

TECHNICAL MEMORANDUM

To: Pando Holdings
205 Detroit St., Ste. 203
Denver, CO 80206-481

From: Lynn Bacon, PWS
TerraQuatic, LLC
1336 Cherry Drive
Bozeman, MT 59715

Date: December 21, 2022

Subject: *Hillview Subdivision Aquatic Resources Delineation Technical Memorandum*

INTRODUCTION

An aquatic resources delineation was conducted within the proposed Hillview Subdivision property located in Missoula, Montana in Missoula County (SESE Section 6 and SWSW Section 5, Township 12 North, Range 19 West: **Figures 1 and 1a**; 46.821427, -114.022690). The proposed project site is located within agricultural grassland and includes one home.

METHODS

Wetlands were delineated using the 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast (Version 2.0) (U. S. Army Corps of Engineers [USACE] 2010). The 2018 National Wetland Plant List (USACE 2018) was used to determine vegetation indicator status rating. Data points (DP) were established within all potential wetland (WL) area(s) and adjacent uplands (UPL), i.e., nonwetland areas (**Exhibit A, Appendix A**). At each data point wetland indicator data were collected and analyzed using USACE wetland determination data forms (**Appendix B**). In general, an area qualifies as a wetland if a site exhibits positive wetland indicators for three parameters: vegetation, soils, and hydrology. In certain circumstances, an area may still qualify as a wetland in the absence of one or more indicators. Photographs are included in **Appendix C**. NRCS (2021) soil map and Montana Natural Heritage Program wetland inventory (MNHP 2021) map are included in **Appendix D**. City of Missoula stormwater utility map is included in Appendix E. Cushing Terrell conducted the wetland boundary survey and the channel bed width and area were estimated based on wetland scientist observations.



Figure 1. Proposed Hillview Subdivision delineation investigation area (pink polygon), Missoula, Montana.

