County of McHenry - Division of Water Resources

Water Resources Action Plan

Section II: Local Water Quantity and Quality

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Items in Blue – Appendix or Attachment available

Items in Red – Definition available

Water Resources Action Plan
Section 2. Local Water Quantity and Quality
A) Introduction

McHenry County is solely dependent on groundwater for all of its private and public water supplies, including all drinking water. All wells within the County withdraw groundwater from either locally recharged shallow aquifers or deeper, regionally recharged aquifers.

Keeping McHenry County's groundwater resource free from contaminants requires careful planning. Human activities such as deicing and seal coating pavements, application of pesticides and fertilizers, irrigation, sand and gravel mining, pollution from industry and household wastes, and adding impervious surfaces can have potentially adverse impact on water quantity and quality. As McHenry County develops, it will increasingly rely on its shallow aquifers. Therefore, it is of the utmost importance to protect and preserve the quality and quantity of groundwater.

How aquifers work

Water from precipitation is transmitted from land surface downward to an aquifer through infiltration. For the purpose of this document this process is termed aquifer recharge. Aquifer recharge is critical for an aquifer to remain viable. Recharge occurs in all areas of the county, but all do not recharge uniformly or quickly.

Groundwater recharge is a complex function that varies according to soil, hydrogeology, topography, and land uses. Recharge is facilitated by permeable, uncompacted soils that underlie most of the county, as well as by deep-rooted plants that provided pathways for precipitation to infiltrate the upper soil layer. A common characteristic of an effective or sensitive recharge area is the presence of relatively permeable granular soils near the surface, underlain by sandy or gravelly deposits.

Discharge areas are fed by an upward influx of groundwater to the surface. In McHenry County, most surface water features are considered groundwater discharge points, including wetlands, lakes, creeks, rivers, and streams. As a result, protecting groundwater recharge is essential to all of McHenry County's residents, businesses, and economies, as well as its water-dependent environmentally sensitive areas.

The identification of recharge areas is an essential step in the integration of water supply and land use planning including protection of groundwater quality. Existing data on groundwater contamination shows that problems vary spatially and not all regions are equally vulnerable. Therefore, McHenry County has created a Sensitive

Aquifer Recharge Areas map, which categorizes areas of the county by their potential for groundwater recharge and contamination.

- **Appendix 2.1** "Sensitive Aquifer Recharge Areas Map"
- **Appendix 2.2** "Overview of SARA Map"
- **Appendix 2.3** "SARA Map Descriptor"

Threats to groundwater quality and quantity

McHenry County's more permeable soils make local groundwater *quality* more susceptible to contamination. A substantial portion of the County is underlain by soils that exhibit a "high potential for groundwater contamination." Once contaminants are released into the soils they are able to seep into McHenry County's water supply. Any land-use activity that stores, uses, or produces known contaminants of concern (found to be a risk to human health and capable of groundwater transport) and has a sufficient likelihood of releasing such contaminants to the environment at detrimental levels is considered a potential threat to groundwater quantity and quality.

The USEPA has developed a list of possible contaminant sources categorized into four major land use categories: Industrial/Commercial, Agricultural, Municipal/Residential, and Miscellaneous.

- **Appendix 2.4** "Potential Sources of Contamination Categorized by Land Use (U.S. EPA, 2003)"

From this list, the following activities were selected for water quality protection measures within McHenry County:

Industrial/Commercial Land Uses

- Underground and Above Ground Storage Tanks
- Mining (Sand and Gravel)
- Wrecking Yards

Municipal/Residential Land Uses

- Addition of Impervious Surfaces and Storm water Management Activities
- Golf Courses
- On-site Wastewater Treatment (Septic) Systems
- Conventional Centralized Wastewater Treatment Facilities

Agricultural

- Use and Storage of Fuel and Agricultural Chemicals
- Confined Animal Feeding Operations

Miscellaneous Land Uses

- Improperly Abandoned Wells

Any land use that can reduce the *quantity* of recharge to the aquifer to a significant degree is also considered to be a threat. It should be noted that increasing impervious surfaces (i.e. parking lots, sidewalks, rooftops, driveways, and roads) does not necessarily lead to decreases in recharge or base flow, so long as infiltrative best management practices are used to keep water onsite. However, increasing urbanization, which involves both the replacement of soil and vegetation by pavement and buildings and the replacement of natural stream networks by artificial drainage systems, can reduce infiltration, thereby impacting groundwater recharge.[1]

[1] Dingman, 2002

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B1) Overarching Recommendations

The majority of the recommendations in the Local Water Quantity and Quality section of MCWRAP are designed to address specific issues, such as protecting open space, monitoring chemical substances, and preparing contingency plans for water shortages. In addition to a these specific recommendations, the Groundwater Protection Action Plan Task Force has also suggested overarching goals that policymakers throughout the County should consider.

General Policy Recommendations

- Raise public awareness and establish development guidelines about the best practices for implementing groundwater recharge programs that balance water extraction and replacement.
- Preserve the quality and replenish the quantity of existing groundwater resources.
- Preserve the capacity of groundwater systems to supply projected potable and non-potable water needs and to provide adequate base flows to sustain healthy aquatic ecosystems.

Existing Standards

Municipality in McHenry County is required to be in compliance with a number of existing federal, state, and county regulations pertaining to water quality and quantity. Municipalities should be aware of these regulations.

State and Federal Regulated Contaminants

The State and Federal Regulated Contaminants List[2] is a list of categories of common sources of contamination in drinking water and potential health effects from exposure above the maximum contaminant level. Any drinking water facility must monitor its output (finished water) to ensure that these contaminants do not exceed the maximum contaminant level. The list includes microbial, contaminants, inorganic, synthetic organic (including pesticides and herbicides), volatile organic, compounds, as well as disinfection/disinfection by-products, and other treatment chemicals.

[2] United States Environmental Protection Agency, Safewater, Drinking Water Contaminants,http://www.epa.gov/safewater/contaminants/index.html

- **Attachment 2.1** "State and Federal Regulated Contaminants" and 35 Illinois Administrative Code 611

Consumer Confidence Report
Each community water supply in McHenry County is required by Illinois Pollution Control Board Regulations to publish an annual consumer confidence report (CCR) regarding the quality of drinking water provided to consumers of the drinking water. http://www.epa.state.il.us/water/compliance/drinking-water/consumer-confidence-report.html#ccr2. This report is required to include a summary of information regarding the source of drinking water used, its susceptibility, and any efforts taken to protect the source of drinking water as well as a summary of drinking water standard violations. Starting in 1996, the Illinois Environmental Protection Agency (Illinois EPA) conducted the first round of source water assessments for all of the community water systems in Illinois and published fact sheets that are published on the Illinois EPA's web page. (Note: Illinois EPA utilized the services of the Illinois Rural Water Association staff to conduct some of the source water. Attachment 2.2 is an example, the City of McHenry 2008 Drinking Water Quality Report.

- **Attachment 2.2** "Consumer Confidence Report"

Source Water Assessment Summary
The Source Water Assessment Summary is included in each community's Consumer Confidence Report. This report is prepared by the Illinois EPA or the Illinois Rural Water Association and examines the source water quality of an area, its susceptibility to contamination, and determines the community's five-year time related capture zone (recharge area within which the groundwater reaches a well within five years). The Source Water Assessment Summary is updated by the Illinois Environmental Protection Agency based on agency priorities. The Village of Marengo Source Water Assessment is included as an example.

- **Attachment 2.3** "Source Water Assessment Summary"

Drinking Water Report
The Drinking Water Report provides a list of the points of contact and a detailed description of the water sources for a particular drinking water source. Required by the Illinois Pollution Control Board Regulations to be included in the Consumer Confidence Report, the Drinking Water report was initially completed by the IEPA. No annual update is required, but the report can be updated occasionally based on program priorities. The Village of Marengo Drinking Water Report is included as an example.

- **Attachment 2.4** "Drinking Water Report"

County Regulations for Abandoned Wells

McHenry County Department of Health has a comprehensive water well program which requires sealing of abandoned water wells under permits issued and inspected by the Department. The program covers private, semi-private, community, irrigation, dewatering, and monitoring wells, which typically occurs upon installation of replacement wells, demolition of structures, connection to community water, and siting of new developments. The owner is required to properly abandon any unused well within 30 days after which time it is no longer used to supply water, has become a public health or safety hazard, or has the potential for allowing contaminants into the aquifer.

The Department of Health participates on the Northern Regional Groundwater Protection Planning Committee, whose efforts include facilitating sealing of abandoned water wells by offering low cost sealing materials and public education throughout the Northern Illinois region. Continued emphasis should be placed on public education to ensure that property owners understand the importance of properly sealing abandoned water wells to protect the quality of our groundwater. Additional information is available on the McHenry County Department of Health website: www.mcdh.info.

- **Attachment 2.5** "County Regulations for Abandoned Wells"

Illinois Water Use Act of 1983 (WUA)[3]

Groundwater withdrawals in Illinois are governed under the rule of reasonable use, defined in the Illinois Water Use Act of 1983[4] (WUA) as "the use of water to meet natural wants and a fair share for artificial wants. It does not include water used wastefully or maliciously." The WUA is designed primarily as a mechanism for restricting groundwater withdrawals in emergencies in limited areas of the state[5] and to provide for public notice of new withdrawals that are both planned and deemed substantial (i.e. 100,000 gallons/day).[6]

A provision in the Water Use Act of 1983 requires landowners to notify the local Soil and Water Conservation District (SWCD) and other local governments of an intended new well that is capable of withdrawing at a rate of 100,000 gallons per day or greater before construction begins. The SWCD is to confer with the Illinois State Water Survey (ISWS) and Illinois State Geological Survey (ISGS) to consider possible effects from the new well on neighboring groundwater users. Should a SWCD believe it to be necessary to recommend a restriction, such a

[3] The following information was taken from the CMAP Regional Water Supply Plan, Version 8, September 2009.
[4] 525 ILCS 45/
[5] Limited to 4 counties: McLean, Tazewell, Kankakee, and Iroquois
[6] Since this was written, Governor Quinn signed legislation (SB2184) on August 10, 2009 to amend the Water Use Act of 1983.

recommendation is made to the Illinois Department of Agriculture where authority rests for this determination.[7]

The institutional structure for managing water supply in Illinois took a major turn on August 10, 2009 when Governor Pat Quinn signed into law Senate Bill 2184[8] amending the Water Use Act of 1983 in several key ways:

- "High-capacity well" and "high-capacity intake,"[9] the later a new addition, are defined to be withdrawals from wells/surface water in volumetric rates of 100,000 gallons or more during any 24-hour period.
- Existing high-capacity wells must now register with the local Soil and Water Conservation District in addition to newly proposed high-capacity wells.
- Most important is a new water-use reporting requirement: Those responsible for high-capacity wells/intakes are now obligated to report water use to the Illinois State Water Survey's Illinois Water Inventory Program. Water users of agricultural irrigation are exempt for the first five years, but must determine water use via an estimation method deemed acceptable by the ISWS. Individuals responsible for withdrawals that take place within the boundary of a water authority or other local government entity that estimates irrigation use through a method acceptable to ISWS are exempt from participating as an individual in IWIP.
- The exemption that previously applied to the six northeasternmost counties of Illinois has been removed.[10]

Attachment 2.6 "Illinois Water Use Act of 1983"

[7] This power only exists for limited counties, as part of Section 5, Groundwater Emergency Restrictions.
[8] Public Act 096-0222
[9] The addition of "intake" was solely meant to include them for water withdrawal reporting purposes.
[10] This exemption dealt with assessments of new high-capacity well impacts. ISWS and ISGS are supposed to evaluate the impacts of new high-capacity wells anywhere in the State. However, as of October 2009 this mandate has not been funded.

Additional Recommendations

In addition to the existing standards designed to protect groundwater, the Groundwater Protection Task Force recommends the following action steps to further protect and understand our water resources countywide:

Cross-Connection Control Rules and Regulations

Cross-connection control provides rules and regulations to isolate contaminants or pollutants which could otherwise backflow into the public water supply system. These rules and regulations also promote the elimination or control of cross-connections between public or consumer potable water system and non-potable water systems, plumbing fixtures, and sources or systems containing substance of unknown or questionable safety. Lastly, it requires a continuing program of cross-connection control to prevent the contamination or pollution of the public's potable water system.

- **Attachment 2.7** "Cross-Connection Control Rules and Regulations"

Water Use Reporting Standards

Historically, the Illinois State Water Survey (ISWS) has encouraged voluntary participation in their annual Illinois Water Inventory Program for all large capacity well users. ISWS typically receives a 75% return each year on the requested data which includes important water level information. However, amendments of Senate Bill 2184, effective January 1, 2010, state that high-capacity wells/intakes (100,000 gallons in any 24-hour time period) are now obligated to report this water use.

The Groundwater Protection Task Force recommends the Water Inventory Report be submitted monthly to McHenry County Water Resources to allow for up-to-date information on aquifer water levels. McHenry County Water Resources and the Illinois State Water Survey agree to work together in understanding the changing availability of our finite water resource and other local and regional impacts on our aquifers. This data will be shared annually with all local governments in McHenry County.

- **Attachment 2.8** "Water Use Reporting Standards"

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B2) Land Use and Zoning

Decisions about a wide variety of land-use development can affect McHenry County's groundwater quality and quantity. Following are key areas of land-use impact, with recommendations for action.

Groundwater Withdrawals

Extracting groundwater through pumping wells changes the natural rates of recharge and discharge, effecting water quantity.[11] The impact of one well may not be significant to regional aquifer recharge, but several hundred wells (or several high-capacity wells) in a limited aquifer may stress the system and/or locally change the flow direction.

Currently, corporate boundaries define where a community can site a well. While this works for each individual municipality, the cumulative effects of well siting by multiple jurisdictions are not considered. This also applies to other large water users such as business, industry, and agricultural-irrigation wells.

Policy Recommendations

- With the passing of Public Act 096-0222, all new proposed high-capacity wells must be reported to the local Soil and Water Conservation Districts by the State. The Soil and Water Conservation District (SWCD) will then conduct an impact assessment prior to siting a well to determine: the carrying capacity of the aquifers, potential effects on neighboring groundwater users, and the potential effects on hydrologically connected water-dependent environmentally sensitive sites (both quantity and quality) when making land use decisions.
- The County should work with the local Soil and Water Conservation District and the Illinois State Water Survey to ensure that all proposed high-capacity wells meet the revisions of the Water Use Act of 1983 contained in Public Act 096-0222.
- The McHenry County Department of Health should evaluate the potential to implement an inventory and monitoring program for private water wells. This could include a reminder program for annual water sample analysis.
- The McHenry County Department of Health should continue to work with local governments, onsite wastewater treatment professionals, water well

[11] Dingman, 2002

drillers, realtors, and other stakeholders to educate private homeowners in the care and maintenance of private water wells and the proper operation and maintenance of onsite wastewater treatment systems.

- Consideration should be given to work with a community of real estate professionals to work towards a standardized process for well and septic inspections at Real Estate transfers, were applicable.

Zoning Regulations

Land Use Planning is a critical step for the protection of Sensitive Aquifer Recharge Areas. Many land use activities can potentially affect the quality and/or quantity of groundwater recharge. When development activities occur, it is imperative to implement surface water and groundwater protection measures to protect the County's water resources for all to enjoy. Some municipalities in McHenry County have already begun this task: Crystal Lake, Bull Valley, and Woodstock have mapped sensitive recharge areas that are critical to both surface waters and future water supplies. They have also adopted ordinances to control development in these areas to minimize adverse impacts to natural recharge functions.

Any development that involves grading or paving over large tracts of land, such as shopping centers, parking lots, and high density housing developments, can be particularly damaging to the soil's natural recharge ability. High-intensity developments also generate pollutants, such as salt, herbicides, pesticides, nutrients, and petroleum by-products that can contaminate surface and/or groundwater. In sensitive recharge areas, leaks or spills from landfills, chemical storage facilities, and industrial or manufacturing facilities involving solvents or other polluting chemicals can contaminate groundwater.

