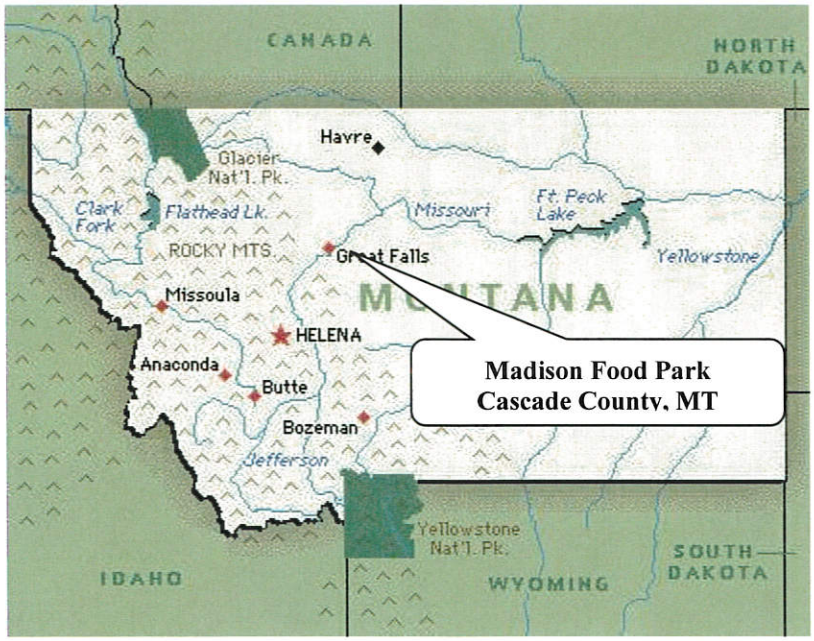
Madison Food Park, LLC
Value-Added Dairy/Cheese Processing Facility
Special Use Permit Application
Cascade County, MT



April 2019

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  - **E. SUP Criteria Supporting Information**

bsc&e | BIG SKY CIVIL & ENVIRONMENTAL, INC

1324 13th Ave. SW
P.O. Box 3625
Great Falls, MT 59403
406-727-2185 Office
406-727-3656 Fax

Owner:
Madison Food Park, LLC
c/o Church, Harris, Johnson & Williams
114 3rd Street South
Great Falls, MT 59401

Submitted To:
Cascade County PWD
Planning Division
121 4th Street North, Suite 2H/I
Great Falls, MT 59401

Cascade County Special Use Permit Application

Cascade County Public Works Department Planning Division
121 4th St N, Suite 2H-2I
Great Falls, MT 59401
Phone: 406-454-6905 Fax: 406-454-6919

Permit No:_____
App. No.: Sup 006-2019
Applied Date: 4-25-2019

General Information

A Special Use Permit (SUP) is required for uses in which conformance to additional standards will be required due to characteristics that are unique and special to the use. SUPs are to be issued for one specific use and are required for each tract of land. Legally issued SUPs shall expire one year after the date of approval if construction, or the use permitted, has not started. A one-time only six (6) month extension may be granted by the Zoning Board of Adjustment (ZBOA) upon request. SUP applications require a non-refundable application fee of four hundred and fifty dollars ($450.00). Each SUP application shall be accompanied by an Location/Conformance (L/C) Permit application for changes in use and/or structures associated with the SUP application. The L/C Permit application fee is included in the SUP application fee.

Application Information

Property Owner Name: Madison Food Park, LLC

Applicant Name: Big Sky Cheese, LLC

Application Type: ☒ Change of Use ☐ New Structure(s)

Special Use Call Out: Value-added Agricultural Commodity Processing Facility: Cheese Processing Plant

Understanding the Regulations

The proposed use must be specifically mentioned as a category in *Uses Permitted Upon Issuance of a Special Use Permit* within Section 7 of the Cascade County Zoning Regulations. Portions of the County Zoning Map and the Zoning Regulations are available at the Cascade County Website at http://departments.cascadecountymt.gov/planning.

Steps of the Application Process

(1) Schedule a Pre-Application meeting with planners to ensure the project will meet the standards for Special Use Permits as outlined within Section 7 of Cascade County's Zoning Regulations.

(2) Complete, sign and submit a Special Use Permit application, Location/Conformance Permit application and a Use Statement Form, with the $450.00 application fee to Planning Staff.

(3) Diagrams, business plans, photographs and other documents may be requested as part of a complete application, depending on the applicant's proposal.

(4) Planning Staff will notify interested agencies of the proposed project to request comments for the application.

(5) Planning Staff will schedule a public hearing before the *Cascade County Zoning Board of Adjustment*;

(6) Legal notice will be published twice in the Great Falls Tribune with at least six (6) days separating each publication.

(7) Notice will be sent to all adjacent landowners via certified mail.

(8) Planning Staff will present the application to the Zoning Board of Adjustment along with recommendations, based on findings of facts.

(9) The *Zoning Board of Adjustment* will make a determination on the application; three (3) affirmative votes are needed to issue the permit.

(10) Upon written notice from the Planning Staff, the applicant may begin the permitted special use.

