Village of Downers Grove
Stormwater Master Plan Update

Appendix F

Technical Memorandum

Stormwater Maintenance Program

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1.0 INTRODUCTION

An essential component of a stormwater management program is the operation and maintenance of the various stormwater system components. Effective maintenance ensures that the capacity of the storage and conveyance facilities is maintained. Ideally, a maintenance program should address operations and maintenance concerns proactively instead of reacting to problems that occur such as flooding or water quality degradation.

The Village of Downers Grove's stormwater system includes over 7,000 structures (catch basins, manholes, inlets) over 128 miles of storm sewer, over 60 miles of ditches, nearly 47,000 feet of culverts, over 11 miles of streams, and numerous detention ponds wetlands underground storage facilities and other components that collect, convey, control or treat stormwater.

This memorandum documents current maintenance procedures and guidelines used by the Village and compares the activities and labor effort to recommended activities, frequency and anticipated labor effort.

2.0 CURRENT STORMWATER MAINTENANCE ACTIVITIES

The Public Works Department is responsible for maintaining the stormwater facilities within the Village limits. The Village holds easements and rights-of-way for a small portion of the stormwater system and generally assumes no responsibility for maintenance of facilities on private property. Stormwater maintenance activities are currently performed on a reactive (or "as-needed") basis, usually resulting from complaints received from property owners, or as problems are observed by Village staff. A comprehensive maintenance cycle has not been developed to date.

Village staff maintain a list of problem areas which historically require some type of maintenance after storm events. Examples of these problem areas include locations where trees tend to fall, outlet structures whose operation is adversely affected by small amounts of debris, and inlets which quickly become clogged with litter. After storm events, Village staff review the problem area list, and visit areas where problems are anticipated.

To assist in determining the existing level of service for stormwater facilities maintenance, Village staff consisting of field personnel and engineers were interviewed during February and March of 2006. Current maintenance activities performed by the Village were reviewed and documented. Resources utilized to perform the activities were outlined, and additional activities to enhance the program were discussed.

Based on discussion with staff, the following maintenance activities are performed in the Village.

2.1 Current System Inventory and Maintenance Records Activities

Documentation of stormwater system components and associated maintenance has not been a priority until recently. This has resulted in a lack of accurate records showing the type, size, and location of sewers, structures, detention facilities, and other stormwater elements, which, in turn, causes inefficiencies in emergency response, maintenance scheduling, capital improvement planning, and other activities.

Currently, the storm sewer system inventory consists of hand-drawn atlas maps produced in 1994. These atlas maps show the approximate location and alignment of sewers and structures with respect to the streets, and elevation data, if available. The Village is developing a GIS-based storm sewer map. As resources become available, field data for the storm sewer system is gathered and input to the GIS.

Details for stormwater detention facilities are found on as-built plans submitted to the Village at the completion of construction. These plans generally show the storage volume and release rate for the storage, along with details of the inlet and outlet facilities. The Village has recently developed a map showing the general location of stormwater storage detention facilities. Underground detention basins are not included on the map.

Stream resources information is included in the Village GIS. Stream location and floodplain/floodway information for the major stream resources are included.

Maintenance activities have been documented since 1996, but the information is not yet available in a centralized and easy-to-access format. In the last several years, procedures have been standardized for recording maintenance and repairs performed for stormwater facilities. In addition to preparation of maintenance reports describing the activities, Village staff annotate a map to show updated information about the stormwater facilities in the problem area. This information is being added to the GIS as resources are available.

The Village has been tracking maintenance activities as resources allow. Maintenance records for stormsewer cleaning and televising are available from 2001 and for ditch cleaning from 2004. Documentation of repair or replacement of drainage structures is available from 1997. Staff is developing a centralized record-keeping system to track all maintenance activities.

2.2 Current Stormwater Storage Facility Maintenance Activities

Over 300 storage facilities provide detention or retention of stormwater after storm events. These facilities are located throughout the Village, in parks, common areas of subdivisions, above and below parking lots, and other locations. A summary of basin data is included in Table 1.

The Village maintains four sites with stormwater storage facilities on an as-needed basis. Maintenance activities include: removing debris and woody growth which has caused a blockage or obstruction to inlet and outlet pipes and channels; maintaining vegetation on banks, by mowing, weeding, and pest control; and installing, cleaning, repairing or replacing storm drainage structures.

