Stormwater Utility Report

January 29, 2016

Introduction

This report provides information and analysis in support of the Village Council Top Priority Action Item *Consider Changes to the Stormwater Utility*.

The Village has owned and maintained a stormwater management system for many decades. The size and complexity of the system has increased dramatically in the past several years. In 2013, the Village created a stormwater utility to pay for all stormwater management related expenses. Under the utility approach, revenues are generated by fees paid by property owners. The fees are based on the amount of impervious area located on each parcel. All properties except those that are exempt from property taxes pay stormwater fees.

Prior to the creation of the stormwater utility, general revenues, primarily property taxes, were used to pay for stormwater related expenses. With the creation of the utility, the Village identified a recommended level of service to be provided and developed a long term plan for achieving it. The plan addresses revenue generation, system maintenance activities and capital improvements over a 15 year period.

In 2015, the Village Council identified *Consider Changes to the Stormwater Utility* as a Top Priority Action Item. While the fundamental policy question to be addressed relates to the type and amount of revenue that should be used to pay for stormwater related expenses (utility fees or property taxes), many other policy issues could be addressed as part of this project including but not limited to:

- What level of stormwater management service should the Village provide and how does this compare to the level of service currently being provided?
    - What maintenance activities should be completed and how often should they be completed?
    - What capital improvements should be made to the stormwater system? When should they be made? How should they be prioritized?
- What is the financial and operating plan to move from the current level of service to the recommended level of service?
- How should revenue be generated? Fees, property taxes or a combination of both? Who should pay for these costs and in what amounts?

The policy direction provided by the Council with this project will begin to be implemented in 2017 and will be reflected in the FY17 Municipal Budget.

The project is scheduled to be completed by September 30, 2016. The work plan calls for the Council to host a series of public meetings on this topic from February through September. Public participation in this project in welcomed and encouraged.

This report provides a summary of:

- Summary of Key Policy Questions and Points
- Background Information
- The Village's Recent Stormwater Management History
- Federal, County and Village Stormwater Regulations
- The Recommended Level of Service
- The Existing Stormwater Management System and the Current Level of Service Provided
- The Stormwater Utility
- Multi-Year Plan for Moving from the Current to the Recommended Level of Service
- Comparison of a Utility and Property Tax Model

Overview

Key Policy Questions

- What level of stormwater management service should the Village provide and how does this compare to the level of service currently being provided?
    - What maintenance activities should be completed and how often should they be completed?
    - What capital improvements should be made to the stormwater system? When should they be made? How should they be prioritized?
- What is the financial and operating plan to move from the current level of service to the recommended level of service?
- How should revenue be generated? Fees, property taxes or a combination of both? Who should pay for these costs and in what amounts?

Key Points

1. There is a large, complex stormwater management system in the Village of Downers Grove. Portions of the system are publicly owned while other portions are privately owned.

2. The goal of the stormwater management system is to reduce the frequency and severity of stormwater related flooding of buildings, yards and roads by:
    - limiting the amount of stormwater runoff that enters the system (achieved via regulations and incentivizing on-site stormwater management)
    - storing and conveying runoff in structures and areas designed and intended for such purposes

3. The effectiveness or level of service of the stormwater management system can be expressed in terms of the percentage of rain events in which runoff is safely stored and conveyed for the properties it serves.

4. The recommended level of service is to create and maintain a stormwater management system that will safely convey and store runoff for 100% of properties from 95% of rain events experienced in any given year. The Village Council can change the recommended level of service.

5. The current level of service of the stormwater management system varies throughout the Village based on whether formalized infrastructure exists, the age and condition of the infrastructure and the physical attributes of properties.

6. The Village's stormwater management system currently safely stores and conveys stormwater for about 90% of the properties in 95% of the rain events. There are approximately 2,200 properties in the Village that are not served at the recommended level.

7. The stormwater management system must be maintained to continue to provide the current level of service. Maintenance includes recurring maintenance activities and the replacement of existing structures once they are beyond their useful life.

8. To achieve the recommended level of service, the stormwater system must be expanded and enhanced by constructing new infrastructure where it does not currently exist, increasing the capacity of existing infrastructure that is not adequately sized, and increasing the maintenance activities.

9. The level of service of the stormwater management system has improved greatly since 2008 as a result of the construction of over 50 capital projects at a cost of about $30 million and increased maintenance activities.

10. The Village is performing about half of the maintenance activities required to sustain the current level of service. The cost of the current maintenance activities is about $2 million per year.

11. The Village has identified the maintenance activities that should be performed to achieve the recommended level of service. The estimated annual cost of these activities is $4 million.

12. The Village has identified and prioritized 22 capital projects that should be constructed to improve service levels in areas that do not currently meet the recommended level. The estimated cost of these projects is more than $40 million, including $500,000 of existing storm sewers should be replaced each year.

13. Revenues dedicated to fund the stormwater management system generate about $3.7 million while the estimated annual revenue required to achieve the recommended level of service is $8 to $10 million.

14. The Village has a financial and operating plan to move from the current to recommended level of service over a 15 year period. The plan calls for 8.7% annual increases in revenue,

a steady increase in the maintenance activities and alarge amount of capital projects to be constructed between 2018 and 2024. The capital projects would be paid for with proceeds from two $10 million bond issues in 2018 and 2021.

15. The Village currently operates the stormwater management system as a utility. All property tax paying parcels pay fees based on the amount of impervious area located on the parcel. Fees can be reduced by qualifying for credits and incentives.

16. The utility was created in 2013 to:
    - improve the relationship between the amount paid by a property and its impact to the stormwater system,
    - provide a dedicated revenue source to be used solely for stormwater expenses
    - generate additional revenue to pay for the cost of improving the service level and complying with regulations.
    - increase awareness about stormwater management and the cost of providing services
    - encourage property owners to reduce runoff generated by their property by managing stormwater on-site.

17. In 2015 the stormwater fee system was amended to not charge fees to owners of property that are exempt from property taxes.

Summary of Utility Model Compared to the Property Tax Model

The cost burden of the utility model compared to the property tax model is shown in the tables below.

Land Use Category	Amount of Impervious Area	Revenue in Property Tax Model	Revenue in Utility Model
Residential	47%	76%	52%
Commercial	36%	21%	39%
Industrial	8%	3%	9%
Property Tax Exempt	9%	---	---
Total	**100%**	**100%**	**100%**

2016 Analysis	Utility Model	Property Tax Model	Difference
Revenue Available for Stormwater Fund	3,644,739	3,644,739	$0
VoDG Tax Levy	12,303,584	15,948,323	3,644,739
Annual SW Fee for Typical House (Tier 2 Fees)	116.64	0.00	(116.64)
Annual VoDG Property Tax for Typical House ($300,000 EAV)	608.68	788.99	180.31
Total Paid by Typical House	**725.32**	**788.99**	**63.67**

Stormwater fees are based on an Equivalent Runoff Unit (ERU). One ERU is equal to 3,300 square feet of impervious area, which is the average for a single family residential property in the Village. Each single family residential property is charged according to one of three tiers (.75 ERU, 1 ERU or 1.5 ERU). Other properties (commerical, multi-family) are charged based on the actual amount of impervious area (the fee per ERU is multiplied by the actual amount of impervious area).

The stormwater fees and revenue generated from the fees are shown in the table below.

Year	Fee Per ERU	Annual Revenue
2013	$8.40	$3,267,817
2014	$8.94	$3,701,939
2015	$9.72	$3,657,367
2016 (adopted budget)	$9.72	$3,644,739

- Property tax exempt parcels were excluded from stormwater fee beginning January 1, 2015
- Credits and incentives vary from year to year

Background Information

What Kind of Water?
All water is not the same...

> **Tap water** comes from a faucet and is used for drinking, bathing, cooking and household purposes. Customers receive a bill for their tap water use from the Village.
>
> **Wastewater** is water that has been used for such things as washing clothes or flushing the toilet. Customers receive a bill for their wastewater use from the Downers Grove Sanitary District. Wastewater is also known as sanitary sewage.
>
> **Groundwater** is the water located underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers.
>
> **Stormwater** originates from rain or melting snow or other activities involving outdoor water use such as car washing or hosing off the driveway. Water that does not soak into the ground becomes runoff. Every property generates runoff and benefits from the Village infrastructure system that manages stormwater.

This report deals with stormwater and the stormwater management system.

Rain Events and Service Levels
Simply put a *rain event* is any occurrence of rainfall. A rain event can range from a light drizzle to a downpour; from a shower to a thunderstorm. Sometimes rain events are referred to as *storm events*. They are the same thing.

Rain events vary greatly. Duration varies from just a few seconds of rainfall to extended periods of rain lasting 24 hours or more. Amounts vary from just a trace of rainfall to multiple inches. Intensity varies from a small amount of rain falling over a long period of time to large amounts of rain falling in a short period of time. The number of rain events that occur in an area vary as well. In the Chicago area, there are on average 125 days in each year with rain events.

Since the stormwater management system exists to manage runoff generated from rain, the effectiveness or level of service of the system is expressed in terms of rain events.The specific attributes of each rain event affect the stormwater management system differently. Level of service

can be expressed in terms of the percentage of rain events that are effectively managed by the stormwater management system. For example, a system that effectively manages runoff from 99% of rain events provides a high level of service. Conversely, a system that effectively manages runoff from 50% of the rain events provides a low level of service.

Number of Days with Rain Events at O'Hare, 2011 to 2015

	2015	2014	2013	2012	2011	Total
Jan	2	2	6	3	0	13
Feb	1	1	2	3	3	10
Mar	4	4	3	9	8	28
Apr	9	12	14	12	18	65
May	15	17	13	13	19	77
Jun	16	16	17	8	14	71
Jul	11	13	13	11	14	62
Aug	9	14	9	10	11	53
Sep	7	12	10	10	14	53
Oct	9	10	12	12	10	53
Nov	8	6	8	6	9	37
Dec	11	6	5	8	11	41
Total	**102**	**113**	**112**	**105**	**131**	**563**

Managing Stormwater

When it rains and when snow and ice melts, the water has to go somewhere. Some of the water soaks into the ground and becomes groundwater. Water that does not soak into the ground becomes runoff. Runoff flows overland following the contours of the land and collects in low lying areas or flows into storm sewers and creeks.

