CHAPTER 2
PROJECT GOALS AND OBJECTIVES

INTRODUCTION

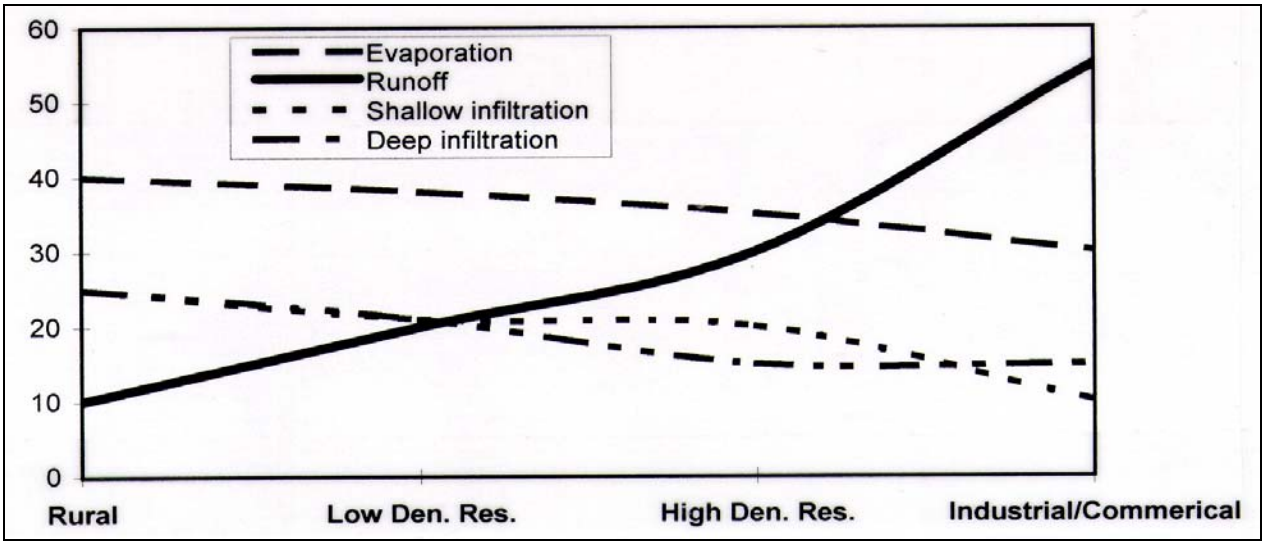
The following chapter outlines the goals and objectives that will act as the basis for planning decisions made in this report. Prior to outlining the goals and objectives, the chapter provides an overview of existing water quality and drainage problems to help the reader understand the issues that the plan needs to address.

EXISTING WATER QUALITY AND QUANTITY CONCERNS

Water quality problems in the Town of Salem fall into four categories: changes to stream flow, increases in stream temperature, loss of stream habitat, and non-point source pollution.

As the Town of Salem converts from agricultural land, forest, and wetland to urban land use, the surface of the landscape changes. In the past, greater amounts of water infiltrated into the ground and remained in wetland storage. Historically, storm water reached the stream courses over long periods of time. With the change in surface cover due to urbanization and the associated increase in impervious surfaces, such as parking lots, roads, driveways, and roofs, more of the rainfall today is intercepted and becomes surface runoff. These changes all affect the hydrologic budget of the drainage area. A hydrologic budget is a quantitative statement of the hydrologic cycle used to equate the components of precipitation, evaporation, runoff, and infiltration. Figure 2-1 illustrates the changes that urbanization can have on the hydrologic budget.

