

## INTRODUCTION

Riverfront Trails is a proposed major subdivision located on the 92.73-acre parcel at the intersection of Lower Miller Creek Road and Old Bitterroot Road in Missoula, Montana. The parcel is proposed to be divided into residential and commercial lots supporting a range of housing types within a Planned Unit Development (PUD) subdivision and Neighborhood Character Overlay District. There are no existing structures, water, or wastewater facilities currently onsite. The proposed subdivision is located on land which is currently and has historically been in use for agricultural production of hay and alfalfa, with an area of riparian vegetation associated with the bank of the Bitterroot River.

## PURPOSE AND INTENT

Riparian resource areas provide protection from river channel changes, protection of riparian habitat and associated fish and wildlife, protection of water quality and quantity, and outdoor recreation in a visually attractive environment. The intent of this Riparian Management Plan is to ensure that the project supports the goals outlined in Section 3-130.1C of the City of Missoula Subdivision Regulations for the preservation of riparian resource areas.

The approximate extent of the riparian resource area is shown on Exhibit G: Vegetation Map. It straddles the northwestern property boundary, encompassing most of the bank of the Bitterroot River. The riparian resource area will be protected and preserved through the dedication of open space and common space along the Bitterroot River. The subdivision will not create any Lots that are wholly or partially within the riparian resource area. Therefore, the project will not include development of any kind or removal of existing vegetation within the riparian resource area, except for the treatment of noxious weeds detailed in the Weed Management Plan.

## VEGETATION TYPES

The approximate extent of riparian vegetation is shown on Exhibit G: Vegetation Map. The riparian vegetation on the property includes the black cottonwood/red-osier dogwood habitat type and spruce/red-osier dogwood habitat type [1]. A riparian buffer area will be created through the dedication of open space, which will include natural grassland. The open space will create a buffer of approximately 500 to 800 feet between the riparian resource area and the nearest residential lots. The riparian resource area drains into the Bitterroot River. It is crossed by a drainage easement, which conveys the stormwater discharge from the Maloney Ranch subdivision. The stormwater discharge from Riverfront Trails will be conveyed across the riparian resource area through underground piping and into the Bitterroot River. Please refer to the Riverfront Trails Stormwater Design Report for additional information regarding water quantity, water quality, routing, and treatment methods for the Riverfront Trails subdivision.

## RIPARIAN RESOURCE DESCRIPTION

The riparian vegetation on the property includes the black cottonwood/red-osier dogwood habitat type and spruce/red-osier dogwood habitat type [1]. The vegetation appears to make a moderate

contribution to stabilization of the Bitterroot Riverbank, and this will be expected to continue with the preservation of the riparian vegetation. The meander of the river channel appears to promote sediment deposition in a point bar along the bank and riparian area, but the vegetation likely provides some stabilization during periods of flooding and high water.

Minimizing soil compaction within the riparian area is an important management consideration, as compaction can restrict rooting depth of plants, affecting the activity of soil organisms, and increasing the hazard of water erosion [2]. According to the NRCS Soils Survey, the soils in the riparian area are Newbar very gravelly loamy sand and Water-Riverwash complex [3]. Given the loamy sand classification, the soils in the riparian area are more susceptible to compaction than clayey soil complexes. Compaction within the riparian area will be minimized due to its preservation as open space by reducing the number of trips across the area. Designated paths to the river will be provided to visitors. Use of equipment and machinery within the riparian area will be minimized or eliminated.

The riparian vegetation contributes to fish and wildlife habitat in the vicinity. The property is used by whitetail deer, small mammals, and various bird species common to the Missoula Valley. The Bitterroot River provides habitat for several fish species. According to data available from Montana Fish, Wildlife, and Parks, the riparian area is within the known range distribution of various species of grouse and pheasants [4]. It is within the known range distribution of certain big game species, but considering the urban nature of the vicinity, their presence and use is likely highly infrequent and transient in nature. The riparian area does not serve as habitat for any threatened or endangered species.

## MITIGATION OF ADVERSE IMPACTS

The riparian resource area will be protected and preserved through creation of an open space and common space accessible to the public. The existing fences along the riverbank will be removed, and the project will not include additional development of any kind or removal of existing vegetation within the riparian resource area, except for the treatment of noxious weeds detailed in the Weed Management Plan, installation of a swale to discharge stormwater from the property, and any portions of stormwater wetlands that must be constructed within the zone to ensure proper functioning. The property already contains competitive, desirable natural grasses, so revegetation following treatment of noxious weeds will not be necessary.