Policy Recommendations

Prohibited Practices: The following new facilities, sites, units, or potential routes should not be located within a delineated Category A or B sensitive aquifer recharge area:

- Low-level radioactive waste sites
- Municipal waste landfills
- Special or hazardous waste landfills

Restricted Practices: Class V underground injection wells should be *restricted* within a delineated Category A or B sensitive aquifer recharge area:

- "Restricted" could include, but not be limited to, the use of best management practices, setbacks, and pretreatment to protect

groundwater quality. If Class V wells are allowed, stormwater best management practices should be required along with annual inspection and maintenance to ensure proper functioning of the system.

- Retrofitting existing drywells utilizing a treatment train and other best management practices should be encouraged. Reference the McHenry County Stormwater Ordinance for best management practices

- Class V underground injection wells include multiple-family and non-residential onsite wastewater treatment systems serving 20 or more individuals a day. However, Article X of the McHenry County Public Health Ordinance already includes requirements to address systems installed in rapidly permeable soils on individual sites and for new subdivisions. It is not the intent of this policy to propose additional restrictions for onsite-wastewater treatment systems.

Development: The County and Municipalities can help protect groundwater quality and quantity by passing regulations and policies that:

- Minimize intensive development activities in sensitive aquifer recharge areas.
- Minimize impervious surfaces and mass grading in recharge areas, utilizing conservation design techniques such as clustering, narrower street widths, reduced parking lot sizing, and pervious pavement. Use of pervious pavement may also require some consideration of water quality protection due to vehicle fluids.
- Discourage intensive development activities, such as industrial facilities, shopping centers, parking lots, and high density housing developments in areas designated Category A or B on the SARA map.
- Use stormwater best management practices that promote infiltration and treatment to the maximum extent practical.
  (see Section B3 for more information on Stormwater Best Management Practices)
- Employ conservation design techniques to the maximum extent practical in sensitive recharge areas. These techniques help preserve open space and reduce impervious surfaces.
- Review and revise the County's subdivision ordinance, as appropriate, to:
  - require an inventory of high priority recharge areas on the site and within 200 feet of the boundary of the site, and
  - add high priority recharge areas to the list of resources to be included as a cumulative trigger for the purpose of

determining if a conservation design requirements are mandatory.

- Promote natural landscaping with native prairie grasses, trees, shrubs, and wetland plants in lieu of conventional turf grass. Natural landscaping does not require irrigation or fertilizer and can significantly enhance groundwater infiltration.

- Require or promote conservation design ordinances to help ensure that groundwater recharge is preserved, along with the more obvious natural features like oak woods, wetlands, and creeks. McHenry County and several local municipalities have adopted standards that require conservation design for subdivisions and other land developments.

- **Attachment 2.9** "Conservation Design Standards and Procedures"

Wellhead Protection Areas via Zoning Authority
State statutes provide local governments the authority to protect groundwater recharge areas and community wellhead zones via ordinances and zoning controls. Marengo, Lake in the Hills, and Fox River Grove have adopted wellhead protection ordinances (WHPA) that can serve as models. A detailed discussion of relevant land use related groundwater protection tools can be found in the County's *Groundwater Resources Management Plan,* Report 3. A summary:

- WHPA's must first be determined
  - Establish minimum and maximum wellhead setback distances
  - Identify potential contamination sources within the WHPA
  - Adopt protection programs, such as restricted zoning within.
    - Certain land uses within zones could be restricted
    - Permits could be required for potentially hazardous land uses within setback distances.
- Limit the location of new wells within identified setback distances of likely contaminant sources, such as industrial facilities.
- Restrict certain activities within established WHPA's.

Regulated Recharge Areas (RRA) Designation
Consider obtaining a Regulated Recharge Areas Designation via 415 ILCS 5/17.3 for each municipality as well as unincorporated McHenry County. Section 3 of the Illinois Groundwater Protection Act ("IGPA") of 1987 established a definition of a regulated recharge area: "…a compact geographic area, as determined by the Illinois Pollution Control Board, the geology of which renders a potable resource groundwater particularly susceptible to contamination" [415 ILCS 5/3.67]. The process by which this designation can be obtained can be summarized with five general principles:

1. Local involvement,
2. Responsible partnership,
3. Differential protection,
4. Sound technical information,
5. Preference for prevention.

With assistance from the Illinois Pollution Control Board, local jurisdictions can utilize the RRA designation to place protections on groundwater quality. The Illinois Pollution Control Board can assist with:

- Recharge Areas Suitability Assessment (RASA) which can establish a means of assessing the risk of a new "major potential source (of contamination)" before commencing construction and provide an incentive for implementing best management practices before locating in a RRA area. Public input is part of this process.
- Implementation of abandoned and Improperly Plugged Well Education and Assistance Programs.
- Road sign posting to increase awareness of where recharge protection areas or watershed are located. Also serves to provide a mechanism for notification in cases of an accidental contaminant release.
- Establishing a registration process for potential sources and potential routes of groundwater contamination.
- Publicizing information and registration meetings.
- Developing Chemical Management Systems to prevent contamination from chemical substances, including performance-based requirements for contaminant containment.
- Promoting chemical substance management training program as offered by the Illinois EPA to provide technical assistance to the small businesses in the delineated recharge area. Intended to provide for awareness regarding the sensitivity of the recharge area, meeting the requirements in the regulation, and assistance with pollution prevention.

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B3) Stormwater Management

The presence of pollutants from contaminants and sediments makes water quality treatment of stormwater runoff necessary. The USEPA[12] reports that 77 of the 127 priority pollutants have been detected in urban runoff nationwide. Impervious surfaces and management of stormwater runoff can also affect the quantity of recharge to the aquifer by changing the local water balances and volumes and decreasing base flow components.[13]

A low-impact, infiltration-based development (LID), also known a conservation design, is a collection of strategies to limit the impact of development on water intake into aquifers, including preserving more natural space with a smaller development footprint, encouraging native plantings, and decreasing the amount of impervious surfaces. The use of LID in stormwater management can offset the losses of recharge, and in some cases completely eliminate the losses due to impervious surface additions.[14] A more detailed discussion on the elements of a LID can be found in "Low Impact Development (LID) – A Literature Review."[15] [http://www.epa.gov/nps/lid/lidlit.html]

The routing of stormwater into filtration/infiltration systems (in most cases) is the preferred method for stormwater management in McHenry County. A number of literature sources have been compiled demonstrating that they can be effective in providing contaminant removal[16]. Stormwater control techniques that maximize recharge benefits should be a priority, provided they do not result in a degradation of the groundwater quality. Under current law, stormwater management regulations only control runoff rate, not runoff volume.

Policy Recommendations

Protection of Groundwater Quantity

- Limit post-development runoff to predevelopment volumes and rates to the maximum extent practicable by encouraging infiltration of water into the soil with a treatment train (a series of elements that improve water quality, such as a settlement casement, plantings, etc.), where groundwater pollution will not result.

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[12] 2001b
[13] Holman-Dodds et al., 2003
[14] Konrad and Burges, 2001; Holman-Dodds et al., 2003
[15] USEPA, 2000
[16] Barrett, 2002; Potts, 2002; USEPA, 2000; Wisconsin Runoff Rules NR151 Subchapter III

- For Residential Development, *90% of the pre-development infiltration* volume should be maintained. For Commercial/Industrial Development, *60% of the pre-development infiltration* volume should be maintained.
  - Appendix 2.5 "Wisconsin Runoff Rules NR 151 Subchapter III"

- Encourage the use of natural drainage best management practices (BMPs), distributed small scale controls and natural landscaping (including, but not limited to use of: permeable pavement, bio-swales, rain gardens, and infiltration basins) to reduce runoff volumes and encourage recharge, wherever practical, in lieu of curb and gutter and storm sewer systems.
- Encourage retrofitting of existing stormwater management systems to ensure the use of best management practices that maximize groundwater recharge.
- Limit impervious surfaces, as well as grading and compaction of surface soils and underlying materials, which adversely affect natural water recharge capabilities.
- Prioritize restoration of areas with diminished recharge, such as pre-developed areas. Restoration could include use of permeable pavement, native grasses, rain gardens, and bio-swales.

Protection of Groundwater Quality

- To protect groundwater quality[17]:, infiltration is discouraged in areas associated with
  - fueling and maintenance areas
  - areas in close proximity to wells
  - areas with inadequate separation distance to groundwater or bedrock
  - areas where the soil is contaminated
- One possible exception to this guideline is if adequate treatment is provided to ensure that there will be no degradation of groundwater quality.
- The Stormwater Technical Advisory Committee should develop a list of industries where infiltration should be discouraged or prohibited utilizing SIC codes.

Class V Injection Wells (excluding approved onsite wastewater treatment systems) should be restricted within sensitive aquifer recharge areas.

- It should be a priority to implement best management practices for all existing and proposed stormwater drywells in McHenry County utilizing a treatment train approach.

[17] Wisconsin Runoff Rules, NR151, Subchapter III

- Promote the infiltration of clean runoff in developing areas, developed areas, and during redevelopment utilizing techniques such as bio-swales, filter strips, permeable paving, and natural landscaping.

National Pollution Discharge Elimination Systems

National Pollution Discharge Elimination System (NPDES) Phase II program requires operators of Municipal Separate Storm Sewer Systems (MS4s) in urbanized areas to implement Best Management Practices (BMPs), which aim to preserve, protect, and improve the nation's water resources from polluted stormwater runoff discharges; to reduce pollutant contaminations that have the greatest likelihood of causing continued environmental degradation; to enhance water quality, aquatic health, and biodiversity in streams and riparian areas; and to preserve the quality of water entering groundwater system.

There are six minimum control measures of the NPDES Phase II Program for which BMPs are implemented:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Stormwater Runoff Control
5. Post-Construction Stormwater Management in New Development and Redevelopment
6. Municipal Pollution Prevention and Good Housekeeping

Policy Recommendations

Education

- Educate the public (countywide) of possible point and non-point source pollutants that can enter into various water bodies such as ponds, lakes, rivers, streams, wetlands and sensitive groundwater recharge areas.

- Develop and distribute training materials for commercial and industrial businesses for pollution prevention and good housekeeping practices with regard to point pollution discharge, water conservation, recharge potential, and water quality.

- Educate the public on the importance of stream quality classification and the need for protection.

- Support community efforts for best management practice program participation events.

- Utilize school programs, brochures, articles, and water conservation events to help educate the public on all above topics.

Coordination of Efforts

- Coordinate countywide stormwater and sanitary drainage system mapping information sharing through utilizing the County's GIS application of ATHENA, the publicly available McHenry County GIS Web Viewer [http://www.co.mchenry.il.us/departments/planninganddevelopment/Documents/Athena.htm]

- Develop a coordinated NPDES MS4 Phase II program with local government entities to further advance education and public involvement countywide and enhance ordinances in the McHenry County Stormwater Management Program for Construction Site Stormwater Runoff Control and Post-Construction Stormwater Management in New Development and Redevelopment with the inclusion of low-impact design conservation practices and green infrastructure.

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B4) Open Space

Water-dependent natural resources in McHenry County, including rivers, lakes, streams, and wetlands, evolved based on the natural water cycle. Most of the county's streams depend on groundwater discharge to provide the base flow when there is no surface run off from precipitation, as do the county's many glacial lakes and wetlands. The myriad plant and animal organisms living in or near these waterways are dependent on the quality and quantity of the water. The McHenry County Natural Areas Map depicts most of the county's water dependant natural resources.

- **Attachment 2.10** "McHenry County Natural Areas Map"

Groundwater concerns connected to natural resources have much in common with those related to groundwater for human use. Management of groundwater resources can affect natural areas in two interrelated ways, one related to water quantity, the other related to water quality. For example, impervious surfaces associated with growth and urbanization causes most of the precipitation that falls on these surfaces to become stormwater runoff, rather than infiltrate into the soil, which is a natural pathway to recharge aquifers, provide base-flow to local streams and rivers, and support other water-dependent ecosystems (e.g. wetlands). Furthermore, as water infiltrates and percolates through the ground, some contaminants can be filtered, mediated, or removed by the soil, improving water quality.

When polluted groundwater discharges to lakes, streams and wetlands, the effect on aquatic organisms can be devastating. For example, low chloride concentrations (road or water softener salt) can produce chronic toxic symptoms in sensitive aquatic plants, and can result in weight loss, reproductive loss, and reduced survival rates in aquatic animals. Higher chloride concentrations can result in the failure of sensitive plants and animals to survive altogether.

When precipitation is channeled and diverted directly into waterways, it decreases infiltrative rates and reduces the amount of groundwater that feeds surface water resources. In Illinois, groundwater contributes at least 25% to the total stream flow.[18] In drier periods, when human water-use demands are often greatest,

[18] Herzog, Beverly L. and Paul R. Seaber. Ground-Water and Surface-Water Relationships in Illinois. Illinois State Geological Survey, October 24, 1990. White Paper Executive Summary compiled in *Report of the Illinois Instream Flow Protection Committee*, April 30, 1991 prepared by the Illinois Instream Flow Protection Committee, page 25.

groundwater tends to provide a very high percentage of stream flow compared to wet periods when rivers and streams are dominated by surface runoff.[19]

In areas where excessive groundwater withdrawals exist and water tables are lowered, groundwater discharge to streams and wetlands can cease, causing them to periodically dry up. This has and can result in the loss of aquatic species that lived in or near the stream or wetland. A recent example is the drying up of Wisconsin's Little Plover River, a Class I trout stream, in 2005.[20]

In order to minimize impacts on water-dependent natural resources and wildlife, care should be give to achieve as much infiltration as natural soil and geological conditions allow on open space, natural areas, farmed lands, and on developed lands. It is important to assure both the quality and quantity of water is sufficient to sustain rare and sensitive aquatic ecosystems, as well as healthy lakes, rivers, and stream systems.

Policy Recommendations

- Encourage the protection of sensitive recharge areas by townships, municipalities, the McHenry County Conservation District and land conservancy agencies. Consider protection of sensitive aquifer recharge areas via purchase (fee title), easement, lease, and/or donation options.

- Implement conservation design strategies that minimize any alteration of the natural hydrology or water quality for any new development in ground-watersheds that discharge to sensitive aquatic ecosystems.

- Identify and preserve greenway connections along streams and those that link to nearby natural areas and open spaces in conjunction with McHenry County Conservation District, municipalities, townships, and other appropriate agencies, and private landowners.

- Preserve and enhance the chemical, physical, biological, and hydrologic integrity of streams, lakes, and wetlands, with a particular focus on all Class A and B streams and rivers as reported and defined by the Biological Stream Characterization System of the Illinois EPA (on a scale of A to E) to enhance those presently of lower quality to achieve a minimum Class B rating, where feasible. Preserve the integrity of all water dependent McHenry County Natural Areas Inventory (MCNAI) sites.

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[19] Ibid.

[20] Wisconsin has recently established a public rights flow on the Little Plover River, in response to groundwater withdrawals which led to the drying up of this Class I trout stream in 2005. See In the Matter of the Establishment of Public Rights Stage(s) / Flow(s) for the Little Plover River, Portage County. Order of the State of Wisconsin Dept. of Natural Resources. http://dnr.wi.gov/news/BreakingNews_Lookup.asp?id=1164

- Implement land use and development policies that preserve a minimum base flow in wetlands and streams.

- Protect and enhance the capacity of streams and lakes to meet recreational demands for fishing, swimming, and boating.

- Designate Class III Special Resource Groundwater Protection Areas as overlay districts and protect them from inappropriate development following the recommendations put forth in the McHenry County 2030 Comprehensive Plan.

- Encourage the use of natural drainage countywide in combination with natural landscaping, wherever practical, in lieu of curb and gutter and storm sewer systems. Utilize natural landscaping in lieu of turf grass, wherever feasible.

Conservation Design

Conservation design allows for land to be developed while protecting the most valuable environmental resources as open space. The McHenry County Board has amended the McHenry County Subdivision Ordinance to include Conservation Design Standards and Procedures.

According to conservation design principles, the natural resources on a property must be inventoried early in the design process so the developed area can be located on the least environmentally sensitive portions of the property. The natural resources on the undeveloped portions of the property are then protected as open space and maintained for the benefit of the current residents and generations to come.

