ROCK CREEK WATERSHED ASSESSMENT AND MANAGEMENT PLAN

Prepared for

City of Rockville, Maryland
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EXECUTIVE SUMMARY

Background

The City of Rockville faces the challenge of maintaining healthy, sustainable watersheds in a highly developed, urban area. This challenge includes managing stormwater runoff from neighborhoods and commercial areas to minimize flooding and improve water quality in the City's streams. The City must also remain in compliance with state and local stormwater regulations that require the City to restore and protect its watersheds, the Potomac River, and the Chesapeake Bay.

The City of Rockville, as an active steward of the environment, is responsible for watershed management within the City limits. The City's Department of Public Works (DPW) oversees stormwater and sediment control regulations for new and redevelopment, maintains and repairs public stormwater management facilities and storm drains, and designs and constructs Capital Improvement Program projects for stormwater management facilities and stream restoration. The City works with private owners and commercial operators to protect water quality from illicit discharges and offers education and outreach programs to promote sustainable practices. It also evaluates watershed policies, monitors stream and stormwater facility conditions, and administers the City's Stormwater Management Fund that supports staffing, consultants and contractor services, and other watershed program elements.

The City's watershed management program is regulated by the Maryland Department of Environment (MDE) under a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit. This permit is part of a national watershed protection program administered through the U.S. Environmental Protection Agency under the Clean Water Act. The permit, reissued every 5 years, requires Rockville to implement effective programs that reduce water-borne pollutants from construction sites, municipal activities, and commercial and residential properties. Under this permit, the City is responsible for stream conditions and the quality of the runoff discharged from public storm drains into streams. Throughout the Chesapeake Bay, MS4 permits are beginning to incorporate numeric stream quality standards that will require municipalities to provide even higher levels of watershed protection. The City expects its next NPDES permit in 2013. The City's already extensive efforts will likely need to expand to balance the existing effects of urban development with increasingly effective watershed improvements.

As part of this comprehensive effort, DPW has completed an update to the 2000 Rock Creek Watershed Management Plan. The Rock Creek Watershed Assessment and Management Plan, prepared with the consultant services of URS Corporation, will help the City prioritize Capital Improvement Program (CIP) projects and programmatic activities over the next decade. The updated Assessment's findings and recommendations were evaluated by City staff from DPW's Environmental Management and Engineering Divisions, the Department of Recreation and Parks, and the Watershed sub-committee of the City's Commission on the Environment. The findings and recommendations were also presented in two public meetings and the final draft report was published on the City's website for public comment.

Rock Creek originates in northern Montgomery County, passes briefly through Rockville, and continues through the District of Columbia to meet the Potomac River. The Rock Creek watershed encompasses 4 square miles of the eastern side of the City; however, the City represents only 5% of the total watershed. The watershed includes parts of Rockville Town Center and the Rockville Pike/Hungerford Drive corridors, the neighborhoods of Lincoln Park, East Rockville and Twinbrook, and industrial areas along Gude Drive and Southlawn Lane, as well as Redgate Golf Course and the City's Civic Center Park. Several Rock Creek tributaries originate in the City, including Croydon Creek and Calvin Park tributary that traverse the Civic Center Park, Twinbrook and Rockcrest tributaries, and Northeast Park tributary and other streams running through Redgate Golf Course.

The City's goals for this management plan include identifying additional stormwater management (SWM) opportunities and stream restoration projects, Environmental Site Design (ESD) opportunities and constraints for small-scale SWM features, and operational strategies that would complement the City's ongoing watershed projects and operations. This report also highlights new directions that the City's watershed management program should consider in the next decade. The framework for assessing progress and future watershed opportunities is shifting across the state. Recent State-issued NPDES permits focus heavily on capturing nitrogen, phosphorus and sediment by directing communities to add stormwater management and other water quality improvements in previously developed areas lacking water quality treatment. Montgomery County's 2011 NPDES permit required the county to treat 20% of its uncontrolled areas over the next 5 years. Staff expects the City's next NPDES permit to contain similar requirements. To meet these requirements, Rockville may need to incorporate small-scale SWM opportunities and programmatic initiatives identified in this assessment. Although Rockville has had a very strong stormwater retrofit and stream restoration program for the past 30 years, the extent of required additional action is not yet clear.