The proposed layout of trails through the open space is shown on Sheet C8.2 of the preliminary construction plans. The discharge swale and stormwater wetland is shown on Sheet C6.12.

## MAINTENANCE AND MONITORING

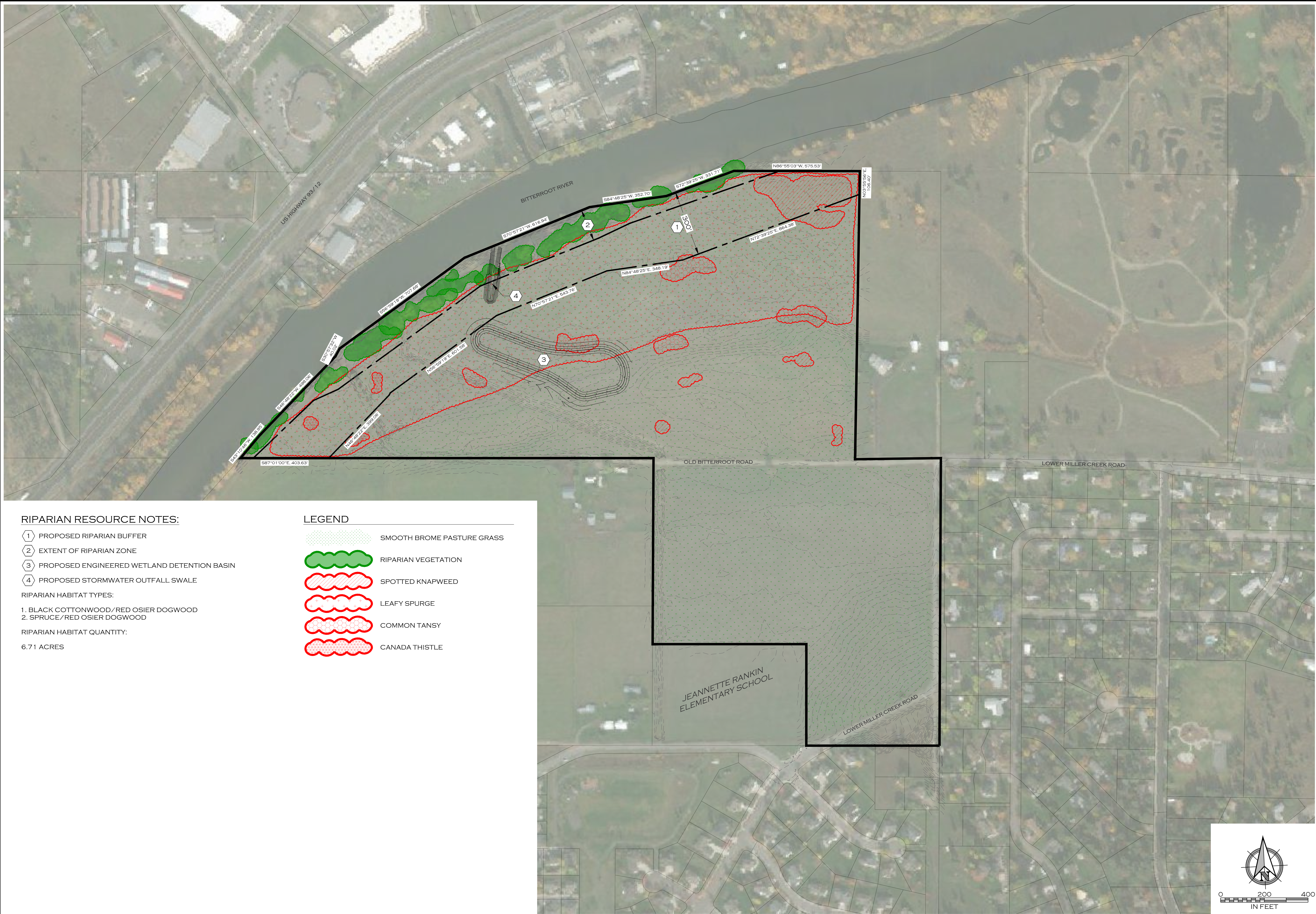
The open space tract and riparian area will be partially dedicated to the public and, maintained by the City of Missoula Parks and Recreation Department, and partially preserved as a common space. Recommended maintenance tasks to be conducted by the responsible parties include:

1. Visually inspect the riparian zone annually and after major storm events to see if any damage or problems have occurred.