In general, there are three open space objectives in a conservation design community.

- Preserve intact natural communities, habitats of rare species, restored native habitats, environmental corridors that provide connectivity between protected areas, steep slopes, and significant historic or archaeological sites.
- Create naturally landscaped areas to provide environmental benefits and wildlife habitat.
- Preserve and enhance areas that have little habitat value but offer scenic views, recreation amenities, or contribute to the sense of open space in the development and surrounding area.

As communities face increased pressure from growing populations, which can degrade natural resources, a conservation design ordinance can be an effective method for governmental entities to provide a balance between development and conservation.

Policy Recommendations

Identify priority areas of concern: Identification of aquatic natural areas is the most important step in identifying management practices needed to protect and sustain the quality and quantity of water required for their long-term viability. The following recommended mapping steps for McHenry County are designed to identify the most at-risk natural areas:

- **MAP 1**: Create a map depicting Water Dependent Ecosystems of McHenry County. This map should include:
    - Rivers and streams from the US Geological Survey (USGS) Topographic map: note all intermittent and perennial streams and highlight Class A and B waters.
    - USGS Hydrologic Investigations Atlas (HA) series flood of record map – anything that is pond, lake, river, stream
    - McHenry County Natural Areas Inventory (MCNAI) – any area that is water-dependent (do not include any features that are not wet)
    - Natural Resources Conservation Service Wetland Inventory
    - Advanced Identification (ADID) Wetland map
    - Ducks Unlimited National Wetland Inventory (NWI) Update
    - Class III Special Resource Groundwater Protection Areas

- **MAP 2:** With the assistance of the Illinois State Water Survey (ISWS), create a map that shows the areas of McHenry County that experience significant reduction in the potentiometer surface (groundwater levels).
    - This map should incorporate the data from Figures 16, 17 and 20 in the draft ISWS report Regional Groundwater Modeling for Water Supply Planning in Northeast Illinois, which show areas of McHenry County that have experienced the greatest drawdowns in the shallow aquifer during the 1985 and 2005 droughts (Figures 16 & 17) and projected drawdowns for the year 2025 under the baseline water demand scenario.
    - Overlay Map 1 on top of Map 2. Aquatic resources in these critical areas should be prioritized for further assessment and monitoring.

- **MAP 3**: Work with the Illinois EPA to create a map of the five-year capture zones of all community water wells finished in the shallow aquifer.
    - Develop a plan for collecting additional information on all shallow aquifer wells, beginning with the wells with the largest withdrawals. Over time, work towards developing capture zones for all shallow aquifer wells.
    - As Map 3 is populated with capture zone information, it should be overlaid on Map 1. Aquatic resources in these areas should be prioritized for further assessment and monitoring.

Map to identify priority areas for protection: MCNAI sites should be overlaid on the SARA and any unprotected areas should be prioritized for permanent protection measures, including purchase by open space agencies and/or establishment of conservation easements.

Establish a program to monitor water levels and water quality of McHenry County's sensitive aquatic resources: Funding, study, and assessment are needed to better understand the impacts of shallow aquifer withdrawals on McHenry County's aquatic natural areas, as well as impediments to recharge of shallow aquifers. Coordination of permanent water level monitoring programs should be established to better understand the impacts of water withdrawals from shallow aquifers on surface water bodies. McHenry County Division of Water Resources, Illinois State Geological Survey, Illinois State Water Survey, Illinois Environmental Protection Agency, and the United States Geological Survey, should coordinate their programs. Effort should be given to locate any additional observation well data that may exist in McHenry County.

Water-dependent species diversity, health, and water quality should also be monitored to improve our understanding on how pollutants are impacting these resources. Sensitive aquatic resources in the areas identified as experiencing the greatest groundwater drawdown (Map 2) should be prioritized for study followed by natural areas located in well capture zones (Map 3).

Establish a processes for evaluating proposed land use changes with potential impacts on Sensitive Aquatic Resources: Care should be given to evaluate impacts to Sensitive Aquatic Resources as part of proposed land-use changes. A protocol for assessing impacts should be developed and recommended by McHenry County and municipalities in their land-use and zoning decisions. This process would expand on existing programs, such as the Natural Resource Review performed by the Impact Assessment Section of the Illinois Department of Natural Resources, to include all McHenry County Sensitive Aquatic Resources (Map 1). The protocol should:

- Use a groundwater consultation process to evaluate the effect of land-use practices on groundwater quantity and quality and aquatic resources. Michigan has developed a GIS-based Water Withdrawal Assessment Screening Tool to determine whether a proposed withdrawal will likely cause an Adverse Resource Impact on local stream and river ecosystems. This tool should be evaluated for its applicability in McHenry County.
- Work with the Illinois EPA to change state legislation to allow the agency to determine impacts on sensitive aquatic resources in their permitting program for any new large capacity wells. Public Act 096-0222 is a start toward this.
- Develop a stream flow assessment process: with an evaluation of the effects of land-use practices on environmental flows of McHenry County streams. The following could be evaluated for their applicability in McHenry County:
    - from Texas: http://www.texaswatermatters.org/environment.htm#2
    - by The Nature Conservancy: http://www.nature.org/initiatives/freshwater/misc/art16857.html
    - Illinois Streamflow Assessment Model: Principal Investigator: V. Knapp, Illinois Department of Natural Resources, 6/30/1995 - 6/30/2004 at http://www.isws.illinois.edu/wss/rivers.asp#ILSAM

In order to preserve the quality of riverine resources in McHenry County, it is important to understand and account for the natural dynamics of flowing water systems, which is vital to the sustenance of the ecological integrity of such systems. The natural magnitude, frequency, duration, timing, and rate of change of flows determine the water quality, energy sources, physical habitat, and biotic interactions that regulate the ecological integrity of stream systems.[21] In general, maintaining the pre-development infiltration and runoff rates should be a priority. This can be accomplished through utilizing the appropriate storm water management techniques.[22]

It is important to determine the direction of groundwater flow in order to define the up-gradient areas that infiltrate groundwater supplying a given natural area. McHenry County Water Resources is working with the Illinois State Water Survey to complete a groundwater flow model for all of McHenry County. Site specific work may be needed to refine location specific groundwater flow for the purpose of water dependent ecosystem protection.

[21] The Natural Flow Regime, BioScience Vol. 47 No. 11, December 1997), , Where Rivers Are Born at http://www.sierraclub.org/cleanwater/reports_factsheets/

[22] For more information, refer to the McHenry County Stormwater Ordinance.

Utilize the Class III groundwater protection tool: The Class III Special Resource Groundwater designation provided by Illinois statute.[23] is another tool available to provide protection to groundwater dependant natural resources. The statute provides that this designation may be applied to groundwater that:

- is demonstrably unique (e.g., irreplaceable sources of groundwater) and suitable for application of a water quality standard more stringent than otherwise applicable.
- is vital for a particularly sensitive ecological system.
- contributes to a dedicated Illinois Nature Preserve.

The Class III designation affords the groundwater contribution area, or capture area for the natural feature, protections similar to those that municipal well capture areas receive (i.e. the Illinois Pollution Control Board has regulations regarding prohibition of activities that have the potential to degrade water quality and quantity). At present there are two Class III groundwater systems in McHenry County: the Boone Creek Fen (Illinois Natural Inventory site), and the Parker Fen (Nature Preserve).[24] Collectively, these two designated areas comprise about six square miles, which is roughly one percent of the county's surface area. Additionally, there are two proposed Class III groundwater designations in McHenry County pending before the Illinois Pollution Control Board: Lake in the Hills Fen (Nature Preserve) and Elizabeth Lake (Nature Preserve).

Many of the restrictions that have been applied to Class III recharge areas in McHenry County are similar to the Best Management Practices recommended within many of the sections of the Water Resource Action Plan, including Groundwater Recharge, Water Conservation, Wastewater, Pollution Prevention, and Winter Snow and Ice Operations.
These protections measures include:

- Reduction of salt impacts on ecosystem
- Pollution Prevention measures for industrial and commercial activities
- Reduction of mass grading and compaction that limits infiltration
- Prioritization of infiltration and reduction of impervious surfaces
- Utilization of native vegetation

Because the statutory restrictions that a site must be unique, vital and contribute to a nature preserve (listed above), the Class III designation may not have wide

[23] 35II Admin Code 620.230
[24] Local jurisdictions have enacted regulations for Class III groundwater systems that provide an additional level of protection of water quality, and that also seek to protect groundwater quantity.

application within the County. However, the methods prescribed for determining the groundwater contribution area for a Class III site may be useful to help protect other important natural areas.

- Establish Class III groundwater protection for groundwater-dependent natural areas
- Develop a "model" ordinance to make Class III groundwater protection an effective tool for maintaining quality and quantity of groundwater feeding natural sites. A Bull Valley example can be used as a guide.
- Develop Class III groundwater quality standards on a case-by-case basis.

Address water quality issues through Best Management Practices (BMPs) and Policies: Maintaining the maximum natural infiltrative rate of an area (based on soil and geologic conditions) is key to sustaining the groundwater resources the county residents and natural ecosystems depend on. Consideration should be given to include groundwater infiltration Best Management Practices in the Stormwater Ordinance and in revisions to the Subdivision Ordinance.

In addition, wastewater infiltration through properly, sited, constructed, operated, and maintained, onsite wastewater systems and land application systems should be promoted in McHenry County. Onsite wastewater treatment systems provide for local groundwater recharge. Land treatment systems reduce the reliance on potable water for irrigation through the beneficial reuse of the treated wastewater with the additional benefit of the utilization of nutrients by the vegetative cover and reduce the direct discharge of wastewater pollutants into streams. (for more on Wastewater, click here). However, proper maintenance of onsite systems is essential for these systems to operate optimally.

Recommendations and policies should be developed to protect water dependant ecosystems from unnecessary water quality degradation, including:

- Ordinance restrictions by municipalities, townships and the county on:
    - Phosphorus-containing lawn fertilizer[25]
    - Tri-sodium phosphate use
    - Coal tar sealants[26]

[25] The Village of Lakewood's ordinance is an example.

[26] Coal tar has been shown to be a major source of polycyclic aromatic hydrocarbons (PAHs) which are harmful to aquatic organisms. Refer to Section 5: Water Quality of the Groundwater Protection Action Plan for a model ordinance banning the use of Coal Tar.

- Encourage the use of BMPs for wastewater treatment plants that reduce: nutrients, personal care products and pharmaceuticals in wastewater discharges[27]

- Continue to encourage the use of the water quality tools found within the McHenry County Stormwater Ordinance, including wetland protection and waterway buffers. Promote the use of BMPs addressing land use changes that have an impact on water dependant ecosystems, including: water volume, chlorides, nutrients, pH, and temperature.

- Chlorides:

    - Encourage the use of the tools for reducing the impact of road salts found within Subsection B6: Winter Snow and Ice Operations of the Water Resources Action Plan[28]

    - While the impact of road salt has been quantified, the impact of chlorides from water softener discharge, particularly through onsite wastewater treatment systems has not been quantified. Additional studies should be conducted to quantify the impact of softeners to determine if regulation is warranted. Consideration should be given to promote alternative water softening and iron removal systems and to minimize chloride use in water softening systems[29].

- Work with the USDA Natural Resources Conservation Service and the local Soil and Water Conservation District to promote Best Management Practices (BMPs) for agriculture, nurseries, and sod farms to address: fertilizer use, waterway buffers, and conservation practices.[30] (Note: could add the Conservation Reserve Program, within approved WHPAs, thru the NRCS)

[27] Section 4: Wastewater Model Policy of the Groundwater Protection Action Plan.
[28] Section 7: Winter Snow and Ice Operations Model Policy Groundwater Protection Action Plan.
[29] Section 5: Water Quality Model Policy of the Groundwater Protection Action Plan.
[30] Refer to the Water Conservation Chapter of the Groundwater Protection Action Plan for additional information on water conservation best management practices.

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B5) Facility Regulation

Potential land use activities that store, use or produce known contaminants of concern (constituents found to be a risk to human health) and have a sufficient likelihood of releasing such contaminants to the environment are considered threats. The concentration thresholds of these constituents are prescribed by the USEPA and are referred to as Maximum Contaminant Levels (MCL).

A wide variety of activities can have an impact on water quality and quantity. This section provides information and recommendations about activities by private and public entities that should be monitored and in some cases regulated by municipalities in McHenry County because of their effect on local water.

Mining Operations

Open pit mining operations, such as sand and gravel mining, may pose a groundwater quality threat. While a mining operation itself does not contaminate the water, the process creates a more direct connection or route between the exposed ground surface and groundwater than would normally be present. Removing the protective layer of soil makes the groundwater more susceptible to environmental accidents like spills in the operating pit.

Excavating above the water table with no associated activities such as vehicle maintenance or asphalt batch plants causes a relatively low risk to groundwater quality and quantity. However, mining below the groundwater table causes greater risk. Surface water can then carry higher levels of pollutants to sand, gravel, and shallow bedrock aquifers without passing through the top soil layers that act as a natural filtration system. For this reason, great care is needed in siting potentially contaminating land uses within, or in the vicinity of, open mined areas.

Open pit mining also has the potential to impact groundwater quantity. While quantity concerns have not been recorded to date in McHenry County, the types of water quantity issues related to sand and gravel mining could include:

- Loss of water supplies due to breach of an aquifer plug or site water consumption. (Site water consumption is typically associated with mining that includes dewatering operations.)For example, in October 1993, mining activities at the High Rock gravel mine near Monroe, WA caused a loss of water supply due to a breach of an aquifer plug.[31]

[31] Garland, D. and Liszak, J., 1995).

- Changes in the timing or quantity of discharge from springs.[32]

Policy Recommendations

- Continue to monitor water levels and water quality from the associated monitoring wells required for the mining operations.

- Continue to audit and minimize impacts of gravel mining on water quality by enforcing and implementing reclamation plans for future land uses and encourage reclamation of historic borrow pits.

- As part of the Conditional Use Permit, require sensitive and approved reuse of reclaimed mining areas. (Note: **SB 3721 (Harmon/Currie)**. Amends the Environmental Protection Act (EPAct). Requires the Illinois Pollution Control Board (IPCB) to adopt rules that define "uncontaminated soil" for purposes of clean construction or demolition debris (CCDD) and uncontaminated soil generated from construction or demolition activities.)

- Require the use of a vegetated buffer strip around a mined area similar to recommended buffers around wetlands. This will reduce the potential of surface water pollutants from entering the mined area by providing an area for filtration and infiltration of water.

Abandoned Wells

Abandoned water wells and monitoring wells represent potential routes of contamination to groundwater. McHenry County Department of Health has a comprehensive water well program that requires abandoned water wells to be sealed under permits issued and inspected by the Department. The program includes identification and sealing of abandoned wells upon installation of replacement wells, demolition of structures, connection to community water, and siting of new developments. The Department participates on the Northern Regional Groundwater Protection Planning Committee, which offers low-cost sealing materials and public education throughout the Northern Illinois region.

Policy Recommendations

- Continued emphasis should be placed on public education to ensure that property owners understand the importance of properly sealing abandoned water wells to protect the quality of groundwater.

- McHenry County Department of Health should continue to work with the Northern Regional Groundwater Protection Committee in facilitating the

[32] WA State Dept. of Ecology, 2000c; Garland and Liszak, 1995

proper abandonment of water wells by providing education and low cost materials to property owners needing to abandon their wells.

Underground and Above Ground Storage Tanks

An underground storage tank (UST) system is a tank and any connected underground piping that has at least 10 percent of its combined volume underground. USTs, which are generally associated with industrial/commercial land uses, can be found at filling stations, airports, hospitals, automotive repair shops, military bases, industrial plants, residential areas, and other facilities.[33]

Historically, USTs have not had a good track record, with over 35 percent of UST systems nationwide showing leak rates over 1.2 gallons/day[34.] In an effort to prevent future contamination from USTs, the USEPA mandated underground storage tanks that contain hazardous substances, including fuels, be removed by December 22, 1998 or have spill, overfill, and corrosion protection upgrades (40 CFR 280).[35] However, regulations for USTs focus on monitoring and post-leak detection rather than prevention of leaks.[36] Also, certain classes of tanks, most notably home heating oil tanks, are exempt from federal and state regulations, providing no assurance of safety.

