of Heating Oil Tanks per WHPA

WHPA	Number of Known Heating Oil Tanks
WHPA-1	13
WHPA-2A	13
WHPA-2B	4
WHPA-3	30
Outside WHPA	0

While thirteen heating oil tanks may be found within WHPA-1 and WHPA-2A, these are ranked as a high to very high risk to the aquifer. These are considered to be a medium to high risk to the aquifer. Four known heating oil tanks may be found in WHPA-2B, and 30 known heating oil tanks may be found within WHPA-3. Heating oil tanks may be located just outside the WHPA. These particular tanks are of lower priority within the plan, because they are distant from the wells.

Modes of Contamination

Both the KY Environmental and Public Protection Cabinet and the US EPA consider heating oil tanks to represent a high risk to an aquifer. The toxicity of the materials is high, and the opportunity for undetected leaks to occur is also very high. Leaks from heating oil tanks buried outside may be detected only through measurement of the level of product, and noting a change in the level during the summer. Aboveground heating oil tanks may present some environmental damage to the vegetation surrounding the tank, or product sheens in the soil, but most are located near bushes and trees and are infrequently inspected by the home owner.

Heating oil tanks located in basements and crawl spaces may provide more opportunity for leak detection, as heating oil has a pungent smell that would be noticeable to anyone entering these areas. However, homeowners may be reluctant to report a leak to a public official due to liability and clean-up issues.

Most leaking heating oil tanks are the result of corrosion of the tank wall, loose fittings and pipes, or over-fill of the tank. Many tanks do not have any kind of over-fill gauge or capacity gauge, and over-filling is a problem. Heating oil suppliers are reluctant to report over-fills and leaks, as well.

Existing Laws and Regulations

Most residential heating oil tanks are not regulated by the KY Environmental and Public Protection Cabinet, because the tanks are below the minimum required size for regulation (550 gallons or less). Even if the heating oil tank is larger, homeowners and agricultural users are exempt from state laws requiring registration, leak detection, and tightness testing.

There are no ordinances within the Louisville/Metro government pertaining to home heating oil tanks, and the Fire Marshall does not require residential heating oil tanks to be registered.

However, the KY DOW requires that residential heating oil tank owners complete a Groundwater Protection Plan. The KY DOW offers a generic plan specifically for home heating oil tank storage and use, and requires that all owners fill out and maintain the plan. At present, the plan is a generic plan that educates the tank owner about the proper care and monitoring of their heating oil tank, as well as the development of contingency plans should the tank leak. The homeowner is asked to sign the plan, certifying that he will make an effort to follow the recommendations found within the plan.

Management Plan

The Management Plan for home heating oil tanks uses the existing regulation for the Groundwater Protection Plan (GWPP) as a springboard for protecting the groundwater supply. Since a GWPP is required of all home heating oil tank owners, LWC will send a blank, generic GWPP to all known heating oil tank owners. LWC will then send a listing of those that have received the plan to the KY DOW, who can contact the homeowner and request a copy to be sent to them. The Management Plan is summarized in Table 8.7.2.

The GWPP recommends tank tightness testing for active tanks, pumping out existing inactive tanks, and abandoning existing inactive tanks. LWC will pursue funding opportunities to modify and/or abandon those tanks located within WHPA-1 (which will be performed only with the homeowner's permission). LWC will not be responsible for any remediation costs associated with the tank abandonment. Tank tightness testing and the potential for in-place abandonment will enable protection to the area of highest risk.

For those tanks located outside WHPA-1 (21 tanks) the homeowners will be responsible for any charges incurred during the tank tightness testing, pump-out, and/or abandonment. These costs are relatively low, and are discussed later. Public Education materials will be used to educate individual homeowners about heating oil tanks, monitoring heating oil levels, and abandonment procedures.

Zoning and other regulations were discussed by the Management Committee about allowing new heating oil tanks to be installed within the WHPA. For the most part, WHPA-1 has been fully developed, and no area exists that would allow additional construction. Natural gas has become available to nearly all other potential development sites within the WHPA, so it is unlikely that new homes built in the area would rely on heating oil as a source of winter warmth. The plan listed above should adequately protect WHPA-1, which is the area of highest risk.

Remediation of existing contaminant sources is recommended for all WHPAs. Homeowners will be responsible for remediation costs. Liability issues during property transfers will be a main force in instigating clean-up and remediation of contaminated sites within the WHPAs.

Additional precautions during floods are also recommended. The public outreach program for heating oil tanks will educate the homeowners about the need to tie down their aboveground heating oil tanks during floods, to minimize the risk of leaking during a flood event. A listing of the known heating oil tanks has been given to the Harrods Creek Fire Protection District so that they may be aware of aboveground heating oil tanks that may need to be restrained during floods. In addition, the fire department's knowledge of the location of these tanks may help the firefighters prevent a contaminant event during a fire or other emergency, and prevent a deadly accident.

Public outreach and education documents will be given to homeowners with heating oil tanks. In addition, educational materials will be sent to local heating oil suppliers discussing the WHPP and BMPs for heating oil delivery. Specific information about this portion of the plan will be discussed later, as well.

Estimated Costs

Several environmental remediation businesses were contacted for cost estimates. The costs listed below are example of the costs associated with various types of testing discussed above. Prices for Louisville Water Company’s costs were based on three heating oil tanks and work occurring simultaneously on each tank, which would lower mobilization fees.

Most cost estimates varied significantly between companies and with the potential for additional remediation tasks to be performed. Therefore, cost estimates listed below in Table 8.7.3 may vary according to the company selected and to individual situations that may exist.

Table 8.7.3

Estimated Costs for Home Heating Oil Tank Testing/Abandonment

Activity/Item	Estimated Cost
Tank Tightness Testing	\$150 - \$400 per tank
Tank Removal	\$2,000 - \$3,000 per tank
Site Remediation ¹	\$7,500 - \$10,000 per site
Pump out existing fuel	\$0.40/per gallon
Tank Abandonment ²	\$20 - \$50 per tank

¹ May vary widely, based on site conditions.

² Tank may be abandoned in place at relatively low cost to the homeowner.

Public Outreach and Education

Specific public education materials have been gathered or developed for the homeowners that use heating oil tanks, either aboveground or below ground, and for the heating oil tank suppliers, as part of the overall Public Outreach and Education Plan. These materials are listed below. Copies of the pamphlets may be seen in the original Public Outreach and Education portion of the submittal of Phase II.

- 1 *WHPP 007F Groundwater – Protecting it is Now the Law;*
- 2 *WHPP 005B Groundwater Protection Plans for Homeowners;*
- 3 *WHPP 007B Groundwater Protection Plan for Home Heating Oil Tanks;*
- 4 *WHPP 006D Facts About Kentucky’s New Environmental Release Reporting and Cleanup Law;*
- 5 *WHPP 006J Handbook for Hazardous Waste Generators;*
- 6 *WHPP 006L Preventing Groundwater Pollution: Secondary Containment;*
- 7 *WHPP 006O UST Frequently Asked Questions; and*
- 8 *WHPP 005C Emergency Phone Numbers.*

Homeowners that use heating oil as a source of winter warmth will receive, by special mailing, a copy of WHPP 005B, WHPP 007B, WHPP 006D, WHPP 006L, WHPP 006O, and WHPP 005C. Once these have been received, LWC will provide a mailing list to the KY DOW for their use in contacting homeowners for copies of the GWPP plan. All letters of notice and approval will be tracked, if copies are received from the KY DOW, and will be placed within the hard copy file of the property. Additional notations may be made on the Potential Contaminant Inventory data base, indicating that the homeowner has met all requirements by law.

Heating oil suppliers will receive, by special mailing, a copy of WHPP 007F and WHPP 007B for distribution to homeowners, as well as WHPP 006D, WHPP 006J, and WHPP 005C. A letter will be sent accompanying the pamphlets that describes the location of WHPA, the purpose of the WHPP and asking their cooperation and help in reporting accidental releases and spills.

These activities were accomplished during the first implementation of the Management program, and will be completed during the next phase of the WHPP. Several tanks were removed by the homeowners, and several others were discovered. Ninety percent of all known tanks submitted a GWPP.

Additional brochures were prepared and distributed, including those below:

1. *WHPP 505 – Listing of Certified Tank Removal Companies in Louisville, KY*
2. *WHPP 504 – Tank Removal Checklist*
3. *WHPP 503 – Heating Oil Tank Addendum, Seller’s Property Disclosure Statement*
4. *WHPP 502 – Fact Sheet: Removing an Underground Heating Oil Tank*
5. *WHPP 501 – Fact Sheet: The Impact of Heating Oil Tanks on Residential Real Estate Transactions*
6. *WHPP 500 – What You Should Know About Buying or Selling a Home with a Heating Oil Tank.*

8.8 Domestic Wells and Monitoring Wells

Water wells in the WHPA represent a high contaminant hazard, as the well can allow direct access for surface contamination to enter the aquifer that supplies LWC’s collector well.

Most wells consist of a central pipe or casing that extends from ground surface to a water source, or aquifer, below ground. Within the WHPA, the wells usually extend from ground surface down into the upper reaches of the aquifer, which is approximately 40 feet.

Well depths vary, according to the depth of the aquifer, the length of the screen, construction standards at the time the well was drilled, and the costs of drilling. Many domestic wells in the area are relatively shallow, which means that the screen does not extend to the bottom of the aquifer, but will use the upper layers of the aquifer as a source of supply. Even a relatively short screen intersects enough saturated sand and gravel to produce sufficient groundwater for home use, which is a maximum of 20 gallons per minute.

Well types include domestic wells, which are those used by private residences as a source of supply, monitoring wells, which are used to test the groundwater depth and/or quality, Public Water Supply Wells, which are large wells designed to provide drinking water for the public, irrigation wells, and other specialized wells.

Domestic wells include home wells that are designed to meet one family’s need for drinking water. Domestic wells include house wells, hand pump wells, or any well that would serve as an irrigation or wash water supply to a home. These wells do not have to be registered with the KY DOW as a high capacity user.

Domestic wells drilled since 1990 are required to have a well log on file with the KY DOW, which was submitted by the well driller immediately following installation. Many of the wells drilled within the WHPA do not have well logs on file, as they were drilled prior to 1990.

Many of the domestic wells in the area are reported to be inactive. Since LWC provides high quality drinking water to the homes and businesses in the area, many older domestic wells are not in use, but have not undergone the proper closing procedure. Since the regulations for

installation of a domestic well have changed, it may be safe to assume that the majority of these wells are not in compliance with current regulations. (Regulations will be discussed further.)

Monitoring wells are wells that used for measuring water levels or collecting water samples for groundwater quality testing. Many of these wells are also domestic wells that are monitored by the USGS, while other monitoring wells are used by LWC to determine water levels and water quality near the collector well.

Several monitoring wells are constructed as cluster wells. Cluster wells are composed of several wells, placed within the same bore hole, with screens set at different levels to monitor water quality along several different elevations. Some of these wells may have undergone proper closure procedures, as they are owned by businesses as a part of a required monitoring network. Site interviews of these businesses indicate that at least some of the cluster wells have been properly closed.

Public Water Supply (PWS) wells are wells that supply the public with drinking water. Several of these wells that supply the public with drinking water do not produce water in sufficient quantities to be considered a high capacity user. These wells would include the well that serves the drinking fountains at Hays-Kennedy Park and River Fields, (Bass Road), as well as the wells on the Wallace property. An additional PWS well was located on River Road, but its use is unknown at this time.

Irrigation wells, if used by an agricultural business, are not considered to be high capacity wells unless they produce more than 100,000 gallons of water per year. If an irrigation wells produces more than 100,000 gallons of water per year, it is required to be registered by the KY DOW to register water usage. No irrigation wells were located within the WHPAs that fit into the high capacity user category. In addition, no irrigation wells are known to be located on agricultural property within the WHPA.

Oil and gas wells can represent a very high risk activity to an aquifer supplying a PWS well. Registration of these wells has occurred for many years within the KY Geological Survey (KGS), which maintains a very large data base and records for the wells. At present, no records exist showing any oil and gas wells in the WHPA. In addition, no local resident has reported the location of an oil or gas well within the WHPA.

From the results of the windshield survey, information provided by LWC's billing department, well logs from the KGS, records from the USGS, and records from the Louisville/Metro Health Department, the total number of wells within the WHPA is currently believed to be 230, potential and known wells. Over 95% of these wells are domestic wells, while the rest are PWS wells, or monitoring wells. Distribution of the wells within the WHPA may be seen in Table 8.8.1.

Table 8.8.1
Number of Wells per WHPA

WHPA	Number of Wells
WHPA-1	15
WHPA-2A	84
WHPA-2B	20
WHPA-3	69
Outside Area	42

Other homes may have wells that are not listed within any data base, which may be found either within the crawl space beneath a home, or in the basement, and were not readily seen during the windshield survey. However, this is as accurate an account as can be made at present.

New wells drilled within the WHPA will be constructed according to the KY DOW water well construction rules, which have been generally summarized in the Existing Laws and Regulations section of this report. New wells must be drilled by a certified water well driller. The well driller must submit a construction and formation log to the state within thirty (30) days of completion of the well. In addition, the KY Public Health Department requires that all new wells pass a water quality test for fecal coliform bacteria. No other water quality testing is required.

A local ordinance or law that prohibits the installation of new domestic water wells where LWC is available to provide a drinking water supply was reviewed by the Louisville/Metro Attorney's office, and dropped for the city/county combined government. Water lines are available through most of the WHPA, with the exception of some of the farming operations (i.e. Wallace Farms). While it is unlikely that most homeowners will drill water wells on their property, the possibility exists that additional wells may be constructed within the WHPA for domestic use.

LWC is planning to construct additional PWS wells along a corridor extending from the southwest edge of the current LWC property to Harrods Creek. These will be constructed more like conventional vertical wells, instead of the radial collector well currently in use.

The Wallace Farm property currently has two wells that are listed as PWS wells, but are used very little, if at all. It has been reported to the LPT that these wells have been contaminated with fecal coliform bacteria, and/or nitrates and ammonia. The wells are located near several barns in the area. Disinfection of the wells may sufficiently clean the wells of fecal coliform for PWS use, but additional treatment will be needed to remove nitrates and/or ammonia.

Several domestic wells are used on the Wallace Farm property that supply homes on the property with drinking water. It is possible that the Wallace Farm will install additional wells to supply the barn and other public areas. If not in use, the wells should be abandoned. However, if the wells have been constructed properly, they may be used as monitoring wells for water quality assessment.

Additional monitoring wells and well clusters are likely to be installed at gas stations or other businesses that have underground storage tanks, or at sites that have reported a spill or leak of hazardous materials. These wells would be required to be installed by the state to monitor the effects of any clean-up activities. LWC will also likely install additional monitoring wells in the future. These wells will serve as data points for both water quality and information on water levels.

Additional irrigation wells, monitoring wells, and livestock wells may be installed by the agricultural industry along the outer borders of the WHPA. These wells must be permitted by the state as high capacity users, if they withdraw large amounts of groundwater, even on a seasonal basis.

Several existing domestic wells are currently in use by the USGS as monitoring points for general water quality and water level analysis. These wells are sealed at the surface to prevent entry of surface materials into the aquifer below. Other domestic wells may be used by LWC and the USGS as monitoring points in future monitoring programs.

Modes of Contamination

Contamination from water wells is a serious threat to a public water supply. Contaminants may enter a well through a cracked or broken well casing, or around an improperly sealed well casing, to enter the aquifer directly from the ground surface. Homeowners may see a well as a perfect disposal point for unwanted or unused oils, paints, pesticides, or other contaminants.

Flooding can put pressure on a well seal, breaking the seal and allowing entry of surface waters and contaminants directly into the aquifer. An open well can become a point of entry from overspray of pesticides or paint aerosol cans. Open wells are also often the recipient of other liquids and small items.

Leachate from septic drainage fields may travel just below the ground surface to an improperly sealed well or to a crack or break in the casing, entering the well and traveling to the aquifer. The well casing must be properly sealed from contamination, and the well capped, to prevent entry of materials from the surface for the well to remain in use.

Existing Laws and Regulations

The latest standards for construction and practices for the installation of water wells in the Kentucky are listed in 401 KAR 6:310. General rules and regulations have been summarized below.