The Village also informally inspects the outlet structures for various privately owned stormwater basins throughout the Village as needed to ensure proper operation during storm events. Staff routinely maintains certain structures that require more frequent attention to ensure proper operation.

Table 1
STORMWATER STORAGE SUMMARY

BASIN TYPE	BASIN OWNERSHIP	NUMBER OF BASINS
Dry Bottom	Public agencies	22
	Homeowners associations	39
	Private parcel owners	52
	Commercial	70
Wet Bottom	Various	31
Parking Lot	Commercial	89
Various	Good Samaritan Hospital	7
	Total Number of Basins	310

2.3 Current Stream Maintenance Activities

Stream maintenance is performed by Village staff, generally on an emergency basis. This work includes removal of fallen trees and other debris as needed.

Stream maintenance is limited to those few stream reaches under the direct control of the Village or for which the Village has an easement or other right of access and maintenance.

2.4 Current Wetland Maintenance Activities

Maintenance for wetland areas is performed by Village staff, generally on an emergency basis. This work is limited to debris removal and management of vegetation adjacent to control structures.

2.5 Current Street Sweeping Activities

Street sweeping is an important stormwater maintenance activity. Sweeping cleans the gutters before sediment and debris are washed into the stormwater system. This helps to prevent clogging of inlet structures, which reduces localized flooding after storm events. Sweeping also improves downstream water quality by collecting sediment and pollutants. Sweeping is performed only on streets with curb and gutter because sweepers need to work against a curb to operate effectively. This includes approximately 100 miles out of the total 163 miles of street in the Village.

The Village owns and operates two street sweepers. The sweepers are scheduled to perform 10 cycles per year on a monthly basis from March through December. Residential and commercial streets are swept once a month, except for the streets located in the downtown area, which are swept once a week.

The Village plans to sell the sweepers and contract out all street sweeping activities beginning in 2006. This will allow staff to focus on targeted maintenance tasks which better utilize their skills.

2.6 Current Sewer Maintenance Activities

Storm sewer maintenance helps to ensure that the storm sewers operate as they were designed and are cleaned of the pollutants (sediment, oils) that they trap. Maintenance activities can reduce localized flooding and pollution of surface water and groundwater.

Storm sewer maintenance includes documentation of component condition, repair, and replacement of inlets, catch basins, manholes, outlet structures and pipes. There are over 128 miles of storm sewer pipe and over 7,000 appurtenant structures in the Village.

The Village owns sewer televising equipment used to document the condition of storm sewers. The equipment is operated by Village staff, generally during the winter months when other maintenance activities are reduced. Because of resource limitations, only known problem areas and areas with upcoming CIP projects are televised. This approach allows staff to address known problem areas and provides cost savings by coordinating repairs and replacements with the road program to reduce construction costs. About 50 miles of the known pipes have been televised in the last five years by Village staff

Prior to televising, structures and pipes are cleaned to allow the televising equipment to move through the system. The Village hires a contractor on an annual basis to clean structures and pipes using high-pressure water jets for 10 weeks during the summer. The areas to be cleaned are outlined each year. The contractor completes as many areas as possible, until the contract limit (about 240 hours for the last few years) is reached.

The Village has scheduled the purchase of a jetting machine in 2006, after which staff will perform both the sewer cleaning and sewer televising activities.

2.7 Current Ditch Cleaning Activities

About 63 miles of the streets in the Village (about 44%) were constructed without curb and gutter. Most of these streets are drained by shallow (i.e. less than 2 feet deep) roadside ditches. As debris and sediment accumulate in these ditches, stormwater conveyance is reduced. With limited maintenance resources, the Village prioritizes the ditch cleaning to the most critical areas. Priorities are based on the following criteria:

- flooding of private property
- flooding of right-of-way
- hazard to vehicular traffic

Ditches located on private property are the responsibility of the individual property owners.

The Village hires a contractor on an annual basis to clean roadway ditches. Contract hours have been reduced significantly over the last 5 years and currently are between 150 and 200 hours, or about 5 weeks. The contractor completes as many linear feet of ditch cleaning as possible up to the contract limit.

2.8 Summary of Existing Maintenance Activities

Table 2 summarizes the current activities performed by the Village.