To reduce the risk of stormwater flowing and collecting in areas that are not desirable such as in buildings, in yards and in roads, stormwater should be managed. A stormwater management system consists of pipes, ditches, basins, and other components that hold and direct stormwater into the places it is designed to go. The concept is simple: construct and maintain a system that keeps stormwater runoff out of structures (houses and buildings) and delivers it to detention basins, pipes, ditches and creeks.

There are two key components of managing stormwater: storage and conveyance. Storage is the act of temporarily holding stormwater so that some water can soak into the ground or slow down the flow of water to prevent it from overwhelming areas downstream.

Conveyance is the act of carrying stormwater into a larger body of water such as a creek. Pipes, ditches and streams convey stormwater.

Storage and conveyance work together to deliver stormwater runoff to the desired locations within the desired time frame.

Without proper stormwater management, rain events may result in flooding in buildings, in yards and on roads, leading to property damage and dangerous road conditions. Stormwater runoff must be channeled through a system of pipes, ditches, catch basins and storm drains before being safely discharged into local streams and rivers. Even if a specific property has never flooded, the stormwater that flows from the property still contributes to the overall flow and must be managed so that it does not cause flooding downstream on property or roads.

Flooding and Its Causes

Flooding is the collection of an amount of water in an area of land or buildings that is intended to be kept free of water.

Flooding has many causes. Some flooding is due to stormwater while other flooding is due to sanitary sewer water and groundwater. The Village's stormwater management system, described later in this report, is intended to reduce the frequency and severity of flooding due to stormwater issues (items 1, 2 and 3 below).

1. *Too much stormwater all at once*- Flooding can be caused when one large rain event generates an amount of runoff that exceeds the capacity of the stormwater management system.

2. *Too much stormwater over a long period of time* - Flooding can be caused when a series of rain events generates an amount of runoff that exceeds the capacity of the stormwater management systems. This typically happens after a series of rain events when the ground becomes saturated, and the basins and creeks are full.

3. *Stormwater flows into a building through windows and doors* - This type of flooding happens when runoff exceeds the capacity of stormwater management system as described in the two scenarios above. Stormwater flows over the land directly into buildings through window wells and doors.

4. *Groundwater enters a building when a sump pump stops working or is overwhelmed* - Basements can flood when sump pumps stop working and

groundwater flows into the sump pit and is not pumped out. Groundwater then overflows the sump pit and into the basement. Sump pumps can stop working due to power outages and pump motors burning out. In some cases, flooding occurs when the sump pump is overwhelmed as the horsepower of the pump is not sufficient to handle the amount of water entering the sump pit.

5. *Groundwater Seeps into basement floors and walls* - Basements can flood when groundwater seeps into cracks in the basement floors and walls.

6. *Sanitary sewer system becomes blocked* - Basements can flood when sanitary sewage can not flow into the sanitary sewer system due to a blockage. More information about this type of flooding can be found on the Downers Grove Sanitary District website by clicking here:http://www.dgsd.org/sewercustomerprograms.htm

7. *Sanitary sewer takes in stormwater and overflows* - Basements can flood with a mix of sanitary sewage and stormwater. This occurs when sanitary sewer pipes take in stormwater in an amount that exceeds the capacity of the sanitary sewer system and backs up into the building. More information about this type of flooding can be found on the Downers Grove Sanitary District website by clicking here:http://www.dgsd.org/sewercustomerprograms.htm

Improving the System, Not Solving Flooding

Stormwater management systems cannot prevent all flooding. No matter how big the stormwater management system is and no matter how well it is maintained, there will be a rain event that generates more runoff than the system can handle. Therefore, “solving” the stormwater issues is not feasible. The stormwater management system can be changed or enhanced to improve its ability to store and convey runoff in rain events.

Village's Recent Stormwater Management History

The Village has owned and maintained a stormwater management system for many decades. In 2002, the Village created the Stormwater Utility Exploratory Committee to examine the feasibility of creating a utility to address cost of complying with the regulations found in the Clean Water Act.

In 2006, a Stormwater Master Plan was completed which provided recommendations for how the stormwater system should be managed to ensure compliance with the federal and county regulations.

Widespread flooding from heavy rains in October of 2006 prompted the Village to comprehensively address deficiencies in the infrastructure and maintenance of the public stormwater system. In 2007 the Village completed the Watershed Infrastructure Improvement Plan (WIIP) which included projects recommended to primarily address drainage and stormwater issues within the public system.

From 2008 to 2015 the Village constructed more than 50 capital projects funded primarily by a $25 million bond issuance.

In 2013, the Village launched the stormwater utility and created a plan for establishing stormwater fees that would increase revenues over a 15 year period, allowing the Village to move from the current level of service to the recommended level within that time frame.

Prompted by widespread flooding from heavy rains in April of 2013, the Village prepared the 2014 Stormwater Project Analysis. This report included a new approach for prioritizing stormwater capital improvement projects that is consistent with the Village's fee-based stormwater utility and formalized the Village's recommended level of service.

Federal, County and Village Stormwater Regulations

The Village is subject to county and federal regulations regarding stormwater. It is required to manage the stormwater system at a level that ensures compliance with the federal Clean Water Act and in accordance with DuPage County stormwater regulations.

Clean Water Act

The Federal Clean Water Act requires the Village to participate in the National Pollutant Discharge Elimination System (NPDES) permit program, which is administered by the State of Illinois. All municipalities that have a stormwater system that discharges into a stream or lake are required to hold this permit. The permit requires that the Village develop, implement, and enforce a stormwater management program designed to reduce the discharge of pollutants from the stormwater system to the maximum extent practicable and to protect water quality.

As part of the permit, the Village is required to report on progress on these six measures annually:

- Public education and outreach on stormwater impacts: Regularly distributing educational information through a variety of outlets, including speaking at local workshops and events, social media posts and informational articles in local newspapers, the Village newsletter and on the Village's website
- Public involvement and participation: Creating opportunities for the public to participate and take actions to reduce stormwater runoff, such as rain barrel sales. Participating in the Municipal Engineers Group at the county level.
- Illicit discharge detection and elimination: The Village has an agreement with DuPage County regarding non-stormwater related discharge into its system. Pursuant to the terms of the agreement, DuPage County will investigate incidents and the Village will enforce against violations.
- Construction site storm water runoff control: DuPage County and the Village's stormwater control ordinance require erosion and sediment control Best Management Practices along with the control of construction material debris. The Village reviews BMP designs prior to construction and inspects sites during construction.
- Post construction storm water management in new development and redevelopment: The Village has a stormwater control ordinance that regulates new development and on-going maintenance for privately owned and maintained stormwater controls.
- Pollution prevention/good housekeeping for municipal operations: The Village implements internal policies, procedures and training to reduce the risk of pollution from its own operations.

DuPage County Stormwater Regulations

The DuPage County Stormwater Ordinance has specific regulations for developments, specifically regarding development in the floodplain, site runoff, and sediment and erosion control. The Village is a complete waiver community, which means that it is required to adopt regulations consistent with and at least as stringent as the DuPage County requirements.

Village Regulations

The Village adopted a stormwater control ordinance that is consistent with, and more stringent than, the County ordinance. http://www.downers.us/public/docs/code/Chapter26.pdf

Examples of requirements for developments include:

- Floodproofing for new buildings or additions to buildings located in a floodplain or localized poor drainage area (LPDA)
- A permit review process that includes items such as a drainage plan, a grading and site restoration plan, review of impact on wetlands, and sediment and soil erosion control plans

Additionally, in 2015, the Village adopted a revision to its stormwater ordinance that requires all developments that result in new impervious area of greater than 700 square feet to install Post-Construction Best Management Practices to mitigate the stormwater impacts of new development on neighboring properties. Examples of these include dry wells, rain gardens or permeable pavers. These regulations are intended to reduce the amount runoff flowing onto adjacent properties and entering the public portion of the stormwater management system.

National Flood Insurance Program

The Village participates in the National Flood Insurance Program, which means that any property owner or renter may buy flood insurance. As part of this program, the Village agrees to implement floodplain management regulations. In addition, the Village has a rating under the National Flood Insurance Program Community Rating System of a CRS 6. The Community Rating System (CRS) is a *voluntary* incentive program that recognizes communities for implementing floodplain management practices that exceed Federal minimum requirements of the National Flood Insurance Program (NFIP) to provide protection from flooding. Only about 5% of all NFIP communities participate in the CRS program, In exchange for a community's proactive efforts to reduce flood risk, policyholders can receive reduced flood insurance premiums for buildings in the floodplain.

These reduced premiums reflect the reduced flood risk resulting from community efforts toward achieving the three CRS goals:

1. Reduce flood damage to insurable property

2. Strengthen and support the insurance aspects of the NFIP

3. Encourage a comprehensive approach to floodplain management

There were over a dozen stormwater best practices and activities in place by the Village that were recognized by the rating agency. Some of these practices include Village flood protection standards, local flood studies, and open space preservation.

The Village's CRS 6 rating qualifies property owners who live in the floodplain for a *20% discount on flood insurance premiums*, as of May 1, 2014. Property owners that do not live in the floodplain can still purchase insurance at a discounted rate.

The Recommended Level of Service

The Village has established the following recommended level of service for the stormwater management system:

> **The recommended level of service is to create and maintain a stormwater management system that will safely convey and store runoff for 100% of properties in 95% of rain events experienced in any given year**.

This means that 100% of properties in the Village would be protected from stormwater flooding in 95% of rain events. It is not possible to construct a stormwater management system that will protect 100% of properties from 100% of rain events.

The recommended level of service was developed over time and is based on the findings and analysis of the 2006 Stormwater Master Plan, the 2012 Stormwater Utility Report and the the 2014 Stormwater Project Analysis.

For purposes of the recommended level of service, "safely convey and store runoff" means: Stormwater is carried through functioning pipes, overland flow routes or ditches that are built for that purpose and volume and stored in natural or constructed basins or other infrastructure facilities, rather than in areas not intended for overflow, such as roads or buildings.

Achieving the recommended level of service means that:

- All properties in the Village will be protected from stormwater related flooding in 95% or more of all rain events.
- Some properties will experience stormwater related flooding in 5% or fewer rain events. Given that there are about 125 days with rain events each year, stormwater related flooding on a small number of properties can be expected about six times per year.
- Some Local Poor Drainage Areas (LPDAs) would be eliminated. Others would be reduced in size by adding storage or other infrastructure that would further reduce the likelihood of flooding. (More information on LPDAs is included in the appendix)
- Some floodplain areas would be reduced in size while other floodplain areas would remain unchanged. (More information on floodplains is included in the appendix.)