Above ground storage tanks (ASTs) usually store products similar to UST; contaminants can include VOCs, arsenic, barium, cadmium, chloride, lead (historically), and other agents. Past instances of contamination from ASTs include releases from corrosion holes, failures of piping systems, spills and overfills, and equipment and human operational failure. Groundwater contamination from ASTs can be prevented by routine monitoring, proper design to prevent corrosion, quick cleanups of minor spills[37] and secondary containment controls.

Policy Recommendations

- All Tier I[38] underground storage tanks are subject to UST regulations. The federal requirements for USTs can be found in 40CFR Part 280 and 40CFR Part 281, although codification of individual state and territorial programs is found in 40 CFR Parts 282.50-282.105.

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[33] This section was derived from Chapter 6: Critical Aquifer Recharge Areas King County Washington, Executive Report, Best Available Science, Volume 1, February 2004.
[34] Young and Golding, 2002
[35] Young and Golding, 2002
[36] Redmond, 1999
[37] USEPA, 2001a
[38] USEPA, Regulations Pertaining to Underground Storage Tanks. http://www.epa.gov/oust/fedlaws/cfr.htm

- All above ground storage tanks for hazardous substances should be prohibited, unless protected with primary and secondary containment areas and a spill protection plan.

- For additional pollution prevention measures, refer to the other sections within the Water Resource Action Plan.

Salvage yards and automotive recyclers

Wrecking yards are establishments that engage in the destruction and crushing of automobiles that are no longer usable. In 1987, Congress mandated that "industrial" sites obtain stormwater permits. In 1990, USEPA defined "industrial" to include, among many other types of sites, "salvage yards and automotive recyclers." [Title 40 CFR 122.26(b)(14)(vi)]. These mandates apply across the country. [39]

The primary regulatory issues at an auto salvage yard facility are:

- Fluid storage
- Waste fluid storage
- Storage tanks--above ground and underground
- Fugitive air emissions--evaporating fuel, refrigerants
- Contaminated stormwater
- Chlorofluorocarbon (CFC) recovery licensure and training
- Improper disposal
- Tire storage and disposal

The two most important regulatory issues for salvage yards as related to groundwater protection are fluid management and contaminated stormwater. Fluid management issues include oil, antifreeze, brake fluid, and windshield wiper solvent, which can be improperly removed or not removed at all from the vehicle prior to storing in the salvage yard area. Fluids commonly leak from the deteriorating vehicles and spill out onto the ground, contaminating the water and soil. This is particularly troublesome with regard to stormwater and groundwater contamination. Congress and USEPA has created national rules that provide the basic framework for stormwater regulations, which are implemented by state environmental agencies.

[39] This information was derived from the Great Lakes Regional Pollution Prevention Roundtable website. For additional information see: http://www.glrppr.org/hubs/index.cfm?page=subsection&hub_id=506&subsec_id=12

Recommendations

The following is a list of Best Management Practices for auto salvage facilities identified by the USEPA when publishing stormwater regulations:[40]

Dismantling and vehicle maintenance:

- Drain all fluids from vehicles upon arrival at the site. Segregate the fluids and properly store or dispose of them.
- Maintain an organized inventory of materials used in the maintenance shop.
- Keep waste streams separate (i.e. waste oil and solvents). Non-hazardous substances that are contaminated with hazardous substances are considered a hazardous waste.
- Recycle antifreeze, gasoline, used oil, mineral spirits, and solvents.
- Dispose of greasy rags, oil filters, air filters, batteries, spent coolants, and degreasers properly.
- Label and track the recycling of waste material.
- Drain oil filters before disposal or recycling.
- Store cracked batteries in a nonleaking secondary container.
- Promptly transfer used fluids to the proper container.
- Assure all floor drains are routed to approved structures.
- Plug floor drains that are connected to the storm or sanitary sewer. If necessary, install a sump that is pumped regularly. The Illinois Plumbing Code requires facilities for vehicle maintenance to have floor drains. The critical issue is the end discharge point for the floor drain waste. It would be appropriate for vehicle fluids to go into a floor drain connected to a special waste holding tank. The waste from this tank should be properly disposed of by a special waste hauler.
- Inspect the maintenance area regularly for proper implementation of control measures.
- Filter stormwater discharges with devices such as oil-water separators.
- Train employees on proper waste control and disposal procedures.

[40] This information was extracted from the ECAR Center website. ECAR is a "one-stop shop" for all automotive dismantling and recycling operations and provides comprehensive and up-to-date environmental compliance assistance. http://www.ecarcenter.org/il/il-stormwater.htm

Outdoor vehicle, equipment, and parts storage:

- Use drip pans under all vehicles and equipment waiting for maintenance and during maintenance.
- Store batteries on impervious surfaces. Curb, dike, or berm this area.
- Confine storage of parts, equipment, and vehicles to designated areas.
- Cover all storage areas with permanent cover (roof) or temporary cover (canvas tarps).
- Inspect the storage yard for drip pans and other problems regularly.

Vehicle, equipment, and parts washing areas:

- Avoid washing parts or equipment outside.
- Use phosphate-free biodegradable detergents.
- Consider using detergent-based or water-based cleaning systems in place of organic solvent degreasers.
- Designate an area for cleaning activities.
- Contain steam cleaning washwaters or discharge under an applicable NPDES permit.
- Ensure that washwaters drain well, and are not draining into a MS4 or surface water body.
- Do not discharge wastewater into a dry well.
- All discharges authorized by the general stormwater permit must fully meet all applicable water quality standards.
- Inspect cleaning area regularly.
- Install curbing, berms or dikes around cleaning areas.

Liquid storage in above ground containers:

- Maintain good integrity of all storage containers.
- Install safeguards (such as berms) against accidental releases in the storage area.
- Inspect storage tanks to detect potential leaks. Perform preventative maintenance.
- Inspect piping systems for failures or leaks.
- Train employees on proper filling and transfer procedures.

Improper connection with storm sewers:

- Assure all floor drains are routed to approved structures.
- Update facility schematics to accurately reflect all plumbing connections.
- Install a safeguard against vehicle washwaters and parts cleaning water entering the storm sewer unless permitted.
- Maintain and inspect the integrity of all underground storage tanks; replace when necessary.

Policy Recommendation

- Ensure that all new or proposed wrecking yards are in compliance with the Code of Federal Regulations.

Agricultural and Golf Course Operations

The use of fertilizers and pesticides on landscaped lands can contribute to groundwater pollution. Examples of heavily landscaped areas include golf courses, residential yards, commercial yards, ball fields, and parks.[41] Agriculturalists also use pesticides in crop production and nursery production. A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Pests can be insects, mice and other animals, unwanted plants (weeds), fungi, or microorganisms like bacteria and viruses. Though often misunderstood, the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests. Under United States law, a pesticide is also any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.[42]

The physical and chemical properties that make pesticides effective for pest control also add to their potential for groundwater contamination. Pesticides have two properties, persistence and adsorption, that control their fate after application to the soil. Persistence relates to a pesticide's ability to degrade over time so pesticides that are highly persistent (i.e., do not degrade quickly) pose the highest threat to groundwater. Adsorption refers to the pesticides ability to bind to soil particles after application. However, many pesticides have a high adsorption potential and low solubility in water, making them less of a contamination risk to groundwater[43]

[41] USEPA, 2001 c
[42] USEPA, 2003
[43] Mahler et al., 2002

Fertilizers are organic and inorganic materials added to soil to supply nutrients for plant growth. Fertilizers that contain nitrogen, potassium, and phosphorus are commonly used, and regardless of the form of nitrogen added--chemical fertilizer, an organic mix, manure, or sewage sludge-- soil organisms convert it to nitrate before plants take it up.

Pesticides most commonly leach to groundwater in areas with permeable soils and high water table surfaces.[44] Studies specific to the application of pesticides to turfgrass have shown that leaching can be a problem on sandy soils when a rainstorm or heavy irrigation occurs in the first few days after application.[45] It has also been documented that improper or excessive use of nitrogen fertilizer on golf courses can lead to nitrate pollution of groundwater.[46] The same is true for agricultural fields.

In addition to pesticides and fertilizers, manure mismanagement from small and large farms, including hobby farms, can cause pollution of surface and groundwater resources. In McHenry County, large confinement livestock operations housing beef, dairy, poultry, and hogs are decreasing. However, the hobby farm and equine facility horse populations are increasing. A single horse produces seven to nine tons of manure a year. Poor manure management practices, including spreading manure on frozen or compacted soils, manure application in excess of crop requirements, and improper manure storage can result in the contamination of surface and groundwater.

Agriculture Policy Recommendations

- Conduct nutrient management, including regular soil testing, to determine optimum rates and locations for fertilizer applications.
- Exclude livestock from direct stream access and filter strip areas.
- Install filter strips along streamside property that is not currently covered by year-round vegetation.
- Install grassed waterways where runoff concentrates at topographic low points in farm fields.
- Practice conservation tillage.
- Restore farmed wetlands that will serve as pollutant sinks.
- Ensure that all livestock operations comply with applicable local, state, or federal laws such as the Confined Animal Feeding Operation (CAFO) Rules.

[44] Teso et al., 1996
[45] CSU, 1993
[46] Wong et al., 1998; CSU, 1994

- In conjunction with the Soil and Water Conservation District, the USDA Natural Resources Conservation Service, and the Farm Bureau, develop Best Management Practices for all livestock facilities, small and large.
- Educate agriculturalists about proper storage of farm materials, including onsite storage of fuel, oil, fertilizers, pesticides, or other chemicals.

Golf Course Policy Recommendations:

- Conduct nutrient management, including regular soil testing, to determine optimum rates and locations for fertilizer applications.
- Install filter strips along streamside property that is not currently covered by year-round vegetation.
- Educate golf course superintendents about proper storage of golf course materials, including on site storage of fuel, oil, fertilizers, pesticides, or other chemicals.
- Fertilizer and pesticide applicators should implement Best Management Practices for their use.
- Encourage golf course superintendents to participate in programs such as the Audubon Certification or the Groundwater Guardian (GC) Green Site. The Audubon Certification program works with natural landscaping and other environmentally friendly techniques in design and management. The Groundwater Guardian (GG) Green Site program was developed to recognize good stewards of groundwater by encouraging managers and superintendents of highly-managed green spaces to implement, measure, and document their groundwater-friendly practices. The program will document current practices related to pesticide and fertilizer use, water use, pollution prevention, water quality, and environmental stewardship. Managers of highly-managed green spaces can apply for Green Site designation. Highly-managed green spaces include, but are not limited to:
    - Golf courses
    - Ball fields
    - Educational campuses
    - Residential, recreational, city, and office parks
    - Wellhead protection areas
    - Nature centers
- Incentivize the use of wastewater and stormwater.

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B6) Winter Snow and Ice

A blanket approach to snow and ice removal from roads, parking lots, and other surfaces will not work for the broad range of conditions McHenry County experiences; different strategies are needed for different regions and different conditions. Please use the information below and the tools provided in the handbooks and training session to continue to test, document, and refine your winter snow and ice operations.

Removal of snow and ice from McHenry County pavement is essential to both public safety and to the local economy. During winter storm events, the use of pavement deicing chemicals is a widely accepted and, as some would argue, essential means of keeping pavements safe and passable. However, mechanical snow removal is the best method for snow and ice removal. Chemicals should only be used to break the bond between ice and pavement.

Pavement deicing is typically accomplished though the use of road salts. There are a variety of road salts that may be used for deicing, including sodium chloride (NaCl), calcium chloride ($CaCl_2$), magnesium chloride ($MgCl_2$), and potassium chloride (KCl). Sodium chloride, or common salt, is by far the most popular roadway deicing chemical because of its reliability, economy, and usability. However, it is also corrosive to vehicles, roadway surfaces, and bridges and has been found to have adverse effects on groundwater and environmentally sensitive areas.[47]

Contamination by chlorides in groundwater and surface water is a growing concern in McHenry County, as well as across the region (see Section TK for more on chlorides). Salt used for pavement deicing is one of the primary sources of this increase.[48] Chloride contamination can be dealt with either *post hoc* in a reactive fashion or a *priori via,* a more proactive approach. The reactive approach, however, is very often more expensive than the proactive prevention.[49] Once contaminated, restoration of water quality and ecosystems can be very difficult and costly, if not impossible.

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[47] Panno, S.V., K.C. Hackley, H.H. Hwang, S. Greenberg, I.G. Krapac, S. Landsberger and D.J. O'Kelly, 2002. Source Identification of Sodium and Chloride Contamination in Natural Waters: Preliminary Results. In Research on Agricultural Chemicals in Illinois Groundwater: Status and Future Directions XII, Proceedings of the 12th Annual Illinois Groundwater Consortium Conference, Makanda, IL, April 22, 2002. Available online http://www.water-research.net/Waterlibrary/privatewell/nacl.pdf

[48] Water softeners are an additional source of chlorides.

[49] CMAP Regional Water Supply Plan

Effective salt management practices, including proper application, storage, handling, and a training program, can reduce the amount of salt entering the environment. Currently there is no requirement for certification of deicing agent storage facilities and applicators, or for local units of government to require compliance with the Winter Snow and Ice Operations Policy. It is strongly recommended that local governments consider a proactive approach to reducing chloride contamination by implementing and enforcing the practices described below.

Local communities (including townships and the county), the Illinois Department of Transportation (IDOT), and the Illinois Tollway Authority are the primary parties responsible for maintaining roadways during winter storm events in McHenry County. These entities should coordinate their snow and ice practices to conform to best practices.

- IDOT is responsible for maintaining state highways and roadways located within McHenry County; these roadways typically have an U.S. or Illinois state highway route number assigned to them.
- The Illinois Tollway Authority is responsible for maintaining the short portion of the Northwest Tollway (I-90) located in the southwest corner of McHenry County.
- McHenry County and the local communities and townships are responsible for maintaining all county and township roadways, as well as local streets, including local collector and arterial streets, located within the county.
- Private snowplow operators are the primary parties responsible for maintaining private roadways and parking areas on commercial, industrial, institutional, office, and multiple family properties in McHenry County.
- Private snowplow operators also maintain some sidewalks and single family properties in McHenry County.

Application of Deicing Agents

A well-planned and operated pavement deicing program can assist in mitigating negative environmental effects while reducing the overall costs to maintain pavements during winter storm events. To assist entities responsible for snow and ice removal in McHenry County in improving their operation practices, McHenry County Water Resources and the McHenry County Division of Transportation have developed two field handbooks to promote an awareness of the tools, best practices, and limitations for snow and ice control, the "McHenry County Snow and Ice Control Handbook" and the "Winter Parking Lot and Sidewalk Maintenance Manual."

These publications encourage progressive changes in snow and ice control practices that will help to reduce pavement deicing chemical usage, use of abrasives, and environmental impacts while meeting the safety and mobility needs of roadway

users. McHenry County has also developed a flip chart to be kept inside snow and ice removal vehicles.

- **Attachment 2.11** "McHenry County Snow and Ice Control Handbook"

- **Attachment 2.12** "Winter Parking Lot and Sidewalk Maintenance Manual"

- **Attachment 2.13** "Operators Flip Chart"

In addition, the Salt Institute has developed a "sensible salting" program, which includes information on planning; personnel training, equipment maintenance, spreader calibration, proper storage, proper maintenance around chemical storage areas, and environmental awareness.[50] As part of this "sensible salting" program, the Salt Institute has created a Snow fighter's Handbook that presents the components of the "sensible salting" program along with guidance on how to implement these improved roadway deicing procedures.

- **Attachment 2.14** "Snowfighter's Handbook"

Policy Recommendations

- The Salt Institute's "Snowfighter's Handbook," the "McHenry County Snow and Ice Handbook," the "Winter Parking Lot and Sidewalk Maintenance Manual," and the flip chart are policy recommendations all entities responsible for snow and ice removal in McHenry County should follow. All entities are strongly encouraged to obtain a copy of these handbooks and flip charts as well as to obtain certification for winter snow and ice operations through an annual Managing Snow and Ice Control Operations Workshop, see Section below on Training and Certification.