8.8.1 General Requirements

- A. *Location of the well shall include use of every natural protection available to promote sanitary conditions. (The well should be placed up slope from any potential source of contamination.)*
- B. *The well shall be located so that it is accessible for repairs, maintenance, treatment, and inspecting.*
- C. *The well should not screen two separate formations, which would enable contaminants to move from one aquifer to another.*
- D. *No well casing shall be cut off below ground surface unless a pitless well adaptor or pitless well unit is to be installed. Pitless well adapters shall be installed to provide a leak-proof seal. The well casing shall extend at least four (4) inches above ground surface. If practical, the well shall extend above any known conditions of flooding or runoff from the surrounding land.*

8.8.2 Location

- A. *The minimum lateral distance from sources of pollutants shall be maintained, (Table 8.8.2).*
- B. *Sources of pollutants such as streams, refuse disposal sites, excavations, waste treatment facilities, buried oil and gasoline storage tanks, improperly constructed wells and cisterns shall be evaluated and a distance determined based on the pertinent facts. (Increased distances may be recommended.)*
- C. *When the upper formations are composed of materials with a permeability of 1×10^3 centimeters per second or greater, the lateral distances in Table 2.1 shall be doubled.*
- D. *Wells may be constructed in flood zones only if water-tight construction is provided. If practicable, the casing of the well shall be two (2) feet above the maximum flood level.*
- E. *If the well is constructed adjacent to a building, it shall be located so that a center line of the well extended vertically shall clear any projection from the building by at least five (5) feet.*
- F. *Wells shall not be constructed in basements or pits.*

Table 8.8.2

Minimum Lateral Distances from Potential Pollution Sources

Source of Contamination	Minimum Distance	Source of Contamination	Minimum Distance
<i>Cess Pools</i>	<i>150 feet</i>	<i>Sewer (non-cast iron, non-perforated)</i>	<i>50 feet</i>
<i>Leaching Pit</i>	<i>100 feet</i>	<i>Sewers (cast iron with watertight leaded or mechanical joints)</i>	<i>15 feet</i>
<i>Pit Privy</i>	<i>75 feet</i>	<i>Sewers (Schedule 40 or heavier plastic pipe, non-perforated)</i>	<i>15 feet</i>
<i>Subsurface Seepage Tile</i>	<i>75 feet</i>	<i>Footing Drains</i>	<i>10 feet</i>
<i>Lateral fields</i>	<i>70 feet</i>	<i>Pump House Floor Drain</i>	<i>2 feet</i>
<i>Manure piles</i>	<i>75 feet</i>	<i>Cemeteries</i>	<i>75 feet</i>
<i>Septic tank</i>	<i>50 feet</i>	<i>Property lines</i>	<i>20 feet</i>
<i>Barnyard</i>	<i>50 feet</i>		

II.8.3 Wells Drilled in Unconsolidated Formations

- A. *Well casing must be at least twenty (20) feet in length, and shall extend no less than ten (10) feet below the projected pumping level.*
- B. *The well driller shall fill the annular space between the casing and the bore hole with impervious drill cuttings, native clay, bentonite, or neat cement-bentonite slurry.*
- C. *Gravel packs installed within the wells shall not extend above twenty (20) feet below ground surface. Gravel packs shall consist of clean, washed, and disinfected gravel.*
- D. *The driller shall develop the well to ensure free entry of water without sediment.*

II.8.4 Special Type Wells

- A. *For a bored or dug well, the driller shall grout the open space between the excavation and the installed casing with concrete, at least six (6) inches above ground surface and to a depth of not less than ten (10) feet. The driller shall insure that the diameter of the well bore is at least four (4) inches greater than the outside diameter of the well casing. The upper casing shall be at least eight (8) inches above ground surface.*
- B. *For a bored well of buried slab construction, the driller shall terminate the well casing at a depth of ten (10) feet or more below ground surface. The driller shall*

firmly imbed or connect the casing to a pipe cast in a reinforced buried concrete slab. The casing shall be at least four (4) inches in diameter and extend at least eight (8) inches above ground surface.

- C. *For a driven well, the well point, drive pipe, and joints shall be structurally suitable to prevent rupture or distortion during the driving process. The upper ten (10) feet of the driven well shall be at least two (2) inches in diameter larger than the inner driven pipe, and the annular space filled with an impervious material.*

II.8.5 Abandoned Wells

- A. *If a constructed water well is not suitable for its intended purpose, it must be abandoned within thirty (30) days.*
- B. *Before a well is to be abandoned, the driller shall measure the depth of the well, and check to ensure there are no obstructions in the well which may interfere with plugging operations. The driller shall remove at least five (5) feet of the upper casing, liner pipe, or other materials in all wells, and shall pull out or drill out screens, casings and liner pipes whenever possible.*
- C. *The driller shall disinfect the well and fill materials with a calculated concentration of at least 100 parts per million of available chlorine. Cement grouts do not require disinfection.*
- D. *The driller shall use neat cement, or neat cement-bentonite grout to a depth of five (5) feet below ground surface. The driller may use clay from five (5) feet below ground surface to ground surface.*
- E. *Pre-existing contamination. A well that has become contaminated shall be considered a special case. The method of filling and sealing such wells shall be submitted to the Cabinet by the drillers and subjected to individual review and written approval by the cabinet prior to sealing.*
- F. *If a well is located in unconsolidated formations, the well may be filled with sand and gravel to the top of the water table or aquifer, if there is no artesian flow of water in the well. Use of sand and gravel rather than neat cement is considered a special case and must be subjected to review and approval by the cabinet.*

II.8.6 Other Regulations

- A. *Groundwater Protection Plan – all well owners are required to complete a Groundwater Protection Plan, (GWPP), and retain the plan on file, should the Division of Water ask for a review of the plan.*

- B. *Special rules exist for the installation of monitoring wells for gas stations, landfills, etc. These rules are not available via the internet, but may be acquired from the Department of Environmental Protection.*
- C. *The Kentucky Cabinet for Health Services requires that all new wells pass a fecal coliform test prior to the well's use.*
- D. *The Louisville City government had an ordinance stating that all homes and businesses within the city that has city water available must use the supply as a source of drinking water. (Jefferson County did not have this ordinance.) At this time, based on the recent merger of City and County governments, the ordinance as written, is considered to be preliminary and subject to change. It is currently under review. The ordinance is listed below in Figure 8.8.1.*

§ 52.19 WATER CONNECTIONS REQUIRED.

Every dwelling, business establishment, or other place within the Metro Government in which people live or transact business, and wherever the Metro Government water supply abuts property, shall have Metro Government water piped into the premises at the expense of the owner, occupant, or agent in order that a safe supply of drinking water may be constantly available.

Figure 8.8.1 -- Louisville Metro Drinking Water Ordinance

- E. *Other Louisville Metro Health Department regulations are as follows:*
If city water is not available, a homeowner may have a cistern, which is preferred by the Louisville/Metro Health Department, or a well to supply drinking water. All rental property must be connected to city water. (This ruling may affect the many rental properties within the WHPAs.) All businesses, such as commercial and government properties, must use city water as a source of drinking water. However, homes and businesses may have a well on the property that supplies water for other needs.
The Louisville/Metro Health Department is currently working on ways to enforce these regulations for the properties that were formerly located within the Jefferson County government boundary.

The KY DOW is responsible for oversight of the construction of new wells, as well as inspection of old wells. The KY DOW requires capping or plugging of wells that are improperly constructed or present a high risk of contamination. The KY DOW is also responsible for administering the Groundwater Protection Plans for domestic well owners. The KY DOW has produced a generic plan for all domestic well owners that acts as an educational tool, and as a means of helping well owners properly care for their well.

Home inspection companies do not usually make detailed inspections of wells unless the potential buyer of a property requires and pays for the inspection. Sellers are not required to disclose information on water wells. Real Estate disclosure statements are unlikely to disclose this information.

The Potential Contaminant ID Committee has reported that several wells in the WHPA have become contaminated from septic system Leachate. Once city water became available to these residents, hook-ups were made to the LWC pipelines, and water quality complaints ceased. However, these wells have not been properly closed or sealed.

Several inactive wells are reported to be located in basements or crawl spaces beneath homes. Several rental properties are also reported to have wells that serve as a drinking water supply source.

It is not known at this time if the several 'wishing wells' seen during the windshield survey are actually hydraulically connected to the aquifer. It is certainly possible that they are, as water levels in the area are fairly near the ground surface in many areas, but most are likely decorative in nature. Many open or uncapped wells were seen during the windshield survey. These represent a very high risk to the aquifer from direct contamination from the ground surface.

Only a certified water well driller can properly plug an abandoned well, according to state law. There are three firms in the Louisville/Metro area that have the capabilities of properly closing inactive water wells: Layne, Inc., Burton Drilling, and Greenbaum, Associates.

Some of the wells that are properly constructed and are of various depths may be of value to LWC for use as monitoring points for water quality and static water level measurements.

Criteria for the selection of an existing domestic well as a future monitoring well would include:

1. Location within the WHPA at a point where a well would serve as a sentry for potential contaminants or a point where static water levels may be critical to the collector well and any new wells drilled within the aquifer;
2. Construction of the well so that the well would not represent a risk of contamination to the aquifer from surface materials or surface water;
3. Permission from the homeowner for the installation of a locking well cap to prohibit the introduction of any materials or equipment by anyone other than LWC or USGS personnel; and
4. Permission from the homeowner for access for LWC and USGS personnel.

Use of existing wells as monitoring points would be a very cost effective method of monitoring water quality changes through time.

Management Plan

Abandoned water wells represent a high risk to the aquifer in WHPA-1, a medium risk to the aquifer in WHPA-2A and 2B, and a low risk to the aquifer in WHPA-3. Several wells that would normally be considered to be a medium or low risk to the aquifer are rated as high risk, as these wells are open, uncapped wells. Evidence suggests that several of these wells may be used as disposal points for household hazardous materials.

Of the 230 known and potential water wells located within the WHPA, 95% of these are domestic wells. Several of these wells are uncapped wells and may serve as a disposal point for household hazardous materials. These wells are of significantly higher risk to the aquifer than those that are capped.

The vast majority of monitoring wells in the area have been constructed by LWC and the USGS, while there are many domestic wells currently in use by the USGS for monitoring purposes. Most of these wells are properly constructed, sealed at the surface, and have a locking, sealed cap. Some of LWC's monitoring wells may not be in hydraulic connection with the aquifer. These wells should either be further developed until a hydraulic connection is made, or plugged. Plugging these wells should be lower in cost than those reported here, as they are properly constructed, sealed at the surface, fitted with PVC piping, and have no pumps or other equipment installed into the well casing.

There is a well cluster located on the Dairy Mart property on Highway 42. These wells are not currently in use, but there is a good possibility that the wells have been constructed according to regulations and requirements by the Kentucky Cabinet for Environmental Protection, which are very stringent. Despite their location, it is unlikely that these wells represent a high risk to

the aquifer as they are very shallow (less than 25 feet deep) and were placed so as to monitor the effects of leaking underground storage tanks located above the aquifer.

According to available well logs, the monitoring wells at the Dairy Mart do not penetrate the upper clayey zone, and therefore do not present a direct conduit to the aquifer below. However, if these wells are no longer in use or monitored by the Dairy Mart, they should be plugged, primarily because of their location within the boundaries of a gas station.

In addition, there are several 'wishing wells' on properties within the WHPAs. At present, it is not known if these are actual wells in hydraulic connection with the aquifer, or are in place simply for decorative purposes. These wells should be inspected by the DOW to determine whether the bottom of the well is actually below the clay overburden and in direct connection with the aquifer. From the results of the inspection, the homeowner should follow the DOW recommendations for partial plugging of the borehole.

A historic well may be noted at site #3244, which is very likely a dug well, covered by a historic stone building. While picturesque, the well is open at the surface and in use as an irrigation well.

The Louisville/Metro Health Department will continue to discuss what, if any, additional water quality testing should be completed on domestic wells located within WHPAs. (LWC water is available to homes within these areas.) LWC will also work with the Louisville/Metro Health Department and the KY DOW to acquire funds for modifying wells that are not in compliance with current state laws. These may take the form of a money pool for low cost loans for homeowners to modify existing wells, or for LWC to pay for the modification of selected wells.

The Management Plan includes urging compliance with existing Metro ordinances, inspection of existing wells, selection of wells for inclusion in the monitoring network, completion of Groundwater Protection Plans for well owners, modification or plugging of wells that are not in compliance with current regulations, upgrading LWC monitoring wells, and public education. Table 8.8.3 summarizes the proposed management plan for wells in the WHPA.

Estimated Costs

Several certified water well drillers were contacted to provide general estimates for the cost of plugging an inactive well. These costs ranged from \$1,500 to \$2,500, depending on the depth, the condition, and the location of the well. If several wells are plugged at once, costs should be lower due to decreased mobilization fees.

Capping an inactive well is less expensive than plugging the inactive well, but may occur only on those wells that whose casing appears to be intact properly sealed. In many cases, installing a cap or seal on a well would bring the well up to current construction standards, negating the need for plugging. Estimated costs for well capping are in the range of \$100 to \$250. Costs for placing a concrete pad around a well to prevent contamination from entering the aquifer are from \$300 to \$800, depending on the location and condition of the well. Wells that are located in basements or crawl spaces or near a heating oil tank, present a unique problem, and costs may significantly increase for plugging or capping.

For estimating purposes only, several cost estimates are listed below in Table 8.8.4. LWC’s costs should be minimal. Estimates are based on the number of known wells in the WHPA. Other wells may be found and located as implementation of the plan progresses. Homeowner’s costs are estimated to be from \$150 to \$2,500 based on the recommendations by the KY DOW per site.

**Table 8.8.4
Domestic Well Capping and/or Plugging Cost Estimates**

WHPA	# of Domestic Wells	Estimated % in use ¹	# Domestic Wells in Use ²	# Wells to be Capped ³	# Wells to be Plugged	Cost for Capping ⁴	Cost for Plugging ⁵
WHPA-1	15	40%	6	6	1	\$10,800	\$1,000
WHPA-2A	84	25%	21	21	63	\$37,800	\$63,000
WHPA-2B	20	75%	15	0	0	0	0
WHPA-3	69	75%	52	0	0	0	0
Subtotal	203	NA	94	27	64	\$48,600	\$64,000
Total Estimated Cost						\$112,800	

- 1 Includes domestic wells that are currently in use as monitoring points by LWC and USGS.
- 2 Most homeowners in the area use LWC water as a source of drinking water, but some domestic wells are in use for irrigation , wash water, or swimming pool fill purposes.
- 3 LWC estimates that 80% of the wells can be updated to current regulations by installing a sealed cap.
- 4 Estimated cost based on the average estimated price of capping a well at \$1,800.00
- 5 Estimated cost based on the average estimated price of \$1,000.00

At present, only those wells located in WHPA-1 are required by the Management Plan to undergo capping and plugging. Estimated costs for modifying only those wells located within WHPA-1 are \$2,000.

Public Outreach and Education

The Public Outreach and Education Committee has prepared a pamphlet especially for water well owners, as well as gathered several pamphlets for the education of the public. These pamphlets are listed below. Copies of these materials may be seen in Appendix 6.

1. *WHPP 002A Closing an Abandoned Water Well;*
2. *WHPP 005B Groundwater Protection Plans for Homeowners; and*
3. *WHPP 007C Groundwater Protection Plans -- Protecting Your Well and Water Supply.*

These materials will be sent to each homeowner or property owner that is listed within the Potential Contaminant Inventory data base as having a water well. LWC will then notify the KY DOW that these water well owners have received the packet of information and a GWPP for a water well. LWC will collect any copies of letters pertaining to the request for the GWPP, receipt of the GWPP, and approval of the GWPP, and add the copies to the paper file maintained at the Crescent Hill Filter Plant. LWC will also make any pertinent notations on the data base about the plan.

These steps were completed in the implementation portion of Phase II. Ninety-nine percent of all home owners with water wells submitted a GWPP. Since then, several wells have been closed permanently. Additional pamphlets were produced that will be used as educational tools for the implementation of Phase III. These include:

1. *WHPP 912 – What You Need to Know About Groundwater, and*
2. *WHPP506 – Identifying a Domestic Water Well.*

The homeowners and property owners within the survey are on disk, provided with this report.

8.9 Septic Systems

Much of the WHPA relies on individual waste water treatment facilities, or septic systems. By our present count, 373 properties within the WHPA use septic systems to remove waste water. Thirty-seven of these residences are located within WHPA-1, 123 are located with WHPA-2A, 30 are located within WHPA-2B, 124 are located in WHPA-3, and 59 are located just outside the WHPA. Using a standard of 3.7 people per home, or per site (as recommended by the KY DOW personnel) septic systems currently serve a population of approximately 1,380 people.

Even though the WHPA has expanded greatly since the first report, a large area of the WHPA, in the area adjacent to the water company property, was placed on sewers.

Based on the results of the site interviews of local businesses, most commercial properties use the MSD sewer network for waste disposal. The commercial properties relying on septic systems for waste disposal include a restaurant, several marinas and boat docks, and several private clubs. Figure 7.7.4 shows the location of MSD's sewer network and the areas where septic systems are used.

Many of the homes that use septic systems were built before the current regulations were in effect (August 1995). Likely, these homes use 'pit' or 'dry well' septic systems. It is difficult to determine which type of system is in use from the windshield survey, as there is a large variety of installers and system designs. Pit or dry well septic systems present a higher risk to the aquifer than more conventional septic systems, as waste water is directly introduced to the aquifer.

Many of the more recently built homes have septic systems whose general construction is approved by the state, but are not in compliance with existing regulations (homes built prior to 1995). By today's standards, many septic tanks are too small for the property, and lateral fields are too short. Today's standard sizing is based on the number of bedrooms on the property, and can be increased by other factors. For example, a three bedroom home constructed on group 4 soil (common in Jefferson County) would require a 1,000 gallon tank and 660 feet of laterals to service the home. However, if the home has a garbage disposal, the septic tank must be 1,250 gallons in size.

Table 8.9.1 – Septic System Risk/Susceptibility Analysis

Land Use ¹	Contaminant Value ¹	WHPA ²	Hydrologic Sensitivity ³	Numeric Rating ⁴	Susceptibility ⁵
2	2	3	3	15	High
2	2	2.B	3	14	Medium
2	2	2A	3	13	Medium
2	2	1	3	11	Low

¹ Land Use and Contaminant Values are assigned within the KY Wellhead Protection Guidance Document

² Proximity is based on the WHPA number. In this case, the values have been assigned as follows: WHPA #1 = 180 day TOT = 3, WHPA #2A = 5 year TOT = 2.5, WHPA #2 = 10 year TOT = 2, WHPA #3 = steady state conditions = 1. ³ Hydrologic Sensitivity is rated in accordance with “wells >50 feet in depth in unconfined and fractured aquifers”, as stated in the KY Wellhead Protection Guidance Document, under the guidance of Bruce McKinney, Coordinator, Wellhead Protection Program.