2. Control of noxious weeds as soon as possible, before they grow out of control. Weed control will vary, but may include mowing, selective use of herbicides, mulching, and other integrative vegetation management (IVM) techniques.
3. Replanting and reseeding of any areas where plants have died or been washed away by flood waters. Parties should ensure there are no empty soil spaces that could be occupied by weeds and invasive plants. The areas should be reseeded in accordance with the recommendations of the weed management and revegetation plan.
4. The final, approved version of this Riparian Resource Management Plan shall be implemented in perpetuity and may not be altered without City Council approval. All Lot owners are subject to and shall abide by this Riparian Resource Management Plan.

## REFERENCES

- [1] P. L. Hansen, R. D. Pfister, K. Boggs, B. J. Cook, J. Joy and D. K. Hinckley, Classification and Management of Montana's Riparian and Wetland Sites, Missoula: School of Forestry, The University of Montana, 1995.
- [2] USDA Natural Resources Conservation Service, Soil Quality Resource Concerns: Compaction, Washington: United States Department of Agriculture, 1996.
- [3] Montana Fish, Wildlife, and Parks, "Maps and GIS Resources," 2021. [Online]. Available: <https://gis-mtfwp.opendata.arcgis.com/>.
- [4] Natural Resources Conservation Service, "Custom Soil Resource Report for Missoula County Area, Montana," Natural Resources Conservation Service, 2021.



**RIPARIAN RESOURCE NOTES:**

- 1 PROPOSED RIPARIAN BUFFER
- 2 EXTENT OF RIPARIAN ZONE
- 3 PROPOSED ENGINEERED WETLAND DETENTION BASIN
- 4 PROPOSED STORMWATER OUTFALL SWALE