- Treatment recommendations can also be obtained from maintenance decision support systems (MDSS) through private contractors.

[50] USEPA, 1999

Storage

Proper storage of road salt supplies is of the utmost importance for protection of our flora, fauna, and surface and groundwater resources in McHenry County. When salt is stored outside and uncovered, the pile is left exposed to precipitation from storm events, which causes runoff water to become salt-laden with chloride and sodium ions.

While it is common for local roadway maintenance agencies to store road salt in covered structures, there are many other small, uncovered salt storage piles throughout the county. These are often a significant contributor to chloride contamination of our groundwater and surface water county-wide. Currently, the Illinois EPA regulates de-icing agent storage piles in excess of 50,000 pounds if located within appropriate setback zone(s) of potable water supply wells.

Policy Recommendations

- The County and any unit of government that participates in winter snow and ice operations in McHenry County should adopt a Winter Snow and Ice Operations: Deicing Storage and Handling Policy.

- The County as well as local units of government should require private snowplow operators and business in their jurisdiction to comply with the Winter Snow and Ice Operations: Deicing Storage and Handling policy guidelines outlined below.

- A County policy should be developed requiring that *all* salt storage facilities, both liquid and granular, be permitted by both the County and/or the municipalities of McHenry County.

    - Proof of a storage and handling policy that meets Subsection B6 should be required as part of the permitting process. Failure to comply could result in rendering a potable water supply unusable due to contamination.

The following recommendations on snow piles and general deicing chemical storage apply to *all* permanent and temporary indoor and outdoor facilities:

Snow Piles

- Store in an area where solids can be recovered after the snow melts.

- Locate snow down-slope from salt and sand storage to prevent the snow melt from flowing through salt and sand storage areas and/or carrying it into the nearest drainage system.
- Avoid pushing snow into lakes, ponds, wetlands, rivers or other natural areas, both to reduce chemical contamination and to increase the amount of solids that can be recovered after the melt.

General: Deicing Chemical Storage

➢ Facility Location

- Facility should be in close proximity to the area to be salted.
- Facility should be located outside of floodplains, on impermeable surfaces, and on relatively impermeable soils.
- Facility should not be located in close proximity to surface water features.
- Storage of deicing agents in excess of 50,000 pounds is prohibited within the minimum setback zone of any potable well.[51]
    - Potable wells other than community wells have a 200-foot circular minimum setback zone.
    - Community wells may have a 200- or 400-foot circular minimum setback zone, depending on whether the well uses a confined (200 ft) or unconfined (400 ft) aquifer.
    - Community wells can adopt maximum setback zones (typically 1,000 feet) of up to 2,500 feet. They may be circular or irregular in shape.
    - Facility cannot be located within 200 feet of any/all drywells.
- Slope should be away from salt storage pile/facility.
- Salt vulnerable/intolerant natural areas should be avoided to the greatest extent possible. Where they cannot be avoided, specific measures should be included in the design of the storage facility to protect vulnerable areas.
    - Salt vulnerable/intolerant natural areas could include:
        - ✓ Areas adjacent to salt sensitive vegetation and agricultural operations

[51] IEPA Title 35 Part 616, Subpart L
http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.asp
Illinois Environmental Protection Act, Section 3.355 (415 ILCS 5/3.355), Section 14.2 under Title IV: Public Water Supplies http://www.ipcb.state.il.us/SLR/TheEnvironmentalProtectionAct.asp

- ✓ Areas draining into a source of drinking water (surface water and groundwater)
- ✓ Areas draining into bodies of water with low dilution, low volume, or salt sensitive species
- ✓ Areas associated with groundwater recharge zones or shallow water table, with medium to high permeability soils

- Facility Specifications
  - Any roof leaks, tears, or damage to the storage facility should be temporarily repaired during the winter or on an ongoing basis to reduce the entrance of precipitation, with permanent repairs being completed prior to the next winter season.
  - Construct floor out of Bituminous Concrete or Portland cement concrete and seal to prevent salt infiltration**.**
  - Ensure the floor or pad has a slope between two percent and five percent to allow any moisture to drain into the collection sump or runoff pond.
  - The floor should be inspected annually for cracks and repaired/resealed as required.
  - Install a plastic liner beneath the storage and loading areas. If these locations are present on pervious pavement, ensure that spilled salt does not migrate through and into nearby groundwater.

- Site Drainage
  - The site should be graded to direct drainage away from storage areas and to the maximum extent possible away from any down gradient groundwater well locations or salt vulnerable areas.
  - Drain storage site runoff via tile ditches or pipes to a collection area, preferably a specially designed sump area or runoff storage pond with a liner, if possible.
    - A Best Management Practice (BMP) with a control restrictor to stop or restrict discharge downstream.
    - Salt-laden water should be collected and properly managed
  - Snow plowed from the site should be directed to areas where melted water will be directed away from groundwater wells, storage area and salt vulnerable areas.

- Salt Piles
  - Promote indoor operations where possible.

- Store where rain, snow, and melt water cannot access it.
- Store away from lakes, rivers, ditches, storm drains, and wetland edges.

➢ Salt Bags

- Store away from rain or snow inside of the facility.
- Dispose of bags properly.

➢ Liquid Chemicals

- Designers should consult with local environmental regulatory authorities regarding siting and containment requirements for storage facilities.
- Understand the freezing point of proposed liquid. This physical property will determine if it can be stored outside or if it must be stored inside. Consideration should be given to store salt brine (NaCl) indoors and in double-walled containers.
- Label tanks documenting contents.
- Where practical, secondary containment should be provided through double-walled tanks or containment dykes.
- Before installing tanks, check on local visual screening ordinances.
- Periodic inspection of tanks, pumps, and pipes/hoses should be carried out and any leaks should be repaired immediately.
- Tanks should be turned off every night.

➢ Sand piles

- Winter sand is typically mixed with some deicers to prevent freeze-up of the pile. Therefore, sand pile storage should be the same as salt pile storage.
- Do not use leftover winter sand for other uses. Save sand undercover for next season.

Indoor Deicing Chemical Storage
Storing salt and sand/salt mixes indoors is the best policy. Structure designs can include domes, rectangular sheds or barns, high arch structures, and elevated silos. *In addition* to the "snow pile" and "general" recommendations from above, the following factors should be taken into consideration when storing pavement deicing chemicals in existing facilities and when siting new facilities:

- Facility Specifications

  - Prevailing winter wind direction should be noted.
    - Position new buildings and doors, with regard to sheltering loading operations, minimizing snow drifting around doorways, and keeping precipitation out of the storage areas.

  - Door location and size**:**
    - To the extent possible, doors should be high enough to allow a transport trailer to end dump inside the structure.
    - The entrance to the structure should have a door, curtain, or a sufficient overhang to minimize precipitation entering a structure.
    - Where possible, the facility should be generally oriented such that the door is facing away from the prevailing winter wind direction.

  - Extraneous equipment such as a conveyor system**:**
    - A conveyor system can maximize storage space available due to its top-loading capacity.
    - Using a conveyor system will improve traffic flow by separating unloading/loading operations.
    - A conveyor reduces the amount of salt waste from unloading operations.
    - Any salt spilled during the unloading process should be shoveled and/or swept into the unloading pit and run up the conveyor at the end of unloading.

  - Base
    - Floors of all structures should have low permeability and be constructed of quality strength asphalt or concrete that is

sloped away from the center of the storage area for drainage purposes.

- The base pad inside the storage facility should be flat with the periphery pavement sloped away from the center of the storage area for drainage purposes.
- Both asphalt and concrete are somewhat permeable and should be sealed to minimize infiltration.
- The loading pad should be constructed of asphaltic concrete or other low permeability material facade.

- Roof and exterior of the storage structure:
  - Must use materials that prohibit precipitation and moisture from entering the building.
  - Must be constructed of non-corrosive materials that will not interact with de-icing agents placed in the facility.
  - Must be free of gaps that would allow salt or salt impacted drainage to escape.
  - Must prevent dissolved de-icing agents from entering into adjacent soil, surface water, or groundwater.

➢ Site Drainage

- Direct drainage away from storage facilities and provide for the interception and management of salt impacted drainage.
- Run-off from the roof must be diverted away from the loading pad and building.
- Properly locate catch basins with hook-ups to storage areas to avoid directing salt-laden runoff through storm sewers into salt vulnerable watercourses or directly into the ground through poorly sealed sumps.
  - Any residues left on the floor of the facility at the end of the season should be rinsed into the drain where it will travel to the designated holding facility.
  - If necessary and when appropriate, the detention ponds and holding tanks should be emptied and materials disposed of according to regulations.

Outdoor Deicing Chemical Storage:
Storage of salt outdoors may be necessary due to lack of facilities. In addition to the "salt pile" and "general" salt storage recommendations from above, the following factors should be taken into consideration when storing pavement deicing chemicals at existing facilities and when siting new outdoor facilities:

- Facility Specifications
  - Base must be constructed of materials capable of containing de-icing agents (i.e. bituminous or concrete pad).
  - Impermeable member/cover must be placed over all storage piles to protect against precipitation and surface water runoff. The membrane cover must prevent run-off and leachate from being generated by outdoor storage piles.
  - For very small and temporary sites - see Temporary Storage policies below.

- Site Drainage
  - Properly locate catch basins with hook-ups to storage areas to avoid directing salt-laden runoff through storm sewers into salt vulnerable watercourses or directly into the ground through poorly sealed sumps.
  - If necessary and when appropriate, the detention ponds and holding tanks should be emptied and materials disposed of according to regulations.
  - Surface drainage must be directed to prevent flow through the base of the storage piles. De-icing agents must not be stored where drainage may enter into water supplies, farmlands, or streams.

Temporary Storage
Temporary storage of pavement deicing chemicals may be necessary for industrial, commercial, and residential deicing operations. In addition to the "salt pile" and "general" salt storage recommendations from above, the following factors should be taken into consideration when temporarily storing pavement deicing chemicals.

- Salt piles facility Specifications
  - Should be bordered by curb on two sides to ensure the pile is contained and less likely to be impacted by surface runoff.
  - Should be located away from drains.
  - Should be stored on the highest point in a parking lot so that drainage flows away.

- Base: Store deicing agent on a waterproof material to prevent runoff and absorption of moisture from the ground.
- Cover: Keep the deicing/anti-icing agents covered at all times with a waterproof flexible covering to prevent runoff.

Handling

A primary source of salt entering the groundwater is salt spillage that is either plowed or washed from the maintenance yard and/or unloading and loading area(s). Care to minimize spillage and procedures to clean up spilled salt can reduce costly losses and impacts to the flora, fauna, and surface and groundwater.

Policy Recommendations

General Practices: All snowplow operators and contractors should be required to attend a Winter Snow and Ice Training and Certification Workshop every three years and to obtain certification. Proof of certification should be provided to the Division of Water Resources and to the municipality the operator operates within. These operators and contractors should provide proof to the county that their operations meet standards.

Facility Site

- Spilled materials should be swept and returned to the pile in a timely manner.
- Salt and sand/salt mixtures that are spilled outside of storage facilities or within or adjacent to maintenance yards should be collected and returned to the storage facility as soon as possible following the completion of a storm event.
- All areas surrounding the storage pile (including but not limited to the loading/unloading pad) must be routinely inspected to determine whether any release of de-icing agents has occurred. Areas to be cleaned as necessary and spilled de-icing agents must be placed back under the protective covering.
- The integrity of the storage facility and loading pad must be maintained.

Loading/Unloading Areas

- Where practical to do so, spreaders should be loaded inside the storage structure. When inside loading is not possible, other systems are needed to recover salt spills that occur during loading.
- When loading spreaders outside of the storage structure, care should be taken to minimize spillage of salt onto the loading pad.
- Promptly clean up all spills and scattered salt after loading and unloading.
- Sweep loading areas back into the piles to reduce leaching.

Storage Pile

- For an outdoor facility, piles must be formed in a conical shape, covered and stored on a paved pad capable of preventing leachate from entering adjacent soil, surface water, or groundwater.
- Storage piles must be designed and covered to control wind dispersal of the product by means other than wetting.
- Storage piles must be reshaped into a conical form and covered as necessary to prevent leaching.

Pavement Deicing Transport Vehicle

- Loading/hauling:
  - Set up and load on a level surface wherever possible.
  - Maintain loading area, keep clear, and smooth.
  - Don't overload and avoid spilling on units.
  - Remove loose material from the exterior of the dump body.
  - Fill in side gaps in tailgates or equipment with spill shields where materials can escape and spill out.
  - Tarp all transport vehicles.
- Washing:
  - Prior to washing, the trucks/spreaders should be swept to remove as much of the residual solids as possible, thereby minimizing the amount of dissolved salt and solids in the wash water.
  - All trucks/spreaders should be washed at a location where the wash water can be properly diluted, disposed, and stored for re-use.
  - It is preferable to direct wash water to a storage facility where it can be reused for brine production or sent for disposal.
  - Careful consideration must be given to the ultimate receiver of the wash water.

Drainage

- Never unfreeze or melt open frozen storm drains with high doses of salt. This practice is toxic to aquatic life in the receiving waters. Use other methods such as heat to open drains.

- Employ ways to capture any solids before they enter the storm drain systems.
- Make sure parking lots do not drain through salt storage areas.

Training and Certification

Public and private maintenance personnel typically feel a keen obligation to the traveling public. Proper training for maintenance personnel is vital. It provides the know-how to get the job done and encouragement to perform in a way that brings praise rather than discredit to your organization. The underlying theme of all training sessions should be the "Sensible Salting" concept, which includes:

- Proper covered storage
- Good maintenance of storage areas
- Good equipment maintenance and knowledge of equipment
- Proper spreader calibration
- Proper deicing agent application
- Concern for our environment as well as the public's safety.

Appendix 2.6 "Suggested Program Outline for Fall Training Sessions"

Policy Recommendations

Winter Snow and Ice Certification:

- All public and private winter maintenance personnel should attend a "Winter Snow and Ice Training and Certification Workshop" prior to performing any snow or ice removal operations. All operators and applicators should be required to obtain certification every three years. Proof of certification should be provided to the Division of Water Resources and to the municipality the operator operates within. These personnel include, but not limited to:
    - The County Division of Transportation Operators and other maintenance staff responsible for winter snow and ice activities;
    - municipality and township public works superintendents, managers, directors, operators;
    - snow-plow operators/deicing applicators;
    - contractors maintaining private/public walkways and/or parking lots;
    - property managers writing deicing contracts;

    - educational institutions;
    - commercial and industrial facilities;
    - distributors of anti-icing/deicing products;
    - others responsible for winter maintenance.

- Training workshops should be offered annually to all winter maintenance personnel. The University of Wisconsin, the County of McHenry, or American Public Works Association may host training and certification workshops. Certifications from each of these entities will qualify under the Winter Snow and Ice Operations Policy. Training Options:
    - Managing Snow and Ice Control Operations: Certification for the Private Sector. For all individuals that are not employed by a public agency who are responsible for snow and ice removal operations on parking lots, sidewalks, private drives, and private roadways

    - Managing Snow and Ice Control Operations: Certification for Public Sector. For municipal, township, and county supervisors and operators who are responsible for snow and ice removal on public roadways, parking lots, and sidewalks.

    - Winter Snow and Ice Certification for Supervisors: "Train the Trainer." Municipal, township, county supervisors should attend an abbreviated session on the latest snow and ice removal techniques.
- All operators should be required to display certificate stickers in the window their vehicles.
- Individuals operating within McHenry County should be required to submit a copy of their certification to the McHenry County Water Resources Manager. An up-to-date list of all of the certified operators will be maintained on the Water Resources website. Operators will be required to renew or be recertified every three years. Refresher courses will be offered annually.

Water Resources Action Plan
Section 2. Local Water Quantity and Quality

B7) Wastewater[52]

Most of the homes or businesses in McHenry County receive potable water for drinking, washing, the toilet, watering landscaping, etc. from a municipal water system or well, and then return that water through to a wastewater treatment plant. Treating water to potable standards is not necessary for some of these uses, and water treatment does come with associated costs.