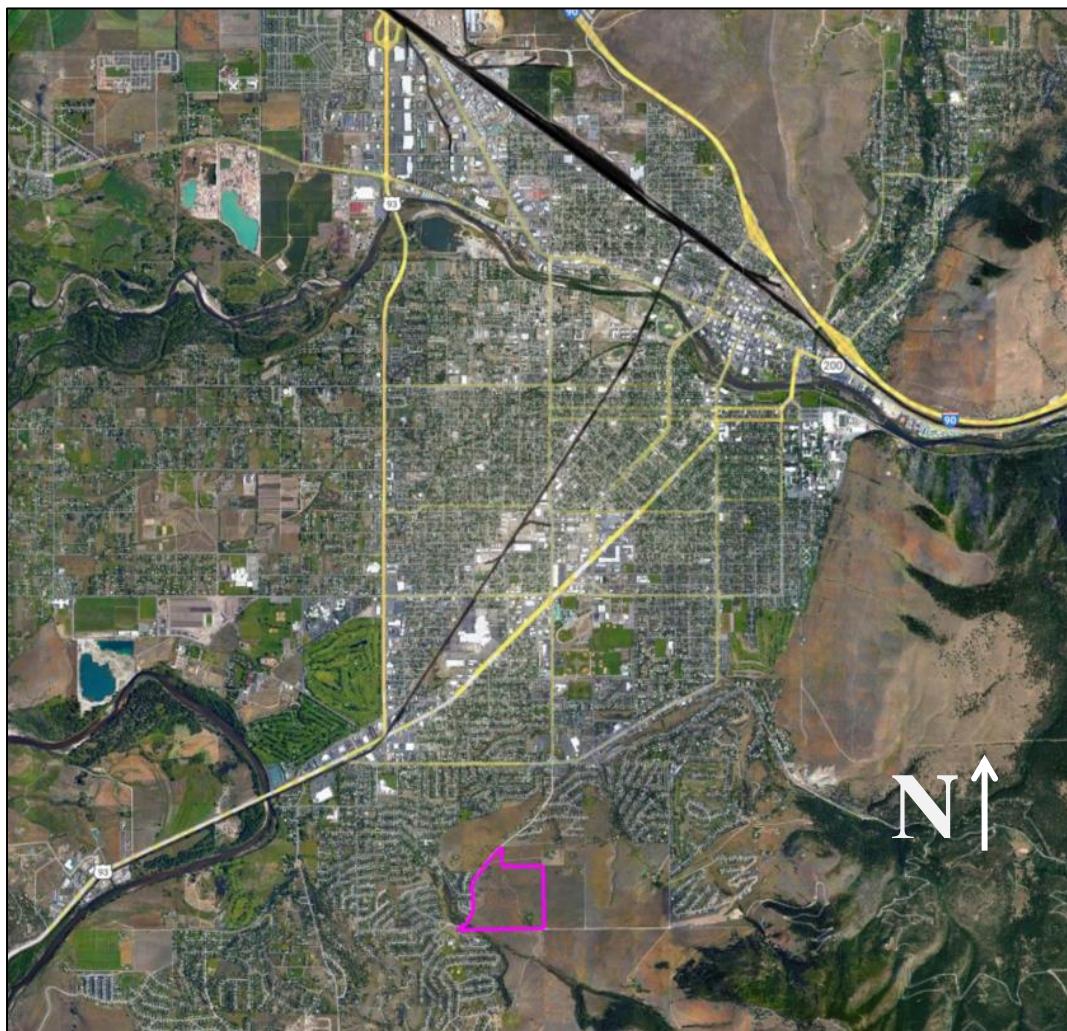


Figure 1a. Proposed Hillview Subdivision delineation investigation area (pink polygon), Missoula, Montana.

RESULTS

An aquatic resources delineation was conducted within the proposed Hillview Subdivision project site on September 28, 2021 (**Ex- A, Appendix A**). One aquatic feature was identified in the southwest corner of the property. The feature includes an unnamed perennial stream channel (NWW-1: 375 sqft) within Moose Can Gully and a narrow wetland fringe (WL-1: 2,580 sqft) along both sides. The stream channel is narrow and averages 1 to 1.5 feet wide. A feature identified as a pond in the center of the property by Montana Natural Heritage Program (2021) does not exist.

Moose Can Gully is located within a robust riparian swale with steep slopes along both sides. The vegetation community along the slopes is comprised of quaking aspen (*Populus tremuloides*), ponderosa pine (*Pinus ponderosa*), choke cherry (*Prunus virginiana*), snowberry (*Symporicarpos* sp.), and nonnative grass species (orchard grass: *Dactylis glomerata*, timothy: *Phleum pratense*, and smooth brome: *Bromus inermis*). Dominant wetland species along the channel include nonnative spreading bent (*Agrostis stolonifera*), sedge species (*Carex* sp.) and manna grass along the perennial stream channel. Soils within the wetland fringe and upland slope areas are very dark grayish brown (10YR 3/2) and very rocky at a depth of 12 inches below ground surface (BGS; unable to excavate deeper). Given true hydric indicators could not be observed within the wetland fringe because of the large broken rock interface at 12 inches BGS, soils were classified as hydric based on proximity to the perennial stream, potential for saturation, geomorphic position, and dominance of hydrophytic species. The Moose Can Gully aquatic resource qualifies as a riverine, perennial, rock bottom, palustrine, emergent channel bed wetland system (Cowardin 1979).

Water conveyed downslope within Moose Can Gully enters the City of Missoula stormwater conveyance system in the vicinity of the southeast intersection corner of 23rd Avenue and Garland Drive (City of Missoula 2022; **Appendix E**). The stormwater system outfalls on the east bank of the Bitterroot River. Therefore, Moose Can Gully, its channelbed and wetland fringe are likely under federal USACE jurisdiction. At this time, development of the Hillview Subdivision proposes no impact to likely federally-regulated aquatic features within Moose Can Gully. However, if impacts are proposed in the future a Section 404 Permit would likely be required. The USACE makes the final jurisdictional determination at the time of permitting. Other environmental permits (e.g., MT310) or certification (MTDEQ 401) may also be required. In general, perennial streams do require a MT310 Permit, however the Missoula County Conservation District should be consulted to determine whether any future proposed impacts would require this authorization.

