STORMWATER MANAGEMENT AND

EROSION CONTROL PLAN

LOT 1A SCHWEITZER VIEW BUSINESS PARK PHASE 1 REPLAT

PROFESSIONAL ENGINEER
REGISTERED
10390
6/14/19
STATE OF IDAHO
RYAN J. LUTTMANN

RECEIVED
JUN 14 2019
PLANNING OFFICE
CITY OF PONDERAY

Prepared for:

TUCKER TAYLOR, LLC

Prepared by:

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June 2019

Project No. 51008.001.02

INTRODUCTION

The purpose of this report is to assess the proposed improvement to Lot 1A of the Schweitzer View Business Park Phase 1 Replat for the management of stormwater runoff and control erosion from the project site. The 0.57+/- acre site is located in Ponderay, Idaho in Township 57N, Range 02W, Section 11 and is located on the south side of Schweitzer Plaza Drive.

The report is based on and limited to the soil types identified by site inspection and the *Soil Survey of the Bonner County Area,* the preliminary site plan layout and general topography of the site.

EXISTING SITE CONDITIONS

The existing site is vacant land that is owned by Calnell, LLC with a proposed lease Tucker Taylor, LLC. The area for the proposed improvements relatively flat and is surfaced with some grasses, weeds, dirt and gravel materials. The proposed on-site improvements include the construction of a paved area, sidewalk extension along the roadway, extension of underground roadside drainage facilities, new paved surface area, overhead LED lighting, 2' high eco blocks along the southern and eastern property lines and a paved approach to Schweitzer Plaza Drive.

The site investigation did not reveal signs of slope instability or mass movement on site.

A vicinity drainage plan was not prepared with this report. The site visit revealed that no off-site drainage would impact the site or the planned stormwater improvements proposed with this project. Roadside drainage will be maintained and routed to the roadside drainage facilities.

SOILS

The Department of Agriculture's *Soil Survey of the Bonner County Area* identifies the subject soils as "Mission Silt Loam, 0 to 2 percent slopes". According to the survey, "Mission Silt Loam" is somewhat poorly drained and is shallow to a hardpan and is on terraces. It formed in silty glacial lake-laid sediment derived from mixed sources and has a mantle of volcanic ash and loess. The average annual precipitation is about 32 inches and the average annual air temperature is about 44 degrees F, and the average frost-free period is about 115 days.

Permeability of this Mission soil is very slow. Effective rooting depth is limited to a depth of 10 to 20 inches by the hardpan. Available water capacity is moderate. Runoff is slow, and the hazard of water erosion is slight. Water is perched above the hardpan late in winter and in spring.

Soil Permeability:

Depth (inches)	Permeability (in/hr)
0-11	0.6-2.0
11-20	<0.06
20-32	0.2-0.6
32-47	<0.06
47-60	0.06-0.2

A Custom Soil Resource Report from the USDA NRCS Web Soil Survey has been included at the end of this report. If undesirable ponding is observed with the native soils, the owner may choose to install a perforated underdrain beneath the grassed infiltration area.

STORMWATER MANAGEMENT

Run-off stormwater from all impervious surfaces will be collected and treated in grass infiltration swales. The swale volume will be designed to capture, at a minimum, the first ½" of run-off from the site. If plans for future expansion are desired, the stormwater plan should be reevaluated at that time and reviewed with future City of Ponderay stormwater ordinances.

CALCULATIONS

Included in this report are the calculations that demonstrate the ability of the stormwater system capability to retain and treat the first ½" of run-off from the impervious surfaces, the capacity of the retention basin and the design storm yield expected at the site.

The results of the calculations are as follows:

1. The minimum swale volume required to retain and treat the first ½ inch of run-off is 675 cubic feet.
2. There is no additional storage volume required for Pre- vs. Post Development run-off for a 25 year, 24-hour storm because of the large infiltration area provided. An additional 100 cubic feet of storage is proposed to cover the differences calculated between Pre- vs. Post Development run-off for other 25 year storm events.
3. The minimum design swale volume is over 775 cubic feet.
4. The minimum base swale area for design is 6,197 square feet, based on a swale depth of 1.5 inches.

TEMPORARY EROSION CONTROL

The hazard of water erosion on the site is classified as slight for the Mission silt loam. The existing site currently drains toward a deeper sedimentation basin that is owned and operated by Tucker Taylor, LLC which will serve to reduce the potential for sediment to leave the project area without treatment.

