Site Evaluation & Design

BURNT FORK ESTATES

For

BURNT FORK ENTERPRISES

Section 26, Township 09N, Range 20W, CS 495033-TR Tract 1
Less Creekside Meadows-Phase 1 Annex #502166 & 569710
Ravalli County, Montana

Prepared by:

Professional Consultants Inc.
Unmatched Experience. Uncompromising Standards.

3115 S Russell St
Missoula, MT 59806
(406) 728-1880

August 25, 2020

PCI Project No. 8952-19

TABLE OF CONTENTS

1 INTRODUCTION

This report proposes a new 137-lot subdivision of the lot legally described as CS #495033-TR Tract 1 Less Creekside Meadows-Phase 1 Annex #502166 & 569710. This is a 57.68-acre agricultural tract located in S26, T09N, R20W, Geocode: 13-1764-26-4-01-12-0000. There are currently no structures on the land. A water main runs within an easement through the property and three sewer main stubs extend onto the lot.

The lot is proposed to be divided into 121 residential lots and 16 commercial lots with three common areas and five accesses to the lots. Residential lots consist of 78 single-family units and 43 multi-family units. Multi-family lots are planned for sixteen 4-plexes, twenty-five duplexes, one 7-plex, and one 10-plex resulting in 131 proposed living units within the multi-family lots. Total proposed number of living units for the subdivision is 209 units. Calculations will assume 220 living units to accommodate any potential design changes to multi-family lots. Commercial lots will be office space with assumed floorplan areas of 3,000 ft^2. Assumed employee/customer averages of 10 and 40 respectively will be used for flow calculations. All lots will be serviced by municipal water and sewer via water main extensions off the existing water main and sewer main extensions that will gravity-drain sewage north to the existing main stubs. Trench plugs will be installed with main extensions to prevent groundwater flow potential along new main lines.

Lots are respectively assumed to have an average impervious area of 3,000 ft^2, 6,000 ft^2, and 80% coverage for single-family lots, multi-family lots, and commercial lots. Remaining area will be landscaped to mitigate additional runoff. Stormwater runoff generated by proposed impervious structures will be conveyed through an underground pipe system that will connect to existing infrastructure in the northern subdivision of Creekside Meadows. Stormwater will enter this system through curb inlets and outfalls to Swamp Creek. Post-development runoff will not exceed pre-development rates during the 2yr-24hr storm event as additional runoff will be controlled through landscape infiltration and retention ponds. Two sources of offsite flows will be allowed to pass through as it has done historically.

2 PHYSICAL CONDITIONS

2.1 VICINITY MAP

A USGS topographic map displaying the project location in Stevensville, Ravalli County, Montana. The property lies at the northwest corner of Middle Burnt Fork Road and Logan Road, about 1.25 miles east of Main Street (HWY 269) in Stevensville. The map shows the ground slope of the property and surrounding area. The Vicinity Map is included in Appendix A.

2.2 SOILS SURVEY MAP

A Custom Soil Resource Report has been generated for the property by the National Cooperative Soil Survey with the USDA. A map of the surveyed area is included with the report. The Soil Map and Resource Report are included in Appendix B.

2.3 TOPOGRAPHIC MAP

A topographic site map is provided, showing the detailed ground slope of the project area. It also shows the water supply and wastewater facilities, existing and proposed, and other local features.

2.4 PRELIMINARY PLAT/CERTIFICATE OF SURVEY

A preliminary plat with full legal property description is provided, displaying areas subject to flood hazard, natural and man-made water systems, and existing and proposed utilities.

3 WATER SUPPLY

3.1 EXISTING SYSTEMS

There is an existing 8" water main on site that is operated by the town of Stevensville, Montana. Approximately 2,160 feet of this main runs through the property.

3.2 PROPOSED SYSTEMS

Water is proposed to be supplied to the proposed lots via water main extensions and service stubs. Approximately 5,500 linear feet of water main will be installed throughout the seven phases of this project. Each phase is planned for installation only of water main necessary to serve the proposed lots in that phase.

Estimated peak water demand for the subdivision is calculated as a summation of single-family, multi-family, and commercial water demand. The International Association of Plumbing and Mechanical Officials (IAPMO) Water Demand Calculator for Estimating Peak Water Demand for Indoor Residential Water Use version 1.4, March 2019 was used to calculate peak demand based on an average fixture count for both single-family and multi-family lots. Seventy-eight single-family units are based on an average fixture count that includes 2.5 bathrooms with traditional kitchen and laundry facilities. One hundred forty-two multi-family units are based on an assumed average of 1.5 bathrooms, also with traditional kitchen and laundry facilities.

Commercial daily water demand is calculated from MDEQ Circular 4 estimates for office space based on expected number of employees and customers. Expected averages of 10 employees (13 gpd/unit) and 40 customers (3 gpd/unit) per commercial unit are used for this calculation. This results in a total daily demand of 250 gpd per commercial unit, utilized during an 8-hour workday. A peaking factor of 4.0 is used to determine the peak hour demand for the commercial lots resulting in an estimated peak demand of 2.08 gpm per commercial unit or 33.3 gpm for the commercial district.

Irrigation demand for the subdivision is based on proposed landscape acreage (28.2 ac) and an application requirement of 1 in/week over 2-3 days. With irrigation days spread out over the week (7 days) and a 6-hour watering window, estimated irrigation demand is about 300 gpm.

This results in an estimated peak water demand of about 600 gpm for the subdivision. Peak domestic, irrigation, and commercial demand are not likely to occur at the same time, so a 600 gpm peak demand is a conservative estimate. Table 1 summarizes the water demand throughout the subdivision. The existing 8" water main is sufficient to supply the additional demand that this subdivision will place on the system. The existing booster station, with a production of 300 gpm, was approved to serve 121 single family homes at an average peak rate of 2.48 gpm/unit. Estimates for the proposed subdivision of 220 living units and 16 commercial units utilize a demand average of 2.54 gpm/unit. The proposed subdivision can connect an additional 60 units to the water supply before an upgrade to the system will be required. See Appendix C for water use estimate spreadsheets.

Water Use	Number of Units	Peak Demand
Single-Family Homes	78 units	127.5 gpm
Multi-Family Homes	142 units	150.2 gpm
Irrigation	28.2 acres	300 gpm
Commercial	16 units (10 employees, 40 customers each)	33.3 gpm
Total	137 Lot Subdivision	600 gpm

Table 1

Service stubs are proposed for each lot and will include curb stops and all other necessary appurtenances.

4 WASTEWATER TREATMENT

The subdivision is proposed to be serviced by municipal sewer operated by the Town of Stevensville by way of sewer main extensions.

4.1 FLOODPLAIN

A FEMA generated map of local floodplain area is provided in Appendix D. It displays Zone X Area of Minimal Flood Hazard for the proposed project site.

4.2 EXISTING SOIL INFORMATION

USDA WebSoil Survey describes the soils in the area primarily as Fairway-Grayhorse Complex and Grayhorse-McCalla Complex. Typical soil profile is composed of a silt loam top layer, with loam particulates showing an increasingly higher sand and gravel content and the layers get deeper. It is described as a somewhat poorly drained soil and classified in hydrologic soil group C. The water table is estimated to be between 12” and 39” with greater than an 80” depth to a restrictive layer. See attached report, Appendix B.

4.3 SOIL PROFILE DESCRIPTIONS

PCI dug 8 soil profiles across the property in March of 2020. In general, sand, gravel, and cobbles were discovered below 48”. This is consistent with the WebSoil Survey. Half of the profiles revealed clay in the B horizon down to 55”. Groundwater was noted as high as 60”. Results are included in Appendix E.