**RIPARIAN HABITAT TYPES:**

- 1. BLACK COTTONWOOD/RED OSIER DOGWOOD
- 2. SPRUCE/RED OSIER DOGWOOD

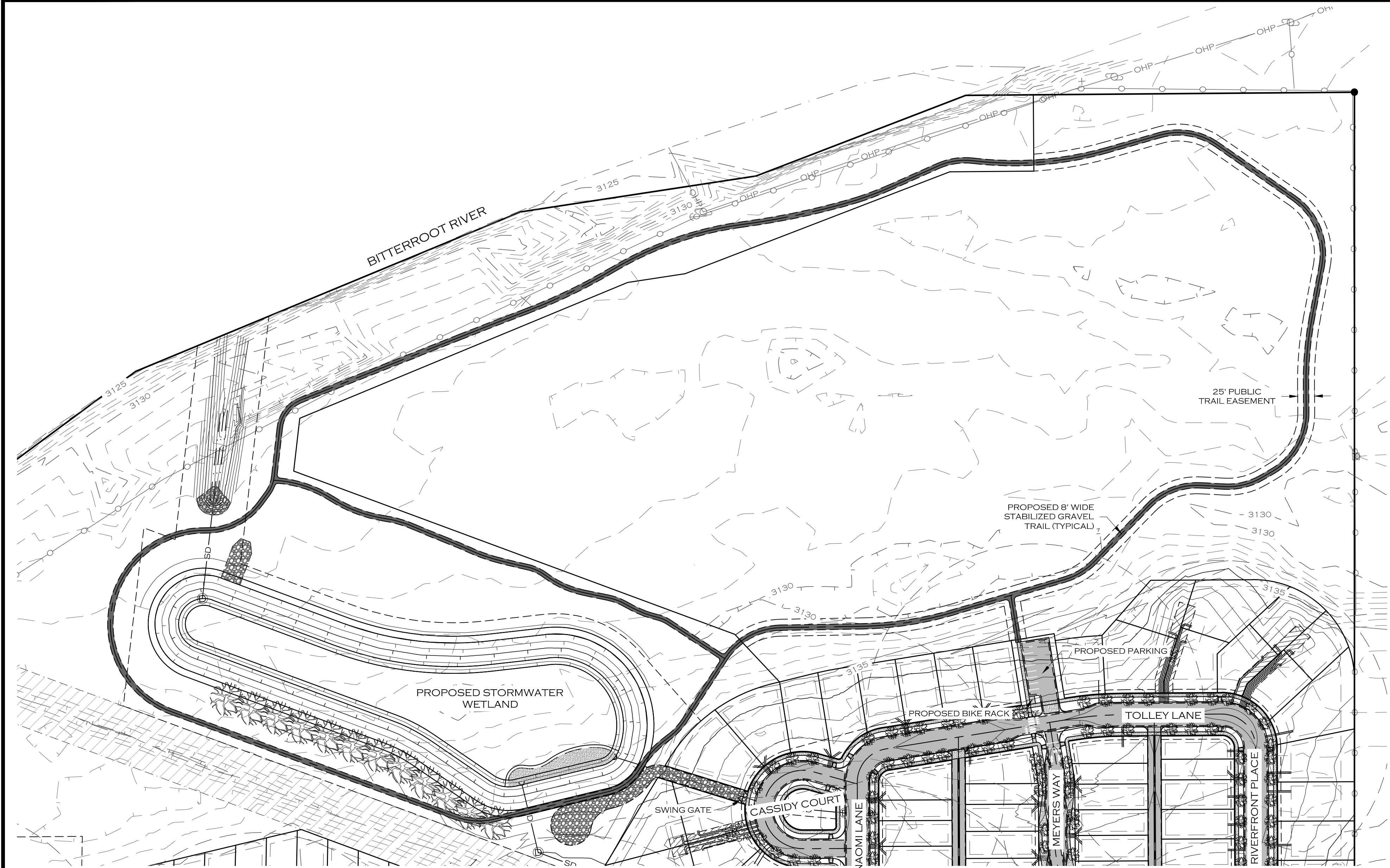
**RIPARIAN HABITAT QUANTITY:**

6.71 ACRES

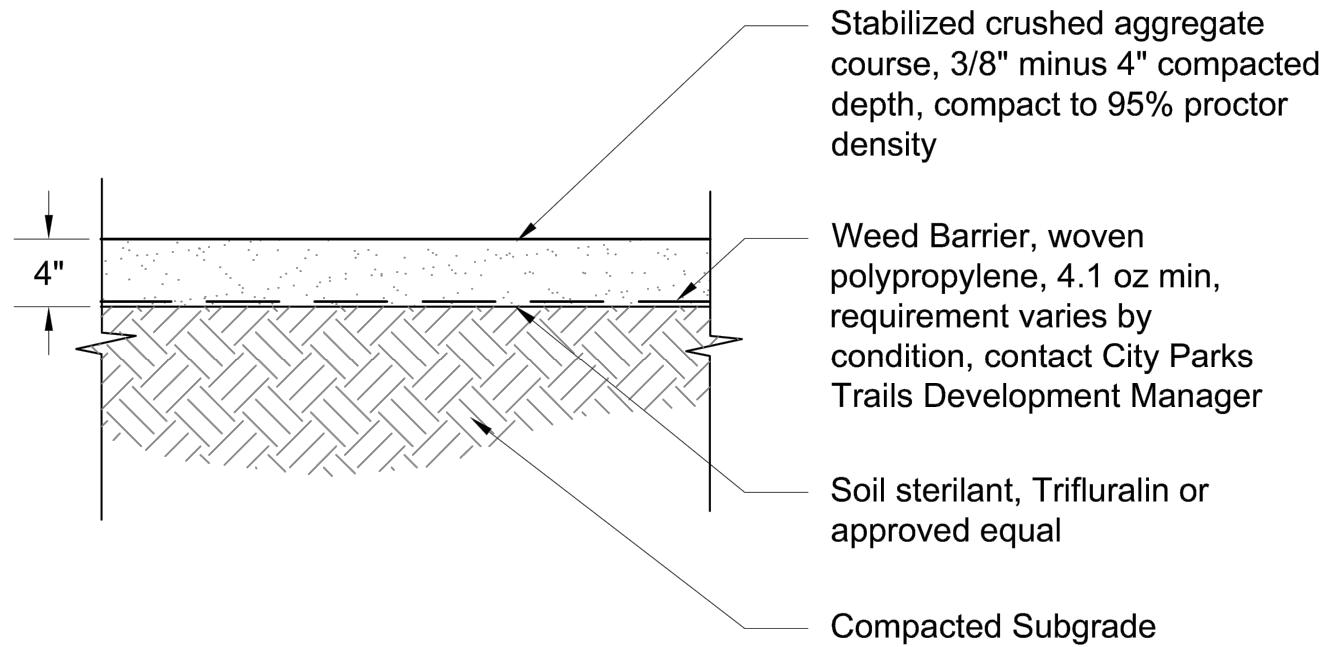
**LEGEND**

- SMOOTH BROME PASTURE GRASS
- RIPARIAN VEGETATION
- SPOTTED KNAPWEED
- LEAFY SPURGE
- COMMON TANSY
- CANADA THISTLE

MISSOULA	RIVERFRONT TRAILS	MONTANA	VEGETATION MAP	<div>EX-G</div>	<div>WOITH ENGINEERING, INC.</div>				<div>ENGINEERS &amp; SURVEYORS</div>				405 3RD STREET NW, SUITE 206 • GREAT FALLS, MT 59404 • 406-591-1955				3000 O'LEARY STREET, SUITE A • MISSOULA, MT 59801 • 406-203-9585				• WWW.WOITHENG.COM •				COPYRIGHT © WOITH ENGINEERING, INC., 2020																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										



SECTION



- NOTES:
- 1. Refer to part 5, section 2 of Missoula Parks and Recreation Design Manual for gravel trail notes, aggregate gradation, and stabilizer specifications.
  - 2. Use psyllium stabilizer from Stabilizer Solutions, Polypavement, or approved equal.
  - 3. Thoroughly mix stabilizer into aggregate per manufacturer's recommendations.

	STABILIZED TRAIL DETAIL			PR-122-2
	Approved by:	Drawn by:	PM	
	Parks & Rec. Design Mgr. Neil Miner	Checked by:	CB	

**LEGEND**

	PROPOSED BUILDING
	PROPOSED SIGN POST
	PROPOSED ROAD CENTERLINE
	PROPOSED TRAIL
	PROPOSED CURB
	PROPOSED WHITE TRAFFIC STRIPE
	PROPOSED YELLOW TRAFFIC STRIPE
	PROPOSED ASPHALT ROAD
	PROPOSED SIDEWALK/CONCRETE
	PROPOSED ADA STALL MARKING
