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Memorandum Providing Background on and an Explanation of Amendments to the Brown's Creek Watershed District Rules

January 10, 2018

I. BACKGROUND

Introduction

This memo presents a summary and explanation of proposed changes to the following rules of the Brown's Creek Watershed District:

- Definitions
- Rule 1.0: Procedural Requirements
- Rule 2.0: Stormwater Management
- Rule 3.0: Erosion Control
- Rule 4.0: Lake, Stream and Wetland Buffers
- Rule 5.0: Shoreline & Streambank Alterations
- Rule 6.0: Watercourse & Basin Crossings
- Rule 7.0: Floodplain and Drainage Alterations
- Rule 8.0: Fees
- Rule 9.0: Financial Assurances
- Rule 10.0: Variances
- Rule 11.0: Enforcement

The memo provides information to support BCWD's judgment that the proposed changes will improve the capacity of the BCWD regulatory program to protect water resources in the Brown's Creek watershed. The memo adds to the body of research, analysis, experiential evidence and collaborative dialogue supporting and explaining the Brown's Creek Watershed District Rule that is found in three prior Statement of Need and Reasonableness documents issued by BCWD in 1998 and 2007. (The prior SONARs can be obtained from the BCWD office – 651-330-8220, ext. 26.) Building on those prior statements, this memo establishes the basis for BCWD's determination that the effectiveness of the amended rules reasonably supports the administrative and compliance burden incurred through imposition of the revised rules on property development and other land-altering activities in the watershed.

When the proposed revisions were released on October 18, 2017, BCWD invited all interested parties to submit written comment on the proposed changes before December 4, 2017, in compliance with the 45-day period for receipt of written comments required by Minnesota Statutes section 103D.341. BCWD then held a **public hearing** on the proposed revisions as part of the regular meeting of the managers **on December 13, 2017,** at which time BCWD provided

interested persons with have an opportunity to address the BCWD Board of Managers concerning the proposed revisions.

BCWD received both written comments and testimony at the public hearing, though the latter did not introduce issues, concerns or questions beyond those that had been raised in written comments. (The managers did receive input on when the amended rules should become effective.)

Staff reviewed the comments received with the managers, who provided direction on responses. The managers approved the responses and this memo, and adopted the amendments as part of BCWD's regular meeting January 10, 2018, with an effective date for the amended rules of February 1, 2018.

Three further specific changes were made to the rule amendments in response to comments:

1. The definition of "reconstruction" was revised to remove unnecessary reference to changes to buildings, leaving the fully effective language BCWD had proposed in October regarding changes to impervious surface area. In addition, BCWD refined the short list in the definition of types of work that are exempt because they do not involve land-disturbances of a nature or extent that present an opportunity to implement stormwater-management facilities and because they do not increase the volume or composition of runoff. This leaves the reference to "reconstructed buildings" in subsection 7.3.2 to be interpreted and applied in accordance with accepted, commonplace understanding of the term.
2. BCWD moved references to state best-management practice design and construction guidance from among the standards in subsection 2.4 of the Stormwater Management Rule to the required exhibits subsection (please see new subsection 2.7.1). The move underscores that when submitted to support a permit application, designs and plans must be consistent with the best practices provided in the referenced state-of-the-art practices and techniques documents. Such materials can save property owners time and the cost of having to research best practices themselves. And while it is unlikely that a change to the referenced standards (which are maintained online) would have a significant impact on project designs or plans, BCWD does not and will not *require* applicants to update plans and designs to conform to updates made to the reference materials after submission of a complete application.
3. BCWD has removed the reference to case-by-case analysis of the need for temporary sedimentation basins by the BCWD engineer from 3.2.2(f) in the Erosion Control Rule, leaving determination of the specific temporary sedimentation basins needed for a particular project to be determined by application of subsection 3.2.4 of the rule.

Watershed district regulatory authority and relationship to city regulation

Legal authority for BCWD's rules is found in Minnesota Statutes chapters 103B and 103D. Under Minnesota Statutes section 103D.341, subdivision 1, watershed districts must adopt rules "to accomplish the purposes of [the watershed act] and to implement the powers of the managers." These purposes include, among others, conservation of water for public uses; controlling erosion and siltation of lakes, streams and wetlands; and protecting water quality in

these bodies.[1] Watershed district managers are further authorized to regulate and control the use of water within the watershed and regulate the use of streams and watercourses to prevent pollution.[2] Finally, watershed districts in the Twin Cities metropolitan area are authorized to regulate the water resource impacts of land use and development where local government units have not adopted district-approved local water management plans or where other local units of government (cities) elect to defer exercise of regulatory authority to BCWD.[3]

In adopting the revised rules, the BCWD Board of Managers will set a date on which the updated rules will be effective throughout the watershed. BCWD has *tentatively* identified February 1, 2018, as the working target for an effective date. Permit applications that are not complete as of the effective date will be subject to the updated rules. A watershed city may elect to amend its local water management plan and adopt implementing ordinances, and upon BCWD's approval of the city's plan amendment and implementing ordinances, the city will assume sole regulatory authority in place of BCWD for the relevant rule areas. The delineations of authority will be articulated in a memorandum of understanding that must be approved by the city council and the BCWD Board of Managers. The MOU also will provide a framework whereby the two entities will regularly meet and collaborate to ensure that fully protective water-resource standards and criteria are in place, effectively implemented and vigorously enforced.

Plan background

While BCWD undertook (and completed) a comprehensive overhaul of its guiding watershed management plan in 2016, the revised plan does not include shifts in policy and goals that would mandate major changes to BCWD's rules. Instead the plan directed "[c]ontinued rigorous and effective administration"[4] of the regulatory program to "provide[] a baseline level of protection and contribute[] to restoration of water resources by ensuring that development and redevelopment in the watershed does not degrade water quality, allowing capital investments to fully accrue to the restoration benefits."[5] The plan goals supported by this approach include:

- Protect and maintain the quantity and quality of groundwater recharge;
- Reduce volume-related stormwater impacts to waterbodies;

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1 Minn. Stat. § 103D.201, subd. 2.

2 *Id.* § 103D.335, subds. 10 and 16.

3 *Id*. §§ 103D.335, subd. 23; 103B.211, subd. 1, providing metro watershed organizations with authority to regulate the use and development of land in the watershed when one or more of the following conditions exists:

> (i) the local government unit exercising planning and zoning authority over the land … does not have a local water management plan approved and adopted in accordance with the requirements of section 103B.235 or has not adopted the implementation program described in the plan;
> (ii) an application to the local government unit for a permit for the use and development of land requires an amendment to or variance from the adopted local water management plan or implementation program of the local unit; or
> (iii) the local government unit has authorized the organization to require permits for the use and development of land.

4 Brown's Creek Watershed District, 2017-2026 Watershed Management Plan, sec. 4.4.4, p. 76.

5 *Id.*, sec. 4.4.6 p. 79.

- Ensure no net increase in runoff rate from new development and redevelopment;
- Continue to perform routine site inspections during the construction process to monitor the performance of erosion and sediment control practices.
- Manage the watershed to mimic natural (pre-settlement) hydrologic conditions;
- Protect water quality in lakes and large ponds that currently meet state standards and designated uses;
- Establish reasonable goals for the functions and values of lakes and maintain functions and values;
- Ensure no net loss of wetland functions and values within the watershed;
- Increase the quality of buffers around wetlands;
- Ensure no net loss of flood storage in the watershed;
- Assess the potential for flooding properties when evaluating land management activities;
- Minimize the risk of flooding to structures within landlocked basins;
- Minimize the risk of flooding on downstream properties when outlets are provided for landlocked basins;
- Establish controls to reduce the potential for transport of pollutants into the groundwater;
- Maintain or restore (where needed) presettlement recharge conditions in the watershed; and
- Utilize data as part of a regular evaluation of regulatory program performance.

The plan signaled that BCWD found that substantial overhaul of its rules would not be required for the regulatory program to effectively contribute to implementation of the plan and achievement of the goals. Instead, the plan stated that rulemaking would focus on several key questions in considering updates to its rules:

- Consider the need to develop and adopt rule language similar to the Minimal Impact Design Standards[6] performance goal of 1.1 inches over impervious surfaces and otherwise evaluate the need to develop and adopt a simplified performance goal similar to the MIDS'.
- Ensure that its stormwater management criteria were fully protective and not unnecessarily inconsistent with the standards set by other watershed organizations – especially in Washington County;
- Determine whether its stormwater management standards and criteria should be made applicable to a wider scope of land-disturbing projects – especially redevelopment;
- Examine the stormwater rule to determine whether it needs to be revised to ensure no net loss of aquifer-recharge capacity;

[6] *Available at* https://stormwater.pca.state.mn.us/index.php?title=Minimal_Impact_Design_Standards (last visited October 16, 2017).

- Revise the BCWD water-quality standard to ensure that water resources entirely within a project site are protected against degradation; and
- Assess whether the BCWD buffer requirements should be made more broadly applicable.[7]

The outcome of BCWD's analysis on each of these points is discussed in the rule-specific sections below.

The plan also anticipated that BCWD would need, in its rule-revision process, to define the surface-water contributing area to groundwater-dependent natural resources, revise the redevelopment trigger in the Stormwater Management Rule, apply water quality and volume management requirements to onsite stormwater flow alterations, exempt routine agricultural activities from regulatory requirements, add language to address installation of geothermal practices and update and clarify maintenance standards. Having analyzed the issues, convened a stakeholder group (as described below) and reviewed the regulatory program in two special meeting and one regular meeting of the managers, BCWD has determined:

- The extent of a surface-water contributing area to a groundwater dependent natural resource is best determined via a site-specific hydrological analysis and that the current rule definition establishes the necessary parameters for such analysis. Guidance will be developed;
- BCWD does not have data to support a determination that installation of geothermal practices that have a potential impact of water resource is a frequent enough occurrence in the watershed to warrant analysis, much less regulation; and
- BCWD does not have the appropriate tools at this time to revise rules to ensure no net loss of aquifer-recharge capacity.