The contractor shall be required to provide a water truck (or equivalent) to apply water to the construction site in an appropriate manner to mitigate dust during grading and construction activities for compliance with the City's dust control regulations.

If mud is tracked from the site onto Schweitzer Plaza Drive, temporary construction entrance stabilization should be placed, as needed, on the access utilized during construction.

PERMANENT EROSION CONTROL

All disturbed areas associated with the project that do not receive pavement or concrete shall be reseeded promptly. The revegetation of the site will serve as permanent erosion and sediment control for the site. Alternate seed mixture recommendations may be obtained from the U.S.D.A Natural Resource Conservation Service, the project Landscape Architect or a commercially marketed grass mixture. All revegetation work should be accomplished between the dates of April 15 and October 15 of a given year.

CONSTRUCTION SCHEDULE

The proposed schedule for site activities should occur in the following order:

Time Sequence	Construction Task
1	Rough-in swales to serve as sedimentation ponds during construction
2	Remove vegetation and topsoil for construction of hard surface area and stockpile within designated area.
3	Protect topsoil stockpile as necessary during construction by covering piles when not in use
4	Construct hard surface areas
5	Hydroseed and revegetate all remaining disturbed areas

OPERATION AND MAINTENANCE PLAN

Operation and maintenance shall be the responsibility of the current landowner. During the terms of the lease agreement, the Temporary and Permanent Erosion and Stormwater control measures will be the responsibility of Tucker Taylor, LLC at 476571 US-95 in Ponderay, Idaho. The phone number is (208) 263-2138.

Operation and maintenance shall include and not be limited to the following items:

1. Install temporary erosion control measures as needed.
2. The newly seeded areas shall be inspected weekly until it is certain that adequate root depth has formed and shall be inspected every three months and after every large storm event for erosion. If erosion has occurred, the eroded soils and vegetation shall be replaced.
3. The grassy swales shall be inspected every three months and after every large storm event. Any sediments and other debris deposited in the swales shall be removed and disposed off-site. In the summer months, the swales shall be watered and mowed as needed.

SUMMARY

The proposed site is adequately suited for the proposed improvements. The site is capable of withstanding any disturbances created by the proposed project and Stormwater Management and Erosion Control plan without risk of additional site run-off and/or sedimentation of ground water and/or surface water. The Stormwater Management plan is adequate to retain the first ½" of rainfall from all impervious surfaces proposed for the site.

STORMWATER CALCULATIONS

PROJECT: Tucker Taylor LLC, Lot 1A Site Improvements

PREPARED BY: RYAN J. LUTTMANN, P.E.

DATE: June 14, 2019

I. 1/2" RUN-OFF CALCULATIONS (PROPOSED ADDITION)

A. IMPERVIOUS SURFACES (square feet) — 16,190 Ft^2

BUILDINGS	0
CONCRETE	659
PAVEMENT	15,531
TOTAL	16,190

B. VOLUME REQUIRED FOR 1ST 1/2" STORAGE (cubic feet) — 675 Ft^3

IMPERVIOUS AREA X (0.5in/12ft) =

II. PRE-DEVELOPMENT 25 YR STORM CALCULATIONS (24 HR STORM)

A. TIME INCREMENT FOR BOWSTRING CALC'S (min.) — 5 Minutes

B. CALCULATED TIME OF CONCENTRATION (min.) — 1.53 Minutes
TIME OF CONCENTRATION USED (5 minute minimum) — 5.00 Minutes

L = 120 $\quad$ n = 0.02
s = 0.008 $\quad$ C_t = 0.15
where: $T_c = C_t\,(Ln/s^{0.5})^{0.6}$

