

Project Name	Iron-Enhanced Sand Basins for Private Developments	Date	8/6/2026
To / Contact info	BCWD Board of Managers		
Cc / Contact info	Karen Kill, District Administrator		
From / Contact info	Paul Nation, PE; Steve Lawton EOR		
Regarding	Follow up from previous discussions		

Background

Iron-enhanced sand filters (IESFs) are emerging stormwater best management practice (BMPs) which use sand-based filtration media amended with iron to remove pollutants, particularly dissolved phosphorus, from runoff through filtration and chemical binding (Minnesota Stormwater Manual). IESFs require underdrains to convey filtered stormwater and aerate the filter bed and therefore do not directly achieve volume reduction the way that other BMPs like infiltration basins do.

EOR briefly investigated the prevalence of iron-enhanced sand filters being designed as BMPs for stormwater treatment in private development by consulting our partners and colleagues familiar with nearby watershed districts (WDs). We contacted personnel at Capital Region Watershed District (CRWD) and Ramsey-Washington Metro Watershed District (RWMWD) and spoke with colleagues familiar with Elm Creek Watershed Management Commission (ECWMC), Prior Lake-Spring Lake Watershed District (PLSLWD), Comfort Lake-Forest Lake Watershed District (CLFLWD), and Carnelian-Marine-St. Croix Watershed District (CMSCWD). Our findings and pertinent information from the Minnesota Stormwater Manual (MSM) are reported herein.

Number of BMPs Permitted

- BCWD: 2 projects (Central Commons and 7Brew Coffee)
- CRWD: About 15 projects since 2015, including the Ford redevelopment (Highland Bridge) in St. Paul; about 9 of these were private development projects
- RWMWD: 3-4 projects in the last few years; seemingly becoming more common
- ECWMC: 5-10 projects in the last decade
- CLFLWD: No IESF projects permitted

Volume Crediting and Water Quality

Several WDs offer volume credit for IESF practices which incentivizes their use over traditional filtration basins.

- CRWD and RWMWD offer 80% volume control credit for IESF filtration, with full infiltration being 100%.
- CLFLWD and PLSLWD offer 70% volume control credit for IESF filtration.
- BCWD, CMSCWD, and ECWMC do not offer IESF volume control credit.

Note: Other watersheds may prioritize nutrient removal for water quality concerns, while one of BCWD's leading priorities is preserving infiltration and limiting warm, surface runoff to protect groundwater-dependent resources (including the trout stream and its tributaries).

Maintenance & Testing Considerations

BCWD's stormwater maintenance declaration template includes language requiring inspections twice a year along with testing of the phosphorus to iron ratio in sand media every 5 years. The 7Brew Coffee permit used this language, while Central Commons used a stricter requirement of testing after the first 5 years, and yearly testing after that until replacement of the basin media. While local geotechnical firms have the capabilities to do this testing, it is not yet common practice and the testing is only approximate due to the ability of iron to bind with other ions and organic matter present in stormwater. State experts like the Saint Anthony Falls Laboratory and the MSM have not provided further guidance on this matter.

Note: While both 7Brew Coffee and Central Commons have been permitted, construction is not complete and the IESFs are not yet online.

Other WDs have noted the following concerns regarding maintenance.

- CRWD has reported struggling with staff time to enforce maintenance of IESFs and has not required testing of media or effluent from the practices. In recent years, they have used confirmation of appropriate drawdown time as a proxy for monitoring performance of the media (IESF media can become clogged without maintenance and lead to stagnant water and reduced pollutant removal capacity).
 - Staff at CRWD also noted that they have established more intensive requirements for systems with more costly maintenance like manufactured filtration systems (although they haven't applied these requirements to IESF practices). They require a signed 5-year maintenance contract and release financial assurance each year that the systems are maintained. This engages property owners in understanding the maintenance costs of their systems and incentivizes them to complete routine maintenance.
- RWMWD reported that staff inspect public/private aboveground BMPs approximately every 5 years. Staff have found that IESFs often lack the necessary maintenance for desired performance and noted that, while most BMP types lack necessary maintenance, failure to maintain IESFs can be more detrimental than would be the case for other BMPs.
 - RWMWD has developed guidance for permittees outlining best practices for design of IESFs including no vegetation in the bottom of the basin, specifics for media composition, and underdrain design.
 - Staff at RWMWD also provided one example O&M plan that required testing of sand media every 5 years, along with testing of water quality grab samples at the basin outlet to determine effluent phosphorus concentrations.

MN Stormwater Manual Recommendations

The MSM identifies IESFs as effective BMPs for dissolved nutrient removal, suitable for urban areas and improving nutrient-impaired waters. The technology is relatively new with limited performance history. Clogging of the media by sediment or decomposing plant material can reduce the performance and the lifespan of the practice. Per the MSM, recommended inspection and maintenance practices for IESFs include:

- *IESFs should be inspected at least annually, though monthly or quarterly inspections are recommended for the first two years to establish necessary maintenance frequencies.*
- *Remove accumulated sediment, as needed*

- *Remove vegetation, as needed*
- *Rake surface with a steel rake to break up oxidized iron clumps or crust*
- *For Pond-Perimeter IESF Trenches, remove duckweed, algae, and other organic material weekly, or as buildup occurs*

Conclusion

Our inquiry into IESF implementation and maintenance in local watersheds has brought us to the following conclusions:

- IESFs for stormwater treatment have become more common over approximately the last decade on projects permitted in local WDs, including private development projects.
- Maintenance of all stormwater BMPs is important for achieving proper function but is not consistently enforced. Maintenance of IESFs can be more involved than for other BMPs, making assessment more important. WDs report not having enough resources or time allocated to inspection or enforcement of maintenance practices.
- Identifying feasible assessment methods and allocating time/resources following up on maintenance requirements for IESF maintenance projects can improve the upkeep of IESFs in the watershed. Enforced annual reporting could be used to keep track of maintenance.

References

[Overview for iron enhanced sand filter | Minnesota Stormwater Manual](#)

[Operation and maintenance of iron enhanced sand filter | Minnesota Stormwater Manual](#)