While the use of chlorides on impervious surfaces was identified as a significant water resources concern in the plan, the plan did not contemplate regulation of chloride use. BCWD nonetheless considered such a step in the course of the rulemaking, and may return to the notion as BCWD gathers more data on impacts of chloride in the watershed. But for now BCWD elected to pursue education and outreach avenues to address the issue. The outcome of BCWD's deliberations on the other topics and issues list is discussed in the rule-specific sections below.

Beyond these substantive issues, BCWD's rule-revision process focused on simplification, wherever possible, of rule provisions and clarification of requirements. The rules adopted in 2007 were innovative in several respects, and included detailed provisions with regard to innovative regulatory areas such as stormwater volume management. Some of the provisions added in 2007 and even predating that rulemaking have proven extraneous, and BCWD focused on streamlining in this rulemaking.[8]

Stakeholder input

In 2016 the BCWD adopted its fourth-generation watershed management plan. Development of the plan included a comprehensive public engagement effort including meetings with BCWD's

[7] Goal statements are found in issue-specific tables in section 3 of the plan, pp. 10-69.

Citizen Advisory Committee, Technical Advisory Committee, adjacent watershed districts, lakeshore residents, members of the private development community and members of the public. Information collected specific to the BCWD rules and permitting program were addressed during the current rule revision.

In addition, major rule revisions being contemplated by the BCWD Board of Managers were shared with the Technical Advisory Committee in March of 2017 at the Brown's Creek Watershed District's annual stakeholder meeting. While there was discussion on certain aspects of the rule revisions, attendees expressed no major concerns. It was decided that revisions being made to the 2007 rules did not warrant additional input from member communities, state agencies, special interest groups or the public outside of the public hearing and the statutory review and comment process. (The CAC and TAC members participating in the sessions mentioned are listed in Appendix A here.)

BCWD rules history

BCWD adopted its first set of rules in October of 1999. Effective January 1, 2000, the rules were intended to implement the basic policies established in BCWD's first-generation watershed management plan. The 1999 rules regulated land use and land-disturbing activities that presented potential impact to water resource through a permitting program, and were intended to provide notice of and criteria for the Board of Managers' determination of whether and under what terms to grant a permit for regulated activities. The 1999 rules also provided procedures to be used for permit applicants and the enforcement of permit terms and conditions.

In 2007 BCWD revised its rules while completing its third-generation watershed management plan. The 2007 rule-revision process was conducted to ensure that BCWD's rules reflected the goals and policies of the revised plan, though the revisions also reflected BCWD's seven years of experience applying its rules. Changes clarified present standards, incorporated rule interpretations that had developed over time, and addressed gaps or specific problem areas that had come to light in the prior seven years.

BCWD adopted its fourth-generation plan in October 2016. To ensure BCWD rules reflected the goals and policies of the 2017-2026 plan, to reflect feedback received during the plan-development process and to clarify rule language following 10 more years of experience applying its rules the BCWD undertook another rule-revision process. Again, many of the proposed changes clarified present standards, incorporated rule interpretations that had developed over time, and addressed gaps or specific problem areas that had come to light over the prior decade.

II. General changes – housekeeping

A substantial portion of the proposed changes to the rules are merely technical language changes, designed to make the rules more readily understood by technical and non-technical users alike and ensure consistency in terms used in the rules. The term "shall" is replaced through the rules with the more accurate and readily understood "must," "will" or "may." The work on the landscape that triggers BCWD rule requirements is consistently referred to as "land-altering activity," which is defined for purposes of the rules. Previously the rules included various configurations of these words and the related "land-disturbing activity."

Beyond these specific textual changes, the rules were simply edited and extraneous provisions and language removed to keep the rules as compact and functional as possible.

III. Rule 1.0: Procedural Requirements

The revisions proposed to the rule setting out the path through the BCWD regulatory process are entirely simplifications, cleanup and streamlining.

- Section 1.2 is updated to provide BCWD's current office address and to make clear that the application process can be started, at least, by submitted an application and supporting material electronically (by email).
- The alternative notification provisions have not been utilized and so were eliminated. To the degree a particular application presents unique considerations with regard to complying with the noticing provisions in section 1.5, the BCWD Board of Managers can approve an alternative process that suits the circumstances.
- Provisions for "tabling" permits were eliminated as superfluous in favor of BCWD compliance with the application-review and -approval framework provided in Minnesota Statutes section 15.99, which requires that all local governments timely act on applications.
- Meeting information and the like is much more effectively distributed these days via electronic sources; BCWD doubts that property owners in the watershed rely on language in the rules to advise them of BCWD meeting times.

IV. Rule 2.0: Stormwater Management

BCWD's framework for mitigating impacts to water resources from stormwater runoff is the locus of the most significant proposed changes. But even here, the changes hew toward simplification and streamlining.

While the changes to the Stormwater Management Rule appear extensive, the only substantive expansions are the application of the rule to all projects creating 10,000 square feet or more of impervious surface (a threshold lower than the present one acre) and the application of this threshold to all redevelopment projects, not just those on properties of five acres or more. In addition, linear (road) projects must provide stormwater management for not only new impervious surface but also reconstructed impervious area when the total of the two exceeds an acre, and projects on properties that wholly contain waterbodies or wetlands must treat stormwater to the BCWD water-quality standard before discharge to such resources. These changes are discussed in more detail below.

Other revisions, by contrast, are purely for purposes of simplification and streamlining. BCWD made a number of clarifying and technical changes that were not driven by new policy, but rather are meant to simply improve the functionality of the rule:

- BCWD proposes to update its definition of "best management practice" (BMP) to be consistent with use of the term in the land-use industry. The definition is revised to include both construction-phase practices designed and implemented to prevent

erosion, control sediment, and ensure proper handling of stormwater, as well as facilities (e.g., infiltration basins) constructed for permanent stormwater management.

- Reference to design guidance materials is moved from the definitions section of the rules to the exhibits section of the stormwater rule (subsection 2.7.1).The version of the rules BCWD places online will include hyperlinks to the reference materials to provide ready access to the most recent edition and take advantage of relatively frequent upgrades.
- The sequence of management methods and associated appendix (2.1 in present rules) are proposed to be removed. Stormwater management sequences are included by reference under subsection 2.4.3 – BMP Design and Construction Standards. Better site design is no longer a new or unique approach to development as it was during drafting 2007 revisions. Further clarification for the sequence of selecting stormwater management for site development may be provided by the creation of guidance documents.

Regulatory scope changes and associated requirements
As a general matter, the applicability section of the rule (2.2) is simplified, with fewer categories of types of work that trigger application of the rule requirements.

Subdivision
First, the subdivision trigger is simplified: Division of a parcel into four or more lots for any type of land use triggers the rule requirements.

Development and Redevelopment
Second, the distinction between development and redevelopment projects is eliminated in favor of a focus on the kind of land alterations that implicate the protections provided by the stormwater rule and, as noted above, the rule requirements were made applicable to 'smaller' projects than trigger the rule presently.

To facilitate the effective administration of the changes, a definition of "redevelopment" was added to in the Definitions to clarify the types of projects that will be required to meet the applicability requirements of the rule. Also, the definition of "reconstruction" was revised to provide clarification as to the type of linear project that will be subject to the stormwater rule; the definition aligns closely with the MIDS definition of "fully reconstructed." Large linear projects that expose the underlying soil and create new and fully reconstructed impervious surface that, in aggregate, exceeds 1 acre in area, typically involve a significant amount of planning by many entities and more opportunities for stormwater management than those with a lesser scope of construction.

The 2007 redevelopment applicability trigger included a site area threshold of five acres or more, with a final impervious area exceeding five percent of the site (10,890 square feet on a five-acre site). The revised trigger broadens the application to include sites smaller than five acres with a straightforward impervious-area threshold of 10,000 square feet, consistent with a number of other watershed organizations in the metropolitan area. Application is further broadened to apply the treatment requirements to reconstructed surfaces, which aligns with the MIDS performance goals. There exist parcels within the Brown's Creek watershed where the land-use authority has not imposed an impervious area threshold or a limitation to the number of accessory structures on a property. Furthermore, many of these properties contain or are near

water resources. The intent behind this is for the Stormwater Management Rule to provide protection in these settings, while excluding the typical individual single-family property. Recognizing that this expansion will draw smaller redevelopment projects into the operation of the rule, BCWD proposes, in 2.2(b)(i) and (ii), a framework similar to those that have been implemented by other watershed organizations to ensure that the stormwater-management infrastructure (BMPs) required to comply with the rule are commensurate with the amount of the site disturbed by the project.

As part of the revision to the thresholds for development and redevelopment, the threshold applicable within the surface water contributing area of the GDNR remains 5,000 square feet, but is clarified to apply in relation to impervious surface area created instead of simply disturbed area. The change recognizes that the rule protects against degradation caused by long-term impacts from runoff, while the Erosion Control Rule provides protection against impacts during construction.

Finally with regard to the development and redevelopment thresholds, parties contemplating potentially regulated projects should note that the impervious-surface thresholds in subsection 2.2(b) apply to imperviousness created *in the aggregate.* This qualification ensures that the applicability of the rule to work undertaken in a series of projects will result, when the threshold is reached, in application of stormwater requirements.

Linear projects
The applicability of the BCWD stormwater-management requirements has been expanded through a handful of changes to definition and rule text.

BCWD proposes the addition of a "linear project" definition – a formerly undefined term – to provide clarification on the types of projects subject to the rule and management standards laid out in the stormwater rule. Further specifying "within the right-of-way" means a constrained parcel of land in which the less stringent applicability trigger of one acre in area applies.

The linear project scope is expanded to include reconstructed impervious surface in addition to new impervious surface to align with regulatory trigger of MIDS. The changes include is clarification consistent with the current permit-review process that linear projects are subject to groundwater dependent natural resource criteria, where relevant.