C. TOTAL AREA (acres) — 0.57 Acres

D. INTENSITY (inches/hour) — 0.11 in/hr

E. IMPERVIOUS AREA — 0 Ft^2

F. DEVELOPED "C" FACTOR — 0.20

IMPERVIOUS C = 0.9
OTHER C = 0.2

G. PEAK FLOW (cubic feet per second) — 0.013 cfs

Q=C*I*A

III. POST DEVELOPMENT 25 YR STORM CALCULATIONS (24 HR STORM)

A. TIME INCREMENT FOR BOWSTRING CALC'S (min.) — 5 Minutes

B. CALCULATED TIME OF CONCENTRATION (min.) — 1.60 Minutes
TIME OF CONCENTRATION USED (5 minute minimum) — 5.00 Minutes

L = 120   n = 0.02
s = 0.007 $C_t = 0.15$
where: $T_c = C_t(Ln/s^{0.5})^{0.6}$

C. TOTAL AREA (acres) — 0.57 Acres

D. INTENSITY (inches/hour) — 0.11 in/hr

E. IMPERVIOUS AREA — 16,190 Ft^2

F. DEVELOPED "C" FACTOR — 0.656

IMPERVIOUS C = 0.9
OTHER C = 0.2

G. PEAK FLOW (cubic feet per second) — 0.041 cfs

Q=C*I*A

IV. PRE- VS. POST DEVELOPMENT RUN-OFF CALCULATIONS

A. PRE-DEVELOPMENT PEAK FLOW (cubic feet per second) — 0.013 cfs

B. POST DEVELOPMENT PEAK FLOW (cubic feet per second) — 0.041 cfs

C. DIFFERENCE OF PRE- VS. POST PEAK FLOW — 0.029 cfs

D. VOLUME OF STORMWATER FOR 24 HR STORM (cubic feet) — 2473 Ft^3

$V = Q_{post\text{-}pre}$ * 24hr * 3600 sec/hr

E. SWALE INFILTRATION FLOW (cubic feet per second) — 0.02 cfs

0   # OF 1cfs DRYWELLS = 0.0 cfs
0   # OF 0.3cfs DRYWELLS = 0.0 cfs
SOIL PERMEABILITY (in/hr) = 0.20

F. VOLUME LOSS THROUGH SWALE INFILTRATION — 2159 Ft^3

G. ADDITION STORAGE REQUIRED ABOVE 1/2" RUN-OFF VOL. — 0 Ft^3

V. ROUTING CALCULATIONS

A. PROPOSED MINIMUM SWALE VOLUME (cubic feet) 675 Ft^3

B. SWALE INFILTRATION FLOW (cubic feet per second) 0.02 cfs

0 # OF 1cfs DRYWELLS = 0.0 cfs
0 # OF 0.3cfs DRYWELLS = 0.0 cfs
SOIL PERMEABILITY (in/hr) = 0.20

C. "BOWSTRING" METHOD

#1 Time Inc. (min)	#2 Time Inc. (sec)	#3 Intensity (in/hr)	#4 Q Dev. (cfs)	#5 V in (cf)	#6 V out (cf)	#7 Storage V (cf)	#8 Overflow V (cf)	#9 PreDev V (cf)
5	300	2.88	1.08	433.20	7.50	425.70	-248.88	131.98
10	600	2.06	0.77	541.09	14.99	526.10	-148.48	164.86
15	900	1.69	0.63	633.61	22.49	611.13	-63.46	193.05
20	1200	1.54	0.58	750.24	29.98	720.26	45.68	228.58
25	1500	1.34	0.50	803.22	37.48	765.75	91.16	244.72
30	1800	1.20	0.45	854.01	44.97	809.03	134.45	260.19
35	2100	1.09	0.41	898.08	52.47	845.61	171.02	273.62
40	2400	1.00	0.37	936.17	59.96	876.21	201.63	285.23
45	2700	0.93	0.35	975.03	67.46	907.58	232.99	297.07
50	3000	0.87	0.33	1009.79	74.95	934.83	260.25	307.66
55	3300	0.82	0.31	1043.80	82.45	961.35	286.77	318.02
60	3600	0.78	0.29	1080.44	89.94	990.49	315.91	329.18
65	3900	0.74	0.28	1108.10	97.44	1010.66	336.07	337.61
70	4200	0.70	0.26	1126.78	104.94	1021.84	347.26	343.30
75	4500	0.67	0.25	1153.69	112.43	1041.26	366.68	351.50
80	4800	0.65	0.24	1192.22	119.93	1072.29	397.71	363.24
85	5100	0.63	0.24	1226.25	127.42	1098.83	424.25	373.61
90	5400	0.61	0.23	1255.80	134.92	1120.88	446.30	382.61
95	5700	0.59	0.22	1280.85	142.41	1138.44	463.86	390.24
100	6000	0.57	0.21	1301.42	149.91	1151.51	476.92	396.51
1440	86400	0.11	0.04	3560.31	2158.67	1401.64	727.06	1084.74

