



## Chapter 5: Water

### *Introduction*

Water supply and use is at the center of Decatur's economy. The City developed due to far-sighted planning for water supply. Decatur would not have been able to develop in the 20<sup>th</sup> Century as a global center for agribusiness had it not been for leaders that set a vision and a supportive citizenry that made Lake Decatur possible. Over the years, the importance of water supply has grown, evidenced by major projects to dredge Lake Decatur and the creation of the Lake Decatur Partnership.

With Lake Decatur at the center of agriculture, business, and recreation, it is also significant that people can see the water they drink. Unlike many parts of Illinois, Decatur can not depend on hundreds of years of supply of water through a deep aquifer or access to the Great Lakes water supply. While it's imperative that communities maintain care of their water supply as well, Decatur has near-term challenges. Small actions, or lack of actions, can have a tremendous impact on day-to-day life and prosperity. Equally important is how Decatur secures and expands its water supply, which can have repercussions and long-term consequences on the environment in the region.

Expansion of water supply is vitally important for the future of the community. It is also the perfect time to expand and plan for water conservation efforts. Planning will entail cooperation among public and private sectors to ensure adequate supply for generations to come.

Related to water conservation measures is the value we place on taking care of our land in order to reduce runoff and silt that is impacting Lake Decatur and causing the need for an on-going dredging and nitrate removal processes, as well as leading to frequent flooding in some of our neighborhoods.

Water supply, stormwater, and wastewater are all a part of a seamless system of the water cycle. We have therefore set out a holistic set of strategies to most efficiently improve the supply, management, and quality of our water.

### **2030 Goals**

- **The Decatur region will be served with a sustainable water supply to meet current and future needs.**

We will expand the public water supply to meet current and future needs, while promoting more efficient use of water through reuse and conservation. We will work with industrial users to ensure that water continues to be used and reused efficiently. In addition, we will encourage a 25% reduction in daily water consumption at the household level. Currently, the average single family water use per day is currently 179 gallons, with a 25% goal reduction to 134 gallons by 2030.



A 25% reduction in per capita water consumption at the household level is possible through water conservation efforts such as water-efficient fixtures, landscape practices, and consumer behavior.

- **Best Management Practices (BMPs) will be utilized in 50% of new development by 2030 to filter stormwater and reduce runoff.**

In order to preserve surface water quality, reducing stormwater run-off to Lake Decatur, the Sangamon River, and its tributaries is a high priority. Through the implementation of Best Management Practices (BMP) and utilization of naturalized and green infrastructure, new development can reduce stormwater runoff and increase infiltration through low-cost, natural techniques.

## ***Key Water 2020 Goals, Strategies, and Projects/Actions***

### **GOAL 1: ENSURE THAT DECATUR HAS AN ADEQUATE WATER SUPPLY TO ALLOW FOR BOTH POPULATION GROWTH AND ECONOMIC DEVELOPMENT.**

Fundamental to a sustainable Decatur is a sustainable water supply that is designed to withstand drought conditions. A sustainable water supply is at the center of a healthy Decatur – economically, socially, and environmentally. Actions need to be taken in the very short term to ensure that Decatur is prepared. A multi-year drought could have devastating repercussions for Decatur; however its impact can be limited to foresighted planning and execution.

#### **STRATEGY 1.1: IMPROVE DROUGHT PREPAREDNESS**

##### **Projects/Actions**

##### **1.1.1 Develop Drought Preparedness Plan**

In the immediate term, Decatur is working with the State Water Survey to draft a detailed drought preparedness plan. The purpose of the updated plan is to be ready at any moment to deal with a drought. In addition, the City is working with large users and putting together a plan that will involve all elements of Decatur to ensure that everyone is prepared including staged elements in the event of drought conditions impending on the region.

#### **STRATEGY 1.2: EXPAND PUBLIC WATER SUPPLY TO PROVIDE A SUSTAINABLE SOURCE FOR THE FUTURE.**

Immediate actions need to be taken to expand the long-term supply of water for Decatur and environs. A number of studies have determined the best options, itemized the costs, and recommended actions. The studies have concluded that Decatur and the environs need approximately an additional 10,000 acre feet of water, nearly a 50% increased capacity of the existing 22,000 acre feet of water available. There are three key recommendations that should all be implemented in order to provide the necessary water supply.

