

City of Novi

Storm Water Master Plan Update

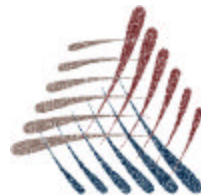


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ftc&h

fishbeck, thompson, carr & huber
engineers • scientists • architects



CITY OF NOVI

STORM WATER MASTER PLAN UPDATE

**FEBRUARY 2005
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EXECUTIVE SUMMARY

An update of the City of Novi (City or Novi) Storm Water Management Master Plan (SWMMP) was commissioned in response to changing environmental regulations, approaches, attitudes, and economic factors regarding the management of storm water and surface water resources in the City.

The City is located within two major watersheds in southeast Michigan. Most of the City (easterly two-thirds) is located in the Rouge River Watershed. The western one-third of the City is located in the Huron River Watershed. Watershed management plans have been adapted by both of these watersheds since the last SWMMP update and the City has also committed to implementing a Storm Water Pollution Prevention Initiative (SWPPI) to meet the requirements of the federal/state Phase II National Pollutant Discharge Elimination System (NPDES) permit program.

An update to the SWMMP was necessary to comply with the Rouge and Huron River Watershed plans as well as the Phase II NPDES regulatory directive. A concise history of storm water management in the City is summarized in Table 1. A map showing the previous direction and present progress of storm water management by drainage district is presented in Figure 2.

A needs assessment was completed as part of this review. In summary:

1. The City continues to experience the result of regional storm water management deficiencies along Ingersol Creek, in the Meadowbrook Lake area, and on the lower reach of the Walled Lake branch of the Middle Rouge River by way of reported flooding, streambank erosion and sedimentation.
2. Sedimentation is also observed to be a problem in at least five regional detention districts.
3. Water quality in Walled Lake is quite good, while Meadowbrook Lake exhibited the lowest water quality scores to the point that it is considered impacted for recreational use.
4. A policy shift away from regional detention towards onsite detention was initiated, but had not been integrated into a SWMMP, or analyzed in terms of effectiveness.
5. Record keeping practices related to storm water facilities were found to be in need of updating.
6. Maintenance of privately-owned detention basins is getting to be an issue.
7. Maintenance of City-owned regional detention basins and storm sewer systems is reactive.
8. A number of isolated localized drainage problems were identified (These areas are indicated in Figure 2).

Key findings from the analysis that formed the basis for the storm water management strategies recommended in this update include:

- In the past, natural lakes, rivers, streams, and wetlands were structurally modified (deepened, widened, paved, dammed) and used for conveyance and regional detention of storm water. They were not viewed as natural resources to be protected. The storm water controls recommended in this plan are designed to be implemented upstream of these natural features to preserve their recreational, wildlife, and economic value as an amenity for the City.
- An onsite detention approach to storm water management should be effective using the criteria presently specified in the City's ordinance. Regional detention (albeit on a smaller scale) should not be ruled out where it makes good sense from an economic, environmental, and/or maintenance standpoint.
- An even more cost-effective approach for storm water management for the City is to couple onsite detention with Low Impact Development (LID) techniques. The LID concept infiltrates storm water near its source while the quantities are still relatively small. Onsite detention does nothing to mitigate the volume increases associated with development. These volume increases translate primarily into accelerated streambank erosion, which usually results in the City initiating a capital improvement project to repair. LID encourages storm water runoff volumes be managed, as well as runoff rates.
- It costs much less to protect lakes and wetlands from sedimentation than to be forced into undertaking dredging projects, to maintain water depth, which is important to the natural functioning of lakes and wetlands.
- The City's Storm Water Discharge Permit (under Phase II of the NPDES program for municipalities) requires that bacteria be controlled by means of an Illicit Discharge Elimination Program (IDEP). In addition to sediment (mentioned above) and bacteria, phosphorous has also been identified as a target pollutant in regard to lake health and overall surface water quality.
- Financing strategies that rely heavily on developer fees with incentives for LID are recommended to minimize the need for special bond sales, additional demands on the City's general fund or implementation of a storm water enterprise fund.

Specific recommendations that address the items identified in the needs assessment and conform to the findings presented above are summarized in Table 5. The ten recommendations listed in this table were synthesized from recommendations made throughout the discussion section of the report (labeled A through R). The estimates provided in the Table 5 are for the next steps of the City's storm water program. The full costs for some recommendations will be determined after initiating the first steps (or scope of services) presented in this update. Other recommendations involve improvements to current ongoing programs.

INTRODUCTION

The City consists of the better part of 32 Sections, which were once part of Novi Township, located in Oakland County in Southeast Michigan. A general location map is shown in Figure 1. Novi gets its name from being stop number six (No. VI) on the Grand River stage route. It has since grown from a stage stop into a progressive community and leader in storm water management.