⁴ Numeric rating is the calculated value of the previous columns in the table.

⁵ Susceptibility is based on the Numeric rating and is set as follows: Very High = 20+, High = >17 - 19, Medium = 12 - 16, Low = < 12

Septic systems present a Medium Risk/Susceptibility in WHPA-1, a Medium Risk/Susceptibility in WHPA-2, and a Low Risk/Susceptibility in WHPA-3. Individual ‘pit’ septic systems located inside WHPA-1 are placed at a high risk/susceptibility rating.

MSD’s five year plan included the extension of sewers into areas within the WHPAs currently served by septic systems. Sewers were extended into Duroc Avenue, Bass Road, Shirley Avenue, Jacob School Road, Rest Way, River Way, Carslaw Court, Beech Avenue, and portions of River Road and US Highway 42. This area includes many of the older homes that may be on ‘pit’ or ‘dry well’ septic systems, as well as several businesses in the area not currently served by sewers.

MSD now provides sewer service for approximately 200 homes in the area. LWC also has placed the homes on Transylvania Beach Road, and the home at the end of Mayfair Ave. on sewers, as a part of the construction activities of the well field extension.

The areas that will remain on septic systems after MSD’s five year extension may be seen in Figure 7.7.4. The streets located within WHPA-1 that will remain on individual septic systems include Beechland Beach Rd., and the extreme western portion of Bass Road.

The extreme western portion of Bass Road only has one septic system, located at the Hayes/Kennedy Park, and would have only very transitory, seasonal high usage volume. Septic systems in compliance with existing regulations on these streets within the WHPAs have a Medium Susceptibility Rating. Since most of the septic systems in WHPA-1 are dry well or pit construction, those wells have been placed at a higher risk.

There is no listing as to the known locations of dry well or pit septic systems. Information on individual systems is likely available from the Louisville/Metro Health Department, but must be gathered on an address by address basis, a very time-consuming process.

A local plumbing company, Zaring Plumbing, very kindly checked their files for service calls to the Beechland Beach Road area. From their data, of the 27 properties on the street, the plumbing company had made service calls to fourteen of the properties. Twelve of the properties that had had service calls had a dry well or pit septic system which is 86% of the properties serviced.

Home inspection companies do not usually make detailed inspections of septic systems, unless the potential buyer of a property requires and pays for the inspection. The home inspector will make note as to whether a property is on a septic system or a sewer, which is included within the real estate listing.

Sellers must disclose information on septic systems, such as defects and repairs made, according to 201 KAR 11:350. However, the older 'dry well' or 'pit' systems did not require frequent repairs or maintenance, as these systems were very efficient in waste disposal allowing direct entry of the effluent into the coarse sands and gravels of the aquifer below. Therefore, the type of septic system used is not usually a matter of disclosure, and real estate disclosure statements are unlikely to yield this information.

Several areas, notably the northeast end of Beechland Beach Rd. at the Louisville Sailing Club, have been reported to have water quality issues from septic system leakage. Drinking water wells within this area are reported to have become contaminated from septic system leachate. Once city water was available to the residents in this area, drinking water complaints ceased. However, it is felt that contamination likely exists in this area, which is located within WHPA-2B.

The Clean Water State Revolving Fund may have money available for the installation, repair, and upgrading of "decentralized" wastewater systems in suburban areas. Projects that may be eligible for funding include new system installation (single and clustered systems) to correct an existing non-point source problem, and replacement, upgrade, or modification of inadequate or failing systems. Other Federal funding sources include EPA 319 Grants and HUD Community Development Block Grants.

Modes of Contamination

Septic systems have the potential for contamination of the aquifer by nearly any type of chemical for home use, including human sewage. Normally, septic systems receive human wastes (black water) as well as detergents, food particles, and small amounts of more hazardous wastes from latex paint brushes, fingernail polish remover, etc. (gray water). Septic systems can also be the receptacle for left over paints, pesticides, fertilizers, and other waste chemicals.

A septic system consists of two main parts, a septic tank and a lateral field. The septic tank usually has baffles installed at the top to hold back floating solids or scum. The middle layer, which is relatively clear, enters the lateral field for bacterial breakdown and soil absorption, and the bottom layer contains solids that are slowly digested by bacteria. The lateral fields allow the wastewater to trickle through the soil, which acts as a biological filter to remove bacteria, viruses, and other pollutants from the effluent.

Contamination to aquifers easily occurs, as the septic system is designed to leach the liquid materials into the soils and groundwater. While bacterial action does occur to break down the solids, many systems are often overwhelmed by the amounts of materials entering the system, and bacterial action does not have time to occur prior to leaching. Dry wells or pit septic systems pose a distinct threat to the aquifer, as solids are not particularly separated from the liquids, and there is no soil barrier between the system and the aquifer to help slow the leaching process and allow the bacterial action to take place.

Existing Laws and Regulations

The Louisville/Jefferson County Metro Government currently follows the State of Kentucky rules, guidelines, and recommendations for installation, use, maintenance, and abandonment of septic systems. (Jefferson County Chapter 156, Housing Standards Code, Sections 156.02, 156.08.) The Department for Public Health, within the State of Kentucky's Cabinet for Health Services, is the governing agency. This department has produced a non-technical manual that explains Kentucky's current regulations. The general steps for installation of a septic system, as required by the State and by Jefferson County are described below.

1. Prior to constructing a septic system, the property owner must fill out an application for a permit with the local county health department.
2. A certified inspector from the local county health department evaluates the property and issues a site evaluation for construction of the septic system. The inspector will examine the soil type, topography, landscape position, and other factors to determine the size and type of septic system to be permitted on the property. The inspector will also check minimum measurement distance from the proposed system area to various features on the property. These features are listed below in Table 8.9.2.

Table 8.9.2 – Minimum Distances from a Septic System

Property Feature	Distance
Property Line	5 feet
House	10 feet
Garage	10 feet
Utility Easement	10 feet
Creek/Stream	25 feet
Well	70 feet

3. The property owner may then contact a Certified Septic System Installer, who will need a completed site evaluation to lay out the system. The installer submits the layout drawing to the inspector for approval, who then issues a permit for construction.
4. After installation, the inspector will conduct an inspection of the system, and issues final approval of the construction of the system.

Several types of septic systems are permitted for construction by the State of Kentucky, some of which may be in use within the WHPA:

1. Rock Lateral System – Standard trench depth is 24". After initial treatment in the septic tank, the effluent travels through perforated pipe, which is placed over 18" of gravel in the trench. This system takes up the most space, but is useful in soils with a restrictive horizon below.
2. Leaching Bed System – In this system, trenches are 2' wide, with one perforated pipe in the center. There must be a minimum soil depth of 18" to use this system, and ground slopes over 5% may be unacceptable for the bed installation.
3. Leaching Chamber System – This system functions like a rock lateral system, but has no gravel placed below the perforated pipe.
4. Gravel-less Pipe System – The system uses corrugated polyethylene tubing, 8" – 10" in diameter. The synthetic wrap prevents soil from blocking the perforations, and acts as a wick to draw effluent out in contact with the surrounding soil.
5. Low Pressure Pipe System – When septic tank effluent rises to the level of the pump control in a pumping tank, the pump turns on and effluent moves through the supply line and laterals. The laterals contain small holes and are 3' to 8' apart. The pump turns off when the effluent level falls below the pump intake. If a pump malfunction occurs, an alarm alerts the homeowner. The design and installation of these systems may be very difficult, and the electrical components must be maintained.

6. Lagoon systems, mound systems, and constructed wetland systems are also permitted. Sizing of the septic systems is determined by the system type, the soil type, and the predicted usage of the system (number of bedrooms, current appliances, etc.).

Additional regulations for septic systems include the KY DOW Groundwater Protection Program. All septic system owners are required to have a Groundwater Protection Plan on site. The KY DOW may ask for a copy of the Groundwater Protection Plan at their discretion.

Cluster or multiple-use septic systems (septic systems that serve 20 people or more) are required by the state and by the US EPA to identify and register the septic system as a Class V Injection Well. This places cluster septic systems as a special classification with separate rules and regulations governing their use, maintenance, and reporting.

Management Plan

Septic systems represent a high risk activity within WHPA-1, if the system installed does not meet the current construction requirements of the State, or is a 'dry well' system. Septic Systems that meet current State and local requirements represent a medium risk to the aquifer beneath WHPA-1, WHPA-2A, and WHPA-2B, and a low risk to the aquifer found beneath WHPA-3.

'Dry well' or 'pit' septic systems represent a high risk activity within WHPA-1 and may be rated at a high risk within WHPA-2A and WHPA-2B, primarily because the construction of these septic systems allow direct introduction of contaminants into the aquifer. These systems represent a medium risk in WHPA-3.

At present, a fairly large area within the WHPA is serviced by individual septic systems. After MSD's five year plan, many of these areas are now serviced by sewers, but the total number of septic systems has not changed very much, due to the increase in area.

Following completion of MSD's five year plan for sewer installation, some homes located within WHPA-2 are still be dependent on individual septic systems for waste disposal. Many of the homes in the Mason Boulevard/Mayfair Avenue area are likely to use dry wells or pit septic systems as well as those known to be on Beechland Beach Road. These systems will also present a high risk to the aquifer, and a higher risk to LWC's planned well field expansion.

The GWPP required by the KY DOW is the first step in LWC's management plan for septic systems. LWC will include, as a part of the Public Outreach and Education door-to-door delivery plan, a GWPP for Septic System Owners to everyone within the WHPAs that uses a septic system for on-site waste disposal. This and other educational materials will be discussed later.

In cooperation with MSD and the Louisville/Metro Health Department, LWC will pursue Federal, State, and/or local funding to replace existing dry well systems in WHPA-1, WHPA-2A, and WHPA-2B that are not a part of the MSD five year extension plan. These systems will be replaced by systems that meet current design standards, providing that funds become available through these means.

The replacement program will go hand-in-hand with a pump out program that will pump out and properly abandon the older dry well or pit systems. In addition, funding will be pursued to upgrade older system designs that are useable to meet current standards.

LWC has already contacted the Non-Point Source Pollution Section of the KY Environmental and Public Protection Cabinet and personnel have attended a workshop on non-point pollution source funding efforts. In order to meet the criteria for funding, a demonstrable threat must be seen for the WHPA.

LWC will also encourage MSD to include parts of the WHPA as areas targeted for sewer expansion. MSD personnel served on the Management Committee and are aware of the need for sewer expansions and updates in the area. The awareness of need is a starting point for future growth and expansion of the sewers in the Prospect, KY area.

LWC will also install a monitoring network that will monitor groundwater quality from those areas to remain on septic systems following MSD's five year extension program. LWC may use wells that are already a part of the USGS monitoring network to collect water quality samples, and may use existing domestic wells as part of the monitoring network. LWC may also install monitoring wells as a part of the monitoring network.

LWC has reported suspected Class V Injection wells that have been discovered during the Potential Contaminant Survey to the US EPA and requested inspections. LWC will continue to request inspections by the US EPA for any other existing potential Class V Injection wells that may come to light in the future.

LWC will also work with the Louisville/Metro Health Department to supplement known data bases on septic systems in the area, for future cost estimates. The Louisville/Metro Health Department is aware of the location of the WHPA and routinely conducts inspections of new septic systems that may be constructed in the area. Table 8.9.3 summarizes the Management Plan for Septic Systems for the WHPAs.

Enforcement of existing regulations is the responsibility of the Louisville/Metro Health Department. The system is already in place and working whereby contractors must submit a prepared and detailed plan of the proposed septic system for any new construction to the Louisville/Metro Health Department for inspection and approval.

Estimated Costs

Several plumbing companies were contacted for cost estimates for repair, abandonment of old systems, or upgrades to existing systems. Most plumbing companies were not willing to provide general estimates, because each home must have a septic system designed solely for the site specific soils, property configuration, and proposed use. This can cause a wide variation in estimates. Table 8.9.4 explains the various general estimated costs associated with the location and abandonment of old systems, and the installation of new systems.

**Table 8.9.4
Estimated Costs of Abandonment & Installation**

Activity	Cost
Site Evaluation – includes application to Health Department, use of backhoe, inspection by plumber & Health Department, construction permit.	\$1,200
Abandon Existing Dry Well – includes digging down to pit, pump out, filling pit with lime dust, smoothing dirt over pit	\$2,750
Re-install Traditional Septic System to code , if possible	\$6,000 - \$10,000
Pump out – dependent upon amount of material removed	No estimate available
Update old system to meet new requirements	Site dependent
Locating existing systems – may be difficult, may require use of an electronic probe at an additional cost	Site dependent
General Inspection of surface features by a licensed plumber, resulting in general cost estimate per site	\$610 per day

Public Outreach and Education

As previously discussed, the GWPP for septic systems has been reproduced in quantity and will be distributed to septic system owners within the WHPA. A certification page has also been included within the GWPP, with the permission of the KY DOW. The certification page states only that the homeowner has read the enclosed documentation and will use the document as a guideline for using and maintaining the septic system.

Other materials have been gathered at no cost from various federal agencies, or produced in house by LWC. The listings of materials that pertain to septic systems that will be used as a part of the public education are below. Copies of these materials may be seen in Appendix 6.

1. *WHPP 002C Household Survey of Hazardous Materials and Products;*
2. *WHPP 002D Index of Household Hazardous Materials and Products;*
3. *WHPP 002F Pollution Prevention Begins at Home;*
4. *WHPP 002J Recycling Reference Guide;*
5. *WHPP 003C Pollution Prevention – Floor Drains;*
6. *WHPP 003O Is Your Septic System a Class V Injection Well?;*
7. *WHPP 005B Groundwater Protection Plans for Homeowners;*
8. *WHPP 006K A Homeowner’s Guide to Septic Systems, (US EPA);*
9. *WHPP 007A Homeowner’s Septic System Guide and Record Keeping Folder, (GWPP); and*
10. *WHPP 007K Kentucky Agriculture Water Quality Authority Producer Workbook.*

Most of these materials will be sent to each homeowner or property owner that is listed within the Potential Contaminant Inventory data base as having a septic system. Other materials listed above may be placed for the public’s use and/or free distribution to interested parties at the City of Prospect Library at City Hall on Highway 42.

8.10 Existing Transportation Corridors

The Wellhead Protection Area contains one major transportation route, US Highway 42, and a smaller transportation route, River Road. Other roads in the area primarily serve as subdivision transportation routes.

Construction along The Gene Snyder Expressway, which leads to I-71 is, at present, on-going, and will result in a large bridge, crossing the Ohio River. Although the I-71 Expressway is located outside the WHPA, it may serve as an alternate route for hazardous material transport. These roads and the construction area may be seen in Figure 7.4.9.

LWC personnel met with the Kentucky and Indiana Departments of Transportation, contractors and sub-contractors to minimize the potential for contamination to the aquifer during construction activities and following completion of the tunnel, bridge, and highway.

A wide range of materials are delivered locally to the Prospect, KY area. These include

1. Gasoline, diesel fuel, oil, oil products, and kerosene for gas stations in the area;
2. Chemicals used for water treatment at the B. E. Payne Plant;
3. Paints, paint thinners, and solvents for the hardware and home decorating stores;
4. Fertilizers, pesticides, herbicides, and fungicides for the hardware and nursery businesses;
5. Hazardous household products such as bleach, ammonia, oven cleaners, and other hazardous and non-hazardous materials for the grocery stores, convenience stores, and restaurants;
6. Silver-bearing materials for the dental, medical, and photography stores; and
7. Other potential contaminant products that are delivered to stores, offices, and shops within the WHPA.

The materials listed above are also transported through the WHPA, to reach other destinations outside the WHPA along US 42. Notable potential contaminants that are transported through the WHPA include fuels, chemicals for lawn care, agricultural chemicals, non-hazardous liquid and/or soluble products, and other hazardous liquid and/or soluble products.

Hazardous materials transport is limited on River Road from the Louisville Metropolitan area, because the bridge crossing Harrods Creek has a very low weight limit. Therefore, large amounts of gasoline, fertilizer, fuel oil, or other hazardous materials cannot enter the WHPA from this route. However, deliveries of these materials may be made on River Road from US Highway 42.

Excessive road salt usage represents a low to medium risk to the groundwater reservoir, as the chlorides enter the storm water and are a large part of runoff. Chlorides dissolve into water very easily, and quickly become a part of the drainage network in the Prospect area. While public safety is the first priority when discussing road salt usage, other considerations must also be made for the contamination of drinking water supplies and corrosion of the road infrastructure and vehicles. Fortunately, methods exist where costs of road de-icing can be reduced without damage to the water resources, road infrastructure, vegetation, or other wild life resources.

Conventional road salt is primarily common table salt, (sodium chloride, or NaCl). In addition, a number of chemicals are often added to road salt to lower the freezing point, reduce the corrosion of vehicles and structures, and prevent road salt from clumping or caking so that it may be easily spread. Iron cyanide is a high soluble chemical added to road salt to prevent clumping of the salt. The cyanide content of a road salt may not be listed, or it may be called 'yellow prussiate of soda', and may reach levels of 45 mg/kg in road salt. UV light breaks down the chemical bond, releasing free cyanide to the environment. As of October 29, 2003, the US EPA has determined that this compound is a toxic compound.

Recent studies in Ontario showed that only 45% of the applied road salt runs off; while the remainder, 55% contaminated shallow aquifers. (*"Road Salt and Winter Maintenance in British Columbia Municipalities"*, page 7.) Since there is a lag period before the salt shows up in groundwater, the potential for contamination water will continue to get worse before it gets better, even if road salting stops.