##### **Projects/Actions**

##### **1.2.1 Develop the use of shallow aquifers**

While Decatur has an emergency back-up supply through the Mahomet Aquifer via the Sangamon River, the distance and cost makes it impractical as a significant source of water.

Decatur can take advantage of shallow aquifers in the immediate environs of Decatur that can efficiently be used and provide water to customers. The use of shallow aquifers needs to be studied, planned for, and managed carefully as not to deplete other water supplies, but it can be a dependable supply of water as a supplement to surface water.

### 1.2.2 Work with ADM on water supply enhancement

ADM's continued success and ability to expand depends on having sufficient water supply. As such, ADM has a current proposal to enhance water supply that also needs to move to the next stage of implementation. ADM already efficiently uses water and reuses its water several times in many of its operations. Expanding capacity in partnership with ADM will not only supply needed water for production purposes, but ensure that industrial needs do not impact the public water supply needs.

### 1.2.3 Proceed with plans for Lake Tokorozawa.

An additional source of water is to utilize water from Lake Tokorozawa. Under drought conditions, the City utilized water from the private landowners. Lake Tokorozawa could be an important source of water on an on-going basis for the City.



### STRATEGY 1.3: MAINTAIN CAPACITY AND QUALITY OF LAKE DECATUR.

#### Projects/Actions

#### 1.3.1 Reduce silt and continue to dredge Lake Decatur

*Lake Tokorozawa*

*Courtesy of Homer L. Chastain & Associates, LLP.*

Maintaining the capacity of Lake Decatur is extremely important not only to ensure adequate storage, but also to protect the quality of the water. The City recently privatized its dredging operations to speed up the project and save funds. It should continue to fund its dredging program, as well as participate in educational programs and stormwater regulation to reduce the flow of silt into the Lake from agricultural and urban land uses.

### STRATEGY 1.4 PROMOTE EFFICIENT USE OF WATER SUPPLY

#### Projects/Actions

#### 1.4.1 Continue to invest in reducing water main leakage.

Water main leakage can be a major loss of water supply. Preventing leakage by a continuous maintenance program is a significant impact method to conserve water, which will reduce the growing demand for water in Decatur and other communities served through the public water supply. The City should continue to invest in maintenance of water mains to reduce leakage, including conducting annual system water audits, leak detection and repair and establishment of an upper limit of acceptable loss as part of a systemic program to increase available supply. Such audits should utilize the International Water Association (IWA)/AWWA water balance standards, where all water from source to customer is documented and verified.

### 1.4.2 Explore use of non-potable water reuse and irrigation on public or private lands.

Negotiate agreements for water reuse with golf courses, other public and private lands, and industrial users. Decatur has a long history of effective reuse of water for industrial production. In areas throughout the nation, water reuse is becoming an increasingly significant source of water, with several benefits:

- Reducing the need for water supply;
- Reducing the cost of wastewater treatment;
- Increasing the potential for improved water quality in rivers and streams by diverting release of treated, non-potable water; and
- Increasing the potential for infiltration of water on open lands to recharge shallow aquifers.

There are two major categories for water reuse:

- a. Industrial, electrical, and commercial reuse of water for production and cooling purposes. Because power plants and industrial uses are the largest users of water, the potential for water savings overall to the water supply is greatest in this area. Decatur and its industries have a long history of efficient use of water, but ongoing cooperation can maximize this potential savings even further. In addition, smaller users such as car washes can be required to reuse water.
- b. Reuse of "graywater," which is non-potable treated water, can be diverted from release into rivers, by being applied on land such as golf courses, public lands, large commercial or even open spaces associated with large residential developments. The technologies for these systems has improved markedly and now are being used widely in the state. They reduce the need for using potable public water supply for irrigation purposes, such as golf courses. Land application can be used in large, residential open space developments to reduce the cost of traditional treatment of wastewater, and increase infiltration and recharge of shallow aquifers. Land application of wastewater is increasing as an alternative to traditional wastewater treatment. Land application should be encouraged as an option to meet discharge requirements and prevent pollution from entering the Sangamon River. It can also be combined with concepts such as conservation



*Fox Mill, a 730 unit residential development in Wasco, Illinois has been operating since 1993, treating all water on-site to prevent discharge into Mill Creek, a high quality nearby stream.*

development to allow for the clustering of development and permanent protection of open space in an economically efficient arrangement that can potentially reduce capital costs of the project.