4.4 GROUNDWATER MONITORING

Groundwater pipes have been installed and will be monitored during the high groundwater season of 2020.

4.5 PROPOSED SYSTEMS

There are three existing sewer main stubs that extend onto the property. The proposed lots in the subdivision will receive sewer service through extension of these mains. Proposed mains will be 8” in diameter and will gravity sewage to existing mains with a minimum of a 0.4% slope. Lines will be installed as needed per the phasing layout. Sewer service stubs are proposed for every lot. Sewer mains and service lines will be installed with all necessary appurtenances.

5 SOLID WASTE

Solid waste disposal will be provided by Bitterroot Disposal and deposited at the Victor Transfer Station. There are no plans for on-site waste disposal.

6 GRADING & DRAINAGE

6.1 SITE INFORMATION

Slopes on the site are consistent (~1% - 2%) with agricultural vegetation of short and tall grasses. There are a few distinct channels, implying that general hydrologic patterns include sheet, shallow, and channel flows. There is a flow path on the southern end of the property (see Common Area of the Commercial Phase 7) originating offsite that must pass through the property. There is also a culvert that passes under Logan Road towards the northern end of the property. This flow must also be allowed to pass through as it has historically. Natural grades on the property fall approximately 1.8% towards W18.5°N. Surrounding area is residential and agricultural land.

Proposed grading will follow the natural grade of the property, directing flows to the north and west and controlling runoff to predevelopment rates as required by DEQ Circular 8. Additional runoff will primarily be controlled by retention and detention areas to be located in the proposed common areas. Stormwater will be conveyed to a storm drain collection system that will transport stormwater through the existing infrastructure to the north and ultimately discharge to Swamp Creek.

Approximate total proposed roadway area is 300,000 ft^2 with about 55,000 ft^2 of sidewalk. Proposed homes are estimated to create 3,000 ft^2 of impervious area for single family lots and an average of 6,000 ft^2 for multi-family lots. Commercial lots are assumed for 80% impervious buildout. Remaining areas on the lots will be landscaped to mitigate increased runoff and a landscaped boulevard adjacent to the roadway will facilitate additional infiltration.

There will be six defined basins in the proposed subdivision. The commercial area is defined as its own basin. Each basin will control and direct stormwater through curb and gutter inlets to the underground storm drain facilities. This pipe system will connect to the existing infrastructure to the north and ultimately discharge to Swamp Creek. Stormwater will primarily exit the subdivision in three locations on the north end of the property, designated as Discharges 1, 2, and 3. Some stormwater will be directed through proposed retention and detention ponds to control discharge rates. Discharge from the commercial area will pass through detention ponds on the south end of the property and exist to the west through an existing drainage.

6.2 INITIAL STORM WATER FACILITY

Proposed facilities for the entire subdivision make up about 1,075,000 ft^2 of impervious area. Initial Stormwater Facility must thusly be sized:

$$V[ft^3] = 0.5" \text{ X } 1{,}075{,}000\ ft^2 / 12 = \mathbf{44{,}860\ ft^3}$$

Runoff calculations are made using the modified rational method and a generated IDF curve provided by DEQ for Stevensville, Montana. Time of Concentration (ToC) pathways were analyzed for each basin. The most conservative time of concentration was 13 minutes for the commercial basin. This ToC was assumed for the subdivision as a whole. See attached

spreadsheet, Appendix F, for more details. The change in post-development volume runoff for the 2yr-24hr storm, per DEQ8 Section 3.3A, is about **62,566 ft^3**. This is larger than the initial stormwater facility, so a facility that can retain 62,566 ft^3 of water will satisfy both requirements. This volume can be distributed among the six proposed basins.

6.3 STORM WATER FACILITIES

Each basin will generate a separate runoff that will culminate at four discharge points. The commercial phase (Basin 1) will have its own outfall to the south end of the western border of the property, while the remaining residential basins (2-6) will outfall to the north end of the property to three existing underground storm drains. From east to west, northerly discharges are labeled as Discharge 1 (18"), Discharge 2 (12") and Discharge 3 (18"). The table below summarizes important features for each basin and 24-hour storm results.

Basin	**Area (A [ft^2])**			**2yr-24hr Storm**		**100yr-24hr Storm**	
	A_{IMP}	A_{LS}	A_{UNI}	V [ft^3]	Q [cfs]	V [ft^3]	Q [cfs]
Predev.	0	0	2,430,000	48,139	4.7	147,248	13.3
1 (16 Comm.)	280,000	65,000	0	25,578	6.2	78,240	17.4
2 (34 lots)	236,520	335,858	0	24,440	2.5	74,758	6.8
3 (9 lots)	71,880	84,500	0	7,253	0.7	22,186	2.1
4 (6 lots)	27,600	55,600	0	3,015	0.3	9,221	0.9
5 (20 lots)	124,080	174,306	0	12,803	1.3	39,161	3.6
6 (52 lots)	337,200	511,784	0	35,170	3.5	107,579	9.9
Subdivision (137 lots)	1,076,628	1,227,261	123,274	110,704	26.6	338,625	75.2

Table 2

Basins 3, 4, and 6 are planned to discharge through to the existing stormwater drainage infrastructure without detention. The remaining basins will be controlled in order to maintain predevelopment runoff rates during the 2yr-24hr storm. Additional runoff will be controlled through two stormwater facilities.

One proposed retention pond will be located near the commercial area, Basin 1, and a retention pond is proposed for the common area at the north end of the property to control runoff from Basins 2 and 5. Basin 3 will discharge undetained through Discharge 1, Basin 4 will discharge undetained through Discharge 2, and Basins 2, 5, and 6 will discharge through Discharge 3, with Basins 2 and 5 detained before release. The commercial Basin 1 will be detained and discharged at the southwestern end of the property.

2yr-24hr Storm

Per DEQ 8 Section 3.3(A), post-development runoff to an adjoining property must not exceed the predevelopment rate during the 2yr-24hr storm. Proposed retention ponds are designed to retain all runoff generated in Basins 1, 2, and 5 during this event. This allows runoff generated in the remaining basins to exit the property at post-development rates without exceeding pre-development flows for the subdivision. This requires a minimum retention facility of 40,000 ft^3 for Basins 2 and 5, and 26,000 ft^3 for Basin 1. Proposed facilities exceed these minimums and

satisfy the requirements for the initial stormwater facility. This ensures that pre-development peak flows and volumes are not exceeded post-development.

Table 3 summarizes basin control structures and discharge flows during the 2yr-24hr storm.

2YR-24HR STORM FLOW SUMMARY				
Basin	**Discharge Location**	**Proposed Pond Volume**	**Offsite Flows**	**Max. Onsite Discharge**
Predevelopment	N/A	-	3 cfs	4.7 cfs
1	Comm. Discharge	29,000 ft^3	2 cfs	0 cfs
2, 5	Discharge 3	A: 8,300 ft^3 B: 38,000 ft^3	-	0 cfs
3	Discharge 1	N/A	1 cfs	0.7 cfs
4	Discharge 2	N/A	-	0.3 cfs
6	Discharge 3	N/A	-	3.5 cfs
Subdivision Postdevelopment	4 discharges	66,000 ft^3	3 cfs	4.5 cfs

Table 3

10yr-24hr Storm

Per DEQ8 Section 3.3(B), roadways must not be overtopped during the 10yr-24hr storm. Proposed retention ponds will be equipped with overflow structures that will release stormwater before ponds can be overtopped. This provides a controlled release that will allow water to flow through the storm drain system and discharge to Swamp Creek from the residential areas. Commercial flows will similarly have a controlled release to the existing stormwater ditch. Existing and proposed stormwater facilities are capable of handling expected runoff during the 10yr storm and roadways will not be overtopped. Table 4 summarizes runoff flows for the 10yr-24hr storm.