REFERENCES

City of Missoula. 2022. Missoula Maps, Infrastructure & Utilities: <https://missoulamaps-cityofmissoula.hub.arcgis.com/pages/30d6486e778848b9b6879fdadea114ef>. Site reviewed December 20, 2022.

Cowardin, L., V. Carter, F. Golet, and E. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. FWS/OBS-79/31. USDI Fish and Wildlife Service. Washington, D.C.

Montana Natural Heritage Program (MNHP). 2021. Wetland and Riparian Mapping <http://mtnhp.org/mapviewer/?t=8>, site accessed August 2021.

Natural Resource Conservation Service (NRCS). 2021. Soil Survey, Hydric Rating by Map Unit. <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>, site accessed August 2021.

U.S. Army Corps of Engineers (USACE). 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0), ed. J.S. Wakely, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Army Corps of Engineers (USACE). 2018. National Wetland Plant List, Great Plains - 2018, U.S. Army Corps of Engineers, version 3.4. Engineer Research and Development Center Cold Regions Research and Engineering Laboratory, Hanover, NH.

APPENDIX A

EXHIBIT A: HILLVIEW SUBDIVISION AQUATIC RESOURCES DELINEATION MAP

Cushing
Terrell

cushterrell.com
800.757.8622

HILLVIEW WAY, MISSOULA, MT
HILLVIEW SUBDIVISION



NOT FOR CONSTRUCTION - PRELIMINARY DESIGN

© 2022 | ALL RIGHTS RESERVED
AQUATIC RESOURCE
DELINeATION MAP

12.12.2022
DRAWN BY | MACHNEY
CHECKED BY | MASCA
REVISIONS

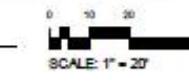


DELINeATION CONDUCTED BY
TERRAQUATIC, LLC ON 9/26/2021

WETLAND EXHIBIT
EX-A



1 AQUATIC RESOURCE EXHIBIT



SCALE: 1" = 20'

LEGEND AND ABBREVIATIONS
CHANNEL BED
WETLAND
NWW NON-WETLAND WATERWAY
DP DATA POINT

APPENDIX B

USACE WETLAND DETERMINATION DATA FORMS

SOIL

Sampling Point: DP-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils³:

Histosol (A1)	Sandy Gleyed Matrix (S4)	2 cm Muck (A10) (LRR A, E)
Histic Epipedon (A2)	Sandy Redox (S5)	Iron-Manganese Masses (F12) (LRR D)
Black Histic (A3)	Stripped Matrix (S6)	Red Parent Material (F21)
Hydrogen Sulfide (A4)	Loamy Mucky Mineral (F1) (except MLRA 1)	Very Shallow Dark Surface (F22)
1 cm Muck (A9) (LRR D, G)	Loamy Gleyed Matrix (F2)	X Other (Explain in Remarks)
Depleted Below Dark Surface (A11)	Depleted Matrix (F3)	
Thick Dark Surface (A12)	Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and
Sandy Mucky Mineral (S1)	Depleted Dark Surface (F7)	wetland hydrology must be present,
2.5 cm Mucky Peat or Peat (S2) (LRR G)	Redox Depressions (F8)	unless disturbed or problematic.

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Soil irregular, not disturbed, will classify as hydric given type of drainage and FAC to OBL vegetation dominance.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of 8)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)

- Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Stunted or Stressed Plants (D1) (LRR A)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water-Stained Leaves (B9) (MLRA 1, 2
4A, and 4B)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (LRR A)
- Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes No Depth (inches): _____
Water Table Present? Yes No Depth (inches): _____
Saturation Present? Yes No Depth (inches): _____

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Vegetation unquestionably comprised of dominant hydrophytic species within property boundary. Though currently raining, investigation conducted during dry fall conditions.