	PROPOSED BICYCLE RACK
	PROPOSED WATER MAIN
	PROPOSED WATER SERVICE
	PROPOSED FIRE SERVICE
	PROPOSED IRRIGATION
	PROPOSED BLOWOFF
	PROPOSED CURB STOP
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED AIR RELIEF VALVE
	PROPOSED SANITARY SEWER MAIN
	PROPOSED SANITARY SEWER SERVICE
	PROPOSED MANHOLE - SANITARY SEWER
	PROPOSED STORM SEWER
	PROPOSED MANHOLE - STORM SEWER
	PROPOSED STORM DRAIN INLET
	PROPOSED DITCH
	PROPOSED POND
	PROPOSED GRADE BREAK
	PROPOSED LANDSCAPING
	PROPOSED DECIDUOUS TREE
	PROPOSED BURIED POWER
	PROPOSED LIGHT POLE
	PROPOSED BURIED FIBER
	PROPOSED BURIED TELEPHONE
	PROPOSED BURIED GAS

- NOTES:**
- 1. TOTAL TRAIL LENGTH: 5,297 FEET
  - 2. TRAILS SHALL HAVE A WIDTH OF EIGHT FEET AND BE BUILT TO THE SPECIFICATIONS FOR STABILIZED TRAILS IN PART 5, SECTION 2 OF THE CITY OF MISSOULA PARKS AND RECREATION DESIGN MANUAL (2018 EDITION).
  - 3. TRAILS SHALL FOLLOW THE NATURAL GROUND CONTOURS TO THE GREATEST EXTENT POSSIBLE.

**COLOR VERIFICATION**  
ELEMENTS ON THIS SHEET ARE INTENDED TO BE IN COLOR. IF PROPERLY REPRODUCED, RED, GREEN AND BLUE WILL BE VISIBLE.

PRELIMINARY

RIVERFRONT TRAILS	MISSOULA	MONTANA	TRAIL PLAN	JOB #:	2101
				DRAWN:	MOH
				DESIGN:	MOH
				QA:	KTS
				DATE:	7/21/2022

**WOITH ENGINEERING, INC.**  
**ENGINEERS & SURVEYORS**  
405 3RD STREET NW, SUITE 206 • GREAT FALLS, MT 59404 • 406-761-1955  
3000 CLARK STREET, SUITE 100 • MISSOULA, MT 59801 • 406-233-5505  
WWW.WOITHENG.COM

**C8.2**

TRAIL PLAN.DWG PLOTTED BY: MATT HAMMERSTEIN ON AUG/01/2022