10YR-24HR STORM FLOW SUMMARY					
Basin	**Discharge Location**	**Proposed Pond Volume**	**Offsite Flows**	**Control Structure**	**Max. Onsite Discharge**
Predevelopment	N/A	-	5.2 cfs	-	8.2 cfs
1	Comm. Discharge	29,000 ft^3	3.2 cfs	24” Storm Pipe	10.7 cfs
2, 5	Discharge 3	A: 8,300 ft^3 B: 38,000 ft^3	-	18” Storm Pipe	6.5 cfs
3	Discharge 1	N/A	2 cfs	18” Storm Pipe	1.3 cfs
4	Discharge 2	N/A	-	12” Storm Pipe	0.6 cfs
6	Discharge 3	N/A	-	18” Storm Pipe	6.2 cfs
Subdivision Post-development	4 discharges	66,000 ft^3	5.2 cfs	-	19.1 cfs

Table 4

100yr-24hr Storm

Per DEQ8 Section 3.3(C), drainfields and homes must not become innundated during the 100yr-24hr storm. Similar to the 10yr storm event, proposed retention ponds are expected to overtop the overflow structures and flow to the underground storm drains. At peak flow, storm drains may reach capacity and begin flooding the roads. Roadways on site have a minimum capacity of 50,000 ft^3 of water storage to allow storm pipes to resume flow. All structures will be built with grading away from foundations and towards the roadways. There are no proposed drainfields within the subdivision. Homes will not become inundated during the 100yr storm.

6.4 OFFSITE RUNOFF

There are two flows that originate offsite that pass through the proposed subdivision. The flows entering from the east will be routed directly to the storm drain infrastructure and allowed to discharge at Swamp Creek. Contributories to this flow are a 12" culvert that pass under Logan Lane and ½ of Logan Lane south to the intersection with Middle Burnt Fork Road (~2,000 ft). Max discharge from a 12" culvert is 1.5 cfs and expected runoff from Logan Lane during the 100yr-24hr storm is another 1.5 cfs. Total pass-through flow from the east is 3 cfs during the 100yr storm. Proposed 18" storm drain is capable of passing these flows along with the flows generated on site. See Tables 3 and 4.

The flows entering from the south will pass through the proposed common area and retention ponds but allowed to pass through the site as it has done historically. These flows are currently fed by a 16" culvert capable of passing up to 3.2 cfs. These flows will be allowed to pass through the Basin 1 stormwater ponds, discharging to the same historical outflow.

7 CONCLUSION

Water and sewer requirements for proposed developments will be fulfilled via water and sewer main extensions operated by the Town of Stevensville. Trench plugs will be installed around mains to prevent flow of groundwater near new installations. Existing and proposed water mains are adequate to meet expected demand. Proposed sewer mains meet sizing and grade requirements and are adequate for proposed service.

Additional stormwater runoff generated by proposed impervious surfaces will be controlled through pond retention and stormwater drains. Proposed ponds are sufficient to mitigate additional runoff generated on site. Offsite flows will be allowed to enter the storm drain infrastructure or directed and controlled through proposed stormwater ponds as needed. Historical paths will not be altered. Post-development runoff will remain the same as pre-development flows during the 2-year 24-hour storm event, roads will not be overtopped during the 10-year event, and homes will not be inundated during the 100-year event.

Prepared by:
Professional Consultants, Inc.

Karl Treadwell

Checked by:

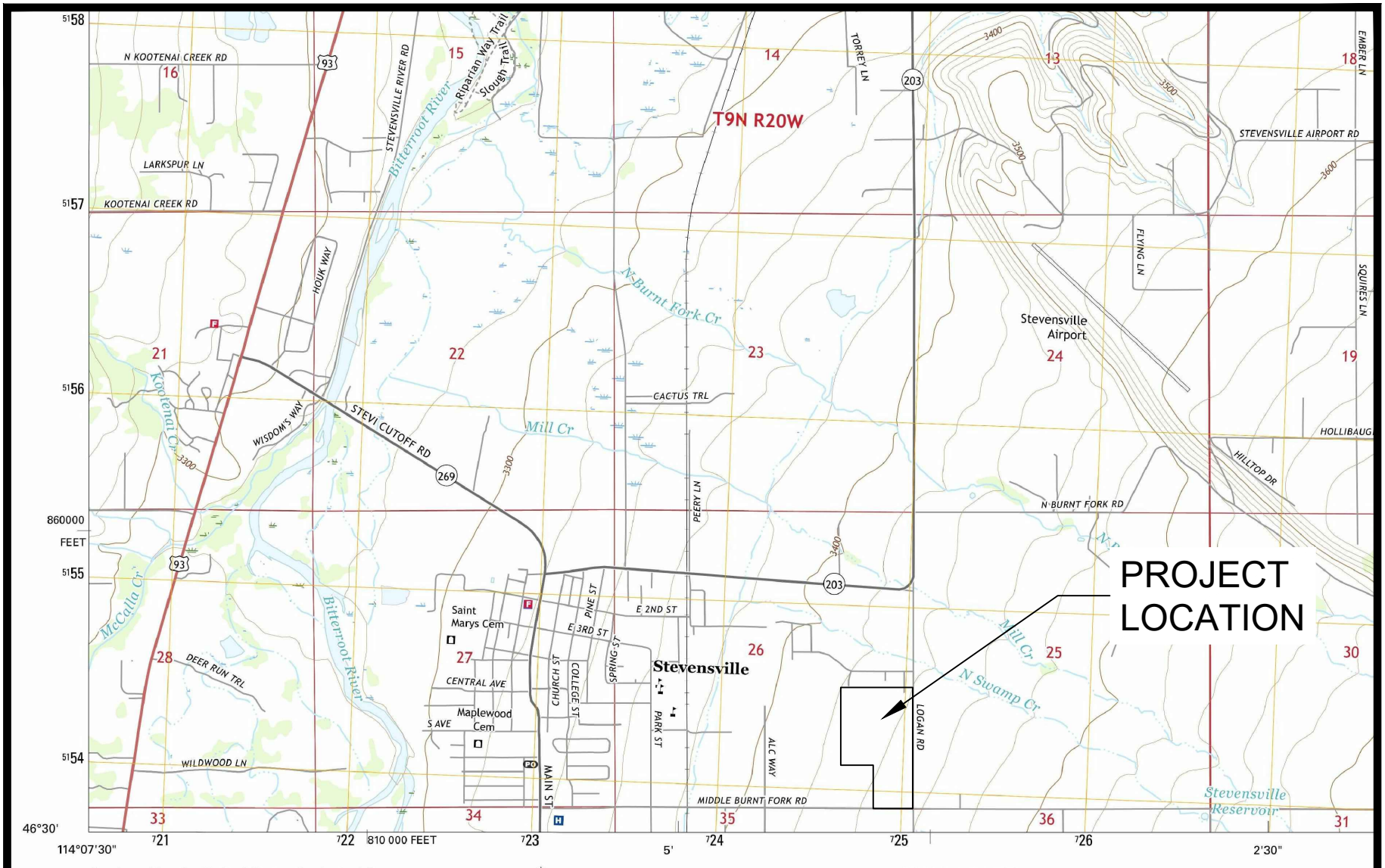
Andy Mefford, PE, CFM

Date: _____

8 APPENDICES

APPENDIX A:

VICINITY MAP



PCI

BURNT FORK ESTATES

RAVALLI COUNTY S26 T09N R20W

VICINITY MAP

APPENDIX B:

CUSTOM SOIL RESOURCE REPORT

United States Department of Agriculture

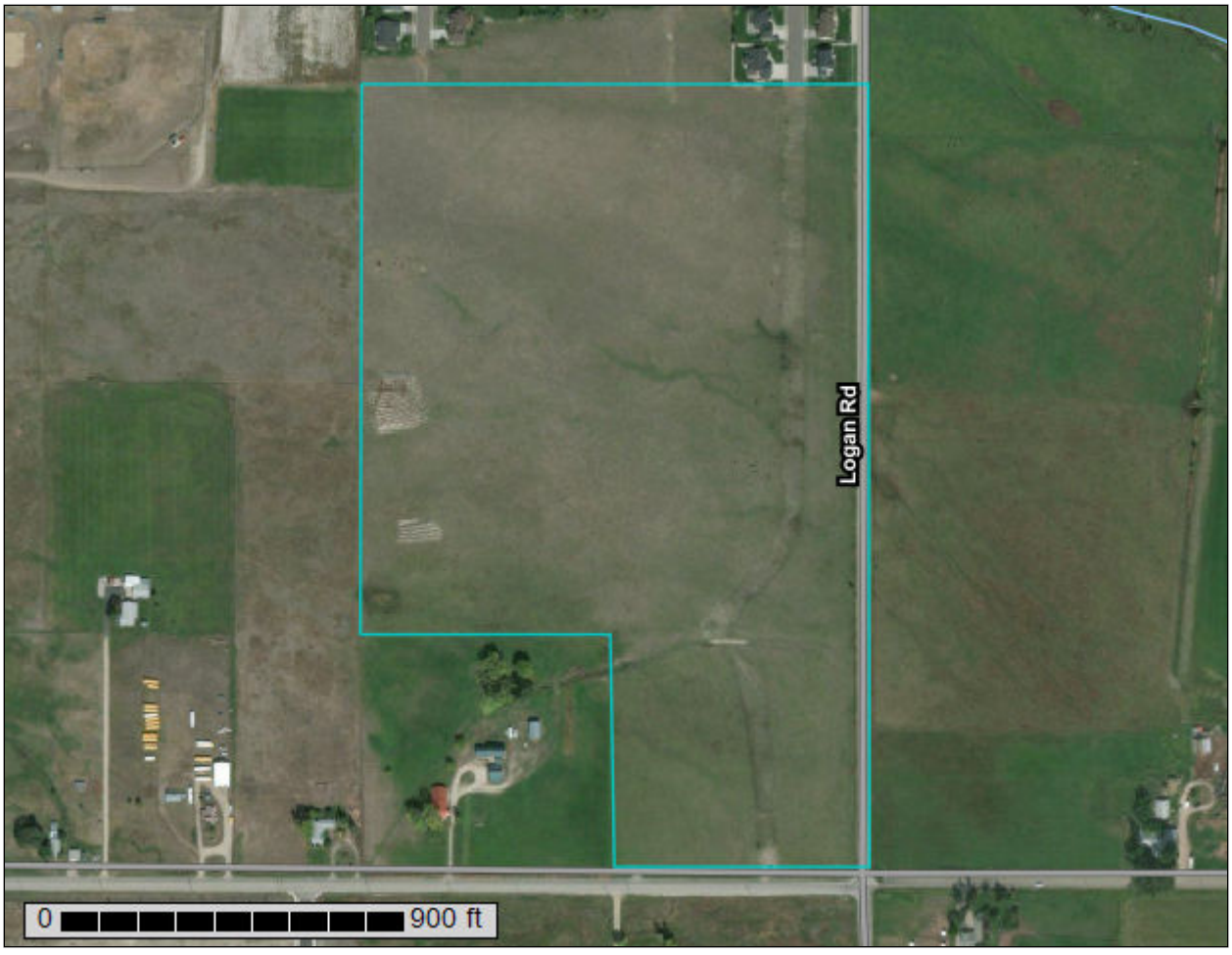
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Bitterroot Valley Area, Montana

BURNT FORK ESTATES



April 13, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

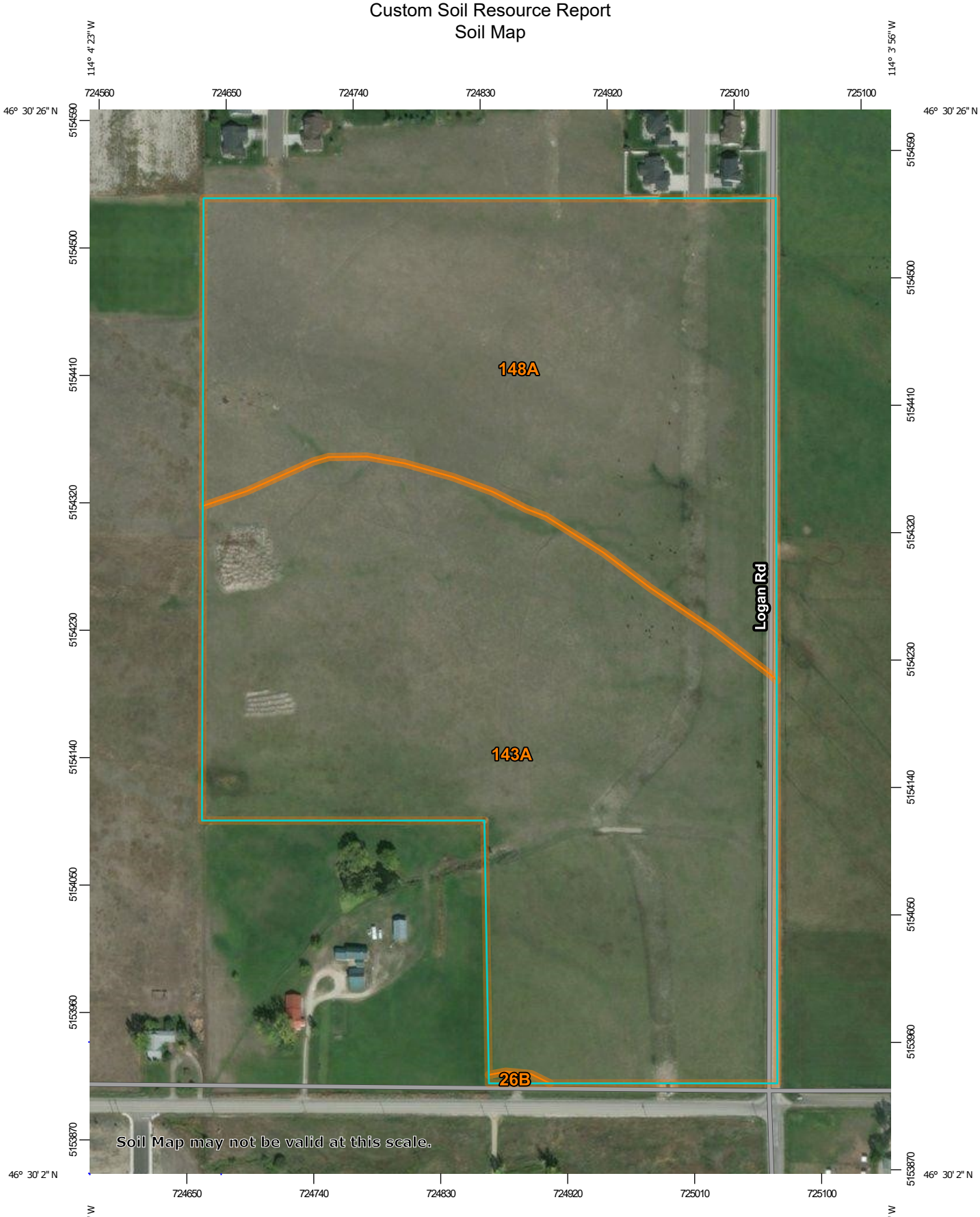
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,660 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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: Bitterroot Valley Area, Montana
Survey Area Data: Version 17, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 30, 2012—Nov 10, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
26B	Grayhorse silt loam, 0 to 4 percent slopes	0.1	0.1%
143A	Fairway-Grayhorse complex, 0 to 2 percent slopes	30.5	56.6%
148A	Grayhorse-McCalla complex, 0 to 2 percent slopes	23.3	43.3%
Totals for Area of Interest		**53.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bitterroot Valley Area, Montana