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region

See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Hillview Subdivision	City/County: Missoula/Missoula	Sampling Date: 9/28/21
Applicant/Owner: Pando Holdings	State: MT	Sampling Point: DP-1U
Investigator(s): L Bacon/TerraQuatic, LLC	Section, Township, Range: SESE Section 6, T12N, R 19W	
Landform (hillside, terrace, etc.): hillside	Local relief (concave, convex, none): convex	Slope (%): 1
Subregion (LRR): LRR E	Lat: 46.820110	Long: -114.028499
Soil Map Unit Name: 17: Bigarm gravelly loam, 4-15% slopes (0 hydric rating)		NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in Remarks.)		
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> significantly disturbed? Are "Normal Circumstances" present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Are Vegetation <input type="checkbox"/> , Soil <input type="checkbox"/> , or Hydrology <input type="checkbox"/> naturally problematic? (If needed, explain any answers in Remarks.)		

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: Upland along drainage is steep hillside.	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30ft radius)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:	
1. <u>Populus tremuloides</u>	20	Yes	FACU	Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)	
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: 3 (B)	
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)	
4. _____	_____	_____	_____		
	20	=Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft radius)				Prevalence Index worksheet:	
1. <u>Symphoricarpos albus</u>	5	Yes	FACU	Total % Cover of: 0	Multiply by: x 1 = 0
2. _____	_____	_____	_____	OBL species 0	
3. _____	_____	_____	_____	FACW species 0	x 2 = 0
4. _____	_____	_____	_____	FAC species 70	x 3 = 210
5. _____	_____	_____	_____	FACU species 25	x 4 = 100
	5	=Total Cover		UPL species 0	x 5 = 0
Herb Stratum (Plot size: 3ft radius)				Column Totals: 95 (A)	310 (B)
1. <u>Phleum pratense</u>	70	Yes	FAC	Prevalence Index = B/A = 3.26	
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
	70	=Total Cover			
Woody/Vine Stratum (Plot size: _____)				Hydrophytic Vegetation Indicators:	
1. _____	_____	_____	_____	1 - Rapid Test for Hydrophytic Vegetation	
2. _____	_____	_____	_____	2 - Dominance Test is >50%	
% Bare Ground in Herb Stratum _____				3 - Prevalence Index is ≤3.0 ¹	
				4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)	
				5 - Wetland Non-Vascular Plants ¹	
				Problematic Hydrophytic Vegetation ¹ (Explain)	
Remarks: Steep slope aspen community with nonnative grasses.				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

SOIL

Sampling Point: DP-1U

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required)

Surface Water (A1)	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
High Water Table (A2)		Drainage Patterns (B10)
Saturation (A3)	Salt Crust (B11)	Dry-Season Water Table (C2)
Water Marks (B1)	Aquatic Invertebrates (B13)	Saturation Visible on Aerial Imagery (C9)
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Geomorphic Position (D2)
Drift Deposits (B3)	Oxidized Rhizospheres on Living Roots (C3)	Shallow Aquitard (D3)
Algal Mat or Crust (B4)	Presence of Reduced Iron (C4)	FAC-Neutral Test (D5)
Iron Deposits (B5)	Recent Iron Reduction in Tilled Soils (C6)	Raised Ant Mounds (D6) (LRR A)
Surface Soil Cracks (B6)	Stunted or Stressed Plants (D1) (LRR A)	Frost-Heave Hummocks (D7)
Inundation Visible on Aerial Imagery (B7)	Other (Explain in Remarks)	
Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present? Yes No Depth (inches): _____
Water Table Present? Yes No Depth (inches): _____
Saturation Present? Yes No Depth (inches): _____ Wetland Hydrology Present? Yes No
(includes capillary fringe)

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available.