The Existing Stormwater Management System and Current Level of Service Provided

The Village maintains a stormwater management system to reduce the frequency and severity of flooding in buildings, in yards and on roads throughout the Village. The Village has owned and operated the system for many decades. In the past several years it has grown in size and complexity. The system now consists of:

- 7,000 drainage structures
- 475 stormwater detention facilities
- 130 miles of storm sewer pipes
- 12 miles of streams
- 140 miles of roadway ditches
- 47,000 feet of culverts

The backbone of the Village's stormwater drainage system is provided by three creeks:

- Lacey Creek, which is north of Ogden Avenue;
- St. Joseph Creek. which flows through the central portion of the Village; and
- Prentiss Creek, which is south of 63rd Street.

All three creeks drain westward and empty into the East Branch of the DuPage River. Storm drainage pipes, inlets, culverts, and ditches drain water from streets and properties to the three creeks.

There are floodplains and Localized Poor Drainage Areas located throughout the stormwater system.

The Village's stormwater system was built over time as the Village developed. The requirements and regulations for stormwater management have become more stringent over time. As a result, in some portions of the Village, the stormwater system is modern and has enough capacity to effectively manage most rain events. In other areas there is no infrastructure, or, the stormwater infrastructure is undersized for the area it serves.

⅔ of the Village is served by storm sewers, pipes and other drainage systems	⅓ of the Village is served by ditches and culverts

The existing stormwater management system provides a high level of service with approximately 90% of the properties protected from flooding in 95% or more of the rain events. About 2,200 properties are not protected from flooding at the recommended level.

The stormwater management system is comprised of publicly owned and privately owned components. Generally speaking, the Village owns and maintains the public portions including ditches, some detention basins, culverts, pipes and portions of creeks. Private property owners own and maintain components such as detention basins, dry wells, drainage swales and portions of creeks.

What is a 'storage' system?
Storage systems are detention basins, ponds and permanent wetland areas that hold and slow runoff. Recently completed storage improvements include the dry basin at Washington Park and the 2nd and Cumnor detention area.

What is a 'conveyance' system?
A conveyance system is made up of ditches, culverts, pipes and creeks that carry stormwater until it drains into a larger body of water. The Village's stormwater drains into the East Branch of DuPage River.

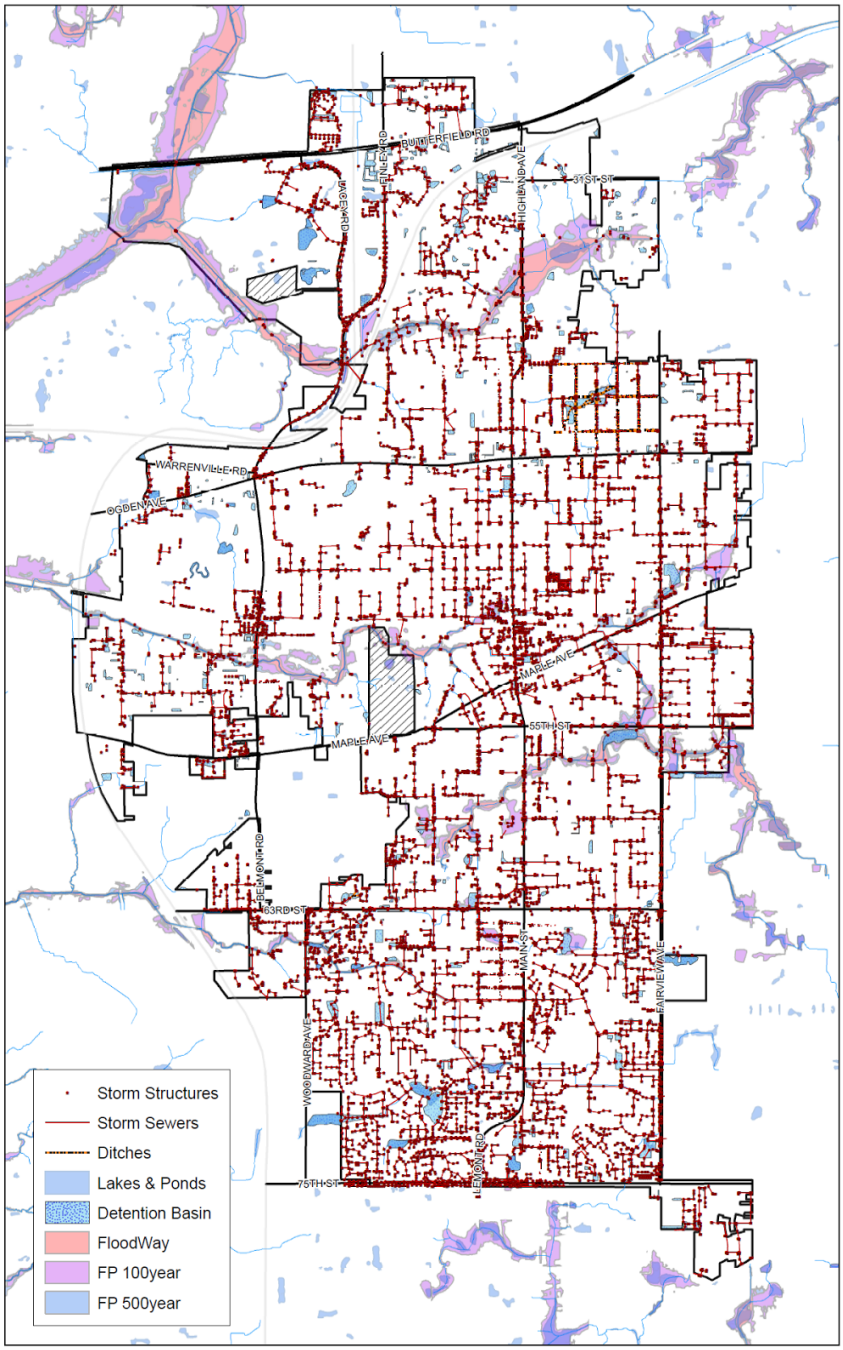
In general, the stormwater system is divided between **storage** and **conveyance** structures. Detention areas, rain gardens and wetlands are storage areas. Storage is used to temporarily hold stormwater in major rain events so that some water can soak into the ground or slow down the flow of water to prevent it from overwhelming areas downstream. Many storage structures also have water quality features; these features serve to prevent pollutants from being washed downstream.

Pipes, ditches and streams are conveyance structures. They carry water until it drains into a larger body of water.

The stormwater system is extensive and consists of:

- Approximately 7,000 drainage structures
- 475 stormwater detention facilities (the majority are privately owned)
- 130 miles of storm sewer pipes
- 12 miles of streams
- 140 miles of roadway ditches
- 47,000 feet of culverts

Map: Village of Downers Grove Stormwater Management System



All Pieces of the Stormwater System Work Together

The stormwater infrastructure is referred to as a ***system*** because all the pieces of infrastructure must work together to reduce flooding. This means:

1. Properties should be designed and built to allow some water to soak into the ground and not run off onto adjacent property.
2. Water that cannot soak into the ground should enter the conveyance portion of the system. This runoff should enter into pipes and ditches.
3. The stormwater should then enter the storage portion of the system. This runoff should be held in detention or retention areas to slow the flow into pipes and streams.
4. Finally, the stormwater should be conveyed into the major creeks and streams. Streams are cleaned and the streambanks are stabilized to prevent erosion to maintain clear paths so that streams do not back up, as well as to protect public and private property adjacent to creeks.

Causes of Stormwater Flooding

In general, flooding occurs when rain or melted snow cannot soak into the ground or be carried efficiently through pipes or ditches until it reaches streams. Flooding can occur for several reasons, including when:

- Too much rain falls (or snow melts) in a short period of time and flows too quickly to be absorbed into the ground
- Long periods of wet weather cause the ground to become saturated to a point where it cannot absorb more water
- Old infrastructure fails, such as when a pipe collapses or a ditch or stream is clogged with debris
- Old infrastructure is not big enough for all of the runoff or was not designed to meet today's standards
- Overflow paths are not provided or maintained. An overflow path provides runoff with a place to be safely conveyed to a pipe or ditch
- Newer infrastructure is not properly cleaned or maintained, such as when the shoreline of a detention pond erodes

More specifically, flooding can occur due to hydraulic and structural failure as described below.

Hydraulic Failure

Portions of the infrastructure system such as storm sewers, culverts and streams become clogged with debris, silt, vegetation or other items, partially or completely obstructing the flow of stormwater runoff. To reduce the likelihood of hydraulic failure, the Village performs maintenance activities such as catch basin cleaning, storm sewer inspection and cleaning, street sweeping, ditch cleaning, streambank stabilization, debris and sediment removal from detention basins and repair

and replacement of structures. These activities are performed based on an established schedule designed to keep the system functioning at capacity.

