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VILLAGE OF FONTANA

STORM WATER MANAGEMENT PLAN

VILLAGE OF FONTANA-ON-GENEVA LAKE
WALWORTH COUNTY, WISCONSIN

SEPTEMBER/2009



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Micki O'Connell, Village Board / Indian Hills
Al Davis, Abbey Ridge
Craig Workman P.E., Director of Public Works
Kelly Hayden, Administrator
Joe McHugh, Former CDA Director / Geneva Lake Conservancy

Prepared by:

RUEKERT & MIELKE, INC.
W233 N2080 Ridgeview Parkway
Waukesha, WI 53188-1020
(262) 542-5733
www.ruekert-mielke.com

Plan Prepared for:

Village of Fontana-on-Geneva Lake
175 Valley View Drive
Fontana, WI 53125
(262) 275-6136
(262) 275-8088

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EXECUTIVE SUMMARY

This report presents a recommended storm water management system plan for the Village of Fontana-on-Geneva Lake. The comprehensive approach used in the preparation of the recommended plan permitted definitive identification and description of the existing storm water management system, existing storm water management problems and the affect of planned and probable future land use conditions on storm water management requirements. The report provides a set of objectives and supporting criteria to guide the development of an effective storm water management system within the Village, presents alternative storm water management plans for the Village, provides a comparative evaluation of the technical, economic, and environmental features of these plans; and recommends a cost effective storm water management plan and sets forth a plan implementation program. A Storm Water Advisory Committee composed of key members of public stakeholder groups and recommended by the Village Board, provided invaluable guidance and recommendations at meetings and acted as a conduit to the public throughout the project.

Complete prevention of storm water flooding within the Village of Fontana-on-Geneva Lake is not possible. Although the majority of the Village drains towards Geneva Lake and there is significant variation of elevation to allow for drainage, the topography includes local depression areas where storm water ponds as well as areas where there are little to no dedicated storm water collection and conveyance systems. In addition, storm water controls can be installed to handle frequent storm events but there is always the statistical chance that another large storm event greater than the design standards will fall within the watershed that will cause flooding. Therefore the goals of this storm water study were to evaluate and recommend means to minimize the effects of future flooding events. Flooding shall be contained to areas designated to convey or store the runoff, and measures shall be taken to maintain and/or improve water quality.

Introduction

In addition to protecting the environment, sound storm water management practices provide protection of public health and safety, private property and water resources. Conversely, inadequate storm water planning, water quality management and flood control can create costly problems that may include danger to human life, loss of the functional use of water resources, an increase in soil erosion, sedimentation and pollution of surface waters leading to a decline in the health of the local ecosystem, disruption of the movement of people and goods, and the delivery of services, compromise of the structural stability of buildings, pavements and utilities which may require costly maintenance and reconstruction, damage to real and personal property, and depreciation of real property values and attendant loss of tax base.

In May of 2007 and again in the Spring of 2008 the Village experienced several extreme rainfall events. These rainfall events as accompanied by widespread surface ponding and flooding reinforcing the Village's decision to have a storm water management system plan devised to answer the need for adequate storm water management and flood control. Consequently, in July 2008, the Village engaged the firm of Ruckert/Mielke to conduct a study of the storm water management system of the Village. The study was to identify actual and potential performance

and water quality problems under both existing and probable future land use development conditions and was to recommend needed corrective measures. Capital and operation and maintenance costs attendant to the recommended corrective measures were to be estimated, and a plan implementation program developed. This report presents the findings of the study and describes the recommended new storm water management system plan.

More specifically, the plan and this report:

1. Describe the existing storm water management system and the existing storm water management, water quality and flood control problems in the Village and identify the causes of those problems.
2. Describe existing, planned, and full build out land use conditions and related storm water management and water quality control requirements.
3. Provide a set of objectives and supporting standards to guide the development of an effective, village-wide, storm water management and water quality control system.
4. Present alternative storm water management system plans.
5. Provide a comparative evaluation of the technical, economic and environmental features of the alternative system plans.
6. Recommend a cost-effective, comprehensive storm water management and water quality control system plan for the Village.
7. Identify the responsibilities to be assumed, and the actions required by, the various government units and agencies concerned to implement the recommended system plan.