Remarks:

Upland and wetland boundary are well-defined

APPENDIX C

DELINEATION AND GENERAL SITE PHOTOGRAPHS



Photo 1. General proposed subdivision vegetation community; view northeast.

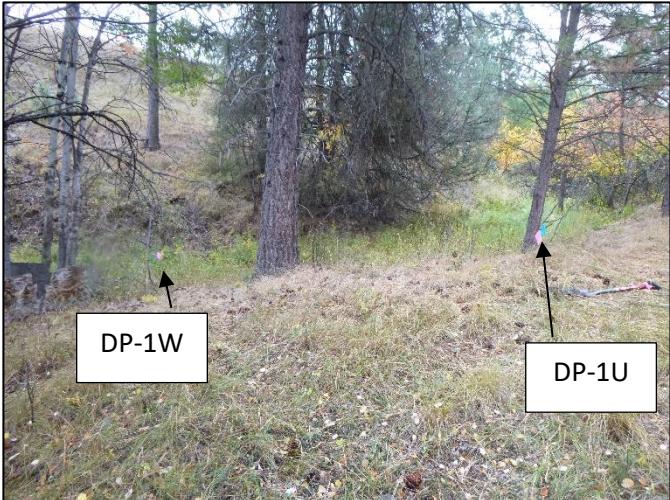


Photo 3. Wetland-1 (green vegetation in gully center) along perennial channel bed (NWW-1) within Moose Can Gully; DP-1W (wetland data point: left blue/pink flags) and DP-1U (upland); view southwest.



Photo 2. Bare spot in west center of property where wildlife likely congregate.