The City has managed its growth by, among other things, adopting a master plan for land use, a storm water master plan, a wetlands protection ordinance, developing numerous city parks and other public amenities, providing reliable sewer and water service, and involving the public in numerous boards and commissions. Since the *Master Plan for Land Use* was being updated, it was determined that the decade-old *Storm Water Management Master Plan* should also be updated to integrate with the land use plan and the recently completed *Middle One Rouge River Subwatershed Management Plan*.

Fishbeck, Thompson, Carr & Huber, Inc. (FTC&H) was retained in March 2004 to complete this update to ensure that future growth within the City included effective storm water management controls to prevent flooding, protect water quality in open watercourses, protect groundwater, and be economical to construct and maintain. Proper management of the City's water resources is part of the overall quality of life for residents.

BACKGROUND

DEMOGRAPHICS

The City is the 33rd largest of Michigan's 1,800 jurisdictions, growing from a population of just under 10,000 in 1969 when it became a city, to over 47,000 in 2000. It is a relatively affluent community, with a median family income that is almost double that of the national average. Novi is "home" to the residents of its 19,000 housing units, 95% of which are occupied and over 70% owner-occupied. This testifies to the obvious conclusion that the City is a very attractive place to live. Its residential areas are primarily single-family owner-occupied homes whose values are almost double the national average. The residents of Novi are proud of their community and desire to protect and enhance the high quality of life that the City provides. An aerial map of the City using 2002 photography is included for reference in Appendix 1.



Novi City Hall

WATERSHEDS

Most of the City is in the Rouge River Watershed, and more specifically, the Middle One Subwatershed, as seen in Figure 1. A small area on the east and southeast parts of the City are in the Upper Rouge Subwatershed. These subwatersheds have adopted Watershed Management Plans (WMP), and the City has committed to a SWPPI to implement various elements of these WMPs. The SWPPI is one required element of the federal/state Phase II NPDES permit program. The SWPPI commitments are enforceable by the state and federal water pollution control agencies (the Michigan Department of Environmental Quality [MDEQ] and U.S. Environmental Protection Agency [US EPA]). A copy of the SWPPI for the City is included in Appendix 2.

The western third of the City, where most of the City's undeveloped land lies, is in the Davis Creek Subwatershed of the Huron River Watershed as indicated in Figure 1. The Huron River Watershed Council (HRWC) is conducting an Upper Huron Initiative that aspires to restore and protect the water quality and environmental integrity of the upper Huron drainage areas. While the overall health of this area is fairly good, this once pristine area is showing signs of degradation. The cumulative impacts of past and present urbanization are threatening the ecosystem. According to the HRWC, Davis Creek, a

state designated “Natural River,” is one of the highest quality streams in the Huron River Watershed, where endangered species of fish and clams are thriving. However, most of this large creek lies in rapidly growing areas. Some parts of the creek are deteriorating, and one branch has suffered from a history of pollution. This Storm Water Master Plan Update was coordinated with the Upper Huron Initiative to help protect this valuable resource.

TOPOGRAPHY AND SOILS

Novi is moderately flat, as is most of southeast Michigan. Elevations in Novi range from about 1,040 feet to about 820 feet above sea level. The major natural water feature is Walled Lake, which is connected to significant wetland areas. Another large wetland area lies east of the Nine Mile and Napier Road intersection. Numerous smaller wetlands have evolved along the drainage courses and in depressions throughout the City. Novi has several other lakes used for recreation, most of which were man-made or artificially enhanced through dredging and/or dam construction. The most significant of these are Meadowbrook Lake, Island Lake, Twelve Oaks Lake, Shawood Lake (formerly Mud Pond), Sandpoint Lake, Village Woods Lake, and Village Oaks Lake.



Walled Lake

Soils in Novi are generally loams and sandy loams with areas of muck. A generalized soil map is included in Appendix 1. Slopes are flat to 6%, with a maximum of 12%. Depth to groundwater is nominally 3 to



Sand Point Lake

6 feet. Loams are soils with a mixture of sand, silt, and clay particles. They are suitable for a wide variety of uses and not highly erodible. The major soil classifications are Marlette sandy loam, Oshtemo-Boyer loamy sands, Houghton and Adrian muck, Capac sandy loam, Blount loam, Fox sandy loam, Lenawee silty clay loam, Matherton sandy loam, Glynwood loam, Spinks loamy sand, Riddles sandy loam, Metea loamy sand, Brookston and Colwood loam, and Sisson fine sandy loam.

The sandy loam and loamy sand soils may offer opportunities for innovative storm water management techniques such as rain gardens, infiltration trenches, and grassy swales. These techniques reduce the need for storm water detention, restore groundwater recharge, stabilize stream flow rates, and reduce storm water pollution.