(11) Permits may be revoked or expire for the following reasons:

a. The *Zoning Board of Adjustment* finds them in violation of the conditions of the permit or another regulation/ordinance.

b. Approval is valid for one particular use and shall expire one year after the date of approval, if construction or the use has not started. The Zoning Administrator may grant a one-time only 6 month extension on the Zoning Board of Adjustment Approval.

c. The Special Use Permit shall expire if the use ceases for six (6) months for any reason. Any future extension requests must be granted by the Zoning Board of Adjustment prior to the date of expiration.

SUP General Impacts Criteria

Explain how the proposed use contributes to, hinders, or otherwise impacts each of the criteria below. All criteria must be discussed. If criteria are not applicable, please explain why. Attach drawings, additional text, site plans, and any other documents that will assist staff and the board in reviewing the proposed use. The more information you can provide, the easier it is for staff and the *Zoning Board of Adjustment* to review the application.

(1) The proposed development will not materially endanger the public health or safety.

a. Traffic conditions in the vicinity, including the effect of additional traffic on streets and street intersections, and sight lines at street intersections and approaches:

For our response to this criterion and all subsequent criteria on this form, please refer to the attached document

b. Provision of services and utilities, including sewer, water, electrical, telecommunications, garbage collections, and fire protection:

c. Soil erosion, sedimentation, and stormwater run-off:

d. Protection of public, community, or private water supplies, including possible adverse effects on surface waters or ground water:

(2) The proposed development is a public necessity, or will not substantially impact the value of adjoining property.

a. The relationship of the proposed use and the character of development to surrounding uses and development, including possible conflicts between them and how these conflicts will be resolved.

_____

_____

_____

b. Whether the proposed development is so necessary to the public health, safety, and general welfare of the community or County as to justify it regardless of its impact on the value of adjoining property.

_____

_____

_____

(3) The proposed development will be in harmony with the area in which it is located.

a. The relationship of the proposed use and the character of development to surrounding uses and development, including possible conflicts between them and how these conflicts will be resolved.

_____

_____

_____

b. Consistency with the municipal and joint land use plans incorporated by the Growth Policy.

_____

_____

_____

SUP Growth Policy Criteria

Explain how the proposed use will be consistent with each of the Cascade County Growth Policy goal objectives. All objectives must be discussed. If an objective is not applicable, please explain why. The more information you can provide, the easier it is for staff and the Zoning Board of Adjustment to review the application.

Goal 1: Sustain and strengthen the economic well-being of Cascade County's citizens.

Objectives:

A. Stimulate the retention of existing businesses and expansion of existing businesses, new businesses, value-added businesses, wholesale and retail businesses, and industries including agriculture, mining, manufacturing/processing and forest products.

_____

_____

_____

B. Stabilize and diversify the county's tax base by encouraging the sustainable use of its natural resources.

C. Identify and pursue primary business development that complements existing business, which is compatible with communities, and utilizes available assets. Identify and pursue targeted business development opportunities to include, but not limited to, manufacturing/heavy industry, telecommunication, and youth/social services.

D. Promote the development of cultural resources and tourism to broaden Cascade County's economic base.

E. Foster and stimulate well-planned entrepreneurship among the county's citizenry.

F. Promote a strong local business environment. Encourage and strengthen business support mechanisms such as chamber of commerce, development organizations and business roundtable organizations.

G. Improve local trade capture for Cascade County businesses. Promote local shopping as well as well-planned businesses and new businesses.

H. Network with and support other economic development efforts in the region and statewide, in recognition of Cascade County's interdependence with other communities and to leverage available local resources.

I. Encourage the growth of the agricultural economy.

J. Stimulate the growth of the economy by encouraging the use of alternative methods of energy production, including wind energy.

Goal 2: Protect and maintain Cascade County's rural character and the community's historic relationship with natural resource development.

Objectives:

A. Foster the continuance of agriculture and forestry in recognition of their economic contribution and the intrinsic natural beauty of grazing areas, farmlands and forests.

B. Preserve Cascade County's scenic beauty and conserve its forests, rangeland and streams, with their abundant wildlife and good fisheries.

C. Preserve Cascade County's open space setting by encouraging new development to locate near existing towns and rural settlements and by discouraging poorly designed, land subdivisions and commercial development.

D. Assure clean air, clean water, a healthful environment and good community appearance.

E. Support the development of natural resources including but not limited to timber, mining, oil and gas production and renewable energy production.

F. Continue to work with federal and state agencies to redevelop properties within Cascade County which are currently undergoing Superfund and Brownfields processes.

Goal 3: Maintain agricultural economy.

Objectives:

A. Protect the most productive soil types.

B. Continue to protect soils against erosion.

C. Protect the floodplain from non-agricultural development.

D. Support the development of value-added agricultural industry in Cascade County utilizing the products from the regional area.

Goal 4: Retain the presence of the US Military in Cascade County

Objectives:

A. Encourage the federal congressional delegation to actively support maintaining the current mission status at a minimum.

B. Promote the location of additional military missions in Cascade County.

C. Encourage the reactivation of the runway at Malmstrom Air Force Base for fixed wing operations.

D. Refer to the Joint Land Use Study for resolving conflicts and promoting mission compatible development.

Goal 5: Preserve and enhance the rural, friendly and independent lifestyle currently enjoyed by Cascade County's citizens.