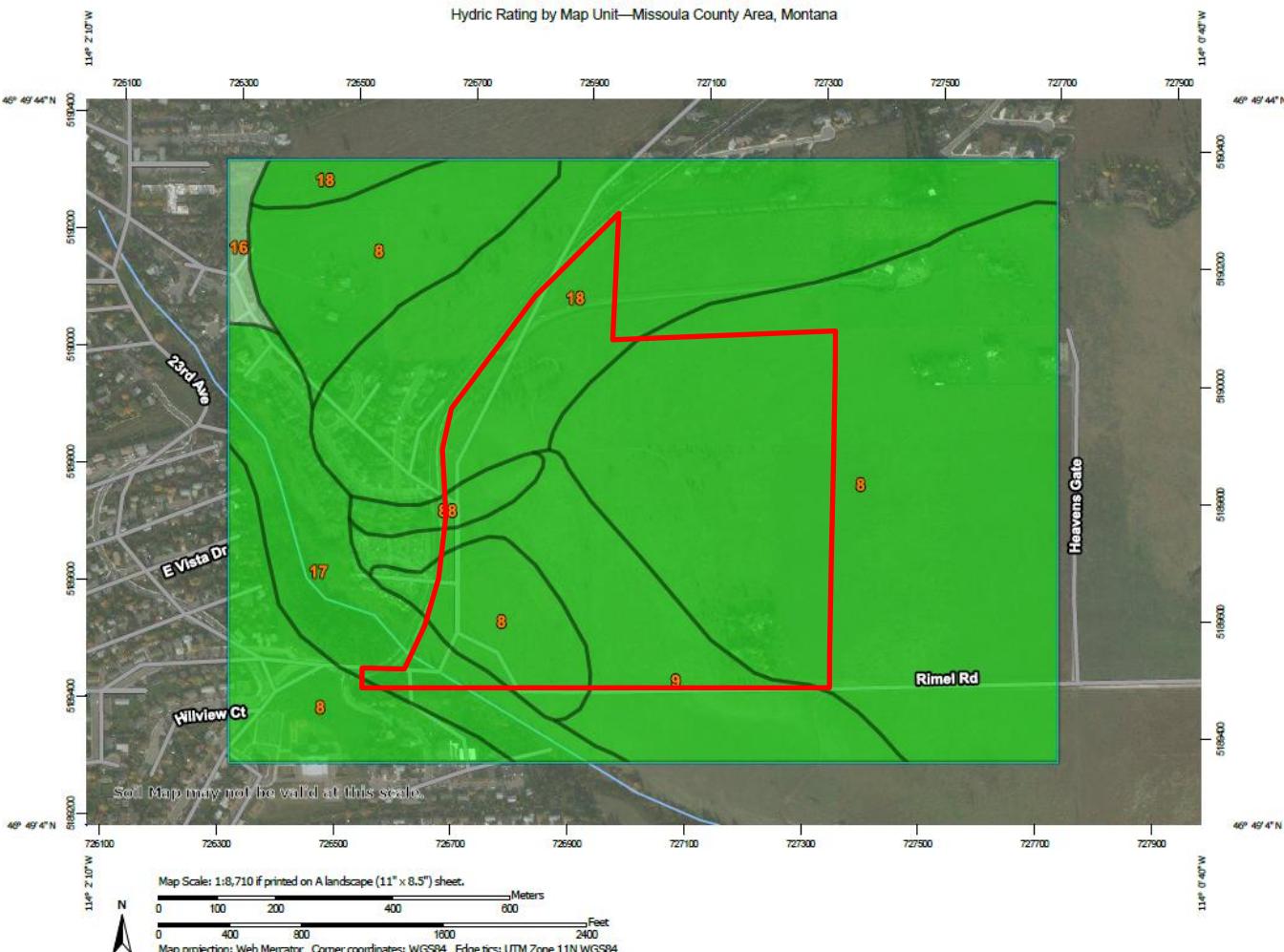


Photo 4. General photo of Moose Can Gully vegetation within wetland fringe and upland slope; view west.

APPENDIX D

NRCS SOIL REPORT AND MNHP WETLAND MAP

Hydric Rating by Map Unit—Missoula County Area, Montana



NRCS Soil Map (2021); red polygon is approximate site boundary.

MAP LEGEND

Area of Interest (AOI)	Transportation
 Area of Interest (AOI)	+++ Rails
Soils	 Interstate Highways
Soil Rating Polygons	 US Routes
 Hydric (100%)	 Major Roads
 Hydric (66 to 99%)	 Local Roads
 Hydric (33 to 65%)	
 Hydric (1 to 32%)	
 Not Hydric (0%)	 Aerial Photography
 Not rated or not available	
Soil Rating Lines	
 Hydric (100%)	
 Hydric (66 to 99%)	
 Hydric (33 to 65%)	
 Hydric (1 to 32%)	
 Not Hydric (0%)	
 Not rated or not available	
Soil Rating Points	
 Hydric (100%)	
 Hydric (66 to 99%)	
 Hydric (33 to 65%)	
 Hydric (1 to 32%)	
 Not Hydric (0%)	
 Not rated or not available	
Water Features	
 Streams and Canals	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Missoula County Area, Montana
Survey Area Data: Version 18, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 6, 2014—Nov 2, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