McHenry County municipalities draw all of their water supplies from groundwater and most municipalities dispose of their treated wastewater as surface water. As a consequence, groundwater withdrawals have no opportunity to replenish the aquifers that they were originally drawn from.

There are several strategies to lower the amount of water that is sent back to a water treatment plant. Several municipalities, notably Huntley and Lakewood, have begun to implement alternative wastewater disposal options by using treated wastewater to irrigate golf courses and open space during the growing season. This approach not only reduces the need for groundwater in irrigation, but also releases a significant percentage of the treated wastewater into the ground, providing better water quality protection for surface water bodies and a beneficial reuse of nutrients. Richmond has developed plans for the reuse of treated wastewater while Algonquin provides treated wastewater to landscape companies for use in irrigation.

Another approach to water conservation that is becoming more popular across the United States is greywater. Greywater (sometimes spelled graywater, grey water or gray water) is defined as used water from laundry machines, bathtubs, showers, and bath sinks. Residential greywater recycling systems divert these used flows before they mix with other wastewater sources such as toilet wastewater (known as blackwater). Greywater is increasingly being used indoors for toilet flushing in many places throughout the country and world. There are also outdoor uses for greywater that include watering of plants, trees and shrubs, as well as lawn irrigation. However, the potential use of grey water systems must include an evaluation of the potential benefits versus the potential public health risks of such systems.

[52] This section was adapted from WATER 2050 produced by the Chicago Metropolitan Agency For Planning.

Policy Recommendations

Facility Planning Area Recommendations for Wastewater Treatment Plant:

- All wastewater Facility Planning Area (FPA) expansion requests should include the water demand aspect of land-use plans within the municipal planning area, as well as the area of the proposed expansion, and identify the source of supply to meet the long-term demand.
- The Illinois EPA should be encouraged to approve only those FPA expansions that will not worsen the water quality of our streams and rivers or that work against efforts to improve the water quality.

Wastewater Reuse

While there may be other benefits to the use of reclaimed wastewater, the rationale in a water supply context is to replace the use of potable water with reclaimed wastewater. This avoids the use of higher-value potable water for lower-value needs and frees up potable water for other higher-value uses. McHenry County has extensive wastewater treatment systems already, and one objective in the Water Resource Action Plan is to identify opportunities to retrofit existing treatment systems to distribute reclaimed wastewater and to retrofit certain potable water applications to use wastewater instead.

There are three potential suppliers of treated effluent:

- Centralized wastewater treatment plants. Centralized plants collect wastewater from homes and businesses from a fairly large area. The water is treated and typically released into a river or stream. Most households and businesses in incorporated McHenry County are served by these centralized systems.
- Decentralized wastewater treatment plants. Decentralized wastewater treatment plants are sized to treat wastewater from a smaller area, typically a single development or subdivision. The treated effluent is either released to a surface water source or is land applied.
- Satellite treatment systems. Although there are no examples of these systems in the region, a satellite treatment system could be located upstream from a central treatment plant to treat raw wastewater for local use. The raw wastewater could be intercepted before entering the sewer system, or it could be withdrawn by tapping into a trunk sewer ("sewer mining").

Potential Users

This section considers three primary applications for treated effluent:

- Turf Irrigation. Turf irrigation is the simplest of the potential uses. Water quality needs for this task, while important, are not as stringent as they would be with agricultural use or as varied as they might be with industrial use. Irrigating turf in park districts, golf courses, homeowners association property, and cemeteries may be candidates for a reclaimed wastewater program. There are also a number of examples in the region of golf courses and park districts irrigating with treated wastewater, providing a base of practical knowledge which could be drawn up to expand reuse in the region. A few examples in McHenry County include: Village of Lakewood, Village of Huntley, Village of Algonquin[53], and Village of Richmond.
- Industrial. Many industries are water-intensive, both in their use of cooling water and in-process water. A major benefit of industrial reuse is that demand for reclaimed wastewater would not be seasonal, as is irrigation, although it may still fluctuate with plant output or other factors. However, water quality requirements may be high and also varied. The use of reclaimed water may be perceived as high risk (as well as low reward because of the price of water).
- Agricultural Irrigation. There are a few instances of using reclaimed wastewater on cropland in Northeastern Illinois, generally on small plots. Although agricultural reuse is permitted under Illinois regulations, some buyers have apparently instituted a policy to refuse certain crops which have been irrigated with reclaimed wastewater, but it is not known how widespread this policy is among purchasers.[54] Reclaimed wastewater is not pathogen free; therefore its use on crops intended for human consumption should be considered carefully to ensure that its use does not create a higher potential for food borne illness. It is important to ensure that when reclaimed wastewater is applied that it be applied in accordance with agronomic rates.

In McHenry County, the opportunity exists to utilize existing centralized treatment plants to irrigate nearby turf and agricultural fields with treated wastewater, with turf irrigation opportunities within a one mile radius from a centralized plant identified as the most viable options. The top five land uses for potential irrigation demand are: golf courses, parks ("recreational open space"), schools, agricultural fields (including nurseries, sod farms, and row crops), and cemeteries, although it is expected that irrigation is fairly rare at cemeteries.

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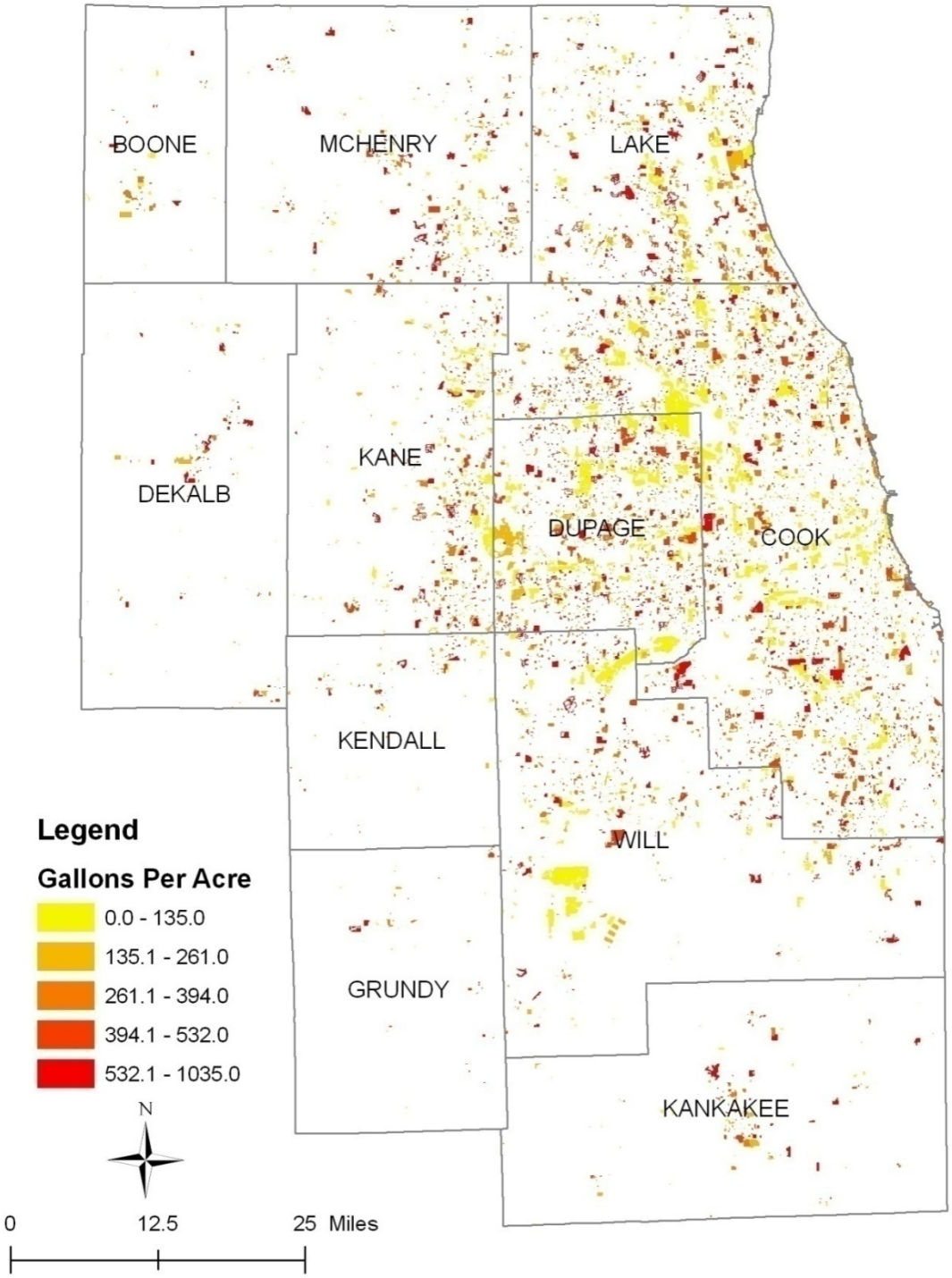
[53] http://www.algonquin.org/egov/docs/1146968628_862792.pdf

[54] Noted by the Agriculture caucus delegate to the Regional Water Supply Planning Group, June 24, 2008 meeting. It was thought that the rationale for refusing crops irrigated with wastewater was the potential for contamination with heavy metals. Delegates from the Wastewater and Non-Municipal Water Suppliers caucus noted, however, that heavy metals are typically from industrial operations, which are regulated under the National Pretreatement Program, substantially reducing the heavy metal load reaching wastewater treatment plants. Furthermore, metals associated with the solid fraction of wastewater during treatment tend to be removed with the sludge.

Figure 1. Intensity of potential irrigation demand



*The 2001 CMAP Land Use Inventory and the 2001 National Land Cover Database (NLCD) were used to locate areas within the water supply planning region that have a potential demand for water reuse. Note that the method provides an estimate of potential irrigation demand by each customer, not whether irrigation is actually used on a particular site.

Supply Capacity

Using these potential sources for irrigation, the potential demand within a one mile radius of existing centralized wastewater treatment facilities was determined (see Table 1). The table also shows what percentage of the daily flow would be used for water reuse. In a few cases, there currently is not a sufficient amount of treated effluent to support potential demand.

Table 1. Potential irrigation demand within one mile of wastewater treatment plant.

Facility Name	Potential Demand (mad)	Potential Demand/ AADF	Public Water Supply
MCHENRY CENTRAL STP	0.257	11.27%	Groundwater
HUNTLEY WEST STP	0.221	33.41%	Groundwater
CRYSTAL LAKE STP #2	0.191	4.14%	Groundwater
CARY WWTP	0.174	10.63%	Groundwater
HUNTLEY EAST WWTF	0.164	15.95%	Groundwater
MCHENRY SOUTH WWTP	0.149	14.37%	Groundwater
BARRINGTON WWTF	0.149	6.02%	Groundwater

MGD = million gallons per day, AADF = annual average daily flow

*Source: WATER 2050, Chicago Metropolitan Agency for Planning

Pipeline construction costs are the largest cost involved in developing a reclaimed wastewater system. Other costs associated with retrofitting existing irrigation systems and treatment facilities for water reuse include retrofitting the irrigation system with clog resistant nozzles, building irrigation ponds, pump installation and operation, and reclaimed waste water signage. Water reuse can also potentially reduce the amount of fertilizer used on site due to the elevated levels of nitrogen. However, it is important to apply at agronomic rates.

As an example of the opportunities and specific costs for wastewater supply, consider the Addison North Sewage Plant in Addison (in Cook County), which has calculated how such a program might work. Figure 2 shows a conceptual distribution network from the Addison North Sewage Treatment Plant running through street right-of-way to connect all the potential irrigation users within the one-mile buffer of the plant. The amount of pipe required would be approximately 30,500 feet. The length required to connect the treatment facility to the golf courses immediately north of the plant would be considerably less at approximately 1,800 feet, but would serve only 0.25 mgd. The golf courses were singled out due to the large amount irrigation typically required and the proximity to the facility.

The annualized unit cost of the reclaimed wastewater distribution systems at two different scales can then be estimated as shown in Table 3. In other words, this is

roughly what the utility would need to charge in order to recover its costs[55]. The Village of Addison currently has water rates of $4.05/1000 gallons. Thus this analysis suggests that for plants with high demand density nearby, a reclaimed water system could be financially viable--a user such as the golf courses may have a financial incentive to switch to reclaimed water.[56] If the potential reuse sites are currently purchasing potable water for irrigation they may benefit from such a system.

Figure 2: Example of conceptual distribution network from treatment plant

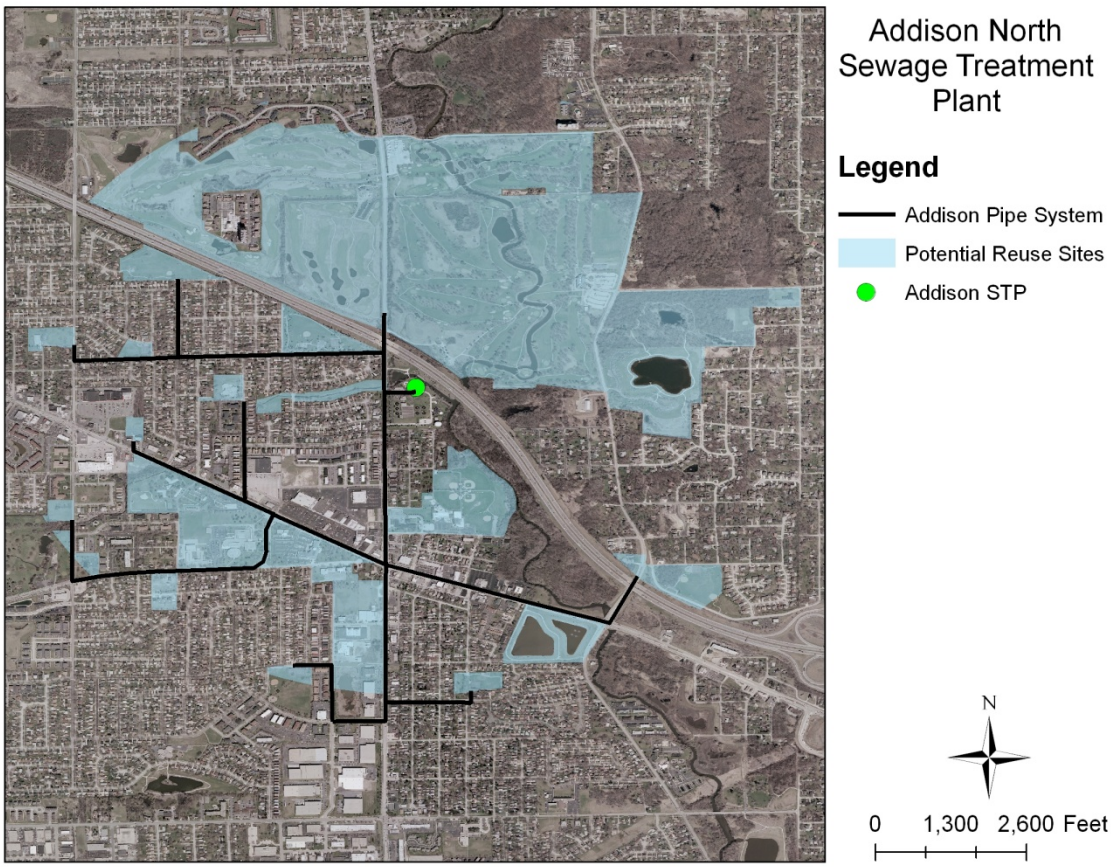


Table 2. Relationship between pipeline length, flow rate, and unit cost for Addison North STP (Source: Chicago Metropolitan Agency for Planning WATER 2050)

	Pipeline length (mi)	Flow (mgd)	Annualized unit cost (2007$/1,000 gal)
All demand	5.78	0.94	$1.75
Golf courses only	0.34	0.25	$0.92

[55] The method is developed in detail in Anderson and Meng, 2008, and this section relies heavily on their work. Costs include the amortized cost for pipeline and pump installation as well as annual O&M for pumping. It is assumed that pipeline installation cost is $135 per foot, the interest rate is 6%, the amortization period and facility life span are 40 years, and that irrigation is used for half the year. It is also assumed that no costs are incurred for additional treatment.
[56] http://www.addisonadvantage.org/water_rates.htm

Regulation and Permitting

The only regulation directly shaping water reuse opportunities in Illinois is the slow-rate land application design standards at 35 IAC 372. Currently Illinois EPA issues permits under the NPDES program for surface discharges of wastewater (although it also permits non-discharging systems under the less burdensome design standards at 35 IAC 372). It appears, then, that the Illinois EPA would permit partial reuse as proposed in this plan on a case-by-case basis. For example, in the Village of Richmond, the design standards (depth to groundwater, proximity to wetlands, etc.) were interpreted as guidelines. In the Village of Lakewood, direct reuse by piping effluent to a golf course was an initial option, but the outfall was placed so that all effluent would first enter and be mixed with "waters of the United States," a term from federal legislation that refers to any navigable body of water in the U.S., before ultimately being used for spray irrigation on the golf course.