Management Progress Since 2000 Rock Creek Management Plan

Since the 2000 Management Plan, the City has constructed five stormwater facilities and two stream restoration projects in the Rock Creek watershed. These include pond retrofits at Northeast Park, Maryvale Park, and the Gude Drive Maintenance Yard, and two at Redgate Golf Course. These are predominantly located in Redgate Golf Course sub-watersheds because of their open space and existing pond infrastructure built in the 1970s. The City also has added stream restoration along the Rockcrest and Twinbrook tributaries. The new Assessment shows that these projects are capturing sediments and trash and have arrested further erosion within the stabilized reaches.

While these recent efforts have been helpful in addressing some local stream impacts, the assessment concluded that the watershed as a whole continues to exhibit degraded aquatic habitat and water quality. This is attributed to the general difficulty in restoring urban watersheds built before adoption of the current stormwater management and stream protection standards. Urban watershed restoration takes decades, and is based on exploiting opportunities to add or enhance stormwater management, restoring streams to a new equilibrium point, and systematically changing behaviors that affect water quality. Also, the definition of effective SWM and

expectations for achievable stream recovery in urban settings continues to shift. The City's watershed goals are driven as much by internal needs for its stream valley parks and infrastructure protection as by Chesapeake Bay water quality objectives.

Current Watershed Conditions

The Rock Creek watershed covers 2,545 acres, or 30% of the City, but contains only 6 miles of streams, the fewest of Rockville's three watersheds. This is a result of development patterns dating back to the 1950s, when streams were frequently piped through commercial sites and residential neighborhoods. Within the City, 40% of the watershed is currently impervious, as compared to the City's overall 35% imperviousness. These impervious surfaces include building rooftops, parking lots, streets, sidewalks and other paved areas. Rock Creek's land use is 51% residential, 33% industrial/commercial/institutional uses, and 16% open space.

The Assessment documents that stormwater runoff from 64% of the Rock Creek drainage area goes directly into the watershed's streams without any treatment. The remaining 36% of the area drains to public or private stormwater facilities. However, many of these are older, outdated structures that provide few water quality benefits. Where it exists, SWM coverage is concentrated in certain sub-drainage areas, leaving large swaths unprotected by any SWM treatment. Consequently, the report finds that Rock Creek continues to show substantial adverse impacts from urban stormwater runoff.

The Assessment finds that Rock Creek's tributaries within Rockville have remained relatively constant since 2000, based on a multi-parameter stream assessment tool. In many places, the waterways are eroded and adversely impacted by nutrients and sediment discharges, and do not provide healthy aquatic habitat. The Rockcrest and Twinbrook tributaries that previously were stabilized displayed better physical condition (i.e., less channel scouring, deposition and erosion), but still showed impacts in water quality and biological indicators. The overall assessment rankings, as compared to the 2000 study's results, showed stream quality gains at Twinbrook and Rockcrest tributaries, which were stabilized in 2007-08, and on the Avery Road tributary; and a decrease on Southlawn Branch. The Assessment also used a Bank Erosion Hazard Index rating to document moderate to severe erosion leading to stream bank downcutting and channel widening. Sections of Croydon Creek and the Calvin Park tributary were identified as the channels most in need of stream stabilization.

The field work supporting this assessment confirmed that the streams are impacted by pollutants from residential fertilizer, pet waste, trash, roadway and parking lot sediment discharges, and oils/grease from cars. The report also identifies numerous hotspots where poor site cleaning and housekeeping practices allow significant sediment and nutrient pollution to run off into storm drains and streams. These were associated with automotive, printing and other industrial businesses along North Stonestreet Avenue, Westmore Road, Dover Road and Southlawn Lane, and the City's Gude Drive Maintenance Yard. These issues will be focus areas for the City's outreach and regulatory efforts. The Redgate Golf Course was in compliance with its pollution prevention plan as of 2011, but should be periodically monitored as operations continue under the new private contractor.

Conclusions

To achieve further water quality improvements, the 2013 Rock Creek report concludes that the City should continue to invest in stormwater facility retrofits, stream restoration and periodic operational maintenance. The combined design and construction costs of the recommended CIP SWM retrofits and a major stormwater rehabilitation project are expected to cost approximately $400,000. The recommended public stream restoration projects are estimated at $1,918,000. If approved, they will be programmed in future CIPs. Additional routine and minor repair stormwater facility maintenance is proposed to be performed through the Operating Budget. Operational and programmatic improvements that may be accomplished with existing staff and budget resources are also recommended.