Table 2
CURRENT MAINTENANCE ACTIVITIES SUMMARY

ACTIVITY	TOTAL AMOUNT	CURRENT RATE / YR	CURRENT FREQUENCY
Storm sewer cleaning	128 miles	10-15 mi	Once every 10 years
Storm sewer televising	128 miles	10 mi	Once every 13 years
Street sweeping -general	95 miles	950 miles	10 times a year
Street sweeping - downtown	5 miles	180 miles	Once a week
Storage facility – village owned	4 each	As needed	Not defined
Storage facility - others	310 facilities	As needed	Not defined
Ditch cleaning	60 miles	2 miles	Once every 30 years
Structure maintenance	7000 each	As needed(20-30/yr)	Not defined
Stream maintenance	11 miles	Debris removal	Not defined

Limited funding has resulted in the current situation where facilities are not properly maintained as frequently as needed. Lack of dedicated labor and equipment resources for routine tasks results in more resources used for emergency stormwater management activities.

3.0 STORMWATER MAINTENANCE NEEDS

3.1 Introduction

Based on the review of the existing level of service for the Village's stormwater system maintenance, we provide recommendations for implementing a comprehensive and effective stormwater system maintenance program. Implementing these recommendations will provide the Village with an adequate maintenance program that will meet the regulatory requirements while maintaining the current level of flood protection available in the existing stormwater system.

The recommended maintenance program components are grouped into 4 categories:

- Provide an inventory of all stormwater infrastructure components
- Utilize GIS for system mapping and maintenance records
- Outline procedures for maintaining stormwater facilities
- Provide guidance on efficiencies in performing maintenance activities

3.2 System Inventory

To efficiently manage and maintain the stormwater system, a comprehensive inventory and accurate mapping of facilities are required. The Village's GIS system is ideal for documenting the location, condition and maintenance history of stormwater system components. Ideally, the GIS would contain the following information collected in the field:

- Outfall locations
- Stormwater management structures (i.e. control structures, BMPs, etc.)
- Location and capacity of flood control facilities
- Location of open channel drainage systems (i.e. streams and ditches)
- Identification of flood overflow routes
- Size and material of sewers and structures
- Invert elevations
- Structural condition of storm sewer components
- Maintenance history
- Hyperlink to system photographs

Once in the database, a field review should be performed to evaluate whether digitized locations are within the tolerance ranges. As new developments and public works projects are completed, the as-built information and work order data can be digitized and incorporated directly in the overall GIS.

For the last few years, Village staff have documented stormwater facility inventory data as they performed other field functions. Some data collected using summer interns has been input into the GIS. Despite this effort, the locations and other data for much of the stormwater system are still undocumented.

Resources should be dedicated to obtaining, inputting, maintaining and updating the required field information into the GIS. This will provide Village staff with the data needed to efficiently operate and maintain the stormwater system. There is an immediate need for the following:

- System-wide storm sewer map showing outfall locations, which will provide staff with a "big picture" of the system without the need to use the cumbersome map atlases
- System-wide stormwater storage facility map showing all public and private facility locations
- System-wide roadway ditch map showing ditch location and maintenance status
- System-wide complaints map to track drainage-related complaints and problem resolution
- GIS-based approach for scheduling and implementing maintenance activities
- Stormwater system details such as structure location, sizes, elevations, materials, high water elevations, overflows
- Photographs linked to specific locations to document system condition, maintenance activities or flooding evidence
- Wetlands map

3.3 Maintenance Records

A GIS is ideal for documenting stormwater system components and tracking stormwater facility maintenance activities. Once the stormwater component of the GIS is up-to-date, Village staff can implement a GIS-based maintenance records procedure to document existing maintenance and plan future maintenance activities.

The Village should evaluate mobile GIS technology, such as a hand-held PDA (personal data assistant) for field staff to use in recording maintenance activities electronically. Many of these devices are equipped with GPS technology which allows the field staff to record the exact location with respect to the maintenance activity. At the end of the day, field staff link their PDAs to a GIS computer, downloading the maintenance data and automatically updating the GIS. This eliminates the need for additional paperwork, which often gets lost or mishandled. Communities across the country are implementing this technology with success.

3.4 Procedures for Stormwater Facility Maintenance

Providing proactive cost-effective maintenance of stormwater facilities will reduce impacts to water quality and maintain system capacity. Procedures for various maintenance activities have been developed to provide guidance to Village staff performing the tasks and to provide a baseline for determining resource requirements for maintenance. General guidelines are provided in this section and detailed information and checklists are provided in the "Stormwater Maintenance Manual,' under separate cover.