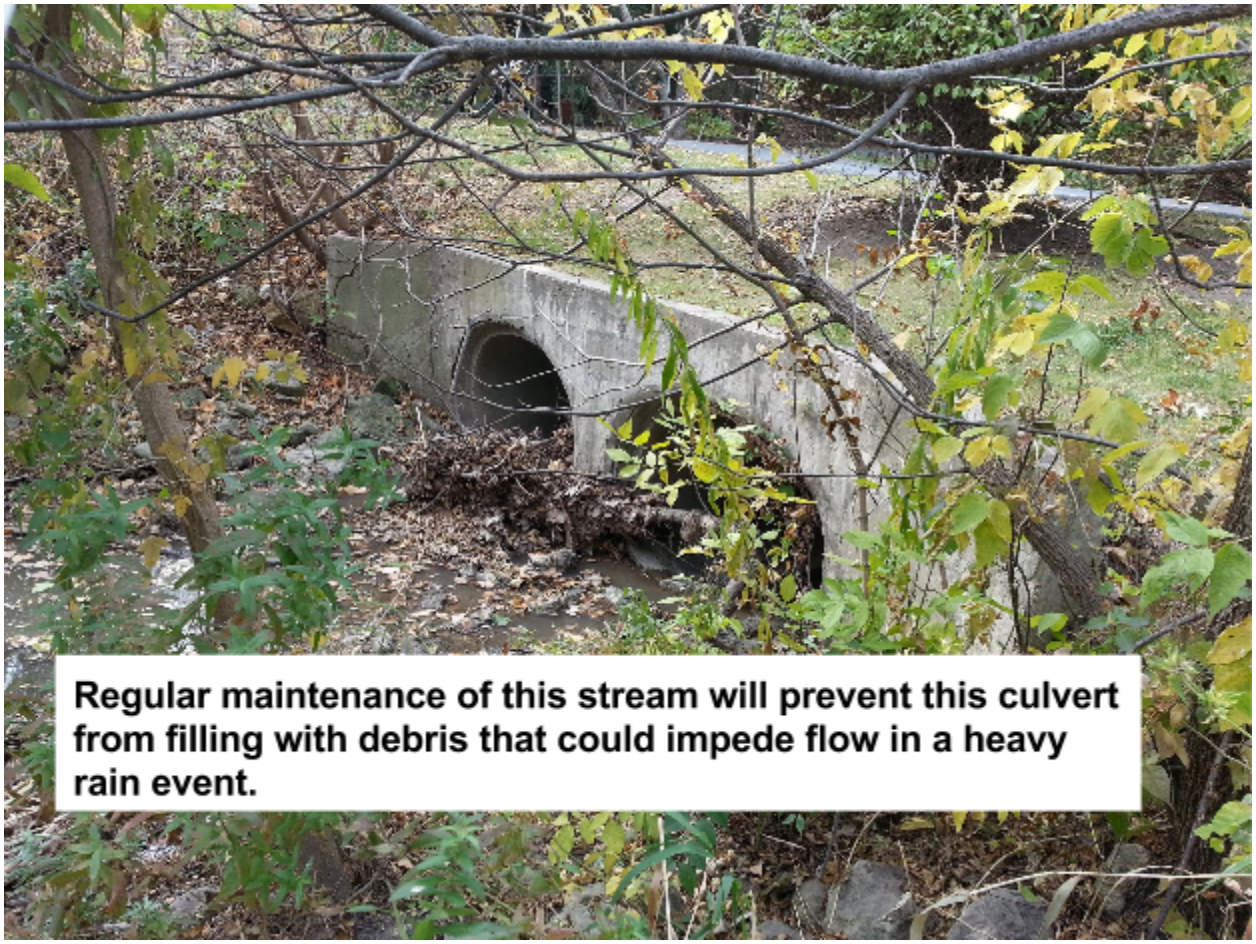
Structural Failure

Portions of the infrastructure system such as storm sewers and culverts crack or collapse. Structural failure is due primarily to age, type of material and construction methods. Below is an example of structural failure of a clay pipe that has collapsed.

To reduce the likelihood of structural failure, the Village replaces portions of the infrastructure that are past their useful life expectancy or that have already cracked or collapsed.

In this picture from the April 2013 flood, the amount of runoff exceeded the capacity of the system. Future capital projects can reduce this risk by expanding capacity.

This is a 'Before' photo of Lacey Creek. The streambank retaining wall failed. Retaining wall failure can cause streams to back up as well as impact water quality downstream.


Regular maintenance of this stream will prevent this culvert from filling with debris that could impede flow in a heavy rain event.

1. Dry Wells or Rain Gardens are Best Management Practices (BMPs) that allow some stormwater to absorb into the ground onsite.

2. Water that is not absorbed into the ground is carried through ditches or pipes.

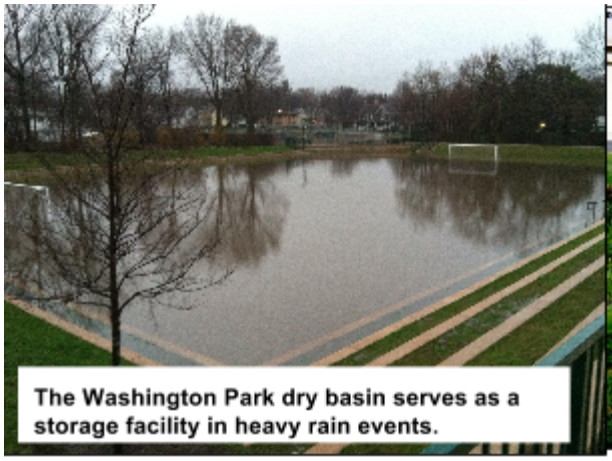
3. A detention or retention area helps holds water until it can drain slowly downstream.

4. This stream is free of major impediments to flow.

The Village's stormwater issues are exacerbated by topography and the history of development in Downers Grove.

- **Some properties are located in depressional areas, which do not connect well to the Village portions of the stormwater management system.**
- **Some buildings were built in floodplains before regulations and stormwater modeling existed**
- **Large portions of creek and detention areas are located on private property where the Village does not have the rights to access and perform work**
- **Infrastructure now maintained by the Village was originally constructed to meet older regulations and may not meet the standards that would be required today**

Examples of Storage



The Washington Park dry basin serves as a storage facility in heavy rain events.

This bioswale collects water in a low spot

Valley View Pond serves as a wet bottom detention area. The Village recently completed a naturalization project that will promote water quality and improve drainage.

Examples of Conveyance

Putting Stormwater Funding to Work

The Village uses stormwater fund revenues for many activities related to maintaining and improving the stormwater management system. Historically, these expenses have been divided into two major categories: Capital and Operations & Maintenance.

Capital Expenses	Operations & Maintenance Expenses
• New stormwater storage (such as a retention area) • Streambank stabilization • Storm sewer expansion and replacement • Major refurbishment or repairs to existing assets • Property acquisition • Debt service payments	• In-house operations (such as engineering and customer service) • Street sweeping • Ditch maintenance • Stream cleaning and maintenance • Storm sewer inspection and maintenance • Detention basin cleaning and vegetation maintenance

Capital Improvements

Capital expenses can best be described as 'project' types of expenses. That is, the project has a start and end with a specific purpose. It results in a new asset or a significant improvement or refurbishment of an existing asset. Many capital projects have been financed through bond issuances. This allows the Village to construct projects up front and pay the cost off over the useful life of the project, rather than accumulating enough cash on hand to pay for the project.

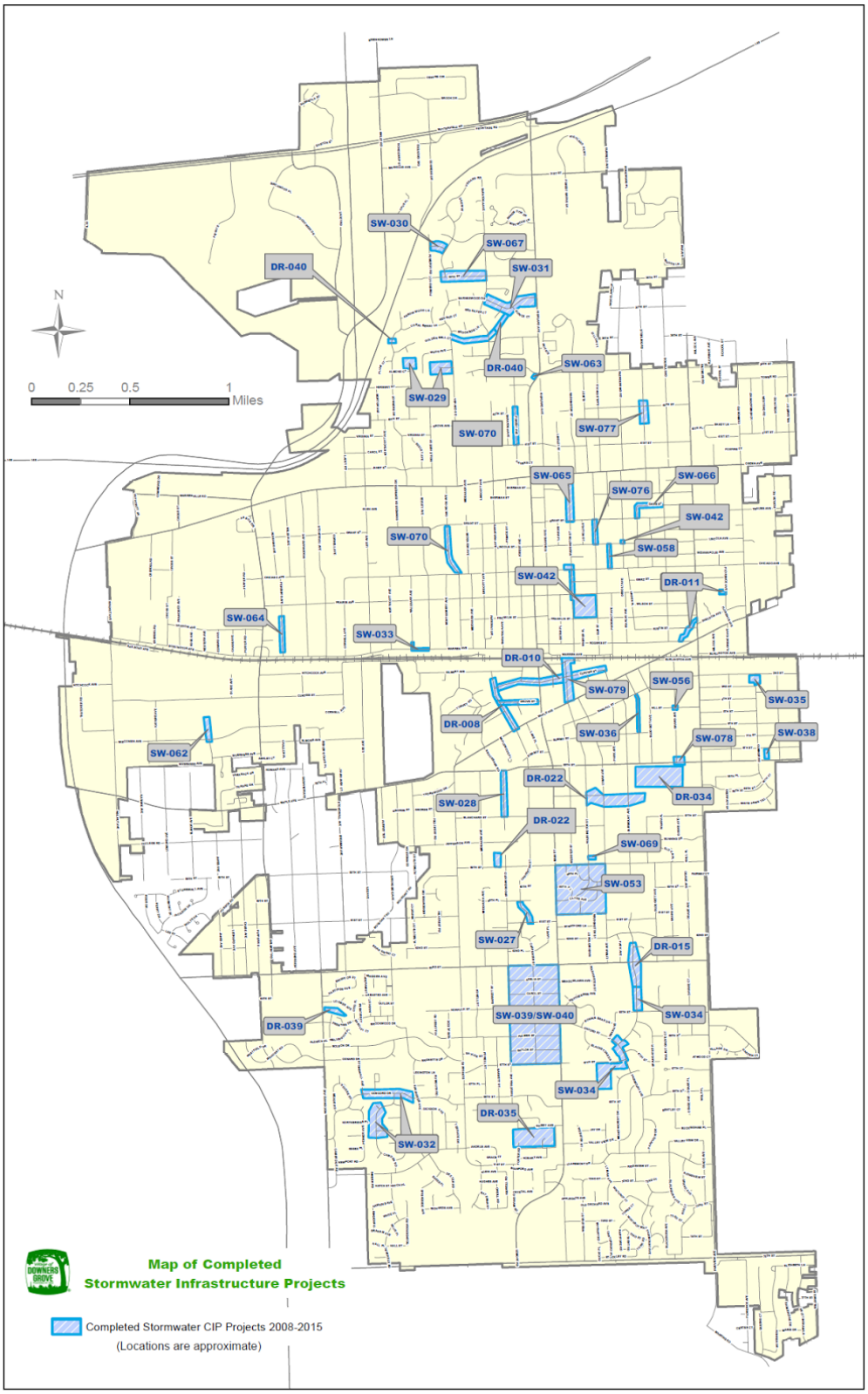
Completed Stormwater Projects, 2008 - 2015

There are many different types of capital projects. From 2008 to 2015, the Village completed more than 50 capital projects at a cost of more than $30 million. A list is provided in the appendix.