Objectives:

A. Maintain Cascade County's citizens independent lifestyle and minimize local governmental intervention, to the extent possible, consistent with the requirements of a continually evolving economy and constantly changing population.

B. Preserve and promote Cascade County's rich cultural heritage, rooted in natural resource development and reflected in its numerous cultural/historic sites and archaeological areas.

C. Promote fire prevention measures throughout the county, giving special emphasis to the extreme fire hazards present at the wildland-urban interface.

_____

_____

_____

D. Encourage the continued development of educational programs and facilities, recreational opportunities and spaces and health services for all county residents.

_____

_____

_____

ATTEST: I hereby certify that the information given herein is true and correct to the best of my knowledge. There are no restrictions placed upon my property which would prohibit the issuance of this permit. If there are any restrictions, then this permit shall become null and void. I hereby grant permission to any Cascade County Zoning Official to enter my property to inspect for compliance with the County Zoning Regulations in relation to this application.

Printed Name of Applicant: Big Sky Cheese, LLC

Signature of Applicant: _____ Date: April 25/19

Printed Name of Property Owner: Madison Food Park, LLC

Signature of Property Owner: _____ Date: April 25/19

Office Use Only

Fee: ☐ Application ($450.00)
Payment Type: ☐ Check No.: _____ ☐ Cash
Date Application Received: _____
Application Number: _____
ZBOA Public Hearing Date: _____
☐ Completed L/C Application(s) ☐ Completed Use Statement
Date Application Approved: _____
Associated L/C Permit Number(s): _____
Approved Permit Number: _____
Approved by (staff): _____

Review Items		
SUP General Impacts Applicant Response Review		
1.a.	☐ Insufficient	☐ Sufficient
1.b.	☐ Insufficient	☐ Sufficient
1.c.	☐ Insufficient	☐ Sufficient
1.d.	☐ Insufficient	☐ Sufficient
2.a.	☐ Insufficient	☐ Sufficient
2.b.	☐ Insufficient	☐ Sufficient
SUP Growth Policy Criteria Applicant Response Review		
Goal 1. A.	☐ Insufficient	☐ Sufficient
Goal 1. B.	☐ Insufficient	☐ Sufficient
Goal 1. C.	☐ Insufficient	☐ Sufficient
Goal 1. D.	☐ Insufficient	☐ Sufficient
Goal 1. E.	☐ Insufficient	☐ Sufficient
Goal 1. F.	☐ Insufficient	☐ Sufficient
Goal 1. G.	☐ Insufficient	☐ Sufficient
Goal 1. H.	☐ Insufficient	☐ Sufficient
Goal 1. I.	☐ Insufficient	☐ Sufficient
Goal 1. J.	☐ Insufficient	☐ Sufficient
Goal 2. A.	☐ Insufficient	☐ Sufficient
Goal 2. B.	☐ Insufficient	☐ Sufficient
Goal 2. C.	☐ Insufficient	☐ Sufficient
Goal 2. D.	☐ Insufficient	☐ Sufficient
Goal 2. E.	☐ Insufficient	☐ Sufficient
Goal 2. F.	☐ Insufficient	☐ Sufficient
Goal 3. A.	☐ Insufficient	☐ Sufficient
Goal 3. B.	☐ Insufficient	☐ Sufficient
Goal 3. C.	☐ Insufficient	☐ Sufficient
Goal 3. D.	☐ Insufficient	☐ Sufficient
Goal 4. A.	☐ Insufficient	☐ Sufficient
Goal 4. B.	☐ Insufficient	☐ Sufficient
Goal 4. C.	☐ Insufficient	☐ Sufficient
Goal 4. D.	☐ Insufficient	☐ Sufficient
Goal 5. A.	☐ Insufficient	☐ Sufficient
Goal 5. B.	☐ Insufficient	☐ Sufficient
Goal 5. C.	☐ Insufficient	☐ Sufficient
Goal 5. D.	☐ Insufficient	☐ Sufficient

Madison Food Park, LLC
Cascade County Special Use Permit Application
Project Overview & Abstract
April 2019

Project Overview

Madison Food Park, LLC (MFP) has acquired an expansive piece of undeveloped real estate (3018 acres), currently operated as farmland and located between five and eight miles east/southeast of the City of Great Falls corporate limits. MFP's principal owners intend to develop Big Sky Cheese, LLC, a value-added dairy/cheese processing facility. The scope and scale of the proposed Big Sky Cheese project will include, when complete, a state-of-the art, environmentally friendly facility for the processing of fresh milk supplied by local and regional dairy producers into a variety of cheese products.

The principals of MFP anticipate that when the development is complete and the facilities are operating at full capacity, the cheese and dairy processing facility will create approximately 5-10 employment opportunities for laborers as well as skilled and management level positions. In addition, there will be positive impacts felt throughout the business community for local contractors and subcontractors, building material suppliers and other related business enterprises that will support the dairy processing facility and its daily operations.

