

Project Name | Brown's Creek Restoration project

Date | February 8, 2024

To / Contact info | BCWD Board of Managers

Cc / Contact info | Karen Kill, Administrator / BCWD

Cc / Contact info | Mike Majeski; Dan Mossing, PE / EOR

From / Contact info | Paul Nation, PE / EOR

Regarding | Regulatory Review Memo

The following review of the above mentioned project located within the legal jurisdiction of the Brown's Creek Watershed District (BCWD) was conducted to determine compliance with the BCWD rules for purposes of review of the proposed project being conducted by BCWD.

Applicant: Brown's Creek Watershed District

Review based on BCWD Rules effective April 1, 2020

Recommendation: Proposed project plans are consistent with BCWD rule requirements

GENERAL COMMENTS

Brown's Creek Watershed District plans a creek- and floodplain-restoration project along 2,000 feet of Brown's Creek in Stillwater. BCWD will undertake the project on four separate adjacent parcels along Neal Avenue North just south of McKusick Road North under land-use agreements with the owners: City of Stillwater, the State of Minnesota (2) and Barb & Beltram Van Tassel, each of whom will continue to own the underlying property. The only development under existing conditions on any of the parcels is the Brown's Creek State Trail, which will not be altered by the work.

Existing Conditions: The stretch of Brown's Creek from McKusick Road to the Brown's Creek State Trail has been degraded by bank erosion, channel incision, (stream bed downcutting), and invasive species. Channel incision has led to floodplain abandonment and subsequent accelerated bank erosion and channel widening. The erosion is exacerbated during storm events when high flows are concentrated in the incised channel. Overbank flows onto the floodplain seldom occur except during extreme storm events. Channel incision has also lowered floodplain hydrology, which has led to the establishment of herbaceous and woody invasive species in the floodplain.

Proposed Conditions: BCWD proposes to install rock riffles to prevent further channel incision and to restore the channel connection to the floodplain. The rock riffles are proposed to be installed at designed elevations that will restore floodplain connectivity of the creek by increasing the elevation of the channel bed at strategic locations. A secondary benefit of increasing the water elevation of the creek will be restoring hydrology in the adjacent floodplain wetlands. Visual indicators of decreasing wetland hydrology include the recent invasion of box elder and buckthorn in the adjacent wetlands that were previously dominated by grasses and sedges. As part of this project, tree harvest of box elder and all woody invasive species is proposed along the creek to open the canopy and restore the fresh wet meadow and sedge meadow wetland communities. The project will also include channel remeandering, bank stabilization, reconnection of cutoff oxbows, and installation of woody cover for fish and macroinvertebrate habitat. An Americans With Disability Act-compliant spur trail may be

constructed as part of the project and so is included in the analysis below. This trail will connect the Brown's Creek State Trail to Brown's Creek and replace an existing foot path that is currently eroding and causing sediment deposition into the creek.

Recommendation: The BCWD engineer confirms that the proposed project conforms to applicable BCWD rule requirements.



Figure 1: Site Plan

Rule 2.0—STORMWATER MANAGEMENT

Under 2.2(b) of the rule, the proposed project does not trigger the application of Rule 2.0 Stormwater Management. The proposed project will create roughly 900 square feet of impervious surface, which, aggregated with existing impervious located on the site, is less than the 6,000 square foot threshold for sites draining to groundwater-dependent resources.

- Rule Not Applicable to Permit.

Rule 3.0—EROSION CONTROL

According to BCWD Rule 3.2, all persons undertaking any grading, filling, or other land-altering activities which involve movement of more than fifty (50) cubic yards of earth or removal of vegetative cover on five thousand (5,000) square feet or more of land must submit an erosion control plan to the District, and secure a permit from the District approving the erosion control plan. The proposed project triggers the application of Rule 3.0 Erosion Control because it involves 4,788 CY of excavation and 9.6 acres of vegetation disturbance (harvest of woody invasive species and trees).