These examples and other available information suggest that Illinois EPA has tended to use its regulatory discretion to promote water reuse where possible, but it still appears the typical permit applicant will face uncertainty.

Implementation Scenarios

There are several contexts in which reuse would likely be most feasible.

- The most straightforward situations are when the irrigator presently uses potable water from a utility with growing demand. In this case, the irrigator has an incentive to switch to a less expensive source than its current unit price for potable water, and the utility has an incentive to offer recycled water to free up capacity in the potable system to meet growth and delay system expansion. The main limitation is that large irrigators like golf courses and park districts are typically self-supplied, pumping water from nearby streams or often from shallow groundwater. Nevertheless, an irrigator would face costs for electricity to run wells and pumps as well as for installation and maintenance.

- In groundwater dependent communities, especially those that use wells in surficial or shallow bedrock aquifer systems, the use of shallow wells by irrigators may reduce availability for both community water suppliers and irrigators. Drought may also trigger irrigation restrictions. Recycled water would help prevent these conflicts.

- There are instances in which wastewater is discharged to a high quality stream or to one that requires more stringent load limits. In these cases, prevention of degradation of the waterway could be accomplished by partial reuse, limiting the amount of new wastewater that enters the stream. Nutrient trading could be a rationale for water reuse, as well.

- Satellite reuse is a possibility mentioned above that may forestall the need to expand a wastewater collection/treatment system as well as the potable water system.

Policy Recommendations

General Wastewater Recommendations: Promote the reclamation of wastewater in an environmentally sound manner and conducive to public and aquatic health, including the encouragement of onsite wastewater treatment systems where appropriate, wastewater recycling and reuse systems, land application of reclaimed wastewater, and wetland or other types of treatment to reduce and eliminate the impacts of nutrient discharges into rivers and creeks.

State:

- Illinois EPA should develop rules specifically for partial reuse and should adopt numeric water quality standards for reuse applications.

County and Local Government:

- Utilize treated wastewater to the maximum extent practicable.
- Evaluate and implement, where practical and appropriate, wastewater reclamation techniques designed with conservation in mind. Encourage wastewater treatment systems in sensitive aquifer recharge areas that maximize beneficial reuse and/or recharge and provide treatment to prevent the degradation of groundwater.
- Encourage and implement wastewater reclamation and reuse throughout the County in lieu of conventional surface water discharges from centralized wastewater systems.
- Consider the use of the attached Water Reuse Ordinance revised by the Task Force.

Attachment 2.15 "Water Reuse Model Ordinance"

Greywater

One approach to water conservation that is beginning to take hold across the United States is greywater. Greywater (sometimes spelled graywater, grey water or gray water) is defined as used water from laundry machines, bathtubs, showers, and bath sinks. Residential greywater recycling systems divert these flows from these uses before they mix with other wastewater sources such as toilet wastewater (known as blackwater). Greywater is also increasingly being used indoors in many places throughout the country and world for toilet flushing. There are also outdoor uses for greywater, including watering plants, trees, shrubs, and lawns.

Research shows that showers/tubs, bathroom sinks, and washing machines can comprise anywhere between 50 to 80 percent of residential water use. It is also estimated that toilet flushing alone can account for almost 30 percent of indoor household water use. Thus the reuse of greywater has the potential to conserve a large amount of potable water and energy. Savings in both of these areas can translate to significant savings in financial costs for water utilities and households alike.

There are many benefits in using greywater, including:

- Reducing the amount of potable, fresh water used by households.
- Reducing the flow of wastewater entering sewer or onsite wastewater treatment systems.
- Minimizing the amount of harmful chemicals used by homeowners.
- Supporting plant growth without using expensive potable water.
- Helping recharge groundwater when applied outdoors.
- Raising public awareness of natural water cycles.
- Saving money on water bills.

As the water-saving benefits of greywater become more widely known, more states are beginning to implement greywater guidelines. For example, Washington, Massachusetts, New York, South Dakota, Montana, Texas, Nevada, Arizona, California, Utah, New Mexico, Georgia, and Florida all have, or are working to incorporate greywater laws, regulations, codes and/or guidelines. Additionally, the National Association of Home Builders recently updated its Green Building Standards Guide, which now includes greywater reuse, as permitted by local code, within its building options.

Attachment 2.16 "State Experiences with Graywater"

The Illinois Plumbing Code and the Private Sewage Disposal Licensing Act and Code currently prohibit greywater systems. There are a few greywater systems currently in use within the City of Chicago. Approval for these greywater permits was obtained via city officials and the Department of Public Health.

As the demand for greywater increases, so does the type of technology available for homeowners/uses. Today there are quite a few companies that specialize in greywater systems, ranging from basic outdoor irrigation reuse to advanced indoor water sanitation for toilet flushing purposes.

Considerations for Greywater Implementation

Greywater is untreated sewage and can contain pathogenic organisms. A greywater system should not result in exposure of individuals directly or through irrigated food crops, to pathogens which could result in illness, and the potable water supply must be protected from cross-connections with the greywater system. Nuisance conditions, including ponding of greywater, odors, insect breeding sites, etc., must be prevented. The potential impact on sensitive receiving environments including groundwater, surface water, and other natural resource areas must be considered if a grey water discharging system is considered.

Currently the Illinois Plumbing Code, Illinois Private Sewage Licensing Act and Code and McHenry County Public Health Ordinance prohibit the discharge of greywater to the ground surface and/or for irrigation purposes. Internal closed greywater systems fall under the Illinois Plumbing Code.[57] There may also be other requirements through other agencies (i.e. Illinois EPA). Legislative changes would be required to consider the use of greywater systems with an external discharge of greywater.

Should future legislative changes allow the use of greywater systems, an evaluation of the potential benefits versus the potential risks of such systems should be completed.

The nature of a greywater regulation is important when attempting to implement legislation successfully, particularly whether to regulate based on design standards or performance standards. The State of California, which based its regulations on specific design standards that all systems must comply with, has not seen many requests for greywater permits. The state of Arizona based its regulations on performance standards, which provide room for innovation within the field. Arizona has seen a steady increase in demand for greywater permits. Note that use of performance standards requires a corresponding system of oversight and monitoring to ensure that the established performance standards are met.

States, counties and municipalities may have regulations that conflict with the ability to implement a greywater regulation. When implementing new greywater regulations, it is important to refer to existing public health codes, septic treatment codes and wastewater management requirements that may prohibit their use. Use of greywater systems may require changes to existing regulations.

In order to effectively promote the use of greywater, it is important to establish a streamlined permitting process. If a significant amount of time and effort is required to obtain a permit, it will inadvertently dissuade homeowners from implementing this water-conservation strategy. Clearly outlined technical details are required in

[57] Illinois Department of Public Health/Springfield, Illinois Environmental Protection Agency, Illinois State Plumbing Code. Water Distribution, domestic supply protections, backflow, section 890.1110-890.1240.

order to obtain a permit. For example, clearly list whether outdoor greywater reuse requires a sub-surface drip or spray irrigation.

A final consideration is cooperation, education and outreach. It is imperative that proponents of the use of greywater systems work closely with public health, building and plumbing officials to clearly identify, understand, and evaluate the potential risks and benefits of greywater use systems, and clearly communicate these potential risks and benefits to policy makers and the community.

Costs for installing greywater systems vary greatly depending upon two considerations:

- Whether or not a greywater system is being installed during new construction or is being retrofitted into an existing building; retrofitting may be more costly (and potentially cost prohibitive).
- The type of system installed and the purpose for reuse (e.g., indoor toilet flushing versus outdoor irrigation). As noted previously, greywater systems vary from simple, low-cost systems to highly complex and expensive systems. More sophisticated systems can treat greywater prior to reuse with settling tanks and sand filters to remove pollutants and pathogens.

Policy Recommendations

Monitor the progress in the ongoing development of national standards pertaining to grey water systems by NSF International. Consider implementation of nationally recognized standards which prevent the creation of public health concerns.

State

- Modify legislation to allow greywater systems within Illinois, including:
    - Illinois Plumbing Code
    - Private Sewage Disposal Licensing Act and Code

- Should future legislative changes allow the use of grey water systems, an evaluation of the potential benefits versus the potential risks of such systems should be completed.
- Provide general education materials to the public about greywater use.
- Create a greywater tax credit for homeowners who install a greywater system.

Should the legislative changes allow for greywater systems, the County and units of local government can:

- Create a model ordinance for adoption by county and local government to guide local implementation of greywater use systems.
- Consider performance-based standards for greywater use and a system of oversight and monitoring to ensure standards are met.
- Provide general education materials to the public about greywater use.
- Encourage the use of greywater in new construction to reduce water demand for toilet flushing and landscape irrigation.
- Support local installation of greywater use systems

Conservation

- Encourage the use of compost toilets as a water savings measure.

Water Resources Action Plan
Section 2. Local Water Quantity and Quality

B8) Pollution Prevention

Pollution is the contamination of air, soil, or water by the discharge of harmful substances. Any contamination of groundwater, McHenry County's sole source of drinking water, could prove to be detrimental to public health and safety. Pollution prevention is one approach to protect and preserve the quality of groundwater.

According to the U.S. Pollution Prevention Act of 1990, pollution prevention (P2) is defined as "source reduction and other practices that reduce or eliminate the creation of pollutants through increased efficiency in the use of raw materials, energy, water, or other resources, or protecting resources through conservation." Pollution prevention also can include substitution of less harmful substances for hazardous ones and eliminating toxic substances from the production process. Source reduction allows for the greatest and quickest improvements in environmental protection by avoiding the generation of waste and harmful emissions, and it makes the regulatory system more efficient by reducing the need for end-of-pipe environmental control by government.

Adopting pollution prevention practices and techniques often benefits industry by lowering a company's operational, environmental compliance and waste disposal costs. There are many benefits of pollution prevention to businesses.

- By preventing the generation of waste, P2 can reduce or eliminate long-term liabilities and clean-up costs.
- A reduction in workplace exposures to hazardous materials can improve their health and hence their productivity.
- If less waste is produced, there will also be a diminished need for on-site storage space.
- By preventing pollution there will be a greater likelihood that a company will be in compliance with local, state, and federal regulations.
- As community pillars, businesses shoulder an important responsibility for protecting the environment and natural resources for their own good as well as that of society.

Municipalities, townships, McHenry County government, local residents, and business owners and operators can utilize these model policies to develop and implement pollution prevention programs and best management practices. A vital component of Pollution Prevention includes education and outreach to the residents, businesses, and municipalities of McHenry County to inform each what their options are and how to properly dispose of the various contaminant sources.

Policy Recommendations

Pollution Prevention (P2) Model Ordinance: Groundwater Protection Regulations – Chemical Substance Controls: It is recommended that all municipalities, townships, and the County consider adopting the revised Fox River Grove Ordinance "Article IX. Groundwater Protection Regulations – Chemical Substance Controls Ordinance." If adopted, this policy would require companies to identify hazardous materials on-site, obtain a permit for these materials, and develop and implement a "Release prevention, containment, and control plan." The ordinance includes information on enforcement procedures. Existing SARA title III and EPA Tier II instructions were also used to refine the ordinance.

- **Attachment 2.17** "Pollution Prevention Model Ordinance"
- **Attachment 2.18** "Environmental Protection Agency—Envirofacts Master Chemical Integrator: Chemical References Index"
- **Attachment 2.19** "Hazardous Substances List from Village of Fox River Grove"

Regulated Recharge Areas: It is recommended that municipalities and the County consider pursuing a Regulated Recharge Areas (RRA) Protection through the Illinois Pollution Control Board (note: Board just adopts the regulations). A RRA designation can provide additional protections for groundwater quality by requiring certain types of activities to complete a Recharge Areas Suitability Assessment (RASA),[58]. The RASA process can provide a means of assessing the risk of a new "major potential source (of contamination)" before commencing construction and providing an incentive for implementing best management practices before locating in a RRA area. The RRA proposal could be developed to include the following activities:

- Abandoned and Improperly Plugged Well Education and Assistance Program
- Road Sign Posting
- Increased awareness of recharge protection areas or watershed location
- A mechanism for notification in cases of an accidental contaminant release
- Information and Registration Meetings
- Registration process for potential sources and potential routes of groundwater contamination

[58] Public input is part of this process.

- Chemical substance management training program offered by the Illinois EPA to provide technical assistance to small businesses in the delineated recharge area—topics include sensitivity of the recharge area, the requirements in the regulation, and assistance with pollution prevention.
- Chemical Management Systems: To prevent contamination from chemical substances including performance-based requirements for contaminant containment.

Coal Tar and Phosphorus

Phosphorus is often found in lawn care products such as fertilizer. A nutrient, phosphorus can migrate to waterways if the soil where it is spread already has a high-phosphorus content. In lakes and ponds, phosphorus causes algae blooms, which can lead to a loss of oxygen in water, impacting marine life. A model ordinance available below outlines how a municipality can control phosphorous use, and an ordinance from Wisconsin provides another example.

- **Attachment 2.20** "Phosphorous Model Ordinance"
- **Appendix 2.7** "Wisconsin Phosphorous Ordinance"

Coal tar, used as a sealcoat on asphalt, contains Polycyclic Aromatic Hydrocarbons (PAHs), which can be transported via air, skin contact and water. PAHs have been linked to carcinogenic human health concern and causes reproductive damage in aquatic species. A model ordinance available below outlines how a municipality can control coal tar use. Also below are links to an form that can be used to exempt certain acceptable uses, as well as a study that gives more in-depth information about the health effects of coal tar.

- **Attachment 2.21** "Coal Tar Sealants Model Ordinance"
- **Appendix 2.8** "Coal Tar Exemption Form"
- **Appendix 2.9** Federal Study of PAH Health Effects from Pavement

Policy Recommendations

All local governments within McHenry County should consider adopting and implementing the "Model" Coal Tar Ordinance and the "Model" Phosphorus Ordinance.

Chlorides

Chloride has been identified as the potential cause of impairment for 318 stream miles (surface water) in the State of Illinois,[59] and contamination of groundwater by chlorides has also been found to be harmful to wetlands and the biodiversity they provide.[60] In a statistical study of the shallow groundwater in the six northeastern most counties of the region, Illinois State Water Survey researchers have determined that chloride levels have increased significantly since the 1950s.[61] Study results show that with each successive 10-year time period, chloride concentrations were significantly greater than the previous year.

Table 3. Median concentrations (mg/L) of chloride in shallow groundwater during two different sampling periods.