FIGURE 2-1
Effects of Urbanization on Surface Water Runoff



Source: Minnesota Pollution Control Agency

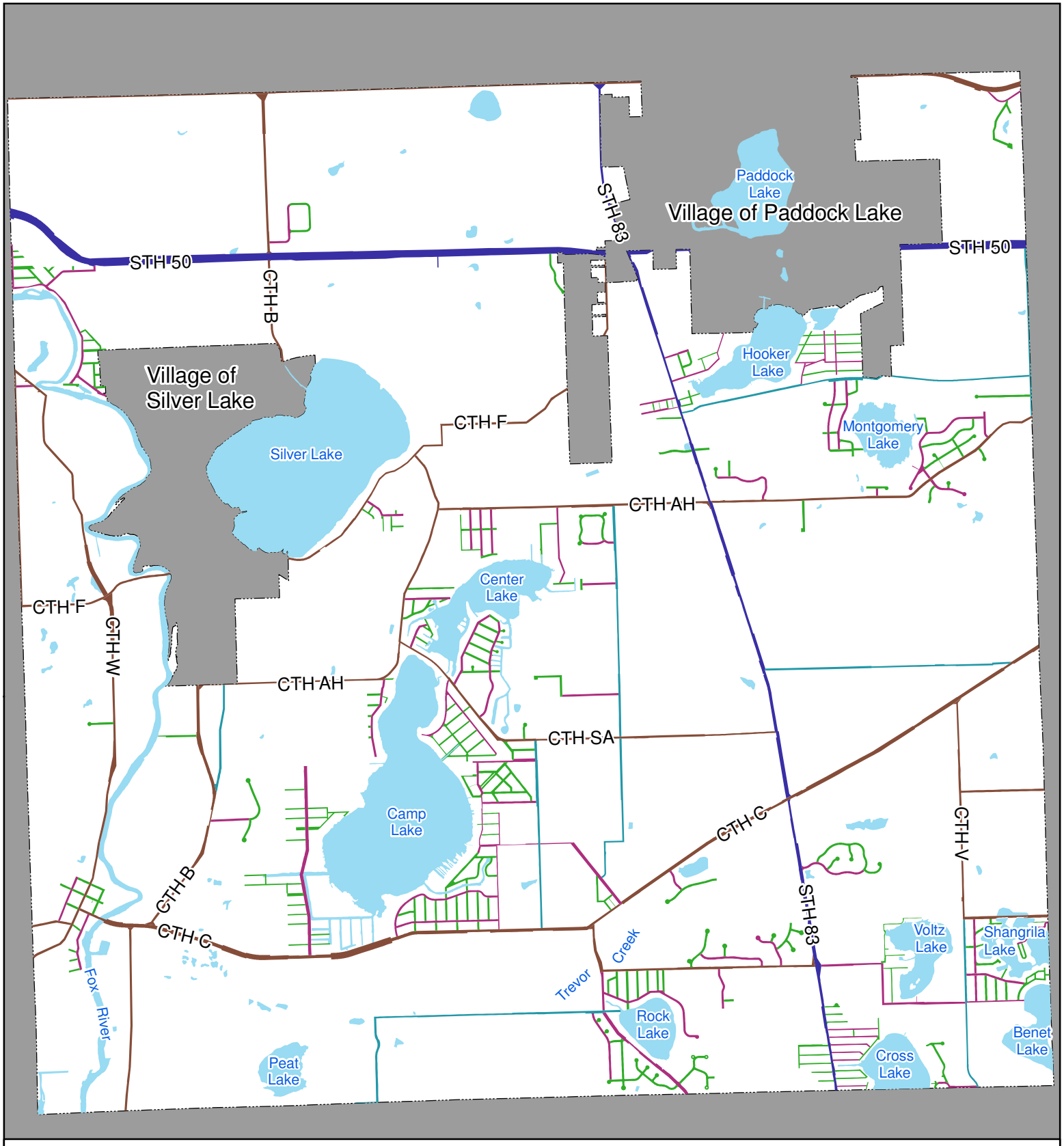


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FIGURE 2-1
TOWN OF SALEM
ROADWAY CLASSIFICATION EXHIBIT

Legend
Municipal Boundary
Roadway Type
S.T.H.
C.T.H.
Arterial
Collector
Minor

N
W E
S

NTS

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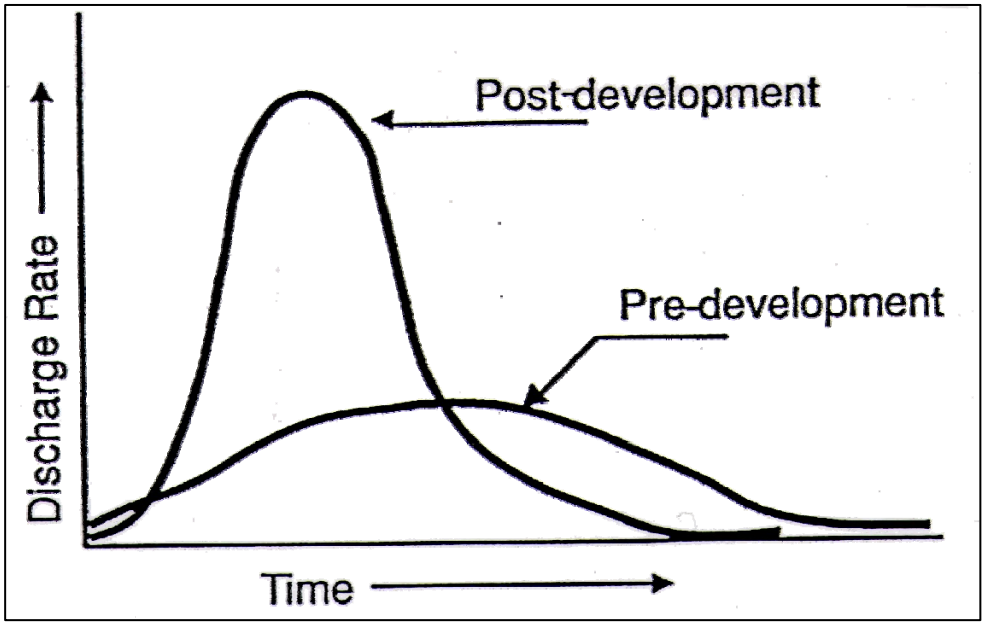
R.A. Smith National
Beyond Surveying and Engineering

As shown in Figure 2-1, as urbanization takes place and more of the land surface is paved over with rooftops, driveways, parking lots, and streets, infiltration rates decrease and less water goes into groundwater storage. As groundwater storage decreases, the groundwater seepage that contributes flow to local streams during dry periods also decreases. The result is lower stream base flow and longer periods in which the intermittent channels are dry or stagnant during non-rain events. The end result is less fish and wildlife habitat in the local streams.

With less water being held in groundwater and wetland storage, more water is running off the land surface. As shown in Figure 2-1, as the density of urbanization increases, the rate of runoff increases. In the past, it took water days or weeks to reach the stream. Today, larger volumes of surface runoff reach the stream in hours, instead of days. The result is higher stream flows and velocities during rain events. Figure 2-2 illustrates typical pre- and post-development stream hydrographs. Only the most tolerant aquatic organisms can survive in the extreme high and low flow conditions of urbanized streams.

FIGURE 2 - 2
Pre- and Post-Development Hydrographs



Source: Minnesota Pollution Control Agency

Urbanization increases the amount of pollution in surface water runoff. This pollution, called non-point source pollution, is the result of man's activities on the land surface. There are two main reasons why urbanization increases pollutant loads in runoff. First of all, the volume and rate of runoff are increased as an area is developed, providing a larger capacity to transport pollutants. The second reason is that more materials are made available for movement by the runoff as the intensity of the land use increases.

