



Woodcrest

Biochar & Iron-Enhanced Sand Filter

The Woodcrest Filter, constructed in 2020, was the first regional scale stormwater filtration BMP in Minnesota to incorporate biochar as a media amendment. It was designed to facilitate head-to-head testing of iron-sand media versus iron-sand-biochar media at removing phosphorus and *E. coli* in urban stormwater runoff.

Woodcrest Filter is comprised of two nearly identical ~10,500 sq ft filter media beds constructed along an existing flow-through rate control pond. The pond's outlet control structure was modified to pass baseflow, but to divert storm flow through the filtration bench via gravity. Each filter bed has an independent drain tile system with designated sampling ports and is instrumented with an area-velocity sensor to evaluate effluent pollutant concentrations and treatment volumes.

Performance Summary

The Woodcrest Filter has consistently met performance expectations, reducing annual loading of sediment, phosphorus, and *E. coli* to Coon Creek.

Cumulative pollutant load removals 2020-2025 (range of annual % load removal)

Pollutant	Woodcrest IES	Woodcrest IES + Biochar
Total Suspended Solids (TSS)	90% (84-95%)	90% (84-94%)
Total Phosphorus (TP)	73% (59-86%)	69% (55-87%)
Orthophosphate (OP)	62% (31-76%)	53% (26-82%)
<i>E. coli</i> *	>58% (15-≥80%)	>70% (37-≥84%)

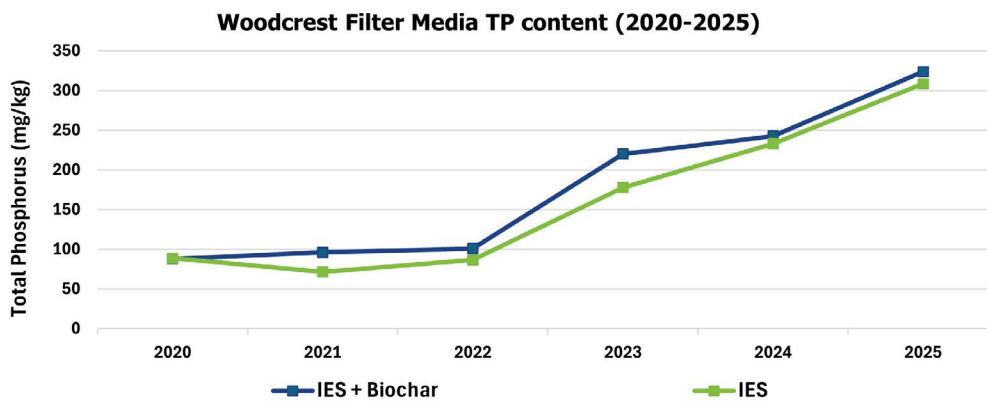
*Some influent *E. coli* results exceeded maximum reporting thresholds, so results are conservative



Visit the project webpage

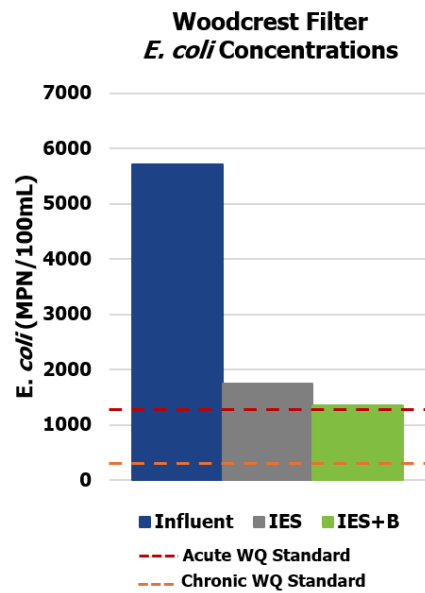


Woodcrest Biochar & Iron-Enhanced Sand Filter Performance Insights Continued



Based on paired influent vs effluent sampling during the first six years of operation, the Woodcrest Filter has consistently met performance expectations, reducing annual loading of sediment, phosphorus, and *E. coli* to Coon Creek (see summary table on front page). A TP reduction target of 69 lbs per year was established based on P8 modeling outputs with an estimated removal efficiency of 0.77 for iron-sand filtration BMPs (MN Stormwater Manual). Annual media testing results confirm that the average TP content in the media has increased from 88 mg/kg shortly after construction to 331 mg/kg in spring of 2025 which equates to capture of approximately 97 lbs TP per year.

Incorporating biochar as a media amendment increased annual *E. coli* load removal by an average of 12% compared to iron-sand alone and decreased average *E. coli* effluent concentrations by an additional 7%. Although this slight increase in performance is not statistically significant, it is meaningful because the filtered effluent concentrations are just shy of meeting the acute recreation standard for *E. coli*. CCWD has also been working cooperatively with USGS staff to evaluate performance of iron-sand and iron-sand-biochar media at removing several additional contaminants of emerging concern including pesticides, PAHs, flame retardants, PFAS, and select tire-wear chemicals



Project Contact

Justine Dauphinais, Water Quality Coordinator
jdauphinais@cooncreekwd.org | (763) 258-4021