The stormwater management requirements for linear projects are revised to align with the methodology of the MIDS performance goals of seeking the full management standard volume on new impervious surfaces, or 50 percent of the standard volume on new and reconstructed impervious surfaces, whichever is greater. This decision and need to broaden application of the stormwater rule to include reconstructed impervious area was based on the following factors:

1. The 2007 SONAR states the case for increasing the volume-control standard from pre-development to pre-settlement for the BCWD. Typical road reconstruction scenarios in the Brown's Creek watershed have added a relatively small amount of new impervious area. Therefore, only mitigating for the new impervious gains very little when compared to the pre-development condition. Roadways and the associated drainage systems create direct connections to water resources, providing an efficient conveyance of runoff volume and the associated pollutants.

2. Through a comparative analysis of the BCWD 2007 stormwater management standard and the MIDS volume-control performance goal, it was concluded that the MIDs goal can be more stringent than the BCWD standard in certain settings and on certain soil types for linear projects. The revised linear project trigger provides similar flexibility to allow greater stormwater treatment that scales with the size and scope of linear redevelopment project.
3. A linear project volume analysis was conducted as part of BCWD's consideration of revisions to its rules. The analysis included review of linear projects with varying proportions of new and reconstructed impervious surfaces.[9] The volume and area required for treatment, using reference drawdown values from the Minnesota Stormwater Manual, were compared to the 2007 standard, the revised standard, and MIDS. The required areas for treatment were compared to the area provided for past permitted projects. Acknowledging the large area needed for volume control on D soils, combined with the limited area available in right-of-ways, the existing standard of only requiring treatment for the new impervious surface is maintained where the applicant can definitive demonstrate that the predominant soil in the roadway corridor is Hydrologic Soil Group Type D. (This BCWD engineer's memorandum providing more detail on the analysis is included as Appendix B .)

Since BCWD implemented a presettlement volume-control standard in 2007, no applicants have required a variance from compliance with the standard. Given this and the findings of the linear project volume analysis, BCWD does not reason that the expansion of applicability of its stormwater requirements to linear projects will impose an undue burden, especially in light of the flexibility provided in the proposed rule for applicants to treat 50 percent of the volume from the aggregate of new and reconstructed impervious surface.

Criteria

As part of the BCWD Watershed Management Plan development process, BCWD evaluated whether or not replacing portions of its rules with the Minimal Impact Design Standards would provide a similar level of protection for the watershed's natural resources.[10] The analysis compared the level of stormwater treatment provided by BCWD's rules with that achieved by the MIDS standards. (The BCWD engineer's memo summarizing the analysis is included as Appendix C here.) This analysis demonstrated that the MIDS performance goals did not achieve the same protectiveness as the 2007 BCWD standards. While MIDS is designed to provide water-quality treatment for the first flush of runoff, it does not provide the level of protection needed to address the groundwater dependency of the natural resources located in the BCWD or the impairments of Brown's Creek.

The volume-control standard (2.4.1(b)) has been revised to clarify that it applies at all discharge locations from a permitted site so as to minimize, to the degree possible, volume-related adverse conditions on downstream properties and resources. This *c*larification has been made in the rule to be consistent with how it has been applied in practice.

The water-quality standard in 2.4.1(c) has been clarified, and its applicability is proposed to be broadened. Applicants will be required to provide treatment to the standard for discharges to

[9] Emmons & Olivier Resources, Modification of Volume Control Standard for Linear Projects, memo, Aug. 3, 2017.

[10] Emmons & Olivier Resources, MIDS Evaluation Results, memo, Aug. 19, 2015 (draft).

onsite receiving waterbodies and wetlands so as to maintain or improve the quality, function and value of all water resources in the watershed – not just those that reside downstream of a project or on two or more parcels.

Regulation
Changes to this section are made to remove underused provisions or to clarify applicability of existing provisions and requirements.

Maintenance
Paragraph 2.6, requiring maintenance of stormwater management facilities, has been clarified to allow public entities, who often cannot as a policy matter record a deed restriction on property they own, to comply with the maintenance obligation by entering a binding agreement with BCWD. This flexibility is further supported by the fact that publicly owned properties generally do not change hands as private property does, allowing BCWD to achieve the purposes of the maintenance requirement by entering and enforcing a private, unrecorded agreement. The provision further recognizes public entities' shared interest in management of public resources for the benefit of all.

Exhibits
Changes to the BCWD stormwater exhibit requirements are explained hereby reference to the provision of the rule affected:

2.7.10 The water-quality analysis requirement is separated from other stormwater calculation exhibits to provide clarification that an analysis of average annual phosphorus loading is a required exhibit. Typically, a stormwater management design that meets the pre-settlement volume-control standard at all discharge points from the site boundary will also meet the stormwater-quality management standard and therefore it is not necessary to demonstrate via analytical analysis. However, in cases where portions of the site are expected to exhibit much higher concentrations of phosphorus when compared with the pre-development condition, or where full compliance of the pre-settlement volume control is not met, including to wetlands and waterbodies contained within the site, a pre-development to post-development average annual phosphorus-loading analysis will be a required exhibit.

2.7.11 Borings/infiltration testing – provides specificity that geotechnical information must be gathered in the location of proposed infiltration BMPs and in a manner consistent with the guidance in the Minnesota Stormwater Manual. Appendix 2.3 was added to provide specific information on the number of required borings.

2.7.12 Linear project soil type – required to demonstrate that the proportion of Hydrologic Group D soil exceeds 50 percent for purposes of applying the BCWD volume standard only to the net additional impervious surface created by a linear project, as provided by the applicability framework in subsection 2.2c.

2.7.16 In considering the rapidly advancing practice of utilizing stormwater reuse as a BMP to meet management requirements, BCWD determined that separate criteria were not necessary. The volume-control obligation in paragraph 2.4.1(b) is a performance standard that does not dictate the specific method, such as infiltration, used to achieve the requirement. Stormwater reuse is just one way in

which the stormwater standards can be met. A required exhibit, referencing current guidance for stormwater reuse, has been added as 2.7.16.

Current Appendix 2.2 is proposed to be deleted. Treatment Efficiency Required to Match Pre-Development Conditions was for illustrative purposes only and resulted in confusion for permit applicants who reasoned that it meant a pre-development to post-development water-quality analysis was not required. (Such analyses are in fact required.)

Exceptions

The section of the rule pertaining to activities to which the rule requirements do not apply has been rationalized and simplified as well. A number of the provisions were made redundant by the clarification and simplification of the thresholds in section 2.2. While the impervious-surface thresholds for development and redevelopment in section 2.2 are such that most single-family home properties will not trigger stormwater requirements, the exemption in 2.8.1 provides that where a home will be constructed consistent with a subdivision plan for which a BCWD permit was obtained and properly implemented, construction of the home will not trigger further stormwater-management requirements – no matter how large the home is as long as treatment capacity remains available. (The revised regional treatment option discussed below extends the same opportunity to other types of development and redevelopment.) The exception in 2.8.2 merely confirms that where impervious surface is not created or re-created, stormwater management requirements will not apply.

Regional stormwater plans

The revised regional compliance option in section 2.9 extends the opportunity to comply with BCWD stormwater criteria on a regional basis beyond areas where infiltration is infeasible. The revision provides the option of pursuing compliance via stormwater facilities built or implemented to provide treatment for all of the uses or planned development within a particular catchment area. Such regional facilities provide the opportunity to incorporate stormwater management into the design for development or redevelopment and to construct stormwater facilities early in process so that treatment is provided throughout construction. Regional facilities allow for more efficient and effective inspection, maintenance and control and can be used by municipalities to promote redevelopment over greenspace development. Rather than providing a criteria-specific exception as in the current rule, section 2.9 articulates a general framework for compliance with rate, volume and water-quality requirements through the use of a regional facility or facilities. Section 2.9 (a) and (b) lay out the additional criteria (beyond the criteria in subsection 2.4.1) with which an applicant must comply to use the regional option.

The regional option requires that an entity or collaboration – most like a municipality or group with a municipality as a key member –recognizes the opportunity for streamlined future construction on individual parcels within a defined region or catchment area if a regional stormwater management plan is developed, provided to the BCWD Board of Managers for approval, and implemented.

V. Rule 3.0: Erosion Control

The BCWD erosion-control requirements remain largely unchanged, reflecting how well-understood the practices required to ensure such protection are among public and private property owners and the construction industry.

The sole substantive change is the addition of temporary basins provisions in 3.2.2(f) and 3.2.4. Criteria for sizing of temporary sediment basins included here is consistent with design requirements of the MPCA Construction General Permit and the Minnesota Stormwater Manual. However, unlike the state provisions, BCWD's proposed requirement applies to all projects, not just those of a certain size. The BCWD regulatory program's experience in the last 10 years indicates that work in drainage areas of less than five acres can cause significant sediment loading. The BCWD engineer may determine based on specific site conditions that a temporary sediment basin is not necessary, based on analysis of site conditions against the factors in subsection 3.2.4.

The criteria for interim stabilization in 3.3.3 and 3.3.4 have been updated to be consistent with the timeframes in the MPCA Construction General Permit.

The exemption from the rules' requirements for routine agricultural practice was obviated by the revision to the definition of land-altering activity, which now explicitly states that routine agricultural activities are not included. Further, BCWD found that the buffer requirement included in the existing exemption was ineffective; since such activities did not come to BCWD for permitting, there was (and remains) no mechanism other than tours of the watershed to determine whether the requirement was met. BCWD does not have data supporting a determination that such efforts would be productive.

VI. Rule 4.0: Lake, Stream and Wetland Buffers

As noted in the watershed plan, BCWD considered an expansion of the applicability of its buffer requirements to smaller wetlands than are currently protected by the rule. Ultimately, in the absence of definitive data supporting broader applicability of the rule, BCWD elected only to clarify and rationalize its buffer provisions. BCWD will assess whether there is a need to expand the protections of the buffer rule in the course of analyzing specific projects that are brought within the scope of the expanded Stormwater Management Rule. BCWD does not have sufficient data suggesting that it is missing opportunities to protect wetlands and provide additional habitat in the watershed with buffers.