Stormwater Storage Facilities - Maintenance of ponds owned by the Village should be included in the annual maintenance schedule. Activities should include at least the following:

Inspection: annually inspect the facility using the checklist provided

Cleaning: Perform debris and litter control checks for inlet and outlet on a monthly basis and after every storm producing runoff. Remove accumulated sediment every 5 years. Remove obstructions and debris deposited during storm events immediately.

Vegetation Management: Establish buffer zones around ponds where practical to enhance native species diversity and to reduce maintenance costs. Mowing shall be conducted once or twice a year or in accordance with required management of established vegetation. Perform irrigation, fertilization, and mulching as necessary. Repair and seed bare areas. Repair eroded slopes.

Maintenance of ponds not owned by the Village should include similar activities: Although the Village informally addresses the maintenance of outlet structures for basins throughout the Village, the remainder of the facility should be maintained by the owner following the above guidelines. It is recommended that the Village require development of a maintenance plan from the owner which defines responsibilities for the various work tasks.

Stream Maintenance - Proactive maintenance of streams is critical to optimal operation of the stormwater system. Removal of debris reduces the risk of flood damages associated with debris jams, provides for more efficient conveyance of stormwater and provides a positive outlet for storm sewers. Stabilization of eroded slopes improves downstream water quality.

Nearly all of the streams in the Village are on private property, but the Village has the statutory authority to access the stream for maintenance. The owner of the property is responsible to maintain their section of stream (i.e. removal of debris and blockages). Periodic maintenance to prevent debris jams from accumulating is the best approach.

However, most property owners do not maintain the channels, which are a critical part of the stormwater system. It is recommended that the Village require development of a maintenance plan from the owner which defines responsibilities for the various work tasks. Development and implementation of a stream maintenance program for all stream reaches can ensure adequate flow characteristics during storm events.

The stream maintenance program should consist of two phases. The first phase includes activities to bring all of the streams in the Village to a consistent level of maintenance, while the second phase includes routine stream maintenance activities.

The initial stream maintenance phase includes tasks such as debris jam removal, tree removal, and slope stabilization. The work in this phase can be extensive due to a present backlog of maintenance. Once this work is completed on a stream reach, routine stream maintenance should be included in the annual maintenance schedule and with cooperation of the property owner. Activities should include at least the following:

Inspection: annually walk the stream and note problem areas

Cleaning: Perform debris and litter control checks for structures on a monthly basis and after every storm producing runoff. Immediately remove obstructions and debris deposited during storm events.

Vegetation Management: Establish buffer zones along stream corridors where practical to restore the riparian area, enhance native species diversity and reduce maintenance costs. Mow, water, and fertilize in accordance with required management of established vegetation. Repair and seed bare areas. Repair eroded slopes.

Public Education - Since the adjacent property owners have a responsibility in this maintenance effort it is recommended that a program of public education be developed to inform the residents of their responsibilities and the requirements for any activities they perform in these protected areas. As owners of property change periodically it is suggested this be an ongoing activity and a part of the Village's overall Public Information effort to help residents understand how the Stormwater system functions and their responsibilities as property owners.

3.5 Procedures for Street Sweeping

Current sweeping activities are adequate for protecting water quality and maintaining the aesthetics of the roadways with curb and gutter. However, the frequency of sweeping in some areas should be reviewed based on the pollution potential. Observations from staff performing the street sweeping can also be used to determine the frequency required. General categories may include:

- Weekly – downtown streets, major roadways, other target areas (locations where school buses line up and wait for loading/unloading, low-lying areas where sediments settle on pavement, roadways used extensively by trucks, etc.)
- Monthly- all other residential and commercial areas

The revised frequency can be incorporated into the anticipated contract for street sweeping,

Several roadways in the Village (Highland Avenue, 55th Street, 63rd Street, Belmont Avenue, Ogden Avenue, etc.) are under the jurisdiction of either DuPage County or the State of Illinois. Street sweeping of these major routes is performed by their respective owners. Since the storm

sewer systems along these routes discharge to local waterways, frequency of sweeping on these high capacity roadways needs to be addressed to help reduce the pollution load from urban stormwater runoff. Coordination with Village efforts should be reviewed to determine if additional sweeping is warranted on these routes. If enhanced sweeping is required, the Village could explore cost sharing arrangements with the County and the State to improve the level of service on the routes.