VI. RESULTS

A. VOLUME REQUIRED FOR 1ST 1/2" STORAGE (cubic feet) 675 Ft^3

B. ADDITION STORAGE PROVIDED ABOVE 1/2" RUN-OFF VOL. 100 Ft^3

C. PROPOSED MINIMUM SWALE VOLUME (cubic feet) 775 Ft^3

D. MINIMUM BASE SWALE AREA @ 1.5" DEPTH (square feet) 6197 Ft^2

FIGURE 6-4 ZONE C, INTENSITY-DURATION-FREQUENCY CURVE
(IDAHO TRANSPORTATION DEPARTMENT)

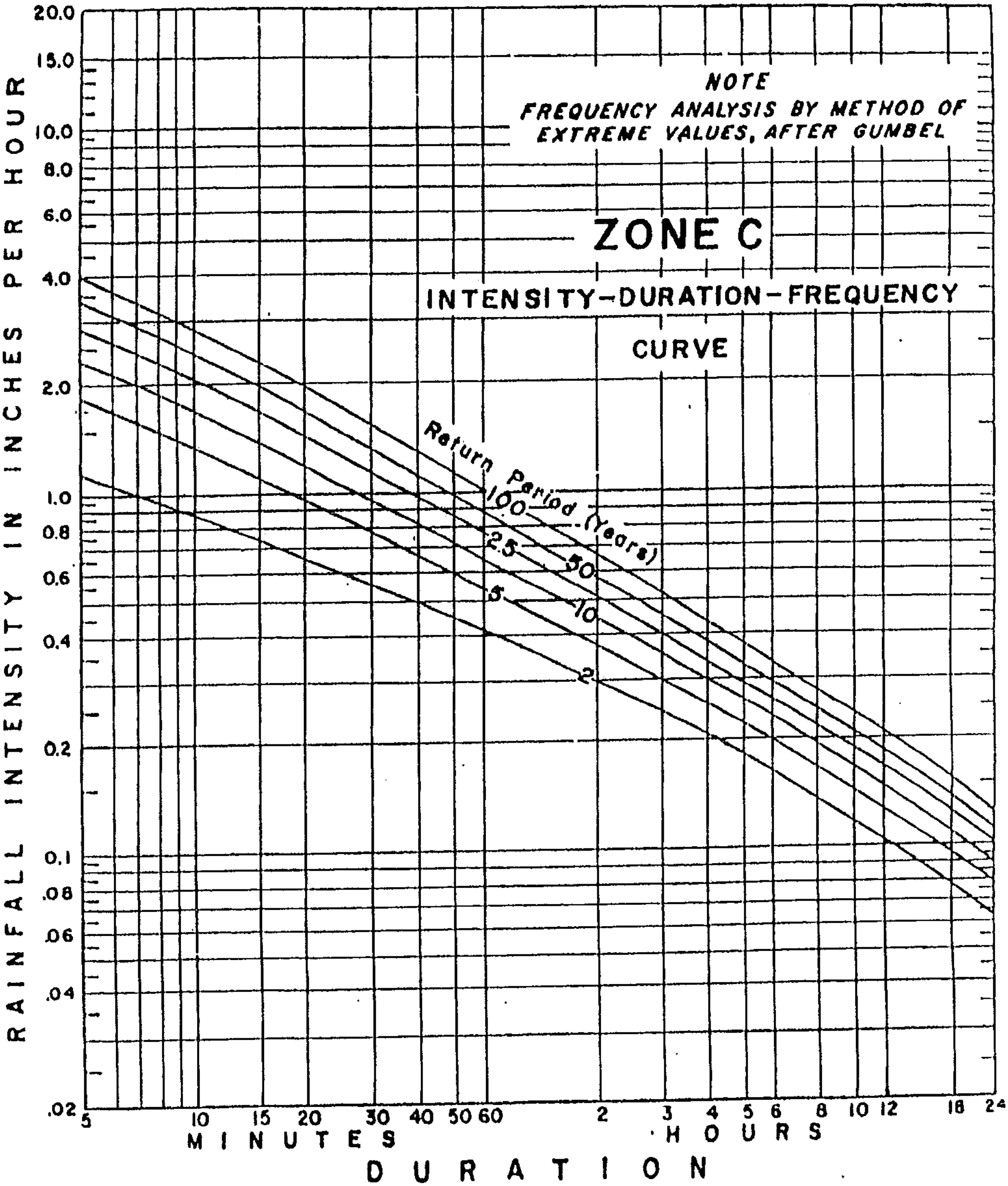

TABLE 6-2 RUNOFF COEFFICIENTS FOR THE RATIONAL METHOD FOR DETERMINING PEAK DISCHARGE

Type of Cover	Flat	Rolling 2%-10%	Hilly Over 10%
Pavement and Roofs	0.90	0.90	0.90
Earth Shoulders	0.50	0.50	0.50
Drives and Walks	0.75	0.80	0.85
Gravel Pavement	0.50	0.55	0.60
City Business Areas	0.80	0.85	0.85
Suburban Residential	0.25	0.35	0.40
Single Family Residential	0.30	0.40	0.50
Multi Units, Detached	0.40	0.50	0.60
Multi Units, Attached	0.60	0.65	0.70
Lawns, Very Sandy Soil	0.05	0.07	0.10
Lawns, Sandy Soil	0.10	0.15	0.20
Lawns, Heavy Soil	0.17	0.22	0.35
Grass Shoulders	0.25	0.25	0.25
Side Slopes, Earth	0.60	0.60	0.60
Side Slopes, Turf	0.30	0.30	0.30
Median Areas, Turf	0.25	0.30	0.30
Cultivated Land, Clay and Loam	0.50	0.55	0.60
Cultivated Land, Sand and Gravel	0.25	0.30	0.35
Industrial Areas, Light	0.50	0.70	0.80