- Rule Requirements Met

The erosion and sediment control plan includes:

- *Rock construction entrances*
- *Floating silt curtain*
- *Stream stabilization measures*
- *Double row of straw wattles around soil disposal area*
- *Restoration of disturbed areas with native seed mixes and weed-free straw mulch*
- *As-built record drawings will be completed prior to project close-out showing that the completed grading conforms to the grading plan.*

Rule 4.0—LAKE, STREAM, AND WETLAND BUFFER REQUIREMENTS

According to BCWD Rule 4.2.1, Rule 4.0 applies to land that is (a) adjacent to Brown's Creek; a tributary of Brown's Creek designated as a public water pursuant to Minnesota Statutes section 103G.005, subdivision 15; a lake, as defined in these rules; a wetland one acre or larger; or a groundwater-dependent natural resource; and (b) that has been either (i) subdivided or (ii) subject to a new primary use for which a necessary rezoning, conditional use permit, special-use permit or variance has been approved on or after April 9, 2007, (for wetlands and groundwater-dependent natural resources other than public waters) or January 1, 2000 (for other waters).

- Rule Not Applicable. *The project is not located on property that has been subdivided or subject to a new primary use for which a necessary rezoning, conditional use permit, special-use permit or variance has been approved on or after April 9, 2007, (for wetlands and groundwater-dependent natural resources other than public waters) or January 1, 2000 (for other waters). Therefore, Rule 4.0 does not apply.*

While Rule 4.0 does not apply, there is proposed tree clearing adjacent to Brown's Creek that would be regulated under this rule if it were triggered. The tree removal (primarily boxelder) will improve the creek buffer by allowing native vegetation to recolonize the floodplain that was shaded out by a dense canopy of invasive species and boxelder. Therefore, the BCWD engineer has determined tree removal is

acceptable as it will enhance the function of the buffer for erosion control, stormwater filtration, and pollinator habitat.

A paved ADA trail spur is proposed on the Brown's Creek State Trail embankment near the downstream end of the project. While creating impervious surface within a buffer is not allowed, the location of the trail spur will occur along an existing footpath that leads to the creek. This footpath has caused localized gully erosion and sediment discharge to the creek. As such, formalizing a paved trail will prevent further soil erosion and resource degradation.

Rule 5.0—SHORELINE AND STREAMBANK ALTERATIONS

According to BCWD Rule 5.2, no person may disturb the natural shoreline or streambank partially or wholly below the ordinary high water mark of a waterbody, without first securing a permit from the District. A permit will be issued only on a demonstration that erosion is occurring or likely to occur. This rule is applicable because the proposed rock riffles and stabilization measures will be placed below the ordinary high water level (top of bank) of the creek.

Rule Requirements Met

According to Rule 5.3, Bioengineering techniques should be used to the extent possible.

While bioengineering techniques are proposed extensively along the bank of the creek, the rock riffles would be considered riprap placement. Bioengineered solutions require vegetation establishment before attaining full structural stability. However, vegetation rooting within the creek bed is unlikely to occur due to the perennial flow and inundation. The rock riffles provide immediate stability once placed. Therefore, the BCWD Engineer finds use of rock riffles to be consistent with the rule criteria, as elaborated below.

The placement of rock riffles complies with BCWD Rule 5.4, Criteria for Riprap Placement by:

5.4.1 Riprap material should be durable, natural stone common to the setting and of a gradation that will result in a stable shoreline embankment able to withstand ice and wave action.

The rock riffles will be constructed of angular granite riprap which will emulate natural rock riffles and contain existing gravel derived from the creek bed to allow for fish spawning and colonization by macroinvertebrates.

5.4.2 The finished slope must be no steeper than 3:1 (horizontal to vertical).

The rock riffles will have a maximum slope of 4:1 on the upstream side of the riffle. The riffle will have a 20:1 slope at the peak and a 6:1 slope on the downstream side.