Sweeping of streets without curb and gutter can be performed, but is less efficient. The sweeper generally needs to avoid contact with the shoulder. Observations from staff can assist in locating streets where debris collects. These streets can be included in a regular sweeping schedule. Perhaps more critical to these streets is the scheduled removal of litter and debris from the roadside ditches to ensure proper operation during storm events.

3.6 Procedures for Sewer Maintenance

Proactive storm sewer maintenance is required to ensure proper operation of these facilities during storm events.

All storm sewers in the Village should be cleaned and televised on a regular basis. Procedures used by the Village appear to be appropriate, resulting in the desired information, but the current rate is too slow to maintain updated data about the system. It is recommended that the length of sewers cleaned and televised annually be increased to about 26 miles per year. This would result in a frequency of 5 years. In other words, every 5 years, a specific structure or pipe length would be cleaned and televised.

Cleaning of structures in the storm sewer system is an important activity and should be scheduled such that 20 to 25% of the system is maintained each year. With over 7,000 structures, this reasonable approach will result in a frequency of 4 to 5 years. Disposal of materials vacuumed from structures must be disposed of properly. Currently sediments classified as nontoxic (e.g., passing the EPA toxicity test) can be disposed of in municipal landfills.

3.7 Procedures for Ditch Cleaning

All the ditches located within the village should be regraded on a regular basis. Procedures used by the Village appear to be appropriate, but the current rate is too slow to maintain conveyance in the system. It is recommended that the length of ditches maintained annually be increased to about 6 miles per year. This would result in a maintenance frequency of 10 years. In other words, every 10 years, a specific ditch length would be cleaned and seeded.

3.8 Proposed Maintenance Activities Frequency and Labor Efforts

The activities outlined in the previous section define necessary components of the stormwater maintenance program. These activities are essential to implementing a comprehensive program to maintain the stormwater system.

To determine the labor required to implement the maintenance program, an analysis was completed which detailed the various maintenance activities, the proposed frequency, and the total annual labor.

Table 3 summarizes the findings. The level of service being recommended would dictate the need for about 22,430 labor-hours annually. Assuming one staff member can contribute up to about 1,700 hours per year based on a full year of 2,080 hours less time for vacation, holidays, training and other assignments like snow removal and special events, the results show a need for about 13 dedicated stormwater staff members to accomplish the required maintenance activities. This would be an increase of five additional staff members along with the full assignment of the current stormwater staff members to perform stormwater duties and not be assigned to other task to the maximum extent possible.

