City of Northfield, Minnesota	Policy Number: 3.03
PUBLIC WORKS (ENGINEERING DIVISION)	Adopted: XX/XX/xxx – Motion xxxx-xxx
SURFACE WATER MANAGEMENT – FLOOD CONTROL	Revised:

3.03 SURFACE WATER MANAGEMENT – FLOOD CONTROL

A. PURPOSE

This policy is intended to guide effective and efficient use and management of the City's Surface Water and Stormwater Conveyance Infrastructure in regards to surface water flooding. Information and guidance identified in this policy are intended to provide safe and reliable infrastructure in accordance with industry standards and design requirements established by governing agencies. This policy takes into consideration public health and safety, environmental factors, and cost of implementation.

B. MANAGEMENT OF SURFACE WATER MANAGEMENT SYSTEM

Surface water runoff occurs when rainfall rates exceed the evaporation rate and infiltration capacity of existing soil. This affect is compounded by the addition of impervious surfaces such as roadways, driveways, buildings, and other hard surfaces without ability to infiltrate surface water. In an urbanized landscape, surface water runoff is expected so cities are required to build and maintain a surface water management system.

The City's surface water management system is comprised of designed infrastructure to effectively convey and detain/retain surface water or stormwater runoff during rainfall events. This includes open water channels or ditches, stormwater pipes and catch basins, stormwater ponds, other detention/retention Best Management Practices (BMP's), and curb and gutter. These practices are all designed to nationally accepted standards and it is the City's goal to ensure proper function and operation to these standards. These standards can be viewed in City Policy 3.02 – Engineering Guidelines.

The City manages surface water in many different ways. This varies from routine or complaint based cleaning of storm sewer, large capital improvement plan projects including road reconstructions and pond dredging projects, or evaluation and updating of the City's Surface Water Model as the City grows or as industry standards change due to climate change and other relevant factors. The City has several different policies, plans, and ordinances to effectively manage stormwater runoff and the surface water management system. These documents have been listed below for reference:

- Municipal Separate Storm Sewer System (MS4) Permit
- City Ordinance, Chapter 22 Article VI – Surface Water Management
- 2007 Comprehensive Surface Water Management Plan
- 2008 Comprehensive Plan, Chapter 5 – Environmental Resources and Chapter 6 Sewer and Water Resources
- 2016 Spring Creek Watershed Model
- Climate Action Plan
- 2020 Comprehensive Surface Water Model
- City Policy 3.02 – Engineering Guidelines

Updates to the City Surface Water Model may identify and require changes to the City's local or regional drainage system overtime to ensure proper operation and provide adequate level of service. The City surface water model currently incorporates main trunks of the storm sewer network, low points in roadways and their overflow routes, open channel conveyance, and storage nodes (stormwater ponds, wetlands, culverts to culvert swales, ponded areas in open fields, etc.) Smaller localized storm sewer is left out of the modeling due to the added complexity and cost of that type of assessment. Localized storm sewer networks are modeled and review on a case by case scenario, as needed.

C. INDIVIDUAL PROPERTY DRAINAGE

There are circumstances where isolated/localized flooding of individual properties may occur (outside of drainage and utility easements) unrelated to the City's Surface Water Management System that are not the responsibility of the City to maintain or correct. These instances are listed below.

1. Flat or minimum-sloped yard – The general requirement for surface water to convey over a turf grass or vegetated area is a minimum of a 2% positive slope. Property owners are responsible to ensure existing conditions or any modifications done on private property maintain adequate slope. Less than 2% slope may require drain tile installation to ensure proper drainage.

2. Lack of Gutter – Proper installation of gutters and downspout are responsibility of the homeowner. Intrusion of surface water through low openings or groundwater through cracked foundations or by other means due to improper installation or lack of gutter/downspouts is not the responsibility of City.

3. Foundation Leaks/Groundwater – The property owner is responsible for ensuring the impermeability of their structure foundation. Seasonally high groundwater tables and hydrostatic pressure may cause minor flooding by seepage through cracks in the foundation or by other means. The City does not monitor groundwater levels on a regular basis citywide and is not responsible for mitigating groundwater intrusion of a structure or dwelling.

4. Sump Pump Discharge or Failure – The property owner is responsible for ensuring adequate function of sump pump(s) on site. Sump pump discharge that is placed too close to the foundation, failure of foundation tile, or failure of sump pump(s) are the responsibility of the property owner. City will permit sump pump discharge to connect to city storm sewer system. This process is to be permitted through the City Right-of-Way (ROW) process.

5. Nuisance Water – Nuisance water or water that pools for extended periods due to poorly drained soils, poor grading, frozen ground conditions, or snow impoundments and does not pose a risk of flooding to the adjacent structure is responsibility of the property owner. Property owners are allowed to place a pump in nuisance water collection areas and pump the water out to the street.

The instances or examples included in the list above do not represent an all-inclusive/comprehensive list and is not an admission of fault and does not make the city liable for flooding that occurs outside the extent of this list.