26B—Grayhorse silt loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: p83f
Elevation: 3,250 to 4,210 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Grayhorse and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Grayhorse

Setting

Landform: Drainageways on inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A1 - 0 to 12 inches: silt loam
A2 - 12 to 18 inches: loam
A3 - 18 to 29 inches: gravelly loam
C1 - 29 to 34 inches: very cobbly fine sandy loam
2C2 - 34 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Ecological site: Subirrigated (Sb) LRU 44A-Y (R044AY150MT), Subirrigated Grassland (R044AP806MT)
Hydric soil rating: No

Minor Components

Capiron

Percent of map unit: 10 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Subirrigated (Sb) LRU 44A-Y (R044AY150MT)
Hydric soil rating: No

Fairway

Percent of map unit: 5 percent
Landform: Drainageways on inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Subirrigated (Sb) LRU 44A-Y (R044AY150MT)
Hydric soil rating: No

143A—Fairway-Grayhorse complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: tfbs
Elevation: 3,280 to 4,560 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Fairway and similar soils: 75 percent
Grayhorse and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fairway

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 8 inches: silt loam
Bw - 8 to 13 inches: loam
Bk - 13 to 21 inches: loam
C1 - 21 to 40 inches: loam
2C2 - 40 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: Subirrigated (Sb) LRU 44A-Y (R044AY150MT), Subirrigated Grassland (R044AP806MT)
Hydric soil rating: No

Description of Grayhorse

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A1 - 0 to 12 inches: silt loam
A2 - 12 to 18 inches: loam
A3 - 18 to 29 inches: gravelly loam
C1 - 29 to 34 inches: very cobbly fine sandy loam
2C2 - 34 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 4w

Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Ecological site: Subirrigated (Sb) LRU 44A-Y (R044AY150MT), Subirrigated Grassland (R044AP806MT)
Hydric soil rating: No

Minor Components

Mccalla
Percent of map unit: 10 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Meadow (M) LRU 44A-Y (R044AY082MT)
Hydric soil rating: Yes

148A—Grayhorse-McCalla complex, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: p8b0
Elevation: 3,280 to 4,940 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Farmland of local importance

Map Unit Composition
Grayhorse and similar soils: 70 percent
Mccalla and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Grayhorse

Setting
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile
A1 - 0 to 12 inches: silt loam
A2 - 12 to 18 inches: loam
A3 - 18 to 29 inches: gravelly loam
C1 - 29 to 34 inches: very cobbly fine sandy loam
2C2 - 34 to 60 inches: extremely gravelly loamy sand

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Ecological site: Subirrigated (Sb) LRU 44A-Y (R044AY150MT), Subirrigated Grassland (R044AP806MT)
Hydric soil rating: No

Description of Mccalla

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: cobbly loam
Bw - 14 to 22 inches: very cobbly loam
C1 - 22 to 32 inches: very cobbly sandy loam
C2 - 32 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: Meadow (M) LRU 44A-Y (R044AY082MT), Subirrigated Grassland (R044AP806MT)
Hydric soil rating: Yes

Minor Components

Blossberg

Percent of map unit: 10 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Meadow (M) LRU 44A-Y (R044AY082MT)
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX C:

WATER PEAK DEMAND CALCULATION

Version 1.4 (March 2019)

↓ Select Units ↓

Thursday, August 20, 2020 12:52 PM

PROJECT NAME : BURNT FORK ESTATES - 78 SF HOMES

GPM | LPM | LPS

FIXTURE GROUPS		[A] FIXTURE	[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1	Bathtub (no Shower)	0	1.0	5.5	5.5
	2	Bidet	0	1.0	2.0	2.0
	3	Combination Bath/Shower	156	5.5	5.5	5.5
	4	Faucet, Lavatory	195	2.0	1.5	1.5
	5	Shower, per head (no Bathtub)	39	4.5	2.0	2.0
	6	Water Closet, 1.28 GPF Gravity Tank	195	1.0	3.0	3.0
Kitchen Fixtures	7	Dishwasher	78	0.5	1.3	1.3
	8	Faucet, Kitchen Sink	78	2.0	2.2	2.2
Laundry Room Fixtures	9	Clothes Washer	78	5.5	3.5	3.5
	10	Faucet, Laundry	78	2.0	2.0	2.0
Bar/Prep Fixtures	11	Faucet, Bar Sink	0	2.0	1.5	1.5
Other Fixtures	12	Fixture 1	0	0.0	0.0	6.0
	13	Fixture 2	0	0.0	0.0	6.0
	14	Fixture 3	0	0.0	0.0	6.0

Total Number of Fixtures 897

99th PERCENTILE DEMAND FLOW = 127.5 GPM

RESET

RUN WATER DEMAND CALCULATOR

Version 1.4 (March 2019)

↓ Select Units ↓

Thursday, August 20, 2020 12:56 PM

PROJECT NAME : BURNT FORK ESTATES - 142 MF UNITS

GPM | LPM | LPS

FIXTURE GROUPS		[A] FIXTURE	[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1	Bathtub (no Shower)	0	1.0	5.5	5.5
	2	Bidet	0	1.0	2.0	2.0
	3	Combination Bath/Shower	142	5.5	5.5	5.5
	4	Faucet, Lavatory	213	2.0	1.5	1.5
	5	Shower, per head (no Bathtub)	71	4.5	2.0	2.0
	6	Water Closet, 1.28 GPF Gravity Tank	284	1.0	3.0	3.0
Kitchen Fixtures	7	Dishwasher	142	0.5	1.3	1.3
	8	Faucet, Kitchen Sink	142	2.0	2.2	2.2
Laundry Room Fixtures	9	Clothes Washer	142	5.5	3.5	3.5
	10	Faucet, Laundry	142	2.0	2.0	2.0
Bar/Prep Fixtures	11	Faucet, Bar Sink	0	2.0	1.5	1.5
Other Fixtures	12	Fixture 1	0	0.0	0.0	6.0
	13	Fixture 2	0	0.0	0.0	6.0
	14	Fixture 3	0	0.0	0.0	6.0

Total Number of Fixtures 1278

99th PERCENTILE DEMAND FLOW = 150.2 GPM

RESET

RUN WATER DEMAND CALCULATOR

APPENDIX D:

FEMA FLOOD MAP

National Flood Hazard Layer FIRMette

FEMA

46°30'28.09"N

114°4'26.55"W

114°3'49.10"W

46°30'3.33"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/14/2020 at 10:10:51 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX E:

PCI SOIL PROFILE DESCRIPTIONS

PROFESSIONAL CONSULTANTS, INC.
3115 Russell Street
P.O. Box 1750
Missoula, Montana 59806
(406) 728-1880
(406) 728-0276 FAX