Cascade County Use Statement Form

Cascade County Public Works Department Planning Division
121 4th St N, Suite 2H-2I
Great Falls, MT 59401
Phone: 406-454-6905 Fax: 406-454-6919

Permit No:_____
App. No.: _____
Applied Date:_____

The Use Statement Form is required for all Special Use Permit applications and is designed to provide pertinent information about the proposed use. It is important that the use statement provides a complete understanding of your proposal. The use statement that you submit must address all the following items that apply to your proposal. Your use statement must be written in on this form or written in a legible manner on a separate sheet of paper and submitted with your Special Use Permit application in print or by email. If your responses are written on a separate sheet of paper, indicate the number of each response corresponding with the item numbers listed below. Where a definite answer cannot be provided for any of the items below, provide an estimate and indicate any uncertainty. Begin by indicating all relevant uses of the proposal below and proceed to address each item. The form will not be considered complete without a signed and dated submission by the landowner and/or applicant.

Use type (check all that apply): ☐ Residential ■ Commercial ☐ Industrial

If the proposed use is residential only then only questions 1-6 are required. For uses that are commercial and/or industrial all questions must be addressed. If the item does not pertain to the proposed use, then indicate that the item does not apply.

1. **Nature of the use - what do you propose to do and how do you plan to do it? Describe in detail.**
   For the response to this and all following criteria, please refer to the attached document.

2. **Access to the site:**

   ■ Public Road ■ Private Road Surface: ■ Paved ☐ Gravel ☐ Dirt

   Indicate the planned access points in the site plan. If a new approach will be required, contact either Montana Department of Transportation or County Road and Bridge Division.

3. **Describe any planned advertising or signage. Include the size, appearance, and placement.**

4. **Will existing buildings be used, or will new buildings be constructed (or both)? Indicate new and old buildings or structures on the required site plan.**

5. **Will any landscaping or fencing be developed? If so, describe the type of landscaping and/or fencing elements planned. Use reference to the site plan for clarity.**

_____

_____

_____

6. **Does the proposed use require any other local, state, or federal permits or licensing? If so, indicate the permits and/or licenses and when they will be acquired. If the permit and/or license has already been acquired, provide the permit and/or license number.**

_____

_____

_____

_____

If the proposed use is residential only, you may stop here and sign at the end of the form.

7. **Operational time limits:**

Months (if seasonal): from _____ to _____

Days per week: _____

Hours: from _____ to _____

Total hours per day: _____

Special activities: _____

Frequency: _____

Hours: from _____ to _____

Are these indoors or outdoors? _____

8. **Expected number of customers or visitors:**

Average per day: _____

Maximum per day: _____

Hours (when they will be there): from _____ to _____

9. **Number of employees:**

Current: _____

Future: _____

Hours they work: from _____ to _____

Do any live on-site as a caretaker? _____

10. **Service and delivery vehicles:**

Number: _____

Type: _____

Frequency: _____

11. **Number of parking spaces for employees, customers, and service/delivery vehicles:**

_____

_____

_____

_____

12. **Are any goods to be sold on-site? If so, are these goods grown or produced on-site or at some other location? Explain.**

_____

_____

_____

_____

13. **What equipment is used? If available, provide pictures or a brochure.**

_____

_____

_____

_____

14. **What supplies or materials are used and how are they stored?**

_____

_____

_____

_____

15. **Does the use produce any of the following by-products which may be considered a nuisance?**

☐ Noise ☐ Glare ☐ Dust ☐ Odor ☐ Smoke

☐ Other _____

If so, explain how this will be reduced or eliminated?

_____

_____

_____

_____

_____

16. **Does the proposed use involve livestock animals? If so, provide the types of livestock and the approximate number of each type of animal involved.**

_____

_____

_____

_____

17. **Will any solid or liquid wastes be produced (other than septic system waste)? If so, list (for each) : (1) the type(s) of waste; (2) the estimated volume of waste; (3) how and where it will be stored; (4) how it will be hauled; (5) where it will be disposed at and how often.**

18. **Estimated volume of water to be used (gallons per day) and the source of water:**

19. **Explain which buildings or what portion of buildings will be used in the operation. Use reference to the indicated structures or buildings in the site plan for clarity.**

20. **Will any buildings or portions of buildings be rented or leased?** ☐ Yes ☐ No

21. **Will any outdoor lighting or an outdoor sound amplification system be used? If so, describe how and when they will be used.**

22. **Is there any other information that will provide a clear understanding of the project or operation?**

ATTEST: I hereby certify that the information given herein is true and correct to the best of my knowledge and acknowledge that the information provided herein may be binding upon issuance of an approved Special Use Permit with conditions.

Printed Name of Applicant: BIG SKY CHEESE, LLC Date: Apr 25/19

Signature of Applicant: Date: Apr 25/19

Printed Name of Owner: MADISON FOOD PARK, LLC Date: Apr 25/19

Signature of Owner: Date: Apr 25/19

Madison Food Park, LLC
Cascade County Special Use Permit Application
Use Statement Form
April 2019

Applicant Responses to County Use Statement Form:

Q1. *Nature of the use - what do you propose to do and how do you plan to do it? Describe in detail.*

R1. Madison Food Park, LLC (MFP) proposes to construct a value-added dairy/cheese processing facility on property totaling 3018 acres, currently operated as farmland and located between five and eight miles east/southeast of the City of Great Falls corporate limits. The dairy processing facility will principally process fresh milk supplied by local and regional dairy producers into a variety of cheese products.