Industrial Areas, Heavy	0.60	0.80	0.90
Parks and Cemetaries	0.10	0.15	0.25
Playgrounds	0.20	0.25	0.30
Woodland and Forests	0.10	0.15	0.20
Meadows and Pasture Land	0.25	0.30	0.35
Pasture with Frozen Ground	0.40	0.45	0.50
Unimproved Areas	0.10	0.20	0.30

TABLE 6-3 GROUND COVER COEFFICENTS

Type of Cover		K (ground cover coefficient)
Forest with heavy ground cover		150
Minimum tillage cultivation		280
Short pasture grass or lawn		420
Nearly bare ground		600
Grassed waterway or small roadside ditch		900
Paved area		1,200
Gutter flow	0.25 feet deep	1,500
	0.50 feet deep	2,400
	0.75 feet deep	3,100

		Concrete (n = 0.012)	CMP (n = 0.024)
Storm Sewers (Concrete)	12 inch diameter	3,000	1,500
	18 inch diameter	3,900	1,950
	24 inch diameter	4,700	2,350

		Narrow W/D = 1	Medium W/D = 2	Wide W/D = 9
Open Channel Flow (n = 0.040)	1 foot deep	1,100	1,500	2,000
	2 feet deep	1,800	2,300	3,100
	4 feet deep	2,800	3,700	5,000

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 Bonner County Area, Idaho, Parts of Bonner and Boundary Counties

June 3, 2019

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.

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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.