Clarifications address uncertainties that have been encountered repeatedly since the current buffer requirements were adopted in 2007. First and most important, the definition of "steep slope" is revised to provide the BCWD engineer with flexibility to apply a site-specific analysis in cases where the required buffer, under strict application of the provision requiring measurement of the slope on a 50-foot average, extends well beyond the top of the actual slope, presenting risk of accelerating runoff through the buffer in a manner that degrades its function and value. The revision retains the basic definition, but gives the engineer the discretion to find, based on a site-specific analysis, that there is an effective break in slope even though the strict application of the steep slope formula in the rule is not met, and that extending buffer beyond

that distance from the resource will provide little to no direct additional benefit to the downstream resource. It is important to note that such circumstances are expected to present themselves rarely, and the analysis of the buffer required will always start with a site plan showing buffer meeting the strict technical application of 12 percent slope over a 50-foot average. Further, where a groundwater-dependent natural resource or a preserve wetland is the resource to be protected by buffer, it likely will be particularly important for buffer to extend the full distance required by strict application of the rule to meet the resource protection and habitat value purposes of the steep-slope provision.

The application of buffers on lakes is simplified through amending the current technical distinctions between types of lakes in subsection 4.3.1 to create a single buffer width for "lakes." Long Lake in Stillwater is the only Recreational Development lake in the watershed. Because the shoreline of Long Lake is entirely developed, the simplification of applying one zone width to all lakes – without distinction between the Department of Natural Resources' Natural Environment and Recreational Development classifications – does not have a regulatory impact in the watershed.

The addition of "existing" to the steep slope provision in 4.3.2 articulates BCWD's long-held policy that a contour constitutes a break in slope (beyond which buffer need not extend) *only* when the contour presently exists on the landscape, not when the applicant intends to grade the slope to flatten it.

Recognizing that the "double-buffer" requirement in section 4.3.5 of the existing rule – applicable in the number of places in the watershed where Brown's Creek's shoreline is wetland – presents a significant imposition on property owners without a commensurate increase in protectiveness of the resources, the provision is proposed to be eliminated in this rulemaking.

Finally, the buffer averaging allowed under subsection 4.3.5 is explicitly not allowed when a resource to be protected is bordered by a mapped natural community (4.3.2), a steep slope (4.3.3) or a floodplain (4.3.4). The BCWD engineer has long maintained that averaging defeats the particular protectiveness that is achieved through extensions of buffer area required by each of these subsections, but the number of conversations about the matter the engineer has had with applicants motivated the clarification added here.

With more than 20 years of institutional experience working with permit applicants to address the buffer requirements, BCWD understands that it is a practice that is particularly difficult to translate from the words in the rules to site plans. BCWD will support applicants' efforts to comply with the buffer requirements by developing and making readily available (via the BCWD website) guidance – particularly regarding application of the steep slope definition and to support applicants' efforts to calculate and develop site plans showing the necessary buffer zones along streams, tributaries and wetlands.

VII. Rule 5.0: Shoreline & Streambank Alterations

Most of the changes to BCWD's Shoreline & Streambank Alterations Rule are straightforward clarifications and text cleanup.

The finished slope criterion in paragraph 5.4.2, as applicable to riprap, is revised to maintain consistency with current Minnesota Department of Natural Resources requirements. And the requirement that a certain percentage of cost be expended on native plantings in riprap stabilization projects has been modified to a general requirement for plantings suitable to the site conditions.

VI. Rule 6.0: Watercourse & Basin Crossings

The changes proposed to the Watercourse & Basin Crossings Rule are solely editorial cleanup.

VIII. Rule 7.0: Floodplain and Drainage Alterations

The term "emergency overflow" is defined to provide clarification of the type of water-control structure is necessary for the lower freeboard requirement in paragraph 7.3.2(c).

Other revisions are for clarification, with one noteworthy exception. The application of low-floor criteria calling for construction of buildings and stormwater facilities at such elevations as will reasonably preclude flooding is simplified and clarified, with the term "basement" replaced by "lowest floor" as the critical elevation from which the freeboard requirement needs to be met on any new or reconstructed building. The freeboard criteria have been expanded to adjacent buildings, and applicants will be required to demonstrate that consideration has been taken to provide the same freeboard of protection to neighbors' structures as is required for onsite buildings. BCWD will require an applicant to make a reasonable attempt to obtain low-floor data on such structures. The extension of the requirement is limited to permanent buildings on adjacent properties such as, but not limited to, those that have permanent foundations or footings, e.g., pole barns, horse stables, machine sheds.

IX. Rule 8.0: Fees

BCWD fee policy and the framework for the organization's administration of its fee schedule are unchanged. BCWD will continue to track costs incurred for permit application assessment and inspection to the dollar and recover such expenses from private applicants. (Public entities are exempt from permit fees by statute.) In addition to the marginal applicant cost savings intended to be facilitated by the proposed simplification and streamlining throughout the rules, BCWD is committed to the development and promulgation of guidance documents that will provide applicants with self-help avenues to lower costs of preparing, reviewing, modifying and finalizing technical materials.

The language in section 8.4 providing notice to applicants of BCWD's ability and intention to recover costs of enforcement actions has been supplanted by BCWD's updated Enforcement Rule.

X. Rule 9.0: Financial Assurances

The only policy change to be effected by the proposed changes to the so-called Surety Rule is not a policy change at all, but rather a codification of BCWD's practice of accepting escrowed funds, as well as bonds and letters of credit, to secure permit performance. Applicants wishing

to utilize this form need to enter an escrow agreement that provides conditions for release of the funds (consistent with the terms of the rule), but BCWD will provide an agreement template that will facilitate applicants' use of the form.

The rule is also modified to clarify that BCWD has a limited window of time in which to inspect a completed project, certify its compliance with the applicable permit and rules, and release the financial assurance. Failure of BCWD to timely act will result in "automatic" release of the financial assurance.

The term "surety" refers to the entity – bank or bonding company – and not the financial instrument an applicant provides to secure permit performance. The change to the name of and the usage in the rule reflects this correction.

XI. Rule 10.0: Variances

More important than what has been changed in BCWD's variance procedures is what has not: BCWD elected to retain the "undue hardship" standard that has been replaced in state law pertaining to city and county land-use planning and zoning programs by the more flexible "practical difficulties" standard.[11] Given that no statute dictates the standard used by watershed districts, the Board of Managers elected to retain the familiar and well-understood undue hardship standard, which the board has applied with the kind of discretion – balancing the burden of compliance on the applicant against the risk of degradation or other harm to water resources from failure to meet the strict application of a rule provision – the state has incorporated into the practical difficulties standard. A principal driver for this decision is that the factors for finding a variance under undue hardship are familiar and useful to managers in the context of applying watershed rules, while the practical-difficulties factors (as articulated in Minnesota law) are not well suited to the kind of circumstances that produce requests for variance from watershed district regulatory standards and criteria.

XII. Rule 11.0: Enforcement

BCWD has substantially revised its Enforcement Rule, but the revisions are made for a single purpose: To provide applicants complete, straightforward notice of the procedures BCWD will use, consistent with state and common law, to find and act on noncompliance. The rule makes clear that and how applicant's important rights to use and enjoy land they own will be honored, while BCWD ensures compliance with its lawfully adopted regulatory requirements protecting water resources on behalf of the public. As noted, the revision also makes clear (in section 11.5) that BCWD may recover costs of enforcement actions from private property owners.

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11 *See, e.g.,* Minn. Stat. § 394.27, subd. 7 (stating the practical difficulties standard for counties).

Appendix A: Stakeholders

CAC members

Karen Richtman-chair
Paul Richtman
Larry Timmerman
George Vania
Jyneen Thatcher
Rick Vanzwol

TAC members

Dan Fabian, Board of Water and Soil Resources
Jeanne Daniels, Minnesota Department of Natural Resources
John Freitag, Minnesota Department of Health
Jeff Berg, Minnesota Department of Agriculture
Judy Sventek, Metropolitan Council
Juline Holleran, Minnesota Pollution Control Agency
Beth Neuendorf, Minnesota Department of Transportation
Stephanie Souter, Washington County Dept. of Public Health and Environment
Jay Riggs, Washington Conservation District
Shawn Sanders, City of Stillwater
Eric Johnson, City of Oak Park Heights
Bryan Bear, City of Hugo
Kristin Handt, City of Lake Elmo
Grant City Clerk, City of Grant
Kathy Schmoeckel, Stillwater Township
Bill Vodisch, May Township

Appendix B: Linear Projects memo

technical memo

Project Name |	BCWD Rule Revision	**Date** |	8/3/2017
To / Contact info |	Karen Kill, BCWD Administrator		
Cc / Contact info |			
From / Contact info |	Ryan Fleming, PE		
Regarding |	Modification of Volume Control Standard for Linear Projects		

Background

The 2007 Rules SONAR states the case for increasing the volume control standard from pre-development to pre-settlement for the BCWD Rules. Typical road reconstruction scenarios in the BCWD have added a relatively small amount of new impervious area. Therefore, only mitigating for the new impervious gains very little when compared to the pre-development conditions. Roadways and their necessary drainage systems create a direct connection to the water resources in the BCWD, thereby providing an efficient conveyance of runoff volume and the associated pollutants.

Through a comparative analysis of BCWD 2007 standards and the MIDS volume control standard, it was concluded that the MIDs standard can be more stringent than the BCWD Volume Control Rule in certain settings and on certain soil types for linear projects. The District desired to consider a standard that has similar flexibility to allow greater stormwater treatment that scales with the size and scope of linear redevelopment project. An overview of MIDS is available in the Minnesota Stormwater Manual (MNSWM).

https://stormwater.pca.state.mn.us/index.php?title=Overview_of_Minimal_Impact_Design_Standards_(MIDS)

Analysis

The MIDS standard scales with the scope of a linear project depending on the degree of reconstruction involved. For example, a small impervious addition, such as a turn lane, is subject to a 1.1" of runoff from impervious area volume control requirement. Whereas, a large road improvement project involving reconstruction of the road is subject to 0.55" of runoff from all new and reconstructed impervious surfaces, or 1.1" from new impervious surfaces, whichever is the larger volume. District staff requested that a similar standard, using BCWD's pre-settlement to post-development standard be analyzed on example permits.