3.9 Maintenance Schedule

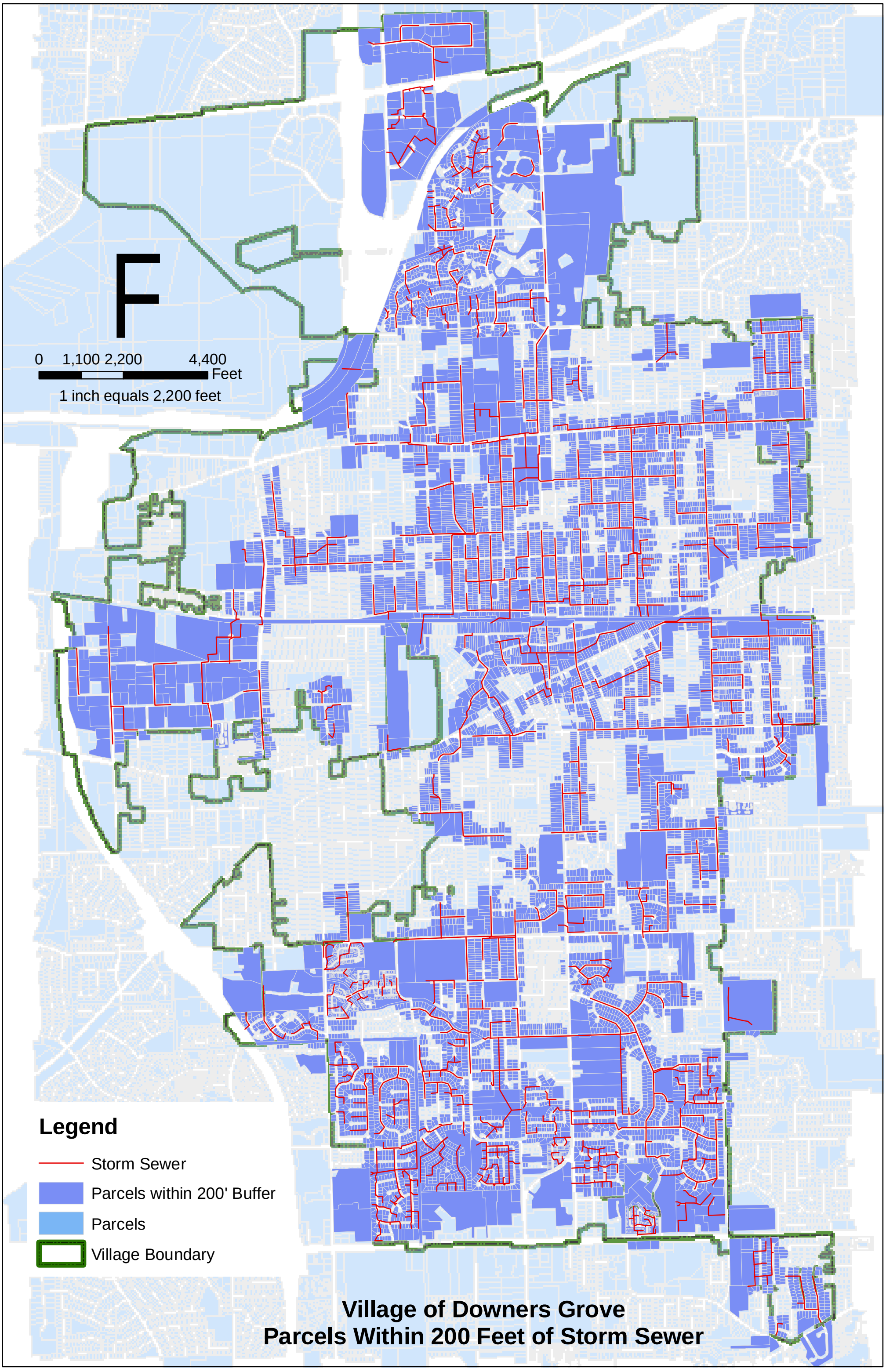
The maintenance activities required and the required level of service has been determined. A maintenance schedule and program can now be developed. Typically, maintenance activities can be divided into two categories:

Scheduled Maintenance – These are maintenance activities which are scheduled and completed on a regular basis in accordance with a maintenance plan. This includes activities such as catch basin cleaning, vegetation maintenance, and trash and debris removal. These activities can be completed by a Village maintenance crew or contractor

Corrective Maintenance – Corrective maintenance is completed on an as needed basis and includes activities such as sediment removal, channel stabilization, culvert repairs, and storm drain pipe replacement. These tasks are schedules after inspections, in response to complaints, and resulting from emergencies. Corrective maintenance often requires more specialized expertise and equipment than is required for scheduled tasks. This expertise may be with Village staff or a contractor specializing in that activity. Some corrective maintenance may require development of a design and bid documents to accomplish the work

TABLE 3 - Proposed Maintenance Activities Frequency and Labor Efforts

MAINTENANCE ACTIVITY	*TOTAL UNITS*		*ESTIMATED FREQUENCY OR %*	*TOTAL UNITS PER YEAR*	*LABOR HOURS PER UNIT*	*TOTAL HOURS PER YEAR*
Structure Maintenance						
clean catch basin/vactor	7000	EA	25%	1750	1	1750
repair structure	7000	EA	1%	70	6	420
replace structure	7000	EA	0.50%	35	16	560
replace lids	7000	EA	1%	70	0.3	21
Storm Sewer						
cleaning	128	LM	20%	27	80	2160
tv inspection	128	LM	20%	27	160	4320
Street Sweeping						
sweeping - curb & gutter	80	LM	15x	1200	1.5	1800
sweeping - curb & gutter CBD	20	LM	40x	780	1.6	1248
sweeping - rural section	50	LM	3x	150	1.5	225
Stream Maintenance						
initial maintenance	12	LM	30%	3.6	260	936
inspection	12	LM	100%	12	24	288
routine maintenance	12	LM	33%	4	85	340
Ditch Cleaning						
regrading/restoration	60	LM	10%	6	1000	6000
Drainage Complaints						
various problems	50	EA	100%	50	20	1000
Storage Facility Maintenance						
maintain vegetation	4	AC	3x	12	14	168
remove debris, sediment	12	EA	100%	12	96	1152
repair structure	4	EA	50%	2	20	40
	total labor hours					**22428**
	staff required					**13**