Road salt (and the chemicals added to it) may enter the groundwater through shallow or poorly designed wells, or highly permeable soils, (low clay content), with moderate precipitation, or high gradient slopes over impermeable soils that drain directly into low volume, slow moving water bodies. These mechanisms may be found within the WHPA, indicating an increased risk of contamination. However, at present the chloride content is measured as below contaminant levels in the water leaving the B. E. Payne Plant.

The Risk Assessment of catastrophic spills of hazardous materials and hazardous wastes transport was found to represent a medium to high risk to the groundwater reservoir. Road salt usage was found to represent a low to medium risk to the aquifer, and general traffic was found to be a low risk to the aquifer. Actual risk per spill is dependent upon the type of materials spilled (solubility and ease of transport), the location of the spill, and other conditions found at the time of the spill (i.e. response time, weather conditions, etc.)

The management plan includes public education and voluntary compliance to limit hazardous materials transports on US 42 and River Road to local deliveries only. This would decrease the amount of traffic through the City of Prospect on main thoroughfares, and encourage hazardous materials haulers to find alternate routes around the City of Prospect and the WHPA.

Modes of Contamination

Pollution from transportation includes an increase in pollutants from general road traffic, and accidental and/or catastrophic leaks or spills from hazardous and non-hazardous materials transport. General road traffic increases the amounts of heavy metals, complex hydrocarbons, and other automotive chemicals from vehicle exhaust, leaks or spills of automotive fluids, and accidents. This is considered to be a non-point pollution source, as storm water dissolves these materials, and slowly percolates to the groundwater reservoir through runoff. General road traffic would be considered a low risk to the aquifer.

Slow leaks of materials from automobiles and commercial transport represent a low to medium risk to the aquifer, depending on the location and type of materials leaked onto the road way. Catastrophic spills of both hazardous and non-hazardous materials represent a medium to high risk to the aquifer, depending on the location of the spill, the amount of materials lost, and the type of materials lost.

Existing Laws and Regulations

Hazardous Waste and Hazardous Materials Transport is a heavily regulated industry requiring all transporters to be licensed, and carry a product manifest with them at all times. While a complete search of all laws and regulations governing the rules of hazardous materials and hazardous waste transport has not been completed, it may be assumed that specific transporters must have permits and licenses to operate. Non-hazardous materials transport is also likely regulated. The use of road salt is not regulated within the State. The US EPA has determined that “Prussian Blue”, a component of several types of road salt, is a toxic compound. While not currently regulated, the material may be regulated in the future.

Many laws and regulations exist for the construction, drainage, and management of major transportation routes. The KY Transportation Cabinet (KYTC) regulates the industry and must review all plans and specifications for construction of major roads and thoroughfares throughout the state. KYTC personnel served on the Management Committee and were of valuable help in developing this plan. The act of developing the plan was in and of itself an educational tool for the KYTC who is responsible for managing the construction of major transportation routes through the City of Prospect and the WHPA.

Additional comments and suggestions were solicited from the City of Prospect, that controls de-icing of the local subdivision roads. Also, the Louisville/Metro Planning Commission was represented on the Management Committee and offered many suggestions for this portion of the Plan.

Management Plan

The Management Plan for the roads and thoroughfares found within the WHPA is based upon public education, education of public officials, on-going discussions, and voluntary compliance. At this time, no regulations, laws, or ordinances are proposed for the WHPA.

As a part of the public education, signs will be placed at the border of the WHPA to inform boaters, commercial boats, hazardous and non-hazardous materials transporters, and the general public about the WHPA. LWC will use signs available from the KYTC and will provide extra signs as needed, to place around the periphery of the WHPA.

The Management Committee discussed the use of an advisory or a restriction on 'through way' hazardous materials transports. The purpose of the advisory or restriction would be to limit hazardous materials transport to local deliveries only. However, since US Highway 42 is a Federal highway, and a major thoroughfare for this portion of the state, it is questionable if local authorities have jurisdiction over the highway. Additional questions were raised about the legality of any wording that may support a restriction versus an advisory. Therefore, the discussion was tabled for a time, pending further investigation.

However, the Management Committee can request that local businesses in the area ask their hazardous materials haulers to stay on specific roads for delivery/removal, if possible. On a strictly voluntary basis, the Management Committee will make this request of commercial and agricultural sites within the WHPA, and will send a request to hazardous waste haulers in the area to use only the preferred delivery routes, use special care while hauling materials within the WHPA, and report all spills immediately. A listing of the hazardous waste haulers in the area may be found in Appendix 5.

The preferred delivery route includes US Highway 42 as the main route, and River Road to Timber Ridge Drive as a secondary route. A map of the preferred delivery route may be seen in Figure 8.10.3. Local deliveries of fertilizer, gasoline, and other products to specific commercial properties will not be limited, changed, or restricted in any way.

The Risk Assessment of overuse of road salt is represented to be a low to medium risk to the aquifer. Road salt placed on roads that follow the contour of the hillside (Covered Bridge Road, Hunting Creek Drive, and Happy Hollow Lane) represents a higher risk of contamination to the aquifer, but a greater need for de-icing, as these roads may become dangerously slick during snow/ice events. Road salt placed on other roads (Windham Way, Innisbrook Drive, and Mayfair Ave.) represents a slightly lower risk of contamination to the aquifer, and also represent less need for de-icing for safety concerns.

The easiest way to lower the risk for contamination by road salt is to use less of the material. In many cases, applying less salt is practical without compromising road safety. To prevent over-application, established amounts of salt per unit area, with respect to snowfalls, should be calculated. Road salt manufacturers usually list recommended application rates for road conditions such as the prevention of black ice, temperatures less than 10°, or the snow is packed. Following these recommendations can reduce the amount of salt used, without compromising safety.

Educational programs about the potential contaminants that result from road salt usage have been and will be initiated by LWC. LWC has given educational materials to the KYTC and the City of Prospect, asking them to use road salt only when necessary and only in the recommended amounts. Additional educational materials may be prepared for a target audience of the homeowners and/or commercial properties in the area. Education is the first step toward increasing understanding of the potential problem and provides some support for road salt reduction by the public.

Additional measures that may be considered by the City of Prospect, Metro/Louisville, and the State Highway Department are listed below:

1. Plowing snow is more economical and environmentally friendly than melting it with chemicals. In general, mechanical removal should be used in preference over road salting, with road salt application used to maintain de-icing. Another method of decreasing road salt use is pre-wetting. In this method, the salt is coated with another chemical that helps the road salt embed itself in the ice or snow. Pre-wetting decreases the amount of road salt needed without a decrease in the level of service, and improves vehicle traction.
2. The use of other chemicals is also an alternative to the use of road salt. Studies have indicated that the real cost of applying road salt is about 15 times the cost of purchasing and applying the road salt. Alternative products may cause less environmental damage, and, even if they cost more, by using less product for the same results, can save money. Alternative products include calcium chloride, calcium magnesium acetate, magnesium chloride, potassium acetate, potassium chloride, sodium salts of carboxylic acids, and urea.
3. Limit salt application to specific areas that need it the most, such as steep inclines and main thoroughfares.
4. Consider actual road conditions before pre-salting, and limit pre-salting to problem areas.
5. Establish buffer zones and filter strips on the sides of roadways to prevent direct spray and runoff from reaching sensitive surface waters and vegetation.
6. Direct salt away from the problem areas. Line ditches and install drainpipes or catch basins where possible to reduce the amount of salt that can enter the groundwater.
7. Snow dumping guidelines can also be established. Snow that has remained on the road and contains road salts or other contaminants should be dumped on a non-porous land surface and allowed to melt. The land should be situated so as to minimize runoff, and should not be used continuously for many years.

LWC plans to take part in an on-going dialogue between the KYTC, the City of Prospect, and the Louisville/Metro Government to discuss these issues for future steps to be taken. At present, all de-icing guidelines depend upon voluntary compliance by the governmental entities.

The hills above the WHPA, while not technically within the WHPA, contain sink holes and other evidence of sub-surface drainage called "karst". The Louisville/Metro Planning Commission will check with other governmental entities to see if any studies have been completed on the karst topography surrounding the WHPA, which may contribute to contamination of the WHPA. LWC's role will be to monitor any studies done and lend assistance to universities or other governmental entities that may be a part of the study.

Additional transportation issues include the design and drainage plan for the bridge and tunnel to be constructed over the Ohio River, at least part of which will be located within the WHPA. At this time, details of the design for these structures are not available. LWC plans to meet with state highway department and design engineers to discuss methods of minimizing the potential for contamination as the design progresses.

Estimated Costs

The Management Plan discussed above is relatively low cost, and may actually save the Louisville/Metro Government, the City of Prospect, and the KYTC money by lowering de-icing costs.

Public Outreach and Education

With the help of the Non-Point Source Pollution Section of the KY Environmental and Public Protection Cabinet, an excellent resource was located for educational purposes. The pamphlet was presented to KYTC, Louisville/Metro Government, and City of Prospect personnel for discussion during the Transportation portion of the Management Committee Meeting. This pamphlet is listed below.

1. *WHPP 007Q Road Salt and Winter Maintenance for British Columbia Utilities.*

Other educational materials suggested by the Non-Point Source Pollution Section was also acquired and have become a part of the research materials that will be used to develop future pamphlets and fact sheets about road salt usage for homeowners and commercial property owners.

8.11 Home and Agricultural Pesticide/Fertilizer Application

A pesticide is any substance or mixture of substances intended for: preventing, destroying, repelling, or mitigating any pest. Pests include insects, animals, unwanted plants (weeds) fungi, and microorganisms such as bacteria and viruses. Though often misunderstood to refer to only insecticides, the term pesticide applies to herbicides, fungicides, and various other substances used to control pests. Under US law, a pesticide is also any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, or a nitrogen stabilizer.

Many household products contain pesticides. In addition to the ant and roach killer, insect repellents, rat and other poisons, flea and tick sprays, pet collars, disinfectants and sanitizers, anti-mold or mildew products, many lawn and garden products, and some swimming pool chemicals are considered by the US EPA to be pesticides.

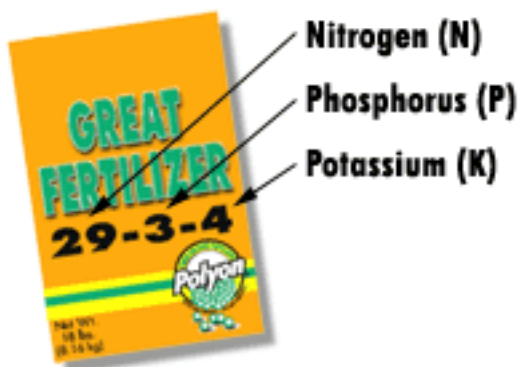
Some pesticides are safer than others. Biologically-based pesticides, such as pheromones and microbial pesticides are becoming increasingly popular and often are safer than traditional chemical pesticides. In addition, the EPA is registering reduced-risk conventional pesticides in increasing numbers.

550,000 pounds of lawn care pesticides were used in Kentucky in 1995. Data is not currently available to determine if the use has increased, but the Kentucky Department of Agriculture reports that it probably has increased.

A pest control “device” is any instrument or contrivance (other than a firearm) intended for trapping, destroying, repelling, or mitigating any pest. A ‘black light’ trap is an example of a device. Unlike pesticides, the EPA does not require devices to be registered.

A fertilizer is a substance that contains one or more recognized plant nutrients that is specially designed to be used for its plant nutrient content and is claimed to promote plant growth. Primary nutrients in fertilizer are nitrogen (N), phosphate (P), and soluble potash or potassium (K). In addition, fertilizers may contain additives which “alter transformation in the soil, maintain good physical condition, reduce corrosiveness and serve some purpose other than providing plant nutrients”. Fertilizers may or may not contain a liming material. A liming material is defined as “a product whose calcium and magnesium compounds are capable of neutralizing soil acidity”.

Of the three main nutrients, (N, P, and K), Nitrogen, (N), is the main nutrient for new, green, growth. Plants that are almost all leaf, such as lawn grasses, need plenty of nitrogen so the first number is especially high in fertilizers for lawns because grass must continually renew itself after mowing. The higher the number, the more nitrogen the fertilizer provides.



Phosphorous (P) promotes root development which helps strengthen plants. It also increases blooms on flowers. Lots of phosphorous is great for bulbs, perennials, and newly planted trees and shrubs. They depend on strong roots, so fertilizers meant for these plants often have high middle numbers.

Potassium or potash (K) improves the overall health of the plants. It helps them to withstand very hot or cold weather and defend against diseases. Most soils already have some potassium, so the third number in the fertilizer analysis is usually smaller than the other two. Fertilizers meant for fall, such as “Winterizer”, also contains extra potassium to prepare plants for cold weather.

Other important nutrients may include Calcium (Ca), Magnesium (Mg), Sulfur (S), and Iron (Fe). Consumers must read the fertilizer label carefully to shop wisely for fertilizers. The most important ingredient, nitrogen, comes in many different forms, so the consumer must look at the total nitrogen in the product.

Fifty-four million tons of commercial fertilizers of all kinds were consumed in the US in 1996. Primary nutrients (N, P, K), accounted for 91% of this total; liming materials accounted for about four percent; secondary nutrients and micronutrients accounted for nearly five percent of the total; and organic fertilizers accounted for one percent of the total.

While Kentucky keeps track of the fertilizer use by agriculture, non-farm use was not coded for reporting to the EPA for the year 1996 (more recent data is unavailable). For other states, non-farm use of fertilizers is about six percent. As a rule, multiple nutrient, and organic fertilizers are used in higher percentages on non-farm land than other fertilizers. Total fertilizer use within the state is listed below in Table 8.11.1. Using an average of six percent Kentucky’s residents should use approximately 57,804 tons of fertilizer per year.

Table 8.11.1
Kentucky Fertilizer Consumption, 1996

Multiple Nutrient Fertilizers	334,649 tons
Nitrogen Fertilizers	395,936 tons
Phosphate Fertilizers	195,011 tons
Potash Fertilizers	202,600 tons
Secondary & Micronutrient Fertilizers	9,922 tons
Liming Materials	0 tons
All Fertilizers	963,407 tons

Nitrates in drinking water can be harmful and are thought to be carcinogenic. In surface waters, fertilizers can stimulate growth of algae and other aquatic plants. When these plants die, the rotting vegetation consumes oxygen ultimately leading to eutrophic waters. Total dependence on chemical fertilizer not only changes the chemical, physical, and biotic properties of the soil, but endangers other environmental aspects. A combination of methods that includes the introduction of organic materials is best for both lawns and crops.

Some nitrogen containing fertilizers are hazardous to human health. Ammonia, for instance, is toxic and can be very reactive with some substances. Ammonium nitrate, another common fertilizer, is explosive, so extreme care must be taken during manufacturing and storage.

Lawnmower emissions, while known air pollutants, are also a potential contaminant for groundwater. Lawnmower emissions include particulate matter that rests on the ground surface, and becomes a part of the groundwater through precipitation and percolation, or is a part of the surface water runoff. Jefferson Co. has received a Clean Air Excellence Award for its education program Lawn Care for Cleaner Air. While this not only increases public awareness about air pollution, it also helps to decrease pollution to the groundwater.

While lawn care chemicals increase the potential for pollution to groundwater and surface water, they also poison wildlife. Wildlife specialists call bird poisonings in residential areas “Lawn Care Syndrome”. Symptoms enumerated by toxicologists include excessive salivation, grand mal seizures, wild flapping and screaming, most often followed by death. According to the National Academy of Sciences (NAS) lawn pesticide use is a significant component of the total pesticide problem. (Pesticides include all herbicides, insecticides, fungicides, etc.) NAS said that although the farmer uses pesticides more widely, the homeowner uses 10 times more per acre than do farmers. In areas of high-density housing, this presents a higher risk to the aquifer.

The State of Minnesota conducted a study of the lawn care habits of Lake Harriet residents before and after an outreach effort. This study showed that education can change people’s behavior, and may have immediate benefits for water quality. In the Lake Harriet area, herbicides and phosphorus were of the most concern.

During 1993 and 1994, the Watershed Awareness Program saturated the 148-acre study area with billboards, brochures, and direct mailings of lawn care tips. The quality of the storm water runoff was monitoring before, during, and after the educational effort. Storm water samples revealed a decrease in average pesticide loads after the outreach activities: MCPA levels decreased to 86%; Dicamba, 59%; 2,4-D, 58%; and MCPP, 56%. (MCPA and MCPP are both chlorinated herbicide acids mixtures.)

The project showed that, after the outreach program, residents apply significantly less lawn fertilizer, and would rather spot-treat weeds or use non-chemical weed control methods.

During the windshield survey of the WHPA, notes were made for each property that either advertised the use of a lawn care service or appeared to use a lawn care service. The survey showed that large blocks of homes in the WHPA use lawn care services or self-apply lawn care chemicals to the degree that the yards are maintained similarly to a professional lawn care service.

Over 60% of all the residential properties in the area use lawn care services or have lawns that are maintained similarly to a professional lawn care service.

A web search was completed, using the Real Yellow Pages available from the internet, for lawn installation and maintenance contractors, and pest control services within a twenty mile radius of the City of Prospect. The accuracy of the search is questionable, because the information contained may be dated by a year or more. However, as a general estimate, this search yielded a total of 123 lawn care services located within a twenty mile radius of the City of Prospect, including those located in Indiana. By counting the number of listings in the Yellow Pages produced by BellSouth, a total of 172 lawn maintenance companies were found.