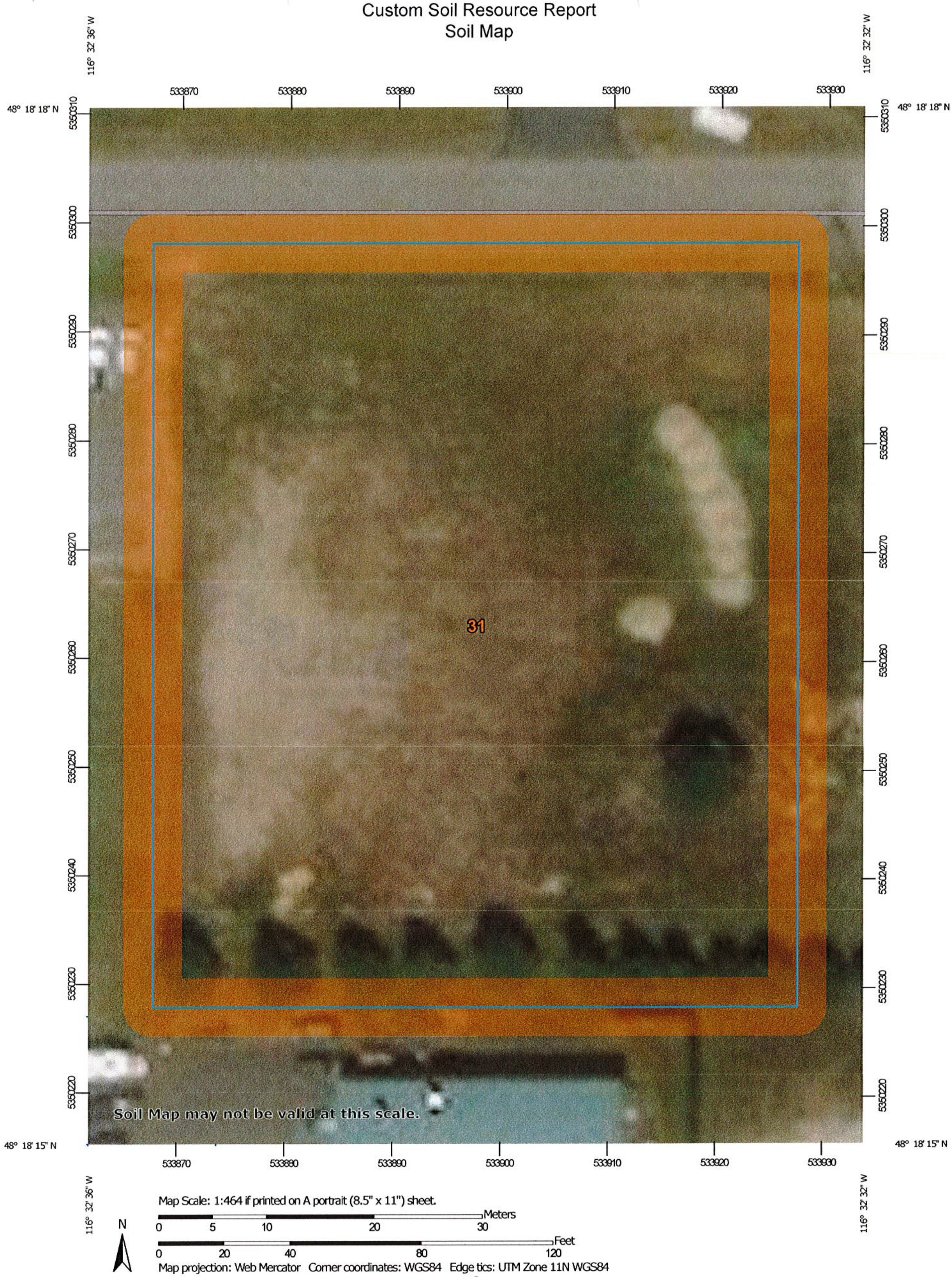
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Soil Map


116° 32' 36" W
116° 32' 32" W
48° 18' 18" N
48° 18' 15" N
533870
533880
533890
533900
533910
533920
533930
5350310
5350300
5350290
5350280
5350270
5350260
5350250
5350240
5350230
5350220
31
Soil Map may not be valid at this scale.
N
Map Scale: 1:464 if printed on A portrait (8.5" x 11") sheet.
Meters
0 5 10 20 30
Feet
0 20 40 80 120
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 1:24,000.

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: Bonner County Area, Idaho, Parts of Bonner and Boundary Counties
Survey Area Data: Version 14, Sep 13, 2018

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

Date(s) aerial images were photographed: Aug 15, 2010—Aug 23, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
31	Mission silt loam, 0 to 2 percent slopes	1.0	100.0%
Totals for Area of Interest		**1.0**	**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.

Bonner County Area, Idaho, Parts of Bonner and Boundary Counties

31—Mission silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 5462
Elevation: 2,000 to 2,800 feet
Mean annual precipitation: 25 to 38 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 90 to 120 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Mission and similar soils: 75 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mission

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over silty glaciolacustrine deposits

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 3 inches: silt loam
Bw - 3 to 12 inches: silt loam
2Btx - 12 to 21 inches: silt loam
2E - 21 to 33 inches: silt
2Bt - 33 to 48 inches: silt loam
3C - 48 to 67 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 20 inches to fragipan
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Other vegetative classification: western redcedar/queencup beadlily (CN530)
Hydric soil rating: No

Minor Components

Hoodoo

Percent of map unit: 3 percent
Landform: Flood plains, drainageways
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Odenson

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

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