Framework Plans

Good engineering practice dictates that storm water management system planning, while properly conducted at the local level, also be conducted consistent with and supportive of plans and historical and environmental and legal actions within the broader framework of watersheds and subwatershed plans, including plans of immediately adjoining areas located within the watershed, in broader and more comprehensive plans that contain the watershed, and in environmental and legal actions made to protect and restore the quality of the watershed and its ecosystem services. These framework plans and actions are in addition to other local and regional ordinances, environmental and legal actions, and development requirements that would be applicable to the Village. Ten key documents which reflect the findings and recommendations of iterative regional and local planning processes extending back to 1991 were identified in this study. These documents serve to make land use, flood control, and storm water management development recommendations contained in adopted county and local plans consistent with each other, and with adopted regional plans.

Study Area Conditions

In any system planning effort, definitive knowledge is required of the existing condition of the system concerned and of the pertinent characteristics of the environment in which the system operates. With respect to storm water management system planning in particular, inventories and analyses are required of such factors as the available topographic and cadastral mapping of the planning area; of existing socioeconomic and land use conditions in the planning area; and of the topography, drainage pattern, geology, climate and weather, water supply and natural resource base of the planning area.

Topographical and cadastral mapping, aerial photographs, environmentally sensitive areas, soils and land use mapping were obtained from Walworth County and the Southeastern Wisconsin Regional Planning Commission (SEWRPC) for use in this study. The SEWRPC year 2000 land use map for the Village was used in this study to represent existing conditions, while proposed or future conditions were represented by the year 2035 land use map. The study also considered the Village's Comprehensive Plan DRAFT August 21, 2009 Future Land Use Plan prepared by Vandewalle & Associates, Inc. when analyzing future conditions. Village infrastructure and maintenance procedures were obtained from Village Staff, or were collected by our field staff and added to the Village GIS system for storm water infrastructure where Village records were unavailable. This information was used as a basis for the analysis and planning of for the storm water management study.

Design Criteria

The basic concepts underlying current urban storm water management planning practice have evolved from older practice which sought to remove excess surface water during and after a rainfall as quickly as possible by the provision of an efficient conveyance system generally consisting of urban street cross sections with curbs and gutters, catch basins or inlets, enclosed conduits, and sometimes hydraulically improved channels. The current practice emphasizes treatment, infiltration and storage as well as conveyance of runoff while integrating constructed drainage facilities with the existing natural drainage system. The objectives of the current practice include reducing the peak rate of runoff; reducing the transport of sediment and other water pollutants to downstream surface waters and wetlands; mitigating the adverse impacts of increased runoff and flow frequency on upstream, downstream and riparian flora and fauna; and protecting against increased downstream flooding.

The components of a storm water management system are compromised of four basic types of facilities: overland flow, collection, conveyance and storage. Each of these components has a broad impact on the overall system objectives and was considered in the design of the alternative storm water management systems under this planning effort.

Non-point source water pollution control may be defined as the management of urban and rural land uses to reduce the loadings of pollutants discharged to surface waters. For the purposes of this report, such control measures will be considered only with respect to urban non-point sources of pollution.

It is feasible and desirable to deal with construction site erosion and sedimentation problems of urban non-point source pollution on a site-by-site basis through regulations. Such control measures include mulching and seeding or polymer application of disturbed areas, construction of filter fabric and straw bale fences to intercept eroding soil prior to discharge to a receiving stream, channel stabilization, construction of sediment traps, temporary diversions, stone check dams and wet detention basins, stabilization of stream banks through the provision of sod, geosynthetics, natural armoring or riprap, protection of storm water inlets and proper construction scheduling.

The second major category of urban non-point sources of pollution is the storm water runoff and associated pollutants contributed from developed urban areas. Non-point source pollution control measures appropriate for developed urban areas can be classified either as source area controls or as outfall controls. Source area controls are best management practices carried out in upland areas near the pollution source. Outfall controls are applied at or near the storm water outlet prior to discharge to the receiving stream. Source area controls may include infiltration devices, pervious pavement, biofiltration cells, decentralized storage facilities or constructed wetlands, vegetated filter strips, street cleaning, increased leaf and clippings collection and disposal, and reduced use of road deicing salt. Outfall controls may include centralized storage facilities or constructed wetlands, proprietary storm water treatment devices and physical or chemical treatment processes.