To develop a complete listing of the lawn care and pest control companies that may provide services to property owners/lessees in the WHPA, LWC contacted the Kentucky Department of Agriculture and requested a listing of companies that are licensed to apply pesticides and fertilizers professionally. The three lists were cross checked with phone company listings for accuracy, and phone calls were placed to many companies to acquire addresses not otherwise available. There are still several companies whose address is not listed, that have a working phone number. Additional attempts will be made to contact these companies and acquire a current address.

Source Reduction Grant

A Source Reduction Grant was applied for and received. The grant was completed, using funds available from the US EPA, and was successful. A copy of the grant report is submitted with this report.

The complete list has been shared with the KY Department of Agriculture and with MSD, so that these companies may become licensed and file a HMPC plan. (HMPC plans will be discussed later.) These companies should also have a Groundwater Protection Plan on file with the state. This, too, will be discussed later.

As a national trend, more and more homes are using lawn services as a means of maintaining a lush turf. As the baby boomers age and become unable (or less inclined) to perform their own lawn maintenance work, lawn care services are on the increase. In addition, massive advertising campaigns by lawn chemical companies increase the use of self-applicable lawn chemicals. In many neighborhoods, the search for the perfect lawn becomes a competition between neighbors that may result in the over-application of lawn chemicals.

Data is not available at this time to determine the national, state-wide, or local trends for the increase in lawn service use. However, even a ten percent increase over the next year or so would significantly increase the number of homes contributing to lawn chemical runoff or percolation to the water table. (A ten percent increase would mean that 475 homes would use lawn care services.) Therefore, there is no indication that the present usage of lawn care services is going to slow down any time in the near future.

Risk susceptibility analysis indicates that the use of pesticides and fertilizers are high risk in WHPA-1 and WHPA-2A, medium risk in WHPA-2B, and low risk in WHPA-3.

Modes of Contamination

All pesticides are toxic to some degree, which means the pesticide can pose some risk to the user, other humans exposed to the chemicals, pets, and to any wildlife that venture onto the lawn—especially if these chemicals are over-used or carelessly applied. Pesticides can also kill earthworms and other beneficial organisms, disrupting the ecological balance of the lawn.

Many farmers and home owners apply more fertilizer to crops and lawns than can be taken up by the plants. Of the total fertilizer constituents, nitrogen is most susceptible to leaching because it cannot be retained by the soil. Phosphates can react with other minerals in the soil forming insoluble compounds and the amount of potassium leached is influenced by the cation exchange capacity of the soil. These excess nutrients can contaminate groundwater and surface water.

The use of chemicals applied for lawn maintenance within the WHPA represents a non-point source pollutant. This means that the uses of chemicals from lawn service companies, or lawn maintenance practices are wide-spread, and can enter the groundwater through percolation of the chemicals through the soils, and by runoff to drainage areas with the WHPA. Some of the common methods of contamination by lawn care products are over-application of chemicals, and spills and/or leaks.

Existing Laws and Regulations

The US EPA has developed a list of Minimum Risk Pesticides that are purported to cause less risk to the environment. These pesticides are exempt from registration, if they meet certain requirements. To qualify for an exemption as a minimum risk pesticide, each active ingredient in the pesticide product must be listed in 40CFR 152.25(g)(1). A listing of minimum risk pesticides on file with the US EPA may be seen in the report on the Source Reduction Grant. Any inert ingredients must also be listed in order for the pesticide to qualify.

Kentucky's regulations state that all pesticide products, even minimum risk pesticides, must be registered with the state. A listing of minimum risk pesticides as registered with the State of Kentucky may be seen in the report of the Source Reduction Grant. These products are listed by brand names whose products contain the chemicals listed in the previous lists. Minimum risk pesticides are typically natural products, or relatively simple chemical compounds. Use of these pesticides qualifies farmers, nurseries, etc., to be able to advertise their products as Organically Grown.

At present, based on research of the Louisville/Metro Ordinances available on-line, lawn maintenance contractors and pest control services are required to adhere to the following Louisville/Metro Government Regulations:

1. Lawn and Garden Services are *"required to submit a HMPC Plan, (Hazardous Materials Use and Spill Prevention Control) if the administering agency (MSD) finds it necessary to protect the public health and safety."*
2. *"The administering agency shall not require an HMPC Plan or amendments to an existing plan for those hazardous materials added to this section by adoption of the "extremely hazardous substances" list pursuant to Section 302(a) of the Superfund Amendments and Reauthorization Act of 1986, (SARA), Until such time as the reporting format under SARA and under this section have been reconciled, but in no event shall such plan be required prior to August 1, 1993."*

Exemptions include:

1. *"Persons who handle agricultural chemicals in the ordinary course of agricultural operations other than warehousing or bulk storage of such chemicals for resale or commercial application."*
2. *"Persons who handle hazardous materials otherwise regulated only at temporary construction sites"*
3. *"Persons who handle hazardous materials only in conjunction with residential use of property for noncommercial purposes."*
4. *"Consumer products and foodstuffs packaged for distribution to, and intended for use by the general public. This refers to ingredients used in production of foodstuffs which are regulated by the Federal Food, Drug, and Cosmetic Act as amended."*
5. *"Retail sale; however, where a portion of the retail sale is used for bulk storage, then bulk storage, is regulated."*
6. *"Liquor stores."*
7. *"Any other exemption based on specific application to the administering agency, provided that such element, compound, mixture, solution, or substance to be considered for exemption, when released into the environment will not present danger to the public health or welfare of the environment or to the employees of any person or the general public."*

8. *“Persons who do not handle hazardous materials in quantities equal to or greater than the reportable quantities, provided that the administering agency may require a plan under such conditions as set forth in § 99.15(A)(3).”*

The Kentucky Department of Agriculture requires that all lawn care and pest control services, (operators and applicators), are to be licensed by the state. This requirement includes the completion of a certification program, and a passing grade on an exam, based on the products being sold. A lawn care service provider would take a different test than a contractor who applies pesticides for termites. Any motorized equipment used to apply pesticides must also be registered with the Dept. of Agriculture.

Usually, the same people that apply commercial pesticides also apply fertilizers, (farmers are exempt from many licensing requirements). While specific training is not required for fertilizer application, the general safety measures as to storage, handling, mixing, and application also apply. Other general regulations are listed below:

1. *A “Dealer” is any person that engages in the storage of bulk fertilizer or a Restricted Use Pesticide for the purpose of redistribution or direct resale, or engages in the business of applying any pesticide to the lands of another. These persons must be licensed. Anyone that sells pesticides and fertilizers for home use are also considered dealers, (Category 12 – Pesticides Sales Agent), but does not have to be licensed, unless they are offering recommendations or advise to the public on which pesticide to use.*
2. *A lawn service company, or an interior pest control service company, that applies pesticides must have at least one person licensed as an operator performing the work. Other personnel may hold an applicator’s license, or be a trainee working under the supervision of a licensed applicator or operator. Any licensed operator or applicator must pass a test on pesticide application.*
3. *Certain products are listed with the US EPA as Restricted Use Pesticides. These products are, as a rule, sold only to licensed pesticide operators, applicators, or dealers. If a homeowner or farmer wishes to use a Restricted Use Pesticide on his property, the homeowner must have a Spray License, and a farmer must have a Private Applicator Card. Restricted use pesticides are not available at most retail stores.*
4. *Any motorized equipment used to apply pesticides must be registered with the State Department of Agriculture.*
5. *The Local Planning Team is unable to propose any ordinance, resolution, rule, or regulation regarding agricultural or silvicultural, (trees), pesticide sale or use. (KRS 217B.270 (2))*
6. *The Local Planning Team is unable to propose any ordinance, resolution, rule, or regulation regarding the application of lawn care or pest control pesticides by private persons.*

In addition, all pesticides used within Kentucky, must be registered with the state of Kentucky, before it is applied or sold. The Kentucky Department of Agriculture, Cooperative Extension Service, holds training sessions for licensed contractors, as well as for farmers, homeowners, and property owners in pesticide and fertilizer application, storing, mixing, transporting, and handling. They have offered to participate in a pesticide application education program that the LPT may wish to hold.

Lawn care and pest control service companies are required to fill out a Groundwater Protection Plan. The plans must be kept on file unless the KY DOW asks to see a copy of the plan. At that time, the company must submit the plan to the KY DOW, who may approve the plan.

Management Plan

The Management Plan for lawn care and pest control services, as well as pesticide use in the WHPA, is a multifaceted approach. Table 8.11.5 summarizes the plan, while the goals of the plan are as follows:

1. Encourage all commercial pesticide applicators, (pest control and lawn care services) to become licensed by the State of Kentucky, Department of Agriculture;
2. Encourage all commercial pesticide applicators to file a HMPC plan with MSD, if they store more than 55 gallons of pesticide on their property;
3. Encourage all commercial pesticide applicators to develop and maintain a GWPP;
4. Encourage the public to use only licensed pest control and lawn care services, and
5. Educate the public about the safe use of pesticides in the home and business.

To this end, LWC personnel has developed a listing of all the lawn care and pest control service companies in the city of Louisville, and the surrounding area that may provide services to homeowners and business owners in the WHPA. LWC has also developed a Public Outreach and Public Education program designed specifically for pest control and lawn care companies.

These companies were notified by the use of specially developed educational materials discussing:

1. The location of the WHPA, and the purpose of the WHPP;
2. Special measures to be taken should an accidental spill or leak of pesticides and fertilizers should occur;
3. State and local requirements, including licensure, GWPPs, and HMPCs; and
4. A notice of new pesticide regulations regarding the maintenance of specific records for the application of pesticides.

The listing of lawn care and pest control service companies in the area has been sent to the Kentucky Department of Agriculture for their review, and the Jefferson County Cooperative Extension Service for their use in up-dating their current mailing list for specialized educational seminars. The listing has also been sent to the KY DOW, GWPP Section so that they may be aware of the companies that may require a groundwater protection plan, and to MSD, for inclusion on their list of required HMPC plans. The state agencies have agreed to cooperate with LWC in maintaining compliance to the regulations by the companies.

LWC sponsored a seminar for both homeowners and commercial properties within the WHPA discussing lawn care and pest control services, as a public education tool. The seminar classes were taught by the Jefferson County Cooperative Extension Service, which is a part of the KY Department of Agriculture. Additional information about the seminar may be seen in the Source Reduction Grant report.

Estimated Costs

Estimated costs include printing costs, delivery costs, and mailing costs. Other state and local agencies will likely also incur some mailing and personnel costs during the enforcement portion of the plan. Additional costs may be incurred as a part of future pest control and lawn care seminar.

Public Outreach and Education

LWC personnel has developed a listing of all the lawn care and pest control service companies in the city of Louisville, and the surrounding area that may provide services to homeowners and business owners in the WHPA. These companies will be notified by the use of specially developed educational materials discussing:

1. The location of the WHPA, and the purpose of the Wellhead Protection Plan;
2. Special measures to be taken should an accidental spill or leak of pesticides and fertilizers should occur;
3. State and local requirements, including licensure, groundwater protection plans, and HMPC; and
4. A notice of new pesticide regulations regarding the maintenance of specific records for the application of pesticides.

A copy of the specially developed letter to be sent may be seen in Appendix 6.

The listing of lawn care and pest control service companies in the area has been sent to the Kentucky Department of Agriculture for their review and notice to the businesses of the requirements for licensure, and the Jefferson County Cooperative Extension Service for the current mailing list for specialized educational seminars. The listing has also been sent to the KY DOW, GWPP Section so that they may be aware of the companies that require a groundwater protection plan, and to MSD, for inclusion on their list of required HMPC plans. The state agencies have agreed to cooperate with LWC in maintaining compliance to the regulations by the companies.

In conjunction with the notices sent to the lawn care and pest control companies, as well as those companies licensed for pesticide application, an educational program has been developed for homeowners in the area. Educational materials will be delivered door-to-door to homeowners in the area, including the materials listed below.

1. *WHPP 002F Pollution Prevention Begins at Home;*
2. *WHPP 003M Integrated Pest Management;*
3. *WHPP 005C Emergency Phone Numbers;*
4. *WHPP 006C Haz Bin: A Guide to the Disposal of Household Hazardous Materials;*
5. *WHPP 007H Best Management Practices for Handling Pesticides in the Home Landscape;*
6. *WHPP 007I Read the Label First! Protect Your Household! (Kids! Pets!);*
7. *WHPP 007J Best Management Practices for the Lawn; and*
8. *WHPP 007T Healthy Lawn, Healthy Environment.*

Additional educational materials will be placed in the City of Prospect Library for free distribution and/or reference. Materials will also be placed for free distribution at the public meeting and seminars. LWC would like to express our appreciation to the US EPA and the KY Department of Agriculture for their generosity in providing free educational materials.

1. *WHPP 002C Household Survey of Hazardous Materials and Products;*
2. *WHPP 002D Index of Household Hazardous Products and Compounds;*
3. *WHPP 007P Danger – Don't Use Farm Pesticides Indoors!;*
4. *WHPP 007V 10 Tips to Protect Children from Pesticide and Lead Poisonings;*
5. *WHPP 007W Join Our Pest Patrol – A Backyard Activity Book for Kids;*
6. *WHPP 007X When Using Pesticides, Protect Your Children, magnet; and*
7. *WHPP 007Y Pesticide Safety, ruler.*

LWC has also developed a public education program for commercial properties in the area, and acquired specialized materials from the US EPA. Day cares and 'school type' settings received:

1. *WHPP 006A Pest Control in the School Environment: Adopting Integrated Pest Management.*

In addition, all businesses received specialized information about pesticide use. These materials are listed below.

2. *WHPP 001F Potential Contaminant Survey – General Products;*
3. *WHPP 003B Pollution Prevention in the Office;*
4. *WHPP 003M Integrated Pest Management;*
5. *WHPP 006B Environmental Resources for Small Businesses;*
6. *WHPP 006P PNEAC – How to Read and Use MSDS for Environmental purposes.; and*
7. *WHPP 005C Emergency Phone Numbers.*

Additional educational materials were written and used during the public education phase of the implementation of the program, and during the Source Reduction Grant. Copies of these materials, and other materials developed may be seen in the attached report. These include:

1. *Greener Lawn Care*
2. *Kentucky's Beneficial Bugs*
3. *Kentucky's Native Trees*
4. *Why Use Native Plants?*
5. *Kentucky's Native Wildflowers and Grasses*
6. *Common Weed Pests*
7. *Common Insect Pests*
8. *Integrated Pest Management*
9. *Garden Design with Native Plants*
10. *Landscaping for Wildlife – Birds and Butterflies*
11. *Landscaping for Wildlife – Mammals, Reptiles, and Amphibians*
12. *Non-chemical Pest Controls*

These materials were also made available on-line on the LWC site, and are currently listed as within the Top Ten websites for the Louisville Metro Government.

8.12 Recreational Boating and Marinas

The WHPA is bounded on one side by water—the Ohio River to the west, and contains Harrods Creek and Goose Creek within its borders. Along the Ohio River, there are privately owned boat docks and boat slips, some of which may be rented in the summer. Along Harrods Creek Goose Creek, there are several privately owned marinas, all of which rent or sell boat slips and docks for boat storage use year around.

Boats found within the WHPA may be generally placed in two broad categories— boats without ‘heads’ (which includes fishing boats, speed boats, dinghies, john boats, canoes, and small sailboats), and boats with ‘heads’ (which includes larger speed boats, houseboats, yachts, larger sailboats, etc.) A ‘head’ is the marine toilet fixture and the storage tanks. Sink water, or ‘gray’ water may also be connected to the storage tank. Also of concern are the bilge water areas of the boat, which may contain oil from the engine, trace chemicals from the boat’s materials that have leached out, chemicals designed to keep the bilge water free from algae and other plant growth, and materials from other spills and leaks.

Businesses that specialize in boat maintenance services may also contribute to groundwater pollution. The marine industry lags behind the automotive industry in substituting less hazardous materials in their products. Many of the products used to paint, seal, destroy algae, etc. contain highly toxic materials, which leach into the water, increasing toxicity of the water.

Numerous residential sites within the WHPA contain boats in temporary storage or abandoned on the property. While these have not been assigned a “Boat” designation within the data base, and may not be sorted, we can estimate that approximately five to ten percent of all homes in the WHPA either have a boat on site, or at a marina nearby. While this is not a large percentage of homes, boat storage and use in and around the WHPA represents a significant source of potential contamination.

At present, the Potential Contaminants Survey Committee knows of four pump-out stations along Harrods Creek:

1. Harrods Creek Boat Harbor;
2. Captain’s Quarters Marina;
3. Harrods Landing Community Yacht Club & Marina; and
4. Marina Village, Inc.

None of the four stations are reported to be operational, nor were they available for use by boaters in summer 2013.

The Louisville Sailing Club provides parking space, a loading ramp, and some docks for sail boats. This is a private club, and they may not be required by state law to provide a pump-out station. A table listing the boat docks and marinas may be seen in Attachment 7.

Limestone Marina, located just south of Harrods Creek on the Ohio River, may have a pump-out station that works sporadically, but it is not readily available to the public, and most boat owners are unaware of its location. Juniper Docks, at the mouth of Goose Creek on the Ohio River, offers gasoline facilities, but doesn't appear to offer a pump-out station. Inquiries indicate that if the pump-out station is available, it is not general knowledge to the boating community. There is a new marina under construction across the river from Captain's Quarters Marina, on the Indiana side. At this time, it is not known if this marina will provide a pump-out station for the public's use in the future.

