Village of Downers Grove
Stormwater Master Plan Update

Appendix G

Technical Memorandum

Rules and Standards

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1.0 INTRODUCTION

The Village of Downers Grove is facing significant pressure to update its rules and technical standards for stormwater management, largely due to the following key factors:

- Redevelopment pressures
- Chronic flooding areas
- New regulations focusing on water quality
- Need to enhance public safety
- Lack of drainage infrastructure

This section includes specific recommendations on changes to existing rules and standard's, permit fees, new rules and standards, and guidance on revised technical requirements.

2.0 RESIDENTIAL DEVELOPMENT

Increasing occurrences of residential redevelopment is causing considerable strain on the existing stormwater infrastructure. New rules and technical guidance are necessary to ensure that the aggregate impacts of redevelopment will not have a negative impact on peak flows and/or water quality.

The current Municipal Code, Chapter 26, Article V (Stormwater and Flood Plain Management) currently exempts residential parcels under 3 acres. This removes single-parcel redevelopment projects from stormwater detention requirements.

The Village should be prepared to provide semi-regional stormwater detention for redeveloping areas. This is necessary to mitigate the impacts of increased runoff due to higher impervious surfaces on redeveloped properties. This may be accomplished through the purchase of property in low-lying areas (LPDAs) and construction of detention basins or other stormwater Best Management Practices (BMPs) that reduce peak flows. Those applying for building permits in redeveloping areas should be charged a stormwater impact fee commensurate with the cost of providing future stormwater conveyance and detention storage to accommodate the increased impervious surface.

Currently the Village assesses fees for redeveloped properties. A fee of $0.565 per square foot of additional impervious area constructed during redevelopment. This revenue can be used for detention-related improvements only (conveyance improvements are excluded). A revision to the fee is recommended using the quantification demonstrated in the following example:

STORMWATER IMPACT FEE
EXAMPLE CALCULATION

Existing 2.17-acre residential block (see figure on following page):

Existing: 30% impervious, runoff coefficient = 0.30
Redeveloped: 60% impervious, runoff coefficient = 0.63

Under redeveloped conditions, limit the 10-year peak flow to that of existing conditions. In this case, a post-redevelopment peak flow of 8.5 cfs should be limited to an existing peak flow of 5.4 cfs.

Detention storage required to control 10-year peak flow: ~2,000 cubic feet

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Stormwater management costs for the typical 2.17-acre residential block (redeveloped):

Pond Construction: $2.50 per cubic foot of storage = $5,000
Rear-yard storm sewer: $55 per lineal foot x 275 lineal feet* = $15,000
Land: 0.014 acre x $700,000/acre*** = $10,000**
TOTAL: $30,000 (per 2.17-acre area)

Per-acre stormwater impact fee: $13,825 (say $14,000)