### **1.4.3 Educate the public to conserve use of water**

A variety of techniques can be used to reduce the household consumption of water. Water savings through these programs goes directly to the bottom line savings of the City of Decatur, and should be thought of as an additional source of water. Programs include:

- a. Promote the use of WaterSense High Efficiency Toilets (HET), through public education of the benefits/long term reduced cost, and through development of a replacement & rebate program. Toilets are the largest indoor residential water user, accounting for nearly 30% of total indoor use.<sup>1</sup> HETs using 1.28 gallons or less of water will save 20% of the water consumed by toilets. HETs will become the new California minimum statewide standard starting in 2014. Decatur has the opportunity of setting an example for the Midwest in terms of a measured improvement in the reduction of water consumed through toilets and other fixtures.
- b. Promote the use of WaterSense High Efficiency Clothes Washers products through public education and through the development of a replacement & rebate program. Clothes washers are the second highest use of household water, accounting for 20%. HEWs can save 4,433 gallons of water plus energy savings per household.
- c. Provide outreach to residents and businesses on benefits of conservation.
- d. Negotiate program with retailers to offer incentives to customers
- e. Work with utilities and state to offer incentives

## **STRATEGY 1.5: IMPROVE QUALITY OF LAKE DECATUR AND TRIBUTARIES**

### **1.5.1 Ensure monitoring of Lake Decatur and tributaries.**

#### **Project/Action:**

Ensure consistent, on-going monitoring of Lake Decatur, Sangamon River, and its tributaries.

## **STRATEGY 1.6: UNDERTAKE A STUDY TO REVIEW PRACTICES AMONG OTHER WATER TREATMENT AGENCIES TO DETERMINE EFFICIENT USE OF ENVIRONMENTALLY-BENEFICIAL PROCESSES.**

#### **Project/Action:**

### **1.6.1 Partner with other water treatment agencies to undertake a study to determine efficient use of environmentally-beneficial processes.**

Decatur should look at best practices from other treatment agencies in the nation to determine if there are more environmentally practices, such as lower chemical or power use, that are cost efficient and would make sense for local use.

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<sup>1</sup> Vickers, Amy, *Handbook of Water Use and Conservation*, WaterPlow Press, Amherst, 2001

**GOAL 2: IMPROVE STORMWATER QUALITY AND REDUCE RUNOFF THAT CAUSES FLOODING AND SILTATION IN LAKE DECATUR**

**STRATEGY 2.1: PROMOTE THE USE OF BMPs TO MANAGE STORMWATER IN ORDER TO REDUCE RUNOFF AND IMPROVE WATER QUALITY**

**Projects/Actions**

**2.1.1 Update Stormwater Management Ordinance**

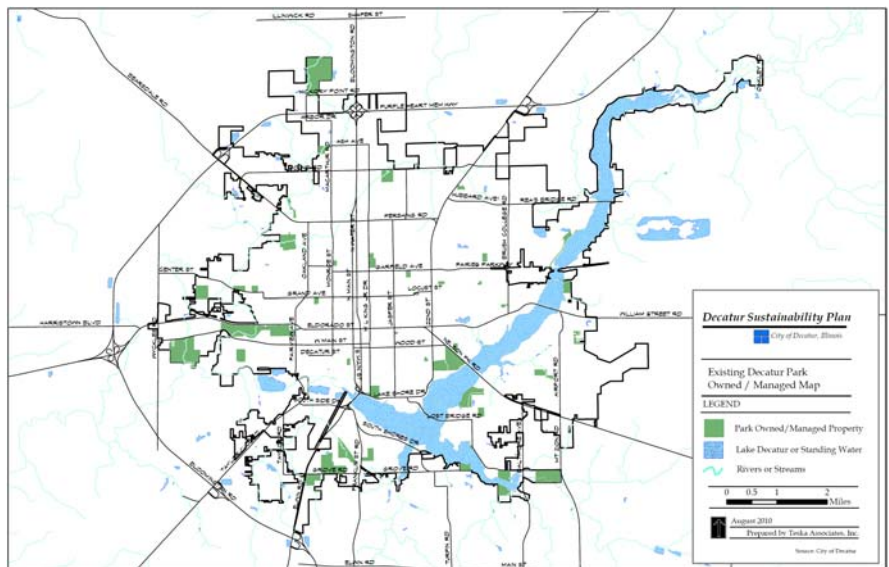
Under the federal Clean Water Act, states must issue National Pollution Discharge Elimination System (NPDES) permits for stormwater discharges. Decatur falls under the permit for small municipal separate storm sewer system or MS4 permit. NPDES Phase II MS4 permits were first issued in 2003. Under the recently passed Public Act 96-26, the Illinois Green Infrastructure for Clean Water Act of 2009 requires that all permittees adopt “green infrastructure” stormwater management strategies and techniques. These strategies and techniques include green infrastructure information in education and outreach programs, incorporation of Best Management Practices in stormwater management during construction (including municipally installed impervious surfaces). In addition, Post-construction stormwater management must also incorporate and favor Best Management Practices over conventional strategies for infiltration, evapotranspiration and harvesting for reuse.