There is only one known boat maintenance facility within the WHPA. This facility is located directly behind and may be a part of Frank Otte Nursery. It is small and likely caters to small boats and small engines. The site may also be a boating-themed florist or gift shop. The window of the store displayed decorations of a boating nature, with flower arrangements and product advertisements for boating products. However, two barrels of waste oil were encountered in the garage behind the office portion of the property, as were several boat maintenance chemicals. A site interview will be completed at this site, again, that may indicate additional practices that could contribute to groundwater pollution.

Most marina and dock rental fees are paid by the boat owners. These fees include the use of sewage pump-out stations that are required by law to be provided. Since the pump-out stations are not operational, the boat owners are paying for a service they do not receive.

None of the government entities that oversee boating and marinas in the area was aware that the pump-out stations were not operational. Each agency requested that LWC provide them with a list of pump-out stations that were not working, which was completed.

Many marinas are associated with subdivisions in the area, offering rental or purchased boat slip space to those that live in the subdivision. Many of these facilities have no buffer zones between the home/condo area and the boat dock/slip area, indicating that any lawn chemicals used on the property may directly run off the property down into the water below.

Testing for increased levels of pesticides, road salts, fertilizers, raw sewage, etc. may be complicated by the location of two MSD sewage treatment plants upstream on Harrods Creek, which collects and transports the sewage effluent to the Ohio River.

Federal funding may be available from the KY Division of Waste Management, Non-Point Pollution Section to install a public pump-out station for use by the boating community. It is not logical that LWC should install and maintain the station. However, perhaps an arrangement can be made with the state or local governments for a place to install and maintain a permanent public station, and personnel available to maintain the station.

Although boat docks and boating wastes present a Medium to Low risk within the WHPA as a whole, the marinas within the area can represent a higher risk to the aquifer, as the water in a marina remains in longer contact with the stream bed than that within the current of the Ohio River. Most of the marinas located in or near the WHPA are located along Harrods Creek. Only one marina has an outlet directly to the Ohio River, Limestone Marina, which is located south of the WHPA. Most of the marinas of concern are located along Harrods Creek, where the water moves sluggishly.

Harrods Creek flows toward the Ohio River. The average daily flow of the creek is not measured by the USGS, but we know that the outflow is increased by the sewage effluent from the two sewage treatment plants directly upstream from the WHPA.

Marinas in the area receive the same gasoline as gas stations in Jefferson County. The gasoline is oxygenated, and is designed to limit the amount of toxic emissions from automobiles and degree of evaporation of the raw gas into the atmosphere.

The components used as oxygenators currently include alcohols and ethers. Methyl tertiary butyl ether (MTBE) is the most widely used ether, though there are others that may be combined with gasoline. MTBE is a volatile, flammable, and colorless liquid that dissolves rather easily in water. At this time, about 30% of this country's gasoline is oxygenated gasoline, of which 87% contains MTBE.

MTBE is a carcinogen if ingested in high doses. The EPA has only limited data about the threat to public health from ingesting low exposure levels in drinking water. If MTBE is present at levels around 20 to 40 parts per billion drinking water tastes and/or smells like turpentine. Some people may be able to detect it at lower levels.

Gasoline has been named as a fungible product. This means that one brand can be substituted for another without penalty. Therefore, purchasing gasoline from one company does not guarantee that the gasoline purchased was produced by that brand. This is a practice that is not openly advertised by gas companies.

None of the marinas in the area are allowed to acquire a variance in purchasing oxygenated gasoline, as it is a federal mandate that Jefferson County use oxygenated gasoline to meet air quality standards. In addition, there is no guarantee that the brand sold at the marina was produced by the brand advertised. Therefore, requiring that marinas carry only gas oxygenated by alcohol is impractical, and difficult, if not impossible, to enforce.

The Risk Assessment shows that Marinas and boat docks represent a medium risk in WHPA-1, and a low risk in WHPA-2A, WHPA-2B, and WHPA-3. However, marinas located on Harrods Creek would represent a somewhat higher risk than boat docks located on the Ohio River, because the water is in contact with the surface water/groundwater interface for longer periods of time, and the potential contaminants are more highly concentrated.

Modes of Contamination

Pollutants resulting from leaching of materials from boats may enter the surface water that borders the WHPA. Spills, leaks, and/or accidental releases may also present a contamination hazard, primarily within marinas. Intentional dumping of raw sewage into the surface water is a common practice among boat owners within the area. In addition, many boat owners dispose of trash and other wastes in our surface waters. Due to surface water/groundwater interaction, these pollutants may also enter the aquifer that supplies the collector well.

Gasoline from recreational boating represents a higher hazard to the surface water/groundwater interface than just spills and leaks. Marine boat engines are more conducive to contamination from MTBE because carburetors are sloppy at best in burning and using the oxygenated gasoline efficiently. Incomplete combustion of the gasoline leads to and increases in MTBE and other gasoline products entering the air and water.

Existing Laws and Regulations

KRS 235.420 states that it is illegal for boaters to dump raw sewage and oily bilge water into Kentucky's waters. This same regulation requires houseboats to have a marine sanitation device in use. A marine sanitation device chops up raw sewage to a more manageable size for disposal. Boaters must rely on pump out stations maintained by the marinas in the area to remove the wastes from their storage tanks. In addition, boaters with oily bilge water must find an alternative way of disposing of the oily water. Most boaters understand that it is against the law to dump raw sewage into the river and streams of the area, but have no alternative, as pump-out stations are not readily available.

Many boats are required to have marine sanitation devices. Any boat equipped with marine toilet facilities on the waters of the Commonwealth must be equipped with one of the three marine sanitation devices listed below:

1. Type I – Treats raw sewage with disinfectant chemicals, and by other means, before the sewage is discharged into the water. The treated sewage must meet certain health standards for bacteria content and must not show any visible floating solids. The marine sanitation device is equipped with a “Y” valve that goes directly overboard. The “Y” valve must be in the closed position in a “No Discharge Zone”.
2. Type II – Must meet a higher level of sewage treatment, because they are larger in size than a Type I and has higher power requirements. This type marine sanitation device is usually installed only in larger recreational boats. This type is also equipped with a “Y” valve.
3. Type III – Certified to a no-discharge standard. Type III devices include re-circulating and incinerating marine sanitation devices and holding tanks. Holding tanks are probably the most common type of Type III marine sanitation device found on recreational boats. Sewage is stored in the holding tank until it can be pumped out into a pump-out station.

Marinas are required by KRS 235.230 to maintain a pump-out station for the owners of motorboats with marine toilet facilities. However, last summer, there were no working pump-out stations in the Harrods Creek/Ohio River area, based on contacts made at the marinas, and an informal survey of boaters in the area. There are several boaters that served on the Potential Contaminant Committee that have reported that the pump-out stations worked for a brief time when the marinas were new, but almost immediately stopped working. They have also reported that there are no pump-out stations available for boaters to use from the upper Mc Alpine Dam at Louisville, to Cincinnati, Ohio. Unfortunately, based on the findings of the Potential Contaminant Committee last summer, this is likely to be true.

Marinas and boat docks in the Louisville area are overseen by local, state, and federal government entities. The River Patrol Unit, which is a section of the Louisville/Metro Police Department, is the local governmental branch with jurisdiction over the marinas in the area. This unit is located near Limestone Marina, south of the WHPA, between the mouths of Goose Creek and Harrods Creek.

The Kentucky Department of Natural Resources, Department of Fish and Wildlife, Louisville District is the state governmental entity that oversees marinas and boat docks in the area. This agency is located in Brandenburg, Kentucky, where it is more centrally located to the rivers and lakes in the entire district.

The U.S. Coast Guard is the federal agency that oversees marinas and docks. They are located in Louisville, near the Mc Alpine Dam. These three governmental agencies are responsible for enforcing federal, state, and local boating laws and ordinances, as well as those written for marinas and boat docks.

Marinas and boat docks within the area are required to submit a GWPP detailing the measures they will take to protect the groundwater from contamination. The KY DOW is the overseer of this program.

Management Plan

The Management Plan for recreational boaters and marinas within the WHPA is educational in nature and encourages voluntary compliance with BMPs. In addition, the plan should increase enforcement activities of existing Federal and State laws pertaining to the marinas that do not offer pump out stations.

There are many small private boat docks on the Ohio River within the WHPA. The proposed management plan for these property owners is educational in nature. Property owners will receive specially prepared pamphlets via direct mail that encourage the use of environmentally safe boating practices and the selection of environmentally friendly products for boat maintenance. The pamphlets will also inform the boat owner about the requirements and types of marine sanitation devices.

There are thirteen marinas, located primarily on Harrods Creek in or near the WHPA. During specific site interviews, the Marina owners will be given educational materials, including a blank GWPP, which is required by state law, a copy of the statute KRS 235.230 listing the duties of a boat marina owner. A listing of the marinas provided with blank copies of the GWPP will be sent to the KY DOW for their use.

At some point in the future, LWC may partner with MSD and other companies or government entities to acquire Federal, State, and/or local funding to install and manage a pump out station for recreational boaters in the area. In order to pursue any grants or funds for this project, base data must be collected and analyzed to determine relative water quality within the WHPA.

The use of MTBE in Kentucky's water ways represents more of a very high risk to the aquifer and surface water than regular gasoline, which is also a high risk activity. Marinas are not allowed to apply for a variance to purchase regular, non-leaded, un-oxygenated gasoline, according to federal law. Therefore, the LPT will discuss construction designs of new marinas within the WHPA with the Louisville/Metro Planning Commission, who approves the construction plans. Areas of discussion will include the possibility of requiring a liner to be installed around the marina to limit the free exchange of groundwater and surface water, and/or limiting the sale of gasoline in marina areas within these WHPA.

LWC will continue to monitor the status of pump-out stations in the marinas on Harrods Creek and the Ohio River. Boat owners may either call LWC, or the US Coast Guard, the KY Dept. of Fish and Wildlife, or the local River Patrol to report a marina with no pump-out station, or one that is not operational.

Educational materials were made available to recreational boats stored within the marinas during the boating season. Permission will be required to make the pamphlets available at the marinas, but it is hoped that the marina owners will distribute the information to boat owners on their property. Other educational materials will be placed at the City of Prospect Library.

Wellhead Protection Area signs have been discussed in the Management Plan for Transportation Routes. However, signs informing boaters of all types will be placed at several locations to inform boaters, tug boat captains, and other people using the river and Harrods Creek and Goose Creek for recreation or commerce, that they are entering a WHPA and that it is a special environmental area, if such signs are available. At present, the water company is planning to place signs on the river bank, facing the river, at the northern and southern boundary of the WHPA, one at the entrance of Harrods Creek, and one on Harrods Creek, near Harrods Landing Community Yacht Club and Marina.

Estimated Costs

At present, the cost of production of the educational materials, and the cost of performing analysis on water quality samples are the only costs of implementing the Management Plan.

Public Outreach and Education

Special public educational materials have been developed or collected from US EPA and KY Division of Fish and Wildlife sources. The educational materials developed for recreational boaters are listed below.

1. *WHPP 002G Eco-friendly Boating;*
2. *WHPP 002I Eco-friendly Boating – Selecting a Marina; and*
3. *WHPP 007R Marine Sanitation Devices.*

These materials will be placed in areas available for distribution to interested parties (i.e. Marina supply stores) and will be sent by direct mail to those home that have private boat docks located within the WHPA.

Special public educational materials were requested from the US EPA for Marinas and will be distributed to them during the site interviews.

1. *WHPP 006Q National Management Measures Guidance to Control Non-Point Source Pollution from Marinas and Recreational Boating.*

Additional general educational materials to be given to marinas include:

1. *WHPP 006B Environmental Resources for Small Businesses;*
2. *WHPP 006D Facts About Kentucky's New Environmental Release Reporting and Cleanup Law;*
3. *WHPP 003D Best Management Practices – Vehicle Washing;*
4. *WHPP 003M Integrated Pest Management;*
5. *WHPP 006V Preparing a Groundwater Protection Plan;*
6. *WHPP 003O Is Your Septic System a Class V Injection Well?;*
7. *WHPP 006K A Homeowner's Guide to Septic Systems;*
8. *WHPP 007A Homeowner's Septic System Guide and Record Keeping Folder;*
9. *WHPP 007F Groundwater—Protecting it is now the Law;*
10. *WHPP 005A Site Specific Groundwater Protection Plan – Page 1; and*
11. *WHPP 005C Emergency Phone Numbers.*

Marinas that sell gasoline to recreational boaters will be given special educational materials for gasoline sales.

1. *WHPP 006L Preventing Groundwater Pollution: Secondary Containment;*
2. *WHPP 006O UST Frequently Asked Questions;*
3. *WHPP 007G Tanks Exempt from UST Regulations and Their Respective Regulating Agencies; and*
4. *WHPP 003L Checklist for USTs.*

A list of the marinas that have received GWPPs will be sent to the KY DOW for their use and information. Any septic systems found that may serve more than 20 people will have an inspection request filled out and sent to the US EPA, Region 4 district.

8.13 Underground Storage Tanks

Several underground storage tanks (USTs) are located within the WHPA, and are used for storing heating oil, gasoline, and/or diesel fuel. Many of the tanks located within the WHPAs are exempt from UST regulations, but may require registration with another agency. Tanks that are exempt include:

1. Tanks used to store heating oil for on-site consumption and use;
2. Tanks less than 110 gallons in capacity;
3. Tanks that serve residences or farms and are used for non-commercial purposes that is less than 1,100 gallons in capacity;
4. Hazardous waste storage tanks;
5. Septic tanks;
6. Pipeline facilities;
7. Tanks located in basements or tunnels;
8. Emergency over-fill tanks that are emptied within 24 hours;
9. Flow-through process tanks;
10. Field constructed tanks;
11. Oil/water separator tanks;
12. Hydrant systems at airports;
13. Tanks of any kind that were emptied of product prior to January 1, 1974; and
14. Above ground storage tanks.

Based on the exemptions listed above, the properties that have regulated USTs on site that are located within the WHPA are listed in Attachment 7. Of the properties listed, one of them (J. Harrods Restaurant) uses the old UST as a septic holding tank, and is not likely to be under the purview of the state regulatory agency. The Country Garden Florist is reported to have an old UST currently buried under the parking lot. If this tank was emptied prior to January 1, 1974, the tank will be exempt from regulations. If the tank was closed according to the requirements in force at the date of closure, the tank will be exempt from regulations. The site interview of this location did not provide additional information about the UST.

Three of the properties listed fall under the regulatory requirements for USTs in Kentucky. These are the two tanks located at the Harrods Creek Fire Protection District, and three gas stations. A records search will be completed prior to the site interviews for additional information. Records searches of three years ago yielded little data.

Contamination of the aquifer or overlying materials may occur from leaks within the tank itself or from leaks from fittings, pumps, or other piping attached to the tank. Small spills can occur at the ground surface, where gasoline or diesel fuel is dispensed into cars.

The primary regulatory agency for USTs in Kentucky is the KY Division of Waste Management, Underground Storage Tanks Branch. The Branch is divided into several sections:

1. Administration – Registers all UST systems, collects annual fees and handles requests for information;
2. Compliance – Assists owners and operators in complying with the operating standards (standards for leak detection, spill and over-fill detection, etc.,) and inventory record keeping;
3. Closure – Oversees the permanent closure activities, through both removal and closure-in-place, of UST systems, including tanks and piping;
4. Corrective Action – Oversees the remediation activities performed at sites with confirmed releases or contamination.

The Management Plan for USTs is based on compliance of existing regulations and on public education of UST owners. LWC will check that all existing tanks and any new tanks installed in the WHPA are in compliance with state records through a records search of the data bases located at the UST Branch in Frankfort, KY. Sites that are found to be out of compliance will be reported to the UST Branch. Table 8.13.1 summarizes the management plan.

GWPPs are also required for UST owners by the KY DOW. GWPP materials have been given and will be given to the owners of USTs. A list of the owners that have received the GWPPs will be sent to the KY DOW for their use.

Educational materials have been developed and/or acquired for the UST owners. The various materials shared with the property owners are listed below, while copies of the materials may be seen in Appendix 6.

1. *WHPP 003L Checklist for USTs;*
2. *WHPP 006L Preventing Groundwater Pollution: Secondary Containment;*
3. *WHPP 006M Activities Subject to 401 KAR 5:037 That Commonly Occur at Convenience Stores;*
4. *WHPP 006N Preventing Groundwater Pollution: Oil/Water Separators;*
5. *WHPP 006O UST Frequently Asked Questions;*
6. *WHPP 006V Preparing a Groundwater Protection Plan;*
7. *WHPP 007D Groundwater Protection Plans for Monitoring Well Owners;*
8. *WHPP 007G Tanks Exempt from UST Regulations and Their Respective Regulating Agencies; and*
9. *WHPP 005A Site Specific Groundwater Protection Plan – Page 1.*

General materials were also shared with property owners that have USTs on site.

1. *WHPP 003M Integrated Pest Management;*
2. *WHPP 003P Business and Commercial Recycling and Waste Disposal Reference Guide;*
3. *WHPP 005C Emergency Phone Numbers;*
4. *WHPP 003B Environmental Resources for Small Business;*
5. *WHPP 006D Facts about Kentucky's New Environmental Release Reporting and Cleanup Law;*
6. *WHPP 006J Handbook for Hazardous Waste Generators; and*
7. *WHPP 006P How to Read and Use MSDS for Environmental Purposes.*

8.14 Other Potential Contaminants

Other potential contaminants were found within the WHPA that represent a medium to low risk to the aquifer. Specific management plans were developed for some of these potential contaminants and are discussed below. Table 8.14.1 summarizes these management plans.