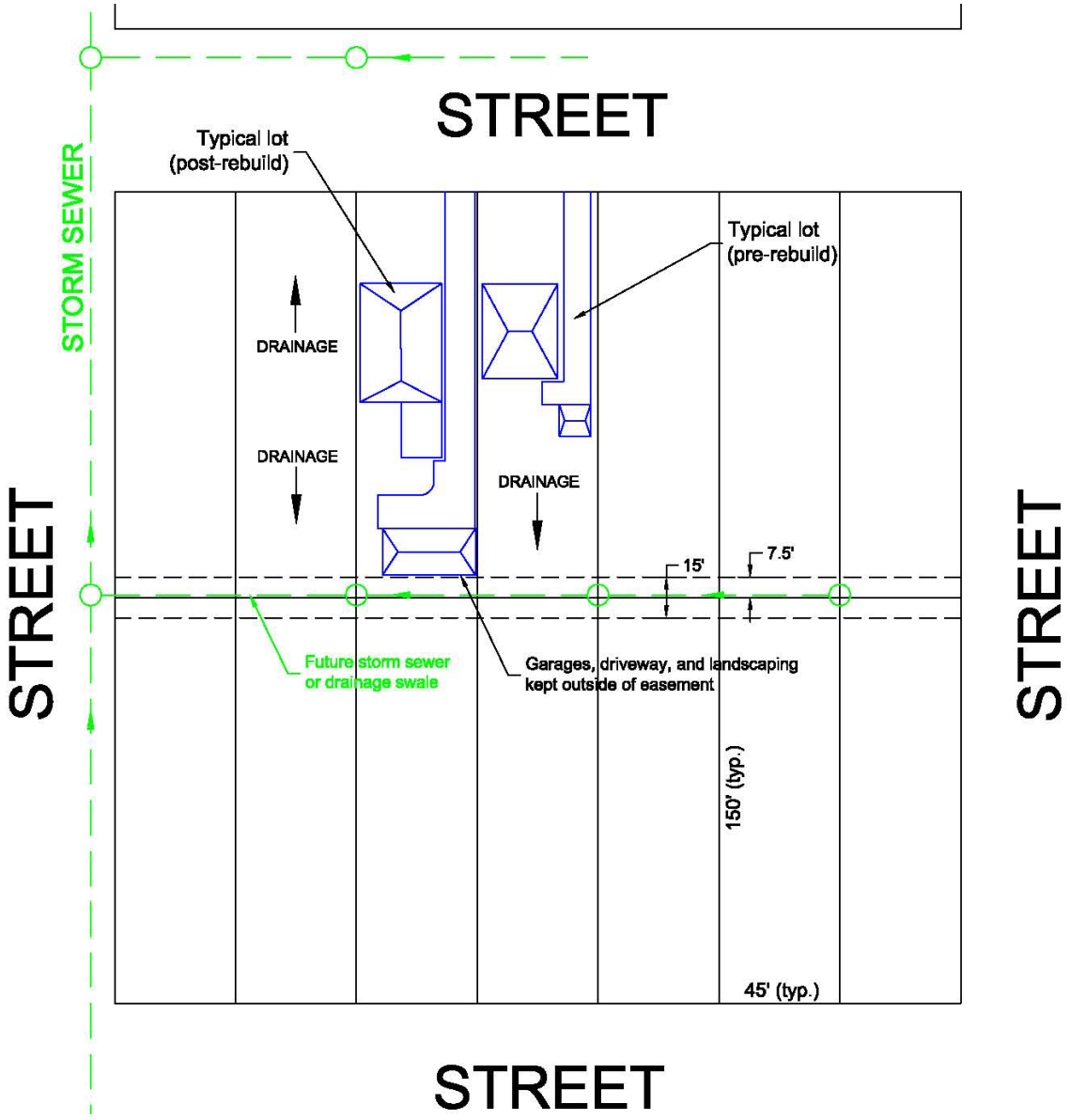
* ***Assuming neighborhood is served by a storm sewer (connection available at street)***
** ***Assuming a 4-foot deep dry detention basin (~600 sq. ft. pond footprint)***
*** ***$600,000 per acre (local market analysis) + $100,000 per acre (site preparation costs)***

Charging a permit fee of $14,000 per redeveloped acre should provide the Village adequate funding to address stormwater conveyance and storage so as to avoid negative downstream impacts (due to increased flow rates or localized flooding). For a typical ¼-acre redevelopment property, this would translate to a stormwater impact fee of $3,500.

The following are key recommendations to address residential redevelopment:

- Increase the building permit fee to $14,000 per redeveloped acre (based on the calculations above).
- Require downspout connections to grassed/landscaped surfaces only.
- For lots that partially drain to a rear yard swale and/or storm sewer, the applicant must provide a minimum 7.5-foot (half-width) easement for future swale/sewer maintenance.

- The easement language should restrict use to prevent paved surfaces, fences, landscaping, or accessory structures from being constructed within the easement (see figure below).
- Require applicant to provide pre- and post-redevelopment impervious surface calculations and a site grading plan. The site grading plan should identify drainage patterns on adjacent properties so as to avoid creating any additional low spots or transferring a drainage problem to another location.
- Once a block has been substantially (>50%) redeveloped, the Village should design a rear-yard storm sewer with catch basins and install the sewer as soon as local conditions permit.
- If local contours provide adequate slopes for rear-yard drainage swales, storm sewers may not be necessary. However, the same easements should be obtained for adequate swale grading, maintenance, and protection against man-made obstructions.