CLIENT: Ralph Hooley – Burnt Fork Estates

PROJECT NO: 8952-19

LOCATION: Sec 26 T 09N R 20W

Logged by: Andy Mefford, PCI Date: 03/30/2020

Backhoe or drill by: Adam Pummill

SOIL PROFILE NO. 1

Slope: +/- 2% Vegetation: grass

Depth	Thick	Texture	Modifiers	Structure	Moisture	Color	Comments
0”-18”	18”						top soil
18”-52”	34”	clay				grey	
52”-106”	54”	sand	gravelly/cobbly				
Comments: no bedrock, groundwater at 72”							

SOIL PROFILE NO. 2

Slope: +/- 2% Vegetation: grass

Depth	Thick	Texture	Modifiers	Structure	Moisture	Color	Comments
0”-16”	16”						top soil
16”-33”	17”	clay	gravelly			grey	
33”-110”	77”						
Comments: no bedrock, groundwater at 108”							

PROFESSIONAL CONSULTANTS, INC.
3115 Russell Street
P.O. Box 1750
Missoula, Montana 59806
(406) 728-1880
(406) 728-0276 FAX

CLIENT: Ralph Hooley – Burnt Fork Estates

PROJECT NO: 8952-19

LOCATION: Sec 26 T 09N R 20W

Logged by: Andy Mefford, PCI Date: 03/30/2020

Backhoe or drill by: Adam Pummill

SOIL PROFILE NO. 3

Slope: +/- 2% Vegetation: grass

Depth	Thick	Texture	Modifiers	Structure	Moisture	Color	Comments
0”-16”	16”						top soil
16”-32”	16”	clay	gravelly/cobbly				
32”-48”	16”	clay				grey	
48”-112”	64”	sand	gravelly/cobbly				
Comments: no bedrock, groundwater at 96”							

SOIL PROFILE NO. 4

Slope: +/- 2% Vegetation: grass

Depth	Thick	Texture	Modifiers	Structure	Moisture	Color	Comments
0”-12”							top soil
12”-36”	24”	sand	gravelly/cobbly			brown	
36”-48”	12”	sand	gravelly/cobbly			tan	
48”-102”	54”	sand	gravelly/cobbly			grey	
Comments: no bedrock, groundwater at 90”							

PROFESSIONAL CONSULTANTS, INC.
3115 Russell Street
P.O. Box 1750
Missoula, Montana 59806
(406) 728-1880
(406) 728-0276 FAX

CLIENT: Ralph Hooley – Burnt Fork Estates

PROJECT NO: 8952-19

LOCATION: Sec 26 T 09N R 20W

Logged by: Andy Mefford, PCI Date: 03/30/2020

Backhoe or drill by: Adam Pummill

SOIL PROFILE NO. 5

Slope: +/- 2% Vegetation: grass

Depth	Thick	Texture	Modifiers	Structure	Moisture	Color	Comments
0”-15”	15”						top soil
15”-103”	88”	sand	gravelly/cobbly			light grey	

Comments: no bedrock, groundwater at 82”

SOIL PROFILE NO. 6

Slope: +/- 2% Vegetation: grass

Depth	Thick	Texture	Modifiers	Structure	Moisture	Color	Comments
0”-19”	19”						top soil
19”-48”	29”	sand	gravelly/cobbly			light brwn	clay content
48”-96”	48”	sand	gravelly/cobbly			light grey	

Comments: no bedrock, groundwater at 60”

PROFESSIONAL CONSULTANTS, INC.
3115 Russell Street
P.O. Box 1750
Missoula, Montana 59806
(406) 728-1880
(406) 728-0276 FAX

CLIENT: Ralph Hooley – Burnt Fork Estates

PROJECT NO: 8952-19

LOCATION: Sec 26 T 09N R 20W

Logged by: Andy Mefford, PCI Date: 03/30/2020

Backhoe or drill by: Adam Pummill

SOIL PROFILE NO. 7

Slope: +/- 2% Vegetation: grass

Depth	Thick	Texture	Modifiers	Structure	Moisture	Color	Comments
0”-16”	16”						top soil
16”-109”	93”	sand	gravelly/cobbly			light brwn /reddish	

Comments: no bedrock, no groundwater observed

SOIL PROFILE NO. 8

Slope: +/- 2% Vegetation: grass

Depth	Thick	Texture	Modifiers	Structure	Moisture	Color	Comments
0”-20”	20”						top soil
20”-55”	35”	sand	gravelly/cobbly			tan/ reddish	clay content
55”-105”	50”	sand	gravelly/cobbly			grey	

Comments: no bedrock, no groundwater observed

APPENDIX F:

STORMWATER CALCULATIONS

Appendix G: Standard Storm Drainage Plan

DEQ Montana Department of Environmental Quali

Sudivision Name	Burnt Fork Estates
EQ#	
County	Ravalli County
Location	S26 T09N R20W
Lot/Area No.	Basin 1

Rational Method Co-Efficients (C)	
0.9	Paved/hard surfaces
0.8	Gravel surfaces
0.1	Lawn/landscaping
0.2	Unimproved areas

Q=C*i*A

Intensity Values

2-year, T_c	1.03	inches/hour
2-year, 24-hour	1.19	inches
10-year, T_c	1.8	inches/hour
100-year, T_c	2.91	inches/hour
100-year, 24-hour	3.64	inches

Total Area/Lot Size 7.91 acres = 344559.6 ft^2

Initial Stormwater Facility Volume (0.5" x Impervious Area) = 11639 ft^3

Pre-Development Characteristics				**2-year, T_c (flow rate)**	**2-year, 24-hour (volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Unimproved Area	7.91 acres	344559.6	ft^2	Q= 1.643 ft^3/sec	V= 6833.765 ft^3	Q= 2.871 ft^3/sec	Q= 4.642 ft^3/sec
Total	7.91 acres	344559.6	ft^2	Q_{Total}= **1.643** ft^3/sec	V_{Total}= **6833.765** ft^3	Q_{Total}= **2.871** ft^3/sec	Q_{Total}= **4.642** ft^3/sec

Post-Development Characteristics				**2-year, T_c (flow rate)**	**2-year, 24-hour volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	6.412940312 acres	279348	ft^2	Q= 5.994 ft^3/sec	V= 24931.780 ft^3	Q= 10.476 ft^3/sec	Q= 16.935 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	1.497059688 acres	65212	ft^2	Q= 0.155 ft^3/sec	V= 646.685 ft^3	Q= 0.272 ft^3/sec	Q= 0.439 ft^3/sec
Unimproved Area	0 acres	0	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Total	7.91 acres	344559.6	ft^2	Q_{Total}= **6.150** ft^3/sec	V_{Total}= **25578.465** ft^3	Q_{Total}= **10.747** ft^3/sec	Q_{Total}= **17.375** ft^3/sec
Runoff Flow/Volume Change				ΔQ= **4.507** ft^3/sec	ΔV= **18744.700** ft^3	ΔQ= **7.876** ft^3/sec	ΔQ= **12.733** ft^3/sec

Required Minimum Facility Volume: **18745** ft^3

= input field

Appendix G: Standard Storm Drainage Plan

DEQ Montana Department of Environmental Quali

Sudivision Name	Burnt Fork Estates
EQ#	
County	Ravalli County
Location	S26 T09N R20W
Lot/Area No.	Basin 2

Rational Method Co-Efficients (C)	
0.9	Paved/hard surfaces
0.8	Gravel surfaces
0.1	Lawn/landscaping
0.2	Unimproved areas

Q=C*i*A

Intensity Values

2-year, T_c	0.43	inches/hour
2-year, 24-hour	1.19	inches
10-year, T_c	0.75	inches/hour
100-year, T_c	1.2	inches/hour
100-year, 24-hour	3.64	inches