Two permitted linear projects were reviewed as well as a theoretical example. As shown in Table 1-3, the projects included road widening (new impervious), and full reconstruction down to the native soil beneath the road bed along portions of the road corridor. In order to consider a revised BCWD Standard on other linear projects, a variety of soil types were assumed in the calculations for this analysis. As such, ranges are presented in table 1 for runoff and treatment volumes for A to D soils based on HydroCAD modeling.

Table 1: Permit 15-04: CSAH 12 - 2-Year Runoff Summary (2.8-inch Rainfall)

Linear Improvement Type	Area (acre)	Pre-settlement Volume (acre-feet)	Post-development Volume (acre-feet)	Treatment Volume (acre-feet)
New Impervious	0.76	0.00 – 0.07	0.15	0.07 – 0.15 (BCWD 2007 Rule)
Reconstructed Impervious	3.29	0.01 – 0.30	0.66	0.19 – 0.40 (BCWD 2018 Proposed 50% of pre-to-post comparison on New and Reconstructed Impervious)
Total	4.05	0.01 – 0.37	0.81	

*For reference, MIDS Volume Control would have been 0.19 acre-feet

Table 2: Permit 07-28: Manning Ave - 2-Year Runoff Summary (2.8-inch Rainfall)

Linear Improvement Type	Area (acre)	Pre-settlement Volume (acre-feet)	Post-development Volume (acre-feet)	Treatment Volume (acre-feet)
New Impervious	6.2	0.02 – 0.57	1.24	0.66 – 1.21 (BCWD 2007 Rule)
Reconstructed Impervious	8.2	0.03 – 0.76	1.63	0.77 – 1.41 (BCWD 2018 Proposed 50% of pre-to-post comparison on New and Reconstructed Impervious)
Total	14.4	0.05 – 1.33	2.87	

*For reference, MIDS Volume Control would have been 0.66 acre-feet

Table 3: Theoretical Permit - 2-Year Runoff Summary (2.8-inch Rainfall)

Linear Improvement Type	Area (acre)	Pre-settlement Volume (acre-feet)	Post-development Volume (acre-feet)	Treatment Volume (acre-feet)
New Impervious	1	0.00 – 0.09	0.20	0.11 – 0.20 (BCWD 2007 Rule)
Reconstructed Impervious	5	0.02 – 0.46	1.00	0.32 – 0.59 (BCWD 2018 Proposed 50% of pre-to-post comparison on New and Reconstructed Impervious)
Total	6	0.02 – 0.55	1.19	

*For reference, MIDS Volume Control would be 0.28 acre-feet

Given the site constraints typical of linear projects, the area available for stormwater treatment becomes critical. To determine reasonableness of an increase in the volume control standard, this area should be assessed.

Guidance is provided in the MNSWM for the maximum depth of infiltration practices to draw down within 48 hours for a given soil type ranging from 2.9 to 38.4 inches. Applying this depth to the range of volumes in tables 1-3, the stormwater treatment area is arrived at. Table 4 includes the area within a road corridor that is needed to accommodate the range of volumes presented in Table 1.

Table 4: Area for Stormwater Volume Management (SWVM)

Permit	Treatment Area Soils A – D (Square Feet)				
	SWVM Area Provided	BCWD 2007 Rule	Estimated SWVM Greenspace	BCWD 2018 Rule	Estimated SWVM Greenspace
15-04	21,147 (3%)	2,055 – 14,702	0.3% - 2%	5,472 – 39,386	1% - 10%
07-28	44,083 (5%)	16,526 – 120,516	2% - 13%	19,173–139,937	2% - 15%
Theoretical	NA	2,654 – 19,421	1% - 15%	7,984 – 58,262	2% - 15%

The amount of area for volume control on the project is circumstantial based on controlling run-on from adjacent land, maintaining rate control within the ditch without bypass, as well as discharge to Groundwater Dependent Natural Resources at certain discharge points from the project. Table 4 displays that the total 2-year volume control area provided in the example permits were three and five percent of the estimated greenspace available along the corridor. These included five to six BMPs with treatment areas ranging in size from 700 to 14,000 square feet. While there was ample greenspace along these corridors, not all areas lend themselves well to stormwater management.

Conclusion

The amount of volume control treatment area provided on the permitted projects falls within the range that would be needed to meet a revised 2018 Volume Control Rule and would exceed it by a significant margin given A-Soils. Where D-soils are the dominant soil type substantially more area is needed to accommodate volume control due to the shallow depth threshold required to draw the BMP down in 48 hours. While it is rare to encounter D-soils along an entire project corridor it is not impossible on smaller projects. Acknowledging the large area required for volume control on D-soils, as well as the limited success of infiltration on these soils alongside roads, an allowance could be considered where it can clearly be demonstrated that the predominant soil in the roadway corridor is Type D. This could be in the form of requiring stormwater management to meet presettlement only for the new impervious surface (consistent with the 2007 Rules), accepting filtration in lieu of infiltration, setting a maximum greenspace area dedicated to stormwater management, or volume control banking.

To explore the option of continuing to apply the 2007 Rule for linear projects where it can be demonstrated that the majority of the soil within the right-of-way (ROW) consists of D soils, the

District Administrator requested that the ROW area in the District be reviewed for proportion of type D soils. This review involved utilizing existing electronic ROW mapping as well as reasonable assumptions for the ROW width on roads where data was not readily available. The following widths were assumed based on scaling roadways in which mapping was available:

Table 5: ROW Width Assumptions

Road Type	ROW Width (ft)
Local	60
County and Trunk Highways	120
State Highway 36	280

Table 6 includes the relative proportion of type D soils throughout the ROW area in the District. Hydrologic Soil Group A/D, B/D, and C/D soils were also included as their drainage characteristic is that of a type D soil in an undrained/un-tiled state.

Table 6: Summary of Soil Types in BCWD ROW

Hydrologic Soil Group	Acres in ROW	Percent of ROW
NO CATEGORY*	65	5%
A	243	18%
B	556	42%
C	296	22%
D, A/D, B/D, C/D	158	12%
Total	1317	100%

*Note that the "No Category" soil areas are an artifact of the NRCS Soils database available and no consistency of drainage characteristic was found when reviewing these areas, e.g. some soil polygons are described as well-drained and others are described as poorly-drained.

Eighty-two percent of the ROW soils in the District are type A, B, or C. Using the three project examples would require approximately one to six percent of the available greenspace. Applying a higher standard than the current Rule on these soil types would benefit the resources of the District while occupying similar area of the ROW that were installed for the permitted projects. Given the relatively small proportion of the ROW represented by type D soils, the lack of mitigating effects of existing impervious, by maintaining the same 2007 BCWD Stormwater standard on type D soil, could be offset by the additional volume control gained on type A, B, and C soils. Therefore, maintaining the current standard where type D soil is predominant, while requiring stormwater management on reconstructed linear impervious surfaces as proposed, can result in mitigating effects for runoff water quantity and quality to District resources while not imposing unreasonable hardship on the road authorities.

Appendix C: MIDS memo

memo

Project Name |	MIDS Evaluation	**Date** |	8/19/15
To / Contact info |	BCWD Board of Managers		
Cc / Contact info |	Karen Kill, District Administrator		
From / Contact info |	Ryan Fleming, PE; Cecilio Olivier, PE; Camilla Correll, PE		
Regarding |	MIDS Evaluation Results **- DRAFT**		

Background

In June of 2013 the work of the Minimal Impact Design Standards (MIDS) workgroup was completed and the Minnesota Pollution Control Agency incorporated this information into the Minnesota Stormwater Manual. Since completion, a number of communities and watershed districts have adopted the MIDS standards at varying levels.

As part of the BCWD Watershed Management Plan development process it was recommended that the BCWD evaluate whether or not replacing portions of its Rules and Regulations with the MIDS requirements will provide a similar level of protection for District natural resources. An analysis to compare the level of stormwater treatment currently provided by the BCWD Rules and Regulations with the MIDS standards was approved at the February 11, 2015 Board Meeting.

BCWD Requirements and MIDS Performance Goals

Because the MIDS approach to stormwater management is to control post-construction runoff volume from 1.1 inches of runoff from impervious surfaces, the stormwater standards compared for this analysis were stormwater runoff volume and phosphorus reduction requirements.

- **Summary of the BCWD Standards**

The BCWD stormwater standards are based on matching pre-settlement runoff volumes and pre-development water quality. To match pre-settlement volumes, new development, redevelopment, and linear projects are required to provide retention (i.e. stormwater stored indefinitely for infiltration and evapotranspiration) for the additional runoff volume resulting from the 2- year 24-hour rainfall event which is equivalent to 2.8-inches. The depth of runoff from the landscape varies whether the underlying soils are sand, silt, or clay.

Phosphorus loading cannot exceed the annual pre-development amount, requiring a pre/post development analysis. Typically, this phosphorus removal standard is met in conjunction with achieving the volume control requirement. If this is not the case, additional stormwater management is required to show that the annual loading is not increased (BCWD Rules Appendix 2.2 includes minimum treatment efficiencies in Table 3).

- **Summary of the MIDS Performance Goals**

MIDS includes the following performance goals for new development, redevelopment and linear projects that create one acre or more of impervious surfaces:

- Volume control for 1.1 inches of runoff from new and/or fully reconstructed impervious surfaces for nonlinear redevelopment activity. Figure 1 shows that the 1.1 inch rainfall corresponds to approximately 68% of the annual rainfall volume.
- For linear projects, the volume retention goal is the highest of either 0.55 inches from the new or fully reconstructed impervious surfaces or 1.1 inches from the net increase in impervious surfaces. As displayed in Figure 1, 0.55 inches of precipitation corresponds to about 38% of the annual rainfall volume.
- Sites that have restrictions such as soil contamination, less permeable soils, bedrock or a high groundwater table, can explore Flexible Treatment Options for meeting water quality performance goals. These include reducing the 1.1 inch standard to 0.55 inches, eliminating volume control and meeting a 60% phosphorus removal standard, or off-site volume control.