No sampling of the runoff from the Town of Salem has taken place, due to the high cost involved. Monitoring of 20 major cities as part of the National Urban Runoff Program (NURP) study has shown that the runoff from various land uses are similar regardless where they are located in the country. The NURP monitoring has shown that sampling of individual communities is not necessary to document a potential source of pollution. The NURP study concluded that mapping of the urban land covers and using developed land surface pollutant relationships could identify pollutant sources. Monitoring in Milwaukee and Madison has shown problem pollutants in urban surface water runoff to include sediment, nutrients, chlorides, bacteria, oil and grease, heavy metals, pesticides, and volatile organic compounds (VOCs). The major sources of these pollutants are outlined in Table 2-1.

TABLE 2-1
Major Sources of Urban Surface Water Pollutants

Pollutant	Major Source
Sediment	Construction sites, agricultural runoff
Nutrients (Nitrogen and Phosphorus)	Fertilizers, soil erosion
Chlorides	Road salt
Bacteria	Pet waste, wildlife
Oil and grease	Automobile
Heavy metals	Automobile
Pesticides	Lawn care, agriculture
VOCs	Automobile, home heating

Source: Novotny and Olem, 1994

REQUIREMENTS OF OWNERS OF MUNICIPAL SEPARATE STORM SEWERS SYSTEM (MS4'S)

Since the early 1970's point source pollution has become a concern for the federal government starting with the Clean Water Act in 1972. This regulation targeted mainly wastewater treatment plants and industrial facilities. In the 1990's, the Environmental Protection Agency (EPA) started targeting municipalities to be responsible for their point source pollution. Phase I of this regulation was enacted in 1990. This regulation targeted larger municipalities with service populations exceeding 100,000 residents. In Wisconsin, both Milwaukee and Madison were included as a part of Phase I.

In 1999 Phase II of this federal regulation was enacted. Phase II targeted point source pollution in smaller municipal separate storm sewer systems (MS4s). "Municipal Separate Storm Sewer System" or "MS4" means a conveyance or system of conveyances, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all the following criteria:

- Owned or operated by a municipality
- Designed or used for collecting or conveying storm water
- Is not a combined sewer
- Is not part of a publicly owned wastewater treatment works that provides secondary or more stringent treatment

Therefore, storm water discharge from these MS4s is considered a point source by federal regulations, and they have dictated that all MS4s must apply for a storm water discharge permit in order to reduce the level of pollutants discharging to waters of the state from surface runoff. These regulations were then passed on to the state levels to regulate their local MS4s.

The federal discharge permit requirements are, therefore, regulated at a statewide level in Wisconsin with the provisions of Chapter 283 of the Wisconsin State Statutes and Chapters NR 151 and 216 of the Wisconsin Administrative Code. These regulations restate that owners and operators of MS4s will be permitted to discharge storm water from all portions of the municipal separate storm sewer system owned

or operated by the municipality to waters of the state in accordance with the Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit No. WI-S049867-1.

The Town of Salem was named as an MS4 that required permit coverage and was authorized this coverage in November of 2006 by the Wisconsin Department of Natural Resources (WDNR) under WPDES MS4 General Permit No. WI-S050075-1.

GOALS AND OBJECTIVES

The goals of the Town of Salem Storm Water Management Plan fall into the following four areas:

I. Protect the water quality of the lakes and streams within the Town of Salem, the local wetlands, and groundwater.

II. Protect environmentally sensitive areas such as wetlands, fish and wildlife habitat, and environmental corridors.

III. Protect public and private property from the potential damages caused by storm water runoff.

IV. Provide the framework for compliance with the Wisconsin Pollutant Discharge Elimination System General Permit to discharge storm water from all portions of the Municipal Separate Storm Sewer System (MS4).

The following objectives and policies have been developed to meet the above goals.

Goal I. Protect the water quality of the lakes and the main tributaries within the Town of Salem, the local wetlands, and groundwater.

1. Reduce the discharge of pollutants from land surfaces in the Town of Salem watersheds.

    a. The WDNR in the Wisconsin Administrative Code NR 151 has developed a series of recommendations to reduce the level of pollutants to waters of the state from surface runoff. Administrative Code NR 151 calls for a 20 percent reduction in Total Suspended Solids (TSS) by March 10, 2008 and a 40 percent reduction by March 10, 2013 from existing development, and 80 percent from all new development.

    b. Identify and analyze potential storm water Best Management Practices (BMPs) throughout the Town to reduce the discharge of pollutants and help reach the 40 percent TSS reduction goal.