Examples of major types of projects include:

- Constructing additional detention storage
- Replacing storm sewers
- Stabilizing or rebuilding streambanks
- Improvements that help move water by creating a ditch or storm sewer system where one does not exist or retrofitting an existing system
- Buying property and removing homes where other stormwater and drainage solutions would be too expensive
- Rebuilding or replacing major infrastructure, such as headwalls

Map: Sites of Stormwater Improvement Capital Projects 2008-2015



Operations and Maintenance

Operations & Maintenance helps to keep the existing assets in the stormwater system functioning properly. The 2016 budget for maintenance is $2.0 million; this allows the Village to perform about half of recommended maintenance.

Table: Current and Recommended Level of Service for Maintenance

			Current		Recommended	
Maintenance Activities		Assets	Assets Managed Per Year	Maintenance Frequency (Years)	Assets Managed Per Year	Maintenance Frequency (Years)
Structure Maintenance	Catch Basin Cleaning	7,000	650	11	1750	4
	Structure Repair	7,000	20	350	70	100
	Structure Replacement	7,000	10	700	35	200
	Lid Replacement	7,000	20	350	70	100
Storm Sewer	Cleaning	130 miles	10	13	27	5
	TV Inspection	130 miles	7	18	27	5
Street Sweeping	Sweeping - Curb and Gutter	80 miles	720	9X per year	1,200	15X per year
	Sweeping - Curb and Gutter (CBD)	20 miles	44	22X per year	800	30X per year
	Sweeping - Curb and Gutter (Rural Section)	50 miles	0	0	150	3X per year
	Debris Removal & Disposal		0	0	1	1
Stream Maintenance	Initial Maintenance	12 miles	0	0	4	3
	Inspection	12 miles	1	12	12	1
	Routine Maintenance	12 miles	2	6	4	3
Ditch Cleaning	Regrading/Restoration	60 miles	3	20	6	10
Drainage Complaints	Investigate Various Problems	N/A	25	N/A	50	N/A
Storage Facility Maintenance	Maintain Vegetation	4 acres	11	0.4	12	0.3
	Remove Debris, Sediment	12	3	4.8	12	1
	Repair Structure	4	1	4	2	2

Annual Maintenance Expenses

The table below is a snapshot of the annual expenses for maintenance.

Activity	Annual Cost	Purpose
Structure Maintenance		
Culvert Repairs	$55,000	Replace or repair culverts that have rusted or collapsed
Storm Line/Catch Basin Cleaning and Inspection	$135,000	Remove debris from underground storm sewer lines
Storm Sewer		
Storm Sewer Line/Structure Repairs	$320,000	Repair storm sewers that have collapsed or that have tree roots or other debris causing backups
Small Projects - Sewer Extension/New Lines	$106,000	Make small connections where gaps in the system are found
Storm Sewers Televising	$80,000	View and clear storm sewers
Ditch Maintenance		
Roadside Drainage Ditch Regrading and Restoration	$360,000	Restore ditches that have eroded or silted in
Street Sweeping		
Street Sweeping	$130,000	Remove leaves and other debris to prevent blocked inlets
Streams and Basins		
Creek Cleaning	$27,000	Remove debris from creeks and streams
Natural Areas Maintenance	$30,000	Ensure vegetation is being maintained and functioning
Private Detention Basin Inspection and Evaluation	$15,000	Inspect more than 100 private basins per year

Customer Service and Response		
Flood Response	$106,000	Respond to flooded intersections or clear and restore other rights of way
Drainage Investigation	$55,000	Investigate local drainage issues on private property
Resident and Homeowners Assocation Support (Drainage Concerns)	$65,000	Provide customer service to residents and other property owners (Approximately 500 calls/year, many requiring site visits and follow up with property owner.)
Engineering and Administration		
National Pollution Discharge Elimination (NPDES) Compliance	$100,000	Work with local agencies and developers to review and enforce stormwater regulations
Capital Project Design and Oversight	$150,000	In-house design and construction management for both small and large projects (such as streambank stabilization, private property acquisition)
Cost-Share Project Design	$15,000	Work with homeowners to design projects that reduce drainage problems spanning multiple properties
Mapping and Data Analysis	$34,000	Review and analyze data collected (such as storm sewer video) and
Other Administrative Support and Supplies	$130,000	Stormwater utility administration support and supplies for repairs
TOTAL	**$1,913,000**	

The Stormwater Utility

In 2013, the Village launched the stormwater utility. Revenue is generated by charging property owners a monthly stormwater fee, based on the property's impact to the stormwater system, as measured in impervious area. All properties except those that are exempt from property taxes pay stormwater fees.

The utility was created to:

- improve the relationship between the amount paid by a property and its impact to the stormwater system.
- provide a dedicated revenue source to be used solely for stormwater expenses
- generate additional revenue to pay for the cost of improving the service level and complying with regulations.
- increase awareness about stormwater management and the cost of providing services
- encourage property owners to reduce runoff generated by their property by managing stormwater on-site.

The stormwater fee is based on the total amount (in square footage) of impervious area on each parcel, including all of the surfaces listed above. Fees are expressed in Equivalent Runoff Units (ERU). One ERU is equal to 3,300 square feet of impervious area, which is the average for a single family residential property in the Village. Each single family residential property is charged according to one of three tiers (.75 ERU, 1 ERU or 1.5 ERU). Other properties (commerical, multi-family) are charged based on the actual amount of impervious area (the fee per ERU is multiplied by the actual amount of impervious area). The Village calculates impervious area by using a data set provided by DuPage County. An impervious area is any area within a parcel which prevents or significantly impedes the infiltration of stormwater into the soil. Examples of impervious surfaces include:

- Parking lots
- Roofs
- Driveways
- Patios
- Decks
- Swimming pools

- Gravel and stone areas

SINGLE FAMILY RESIDENTIAL

Single Family Residential	2016 Monthly Fee
Tier 1 (1-2,500 s. f. of impervious area) = .75 ERU	$7.29
Tier 2 (2,501 - 4,000 s.f. of impervious area) = 1 ERU	$9.72
Tier 3 (4,001- 7,000 s.f. of impervious area) = 1.5 ERU	$14.58

NON-SINGLE FAMILY RESIDENTIAL parcels and RESIDENTIAL PARCELS with greater than 7,000 s.f. of impervious area are charged based on the actual amount of impervious area, measured in ERUs, rounded to the next whole ERU.

Non-Single Family Residential	2016 Monthly Fee
Per ERU (3,300 s.f.)	$9.72

VACANT PARCELS are charged .3 ERU.

Vacant (unimproved) Parcels	2016 Monthly Fee
0.3 ERU	$2.92

Annual Revenues

The Village implemented the fee in 2013. The rates and actual revenues are shown in the table below.

Year	Fee Per ERU	Net Revenue (After Credits and Incentives)
2013	$8.40	$3,267,817
2014	$8.94	$3,701,939
2015	$9.72	$3,657,367
2016 (adopted budget)	$9.72	$3,644,739

- Property tax exempt parcels were excluded from stormwater fee beginning January 1, 2015
- Credits and incentives vary from year to year

Credits and Incentives

The Village has a credit and incentive program that allows property owners to reduce the fee that they pay. An incentive is a *one-time* reduction in the stormwater utility fee, applied to a customer's account balance.Incentives are available for qualifying rain barrels, rain gardens, permeable pavers and other projects that reduce the total volume or peak volume of stormwater, and/or improve the quality of stormwater leaving a parcel. Examples include green roofs, cisterns and Best Management Practices outlined in the Village Stormwater Credit and Incentive Manual with Incentive Application.

Incentive amounts are as follows:

Type	Amount
Rain Barrel	$25 per property
Rain Garden	$300 per property

Permeable Pavers	$300 per property
Other Projects	Up to $250 per property

A CREDIT is an *ongoing* reduction in the amount of stormwater fees assessed to a parcel in recognition of on site systems, facilities, or other actions taken to reduce the impact of stormwater runoff, in compliance with the Village Stormwater Credit and Incentive Manual.

There are six types of credits available, subject to the maximum levels shown.

Control Activity	Stormwater Fee Credit
Site Run-off Rate Reduction (detention basin)	Up to 20%
Volume Reduction (retention basin, permeable pavement)	Up to 20%
Water Quality (Best Management Practices- BMPs)	Up to 10%
Direct Discharge (outside and downstream of the Village's system)	Up to 50%
Education	Up to 100%
Partnership (provide land/facilities to Village to manage stormwater)	Up to 100%

Multi-Year Plan for Moving from Current to Recommended Level of Service

The recommended level of service is to construct and maintain a stormwater management system that safely stores and conveys runoff for 100% of properties in 95% of rain events in a given year.

The existing stormwater management system provides a high level of service with approximately 90% of the properties protected from flooding in 95% or more of the rain events. There are approximately 2,200 properties in the Village that are not protected from flooding at the recommended level.

To achieve the recommended level of service, the Village needs approximately $8 million to $10 million per year; approximately $4 million for operations and maintenance each year and $4 million to $6 million on capital (projects and debt service).

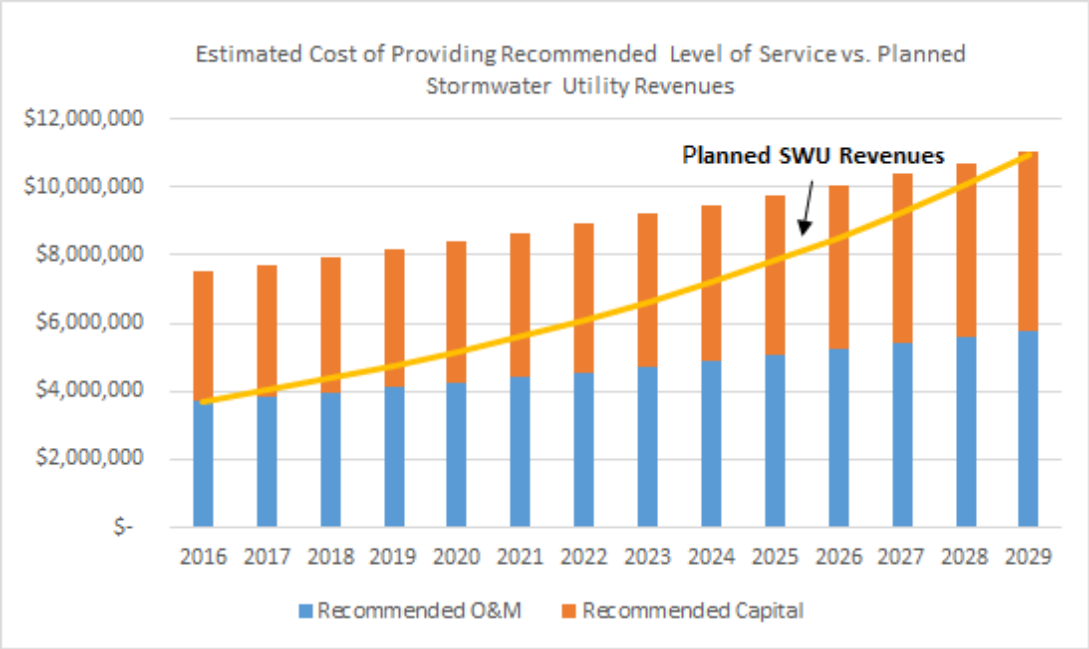
Over the past few years, the Village has spent about $7 million per year. The Village has been receiving about $3.7 million in stormwater fees. The difference between annual revenues and expenses was funded by bond proceeds and grants. As the bond proceeds and grants are spent down, annual spending will decline to under $6 million in 2017. If revenue is not increased and bonds are not issued, annual spending will drop to about $4 million in 2018.