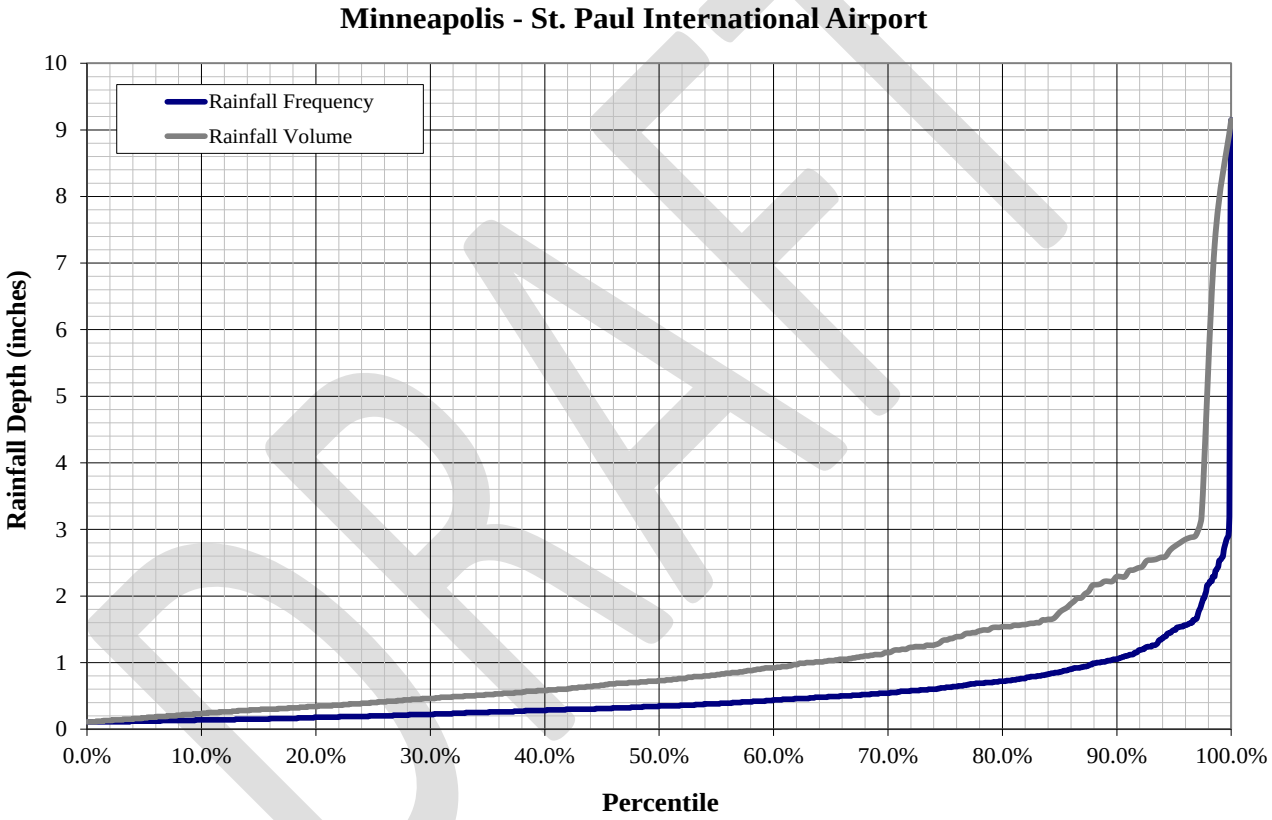


Figure 1:1971-2000 MSP Rainfall Frequency and Volume

Comparison of BCWD Standards and MIDS Performance Goals

This section highlights the main differences between these two stormwater management approaches.

Methodology

To conduct this evaluation, the MIDS performance goals were applied to four development projects that were designed to meet the Watershed District's rules and regulations. The projects selected for this evaluation represent a variety of development scenarios (i.e. residential, commercial and roadway) and soil types as shown in Table 1.

Table 1: Development Sites Selected for MIDS Evaluation

Site Name	Development Type	Site Area [Acre]	Soil Type [HSG]	BMP Infiltration Rate [Inch/Hour]*	Impervious Amount [%]
McDonald's Stillwater	Commercial	2.1	A/B	0.5	59
White Pines Supper Club	Commercial	10.6	B	0.45	27
Fairway Villas	Residential	5.7	A/B	0.6	31
Manning Avenue Expansion	Linear Roadway	20.6	C	0.2	70

*Note: Infiltration rate assigned based on site specific geotechnical information at the BMP location rather than soil mapping

- **Development of a Consistent Comparison**

The MIDS Calculator was developed in conjunction with the MIDS performance goals to aid in sizing facilities to treat the 1.1 (or 0.55) inch depth of runoff from impervious surfaces. The assumptions built into the calculator do not consider the different rainfall distributions inherent with varying annual rainfall depths and, therefore, do not allow for an accurate annual comparison of BMP performance over a variety of storms and temporal distributions (e.g. the same annual volume reduction efficiency is assigned to a given infiltration facility regardless of annual precipitation depth or storm distribution). For this reason, the District's hydrology and hydraulics Stormwater Management Model (District Model) was used to calculate the annual performance of MIDS-sized and BCWD-sized facilities under average, above average, and below average precipitation distributions.

As displayed in Figure 2, precipitation fluctuated 8 inches since 2005, with only a few years near the normal depth (32 inches assumed in the MIDS tool based on zip code). For the purpose of this study, the Minneapolis St. Paul Airport hourly rainfall records for 2005 (average year), 2008 (below average year), and 2014 (above average year) were used. Table 2 shows the relevant precipitation features of the years selected for modeling.

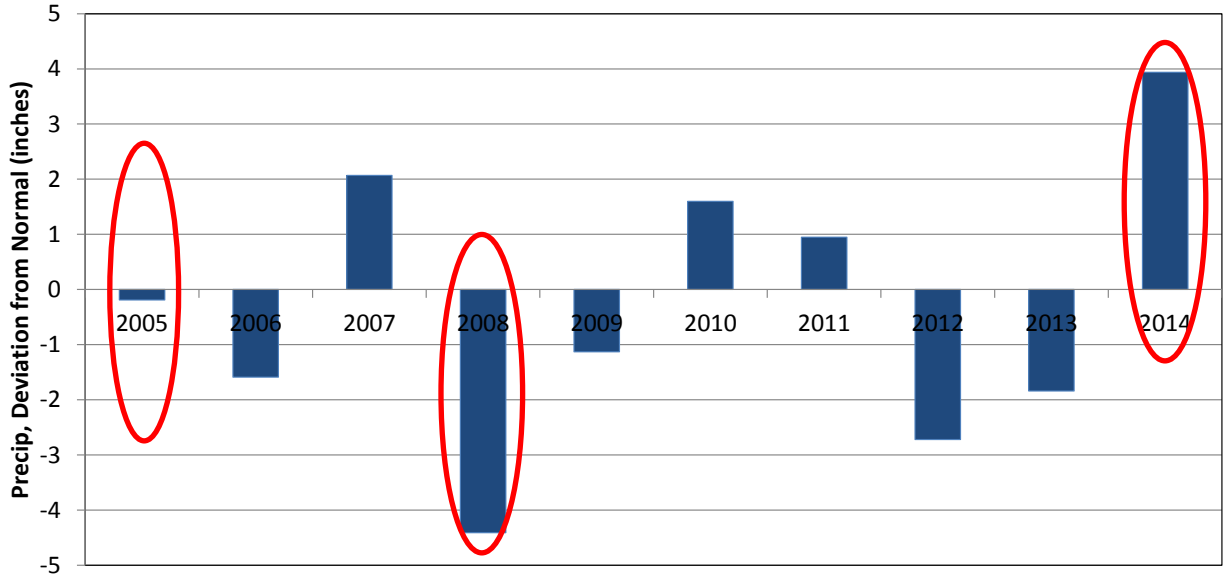


Figure 2: MSP Precipitation Deviation from Normal (Growing season)

Table 2: Model Simulation Years

Year	Total Precip.	24-hour events >2.8-inch	24-hour events >1.1-inch	24-hour events >0.55-inch
2005	32.5 (Average)	1	5	13
2008	21.3 (Below-Average)	0	3	10
2014	35.4 (Above-Average)	1	5	21

Winter precipitation and runoff was included by assuming a soil infiltration capacity of near-zero during winter months.

- **Model Construction**

Each development site was entered into the District Model parameterized with Green-Ampt soil infiltration parameters under pre-settlement and post-development and/or proposed conditions. Volume control BMP's were included for the developed site condition as sized to meet the BCWD Rules and MIDS performance goals.