Additionally, the assessment offers the City guidance to prepare for the next generation of potential NPDES obligations. The City is encouraged to explore other avenues for pollutant reduction, such as using smaller-scale ESD stormwater features as retrofits, and piloting targeted watershed behavior-change campaigns to residents and businesses. The guidance also suggests operational steps to improve the effectiveness of Rockville's stormwater program. These include new tracking measures, implementation of compliance tools, and public outreach to reduce water pollution sources.

This guidance, summarized at the end of the recommendations section, will be further evaluated during development of the City's next NPDES permit. City staff anticipates that MDE, as part of its Chesapeake Bay recovery initiative, will compel some of these as requirements under the City's next NPDES permit. Given the limited opportunities for further large-scale watershed improvements in Rockville, these measures also may be economical alternatives. As they are expected to require additional staff and/or budget, they will be considered in the context of the City's competing needs for the SWM program.

Stormwater Management Recommendations

Stormwater management guidance continues to evolve. Since the City's 2000 Assessment, MDE has issued several updates to State regulations that substantially changed stormwater facility sizing and design standards. In response, the Mayor and Council have updated its SWM ordinance and regulations. In light of this, the City regularly reexamines its stormwater systems for ways to optimize water quality treatment and reduce downstream erosion.

The Assessment evaluated upgrades and retrofits to existing public SWM facilities. These recommended actions may be provided either through a City CIP project or the Operating budget (e.g., small maintenance needs). Five projects are recommended for implementation in Table 1 below. The first three projects are CIP-level retrofits or major maintenance, and their combined design and construction cost is estimated at $400,000. The last two projects are within the scope of annual maintenance activities.

Table 1: Recommended SWM Retrofit and Maintenance Projects

SWM Facility or Site	Location	Recommendation
Burgundy Knolls dry pond	Upstream side of Norbeck Rd. between Allan Rd. and Redgate Farms Ct.	• Retrofit from dry pond to filtration system to add water quality treatment • CIP cost estimate: $250,000
Gude Drive Maintenance Yard	Wet pond adjacent to maintenance yard	• Retrofit for riser modifications on wet pond to increase water quality treatment capacity • CIP cost estimate: $50,000
Croydon Park underground pipe storage system	Between Crabb and Howard Avenues and N. Stonestreet Ave and N. Horners Lane	• Major maintenance to remove debris and repair deteriorated pipes • CIP cost estimate: $100,000
Theatre Users Group (TUG) Bldg. dry swale	Civic Center Park asphalt materials storage area near TUG building (behind Recreation Services Bldg)	• Install cover or containment system for materials storage bins • Operating budget
Fitzgerald Theater parking lot storm drain outfall	Rear corner of theater parking lot and downstream gully	• Repair curb inlet and install riprap to stabilize gully • Operating budget

Opportunities for new ESD measures on City land were also considered. However, these are relatively new so long-term maintenance needs and costs are still unknown. Current design standards limit these features to very small drainage areas (typically less than 1 acre), which are typically the purview of private owners rather than City SWM retrofits.

ESD is easier to construct as part of a more extensive project where topography and drainage also are being adjusted, such as new or redevelopment projects or CIP projects for sidewalks, streets, or parking lots. The Assessment makes the following recommendations regarding the future use of ESD approaches to pollution reduction. Staff will evaluate these in the context of its next NPDES permit, and develop the detailed selection and design tools needed for future implementation.

- Expand the techniques covered by the City's RainScapes program and more actively present these options to interested Homeowners Associations and civic association groups.
- Continue to assess the long-term function and performance of ESD features built in the City, and incorporate up-to-date design features. As these techniques become more common, especially on private developments, they are likely to become more cost-effective.

- Develop ESD selection criteria and identify City property appropriate for future ESD retrofits. Selection criteria should include roadways, parking lots and other impervious surfaces in areas without water quality treatment. Safe conveyance of runoff and cost considerations will also be considerations. As new SWM requirements and methods evolve, these public spaces where runoff might be captured become more valuable, given the dwindling sites for traditional large-scale SWM retrofits.
- Identify more "green street" retrofit opportunities to add filtration features adjacent to or in the roadway. Rockville has already piloted pervious concrete paving for an existing alley and new street designs incorporating bioretention. Work with City staff in all relevant divisions and departments to identify acceptable design criteria and promising locations across the city.