To achieve the recommended level of service now, the Village needs revenues of about $8 million to $10 million, an increase of $4 million to $6 million per year.

Current Plan

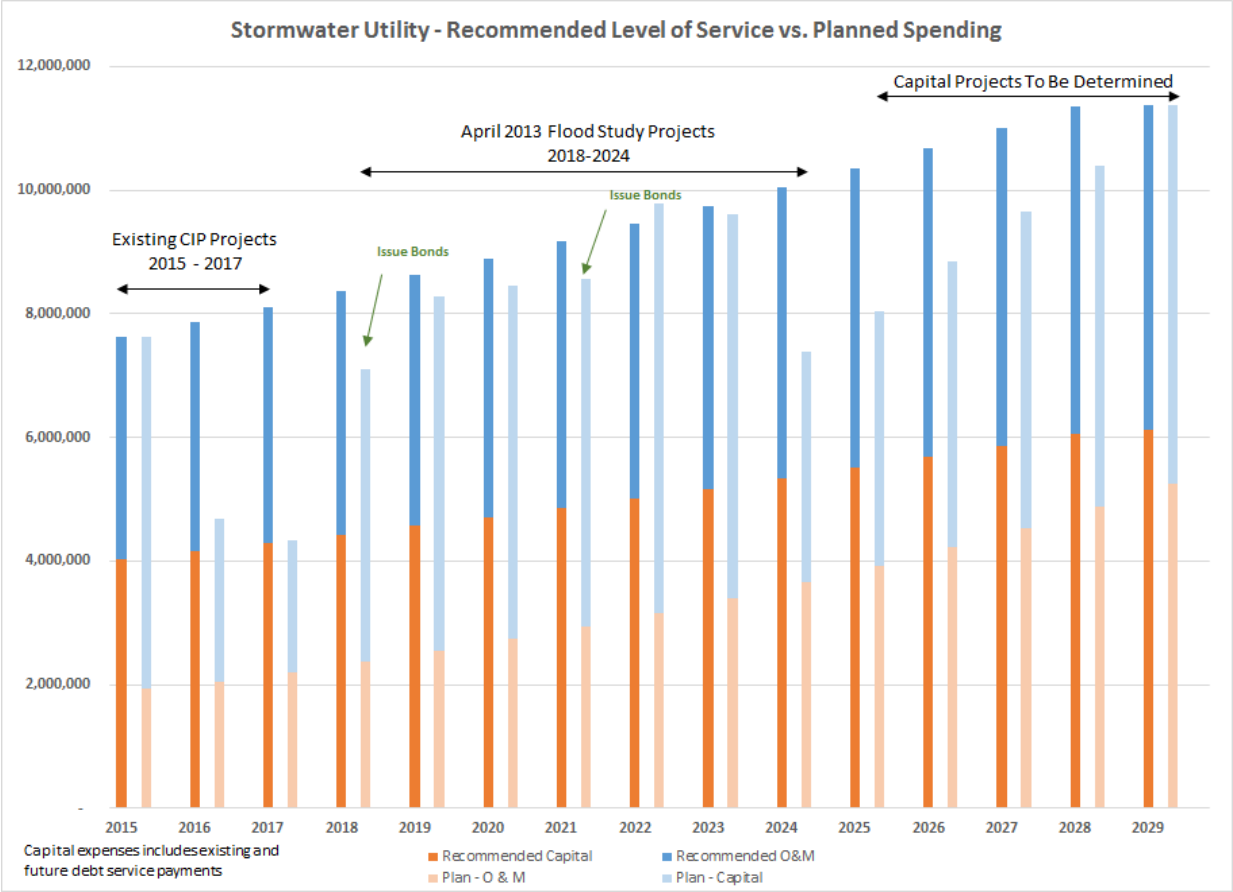
In conjunction with the creation of the Stormwater Utility, the Village established a plan for bringing the stormwater system up to the recommended level of service over 15 years. The chart below shows estimated expenses through 2029. Capital spending varies each year depending on the size of the projects scheduled for each year.

The chart below shows the estimated cost of providing the recommended level of service (100% of properties protected in 95% of rain and storm events). If the Village wanted to achieve the recommended level of service immediately, it would have to double the amount of revenue currently being generated by the stormwater fee. To smooth the effects of a drastic increase on fee payers, the Village's current plan calls for an annual increase of 8.7% until actual revenues would match the cost of providing the recommended level of service.



To bring the stormwater system up to the recommended level by 2029, the Village would gradually increase its annual revenues from approximately $3.7 million in 2016 to more than $11 million. Bringing the system up to the goal level has two major components:

- **Increase the amount the Village spends on capital projects:** The Village has identified $42 million in capital projects. The Village would invest between $4.0 and $6.1 million in capital each year. These capital projects consist of:
    - New detention or other storage projects
    - Acquisition of property or easements
    - Stormwater conveyance (sewers, curb and gutter, ditches, culverts, overland flow routes) to connect underserved areas to other parts of the system
    - Storm sewer replacement or expansion
    - Major repair or refurbishment of major assets
- **Increase the amount the Village spends on maintenance annually over the next 15 years:** The Village will gradually spend more on maintenance until all recommended maintenance activities can be completed at recommended intervals. Over time, the amount the Village spends on maintenance would increase from approximately $2 million in 2016 to more than $5 million in 2029.



Planned Stormwater Utility Rates Per ERU

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Fee	$9.72	$9.72	$10.57	$11.48	$12.48	$13.57	$14.75	$16.03	$17.43	$18.95	$20.59	$22.39	$24.33	$26.45	$28.75

Capital Plan

The plan calls for the Village to invest $4.0 million to $6.1 million in capital projects each year. The amount of capital spending will vary each year depending on the types and number of projects scheduled in that year.

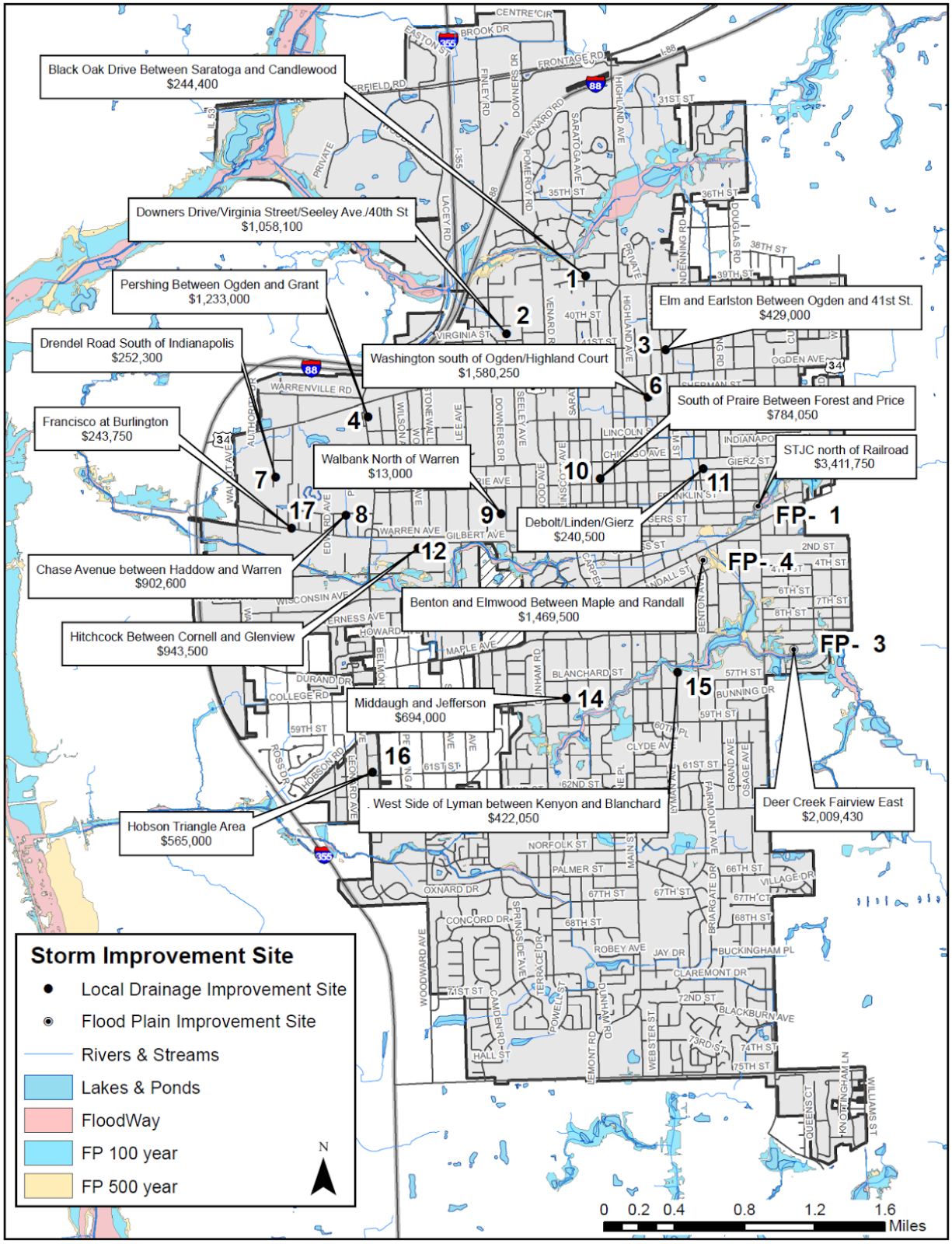
The Village has approximately $42 million in capital projects identified. Bond issuances of approximately $10 million would be issued in 2018 and 2021 to pay for the capital projects. The debt service will be paid by revenues from the stormwater utility. Debt service expenses are included in the capital expense category.

