

Stormwater Management Design Narrative for the Sanders Hall (Addition to Vennum Binkley Hall)

Civil / Stormwater Engineer: Mohr & Kerr Engineering and Land Surveying, P.C.

Owner / Client: Eureka College

The stormwater management design for the Sanders Hall project site includes comprehensive strategies for reducing the quantity and increasing the quality of stormwater runoff. The project site comprises approximately .8 acres and is divided into three drainage areas that each utilize ecological stormwater best management practices (BMPs) to achieve the desired outcomes. A uniquely beneficial aspect of the project includes the direct involvement of Eureka College faculty, staff and students in the site design, native plant selection and the implementation of the site's ecological restoration and ecological stormwater BMPs. The project site will serve as an outdoor laboratory for Science Division and the entire college campus. The goal is to actively study and work to enhance both the ecological and stormwater management benefits of the site over time.

Water Quantity Design – Overall Site

The existing overall site (0.8 acres) is made up of 0.77 acres of mowed turf grass lawn and 0.03 acres of sidewalk. The developed site will include approximately 0.15 acres of impervious surfaces (new building, sidewalks) and 0.65 acres of pervious area (restored native plantings). The project site landscaping will include stormwater wetlands, vegetated filter strips, rain gardens and more traditional planting areas all utilizing native plant materials. In these areas, plantings and site design features (retention) will increase infiltration and reduce flow. These reductions in runoff discharge and runoff volume are reflected in our calculations using a reduced C value for the proposed pervious areas over the existing turf grass. The net overall discharge and volume of the proposed project site will be less than the existing condition. Drainage basin 1 and 3 do not have storage to capture extreme events. These events will be reduced as proposed runoff and volume will be less than the existing turf grass condition. Drainage Area 2, which comprises almost all of the newly impervious area, has a detention volume that will allow it store extreme events in excess of 100 year storm events.

Water Quantity Design – Drainage Area 2

The stormwater management design for Drainage Area 2 includes detention and retention strategies to reduce the quantity of stormwater runoff. In accordance with the Village of Eureka stormwater requirements the stormwater management system was designed to release at a rate equivalent to a 2 year pre-development storm condition with a detention basin sized to hold a 25 year storm under the 2 year outlet conditions. Stormwater calculations utilized a Modified Rational Method as allowed by the Village of Eureka. The detention basin was oversized to improve water quality and exceeds the Village's 25 year requirements providing storage exceeding a 100 year event at a 2 year outlet condition. There is also a stormwater wetland that retains 175 cubic feet of stormwater. This design reduces runoff volume, but it also provides water quality benefits as discussed below that further protect downstream aquatic ecosystems.

Water Quality Design

During construction, silt filter fence, storm sewer inlet protection, stabilized construction entrances and temporary seeding are being used to avoid and/or reduce construction related erosion and sedimentation from runoff.

Permanent (post construction) water quality management practices include the following:

Drainage Area 1:

Drainage area 1 is comprised of .31 acres of pervious / vegetated area that was previously mowed turf grass (predevelopment condition). This drainage area was included in the project site (LEED Boundary) in order to capture project construction activities related to the geothermal (ground source heat pump) well field and construction staging areas. It includes only a small section of impervious area (concrete sidewalk) at the southern end totaling less than .008 acres. Although the area is likely to experience soil compaction as a result of construction activities, soil loosening (tilling) and amendments will be implemented to help aid in the establishment of the native plantings and promote effective infiltration. Surface runoff that does occur will be slowed and filtered – removing sediment and pollutants – through the large area of the vegetated filter strip feature. This pre-treated runoff will then be captured, retained and infiltrated in the stormwater wetland feature at the west/southwest corner of the drainage area.

Drainage Area 2:

Drainage area 2 totals .34 acres. This drainage area includes the newly impervious area of the project building (Sanders Hall) footprint and the stormwater management based landscaping to the west and south of the building. This area was also previously mowed turf grass. The runoff from drainage area 2 will be collected in a shallow stormwater wetland (wet bottom retention/detention basin). The entire landscaped area will be vegetated with native plantings intended to provide both habitat and water quality enhancements. The naturalized basin has been oversized to create additional detention and settling times for the removal of suspended solids. In addition a sand filter has been included in series with the stormwater wetland feature to filter initial flows of stormwater runoff from both the roof area and vegetated swale at the south the building. Water quality goals will be met by filtering and capturing runoff and providing for enhanced infiltration within the series of stormwater features in drainage area 2.

Drainage Area 3:

Drainage area 3 includes approximately .15 acres including impervious / vegetated area and campus sidewalk connections to the east of the project building. This area will also be vegetated with native vegetation and will include predominantly vegetated filter strip features with some integrated rain gardens (bioretention) near stormwater overflow drains to provide increased retention and infiltration prior to any runoff entering the storm sewer system. An additional sidewalk connection will be made to the entrance of Sanders Hall. Nearly all of the remaining former turf grass will be converted to native vegetation. Water quality goals will be met by providing filtration, retention and infiltration through vegetated filter strips and rain gardens.