Areas of Concern

As a result of extreme rainfall events that occurred within the Village in May of 2007 and again in the Spring of 2008 as well as through interviews with Village Staff, it became apparent that particular areas of the Village are more prone to storm water flooding. In addition, it was found that while there are many depressed areas on private properties that detain storm water runoff, some of these areas collect runoff from Village owned land or public right-of ways. These areas are of particular concern to the Village, and as a result were studied in detail. Village officials also recognized the need for continued protection and improvement of water quality within the area's watercourses.

The Village, with the assistance of the Storm Water Advisory Committee, has identified five individual locations to be used as the primary focus for this Storm Water Management Plan. These locations are labeled as Hot Spots 1 – 5, although the numbering is used for reference only and does not represent the priority or severity of the storm water issues. The Hot Spot locations include Sauganash Drive near Davis Court, the Indian Hills and Brickley Drive area, Sauganash Drive and Tarrant Drive near Waubun Drive, Abbey Hills Condominiums along STH 67, and Shabbona Drive. In addition to the five Hot Spot areas, four additional recurring Problem Areas were identified. The recurring Problem Areas were deemed less critical to the overall Village drainage system considered, therefore only a quick analysis was conducted for those areas. The recurring Problem Areas included two areas along Lake Shore Drive; one at the Duck Pond Recreation Area and one within the Potawatomi Creek watershed. All of the areas identified are located within public lands or right-of-way, or are at least partially affected by runoff from public lands.

Alternative Plans

The preparation of a technically sound storm water management plan requires the comparative evaluation of the costs and effectiveness of alternative means of meeting the identified drainage and flood control system needs of the planning area. The primary basic alternative correction measures used for identified storm water management problems were considered as follows: reinforcement of the gravity flow capacity of the existing storm sewerage system, addition of new storm water sewerage system, redirection of the storm runoff to existing systems with excess capacity, reduction of peak flow rates and water quality improvements through the construction of storm water detention facilities, and removal of structures prone to flooding. Constructability and environmental concerns for the selected alternatives were also considered. In addition, to aid in locating potential storm water storage or treatment facilities, the Village asked Ruekert/Mielke to identify undeveloped lots from aerial photographs that could be evaluated for storm water facility locations.

The alternatives were designed to provide an integrated storm water management system that would function without hazardous roadway or property flooding under rainfall events up to a 100-year recurrence interval.

Recommended Plan

The preparation of the recommended storm water management system plan for the Village involved a synthesis of corrective measures selected from among the alternatives considered. The selection of the corrective measures to be included in the recommended plan was based upon a comparative economic analysis, consideration of the level of protection provided, ease of construction and potential environmental impacts. Recommendations were made for the five Hot Spot and four recurring Problem Areas, as well as general recommendations for updating the Village storm water ordinance and expanding public education. \$4.4 million is the estimated cost of constructing the recommended improvements.

It should be reinforced, however, that even after implementing all of the recommendations, complete prevention of future flooding is not possible. Detailed alternatives and recommended improvements were only conducted in the Hot Spot areas and recurring Problem Areas, and only a cursory study of the remainder of the Village was conducted. Therefore these recommendations are intended to minimize the effects of future flooding by containing the flooding to areas designated to convey or store the runoff. The recommendations are also intended to ensure that future development does not increase flooding in other areas of the Village.

Implementation

The final step in the storm water management system planning process will be development of a program for the implementation of the recommended plan. In this step, the recommended corrective measures within the Village will need to be prioritized, and a capital improvement program developed on the basis of this prioritization and estimates of potentially available funding. Following formal adoption of the recommended plan by the Village, realization of the plan will require a long-term commitment to the objectives of the plan, and a high degree of

coordination and cooperation among Village Officials and Staff, Wisconsin Department of Natural Resources Staff, developers and concerned citizens.

The systems-level storm water management plan presented in this report is intended to serve as a guide to the future design and construction of storm water management facilities. Detailed engineering design should examine in greater depth and detail potential variations in the technical, economic and environmental features of the recommended solutions identified in the system plan in order to determine the best means of carrying out the plan.