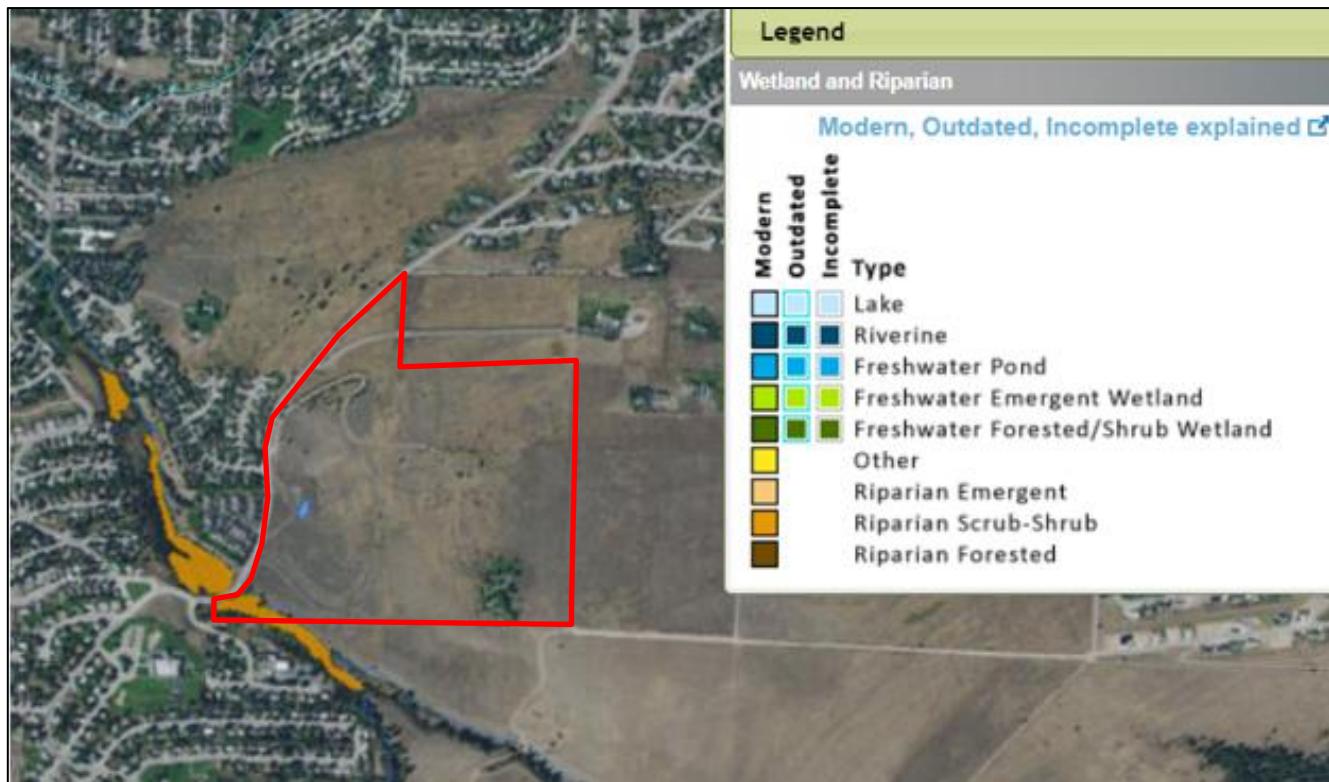
Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