Total Area/Lot Size 13.14 acres = 572378.4 ft^2

Initial Stormwater Facility Volume (0.5" x Impervious Area) = 9855 ft^3

Pre-Development Characteristics			**2-year, T_c (flow rate)**	**2-year, 24-hour (volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	0 acres	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Gravel Area	0 acres	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	0 acres	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Unimproved Area	13.14 acres	572378.4 ft^2	Q= 1.139 ft^3/sec	V= 11352.172 ft^3	Q= 1.987 ft^3/sec	Q= 3.180 ft^3/sec
Total	13.14 acres	572378.4 ft^2	Q_{Total}= **1.139** ft^3/sec	V_{Total}= **11352.172** ft^3	Q_{Total}= **1.987** ft^3/sec	Q_{Total}= **3.180** ft^3/sec

Post-Development Characteristics			**2-year, T_c (flow rate)**	**2-year, 24-hour volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	5.429752066 acres	236,520 ft^2	Q= 2.119 ft^3/sec	V= 21109.410 ft^3	Q= 3.696 ft^3/sec	Q= 5.913 ft^3/sec
Gravel Area	0 acres	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	7.710247934 acres	335,858 ft^2	Q= 0.334 ft^3/sec	V= 3330.596 ft^3	Q= 0.583 ft^3/sec	Q= 0.933 ft^3/sec
Unimproved Area	0 acres	0 ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Total	13.14 acres	572378.4 ft^2	Q_{Total}= **2.453** ft^3/sec	V_{Total}= **24440.006** ft^3	Q_{Total}= **4.279** ft^3/sec	Q_{Total}= **6.846** ft^3/sec

Runoff Flow/Volume Change	ΔQ= **1.314** ft^3/sec	ΔV= **13087.834** ft^3	ΔQ= **2.291** ft^3/sec	ΔQ= **3.666** ft^3/sec

Required Minimum Facility Volume: **13088** ft^3

= input field

Appendix G: Standard Storm Drainage Plan

DEQ Montana Department of Environmental Quali

Sudivision Name	Burnt Fork Estates
EQ#	
County	Ravalli County
Location	S26 T09N R20W
Lot/Area No.	Basin 3

Rational Method Co-Efficients (C)	
0.9	Paved/hard surfaces
0.8	Gravel surfaces
0.1	Lawn/landscaping
0.2	Unimproved areas

Q=C*i*A

Intensity Values

2-year, T_c	0.43	inches/hour
2-year, 24-hour	1.19	inches
10-year, T_c	0.76	inches/hour
100-year, T_c	1.23	inches/hour
100-year, 24-hour	3.64	inches

Total Area/Lot Size 3.59 acres = 156380.4 ft^2

Initial Stormwater Facility Volume (0.5" x Impervious Area) = 2995 ft^3

Pre-Development Characteristics				**2-year, T_c (flow rate)**	**2-year, 24-hour (volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Unimproved Area	3.59 acres	156380.4	ft^2	Q= 0.311 ft^3/sec	V= 3101.545 ft^3	Q= 0.550 ft^3/sec	Q= 0.890 ft^3/sec
Total	3.59 acres	156380.4	ft^2	Q_{Total}= **0.311** ft^3/sec	V_{Total}= **3101.545** ft^3	Q_{Total}= **0.550** ft^3/sec	Q_{Total}= **0.890** ft^3/sec

Post-Development Characteristics				**2-year, T_c (flow rate)**	**2-year, 24-hour volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	1.650137741 acres	71,880	ft^2	Q= 0.644 ft^3/sec	V= 6415.290 ft^3	Q= 1.138 ft^3/sec	Q= 1.842 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	1.939862259 acres	84,500	ft^2	Q= 0.084 ft^3/sec	V= 837.962 ft^3	Q= 0.149 ft^3/sec	Q= 0.241 ft^3/sec
Unimproved Area	0 acres	0	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Total	3.59 acres	156380.4	ft^2	Q_{Total}= **0.728** ft^3/sec	V_{Total}= **7253.252** ft^3	Q_{Total}= **1.287** ft^3/sec	Q_{Total}= **2.083** ft^3/sec
Runoff Flow/Volume Change				ΔQ= **0.417** ft^3/sec	ΔV= **4151.708** ft^3	ΔQ= **0.737** ft^3/sec	ΔQ= **1.192** ft^3/sec

Required Minimum Facility Volume: **4151.7** ft^3

= input field

Appendix G: Standard Storm Drainage Plan

DEQ Montana Department of Environmental Quali

Sudivision Name	Burnt Fork Estates
EQ#	
County	Ravalli County
Location	S26 T09N R20W
Lot/Area No.	Basin 4

Rational Method Co-Efficients (C)	
0.9	Paved/hard surfaces
0.8	Gravel surfaces
0.1	Lawn/landscaping
0.2	Unimproved areas

Q=C*i*A

Intensity Values

2-year, T_c	0.45	inches/hour
2-year, 24-hour	1.19	inches
10-year, T_c	0.8	inches/hour
100-year, T_c	1.29	inches/hour
100-year, 24-hour	3.64	inches

Total Area/Lot Size 1.91 acres = 83199.6 ft^2

Initial Stormwater Facility Volume (0.5" x Impervious Area) = 1150 ft^3

Pre-Development Characteristics				**2-year, T_c (flow rate)**	**2-year, 24-hour (volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Unimproved Area	1.91 acres	83199.6	ft^2	Q= 0.173 ft^3/sec	V= 1650.125 ft^3	Q= 0.308 ft^3/sec	Q= 0.497 ft^3/sec
Total	1.91 acres	83199.6	ft^2	Q_{Total}= **0.173** ft^3/sec	V_{Total}= **1650.125** ft^3	Q_{Total}= **0.308** ft^3/sec	Q_{Total}= **0.497** ft^3/sec

Post-Development Characteristics				**2-year, T_c (flow rate)**	**2-year, 24-hour volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	0.633608815 acres	27,600	ft^2	Q= 0.259 ft^3/sec	V= 2463.300 ft^3	Q= 0.460 ft^3/sec	Q= 0.742 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	1.276391185 acres	55,600	ft^2	Q= 0.058 ft^3/sec	V= 551.363 ft^3	Q= 0.103 ft^3/sec	Q= 0.166 ft^3/sec
Unimproved Area	0 acres	0	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Total	1.91 acres	83199.6	ft^2	Q_{Total}= **0.317** ft^3/sec	V_{Total}= **3014.663** ft^3	Q_{Total}= **0.563** ft^3/sec	Q_{Total}= **0.908** ft^3/sec
Runoff Flow/Volume Change				ΔQ= **0.143** ft^3/sec	ΔV= **1364.537** ft^3	ΔQ= **0.255** ft^3/sec	ΔQ= **0.411** ft^3/sec

Required Minimum Facility Volume: **1364.5** ft^3

= input field

Appendix G: Standard Storm Drainage Plan

DEQ Montana Department of Environmental Quali

Sudivision Name	Burnt Fork Estates
EQ#	
County	Ravalli County
Location	S26 T09N R20W
Lot/Area No.	Basin 5

Rational Method Co-Efficients (C)	
0.9	Paved/hard surfaces
0.8	Gravel surfaces
0.1	Lawn/landscaping
0.2	Unimproved areas

Q=C*i*A

Intensity Values

2-year, T_c	0.43	inches/hour
2-year, 24-hour	1.19	inches
10-year, T_c	0.74	inches/hour
100-year, T_c	1.19	inches/hour
100-year, 24-hour	3.64	inches