Decatur should work with the County, Mt. Zion, and Forsythe for an update to their stormwater ordinances that would:

- a. Revise ordinance to require flow reduction and infiltration standards, while allowing flexibility in the use of Best Management Practices to meet these standards;
- b. Define performance standards for common BMPs; and
- c. Favor the use of BMPs over conventional strategies to meet standards.

Categories of green infrastructure and BMPs include<sup>2</sup>:

- Bioinfiltration – vegetated systems designed to



*Landowners and the Park District must work together to improve shoreline protections, link open spaces, and provide bicycle and amenities along Decatur’s waterways.*

<sup>2</sup> Jaffe, Martin et al, “Using Green Infrastructure to Manage Urban Stormwater Quality: A Review of Selected Practices and State Programs,” A Draft Report to the Illinois EPA, 2010

- facilitate the infiltration of stormwater and remove pollutants through infiltration. Examples include bioretention areas, swales, rain gardens, infiltration basins, urban forests
- Permeable pavement – pavement that allows water infiltration into underlying soil and filters some pollutants
  - Filtration – a variety of devices which actively or passively filter pollutants out of stormwater. These techniques are often used in conjunction with other BMPs
  - Green roofs – roofs with vegetated surfaces designed to reduce runoff and heat island effect through transpiration and evaporation and filter rainwater through their design and materials
  - Constructed wetlands – designed wetland intended to intercept runoff, reduce peak flows, decrease runoff volume and mitigate pollution.

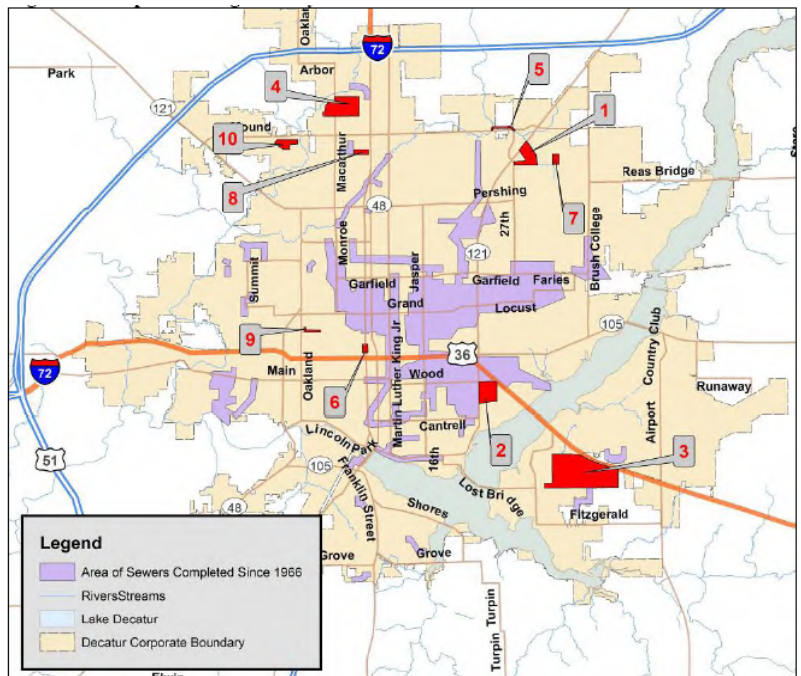
According to a 2010 study required by the Illinois Green Infrastructure for Clean Water Act of 2009 through the International BMP Database, there is significant evidence of the positive impact of the incorporation of these techniques towards both runoff volume and peak flow. Findings include:

- Permeable pavement, bioinfiltration, and green roofs reduced both peak flow and runoff volume between 52 to 85 percent
- As a result of reduced runoff volume, pollutants can be reduced by between 50 and 80 percent
- According to the study, “this reduction in combination with Total Suspended Solids (TSS) and (Total Nitrogen) TN removal efficiency means that green infrastructure practices could decrease up to 90 percent of the pollution in effluent water.”<sup>3</sup>
- Biofilters and retention ponds showed a statistically significant decrease in both TSS and TN

**2.1.2 Utilize BMPs through public spaces – parkways, parks, boulevards and stream protection**

- Inventory parkways, boulevards, and streams for possible use.
- Investigate adding BMPs to West Main St.
- Investigate use of BMPs in stream buffer zones.
- Investigate street rebuilds and streetscapes to include naturalized techniques.
- Seek funds to implement model projects.

**2.1.3 Test BMPs through capital improvements to a high profile public site to demonstrate the effectiveness**



<sup>3</sup> Ibid., page 33

**2.1.4 Utilize BMPs as a strategy to address current flooding issues in neighborhoods through capital improvement plans.**

Determine projects on stormwater capital improvement list that can be resolved partially or in full with BMPs. Many of the areas with chronic flooding problems lie outside the areas of sewer upgrades. Many were designed before current stormwater volume requirements and as a result face flooding. Through the innovative use of BMPs, much of the runoff could potentially be reduced. At a minimum, BMPs should be incorporated in conjunction with conventional stormwater sewer improvements that may be required to address the problem. BMPs will be important to not only potentially reduce the capital investment cost, but can reduce the amount of runoff that will need to be absorbed by the stormwater sewers and discharged.

**2.1.5 Promote an outreach and education program to the public and development community on naturalized stormwater management**

- Educate public regarding use of naturalized stormwater management (rain gardens, native plants, rain barrels, disconnecting drain spouts) and importance of stormwater quality.
- Educate neighborhood organizations, homeowner associations, and landscape firms.
- Educate development community and public officials on successful use of BMPs.
- Hold seminars and publish brochures geared to property owners and professionals.
- Engage prospective developers and landowners regarding demonstration projects that incorporate sustainable techniques – from open space development to incorporation of BMPs

**2.1.6 Implement erosion and sedimentation measures on agricultural lands, construction, and streams.**

- Continue education efforts with agricultural community in partnership with Macon County Soil and Water Conservation District
- Promote techniques including:
  - Conservation tillage (see Figure);
  - Irrigation scheduling and measurement;
  - Furrow dikes; and
  - Contour farming (see Figure).
- Measure impacts such as reduced runoff.
- Coordinate practices to reduce Nitrogen and other pollutants.
- Update Stormwater Management Ordinance to favor green infrastructure when agricultural land is developed into urbanized area.



**2.1.7 Work with property owners (public and private) to improve shorelines to prevent erosion and sedimentation.**

- Work with property owners, including Park District, to demonstrate BMPs to reduce runoff and sedimentation along shorelines, particularly along Lake Decatur and the Sangamon River.
- Consider adopting a buffer from waterways to prevent new impervious surfaces within a certain distance from waterways and wetlands.
- Hold educational workshops.



**GOAL 3: PROMOTE ENVIRONMENTALLY RESPONSIBLE AND EFFICIENT CONVEYANCE & TREATMENT OF WASTEWATER TO MEET LONG-TERM NEEDS.**

Decatur has planned for sufficient wastewater capacity and already reuses 100% of the biosolids produced. It is also experimenting with reuse of treated, non-potable wastewater to use as irrigation on properties such as golf courses. Wastewater should be thought of as another viable source of water that can reduce the total water supply needed by Decatur and nearby communities. This will take long-term planning to have adequate infrastructure, conveyance, and technology to reuse wastewater on a larger scale. Reuse of wastewater provide benefits to sustainability through reduced water consumption overall, reduced pollutants that are released into waterways, and increased infiltration to recharge our aquifers.