County	Well Depth: < 100 ft.		Well Depth: 100-200 ft.	
	<1950's	1990-2005	<1950's	1990-2005
Kane	12	72	11	37
McHenry	10	74	3.5	38
Will	14	57	17	41

Source: Kelly and Wilson, 2008

Presently, chloride in drinking water is not a health hazard; however, elevated levels of chloride can result in the water supply being unusable for consumption due to objectionable taste. At the federal level the secondary drinking water standard for chloride is 250 mg/L, which is the numeric standard in Illinois for identifying cause of impairment of Public and Food Processing Water Supply use in streams, inland lakes, and Lake Michigan. The Illinois numeric standard for identifying chloride impairment of aquatic life use in streams and inland lakes is much less conservative: 500 mg/L.[62]

It is important to note that chlorides are not removed through the currently employed wastewater treatment process in McHenry County Wastewater Treatment Facilities. The two primary sources of chlorides in McHenry County are

[59] Illinois EPA, 2008. Illinois Integrated Water Quality Report and Section 303(d) List – 2008. IEPA, Bureau of Water. IEPA/BOW/08-016. http://www.epa.state.il.us/water/tmdl/303-appendix/2008/2008-final-draft-303d.pdf

[60] A summary of the deleterious effects of chloride-contaminated groundwater on wetlands can be found in: County of McHenry, Illinois: Groundwater Resources Management Plan. Report 5, Chlorides and Agricultural Chemicals: Problem Assessments and Corrective Actions. Final, November 2006. Prepared by Baxter and Woodman, Inc. Crystal Lake, Illinois. http://www.co.mchenry.il.us/common/CountyDpt/WaterRes/PDFDocs/Report05.pdf

[61] Kelly, W.R., and S.D. Wilson, 2008. An Evaluation of Temporal Changes in Shallow Groundwater Quality in Northeastern Illinois Using Historical Data. Illinois State Water Survey Scientific Report 2008-01, Champaign, IL. http://www.sws.uiuc.edu/pubdoc/SR/ISWSSR2008-01.pdf.

[62] This numerical standard does not meet the needs of animal and aquatic life. Standard should be revised to follow the standards of Title 35, Section 302 Water Quality Standards.

pavement deicing agents and home water softeners. The recommendations contained within this section only pertain to wastewater and water softeners.

Policy Recommendations

Homeowners on both private and public water supply and wastewater systems can participate in groundwater protection from chloride contamination accordingly:

- Adopt alternative water softening technologies such as electro dialysis or membrane filtration.
- Reconfigure plumbing to bypass the water softener for certain indoor water uses.[63]

Nutrients

In the more urbanized portion of McHenry County, better control of nonpoint-source pollution and nutrient removal from WWTP effluent offer the two most promising pathways for reducing nutrient enrichment of local waterways. Watershed planning has become the primary vehicle for addressing nonpoint-source pollution. Among the best management practices and other recommendations typically made to reduce nutrient pollution or related causes of water quality degradation are the recommendations below:

Policy Recommendations

Sanitary Districts and Municipal Wastewater Treatment Plants should:

- Choose land application of WWTP effluent when new / increased wastewater volume would otherwise be discharged to a stream.
- Participate in local watershed planning activity as a means to offset any increase in pollutant loads within waters receiving WWTP discharge, via
    - wastewater reuse applications
    - improved control of nonpoint-source pollution elsewhere in the watershed
    - riparian zone restoration within the watershed
- Provide for the reuse of effluent as a resource to produce revenue that can be used to aid in financing other improvement programs.

[63] Baxter and Woodman, 2007. County of McHenry, Illinois. Groundwater Resources Management Plan, Report 5. Chlorides and Agricultural Chemicals: Problem Assessments and Corrective Actions, Final.

- Expand or modify the existing waste treatment technology to reduce the nutrient loads discharged into receiving waters.
    - Upon WWTP expansion or new WWTP construction, implement technology available to remove nitrogen and phosphorus from effluent that will be discharged into a stream.
    - For any new WWTPs where land application is not an option, create "polishing wetlands" where wastewater effluent is discharged and must flow through prior to ultimate discharge into a river or stream.
    - When using polishing wetlands, pretreatment should be considered for these organic contaminants before the wastewater is introduced to the wetland.[64]

Pharmaceuticals and Personal Care Products

Another potential threat to water quality with water supply implications concerns pharmaceuticals and personal care products (PPCPs),[65] which refer to products used by people for personal health or cosmetic reasons, or products used by agribusiness to either enhance growth or protect health of livestock. PPCPs include thousands of chemical substances including prescription and over-the-counter drugs (for people and animals alike), fragrances, and cosmetics.

Only relatively recently have analytical instruments been able to detect such bioactive chemicals in the relatively trace quantities that they are currently found in our nation's water bodies. Research suggests that some of these substances may cause ecological harm and harm to aquatic organisms.

To date, there is no evidence of adverse human health effects from PPCPs in the environment. Readers are encouraged to learn more at US EPA's website. Furthermore, US EPA's Contaminant List 3 includes those currently unregulated contaminants that may require a national drinking water standard in the future.[66]

Policy Recommendations

Counties and Local Government:

- In conjunction with the Illinois EPA, work with local police departments and pharmacies to implement a medication disposal program.
- Develop and distribute education materials on proper disposal of PPCP's

[64] Pretreatment could include, but not limited to: ultraviolet, Ozone, membrane, and activated carbon.
[65] US EPA, 2009. http://www.epa.gov/ppcp/
[66] US EPA, Office of Water, 2008. http://www.epa.gov/OGWDW/ccl/index.html

- Coordinate with their police departments to offer a low-cost or free Medication Waste Disposal program. By offering drop-off locations, residents can have access to a safe and convenient option to disposing of unwanted and unused medications. This also provides a public safety benefit to the community by reducing the unintended misuse of unused and expired medications.

Personal Pollution Prevention (P3)

Personal Pollution Prevention (P3) refers to the proper management and disposal of necessary consumer products, which in small quantities can produce significant contamination to ground and surface waters. These small quantities include Household Chemical Waste (HCW) that can accumulate over time. Examples include cleaning agents, paints, solvents, disinfectants, pesticides, and automotive products. HCW are capable of entering surface water and groundwater through improper use. McHenry County strives to work with municipalities and townships to develop a Personal Pollution Prevention (P3) program.

Policy Recommendations

The Solid Waste Manager of McHenry County should continue to work with local governments and other stakeholders to increase the number of pharmaceutical disposal sites and other types of waste recycling facilities.

Water Resources Action Plan
Section 2. Local Water Quantity and Quality
B9) Planning for the Future

Reliability is essential in delivery of water to McHenry County's businesses and residents. Given that McHenry County relies solely on groundwater, any man-made or natural disruption to the water supply could prove to be detrimental to the County's health and safety. However, good planning and preparation can help agencies maintain reliable water supplies and reduce the impacts of supply interruptions.

The County, local municipalities and other water suppliers should have identified, evaluated, and agreed upon potential provisions for alternative means of supply and distribution that may be necessary during severe or long-term water supply emergencies. Drought and emergency water management, planning, and response are indispensable elements of water supply management. [67]

This plan encourages further study of water use, water conservation practices, and the effect of water conservation investments, so water users can make the best possible decisions when managing water supplies. Stakeholders are encouraged to support building a stronger scientific foundation of the science of water conservation and water resource management in McHenry County.

Water Supply Contingency Planning

A Contingency Plan for groundwater is essential in the preparation for water emergencies such as:

- Drought/Water Table change
- Long-Term Power Outage
- Contamination, due to:
    - Accidental incursion of hazardous compounds
    - Terrorist Action, addition of hazardous compounds on purpose.
    - Naturally Occurring elements (e.g., radon, sulfur, arsenic)

[67] Interstate Council on Water Policy – ICWP – Position Statement on Drought and Water Supply Emergency Preparedness, August 2008.

Contingency planning before a shortage allows for the selection of appropriate responses consistent with the varying severity of shortages. A Water Shortage Contingency Plan (WSCP) should enable water suppliers to provide water for public health and safety and to minimize impacts on economic activity, environmental resources, and the region's lifestyle.

While the actions taken should be adequate to deal with the circumstances and no more, it is essential that water suppliers start demand-reduction programs before a severe shortage. Water suppliers that delay demand-reduction programs may exhaust reserve supplies early in an extended shortage and could cause unnecessary social and economic harm to the communities.

Communities should anticipate potential conflicts among water rights and between state and federal laws, as well as points of vulnerability, such as the reliability of communication systems and other agencies. Planning includes identifying, evaluating, and agreeing upon potential provisions for alternative means of supply and distribution that may be necessary during severe or long-term water supply emergencies. This will help communities avoid unnecessary confusion, delay and conflict during emergency response efforts

The "Loss of Water Guidelines"[68] outlines the steps for a jurisdiction to take in implementation of an action plan, including how to mitigate contamination by working with local officials and safety organizations to successfully communicate emergency procedures.

- **Attachment 2.22** "Loss of Water Guidelines"

The Illinois Water and Wastewater Response Network (ILWARN)[69] is a voluntary mutual aid program, in which utilities (water and wastewater) agree on the ground rules under which they will respond to a call for assistance, establishing guidelines before an emergency happens for issues such as reimbursement, insurance, and responsibilities of the requesting and responding utilities.

- **Attachment 2.23** "Information on the Illinois Water and Wastewater Response Network"

Illinois Public Works Mutual Aid Network (IPWMAN)[70] is a statewide network of public works related agencies whose principal purpose is to provide mutual aid

[68] Loss of Water Guidelines. McHenry County Groundwater Protection Program. Contingency Plan Sub-Committee. 2009.
[69] Illinois Water and Wastewater Response Network (ILWARN).2009. 12 May 2009. www.ilwarn.org.

[70] Illinois Public Works Mutual Aid Network (IPWMAN). 2008. 12 May 2009. www.ipwman.org.

response and recovery assistance to each other when confronted with natural or man-made emergencies and disasters.

- **Attachment 2.24** "Information on the Illinois Water and Wastewater Response Network"

- **Attachment 2.25** "Sample IPWMAN Mutual Aid Agreement and Ordinance"

Policy Recommendations

A contingency plan should contain a priority of water distribution during water supply disruption/emergency. Here are sample priorities for use of available water:

- Health and Safety – homeowner, public service (hospital), and fire fighting
- Commercial, Industrial, and Institutional – maintain economic base, protect jobs
- Permanent Crops – takes five to 10 years to replace
- Annual Crops – protect jobs and local food supply
- Landscaping – direct water to trees and shrubs
- New Demand – generally, two years of construction projects are already approved

A contingency plan should include an up-to-date contact list of engineering companies that can provide scientific consultation.

A contingency plan should include short-term water supply replacement alternatives such as bottled water and use of wells.

To help local agencies and communities prepare, the County of McHenry Division of Water Resources is pleased to publish the following attachments:

- Attachment A: Loss of Water Guide
- Attachment B: Illinois Water and Wastewater Response Network (ILWARN)
- Attachment C: Illinois Public Works Mutual Aid Network (IPWMAN)

The "Loss of Water," "Illinois Water and Wastewater Response Network," and "Illinois Public Works Mutual Aid Network" guides are intended to prepare local water suppliers for the possibility of water supply interruptions and provide technical assistance as they develop their own contingency plans. Different actions will be required depending upon the reason for loss of water. Remedial action will also be based upon the population at risk.

Finally, in the event of a water emergency, additional resources may be made available through the State of Illinois. It is recommended that each locality work with the State as well as local resources to secure a contingent water supply in the event of a water emergency.

Regional Recharge: Some McHenry County community water supplies rely on water from deeper aquifers whose recharge areas lie outside McHenry County. As outlined in Section B2, land-use can negatively impact both quantity and quality of groundwater. High priority should be given to a comprehensive, regional review of land-use impacts on the recharge areas for these deep aquifers in cooperation with Boone County, Winnebago County, DeKalb County, and the applicable counties in southern Wisconsin. Timely development and implementation of a protection plan for those recharge areas is vitally important.

Since recharge rates of deep aquifers are often very low, additional withdrawals are to be discouraged in favor of development of shallower sand and gravel aquifers.

Drought Planning[71]

Although drought is difficult to define due to the many variables associated with it, it is generally thought of as a persistent and abnormal moisture deficiency having adverse impacts on vegetation, animals, or people.[72] According to the Interstate Council on Water Policy, drought will occur at some time every year in the U.S. Each time drought occurs many of the same issues are raised: how much damage was inflicted, to whom, where, who will be paying for it and how can it can be prevented or how damages can be reduced and costs recovered in the future.[73]

The Illinois State Water Survey has recently reported analyses of drought severity, drought return periods, and drought impacts on water supplies based on the historical record.[74] Although the majority of people in northeastern Illinois rely on Lake Michigan for water, a source that is relatively drought resistant, McHenry County has shallow aquifers as primary water sources, leaving our County more vulnerable to drought.

Drought preparedness reduces the social, economic, and environmental impacts of drought and the need for federal emergency relief expenditures in drought-stricken

[71] This policy was modeled after the Chicago Metropolitan Agency for Planning - Regional Water Supply Plan, Version 8, Chapter 4 - Drought Preparedness.
[72] National Drought Policy Commission – *Preparing for Drought in the 21st Century* – May 2005
[73] Interstate Council on Water Policy – ICWP – Position Statement on Drought and Water Supply Emergency Preparedness, August 2008.
[74] Ibid.

areas. It may also lessen conflicts over competition for water during drought. The elements of drought preparedness include:[75]

- Drought planning
- Plan implementation
- Proactive mitigation
- Risk Management
- Resource stewardship
- Consideration of environmental concerns
- Public education

State activity surrounding drought is reactive in nature. Aside from the lack of rainfall that has occasionally been detrimental to agricultural crops, drought has for the most part not impacted public water supplies negatively As for the impact on water use, the most recent drought of 2005, which was particularly severe in some parts of the state and overall ranked as one of the three most severe droughts in Illinois in 112 years of recordkeeping,[76] caused water demand to be 8 percent higher across all water-use sectors (excluding withdrawals by once-through systems in thermoelectric power plants) than (modeled) normal weather would have caused.[77]

Drought planning in Illinois focuses on drought response, beginning with an official determination of drought onset.[78] The Illinois Emergency Management Agency Act[79]--designed to authorize and coordinate emergency management programs for disaster mitigation, preparedness, response and recovery--includes drought among the many "disasters" that upon occurrence would trigger state action.

Drought preparedness should anticipate potential conflicts among water rights and between state and federal laws and points of vulnerability such as the reliability of communication systems and other agencies. Drought preparedness helps to ensure that supplies of clean water are adequate, reliable and at a reasonable cost.

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[75] National Drought Policy Commission – *Preparing for Drought in the 21st Century* – May 2005

[76] The 2005 Illinois Drought by Kenneth E. Kunkel (editor) and others. Illinois State Water Survey, 2006. http://www.isws.illinois.edu/pubdoc/IEM/ISWSIEM2006-03.pdf

[77] B. Dziegielewski and F.J. Chowdhury. 2008. Regional Water Demand Scenarios for Northeastern Illinois: 2005-2050. Project Completion Report. Southern Illinois University Carbondale. http://www.cmap.illinois.gov/WorkArea/Showcontent.aspx?id+10294

[78] Illinois State Water Survey, 2006. The Water Cycle and Water Budgets in Illinois: A Framework for Drought and Water-Supply Planning. I/EM 2006-02. Champaign, IL.

[79] Illinois Emergency Management Act. 20 ILCS 3305/4.

Protecting critical infrastructure systems is essential to developing disaster resilient communities. Communities need to identify and understand the interdependency among systems such as floodways, levees, reservoirs and detention basins, treatment plants and distribution lines. This understanding is essential in reducing the vulnerability of our critical infrastructure and restoring it to serviceable condition in the event of a disaster. The "Urban Drought Guidebook," created by the State of California, focuses on surface water, but it is a valuable tool, with many ideas that can be implemented locally.

Attachment 2.26 "Urban Drought Guidebook"

Policy Recommendations

State:

- Update the 1983 State Drought Plan for drought contingency planning in accordance with the guidance set forth in the Regional Water Supply Plan.
- Provide data collection on drought monitoring and prediction
- Insure efficient information flow to all levels of government and media
- Create long-term and short-term plans for prevention and mitigation, including assessment of drought impacts.

CMAP

- Assist in developing drought plans
- Assist in developing implementation procedures, including mitigation and prevention strategies

County

- Create local-long-term and short-term plans for prevention and mitigation (Natural Hazards Mitigation Plan for McHenry County)
- Work with municipalities to develop a comprehensive water conservation program utilizing the Water Resource Action Plan assembled by the McHenry County Groundwater Protection Action Plan Task Force
- Coordinate the development of local implementation procedures
- Develop Water Conservation Educational Materials.

Public Water Supplier

- Improve conveyance infrastructure efficiencies
- Implement a comprehensive Water Conservation Program
- Develop local implementation procedures

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