Q2. *Access to the site:*

R2. Legal, public access will be provided to the property from US Hwy 89. Access to the dairy processing facility will be via an ingress/egress route to and from US Hwy 89 on the MFP property. A Montana Department of Transportation approach permit will be required to connect the access route to HWY 89. MDT will determine if any improvements to HWY 89 are necessary to handle the dairy processing facility's traffic, and MFP will be responsible for installing such improvements. All internal roads will be improved with appropriate surfacing materials, including asphaltic concrete paving, Portland cement concrete paving, and gravel surfacing where appropriate.

Q3. *Describe any planned advertising or signage. Include the size, appearance, and placement.*

R3. Signage in the Agricultural zoning district is regulated by Section 8.1 of the zoning regulations. All signage associated with the dairy processing facility is expected to meet these regulations. Section 7.2.0.5 of the regulations prohibits off-premise signage and no such signage is anticipated. MFP expects to have a sign at the entrance to the property to identify the facility as well as various onsite directional signage to direct delivery trucks and customers. Directional signs are permitted by Section 8.1.3.2.2 of the zoning district regulations provided they do not exceed 8 square feet, are not more than 8 feet in height, and do not include advertising. All MFP directional signage will comply with these requirements.

Q4. *Will existing buildings be used, or will new buildings be constructed (or both)? Indicate new and old buildings or structures on the required site plan.*

R4. The Proposed Plan of Operations adopted for Madison Food Park (MFP), as drafted by the project development team, includes the following assumptions related to the design, materials and new construction of the facilities to be located on the MFP site: the primary dairy/cheese processing building footprint will be ~20,000 sf, building construction will incorporate steel framework, steel and/or timber siding, steel roofing, precast and cast-in-place concrete footings, foundations and flooring, and energy-efficient insulated panels. A portion of the building will be two stories and the overall estimated height of the building will be ~30-35 feet.

A supplemental building/shop will be located adjacent to the dairy and will be constructed of materials similar to and compatible with the main dairy building.

No existing buildings will be utilized.

Q5. *Will any landscaping or fencing be developed? If so, describe the type of landscaping and/or fencing elements planned. Use reference to the site plan for clarity.*

R5. Landscaping is not required for land uses in Agricultural districts pursuant to Section 8.18 of the zoning regulations.

Nevertheless, placement of all exterior perimeter fencing and relevant landscaping on MFP property will be designed and constructed in a manner so as to minimize the aesthetic impact on the local landscape. Size, shape, color, etc. of the fencing materials and landscaping designs will be reviewed so as to ensure that, where and when possible, the placement of all fences and landscaping materials complement the natural features of the site. Much of the property will remain in agricultural production, consistent with the primary land use occurring in the area. Additionally, the structures will be located on the interior of the site and more than a mile from any existing dwelling. Therefore, visual impacts will be minimal.

Q6. *Does the proposed use require any other local, state, or federal permits or licensing? If so, indicate the permits and/or licenses and when they will be acquired. If the permit and/or license has already been acquired, provide the permit and/or license number.*

R6. The proposed construction will disturb more than 1.0 acre and will require a DEQ general construction storm water permit. The Notice of Intent and SWPPP will be issued to DEQ, and a permit will be secured prior to the commencement of any onsite earthwork activities. The SWPPP will be updated throughout the project development and the permit will officially be closed-out through DEQ's Notice of Termination process upon reestablishment of onsite vegetation.

As noted previously, the project will also require an MDT approach permit for access to Highway 89. Water Rights and permitting will be completed by MFP's contracted hydrogeologist. Montana DEQ will provide review, approval and permitting for wells, process water treatment and storm drainage facilities associated with the development. A septic permit from Cascade County's sanitarian's office will be required. Building permits will be coordinated with the State of Montana's Department of Labor & Industry. Finally, business licenses will become necessary for operations within the plant.

The items listed in response to this criterion have not been obtained at this time. Instead, they are intended to be pursued subsequent to approval of the SUP.

Q7. *Operational time limits:*

Months (if seasonal): from ___ to_____
Days per week: __
Hours: from ___ to ____
Total hours per day: ___
Special activities: _____
Frequency: Hours: from _____ to_____
Are these indoors or outdoors?_____

R7. Pursuant to the Proposed Plan of Operations adopted for Madison Food Park (MFP), as drafted by the project development team, the business enterprise is expected operate 260 days per year; i.e., 5 days/week. Plant operations during a typical processing day will be 7 a.m. to 4 p.m. Facility cleaning, disinfecting, maintenance and repairs will be completed throughout the day (between batches), from 4 p.m. to 7 p.m. each evening, and on Saturdays from 8 a.m. to 2 p.m. Anticipated activities exterior to the

dairy building will include transport, loading/unloading, security, maintenance, wastewater management, refrigeration, etc.