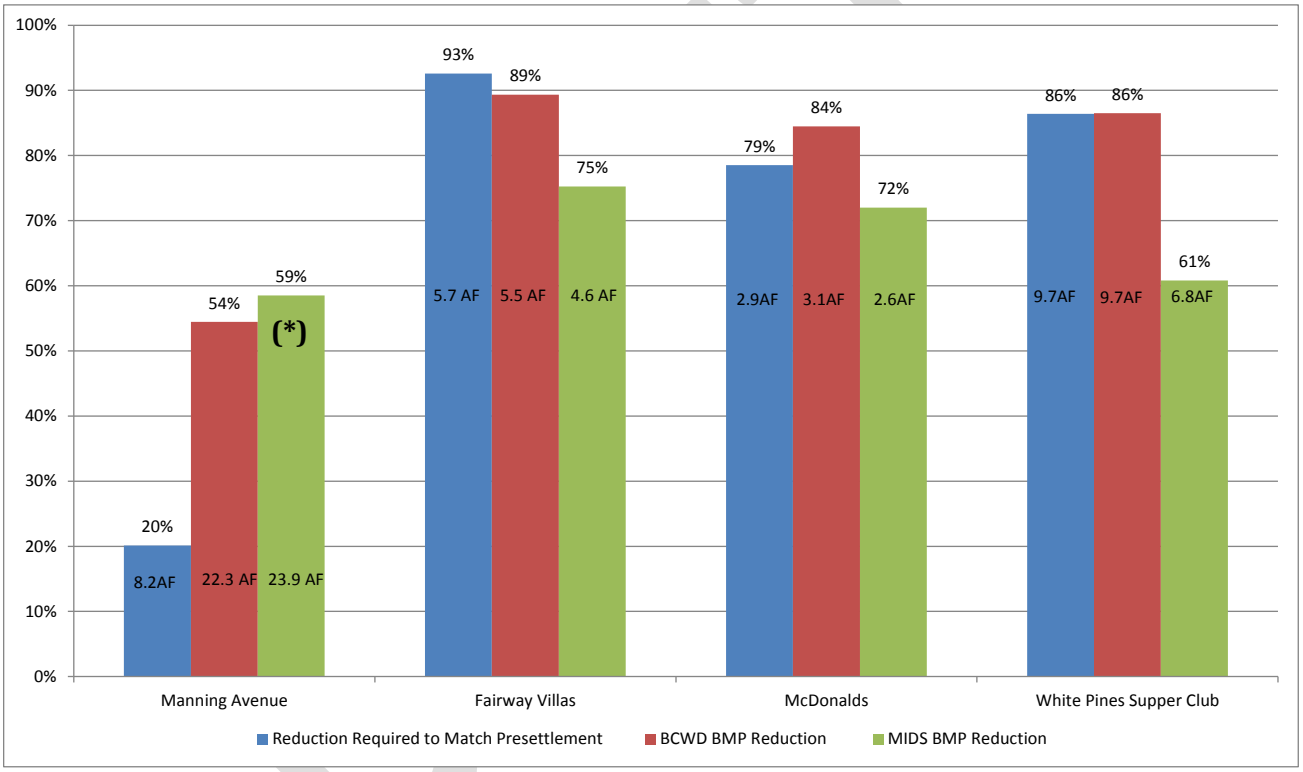
For phosphorus removal comparison, the MIDS Calculator was run with MIDS and BCWD required BMP sizes.

- **Results**

Model outputs from the different scenarios are displayed in Figures 3 through 5. The blue column displays the treatment efficiency required to match the pre-settlement annual runoff volume from each site which is calculated as the difference between the pre-settlement runoff and the post-development runoff without any BMPs implemented. The red column displays the volume reduction resulting from BMPs as designed to meet BCWD Rules. The green column represents volume reduction resulting from BMPs sized to meet the MIDS performance goals.

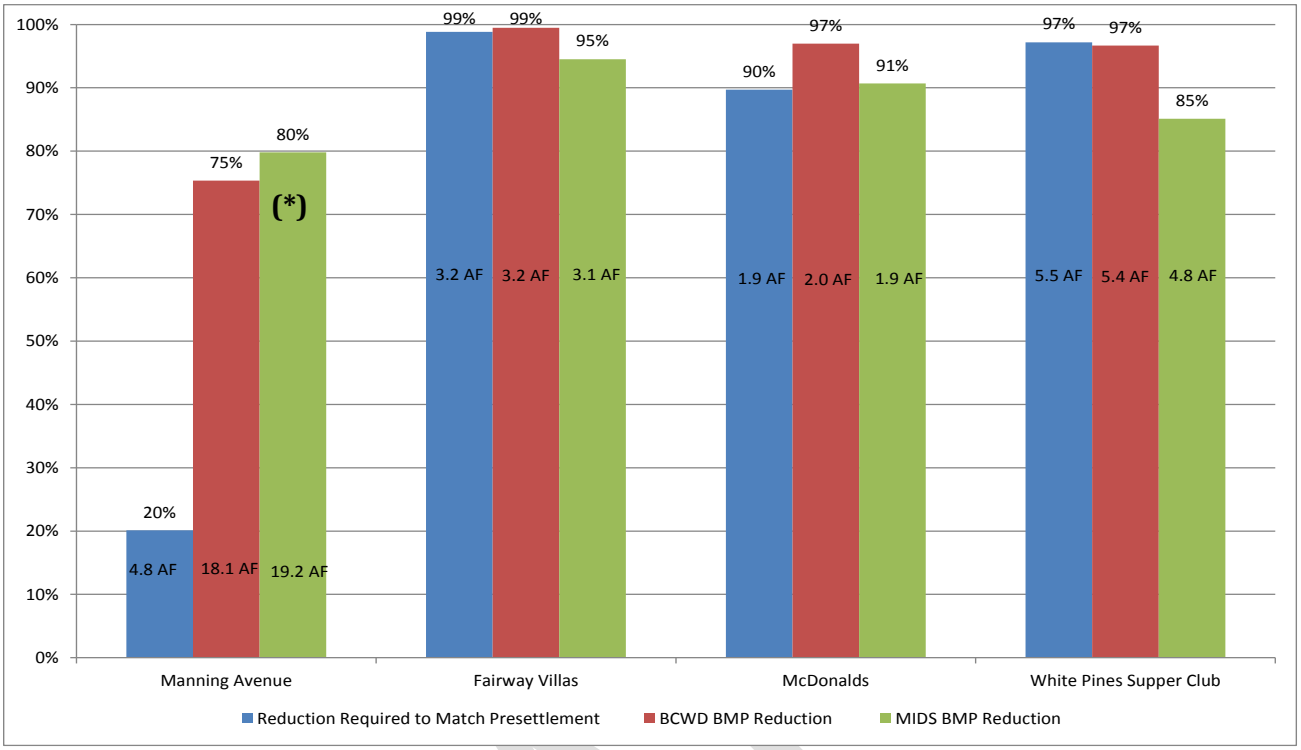
(*): MIDS volume standards outperform BCWD standards only for linear projects under C or D soils

Figure 6 displays the additional volume infiltrated at each site when designed to meet the BCWD Rules compared with the MIDS performance goals for the average year simulation (2005).



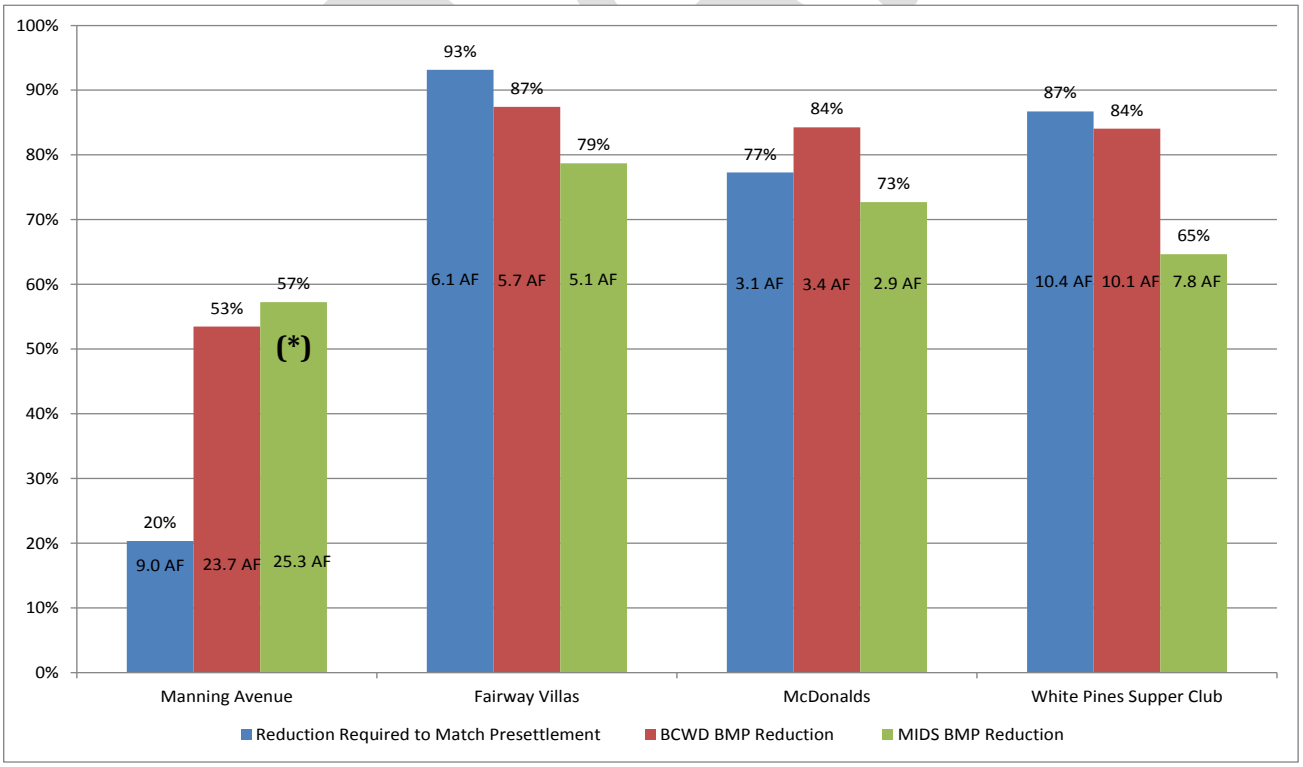
(*): MIDS volume standards outperform BCWD standards only for linear projects under C or D soils