5.4.3 No riprap or filter materials may be placed more than 10 feet waterward of the shoreline measured from the ordinary high water level elevation under normal conditions. The encroachment into the water is the minimum amount necessary to provide protection and does not unduly interfere with the flow of water.

N/A – Streambank application, not shoreline application

5.4.4 A transitional layer consisting of graded gravel, at least 6 inches deep, or an appropriate geotextile filter fabric must be placed between the soil material of the existing shoreline and the riprap to prevent erosion of the embankment and to prevent settlement.

N/A – Streambank application, not shoreline application

5.4.5 Riprap placement may not be attempted when underlying soils are not capable of supporting resulting loads. In these cases, a professional engineer registered in Minnesota should be consulted.

The underlying material varies throughout the project with gravel, sand, clay, and peat. Excavation to competent material is proposed. The construction will be supervised by Dan Mossing, a professional engineer registered in Minnesota with EOR.

5.4.6 The thickness of the riprap layers must be at least 1.25 times the maximum stone diameter, exclusive of toe boulders at least 50 percent buried.

The maximum stone diameter is 18" and thickness of rock riffles are minimum 24". Rock material to be buried between 12"-18" into stream bed which meets the stated criteria.

5.4.7 The riprap must conform with the natural alignment of the shoreline.

N/A – Streambank application, not shoreline application

5.4.8 The design must reflect the engineering properties of the underlying soils and any soil corrections or reinforcements. For a shoreline, the design must conform to engineering principles for wave energy dispersion and resistance to deformation from ice pressure and movement, considering prevailing winds and fetch. For a streambank, the design must conform to engineering principles for the hydraulic behavior of open channel flow, considering channel slope, velocity, tractive forces and upstream and downstream impacts.

Industry standard methods of Rosgen Natural Channel Design and Mecklenburg analysis were used in the design. The rock riffle size specification has taken into account the observed hydraulic behavior of the creek. The height has been specified considering the channel slope and historic creek bed and top of bank elevations.

5.4.9 Riprap-placement projects must contain native vegetation plantings.

Native vegetation seeding is proposed for all disturbed areas of the project site. This includes streambank stabilization areas where the rock riffles will tie into the streambank.

Rule 6.0—WATERCOURSE AND BASIN CROSSINGS

According to Rule 6.2, no person may use the beds of any waterbody within the watershed for the placement of roads, highways and utilities without first securing a permit from the District.

Rule Not Applicable to Permit. *There are no proposed watercourse or basin crossings.*

Rule 7.0—FLOODPLAIN AND DRAINAGE ALTERATIONS

According to Rule 7.2, no person may alter or fill land below the 100-year flood elevation of any waterbody, wetland, or stormwater management basin, or place fill in a landlocked basin, without first obtaining a permit from the District. No person may alter stormwater flows at a property

boundary by changing land contours, diverting or obstructing surface or channel flow, or creating a basin outlet, without first obtaining a permit from the District.

Rule Requirements Met

According to BCWD rule 7.3.1 floodplain filling must be accompanied by a replacement of flood volume between the ordinary water level and the 100-year flood elevation.

Selective floodplain fill is included to narrow the creek channel. This fill is offset by the total volume of excavation proposed within the floodplain for a net cut of 4,788 CY.

Under BCWD Rule 7.3.5, the District will issue a permit to alter surface flows under paragraph 7.2 only on a finding that the alteration will not have an unreasonable impact on an upstream or downstream landowner and will not adversely affect flood risk, basin or channel stability, groundwater hydrology, stream baseflow, water quality or aquatic or riparian habitat.

A HEC-RAS model and no-rise analysis was completed and submitted to the city of Stillwater (local floodplain authority) on 1/26/2024. This analysis indicates 0.00' of rise in the 100-year flood elevation at the upstream and downstream boundaries of the project site. Therefore, there will be no impact to upstream or downstream landowners.