Q8. *Expected number of customers or visitors:*
*Average # per day:*_____
*Maximum # per day:*_____
Hours (when they will be there): from _____ *to* _____

R8. The dairy will include a small retail area for sampling and purchasing of cheese products. The retail area will operate from 8 a.m. to 4 p.m. The number of visitors will vary on a daily basis but is anticipated to grow to an average of ~35 customers per day; the maximum/peak number of visitors per day may reach 50. MFP will not allow customers/similar visitors within the cheese processing building. Although MFP may at some time in the future host visitors for specific purposes (educational and/or promotional) within certain non-bio-secure areas of the dairy, the principals have adopted a comprehensive bio-security program for the facility and have no intention at this time of offering tours or related public viewing events.

Q9. *Number of employees:*
*Current:*_____
*Future:*_____
*Hours they work: from*_____ *to*_____
*Do any live on-site as a caretaker?*_____

R9. There are currently no employees associated with the plant/operations. It is anticipated there will be 5-10 full-time employees (FTE). Work shifts are discussed in the previous response. No onsite living quarters are planned. The principals of Madison Food Park anticipate that when development is complete and the dairy processing facility is operating at peak capacity, the value-added venture will create employment opportunities and positions for laborers, skilled and management level jobs in the following areas: Cheese/Dairy Processing Facility; Refrigeration: Cheese Products; Utilities; Wastewater Treatment, and Beneficial Reuse

Total Number of Projected Full-time Employment (FTE) Positions: 5-10 FTE (estimated)

Q10. *Service and delivery vehicles:*
*Number:*____
*Type:*____
*Frequency:*____

R10. The Proposed Plan of Operations adopted for Madison Food Park (MFP), as drafted by the project development team, includes the following assumptions related to transport and delivery:
As part of normal operations, the dairy processing facility will receive regular deliveries of fresh milk and regularly export finished cheese products. Supplies used in the manufacturing of cheese will also be delivered to the site. Daily/weekly transport and delivery services and schedules will be coordinated via onsite logistics staffing. Initial estimates of the anticipated volume (number & frequency) of both incoming (dairy) and out-bound (liquid whey and processed value-added cheese) truck traffic are estimated to be as follows (based on estimated liquid delivery capacity of 8,000 gallons):

- Milk Delivery Trucks: average of 1.35 trucks per day
- Liquid Whey Delivery Trucks: average of 1.21 trucks per day

- Value-Added Cheese Delivery Trucks: average of 1 truck per day
- Cheese Manufacturing Supplies, colorant, enzymes, salts, etc.: 1 truck per week
- Packaging Supplies, plastic, cardboard, etc.: 1 truck per week
- Lab samples, UPS/FedEx deliveries/pickups: 1-2 trucks per day
- Mail deliveries/pickups: 1 truck per day
- Garbage/refuse trucks: 2 trucks per week

Based on the projections shown above, MFP anticipates the facility will average 6.86 truck trips per day, or approximately 35 trucks per week. For planning purposes, we will estimate 7 trucks per day.

Q11. *Number of parking spaces for employees, customers, and service/delivery vehicles:*

R11. Based on the number of expected employees, customers, and delivery vehicles associated with the operation of the facility, the dairy processing facility is expected to require approximately 25 parking spaces.

Development within the Agricultural zoning district is required to meet the off-street parking requirements of Section 8.4. Section 8.4.8 requires at least two (2) parking spaces for each three (3) working people on a maximum shift for manufacturing establishments. Section 8.4.9 requires parking lots to be located on the same lot as the building served by the parking lot.

Given the size and topography of the site, there is ample room to accommodate the parking needs for the dairy processing facility in accordance with Section 8.4 of the zoning regulations. All parking will be located on the same lot as the processing facility and there will be no use of any public right-of-way for parking facilities.

Q12. *Are any goods to be sold on-site? If so, are these goods grown or produced on-site or at some other location? Explain.*

R12. The dairy processing building will include a small retail store, allowing customers to sample and purchase the various cheeses which are produced onsite.

Q13. *What equipment is used? If available, provide pictures or a brochure.*

R13. Final selection of the equipment, fixtures and furnishing to be used within the MFP processing facilities is currently under review by the facility design team. In general, each internal process will utilize state-of-the-art, robotically controlled or computer assisted equipment. The dairy/cheese processing facility will incorporate the following equipment:

- Milk receiving equipment, hosing & pumps
- Silos: raw milk storage
- Pasteurizers & mixers
- Centrifugal separation & buffering equipment
- Draining & salting belts
- Cheese curd making vats
- Whey handling equipment & liquid whey storage tanks
- Molds & pressing equipment
- Cheese aging shelving & ripening cave
- Q.C. laboratory

- Packaging equipment: air sealing and labeling machines
- Walk-in coolers & cheese cave
- Testing equipment, boilers, air compressors
- High-pressure washing & sanitation equipment

Q14. *What supplies or materials are used and how are they stored?*

R14. The MFP design and development team anticipates the drafting and adoption of a comprehensive Facility Materials & Supply Storage Plan that will detail the type, source, scale, location, conditions, and special handling instructions for each category and item inventoried onsite which will be used in processing, custodial, disinfecting, sanitation, filtration, treatment, preservation, etc. In general, the supplies and materials utilized in the cheese manufacturing process are as follows:

- pH meters, thermometers, test probes
- Paddles & shovels
- Plastic film wrap & bags
- Cardboard boxes & pallets
- Labels
- Seals, clips & tape
- Casings, pails & lids
- Foil, packing/parchment paper
- Cheese cloth
- Cleaning & sanitation chemicals

All abovementioned supplies and materials will be stored within the dairy/cheese processing building, in cabinets and/or on shelving. Excess supplies will be stored in designated areas within the adjacent shop / storage building.