3.0 NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM PROGRAM (NPDES)

The Village's NPDES Stormwater Permit is largely based on the DuPage County permit language. As such, many of the required activities have been pre-defined by DuPage County. As of the date of the Master Plan Update, the Village is nearing the final year of its first stormwater permit cycle (2003 – 2008). Outstanding requirements for the first cycle include development of "Municipal Housekeeping" and Illicit Discharge Detection and Elimination" programs. The second cycle, which begins in 2008, should be written to take advantage of planned stormwater-related activities and projects as defined in this Master Plan.

Specific Best Management Practices (BMPs) to include in the 2008-2013 NPDES permit cycle should include:

- Updates to street sweeping frequency based on Village maintenance history and planned equipment use
- Stream restoration program, as recommended in this Master Plan
- Additional updates to local stormwater ordinances to further enhance stormwater quality (see discussion in the following section, *TMDLs*, for details)

The next Notice of Intent for the 2008-2013 permit cycle will likely be due to the IEPA in late 2007 or early 2008. Early coordination with the IEPA is recommended to determine what changes will be made to the Six Minimum Control Measures so the Village has adequate time to prepare their modified stormwater quality program.

3.0 TOTAL MAXIMUM DAILY LOAD (TMDL)

In 2004, the IEPA completed its final report on Total Maximum Daily Loading (TMDL) for the East Branch DuPage River, targeting the following pollutants:

- Ammonia-N
- CBOD (Carbonaceous Biochemical Oxygen Demand)
- Chloride

Although the majority of pollutants identified in the TMDL report target point sources at area wastewater treatment plants, some are influenced by non-point sources, such as road salt application resulting in higher chloride concentrations and high BOD resulting from urban stormwater runoff during small storms. The establishment of the TMDL values may place a significant burden on the Village of Downers Grove with respect to stormwater quality at its primary stormwater outlets (Lacey Creek, St. Joseph Creek, and Prentiss Creek). Future water quality monitoring may be required at the downstream end of each of these watersheds (especially Lacey Creek and St. Joseph Creek, both of which are identified as impaired streams in the 303(d) list).

In order to anticipate future stormwater quality goals for the East Branch DuPage River, the Village should modify Chapter 26 of the Municipal Code to include a water quality component for specific types of high-intensity development and redevelopment, such as commercial and industrial areas. A provision should be added that requires (at a minimum) BMPs for the "first flush" storm, which typically consists of the first 0.5 to 1.0 inch of rainfall during a storm event. BMPs that could be employed on current (and future) sites include (but are not limited to):

- Infiltration swales
- Rain gardens
- Sediment removal devices (underground "swirl" chambers)
- Permeable pavement
- Green roofs
- Filtration devices (usually underground structures with specialized filter media)
- Wet detention basins

These BMPs, if properly maintained, can significantly reduce stormwater pollutants through the reduction of Total Suspended Solids (TSS) discharged from a particular property, encouraging infiltration (as opposed to runoff into storm sewers), and alleviate channel erosion by reducing peak flow rates. These BMPs can have positive and measurable impacts on key TMDL constituents:

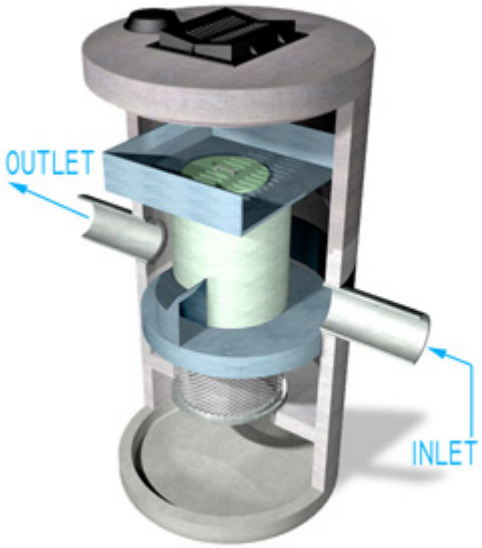
- Increased Dissolved Oxygen (DO) in receiving streams (increased DO is a direct result of a reduction in TSS in stormwater, which helps to control BOD levels)
- Decreased Chloride levels in receiving streams (some infiltration and filtration devices can reduce chlorine concentrations resulting from de-icing operations on roadways and parking lots)

Stormwater quality BMPs are typically designed to overflow into a traditional storm sewer system for larger rainfall events, such as storms exceeding the 1-year magnitude.