2. Prevent the discharge of hazardous waste into the storm water drainage system.

    a. Conduct a public education program to inform local residents that storm sewers and local ditches drain to local streams and lakes. Improper use of lawn care products, solvents, and oil may damage local wildlife and may contaminate the groundwater.

    b. Develop, enhance, and enforce local ordinances that prohibit and fine individuals for purposely discharging pollutants into the Town's drainage system.

3. Conduct a public education program on what local residents and businesses can do to control pollution.

    a. Conduct an annual program on proper use of lawn care products.

    b. Provide information on disposal of household hazardous waste.

    c. Conduct an annual program on the proper storage of industrial materials.

    d. Distribute educational materials on proper construction site erosion control through the Building Inspectors office.

Goal II. Protect environmentally sensitive areas such as wetlands, fish and wildlife habitat, and environmental corridors.

1. Protect stream habitat.

    Where feasible, drainage and flood control facilities should be designed to protect the existing stream habitats. Alternatives for managing storm water runoff are discussed in Chapter 4 of this report.

2. Protect wetlands from the discharge of storm water runoff.

    Storm water discharges to wetlands should be controlled to prevent negative impacts to wetland functional uses.

3. Protect primary and secondary environmental corridors.

    Where feasible, avoid the siting of storm water facilities, such as detention basins and infiltration systems, in primary and secondary environmental corridors identified by the Southeastern Wisconsin Regional Planning Commission (SEWRPC).

4. In addition to the above mentioned goals for the entire municipal boundary, the recommendations from the 2003 SEWRPC Comprehensive Plan for the Des Plaines River Watershed should be adopted for future land use, open space preservation, floodland management, water quality management, and fisheries management specifically in the Des Plaines River Watershed.

Goal III. Protect public and private property from the potential damages caused by storm water runoff.

The purpose of this goal is to protect life and property from damage and inconvenience caused by flooding and drainage problems. The drainage system includes both major and minor components. The minor system is made up of storm sewers and roadside ditches. Storm sewers in the Town of Salem are designed to carry the 10-year storm. The major drainage system includes stream channels and overland flow paths that can carry the flows of larger flood events. To protect properties from the damages of storm water runoff, the following plan objectives and policies were adopted:

1. Design and maintain major and minor storm water drainage systems that will convey storm water in a manner that reduces the public's exposure to drainage related inconveniences, and protects public and private property from runoff related damages.

    a. Storm water drainage systems shall utilize the natural drainage and storage capabilities of the site to the fullest extent possible. New storm water drainage systems should be designed to provide an economical gravity flow drainage system.

    b. Storm water drainage systems should be designed and maintained to utilize the collector and land access streets as open runoff channels during major storm events without flooding adjoining building sites. The streets will be supplementary to the minor storm water drainage system of storm sewers and roadside ditches.

    c. The minor drainage system, made up of storm sewers and roadside drainage ditches, shall be designed to convey the 10-year storm on new developments and redevelopment.

    d. The major drainage system, made up of open channels and overland flow routes, should be designed and maintained to convey the runoff from the 100-year storm without causing safety hazards or damage to public or private property.

    e. Drainage easements for open channels across private property shall be wide enough to convey the 10-year storm for the minor drainage system and the 100-year storm for the major drainage system.

    f. The Town Plan Commission and the Town Board should review the local building ordinances to ensure that appropriate regulations dealing with structure floodproofing and elevation are included and provide assistance to landowners affected by structure floodproofing.

    g. The Town of Salem will cooperate with adjacent communities on the regional management of storm water runoff.