Figure 3: 2005 Average Annual BMP Performance Comparison



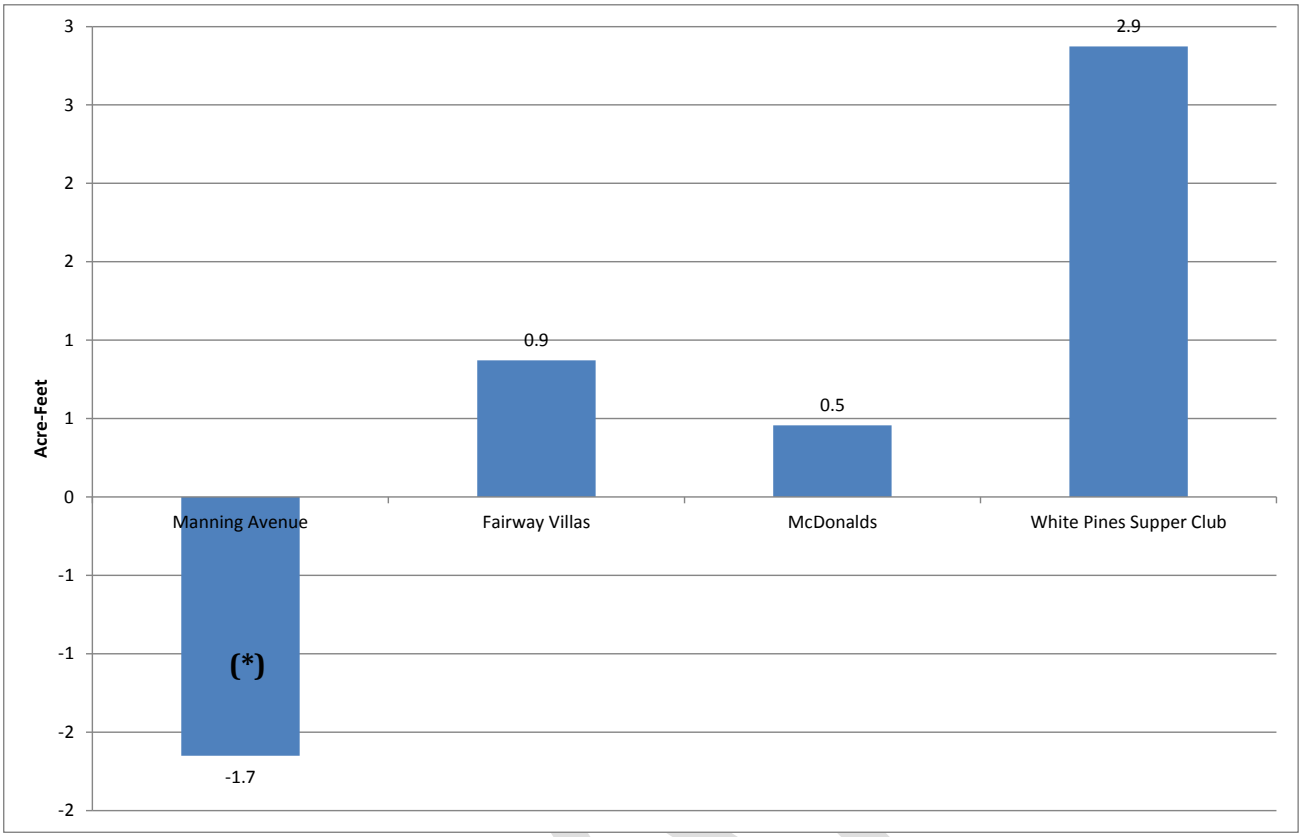
(*): MIDS volume standards outperform BCWD standards only for linear projects under C or D soils

Figure 4: 2008 Below-Average Annual BMP Performance Comparison



(*): MIDS volume standards outperform BCWD standards only for linear projects under C or D soils

Figure 5: 2014 Above-Average Annual BMP Performance Comparison



(*): MIDS volume standards outperform BCWD standards only for linear projects under C or D soils

Figure 6: Additional Average (2005) Volume Control by Implementation of BCWD Rules vs. MIDS Performance Goals

As previously mentioned, the MIDS Calculator was used to compare phosphorus removal efficiency of retention facilities sized to meet MIDS performance goals and BCWD standards. Table 3 shows those efficiencies as compared to BCWD standards.

Table 3: Phosphorus Treatment Efficiency Using the MIDS Calculator

Development Site	MIDS	BCWD	BCWD Appendix 2.2 Reference Standard
McDonalds	83%	98%	86%
Fairway Villas	66%	91%	77%
White Pines Supper Club	69%	82%	64%
Manning Ave Expansion	70%	65%	70%

Discussion

- With the exception of Manning Avenue, for which BCWD Volume Control is only required on the net increase in impervious, the BMPs sized using BCWD standards outperform those sized to meet MIDS. Pre-settlement runoff volumes are largely met by the BCWD sized BMPs for the three years modeled (average, dry and wet years). The Fairway Villas BMP sizing falls short for the average and above average years which documents the difference in sizing BMPs from an event based analysis versus running entire annual simulations as conducted for this comparison. As the results

display, the MIDS performance goals meet the BCWD pre-settlement standard for Manning Avenue under all three scenarios and the McDonalds development under dry-year conditions.

- Applying either BCWD or MIDS standard considerably exceeds the volume required under the BCWD Rule for linear projects. This is due to the rule only considering the net area converted from pervious to impervious (4.1 acres in the Manning Avenue reconstruction). In the case of Manning Avenue (linear project), MIDS volume retention standard slightly outperforms BCWD standards. It is important to point out that this would only occur for C and D soils conditions. For A and B soil conditions (the most commonly found developable soils in the watershed) the BCWD volume retention standards for this case will be more restrictive.

- For all non-linear development and redevelopment projects, comparison under D soils conditions was not performed since developments on D soils have not been encountered through the permit review process. Under D soils, the infiltration capacity is very limited, so both BCWD and MIDS volume retention standards would revert to water quality standards. In that case, the BCWD standards would always be more restrictive that MIDS.

- Figure 6 shows the comparison of retention/infiltration for the average year if BCWD standards are applied versus MIDS performance goals being applied. While the additional volume being infiltrated by applying the BCWD standards appears to be small on an individual site basis, it is not insignificant when you apply the difference to the developable portions of the watershed. The TSMP evaluation performed for the BCWD in August of 2013 evaluated the difference in applying the 2000 and 2007 volume control standards to a 6-acre residential development. The results of this analysis indicate that a volumetric difference of 3.2 AF (equivalent to the volumetric difference seen for the White Pines Supper Club) translates into 293 AF of additional annual runoff volume infiltrated in just that portion of the watershed that falls within the Trout Stream Mitigation Project (TSMP) Agreement (e.g. 3.2 AF applied to the total area of undeveloped and potential re-development parcels in the contributing drainage area to the Diversion Structure which is 550 acres). This 293 AF of additional infiltration or volume control translates into 129 AF of total potential additional baseflow contributions to Brown's Creek, 4,766 lbs of total additional annual load reductions of Total Suspended Solids (TSS) and 101 lbs of total annual load reductions of Total Phosphorous (TP). These are not insignificant numbers when one considers the impairment on Brown's Creek and the fact that one of the stressors is in-stream temperature.

- Prior to 2007, the BCWD stormwater rules targeted the pre-development condition instead of pre-settlement. The Statement of Need and Reasonableness (SONAR), developed in 2007 for the revised Rules, supported the need for a more stringent volume control standard in order to maintain baseflow conditions to Brown's Creek. Because of this requirement, the majority of modeled cases show that the BCWD Rules more closely mimic pre-settlement hydrology. If the target were to mimic pre-development instead of pre-settlement conditions (as other watersheds like Capitol Region WD, Ramsey-Washington Metro WD, and the City of Woodbury), the MIDS performance goal could meet those requirements.

- Under the BCWD Rules, phosphorus removal requirements will be met in almost all development conditions by the volume retention requirement alone. As shown in Table 3, the MIDS performance goals fall short of the District's Phosphorus Reference Standard in three of the four cases in this analysis.

- In addition to MIDS performance goals not meeting BCWD's runoff volume reduction and phosphorus removal standards for the majority of scenarios modeled, adopting MIDS as a replacement for BCWD rules would have other secondary consequences. BCWD Rules includes special provisions to increase protection to groundwater-dependent resources and landlocked basins. BCWD Rules also contemplate situations in which rules compliance is required for development activity down to 5,000 square feet of disturbance (less than the MIDS trigger of 1 acre of impervious surfaces). These provisions are not part of the MIDS Performance Goals.
- BCWD Rules, being stricter than the MIDS performance goals, are better suited to address the effects of climate change. MIDS performance goals are based on past precipitation records and do not appear to account for future changes in rain storms' depth, intensity, and distribution.
- The simplified methodology used by the MIDS calculator is appropriate for BMP sizing to a depth on impervious surfaces. However, it is very different from the method in which compliance is assessed against the BCWD Rules which involves use of hydrology, hydraulic and water quality design tools to review all facets of a development stormwater plan. It would be infeasible to modify the MIDS calculator to reflect BCWD rules unless a new conceptual methodology is adopted and a significant part of the code is changed to support the new methodology.

Recommendations

Given the modeling results regarding runoff volume retention and phosphorus reductions obtained by comparing BCWD Rules to MIDS performance goals, we recommend continuing the implementation of the current BCWD Rules and not considering the replacement of any section of the Rules by MIDS performance goals.

At this point, MIDS performance goals do not meet BCWD standards. If the MIDS standards evolve to provide additional volume, rate and water quality requirements, a re-assessment against the BCWD Rules may be warranted. As explained in the Standards Comparison section of this memorandum, arriving at a specific depth standard across the District is not feasible because the pre-settlement condition changes from site to site just as the proposed development amount of disturbance and impervious coverage is site-specific.

Modifying the MIDS calculator to try to reflect BCWD standards and using it for verification of permit compliance is not recommended at this time due to the effort involved in developing a new MIDS methodology in support of BCWD rules and changing the existing code to incorporate such a methodology. To make it easier for the applicant to conduct a pre-settlement to proposed conditions assessment, the District Rules were revised in 2007 to include the hydrologic parameters necessary.

MIDS goes a long way toward providing stormwater treatment, especially for areas where stormwater standards are lacking. Brown's Creek, impaired for a lack of a cold water assemblage and turbidity, necessitates a higher volume control standard. This has been found through both the Statement Of Need And Reasonableness (SONAR) developed in support of the BCWD Rules and Regulations and the TMDL Report and Implementation Plan. While MIDS is designed to provide water quality treatment for the first flush of runoff, this standard does not provide the level of protection needed to address the groundwater dependency of the natural resources located in the BCWD.