Stream Restoration Recommendations

All Rock Creek tributaries were assessed for current and potential erosion. Stream restoration projects were evaluated at eight stream reaches currently experiencing extensive or severe erosion, and engineering concepts and cost estimates were prepared for three of these, including a severely eroded ravine on Montgomery County Public School property. The stream projects fall into three types:

- Traditional stream restoration efforts;
- A new technique for smaller channels called regenerative storm conveyance, which uses rock, sand and wood chips to stabilize eroding banks and filter runoff from smaller storms; and
- Improved storm drain outfall redesign and construction.

Two recommended future CIP projects are described in Table 2 below. These public stream restoration projects are estimated to cost $1,918,000 for engineering design, permitting and construction.

Two additional stream repairs within the Rock Creek watershed, not included in Table 2, are part of currently proposed CIP projects. The first project, the Stream Restoration CIP project (330-850-2K59), included funds in the approved FY13 CIP budget to reconstruct a 150-foot section of collapsed gabion baskets in Rockcrest Tributary near Aleutian and Midway Avenues in FY 2014. The second, a storm drain outfall channel in Calvin Park is to be rebuilt in the approved Rockville Intermodal Access - Baltimore Road CIP project (350/420-850-8A11).

Table 3 identifies four other stream segments that will be monitored by City staff for worsening conditions. Three of these sites are located either on City land or within a public drainage easement; they may be added to a future CIP if erosion worsens.

An eroded ravine at Rockville High School was included in Table 3 for monitoring, although it will need an alternate funding mechanism (e.g., a grant or school funding) to go forward. The ravine is located primarily on private property owned by Montgomery County Public Schools and an apartment complex. This 200' long ravine receives runoff from several private storm drain

outfalls that have caused severe erosion over several decades. The ravine is 20' deep in places, and continues to downcut and widen. This costly stabilization project would address the most severe erosion in the watershed, but the City's current regulations and policies do not offer a straightforward solution to either compel the private owners to make repairs or to use City funds for private improvements.

Table 2: Stream Restoration Project Recommendations

Project	Proposed Length of Improvements (feet)	Proposed Improvements	Approximate Cost
Calvin Park Tributary – Baltimore Road to Croydon Creek Mainstem (proposed for CIP inclusion)	1,440	• Rock toe protection at specific locations • Vegetative stabilization along stream banks • Installation of grade control structures	$1,268,000
Croydon Creek – Glenview Mansion to Rockville High School (proposed for CIP inclusion)	700	• Rock toe protection at specific locations • Vegetative stabilization along stream banks • Rock cross vanes, rock double wing deflectors, and constructed riffles	$650,000

Table 3: Streams To Be Monitored For Worsening Erosion

Stream Reach	Location	Notes
Rockville High School Ravine (mostly on MCPS property)	Between Rockville High School and the Forest Apartments	• Monitor extent of erosion • Seek options with owners to obtain stabilization • Cost estimate: $301,000
Croydon Creek	Norbeck Road to City Civic Center (near Woodburn Rd.)	• Monitor the channel for worsening erosion and existing gabions for deterioration
Croydon Creek tributary from Burgundy Knolls Dry Pond	At MD State Highway Administration culvert outfall from Norbeck Road	• Work with MDSHA to repair its broken culvert outfall • Re-assess erosion in outfall channel at time of MDSHA repairs to determine if other work is needed

Stream Reach	Location	Notes
Northeast Park tributary	From head of stream near Taft St. to Northeast Park SWM Pond	• Monitor for worsening erosion and effect on SWM pond maintenance

Operational Recommendations

The operational program opportunities are organized into the following categories: stormwater infrastructure maintenance; source control; improved data management; City policy development; and outreach and education. City staff will seek opportunities to accomplish some of these programmatic actions within current staff and budget resources before the next NPDES permit.