F
0 1,100 2,200 4,400
Feet
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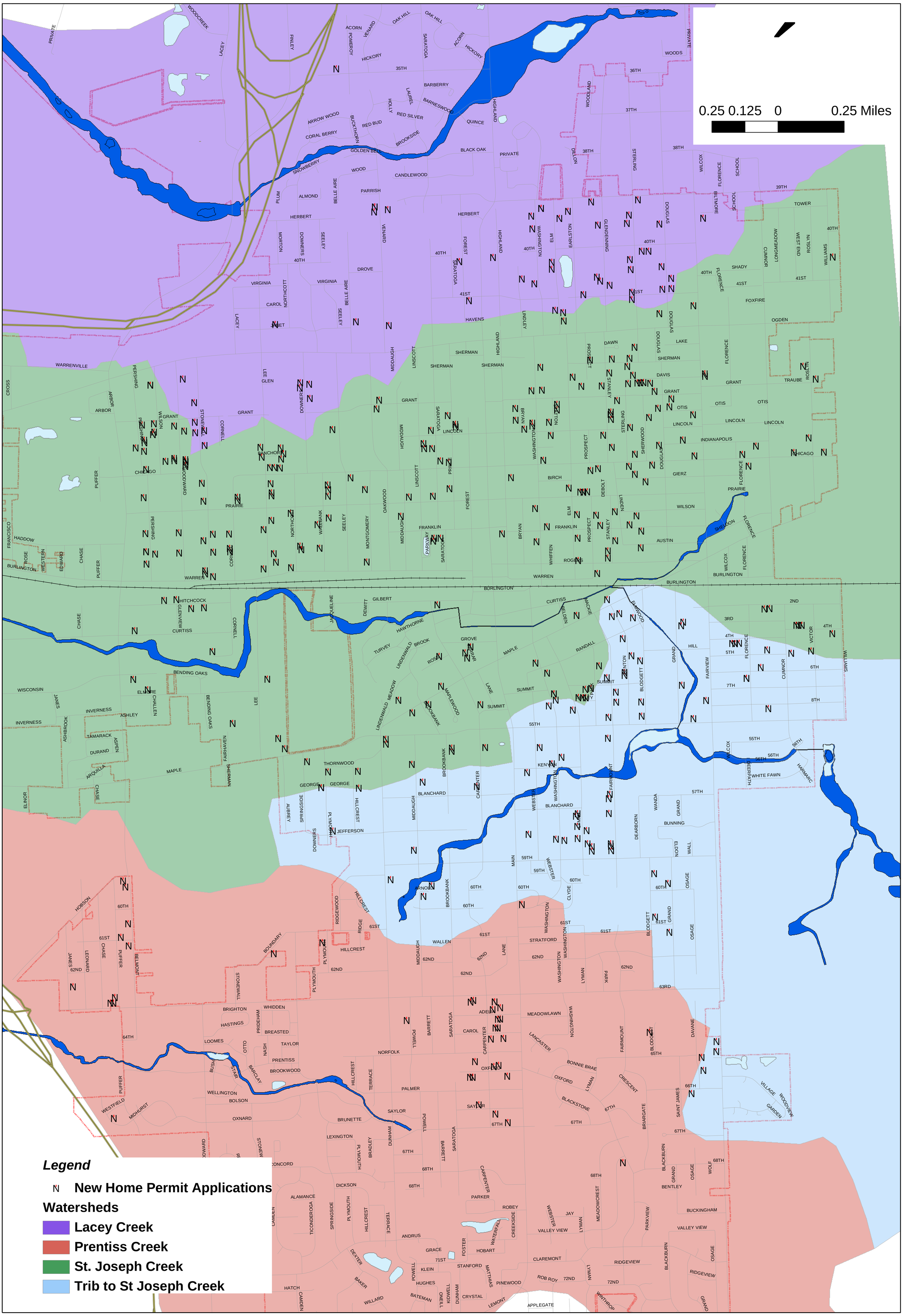
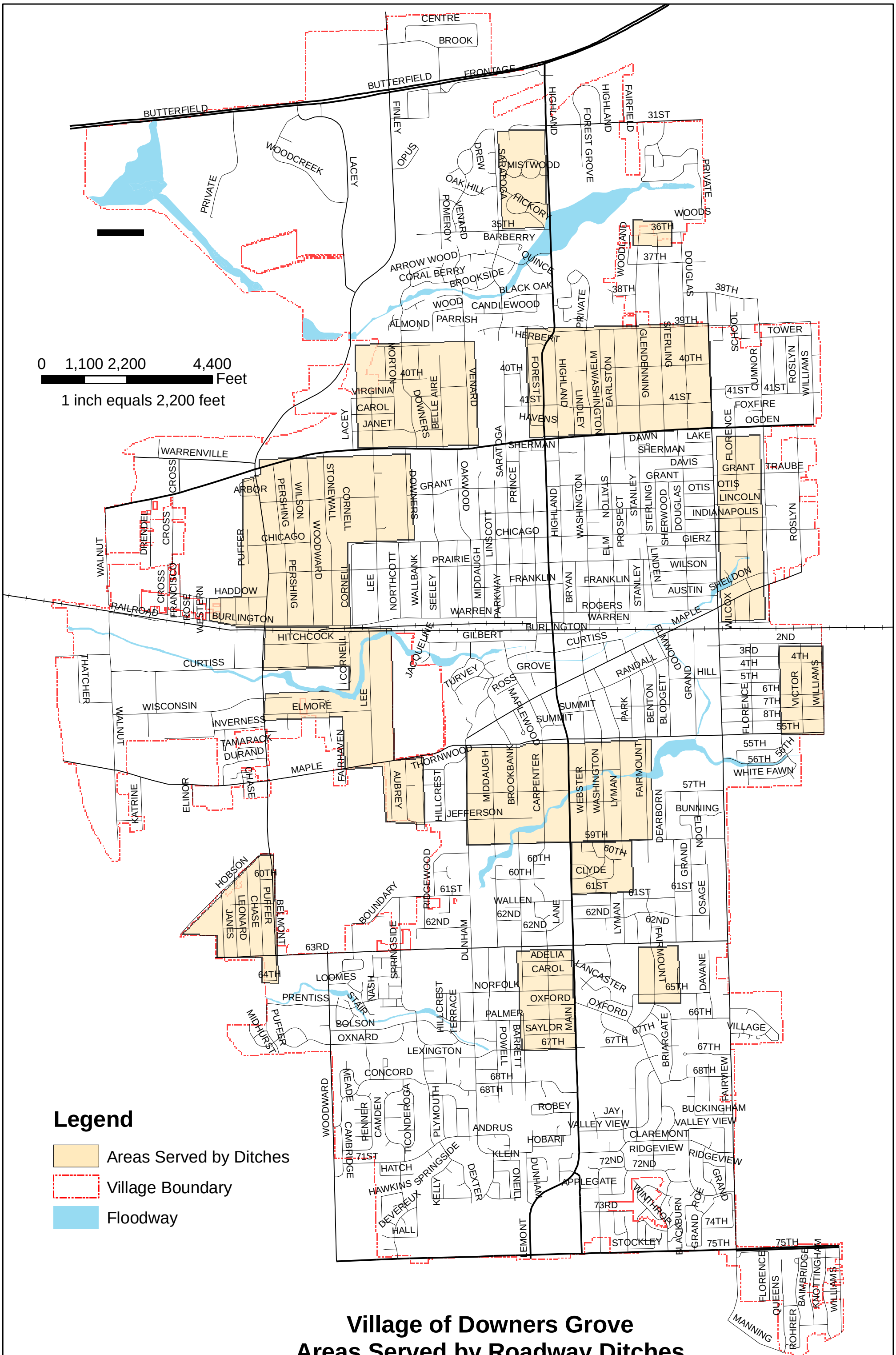
Legend
Storm Sewer
Parcels within 200' Buffer
Parcels
Village Boundary
Village of Downers Grove
Parcels Within 200 Feet of Storm Sewer



Village of Downers Grove
New Home Permit Application Locations, 2003-2005



Village of Downers Grove
Areas Served by Roadway Ditches