**STRATEGY: 3.1 MAINTAIN AND MAKE MOST PRODUCTIVE USE OF WASTEWATER.**

**Projects/Actions**

**3.1.1 Create and implement asset management plan.**

The Sanitary District of Decatur has a well managed program to develop and implement an asset management plan. The Sanitary District should continue to keep the plan up-to-date, and invest in its infrastructure in order to continue to support a highly urban area, which provides for economic development and the needs of its citizens and businesses.



### 3.1.2 Reuse treated water.

According to the Sanitary District; “The reclaimed water treatment process takes water that would otherwise be released into the Sangamon River and applies advanced treatment which involves adding chemicals to remove solids dissolved in the water. A disk filter system is then used to remove most remaining solids. After the water is disinfected with chlorine it is ready for distribution. Virtually all of the remaining solids, phosphorus and pathogenic organisms are removed during Tertiary treatment. Distribution pumps will deliver the water through separate pipelines to the end users.”

Key steps that can be taken are to actively seek additional partnerships with industries and large landowners, and to pursue a delivery system to enable water reuse of reclaimed water. A long-term plan that identifies potential users, determines the efficiency of conveyance, and develops a funding scheme to deliver the water in a cost-efficient manner is needed. Taken in the aggregate, it may be more efficient to add water reuse conveyance if it results in significant savings of public drinking water and can help avoid or reduce public water supply capital and maintenance expenses. Close cooperation is needed between the City of Decatur and Sanitary District to develop a plan that looks at the total water system and most effective means to provide a reliable water system for both water supply and wastewater in a comprehensive system.

### 3.1.3 Continue to reuse 100% of biosolids and explore packaging for smaller users.

The Sanitary District has an outstanding track record of reusing nearly 100% of biosolids, particularly for application on agricultural lands. Sediment dredged from Lake Decatur is also being reused. The District can explore a program to package biosolids safely for distribution or sale to households, community gardens, community supported agriculture and other uses, similar to the Milorganite that has long been produced and sold by the Milwaukee Sewage District. One of the key benefits of this program would be the reduction of conventional household and commercial use of fertilizers on grass – a source of polluted runoff damaging Lake Decatur, the Sangamon River and tributaries.



### 3.1.4 Develop public education for sump pump disconnection.

Develop a public education program for local contractors on the proper installation of sump pumps. Proper sump pump installation has several benefits:

- Reduced pumpage into sewer system, particularly in large precipatory events that cause flooding;
- Reduction in the frequency and severity of flooding;
- Reduced wastewater treatment costs for the urban core of Decatur that has combined sewer systems; and
- Reduced need for capital projects to expand sewer systems throughout Decatur, particularly in flood prone areas outside of sewer improvements that have been made.

### **3.1.5 Develop a public education program fats, oils and greases.**

Fats, oils and greases are an increasing problem that is expensive to address at the collection point. An education program is needed for households that may not be aware of the environmental damage and cost associated with treating fats, oils, and greases that can be avoided. In addition education and code enforcement is needed to ensure restaurants dispose of fats, oils, and greases appropriately. As such, the City should develop brochure, web site materials, and seminars accordingly.

### **3.1.6 Explore environmentally friendly practices for treatment of wastewater.**

Decatur should explore additional techniques for the most cost-efficient and environmentally responsible techniques to treat wastewater. These include

- Consider land application systems to treat wastewater in select circumstances, and the chemicals and techniques used to treat wastewater;
- Investigate practices among other wastewater treatment agencies;
- Determine costs for efficient techniques; and
- Develop timetable and plan for implementation.

### **3.1.7 Conduct a demonstration project to use effluent for crop irrigation**

While biosolids and sediment dredged from Lake Decatur are already effectively reused, a demonstration project should be used as a showcase for agricultural lands, and tool to measure the impacts, including:

- Reduction of conventional fertilizers;
- Reduction of pollutants from land through runoff, particularly Nitrogen; and
- Cost benefits to public and private landowners from reuse.