Q15. *Does the use produce any of the following by-products which may be considered a nuisance?*
Noise?___ Glare?____ Dust?____ Odor?____ Smoke?____ Other?_____
If so, explain how this will be reduced or eliminated?

R15. It should be noted that the entire cheese-manufacturing process will occur inside a fully enclosed building and will not be visible to the general public. Still, it is acknowledged that development of the site with a dairy processing facility will change the appearance of a portion of the property from agricultural use to a value-added manufacturing facility using agricultural products. Most of the property will remain in agricultural production. As with any development, including those permitted in the Agricultural zoning district, such as commercial dairy, the facility has the potential to create some noise, night-time lighting, dust, and odors. These potential impacts can be mitigated as described in this application packet. All bulk materials will be placed within a covered, fully enclosed structure so as to eliminate the potential of creating an unsightly appearance. Proper surfacing of roads and parking areas will minimize dust. Manufacturing operations will occur indoors, minimizing noise impacts. Outdoor lighting will be directed downward to reduce glare. Further, the facility will be located in a rural area with little development and well within the boundaries of the MFP property. The dairy processing facility will be more than a mile from any existing residential dwelling. This distance will create a significant buffer zone that will reduce or eliminate impacts from noise, glare, dust and odors.

Q16. *Does the proposed use involve livestock animals? If so, provide the types of livestock and the approximate number of each type of animal involved.*

R16. The proposed use will rely upon fresh milk which is provided by area producers' livestock and will be delivered to the site via milk delivery trucks; however, no livestock or dairy cows will exist onsite.

Q17. *Will any solid or liquid wastes be produced (other than septic system waste)? If so, list (for each) : (1) the type(s) of waste; (2) the estimated volume of waste; (3) how and where it will be stored; (4) how it will be hauled; (5) where it will be disposed at and how often.*

R17. The Proposed Plan of Operations adopted for the Madison Food Park (MFP), as drafted by the project development team, includes the following assumptions related to the recycling, storage, transport, treatment, beneficial reuse of liquid wastes, and disposal of solid wastes which are generated as byproducts of the environmentally-friendly dairy/cheese processing facility. In addition, estimates have been provided for solid and liquid waste stream volumes identified as typical, related plant operations attributable to employees.

Specifically, initial estimates for the volume of both solid and liquid waste generated directly from the dairy/cheese operations are as follows:

Solid Waste Estimate (Cheese) lbs/day	250
Solid Waste Estimate (Packaging) lbs/day	60
Solid Waste Estimate (Staffing) lbs/day	40
Total Solid Waste Estimate lbs/day	350

Liquid whey 9,716 gpd
(Liquid whey will be hauled to area ranchers and used beneficially as food source)
Liquid waste (process wastewater) 12,960 gpd (10.3 ac-ft/year)
(Treated onsite and reused as irrigation/nutrient source for onsite crops)

Note: Estimates (volume: pounds, tons, cubic yards) with respect to solid waste quantities identified as typical, related plant operations attributable to employees include the following:

100% of all paper based, glass, and plastic products used in the operation of the MFP facilities will be recycled onsite and transported off-site for further value-added processing by strategic partners. The remaining solid waste generated from plant activities which is not recycled will be placed in an estimated 8-cy commercial dumpster as furnished via Montana Waste Systems. The dumpster will be stored on a concrete pad immediately adjacent to the dairy processing building. The dumpster will be enclosed within site obscuring fencing and/or landscaping. It is anticipated the dumpster will be emptied twice per week by Montana Waste Systems. Discarded waste will be transported off-site to the local landfill facility which is located approximately eight miles north of Great Falls.

Q18. *Estimated volume of water to be used (gallons per day) and the source of water:*

R18. The Proposed Plan of Operations adopted for Madison Food Park (MFP), as drafted by the project development team, includes the following assumptions related to the development of and access to a source of onsite water. The development plan for accessing the source of the water required for utilization at MFP includes the drilling and development of 1-2 production wells which will draw water from the Madison Formation located beneath the property. The development team has retained the professional

services of Dave Baldwin, Senior Hydrogeologist/Senior Water Rights Specialist at Hydrosolutions, a Montana-licensed consulting firm.