Stormwater Infrastructure Maintenance

- Continue to implement a sustainable preventative maintenance program for public SWM facilities and storm drains that accounts for long-term needs such as SWM pond dredging and storage pipe rehabilitation.
- Improve the routine maintenance program for the public storm drain system, including identifying inlets with high debris accumulation rates and developing a systematic catch basin cleaning program to prevent this material from flushing into City streams.
- Initiate a culvert clean-out program to keep large road culverts clear of branches, trash, debris and vegetative growth.
- Investigate costs and benefits of increased street sweeping frequency for effective water quality treatment that qualifies for NPDES credit.
- Engage other public agencies, like the Maryland State Highway Administration, to discuss routine storm drain system maintenance issues on their infrastructure, including scheduling.

Source Control

- Develop or update pollution prevention plans, ensure plan implementation and train staff at the Gude Drive Maintenance Yard and the storage area behind the Theatre Users Group (TUG) Building near the Civic Mansion. Both sites conduct maintenance and operations activities that generate high pollutant loads, especially sediment, in their runoff.

Improved Data Management

- Participate in City-wide asset management planning to ensure that any solution sufficiently incorporates stormwater program needs. If a City-wide asset management or ERP program is not procured, then buy a stand-along software package to better track public facility maintenance records and life cycle costs.

- More fully utilize GIS technology to map and manage data. Immediate needs include: riparian buffers, City stormwater CIP tracking, ESD locations (RainScapes program) street sweeping and catch basin cleaning, and enforcement actions.

City Policy Development

- Continue to evaluate ESD measures and emerging SWM techniques and adapt them to fit City conditions and needs.
- Develop generic pollution prevention plans for commercial hotspot businesses, such as automotive repair shops. Through a combination of outreach and enforcement, compel those owners to implement pollution prevention techniques.

Outreach and Education

- Increase outreach and education efforts targeted at private property owners responsible for stormwater facility maintenance.
- Add additional outreach activities and education tools focused on specific target behaviors or audiences, such as improved pet waste management, fertilizer usage, or automotive repair businesses. Using various media types such as social media or multi-lingual videos, City staff may communicate better with hard-to-reach target audiences.

Initiatives for Future Consideration

A number of other opportunities were identified that could strengthen the City's watershed management program. These have additional budget and staff needs that should be considered in the context of the next NPDES permit. Once the NPDES requirements are known, the City will need to assess the level of effort needed to meet these obligations and how to measure performance progress. The City will also do preliminary work to set criteria, evaluate other communities' programs, and gather information on City-specific applications before embarking on these proposals.

Some initiatives would expand existing policies or programs to tackle pollution issues beyond the City's current control. They may also have corollary benefits for owners dealing with drainage and erosion issues on private property. The last initiative gives Rockville the tools to better compare costs and measure performance. As the variety of watershed improvements widens from traditional SWM and stream projects to encompass ESD and source controls, the City may consider these suggestions to help implement the most cost-effective opportunities.

- Consider an ESD pilot program to install grassed or vegetated swales with amended soil in flowpaths through residential back yards. These would promote infiltration and lessen runoff for areas without SWM, where traditional retrofits are not feasible. URS Corporation investigated possible locations in the Twinbrook neighborhood, but fences, play equipment and other private improvements interfered with a continuous swale design. It may prove difficult to find a suitable location; but it may benefit lots with unobstructed flowpaths if the City can obtain owner cooperation.

- Consider a pilot program to install catch basin inserts on public storm drain curb inlets. The program would be designed to measure the lifecycle costs and effectiveness of trapping pollution at inlets before it reaches the storm drain outlets and streams. This may be tested in conjunction with the high-debris inlets identified in the preceding Operational Recommendations. If feasible, this could provide at least partial treatment for areas without SWM.
- Consider street sweeping expansion in commercial areas and near hotspots to qualify for NPDES permit water quality credit.
- Evaluate mechanisms and develop guidelines to significantly reduce stream erosion and/or sedimentation on private properties. Assess the public benefits, costs, and the demand for the City to work with private owners of stream or open drainage systems. Implementation may include enforcement through the City's Water Quality Protection Ordinance, or a new public-private partnership.
- Develop and implement a protocol for stormwater sampling and water quality monitoring. This program could be used to show progress toward reducing targeted pollutants not only from structural BMPs but also from small-scale treatment measures, targeted outreach efforts in specific sub-watersheds, and city-wide operational changes.