8/16/2021
Page 2 of 5

Hydric Rating by Map Unit

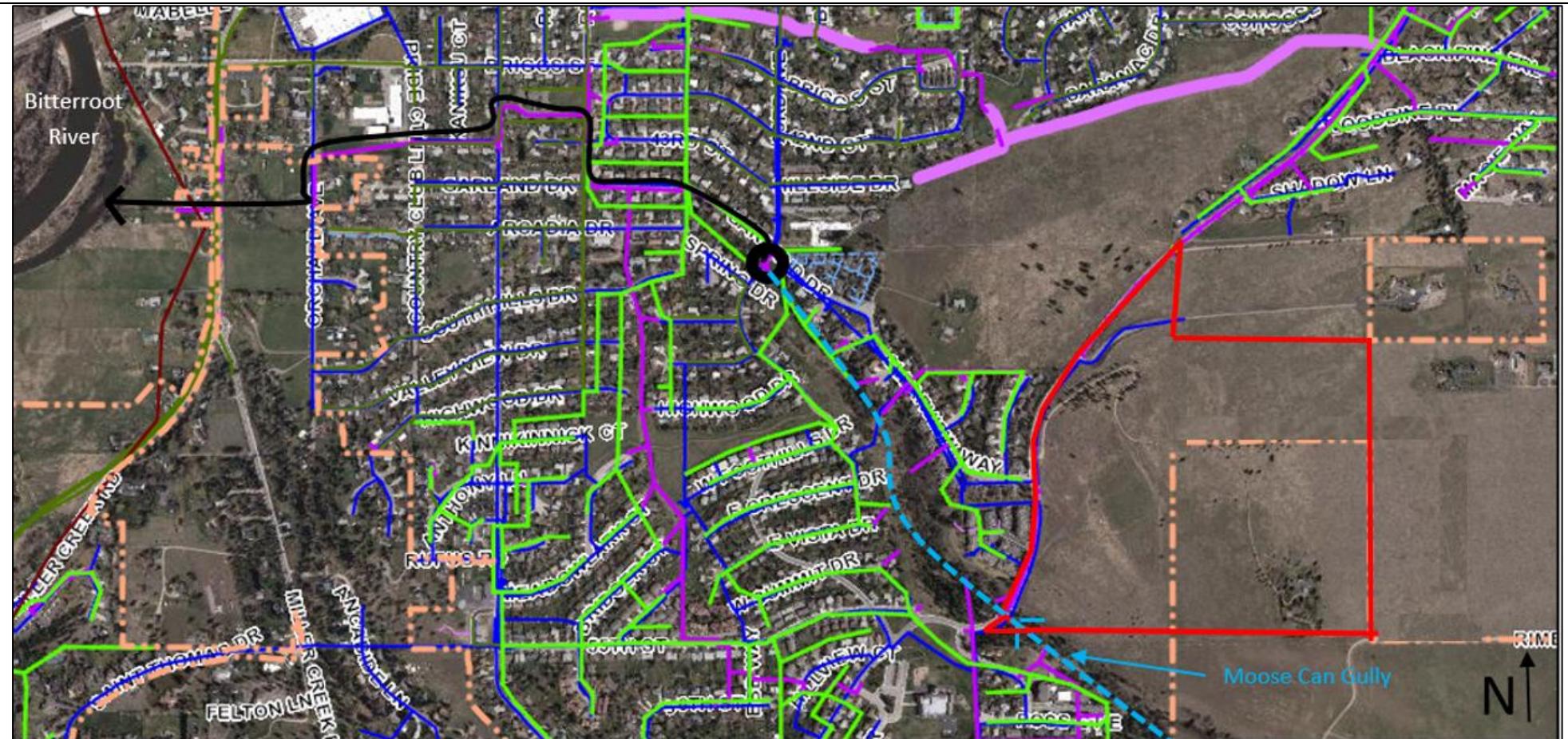
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Minesinger-Bigarm complex, 4 to 15 percent slopes	0	201.6	55.6%
9	Bigarm-Minesinger complex, 15 to 30 percent slopes	0	37.0	10.2%
16	Bigarm gravelly loam, 0 to 4 percent slopes	2	3.3	0.9%
17	Bigarm gravelly loam, 4 to 15 percent slopes	0	31.3	8.6%
18	Bigarm gravelly loam, 15 to 30 percent slopes	0	84.4	23.3%
88	Pits, gravel	0	4.9	1.4%
Totals for Area of Interest			362.4	100.0%



Montana Natural Heritage Program Wetland Inventory Map (MNHP 2021), red polygon illustrates approximate site boundary.

APPENDIX E

MOOSE CAN GULLY PERENNIAL STREAM/WETLAND FRINGE STORMWATER CONNECTION TO BITTERROOT RIVER



Stormwater connection of Moose Can Gully to the Bitterroot River (City of Missoula 2022): black line overlays City of Missoula pink line that indicates stormwater path and inflow on east bank of Bitterroot River; black circle indicates where Moose Can Gully runoff enters city stormwater system; blue dashed line is flow direction of perennial stream within Moose Can Gully; and, red polygon is approximate proposed Hillview Subdivision boundary.