Planned Capital Projects - The projects below are included in the CIP or the 2014 Stormwater Project Analysis. The projected timeframe may change with available funding, ongoing engineering and analysis or the timing of other projects.

Project	Total Projected Costs	Projected Timeframe
Streambank Improvements - St. Joseph Creek South Branch	$2,705,000	Construction beginning in 2017 ($350,000 every two years)
Streambank Improvements - St. Joseph Creek Main Branch	$4,470,000	Construction beginning in 2018 ($410,000 every two years)
Watershed Improvements - Lacey Creek (also includes Highland Avenue Drainage Improvements)	$15,929,000	$1 million in FY16, additional work to be designed in future years
11' Pipe Assessment	$85,000	FY16
Neighborhood Cost Share	$260,000	$50,000 annually
Headwall Replacement - Gilbert and Brookbank	$60,000	FY16
Lacey Creek - 35th St	$435,000	Future work as streets are resurfaced
Green Streets/Sustainable Stormwater Small Projects	$335,000	$65,000 annually
Storm Sewer Annual Replacement	$2,600,000	$500,000 annually
Downtown Water Quality	$304,000	$100,000 in FY16
Land Acquisition (Village Share)	$165,000	FY16
Elm and Earlston between Ogden and 41st St	$429,000	FY18-FY24
South Prairie between Forest and Prince	$784,050	FY18-FY24
Debolt/Linden/Gierz	$240,500	FY18-FY24
Hitchcock between Cornell and Glenview	$943,500	FY18-FY24
Middaugh and Jefferson	$694,000	FY18-FY24
Francisco and Burlington	$243,750	FY18-FY24
West Side of Lyman between Kenyan and Blanchard	$422,050	FY18-FY24
Black Oak Drive Between Saratoga and Candlewood	$244,000	FY18-FY24
Downers Drive/Virginia Street/Seeley/40th St	$664,000	FY18-FY24
Pershing between Ogden and Grant	$1,233,000	FY18-FY24

Washington South of Ogden/Highland Court	$393,000	FY18-FY24
Drendel Road South of Indianapolis	$252,300	FY18-FY24
Chase Ave between Haddow and Warren	$902,600	FY18-FY24
Deer Creek from Fairview East to Village Limits (Floodplain)	$2,009,430	FY18-FY24
Hobson Triangle Area	$565,000	FY18-FY24
Benton and Elmwood between Maple and Randall (Floodplain)	$1,469,500	FY18-FY24
Walbank North of Warren	$13,000	FY18-FY24
St. Joseph's Creek North - BNSF Railroad to Hummer Park (Floodplain)	$3,411,750	FY18-FY24
	$42,262,430.00	

Map: Future Capital Projects Identified in 2014 Stormwater Project Analysis



Maintenance Plan

The plan calls for the Village to gradually increase the maintenance activities performed each year until all recommended maintenance activities can be completed at recommended intervals.

Current Level of Maintenance vs. Future Maintenance Levels

Annual Maintenance Activity	**Current Level of Funding/Annual Activity Level**	**Recommended Level of Funding/Annual Activity Level (per 2006 study)**
Storm Sewer Inspection, Maintenance & Cleaning	18,000 feet	135,000 feet
Street Sweeping	10 times/year	15 times/year
Stream Maintenance	Inspect 1 mile per year Perform routine maintenance on 2 miles per year	Inspect 12 miles per year Perform routine maintenance on 4 miles per year
Ditch Maintenance	8,500 feet	32,000 feet
Retention/Detention Area Maintenance	Remove debris from three basins per year	Remove debris from 12 basins per year
Culvert and Other Structure Maintenance	Repair or replace 50 per year	Repair or replace 165 per year

The Village's plan emphasizes the construction of capital projects as the Village attempts to improve the level of service provided in areas that do not have formalized infrastructure or in areas that are served by undersized, inadequate infrastructure. Capital projects also include major refurbishment and repair of existing assets, such as storm sewer replacement and streambank stabilization. Increasing spending on maintenance activities would improve the condition of existing stormwater infrastructure and would help prevent some flooding, such as the type that is caused when creeks back up, ditches do not allow water to flow or when streets flood due to blocked inlets.

Modifications to the Plan

The Village Council may modify the plan for establishing and using stormwater revenues. The impacts of modifying the plan are summarized below:

Revenues Higher than the Plan

Establishing revenues greater than those shown in the plan would result in the Village performing more maintenance activities and constructing the planned capital projects sooner and moving closer to the recommended level of service sooner. If provided with adequate funding, the Village could perform maintenance activities at the recommended level immediately. Many of the capital projects have not been designed and require land acquisition. Preparing plans and acquiring land take a significant amount of time ranging from several months to over a year. If provided with the required funding, the Village could construct the capital projects currently planned to be completed by 2021, instead of 2024.

Revenues Lower than the Plan

Establishing revenues less than those shown in the plan would result in the Village performing less maintenance activities and constructing the planned capital projects over a longer period of time. It would take the Village longer to achieve the recommended level of service.

Changing the Allocation of Funds Between Maintenance and Capital Projects

The plan currently emphasizes the construction of capital projects as the Village attempts to improve the level of service provided in areas that do not have formalized stormwater management infrastructure or in areas that are served by undersized, inadequate infrastructure. Increasing spending on maintenance activities while decreasing spending on capital projects would likely result in improving the performance of the existing stormwater infrastructure. Decreasing spending on maintenance activities while increasing spending on capital projects would result in improving service in underserved areas while decreasing the performance of the existing stormwater infrastructure.

COMPARISON OF A UTILITY MODEL AND PROPERTY TAX MODEL

A key policy issue to be addressed in this property action item is whether to generate revenue for stormwater expenses using the existing utility model or a property tax model - or a combination of both.

Each model has attributes and impact that should be carefully analyzed.

Model	*Stormwater Utility*	*Property Tax*
Who Pays?	All Properties Subject to Property Tax	All Properties Subject to Property Tax
Based On	Amount of Impervious Area on the Property	Taxable Value of Property

Percentage of Total Share of Stormwater Utility Revenues by Land Use Category

Land Use Category	Amount of Impervious Area	Revenue in Property Tax Model	Revenue in Utility Model
Residential	47%	76%	52%
Commercial	36%	21%	39%
Industrial	8%	3%	9%
Property Tax Exempt	9%	0%	0%
Total	**100%**	**100%**	**100%**

When the Village implemented the stormwater utility in 2013, it reduced the property tax levy by $1.98 million. In 2015, the Village collected an estimated $3.65 million in fees.

The plan going forward calls for an 8.7% increase/year in stormwater utility fees. The table below shows the impact to the typical residential property if the Village changes the funding model and seeks to generate the same amount of revenue ($3.64 million) via the property tax. The typical house would pay an additional $180.31 in property taxes; in contrast, the typical house would pay

$116.64 in stormwater utility fees. Therefore, the property tax model would cost a typical house an additional $63.67 per year.

Typical Cost for a House in Utility vs. Property Tax Model

2016 Analysis	Utility Model	Property Tax Model	Difference
Revenue Available for Stormwater Fund	$3,644,739	$3,644,739	$0
VoDG Tax Levy	12,303,584	15,948,323	3,644,739
Annual SW Fee for Typical House	116.64	0.00	(116.64)
Annual VoDG Property Tax for Typical House	608.68	788.99	180.31
Total Paid by Typical House	725.32	788.99	63.67

Value of Federal Income Tax Deduction

For property owners that itemize their income tax deduction, property tax is an eligible deduction for federal taxes. For most homeowners, this would not fully offset the increase in property taxes that they would see if the Village shifted the costs of stormwater back to the property tax levy. The table below shows the value of deducting $180.31 from federal income taxes and also shows how this offsets the increase.

Tax Bracket	Value of Deducting $180.31 from Federal Income Tax	Net Cost (Benefit) After Income Tax Deduction
10%	18.03	45.64
15%	27.05	36.62
25%	45.08	18.59
28%	50.49	13.18
33%	59.50	4.17
35%	63.11	0.56
39.60%	71.40	(7.73)

Long-Term Comparison of Cost to Residents of Stormwater Fee Model and Property Tax Model

Over time, residents would pay more in property taxes than on the stormwater fee, even with the federal income tax deduction. This assumes the Village continues to increase the fee per plan (8.7%) until 2029.

The table below shows how much more a resident in the typical home would pay annually, after the offsetting income tax deduction. This is based on the 25% tax bracket.