2. Maintenance of a storm water management system that prevents any adverse impacts from increases in flood elevations, and protects and preserves floodplain storage.

    a. To prevent significant property damage and safety hazards, the major streams and their floodplains in the Town should be regularly maintained to accommodate runoff from the storm with a 1% chance of occurrence in any year (100-year interval storm event).

    b. All new and replacement culverts and bridges over waterways shall be designed so as to accommodate, according to the categories listed below, the designated flood event without overtopping the related roadway or railway track and in accordance with the water quality facility objectives and standards as set forth in the SEWRPC Comprehensive Plan for the Des Plaines River Watershed.

(1) Minor and collector streets used or intended to be used primarily for access to abutting properties: a 10-year recurrence interval flood discharge

(2) Arterial streets and highways used or intended to be used primarily to carry heavy volumes of traffic: a 50-year recurrence flood discharge.

(3) Railways: a 100-year recurrence interval flood discharge

Figure 3-1 shows the roadway classifications within the Town. The depth of flow over the top of minor, collector, and arterial streets and highways shall not exceed 6 inches during the 100-year recurrence interval flood.

c. In addition to meeting the applicable requirements in paragraph b. above, all new and replacement culverts and bridges over waterways, including pedestrian and other minor bridges, shall be designed to accommodate the 100-year recurrence interval flood event without raising the peak stage, either upstream or downstream, 0.01 foot or more. The Town of Salem Floodplain Zoning Map is adopted from the Federal Emergency Management Agency (FEMA) map of record. Larger permissible flood stage increases may be acceptable for channel reaches having land use conditions that could accommodate the increased stage without damage to existing structures and that meet the following criteria:

(1) The land impacted is in public ownership and the change in flood profile is part of a public sponsored project.

(2) The land impacted is under single ownership of the project sponsor.

(3) The project sponsors have acquired appropriate flood easements from all impacted landowners.

d. The waterway opening of all new and replacement bridges shall be designed so as to readily facilitate the passage of ice flows and other floating debris and, thereby, avoid blockages. In locations where accumulation of floating ice or debris may cause significant backwater effects with attendant danger to life, public health or safety, or attendant serious damage to homes, industrial and commercial buildings, and important public utilities, the designer shall evaluate the impact of any blockage and provide necessary freeboard between the peak stage and the low concrete or steel in the bridge to prevent increases in flood profiles.

e. Dikes and floodwalls shall not be used to facilitate new development in the floodplain. New development in floodplains shall only be on engineered fill.

f. The existing floodwater storage provided in wetlands and floodplains in the Town of Salem should be maintained. Any loss of flood storage from the floodway and flood fringe due to filling shall be compensated at a ratio of 1.5 to 1.0 at a minimum. The additional compensation is a safety factor to prevent downstream flooding problems. All compensatory storage must be hydraulically equivalent for the 10-year and 100-year recurrence interval flood discharges.

g. Reduced regulatory flood protection elevations and accompanying reduced floodway or floodplain areas resulting from any storage ponds or channel modifications shall not become effective for the purposes of land use regulation until the storage facilities or channel changes are actually constructed and operative.

3. Implement a storm water management system that favors storm water storage versus storm water conveyance.

a. To prevent increases in the extent of the existing regulatory floodplain, storm water storage should be integrated into the design of new development and redevelopment.

b. Regional storm water storage is preferred over individual on-site storage to reduce the potential of overlapping storm hydrographs, which may produce higher flood elevations. Regional storm water storage facilities provide greater opportunities for the integration of other amenities such as wildlife habitat, aesthetics and recreation.

c. In areas where a regional storm water facility exists, on-site storage requirements may be waived in lieu of a contribution to the development of the regional facility.

d. New or altered storm water facilities should be designed to prevent any increase in downstream flood elevations and stream velocities over existing conditions. To achieve this condition, release rates shall be less than or equal to 0.3 cfs per acre for the 1 percent recurrence storm (100-year) and 0.04 cfs per acre for the 50 percent recurrence storm (2-year).