HISTORY OF STORM WATER MANAGEMENT

The history of storm water management in the City is summarized in Table 1:

Table 1 – Summary of Storm Water Management in the City of Novi

Date	Description/Standards
Prior to 1970	<ul style="list-style-type: none"> ● Collect and convey storm water runoff to the nearest outlet, adding storm sewers for new development, and improving or replacing existing agricultural tile systems and open channels, many of which are county drains
1970	<ul style="list-style-type: none"> ● Onsite detention for new development in response to flooding ● Designed to reduce the post-development 10-year peak discharge rate to the pre-developed 10-year peak discharge rate (agricultural condition) ● Storm sewers sized for 10-year rainfall event
1980	<ul style="list-style-type: none"> ● Number of onsite detention basins was already over 60. Problems noted included a large number of basins requiring maintenance that were not effective at preventing downstream flooding. It was also argued that onsite basins were expensive to developers
1983	<ul style="list-style-type: none"> ● City adopted a storm water master plan that called for a regional detention policy. The program called for the pro-active planning and construction of 45 regional detention basins city-wide, with basins serving the smaller drainage districts at the City's perimeter to be built in conjunction with development ● Design of regional basins to include control of 1-year, 10-year, and 100-year storms to agricultural conditions ● Storm water retention (infiltration) was discouraged ● Onsite detention recommended release rate based on existing downstream capacity (not 0.20 cfs/acre, the generally accepted maximum allowable release rate at the time) ● Storm sewers sized for a 5-year rainfall event with aboveground system for passage of 100-year flows ● Plan assumed use of existing wetlands and watercourses for regional basins. Plan included detailed recommendations for drainage easement acquisition
1992	<ul style="list-style-type: none"> ● The City adopted a storm water master plan update that continued implementation of the regional detention policy ● Drainage districts further refined, and an additional regional basin was proposed ● Additional recommendations provided to resolve issues of maintenance and funding (land acquisition costs/developer fees). Ten* of 46 proposed regional basins now constructed (Taft, West Oaks, Cedar Springs, C&O, Bishop, Meadowbrook Glens, Jamestown Green, Civic Center, Thornton, and Lexington Green)
2002	<ul style="list-style-type: none"> ● The City has obtained a Phase II NPDES storm water permit and adopted

Table 1 – Summary of Storm Water Management in the City of Novi

Date	Description/Standards
	<p>a SWPPI, IDEP, and PEP to comply with permit requirements to reduce the discharge of pollutants to the maximum extent practicable.</p> <ul style="list-style-type: none"> • The City adopts storm water design criteria based on Washtenaw County standards calling for onsite detention • Design calls for reduction of 100-year peak discharges to 0.15 cfs/acre (well below agricultural conditions) storage of the runoff volume from a 1.5-year rainfall event released over 24 hours, and a water quality volume of 0.5-inch per impervious acre. These criteria are based upon flood protection, streambank erosion prevention, and water quality, respectively. • Twelve** of 46 proposed regional basins now constructed (Grand River and Ingersoll added) • Storm sewers sized for 10-year rainfall event
2004	<ul style="list-style-type: none"> • Request for review of current storm water plan • Fourteen of 46 regional detention basins now constructed (Dunbarton and Haggerty added) • City has experienced 70% build-out • Ongoing problems include sedimentation of lakes, streambank erosion, maintenance, and deficiency in records of regional systems

*City owned and operated basins only (excludes Twelve Oaks Mall, Meadowbrook Lake, Village Oaks, Whispering Meadows, and Turtle Creek)

**City owned and operated basin only (excludes Island Lake)

SUMMARY OF STORM WATER MASTER PLANS

The City has been operating under guidelines of two storm water master plan documents since 1983:

- *City of Novi Storm Water Management Master Plan*, JCK and Associates, Inc. (formerly Moshe-Kapelczak, Inc.), January 1983.
- *City of Novi 1992 Storm Water Master Plan Update*, JCK and Associates, Inc., December 1992.

These are referred to collectively in this document as the 1983 and 1992 Storm Water Master Plans.

In 1983, the City embarked on a well-designed, comprehensive storm water management plan that appeared to meet the goals of flood protection and took strides towards stream protection and water quality improvement for recreational lakes. This comprehensive and very detailed plan identified storm water management strategies to be implemented on a parcel-by-parcel basis either pro-actively by the City or in conjunction with development. The plan was initiated with much success due to a well thought out financing strategy approved by local voters. However, within a 10-year period, the plan was becoming more difficult to implement. This was due primarily to the following factors:

- Increased land costs affecting the willingness of the City to purchase property and easements.