Year	SWU Model	Property Tax Model	Difference	Increase in Property Tax Paid	Value of 25% Deduction	Net Cost After Deduction (25% Bracket)
2016	725.32	788.99	63.67	180.31	45.08	18.59
2017	735.47	804.68	69.21	196.00	49.00	20.21
2018	746.50	821.73	75.23	213.05	53.26	21.97
2019	758.49	840.27	81.78	231.59	57.90	23.88
2020	771.52	860.41	88.89	251.73	62.93	25.96
2021	785.69	882.31	96.63	273.63	68.41	28.22
2022	801.09	906.12	105.03	297.44	74.36	30.67
2023	817.83	932.00	114.17	323.32	80.83	33.34
2024	836.02	960.13	124.10	351.45	87.86	36.24
2025	855.80	990.70	134.90	382.02	95.51	39.39
2026	877.30	1,023.94	146.64	415.26	103.81	42.82
2027	900.67	1,060.07	159.39	451.39	112.85	46.55
2028	926.08	1,099.34	173.26	490.66	122.66	50.60
2029	953.69	1,142.02	188.33	533.34	133.34	55.00

APPENDIX A - Capital Projects 2008-2015

Project Name	Impact
MAPLE AND CARPENTER STORM SEWER REPLACEMENT (DR-008 AKA SW-008)	Replaced deteriorating storm sewer; Removed safety hazard at St Joseph Creek outfall
ST JOSEPH CREEK DREDGING - MACKIE TO CARPENTER (DR-010 AKA SW-010)	Removed silt from 11' diameter pipe which acts at St Joseph Creek through downtown
STREAMBANK STABILIZATION, ST. JOSEPH, NORTH BRANCH (DR-011)	St Joseph North Branch streambank Stabilization
STORM SEWER REPAIRS - FAIRMOUNT FROM 62ND TO 65TH (CONSTRUCTED WITH SW-034) (DR-015 AKA SW-015)	Replaced deteriorating storm sewer; alleviated street flooding
STORM SEWER REPLACEMENT, SELLEY, NORTH OF JANET (DR-016 AKA SW-016)	Replaced deteriorating storm sewer; alleviated street and yard flooding
STREAMBANK IMPROVEMENTS, ST. JOSEPH, SOUTH BRANCH, PHASE I (DR-022)	St Joseph South Branch streambank stabilization
STORM SEWER EXTENSION, SHERMAN, FAIRVIEW TO DOUGLAS (DR-033)	Alleviated street and yard flooding
VALLEY VIEW POND IMPROVEMENTS (DR-035)	Streambank stabilization and naturalization of creek corridor; improved water quality
PRENTISS CREEK (SUB E), KENSINGTON PLACE ONLINE STORAGE (DR-039)	Streambank stabilization and naturalization of creek corridor; improved water quality
WATERSHED IMPROVEMENTS, LACEY, SUB G, MULTI-PHASE STREAMBANK STABILIZATION (DR-040 AKA SW-007)	Multi-phase Lacey Creek streambank stabilization
STORM SEWERS & EASEMENTS - LEE & NORTHCOTT AT WARREN (SW-013)	Alleviated street flooding
STORM SEWER REALIGNMENT - WILSON TO PERSHING (SW-014)	Replaced deteriorating storm sewer; alleviated street flooding
STREAMBANK IMPROVEMENTS, ST JOSEPH CREEK, SOUTH BRANCH (SW-022)	St Joseph South Branch streambank Stabilization
STORM SEWER IMPROVEMENTS - CARPENTER ST (59TH TO 62ND) (SW-027)	Replaced deteriorating storm sewer; Alleviated street flooding
PARRISH COURT DRAINAGE IMPROVEMENTS (LA-D) (SW-029)	Alleviated street flooding
STORM SEWER REPL. - VENARD & ACORN (LA-G) (SW-030)	Alleviated yard flooding

STORM SEWER REPL. - BARNESWOOD (SARATOGA -HIGHLAND) (LA-G) (SW-031)	Alleviated street flooding
STORM SEWER IMPROVEMENTS - DUNHAM PLACE (PR-E) (SW-032)	Alleviated street flooding
WATERSHED IMPROVEMENTS - ST JOSEPH N. BR., SUB C, WALLBANK AVE DRAINAGE IMPROVEMENTS (SW-033)	Alleviated street, yard, and structure flooding
WATERSHED IMPROVEMENTS - PRENTISS, SUB B, INCLUDING MCCOLLUM PARK (SW-034)	Provided detention; alleviated street, yard, and structure flooding
WATERSHED IMPROVEMENTS - ST JOSEPH S. BR., SUB J, 2ND AND CUMNOR STORMWATER IMPR. (SW-035)	Voluntary buy-out of existing homes; provided detention; alleviated street, yard, and structure flooding; improved water quality
WATERSHED IMPROVEMENTS - ST JOSEPH N. BR., SUB J, BENTON AVE DRAINAGE IMPROVEMENTS (SW-036)	Provided detention; alleviated street flooding
WATERSHED IMPROVEMENTS - ST JOSEPH S. BR., SUB I, 8TH AND CUMNOR STORMWATER IMPROVEMENTS (SW-038)	Voluntary buy-out of existing homes; provided detention; alleviated street, yard, and structure flooding; eliminated need for pumping
WATERSHED IMPROVEMENTS - PRENTISS, SUB B, DG ESTATES STORM SEWER INSTALLATION (SW-039)	Created new stormwater system consisting of ditches, culverts, storm sewers; alleviated street and yard flooding
WATERSHED IMPROVEMENTS - PRENTISS, SUB C, DG ESTATES STORM SEWER INSTALLATION (SW-040)	Created new stormwater system consisting of ditches, culverts, storm sewers; alleviated street and yard flooding
WATERSHED IMPROVEMENTS - LACEY, SUB E, 40TH AND WASHINGTON DRAINAGE IMPROVEMENTS (SW-041)	Alleviated street, yard, and structure flooding
WATERSHED IMPROVEMENTS - ST. JOSEPH N. BR., SUB E, INCLUDING WASHINGTON PARK (SW-042)	Provided detention; alleviated street, yard, and structure flooding
DRAINAGE IMPROVEMENTS, BROOK DRIVE & CENTRE CIRCLE (SW-052 AKA DR-001 & SW-001)	Alleviated street flooding
DRAINAGE IMPROVEMENTS, CLYDE ESTATES (SW-053 AKA DR-002 & SW-002)	Alleviated street and yard flooding; improved water quality
HEADWALL REPLACEMENT, HILL AND GRAND (SW-056 AKA DR-025)	Improved water flow into storm sewer; reduced clogging frequency of grate; improved safety; reduced maintenance; added remote site monitoring
STORM SEWER REPLACEMENT - PROSPECT, LINCOLN TO CHICAGO (SW-058 AKA DR-027)	Rehabilitated deteriorating storm sewer; alleviated street and yard flooding

WATERSHED IMPROVEMENTS, WISCONSIN AND JANES (SW-062 AKA DR-031)	Alleviated street and structure flooding
DRAINAGE IMPROVEMENTS AT FIRE STATION #3 (SW-063 AKA DR-036)	Improved water quality and provided detention
SJN SUB B, STORM SEWER ON PERSHING (SW-064)	Replaced deteriorating storm sewer; alleviated yard flooding
STORM SEWER REPLACEMENT ON WASHINGTON, GRANT TO OGDEN (SW-065)	Replaced deteriorating storm sewer; alleviated street and yard flooding
DAVIS ST. STORM SEWER (SW-066)	Alleviated street and yard flooding
LACEY CREEK (SUB G) - 35TH ST. BETWEEN SARATOGA AND VENARD & HICKORY CT STREAMBANK STABILIZATION (SW-067)	Alleviated street flooding; streambank stabilization
GREEN STREETS/SUSTAINABLE STORM WATER PROGRAM, WASHINGTON ST BIO-RETENTION FACILITY AND DG ESTATES BIO-SWALES (SW-069)	Provided detention; improved water quality
STORM SEWER REPLACEMENT, ANNUAL ELEMENT, OAKWOOD AVE STORM SEWER REPLACEMENT (SW-070)	Alleviated street and yard flooding
STORM SEWER REPLACEMENT, ANNUAL ELEMENT, FOREST AVE DRAINAGE IMPROVEMENTS (SW-070)	Alleviated street and yard flooding; improved water quality
DOWNTOWN WATER QUALITY IMPROVEMENTS, GROVE ST (SW-073)	Improved water quality
ELM STREET STORM SEWER (SW-076)	Alleviated street and yard flooding
STERLING RD/GLENDENNING RD STORM SEWER (SW-077)	Alleviated street and yard flooding
HEADWALL REPLACEMENT, GRAND AT 55TH STREET (SW-078)	Improved water flow into storm sewer; reduced clogging frequency of grate; improved safety; reduced maintenance
WASHINGTON STREET, STORM SEWER REPLACEMENT (SW-079)	Replaced deteriorating storm sewer; alleviated street flooding
STORM WATER RELATED LAND ACQUISITIONS (SW-081)	Land acquisitions; removed frequent flooded homes

Appendix B: Explanation of Floodplain and Localized Poor Drainage Area (LPDA)

What is a Floodplain?

A floodplain is the land area that will flood under conditions of a storm event that has a 1% chance of occurring in any given year. This translates to a 26% chance of flooding within the life of a 30-year mortgage and a 67% chance of flooding within a span of 100 years. You may have also heard of it called the "100-year floodplain," which is also sometimes referred to as the Special Flood Hazard Area (SFHA). The National Flood Insurance Program's floodplain management regulations must be enforced within the Special Flood Hazard Areas by a community as a condition of participation in the flood insurance program.

Floodplains play a valuable role in providing natural and beneficial functions to Downers Grove. Relatively undisturbed flood plains provide natural erosion & sediment control, open space so flooding damage does not occur, and provides improved habitat for a variety of plants and animals. Flood waters can spread over a large area providing benefits such as:

- Reduces the speed at which the flood waters move (higher speeds cause more damage)
- Provides storage of flood waters, which reduces the water that reaches downstream areas, thus protecting downstream properties
- Allows water to soak into the ground and recharge the groundwater aquifer
- Moderates flood water temperatures, reducing the possibility of harmful effects on aquatic plants, fish, and animals

Within Downers Grove, good examples that serve these purposes are the Lyman Woods and Hidden Lake County Forest Preserves, Wallingford Park, Fifty-ninth Street & Main Park, and O'Brien Park to name a few.

Localized Poor Drainage Area

What is an LPDA?

LPDA stands for "Localized Poor Drainage Area." The Village identified these areas as locations prone to flooding due to topography. In other words, LPDAs are areas of land that are bowl-shaped. Stormwater runoff that cannot infiltrate the ground tends to accumulate in LPDAs, creating flooding. Although LPDAs are not officially recognized by FEMA as regulatory flood plains, Village building codes regulate both LPDAs and floodplains similarly.

Risk of flooding within an LPDA or floodplain is generally higher than areas not in an LPDA or floodplain. The actual level of risk depends upon the specific location within the LPDA. Theoretically, there is a 1% chance of flooding in a single year at the outer limits of a LPDA.

Areas closer to the center of the LPDA could have a considerably higher risk if the ground elevation is lower there. It is important to keep in mind that flood elevation calculations and historical flood records are not perfect in their ability to predict the future. Floods do occur outside of flood plains and LPDAs. A "100-year storm" can occur more than once every 100 years. Flood elevations can surpass the 100-year mark in an extreme storm event.

The purpose of regulating LPDAs is to help ensure that new construction will be reasonably safe from flooding and that new construction will not adversely affect other properties. Filling in a portion of an LPDA could cause an increase in flood elevation, potentially leading to flooding of adjacent properties. LPDAs are often located in older neighborhoods that do not have stormwater detention basins. LPDAs serve as natural detention basins to limit flooding in other areas of the Village.