Examples of representative BMPs are included in the following photographs.

Infiltration swales behind curb & gutter allow first flush volumes to infiltrate instead of washing directly into storm sewers.
Photo source: US EPA

Rain gardens allow stormwater to pond and seep into the soil after a storm. Woody vegetation and mulch keeps underlying soils "loose" and promotes effective infiltration.
Photo source: US EPA



Stormwater filtration devices create a vortex, forcing suspended solids into the bottom of the chamber, trapping them for removal and proper disposal. These BMPs are ideal for sites with little or no available "green" areas.
Photo source: CDS Technologies

In addition to the BMPs listed above, the Village should maintain proper municipal good housekeeping practices, such as controlling the application of road salts through salt regulators, proper salt storage, and exploring roadway de-icing alternatives. Detailed documentation of salt usage is important, as Downers Grove may be measured against other communities in salt usage if Chloride levels are not reduced in the East Branch DuPage River.

4.0 LOCALIZED POOR DRAINAGE AREAS (LPDAS)

The Village currently has numerous pockets of areas identified as flood hazard areas, separate from the floodplain. Although these areas are not necessarily directly impacted by the floodplains of the Village's primary drainage channels, they are flood-prone due to a combination of undersized storm sewers and local topography.

The Village should evaluate LPDAs as potential sites for stormwater detention areas. Converting the flood-prone areas into "official" stormwater storage areas will have the following benefits:

- Removes private property from the Flood Hazard Area, reducing the threat of private property loss
- Provides stormwater detention storage for redeveloping areas (as discussed earlier in this section)
- Provides opportunities for parkland and creation of other open space areas
- Provides opportunities for stormwater quality BMPs
- May eliminate the need to increase downstream storm sewer sizes, as peak flows may be controlled through stormwater detention storage
- Allows desirable redevelopment to continue without negatively impacting neighbors.

LPDAs, by virtue of their topography, were likely wet areas or wetlands prior to the settlement of Downers Grove. As such, they are naturally-suited to act as stormwater storage areas. Eliminating LPDAs through storm sewer replacement may be necessary in some critical development areas, but eliminating most or all LPDAs will act to increase peak flows in the Village's major drainage channels, thus increasing flood risk in downstream areas.

It is recommended that the Village identify LPDAs in key economic development zones for potential elimination (through storm sewer size increases) and evaluate the potential for property acquisition in other LPDAs. Where property is acquired by the City, existing structures should be demolished and the area excavated for stormwater detention storage (and complementary parkland, if room permits).

5.0 FLOODPLAIN AREAS

The Village should evaluate flood-prone properties for potential purchase as part of a floodplain buyout program. This program involves purchase of flood-prone properties and conversion to multi-use open space. The sites can be enhanced to provide additional stormwater storage to mitigate flood damage, to preserve environmental resources, and to develop contiguous open space.

It is recommended that the Village develop and implement a floodplain buyout program, working with partners such as park districts and other agencies for potential funding opportunities.

6.0 PUBLIC EDUCATION AND OUTREACH

Based on the responses to the resident survey, it is apparent that there is a need for providing information about stormwater. In addition, keeping the public informed is a key component of a stormwater management program and is required in the NPDES permit. The Village should implement a public education program to provide educational materials to the community and conduct outreach activities about stormwater quality and quantity in the Village.

7.0 COUNTY REGULATIONS

As a full-waiver community, Downers Grove enforces stormwater rules that are at least as stringent as DuPage County requirements. Implementing changes to local rules that further enhance stormwater quality should not be in conflict with DuPage County requirements, provided that County stormwater detention requirements are still maintained.