D. REGIONAL SYSTEM – OFFSITE DRAINAGE IMPACTING PROPERTY/PUBLIC HEALTH & WELFARE

Off-site drainage (or run-on) from a contiguous regional area and collection/inundation of an individual property or properties in an isolated low area may be eligible for financial assistance through the City or other funding parties.

Drainage patterns within engineered infrastructure and correctly graded landscapes typically remain the same over time but the capacity and flow rate of the system may change dependent on shifts in the precipitation patterns and/or degradation to the infrastructure.
The City may participate in the correction of localized flooding issues if it is deemed to be caused by a regional drainage issue and there are feasible mitigation strategies to solve the issue. Mitigation strategies can be broken down into the categories of Rate Control, Volume Control, and drainage direction.

1. Rate Control – Rate Control is typically viewed as how fast stormwater runoff leaves a site or property. This can be through channelized flows of a ditch and storm sewer network or overland/sheet flow. Overland/sheet flow is significantly affected by what kind of ground cover is present. Impervious surfaces will increase the rate of which stormwater leaves a site, and vegetation such as turf grass or deeply rooted native plants will slow the rate at which stormwater leaves a site. This vegetation plays a secondary role in providing volume reduction through infiltration as well.

Stormwater rates in engineered infrastructure such as a storm sewer network are controlled by the size of the pipe the stormwater is entering. Decreasing the size of a pipe will reduce the volume capacity of the pipe and extend the time to convey the water. This prevents scour/erosion to downstream conditions but can also lead to flooding in the upstream watershed area. Increasing the size of the pipe will do the opposite of what is described above and can play a valuable role in reducing flood risk for upstream areas. When increasing the size of the pipe, analysis of the downstream watershed area is required to verify no adverse impacts occur.

2. Volume Control – Volume control is typically thought of in the terms of storage capacity. Storage for a sub-watershed can occur in the storm sewer pipes, on a roadway between the curb lines, or in a constructed Best Management Practice (BMP) such as a stormwater pond or infiltration/filtration basin. As rainfall events intensify over time, the need for more storage throughout the watershed area may be required. This is accomplished by constructing new regional BMP's to handle the excess load to the system. These regional BMP's can be difficult to construct in urbanized fully developed spaces due to the footprint they require. A more feasible way to gain additional storage is retrofitting an existing stormwater BMP to incorporate larger rainfall events and property owners implementing storage/volume reduction practices on site.

3. Stormwater Flow Direction – Stormwater flow naturally moves from an area of higher elevation to lower elevation. Typically stormwater flow direction relates to nuisance water conditions from poorly graded lots which is an item that does not qualify for city assistance since it is not a regional drainage issue. With this mitigation strategy, it is thought of more in the terms of keeping stormwater flow from going where it is not supposed to. This can be accomplished by construction of levees or small berms that will add protection to a low area.

When the City can not effectively and feasibly manage the rate, volume, or direction of stormwater runoff, it may choose to purchase and/or Modify/Demolish the affected property. This mitigation measure presents several options and should be considered in more severe scenarios. The City may choose to modify the basement (if applicable) to protect the property from future flooding events. A modification would consist of reconstructing the basement of an existing property from a walk-out to a look-out, a walk-out to a full basement, or a look-out to a full basement.

Under this mitigation strategy, the City also has the option to purchase (with property owner agreement) and demolish the existing structure. The City may then choose to rebuild a structure that is protected from flood events, not rebuild the structure and designate the land as open/green space, or construct a drainage improvement on the property and put the land into a perpetual Drainage and Utility Easement.

Availability for the mitigation strategies listed above and whether the City can provide assistance is completely dependent upon funding availability and feasibility of the improvement, which may vary from year to year.

E. CLIMATE ADAPTATION AND RESILIENCY

While the strategies and occurrences listed above detail mitigation for existing issues within the storm sewer network or future issues, there are approaches the City can take to help curve the number of flooding events observed over a given time period. The City Council passed a resolution on January 18, 2022 declaring a Climate Emergency, recognizing the crisis humanity is facing on a global scale. On a local scale, climate projections show Northfield and surrounding communities in southeastern Minnesota being warmer with more precipitation and higher intensity/more-extreme storm events.

While stormwater mitigation measures may not solve the root problem of climate change itself, the City can adapt to create a sustainable community that will lessen the effects of more intense rainfall events. Some of those strategies are listed below and can be adopted through policy and or capital improvement projects.

Green infrastructure/Low Impact Development is an approach to managing urban wet weather impacts that mimics, restores, or maintains natural hydrology. Green infrastructure includes a wide array of practices, including infiltrating, evapotranspiring, or harvesting and using stormwater.

On a regional scale, green infrastructure is the preservation or restoration of natural landscape features, such as forests, floodplains and wetlands. On the local scale, green infrastructure consists of site and neighborhood-specific practices, such as bioretention, trees, green roofs, permeable pavements and cisterns. Regional and local practices are coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed.

Benefits of low impact development include better management of storm-water runoff, water capture and conservation, flood prevention, storm-surge protection, and accommodation of natural hazards (e.g., relocating out of floodplains).

Low impact development and green infrastructure can be considered during a planning and development phase with new development and redevelopment projects.