CHAPTER ONE INTRODUCTION

Complete prevention of storm water flooding within the Village of Fontana-on-Geneva Lake is not possible. Although the majority of the Village drains towards Geneva Lake and there is significant variation of elevation to allow for drainage, the topography includes local depression areas where storm water ponds as well as areas where there are little to no dedicated storm water collection and conveyance systems. In addition, storm water controls can be installed to handle frequent storm events but there is always the statistical chance that another large storm event greater than the design standards will fall within the watershed that will cause flooding. Therefore the goals of this storm water study were to evaluate and recommend means to minimize the effects of future flooding events. Flooding should be contained to areas designated to convey or store the runoff, and measures taken to maintain or improve water quality.

Need For Storm Water Management System Planning

Good storm water system planning, water quality management and flood control are among the most important and costly requirements of sound urban development. Adequate storm water planning, water quality management and flood control are essential to the protection of public health and safety, private property and water resources. Inadequate storm water planning, water quality management and flood control can create costly problems which may include danger to human life; loss of the functional use of water resources; an increase in soil erosion, sedimentation and pollution of surface waters leading to a decline in the health of the local ecosystem; disruption of the movement of people and goods, and the delivery of services; compromise of the structural stability of buildings, pavements and utilities which may require costly maintenance and reconstruction; damage to real and personal property; and depreciation of real property values and attendant loss of tax base. Excessive infiltration and inflow of clear water into sanitary sewers caused by poor drainage and flooding may result in sewer surcharging, the backup of sanitary sewage into the basements of buildings, and the bypassing of diluted sanitary sewage to street pavements, road ditches and surface streams and watercourses. The resulting presence of raw sanitary sewage in the environment may create serious public health hazards. Inadequate drainage and flood control may also create breeding grounds for noxious insects with attendant hazards to human and animal health and life.

Impetus and Authority for Planning Effort

Municipal officials have long recognized the hazards to public health and safety and the economic losses caused by inadequate storm water management and flood control. This recognition was reinforced by extreme rainfall events that occurred within the Village in May of 2007 and again in the spring of 2008. These rainfall events as accompanied by widespread surface ponding and flooding reinforcing the Village's decision to have a storm water management system plan devised to answer the need for adequate storm water management and flood control. Municipal officials also recognize the need for continued protection and improvement of water quality within the area's watercourses.

Consequently, in July 2008, the Village engaged the firm of Ruekert/Mielke to conduct a study of the storm water management system of the Village. The study was to identify actual and potential performance and water quality problems under both existing and probable future land use development conditions and was to recommend needed corrective measures. In effect, the study was to produce a new storm water management system plan for the Village. Capital and operation and maintenance costs attendant to the recommended corrective measures were to be estimated, and a plan implementation program developed. This report presents the findings of the study and describes the recommended new storm water management system plan.

Planning Area

The planning area considered in the systems planning effort is shown on Exhibit 1. The planning area consists of all of the area within the corporate limits of the Village, and has an area of about 4 square miles. As shown on Exhibit 1, an approximate divide separating the Lower Fox River – Illinois River drainage basin from the Lower Rock River drainage basin traverses the planning area. More specifically, the area within the Village lying west or south of the divide is in the Turtle Creek watershed; the area lying east or north of the divide drains to Geneva Lake and is within the White River and Nippersink Creek watersheds. This watershed divide was provided by the Geneva Lake Conservancy and extends around the Lake beyond the Village municipal boundary. In the design of the desired storm water management system plan, consideration was also given to any areas that drain into the Village.

Plan Objective

The proposed new storm water system plan is intended to provide the with a design for a community wide, effective storm water management system that will adequately serve the existing, planned design year 2035 build out land use development conditions within the Village. The plan identifies cost-effective, constructible, corrective measures for existing storm water management, water quality and flood control problems; identifies measures needed to avoid the creation of future problems attendant to new land use development; and identifies measures for the reduction of non-point sources of surface water pollution.

More specifically, the plan and this report:

1. Describe the existing storm water management system and the existing storm water management, water quality and flood control problems in the Village and identify the causes of those problems.
2. Describe existing, planned, and full build out land use conditions and related storm water management and water quality control requirements.
3. Provide a set of objectives and supporting standards to guide the development of an effective, village-wide, storm water management and water quality control system.
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