Total Area/Lot Size 6.85 acres = 298386 ft^2

Initial Stormwater Facility Volume (0.5" x Impervious Area) = 5170 ft^3

Pre-Development Characteristics			**2-year, T_c (flow rate)**	**2-year, 24-hour (volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	0 acres	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Gravel Area	0 acres	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	0 acres	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Unimproved Area	6.85 acres	298386 ft^2	Q= 0.594 ft^3/sec	V= 5917.989 ft^3	Q= 1.022 ft^3/sec	Q= 1.644 ft^3/sec
Total	6.85 acres	298386 ft^2	Q_{Total}= **0.594** ft^3/sec	V_{Total}= **5917.989** ft^3	Q_{Total}= **1.022** ft^3/sec	Q_{Total}= **1.644** ft^3/sec

Post-Development Characteristics			**2-year, T_c (flow rate)**	**2-year, 24-hour volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	2.848484848 acres	124,080 ft^2	Q= 1.112 ft^3/sec	V= 11074.140 ft^3	Q= 1.913 ft^3/sec	Q= 3.076 ft^3/sec
Gravel Area	0 acres	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	4.001515152 acres	174,306 ft^2	Q= 0.173 ft^3/sec	V= 1728.535 ft^3	Q= 0.299 ft^3/sec	Q= 0.480 ft^3/sec
Unimproved Area	0 acres	0 ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Total	6.85 acres	298386 ft^2	Q_{Total}= **1.285** ft^3/sec	V_{Total}= **12802.675** ft^3	Q_{Total}= **2.211** ft^3/sec	Q_{Total}= **3.556** ft^3/sec
Runoff Flow/Volume Change			ΔQ= **0.691** ft^3/sec	ΔV= **6884.686** ft^3	ΔQ= **1.189** ft^3/sec	ΔQ= **1.912** ft^3/sec

Required Minimum Facility Volume: **6884.7** ft^3

= input field

Appendix G: Standard Storm Drainage Plan

DEQ Montana Department of Environmental Quali

Sudivision Name	Burnt Fork Estates
EQ#	
County	Ravalli County
Location	S26 T09N R20W
Lot/Area No.	Basin 6

Rational Method Co-Efficients (C)	
0.9	Paved/hard surfaces
0.8	Gravel surfaces
0.1	Lawn/landscaping
0.2	Unimproved areas

Q=C*i*A

Intensity Values

2-year, T_c	0.43	inches/hour
2-year, 24-hour	1.19	inches
10-year, T_c	0.75	inches/hour
100-year, T_c	1.2	inches/hour
100-year, 24-hour	3.64	inches

Total Area/Lot Size 19.49 acres = 848984.4 ft^2

Initial Stormwater Facility Volume (0.5" x Impervious Area) = 14050 ft^3

Pre-Development Characteristics				**2-year, T_c (flow rate)**	**2-year, 24-hour (volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Unimproved Area	19.49 acres	848984.4	ft^2	Q= 1.690 ft^3/sec	V= 16838.191 ft^3	Q= 2.948 ft^3/sec	Q= 4.717 ft^3/sec
Total	19.49 acres	848984.4	ft^2	Q_{Total}= **1.690** ft^3/sec	V_{Total}= **16838.191** ft^3	Q_{Total}= **2.948** ft^3/sec	Q_{Total}= **4.717** ft^3/sec

Post-Development Characteristics				**2-year, T_c (flow rate)**	**2-year, 24-hour volume)**	**10-year, T_c (flow rate)**	**100-year, T_c (flow rate)**
Paved/House Area	7.741046832 acres	337,200	ft^2	Q= 3.021 ft^3/sec	V= 30095.100 ft^3	Q= 5.269 ft^3/sec	Q= 8.430 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	11.74895317 acres	511,784	ft^2	Q= 0.509 ft^3/sec	V= 5075.195 ft^3	Q= 0.889 ft^3/sec	Q= 1.422 ft^3/sec
Unimproved Area	0 acres	0	ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Total	19.49 acres	848984.4	ft^2	Q_{Total}= **3.530** ft^3/sec	V_{Total}= **35170.295** ft^3	Q_{Total}= **6.157** ft^3/sec	Q_{Total}= **9.852** ft^3/sec
Runoff Flow/Volume Change				ΔQ= **1.840** ft^3/sec	ΔV= **18332.105** ft^3	ΔQ= **3.209** ft^3/sec	ΔQ= **5.135** ft^3/sec

Required Minimum Facility Volume: **18332** ft^3

= input field

Appendix G: Standard Storm Drainage Plan

DEQ Montana Department of Environmental Quali

Sudivision Name	Burnt Fork Estates
EQ#	
County	Ravalli County
Location	S26 T09N R20W
Lot/Area No.	Basins 1-6

Rational Method Co-Efficients (C)	
0.9	Paved/hard surfaces
0.8	Gravel surfaces
0.1	Lawn/landscaping
0.2	Unimproved areas

Q=C*i*A

	Intensity Values		Predevelopment	
2-year, T_c	0.43	inches/hour	0.42	inches/hour
2-year, 24-hour	1.19	inches	1.19	inches
10-year, T_c	0.74	inches/hour	0.73	inches/hour
100-year, T_c	1.19	inches/hour	1.18	inches/hour
100-year, 24-hour	3.64	inches	3.64	inches

Total Area/Lot Size 55.72 acres = 2427163.2 ft^2

Initial Stormwater Facility Volume (0.5" x Impervious Area) = 44859 ft^3

Pre-Development Characteristics				2-year, T_c (flow rate)	2-year, 24-hour (volume)	10-year, T_c (flow rate)	100-year, T_c (flow rate)
Paved/House Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Unimproved Area	55.72 acres	2427163.2	ft^2	Q= 4.719 ft^3/sec	V= 48138.737 ft^3	Q= 8.203 ft^3/sec	Q= 13.260 ft^3/sec
Total	55.72 acres	2427163.2	ft^2	Q_{Total}= **4.719** ft^3/sec	V_{Total}= **48138.737** ft^3	Q_{Total}= **8.203** ft^3/sec	Q_{Total}= **13.260** ft^3/sec

Post-Development Characteristics				2-year, T_c (flow rate)	2-year, 24-hour volume)	10-year, T_c (flow rate)	100-year, T_c (flow rate)
Paved/House Area	24.71597062 acres	1076627.7	ft^2	Q= 9.645 ft^3/sec	V= 96089.020 ft^3	Q= 16.598 ft^3/sec	Q= 26.691 ft^3/sec
Gravel Area	0 acres		ft^2	Q= 0.000 ft^3/sec	V= 0.000 ft^3	Q= 0.000 ft^3/sec	Q= 0.000 ft^3/sec
Lawn/Landscaping	28.17402938 acres	1227260.7	ft^2	Q= 1.222 ft^3/sec	V= 12170.335 ft^3	Q= 2.102 ft^3/sec	Q= 3.381 ft^3/sec
Unimproved Area	2.83 acres	123274.8	ft^2	Q= 0.245 ft^3/sec	V= 2444.950 ft^3	Q= 0.422 ft^3/sec	Q= 0.679 ft^3/sec
Total	55.72 acres	2427163.2	ft^2	Q_{Total}= **11.112** ft^3/sec	V_{Total}= **110704.306** ft^3	Q_{Total}= **19.123** ft^3/sec	Q_{Total}= **30.751** ft^3/sec

Runoff Flow/Volume Change	ΔQ= **6.392** ft^3/sec	ΔV= **62565.569** ft^3	ΔQ= **10.920** ft^3/sec	ΔQ= **17.492** ft^3/sec

Required Minimum Facility Volume: **62566** ft^3

= input field