- Declining public awareness of the benefits of the regional detention approach resulted in regional detention projects receiving a lower priority at budget time.
- Changing attitudes of environmental regulatory authorities in regard to open channel cleanout, in-line detention, the use of natural wetlands for storm water management, and the use of streams as storm sewers.

An update in 1992 provided more detailed analysis for continued implementation of regional detention for specific drainage districts and addressed some of the fee structure and maintenance issues that had been identified since adoption of the original master plan.

A map of the original drainage districts including major surface water features, storm sewers, and regional detention basins is shown in Figure 2. The status of implementation of these storm water master plans is summarized in Table 2.

Table 2 – Summary of Previous Storm Water Master Plan Recommendations and Status

Recommendation	Current Status
1983	
Pursue the pro-active planning and implementation of a system of regional storm water detention basins	Ongoing through 2002. Fourteen of 46 regional detention basins constructed
Adopt a wetland and woodland ordinance to preserve these natural features for the management of storm water	Done. Wetlands ordinance adopted on August 19 1985 Woodland ordinance adopted on December 15, 1986
Require the design of both major (100-year) and minor (5-year) drainage systems	Not done. A 10-year design storm has been the standard
Implement a comprehensive regular maintenance program through City ordinance	Done. Provisions for maintenance of new facilities included in Storm Water ordinance May 20, 2002
Conduct a revised flood insurance study to establish new 100-year flood elevations for the City	Not done. However individual LOMRs have been filed. FEMA is presently undertaking a state-wide floodplain mapping update on a county basis. Oakland County is being completed in 2004 through 2005
Revise storm water master plan after 7 years	Done. Completed in 1991 to 1992
Update and maintain topographic section maps for storm sewer inventory	In progress. Geographic Information System (GIS)-based mapping has since been implemented. Storm sewer system maps are incomplete
Keep records of high water levels	Not done
Initiate an easement acquisition program	Done, but not completed. Began and then dropped
Prohibit direct discharges into lakes. Discharge to wetlands instead	Done. Included in City ordinance
Reconstruct/retrofit existing detention basins	Not done
Establish a sediment removal program for lakes	Not done. No routine program established,

Table 2 – Summary of Previous Storm Water Master Plan Recommendations and Status

Recommendation	Current Status
	however, sediment is removed when necessary
Reimburse developers for constructing regional basin on the property that serves upstream properties	Not done
Reimburse developers for upsizing storm sewers to convey un-detained offsite flows across their property to a regional detention basin	Not done
1992	
Install several rain gages throughout the City	One permanent rain gage for sanitary sewer monitoring at Novi Police Department. Four seasonal rain gages are available, but have not been used since 2003
Install permanent stream gauging stations on watercourses throughout the City	Not done
Refine the easement and property acquisition approach, which experienced shortfalls due to increased land costs, waning public awareness, environmental permit issues	Not done
Proceed with an aggressive program to eliminate all temporary onsite detention basins	Not done. Temporary onsite detention basins remain and function as permanent basins
Begin a public awareness program	Not done

Financing of the recommended storm water master plan elements was proposed as indicated in Table 3:

Table 3 – Summary of Previous Storm Water Master Plan Financing Recommendations and Status

Recommendation	Current Status
1983	
Bond issue (general obligation bonds) approved by voters to immediately resolve existing flooding conditions (used over 7 years)	Done. Very effective at jump-starting implementation of storm water master plan
City charter amendment approved by voters to provide 1 mill for establishment of maintenance fund and pursuit of regional detention plan (used over 7 years)	Done. Very effective at jump-starting implementation of storm water master plan
Interest on perpetual maintenance and dredging funds	Done. Used to fund ongoing projects
Storm water detention fees (tap fees) by City ordinance for those parcels not required to provide onsite detention	Done
Chapter 20 of Michigan Drain Code for multi-jurisdictional projects and maintenance activities	Done. However, all but 8 county drains have been turned over to City. Used as needed
Developer construction of regional basins	Done. Rare
Require the property owners to provide for maintenance at their expense where rights-of-way are not obtained (association fees)	Done. City also requires a maintenance plan and agreement
Special Assessment Districts	Not done. Not used to fund public storm water projects

Table 3 – Summary of Previous Storm Water Master Plan Financing Recommendations and Status

Recommendation	Current Status
State grant funds for wetland preservation	Not done. No state funds have been sought
Federal funds for floodplain map updates	Not done. No federal funds have been sought
1992	
Revise City ordinance to require collection of tap fees for all developers (except for individual lots where maintenance of basins is done by the land owner)	Done

In 2002, a new storm water ordinance drastically altered the City's approach to storm water management from that of regional detention, back to an onsite detention policy with more restrictive standards. The new ordinance was adopted without modifying the 1983 and 1992 Storm Water Master Plans.