Dry Cleaners

Only one dry cleaner located within the WHPA actually performs cleaning of clothing on site. This dry cleaner is a well-established company that has one hazardous material spill reported. During the site inspection, no obvious compliance issue was noted. A GWPP was left at the site, along with other educational materials.

The Management Plan consists of three steps; compliance, GWPP plans, and education. If, during a site interview, a compliance issue is noted, the dry cleaner will be reported to the KY RCRA department, who will be asked to investigate. Any dry cleaner in the WHPA that performs cleaning on site will be given a GWPP, and the KY DOW will be noted that they have received the plan. Lastly, specific educational materials have been developed for dry cleaners that have been given to the properties located within the WHPA. These educational materials are listed below.

1. *WHPP 005A Site Specific Groundwater Protection Plan – Page 1;*
2. *WHPP 006V Preparing a Groundwater Protection Plan;*
3. *WHPP 006D Facts About Kentucky's New Environmental Release Reporting and Cleanup Law;*
4. *WHPP 006H Environmental Protection Standards for Kentucky Dry Cleaners;*
5. *WHPP 006P PNEAC – How to Read and Use MSDS for Environmental Purposes;*
6. *WHPP 006T A Pollution Prevention Guide for the Dry Cleaning Industry; and*
7. *WHPP 006U A Self-Audit Checklist for Dry Cleaners.*

Dry cleaning facilities within the WHPA that act only as a collection and pick-up were also given these materials and asked to share them with their respective home offices.

Restaurants

At the present time, there are nineteen restaurants located within the WHPA, and listed in Attachment 7. The Louisville/Metro Health Department is the regulatory agency for the restaurants. Based on the results of the previous Site Interviews, several restaurants do not use oil/water separators to manage grease wastes, but only one, which does have an oil/water separator, is on a septic system (J. Harrods Restaurant). Additional site interviews will be conducted to determine the use of oil/water separators and septic systems.

The Management Plan for restaurants is comprised solely of educational materials and requesting voluntary compliance with BMPs. All restaurants within the area received materials specifically designed for restaurants, as well as general educational materials.

1. *WHPP 003C Pollution Prevention – Floor Drains;*
2. *WHPP 003E Best Management Practices – Restaurants; and*
3. *WHPP 006N Preventing Groundwater Pollution: Oil/Water Separators.*

Paint/Hardware Stores

There are three paint and hardware stores within the WHPA, which is an unregulated industry. The Management Plan for these commercial properties consists of public education and outreach. In addition to general educational materials, these properties received specific educational materials that are listed below.

1. *WHPP 003F Evaluating Paint and Ink Wastes; and*
2. *WHPP What to do with Common Paint Wastes.*

Medical Facilities

There are ten properties that are listed as medical facilities within the WHPA. These properties include doctor's offices, dental offices and veterinary offices, and may produce silver bearing waste, x-ray wastes, and dental wastes. The Management Plan for these facilities is composed of public education for the property owners and managers. Specific educational materials were developed or acquired from federal and state EPA offices for use in the public outreach program, and are listed below. Examples of these materials may be seen in Appendix 6.

1. *WHPP 003I Photograph, X-ray, and Dental Wastes;*
2. *WHPP 003J Waste Reduction for Laboratories;*
3. *WHPP 006I How to Manage Silver-bearing Hazardous Wastes; and*
4. *WHPP 006R Pollution Prevention in Hospitals and Medical Facilities.*

Swimming Pools

Swimming Pools in and of themselves do not present a high risk to the aquifer, but the storage of the hazardous chemicals used to disinfect swimming pools can not only present a risk to the aquifer, but accidental releases of these chemicals can cause enormous harm to the environment. The Management Plan for swimming pools consists of public education about the hazardous materials used to disinfect swimming pools and is listed below. A listing of the swimming pools and hot tubs may be seen in Attachment 7. There are 108 swimming pools and hot tubs in the WHPA.

These materials will be distributed to homeowners and commercial properties within the WHPA that either have a swimming pool, or store the swimming pool chemicals.

1. *WHPP 002E Hazardous Materials – Pool Chemicals.*

Beauty/Nail Salons

Beauty and nail salons use a wide variety of hazardous chemicals in small quantities for hair coloring, hair permanent, fingernail polish, fingernail polish remover, etc. The beauty and nail salons found within the WHPA use sewers as a means of waste disposal, but since large quantities of these materials are used on site, it was felt that a general public education pamphlet would be appropriate to protect the aquifer. The specially developed pamphlet is listed below.

1. *WHPP 003N Best Management Practices for Beauty/Nail Salons.*

Jewelry Manufacturing

Only one jewelry manufacturing site is located within the WHPA. This site is managed by a man who is well aware of the toxicity of the chemicals that can be used to manufacture jewelry. Since there was only one site within the WHPA, the Management Committee felt that a public education pamphlet would be adequate as a management plan. The pamphlet is listed below, while a copy may be seen in Appendix 6.

1. *WHPP 003G Best Management Practices – Jewelry Manufacturing.*

Grocery and Convenience Stores

Only one grocery store (Kroger) may be found within the WHPA, which, based on the Site Interview, strives to be environmentally aware and promote environmental BMPs. The Management Plan for these stores consists of public education about BMPs for these stores. Special educational materials were developed or acquired and are listed below. Copies of these materials may be found in Appendix 6. These stores will also receive more general public educational materials for commercial properties that will be discussed later.

1. *WHPP 003K Best Management Practices for Groceries; and*
2. *WHPP 006M Activities Subject to 401 KAE 5:037 That Commonly Occur at Convenience Stores.*

Custom Print

There is only one custom print shop, which functions more as a copying shop, located within the WHPA at present. Because there is only one shop, the Management Committee felt that public outreach and education for the shop would be an appropriate management plan. A special pamphlet was developed for use for this property and any future custom print shops.

1. *WHPP 003F Evaluating Paint and Ink Wastes; and*
2. *WHPP 006S Pollution Prevention at Custom Print.*

Debris

The sites within the WHPA that were discovered to have debris on the property during the windshield survey are listed in Attachment 7. There are 52 sites with poor housekeeping practices listed. The debris includes household items, barrels, abandoned cars and trucks, and general construction debris.

The Department of Inspections, Permits, and Licenses of the Louisville/Metro Government supervises the property maintenance code for the Louisville/Metro area. Pertinent portions of the property maintenance code are listed below.

- *Weeds – All premises shall be maintained free from weeds or plant growth in excess of ten inches. All noxious weeds shall be prohibited...*
- *Rodent harborage – All structures and exterior property shall be kept free from rodent harborage and infestation. Where rodents are found, they shall be promptly exterminated by approved processes, which will not be injurious to human health. After extermination, property precautions shall be taken to eliminate rodent harborage and prevent re-infestation. Information to alleviate and prevent the infestation of insects, mosquitoes, flies, rats and other vermin may be obtained from the Louisville/Metro Health Department.*
- *Accessory Structures – All accessory structures, including detached garages, fences and walls, shall be maintained structurally sound and in good repair...*
- *Motor Vehicles – Except as provided for in other regulations, no inoperative or unlicensed motor vehicles shall be parked, kept, or stored on any premises, and no vehicle shall at any time be in a state of major disassembly, disrepair, or in the process of being stripped or dismantled...*
- *Accumulation of rubbish or garbage – All exterior property and premises, and the interior of every structure, shall be free from any accumulation of rubbish or garbage.*

The Louisville/Metro Government also addresses illegal dumping, through its Solid Waste Management and Services department, although the removal of such debris is the responsibility of the homeowner.

Metro Government provides the Urban Services District with free disposal of bulk waste items such as mattresses, furniture, appliances, and up to four tires during Project Pickup. However, the program is not yet available to the Prospect Area.

The Management Plan, therefore, consists of both public education and reporting of violations to the Louisville/Metro Government. Public education materials have been developed and/or acquired and will be distributed to homeowners through the area. These materials are listed below.

1. *WHPP 001 Homeowner's Guide to Wellhead Protection;*
2. *WHPP 002B Recycling Used Oil and Antifreeze;*
3. *WHPP 002F Pollution Prevention Begins at Home;*
4. *WHPP 002H Disposal of Home Medical Wastes;*

5. *WHPP 003A What Do I Do with the Gunk in this Barrel?;*
6. *WHPP 006X Preventing Groundwater Pollution: Automobile and Other Salvage Yards;*
7. *WHPP 002J Recycling Reference Guide; and*
8. *WHPP 006C Haz Bin: A Guide to the Disposal of Household Hazardous Materials.*

In addition, properties noted that have debris will be reported to the Louisville/Metro Government for removal, with WHPA-1 having the highest priority and WHPA-2 having the second highest priority for reporting.

Agriculture

There are 30 agricultural sites located within or near the WHPA, although the agriculture area is predominant within WHPA-3. One of these properties, the Henry Wallace farm, is in partnership with River Fields as a conservancy district. The majority of the sites are considered to be horse farms, but there are five sites that have become farms with row crops, and, as such, present a higher risk of potential contamination to the aquifer via pesticide usage.

The Management Plan for this property type consists of public education and outreach, as well as compliance with GWPPs. Specific agriculture educational materials were acquired from the Jefferson County Cooperative Extension Service, or other Federal and state agencies, and will be given to the farm owner during site interviews. These materials are listed below. Copies of the materials may be seen in Appendix 6.

1. *WHPP 007K Kentucky Agriculture Water Quality Authority Producers Workbook;*
2. *WHPP 007M Oil Disposal Options for the Agricultural Community;*
3. *WHPP 007N Storage of Used Oil;*
4. *WHPP 007O Free Collection and Disposal of Unwanted Pesticides; and*
5. *WHPP 007P Danger – Don't Use Farm Pesticides Indoors.*

Additional educational materials, such as GWPPs, will be given to the farm owners, depending on the types of activities that occur. Specific educational materials for these sites have been discussed previously.

Nursery

Only one nursery is currently in operation within the WHPA, Frank Otte Nursery. There are no greenhouses on the property, so high concentrations of fertilizer and/or pesticides are likely not used heavily on the property. However, there is fertilizer and pesticide storage on the property, separated into amounts suitable for the homeowner's use.

Storage of pesticides and fertilizers can represent a potential hazard to the groundwater, but Frank Otte Nursery stores these chemicals under roof and on a concrete pad, behind the main store. Some pesticides are stored within the main part of the store, but they are also under roof and on a concrete floor. From a cursory “customer” inspection, (not a site interview), cleanup materials were located near the storage area, which indicates that the nursery is aware of and operating with at least some BMPs. A site interview at a later date will be performed.

The only outside storage noted during the windshield survey was of mulch materials, as well as the plants for sale. Mulch materials should not represent a high risk to the aquifer, as they are designed to be placed outside, where it is certain to receive rainwater that will percolate down to the groundwater reservoir. However, it is not known at present if the new, dyed mulch materials represent a potential for contamination if stored in the open in large amounts. Additional investigation will be needed to determine if the dye used is environmentally safe.

Since there is only one nursery located within the WHPA, and it appears to be using BMPs during its daily operation, no specially developed materials were prepared for the Public Outreach and Education program. However, several pamphlets will be given to the nursery personnel during the site interview, which are listed below.

1. *WHPP 003D Best Management Practices – Vehicle Washing;*
2. *WHPP 003M Integrated Pest Management;*
3. *WHPP 005C Emergency Phone Numbers;*
4. *WHPP 006B Environmental Resources for Small Businesses*
5. *WHPP 006P How to Read and Use MSDS for Environmental Purposes;*
6. *WHPP 007J Best Management Practices for the Lawn;*
7. *WHPP 007I Read the Label First! Protection Your Household!;*
8. *WHPP 003P Business and Commercial Recycling and Waste Disposal Reference Guide;*
and
9. *WHPP 007N Storage of Used Oil.*

Additional information may be given to the nursery during the site interview, depending on the activities seen on site.

Photography Studios and Development

Three commercial sites within the WHPA develop photographic prints, using “portable” development equipment. These units are self-contained, and serviced by a maintenance contractor, who removes an internal unit that recycles the silver-bearing waste. A specially developed pamphlet was produced and has been given to these sites as a part of the Management Plan, public education. The pamphlet is listed below, and a copy may be seen in Appendix 6.

1. *WHPP 003I Photographic, X-ray, and Dental Wastes.*

A photographic studio, Vale Photography, is located within the WHPA. Development and printing of photographic materials is accomplished off site. Vale Photography received the same educational materials as those with “portable” equipment.

8.15 Groundwater Monitoring Plan

The groundwater monitoring plan is designed to provide a warning system of contamination actually entering the aquifer that supplies groundwater to the collector well at the B. E. Payne Plant. At present, the USGS monitors water levels from several wells in the area, and collects some water quality data for analysis. The Groundwater Monitoring Plan designates specific wells as sentinel wells to provide water quality information about the groundwater stored beneath the WHPA.

As a part of the Management Plan, LWC has contracted with the USGS Louisville District to collect water quality samples, using personnel during their normal static water level testing procedures for selected wells within the WHPA. LWC and Universal Laboratories analyze the water samples for various water quality parameters. LWC and the USGS share, and maintain a data base of the results of testing. If possible, a joint effort will be made by the USGS and LWC to maintain a data base of water quality data for the WHPA.

The selected monitoring wells, one per monitoring area, would be analyzed for Primary Water Standards, Secondary Water Standards, and fecal coliform on a semi-annual basis.

8.16 Public Outreach and Education

Public Outreach and Education is an integral part of the WHPP. By educating the homeowners and businesses in the WHPA, the LWC and the LPT hope to generate support for the Wellhead Protection Program while informing the public of ways that individuals can help prevent groundwater pollution.

The LPT's Public Outreach and Education Program has been developed to educate both the business or homeowner that uses a hazardous product, as well as the business that supplies, transports, and/or stores the hazardous product. The LPT felt that by offering educational materials to both, voluntary compliance with existing laws, regulations, and/or BMPs would be more feasible.

The LPT's program has elements designed for the specific potential contaminants found at various sites within the WHPA. Special educational materials were either developed or obtained from many different state and federal agencies to use as educational tools. These educational materials have been and are in the process of being hand delivered to both commercial properties and homeowners within the WHPA. Additional educational materials will be placed at the City of Prospect Library, located at City Hall in Prospect. Newsletters have been prepared and sent to commercial properties in the WHPA to increase awareness of specific issues. A public meeting will be held to both educate the public about the WHPP, provide additional educational materials, and answer questions about the program.

In-house forms were developed to facilitate the actions of various committees, such as the Windshield Survey Form, which enabled members of the Potential Contaminant Inventory Committee to quickly and easily record potential contaminants found during the drive-by survey. A listing of the in-house forms developed and used by the LPT may be seen in Table 8.16.1.

Educational materials were developed for specific potential contaminants by the LPT for distribution to both the general public and to those who use, store, distribute, or transport hazardous products and materials. Specific educational materials were developed for homeowners, while other specific materials were developed for commercial properties. Selected copies of these materials are attached.

Both federal and state agency web sites were heavily used to gather material for the development of the educational pamphlets. In addition, several educational pamphlets were used as presented on the government web sites, as these are designated for use by the public (non-commercial uses). A partial listing of the web sites used to locate and/or develop educational materials is listed in Table 8.16.2.

Table 8.16.1**LWC In-house Forms Used During Development of the Plan**

Title	#	Type	Pages	Purpose
Windshield Survey Inventory Form		8.5 X 11 single sheet	1	Quick reference of potential contaminants for drive-by survey.
General Information Checklist		8.5 X 11 single sheet	1	Additional information sheet designed to facilitate data entry into Potential Contaminant Inventory data base.
Site Interview Checklist -- Residential		11 X 17 double sided	4	Checklist to facilitate site interviews at residences.
Resident Survey	101	8.5 X 11 single sheet	1	Quick Reference for LPT members who volunteered to look for potential contaminant sites.
Non-Residential Site Interview Form #1	102	11 X 17 double sided	8	Comprehensive checklist for site interviews for commercial, agricultural, and government properties within WHPA. Requires detailed information and input from interviewer.
Non-Residential Site Interview Form #2	103	11 X 17 double sided	4	Checklist for site interviews for commercial, agricultural, and government properties within the WHPA. Less detailed than #1.
Permits Issued	104	8.5 X 11 single sheet	1	Sheet for interviewer to use to list permits issued to commercial, agricultural, or governmental properties.
LPT Attendees List		8.5 X 11 single sheet	2	Attendee sheet for LPT meetings
Well Site Inspection Checklist		8.5 X 11 single sheet	1	Checklist to interviewer to check specific items during well inspections.
Water Well Report	105	8.5 X 11 single sheet	1	Specific well report designed to list general data from well inspections.