4. To maintain the base flow in the lakes and tributaries, the first portion of each storm should be infiltrated into the ground on all new developments.

For residential developments, the project site is defined as the entire area of the development, and one of the following shall be met:

a. Infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 90% of the pre-development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.

b. Infiltrate 25% of the post-development runoff volume from the 2-year, 24-hour design storm with a type II distribution. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes and not composite curve numbers as defined in TR-55. However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.

For non-residential development, including commercial, industrial and institutional development, the project site is defined as the rooftop and parking lot areas, and one of the following shall be met:

a. Infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 60% of the pre-development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.

b. Infiltrate 10% of the post-development runoff volume from the 2-year, 24-hour design storm with a Type II distribution. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes and not composite curve numbers as defined in TR-55. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.

5. Maintain a storm water management system that is equitable and fair, and effectively meets all of the other stated objectives while considering all benefits in light of cost.

a. To minimize new costs, maximum feasibility should be made of all existing storm water system components, as well as natural storm water storage.

b. To the maximum extent possible, the location and alignment of new storm sewers and engineered channels and storage facilities should coincide with existing public rights-of-way to minimize land acquisition or easement costs.

c. Storm water storage facilities consisting of both regional and on-site detention basins should be used, where hydraulically and economically feasible, to reduce the size and resultant cost of the required storm water conveyance system downstream of the storage site.

6. Maintain a storm water management system that requires minimum maintenance and has maintenance requirements that can be implemented by available organizations or units of government.

a. New developments, redevelopments, and streets shall be designed and graded to provide overland gravity flow routes to major drainageways so that drainage will not be affected in the event of failure of the local storm sewer network.

b. Storm water storage pond outlets shall be designed to minimize clogging and downstream erosion.

c. Where feasible, stream banks and edges of detention ponds should be landscaped with native vegetation to prevent bank erosion and to discourage nuisance populations of Canadian Geese.

d. The Town of Salem shall establish a routine inspection program of public storm water facilities. The purpose of the inspection program is to facilitate implementation of a program of minor repairs, with the intent of reducing the need for more extensive major maintenance.

7. Maintain a storm water management system that complies with existing federal, state, regional and local regulations, and adopted management plans.

a. Prior to the design of major projects sponsored by the Town that require regulatory permits, the Town Engineer will contact the affected regulatory

agencies to identify any regulatory constraints.

b. Any projects involving the modification of navigable waters will include in-kind replacement of the stream functional values. Functional values include such items as fish and wildlife habitat, recreational opportunities, and aesthetic values.

Goal IV. Provide the framework for compliance with the Wisconsin Pollutant Discharge Elimination System General Permit to discharge storm water from all portions of the Municipal Separate Storm Sewer System (MS4).

1. Implement a public education and outreach program to increase the awareness of storm water pollution impacts on waters of the state to encourage change in public behavior to reduce such impacts.

2. Implement a program to notify the public of activities required by this permit and to encourage input and participation from the public regarding these activities. The program shall include measureable goals for public involvement and participation and comply with applicable state and local public notice requirements.

3. Develop, implement, and enforce a program to detect and remove illicit connections and discharges to the MS4.

4. Develop, implement, and enforce a program to reduce the discharge of sediment and construction materials from construction sites.

5. Develop, implement, and enforce a program to require control of the quality of discharges from area of new development and redevelopment after construction is complete.

6. Develop and implement a pollution prevention program that establishes measure goals for pollution prevention.

7. Develop and implement a municipal storm water management program to achieve compliance with the developed urban area performance standards of s. NR 151.13(2), Wisconsin Administrative Code, for those areas of the municipality that were not subject to the post construction performance standards of s. NR 151.12 or 151.24.

8. Develop and maintain a MS4 map.

9. Submit an annual report to the WDNR.

A complete listing of the requirements of the Town's MS4 permit can be found in Appendix A. Many of the practices required above are presented in Chapter 6 of this report.