Table 8.16.2

Partial Listing of Web Sites Used to Develop or Locate Educational Materials

EPA Web sites	Kentucky Web Sites	Other Web Sites
<p>ATSDR – Tox Faqs Bio-pesticide Active Ingredients Polluted Runoff, Non-point source pollution EnviroFacts Examples of Photographs of Best Management Practices Smart Growth Network Wastewater Month Office of Pesticides -- Pesticide Fact Sheets What is Integrated Pest Management? Region 4, Serving the South Source Water Assessment Where You Live Groundwater & Drinking Water Material Safety Data Sheets MSDS from Manufacturers National Pesticide Information Center National Service Center for Environmental Publications Office of Pollution Prevention Pollution Prevention Information Clearing House Publications on the EPA Site Small Business Publications Fact Sheets Small Business Environmental Small Business Gateway Surf Your Watershed</p>	<p>KYPollution Prevention Center UK Dept. of Entomology 401 KAR 31040 – Lists of Hazardous Wastes 401 KAR 4220 – Water Supply KGS, Maps, Publications and Databases EPPC Agencies KDA Dept. of Pesticides Kentucky’s Integrated Pest Management KY Cabinet for Health Services, Dept. for Public Health KY Legislative Home Page KY Dept. of Agriculture KY Dept. of Fish & Wildlife Div. of Waste Management KY Legislative Resources Secretary of State KY Onsite Wastewater Training Center KY Division of Water, Drinking Water KY Resources Council Commonwealth of KY Agency List Transportation Cabinet UK Cooperative Extension Service Underground Storage Tank Water Information Water Resource Section Wellhead Protection KY Pollution Prevention Center</p>	<p>Chemfinder.com Croplife America Environmental Contaminants Encyclopedia Greenbook New Vision Enterprises – Electronic Exchange System Centers for Disease Control ESRI-FEMA Hazard Awareness 57 Ways to Protect the Environment Oregon – Educate and Promote, Waste Reduction Ohio River Bridge Project USGS EROS Data Center NWIS Web Data USGS Fact Sheets USGS Formal Reports Cosmetic Dictionary USGS Groundwater – Data for the Nation USGS Internet Resources for Geography and Geology AWWA Research Foundation Surface Water for KY Daily Streamflow Haz-Mat Response, Inc. Water Quality Data for the Nation Cosmetic Active Ingredient Endangered Species List, US Fish & Wildlife FDA CFSAN Cosmetics FEMA Howstuffworks Louisville Code of Ordinances Louisville Metro Government Services Louisville Metro Government PLCAA Green Industry Experts Meyer Groundwater Services City or Prospect, KY Reynolds, Inc. US Coast Guard US Army Corps of Engineers Metropolitan Sewer District Haz Mat Safety</p>

A partial listing of the educational materials collected from various state, federal, and public service agencies is listed in Table 8.16.4. This table lists the title of the pamphlet or booklet, a brief description of the materials within the pamphlet or booklet, and an order number and/or contact agency.

Many state and federal agencies provided free copies of materials for distribution to businesses and homeowners. The LPT would like to express our appreciation to the Kentucky Department of Agriculture, the Kentucky County Cooperative Extension Service, and the US EPA. These free copies have enabled the LPT to provide prepared materials on subjects that are of high concern to the LPT.

The specialized pamphlets and booklets discussed above were intended for the use of two major target audiences; homeowners and commercial properties in the area. The materials developed for each target audience may be seen in Table 8.16.5.

**Table 8.16.5
Target Audiences for Educational Materials**

Homeowners/ Residential Properties		Commercial Properties	
Number	Title	Number	Title
WHPP 001B	Homeowner’s Guide to Wellhead Protection	WHPP 001A	Guide to Wellhead Protection – Business and Commercial Properties
WHPP 002A	Closing an Abandoned Well	WHPP 001C	Wellhead Protection Area Map
WHPP 002B	Recycling Used Oil and Antifreeze	WHPP 001D	You Can Be a Team Member
WHPP 002C	Household Survey of Hazardous Materials and Products	WHPP 001E	Potential Contaminant Survey – General Products
WHPP 002D	Index of Household Hazardous Products and Compounds	WHPP 001F	Wellhead Protection Team Member Questionnaire
WHPP 002E	Hazardous Materials – Pool Chemicals	WHPP 002E	Hazardous Materials – Pool Chemicals
WHPP 002F	Pollution Prevention Begins at Home	WHPP 003A	What Do I Do with the Gunk in this Barrel?
WHPP 002G	Eco-friendly Boating ¹	WHPP 003B	Pollution Prevention in the Office
WHPP 002H	Disposal of Home Medical Wastes ²	WHPP 003C	Pollution Prevention – Floor Drains
WHPP 002I	Eco-Friendly Boating – Selecting a Marine Maintenance Facility ³	WHPP 003D	Best Management Practices – Vehicle Washing
WHPP 002J	Recycling Reference Guide	WHPP 003E	Best Management Practices – Restaurants
WHPP 003A	What Do I Do with the Gunk in this Barrel?	WHPP 003F	Evaluating Paint and Ink Wastes ⁴
WHPP 003M	Integrated Pest Management	WHPP 003G	Best Management Practices – Jewelry Manufacturing
WHPP 005B	Groundwater Protection Plans for Homeowners	WHPP 003H	What to Do with Common Paint Wastes ⁵
WHPP 005C	Emergency Phone Numbers	WHPP 003I	Photographic, X-ray, and Dental Wastes
WHPP 006C	Haz Bin: A Guide to the Disposal of Household Hazardous Materials	WHPP 003J	Waste Reduction for Laboratories
WHPP 006D	Facts About Kentucky’s New Environmental Release Reporting and Cleanup Law	WHPP 003K	Best Management Practices for Groceries
WHPP 006K	Homeowner’s Guide to Septic Systems	WHPP 003L	Checklist for USTs

Table 8.16.5 Target Audiences for Educational Materials (continued)

Homeowners/ Residential Properties		Commercial Properties	
WHPP 006L	Preventing Groundwater Pollution: Secondary Containment	WHPP 003M	Integrated Pest Management
WHPP 006V	Preparing a Groundwater Protection Plan	WHPP 003N	Best Management Practices for Beauty/Nail Salons
WHPP 006X	Preventing Groundwater Pollution: Automobile and Other Salvage Yards ⁸	WHPP 003O	Is Your Septic System a Class V Injection Well? ⁶
WHPP 006Y	End of the Line-- The facts on storm water for salvage yards ⁹	WHPP 003P	Business & Commercial Recycling and Waste Disposal Reference Guide
WHPP 007A	Homeowner's Septic System Guide and Record Keeping Folder	WHPP 005A	Site Specific Groundwater Protection Plan, Page 1
WHPP 007B	A Groundwater Protection Plan for Heating Oil Tanks	WHPP 005C	Emergency Phone Numbers
WHPP 007C	Protecting Your Well and Water Supply	WHPP 006A	Pest Control in the School Environment: Adopting Integrated Pest Management
WHPP 007H	Best Management Practices for Handling Pesticides in the Home Landscape	WHPP 006B	Environmental Resources for Small Businesses
WHPP 007I	Read the Label First! Protection Your Household, (or children, or pets)	WHPP 006D	Facts About Kentucky's New Environmental Release Reporting and Cleanup Law
WHPP 007J	Best Management Practices for the Lawn	WHPP 006E	Universal Waste
WHPP 007T	Healthy Lawn, Healthy Environment	WHPP 006F	Spent Lamps and Universal Waste Requirements
WHPP 007U	Team Members and Meeting Notice	WHPP 006G	Managing Automotive Repair Shop Wastes ⁷
WHPP 007K	Kentucky Agriculture Water Quality Authority Producer Workbook ¹¹	WHPP 006H	Environmental Protection Standards for Kentucky Dry Cleaners
WHPP 007L	Don't Throw It Away!	WHPP 006I	How to Manage Silver-bearing Hazardous Wastes
WHPP 007M	Oil Disposal Options for the Agricultural Community ¹¹	WHPP 006J	Handbook for Hazardous Waste Generators
WHPP 007N	Storage of Used Oil ¹¹	WHPP 006L	Preventing Groundwater Pollution: Secondary Containment
WHPP 007O	Free Collection and Disposal of Unwanted Pesticides ¹¹	WHPP 006M	Activities Subject to 401 KAR 5:037 That Commonly Occur at Convenience Stores
WHPP 007P	Danger-- Don't Use Farm Pesticides Indoors! ¹¹	WHPP 006N	Preventing Groundwater Pollution: Oil/Water Separators

Table 8.16.5 Target Audiences for Educational Materials (continued)

Homeowners/ Residential Properties		Commercial Properties	
WHPP 007R	Marine Sanitation Devices	WHPP 006O	UST Frequently Asked Questions
		WHPP 006P	PNEAC – How to Read and Use MSDS for Environmental Purposes
		WHPP 006Q	National Management Measures Guidance to Control Non-point Source Pollution from Marinas and Recreational Boating
		WHPP 006R	Pollution Prevention in Hospitals and Medical Facilities
		WHPP 006S	Pollution Prevention at Custom Print
		WHPP 006T	A Pollution Prevention Guide for the Dry Cleaning Industry
		WHPP 006U	A Self-Audit Checklist for Dry Cleaners
		WHPP 006V	Preparing a Groundwater Protection Plan
		WHPP 006W	Preventing Groundwater Pollution: Auto Repair Shops
		WHPP 006X	Preventing Groundwater Pollution: Automobile and Other Salvage Yards
		WHPP 006Y	End of the Line-- The facts on storm water for salvage yards
		WHPP 006Z	Managing Repair Shop Wastes
		WHPP 007D	Groundwater Protection Plans for Monitoring Well Owners
		WHPP 007F	Groundwater – Protecting it is now the law.
		WHPP 007G	Tanks Exempt from UST Regulations and Their Respective Regulating Agencies.
		WHPP 007L	Don't Throw It Away!
		WHPP 007R	Marine Sanitation Devices
		WHPP 007S	Attention All Private Applicators! ¹⁰

¹ Also for use as free distribution to boat owners, Marinas will be asked to distribute

² Also for use as free distribution to medical patients, local doctors will be asked to distribute

³ See 1 above.

⁴ Also for use as free distribution to homeowners, Paint and Hardware stores will be asked to distribute

⁵ See 4 above

⁶ May also be used for homes/condos serving 20 people or more.

⁷ Although there are no automotive repair shops at present within the WHPA, there are several located outside the WHPA that may be included in future well field expansions.

⁸ To be distributed to homeowners with debris on the property.

⁹ See 8 above.

¹⁰ Notice to be sent to all Pesticide Applicators in the Louisville Metro Area

¹¹ For Agricultural Homesteads

Pamphlets or booklets used for other purposes are listed below in Table 8.16.6

Table 8.16.6
Materials Used for Other Purposes

Number	Title	Purpose
WHPP 007E	EPA Region 4 Field Inventory Report: UIC Class V Wells	Used to report site as a Class V Well, requesting an inspection by US EPA personnel
WHPP 007V	10 Tips to Protect Children from Pesticides and Lead Poisonings	For free distribution during public meeting and at City of Prospect Library
WHPP 007W	Join Our Pest Patrol – A Backyard Activity Book for Kids on Integrated Pest Management	For free distribution during public meeting and at City of Prospect Library
WHPP 007X	When Using Pesticides, Protect Your Children, (magnet)	For free distribution during public meeting and at City of Prospect Library
WHPP 007Y	Pesticide Safety, (ruler)	For free distribution during public meeting and at City of Prospect Library
WHPP 007Q	Road Salt and Winter Maintenance for British Columbia Utilities	For distribution to State DOT personnel, City of Prospect personnel, and for Louisville/Metro Street personnel.

Residential Properties

At the onset of the developing the WHPP, the LPT sent out notices to selected areas of the WHPA to inform the homeowners in the area that they were living within the WHPA. This public notice was used as a tool to simply inform the homeowners about the WHPA, and provided educational information about the WHPP. Delivery locations may be seen in Attachment 7. The original notice delivery consisted of a LWC Pure Tap water bottle and the notice about the WHPA. A copy of the notice sent may be seen in Attachment 7. The second notice included a post card survey, and a brief pamphlet explaining wellhead protection.

Additional deliveries to homeowners in the area are slated to occur within the implementation of Phase III. Different pamphlets, notices, and booklets will be delivered door-to-door per area, or mailed to those homes where actual delivery is impossible, such as gated communities. A summary of the materials to be delivered to each area is listed in Table 8.16.7.

Table 8.16.7

Door-to-Door Delivery Materials per Area

Area #1		Area #2		Area #3	
Number	Title	Number	Title	Number	Title
001B	Homeowner’s Guide to Wellhead Protection	001B	Homeowner’s Guide to Wellhead Protection	001B	Homeowner’s Guide to Wellhead Protection
002B	Recycling Used Oil & Antifreeze	002F	Pollution Prevention Begins at Home	002B	Recycling Used Oil & Antifreeze
002F	Pollution Prevention Begins at Home	002J	Recycling Reference Guide	002F	Pollution Prevention Begins at Home
002J	Recycling Reference Guide	003M	Integrated Pest Management	002J	Recycling Reference Guide
003M	Integrated Pest Management	005C	Emergency Phone Numbers	003M	Integrated Pest Management
005B	Groundwater Protection Plans for Homeowners	007H	Best Management Practices for Handling Pesticides in the Home Landscape	005B	Groundwater Protection Plans for Homeowners
005C	Emergency Phone Numbers	007I	Read the Label First! Protect Your Household!	005C	Emergency Phone Numbers
006K	A Homeowner’s Guide to Septic Systems	007T	Healthy Lawn, Healthy Environment	006K	A Homeowner’s Guide to Septic Systems
007A	Homeowner’s Septic System Guide and Record Keeping Folder			007A	Homeowner’s Septic System Guide and Record Keeping Folder
007H	Best Management Practices for Handling Pesticides in the Home Landscape			007B	A Groundwater Protection Plan for Home Heating Oil Tanks
007I	Read the Label First! Protect Your Household!			007H	Best Management Practices for Handling Pesticides in the Home Landscape
007T	Healthy Lawn, Healthy Environment			007I	Read the Label First! Protect Your Household!
				007T	Healthy Lawn, Healthy Environment

Additional educational materials, not previously listed, will be placed at the City of Prospect Library as a reference for those who wish more information, and delivered as developed. These materials are of interest to both homeowners and commercial properties. Additional materials may be ordered at a later date for free distribution from the library, and additional materials may be placed within the library as additional educational resources. These materials are listed below.

1. *TIPS to Protect Children from Environmental Risks, EPA Office of Children’s Health Protection, EPA 100-F-02-004;*
2. *Home Safe Home, EPA National Pesticide Telecommunications Network, EPA 735-H-01-006;*
3. *If you must use a pesticide, follow these rules, EPA Office of Pesticides Programs, (7506C), EPA 735-F-98-015;*
4. *Citizen’s Guide to Pest Control and Pesticide Safety, EPA Prevention, Pesticides, and Toxic Substances, (7501C), EPA 730-K-95-001;*

5. *Plug-In to Recycling, EPA 530-F-04-001;*
6. *Water on Tap – What You Should Know, EPA Office of Water, EPA 816-K-03-007; and*
7. *Underground Storage Tanks: Building on the Past to Protect the Future, EPA Office of Solid Waste and Emergency Response, Office of Underground Storage Tanks, EPA 510-R-04-001.*

Additional educational materials will be distributed through community newsletter, the Harrods Creek Fire Department newsletter, and other forums as the plan progresses.

Commercial Properties

Prior to the onset of the Site Interviews, notices were sent to those businesses that were scheduled for interviews informing them that they were operating within a Wellhead Protection Plan. This same process will occur again during the implementation of the plan.

Many commercial properties have received educational materials during the Site Interviews, which were completed for Phase II, but are still in progress at Phase III at this time. Those materials used as educational tools have been discussed within this report and listed. Each packet of information was tailored to the specific needs of the commercial property, presented to the business manager/owner, and discussed as a way that the business could help protect the groundwater supplying the PWS at the Payne Plant.

It must be noted that none of the listings here are complete, as additional materials are constantly updated and developed.

During the Site Interviews, commercial property owners/managers have been encouraged to become a Team Member, which involves the following activities:

1. Reading the educational material provided;
2. Conducting an inventory of the potential contaminants on site;
3. Using BMPs as practical for their business;
4. Taking part in a recycling/reuse/reduce plan;
5. Preparing a GWPP, if requested to do so by the LPT representative; and
6. Filling out the questionnaire and submitting it to the LPT representative.

Team Members received a certificate that was signed by the LPT representative and can be framed for use in their business, a sticker that they may place in their window saying that they are participating in the WHPP, and a spot on the listing of Team Members that was sent to homeowners in the area. While the response was about average, additional plans will be developed for the future.

All businesses in the area have also received a newsletter, named the Wellhead Protection News, which is a short term publication designed to provide additional educational materials and notifications pertaining to Wellhead Protection

Articles pertaining to Wellhead Protection will be submitted to the City of Prospect Newsletter and to the City of Prospect Chamber of Commerce, as the plan is implemented.

Every property within the WHPA will have received at least some educational materials once the Public Outreach and Education Program has been initiated.

8.17 Review, Modification, and Update Procedures

LWC will undertake the review and update of the potential contaminant survey annually, or no less than every five years, as required by 401 KAR 4:220. Several activities may trigger an update on a more frequent basis:

1. Addition of new wells or a significant change in the withdrawal from existing wells;
2. Changes in zoning or land usage;
3. Changes in state and/or federal laws governing Wellhead Protection; or
4. Changes in the potential contaminant source inventory.

For example, the introduction of a new potential contaminant that is not listed within the current Management Plan would trigger an update of the plan to reflect the change in the potential contaminant survey. A change in zoning from farm land to single family use would not trigger an update, as single family use residential properties are currently covered under the current Management Plan.

The process of the update and review will consist of the following steps:

1. Search of local and state laws, regulations, rules, or ordinances pertaining to the specific potential contaminants addressed by the Management Plan and update the plan to reflect these changes;
2. Determine if any of the regulatory agencies responsible for enforcement of these laws, regulations, rules, or ordinances have changed, and update the plan to reflect these changes;
3. Based on the update of the potential contaminant survey, address issues presented by changes in the survey;
4. Update educational materials as needed to reflect any changes in the plan, or to located additional, more recent materials that may be used as educational tools.

The results of the review and update will be submitted, according to 401 KAR 4:220 to the KY DOW as required.