Projected MFP Dairy Facility Building Water Usage projections (gal/day):
Estimated Water Usage: 12,960 gpd (10.3 ac-ft/yr)

Q19. *Explain which buildings or what portion of buildings will be used in the operation. Use reference to the indicated structures or buildings in the site plan for clarity.*

R19. The Proposed Plan of Operations adopted for Madison Food Park (MFP), as drafted by the project development team, includes the following assumptions related to the utilization of facilities, buildings and related structures in support of the general operations of the dairy/cheese processing facility.
The ~20,000 sf building will be dedicated dairy/cheese processing. The north end of the building will consist of two stories. A retail space will be located on the first floor and the upper floor will include offices, conference rooms and bookkeeping/accounting operations. The south end of the building will house all cheese processing equipment and operations.

The supplemental building/shop will house various maintenance equipment, supplies, utilities, and other items that will support the dairy processing operations.
No existing structures will be utilized at MFP.

Q20. *Will any buildings or portions of buildings be rented or leased?*

R20. The dairy/cheese processing building(s) will be developed by the property owner, Madison Food Park, LLC, and will be leased to the applicant, Big Sky Cheese, LLC.

Q21. *Will any outdoor lighting or an outdoor sound amplification system be used? If so, describe how and when they will be used.*

R21. Outdoor lighting consistent with a value-added manufacturing facility will be installed to provide safety and security. MFP anticipates using state of the art technologies for outdoor lighting to reduce light pollution, including directing lighting downward with full cutoff optics. No outdoor amplification is anticipated other than those necessary for safety and code-compliant operations. The facility will be located more than a mile from the nearest dwelling, reducing the potential for impacts from lighting and noise.

Q22. *Is there any other information that will provide a clear understanding of the project or operation?*

R22. Please refer to the responses included within the SUP application.

Madison Food Park, LLC
Cascade County Special Use Permit Application
SUP Criteria – Expanded Responses
April 2019

Included below are the responses to "SUP General Impacts Criteria" located within the Cascade County Special Use Permit Application. Original permit application text is included in *italics*.

Explain how the proposed use contributes to, hinders, or otherwise impacts each of the criteria below. All criteria must be discussed. If criteria are not applicable, please explain why. Attach drawings, additional text, site plans, and any other documents that will assist staff and the board in reviewing the proposed use. The more information you can provide, the easier it is for staff and the Zoning Board of Adjustment to review the application.

1. *The proposed development will not materially endanger the public health or safety.*

   a) *Traffic conditions in the vicinity, including the effect of additional traffic on streets and street intersections, and sight lines at street intersections and approaches:*

Response: As shown on the attached exhibits, the property is adjacent to US Hwy 89 R/W and is located between five and eight miles east/southeast of the City of Great Falls corporate limits, and traffic to/from the site will be via US 89 approximately 3.5 miles east of the Stockett Rd intersection.

The average daily traffic (ADT) near the site as measured in 2017 is 4342 vehicles per day. This count was measured on US Hwy 89, east of the Stockett Rd intersection. The traffic volume drops slightly to 4118 (2017 ADT) just west of Belt. The dairy processing facility is estimated to generate additional traffic as follows:

- Milk, liquid whey, delivery trucks, etc.: average seven (7) vehicle trips per day
- Staffing/employees: average eleven (10) vehicle trips per day
- Retail customers: average thirty (35) vehicle trips per day

The development is anticipated to generate an added 52 vehicle trips per day, a one-percent increase over the current ADT.

Peak daily traffic impacts are expected to occur just prior to and after work shifts, generating approximately ten (10) additional vehicle trips between 6:30 and 7:00 a.m. and again between 4:00 and 5:00 p.m. The majority of vehicles will likely be entering from the west and exiting to the west.

The Montana Department of Transportation will require an approach permit to connect the access roads to Hwy 89 and may require a traffic impact study (TIS) for the purpose of identifying any/all requirements for mitigating traffic impacts, including dedicated turn lanes at the proposed project approach, or the use of other mitigating measures as may be required by the review authority (Montana Department of Transportation). The TIS will be completed by a Montana-licensed professional engineer with the appropriate qualifications and experience.

If any improvements to Hwy 89 are required as a result of the TIS (turning lanes, signalization, etc.), MFP will be responsible for the cost of such improvements.

The Cascade County Zoning Regulations permit a wide range of uses in the Agricultural Zoning District, including many that generate significant amounts of traffic such as campgrounds and recreational vehicle parks, commercial dairies, power plants, and community centers. Additionally, an even wider variety of land uses which generate significant levels of traffic are allowed via a special use permit, including

quarries, veterinary clinics, mobile home parks, equipment rental and sales facilities, hospitals, and many others. Therefore, the Zoning Regulations anticipate and accommodate land uses generating traffic.

The MFP facility will create an additional amount of traffic that can easily be handled by Hwy 89 without affecting its level of service. Turning movements in and out of the facility onto Hwy 89 may require some improvements to Hwy 89 consistent with development of this nature. MFP is prepared to make such improvements as may be required by the Montana Department of Transportation. The amount of traffic generated by the MFP is consistent with both permitted land uses and those allowed and anticipated by the zoning regulations and will not have a material, negative effect on traffic conditions.

b) *Provision of services and utilities, including sewer, water, electrical, telecommunications, garbage collections, and fire protection:*

Response: The dairy processing facility will be served by onsite water and wastewater facilities. Wastewater treatment will be completed onsite using Montana DEQ-approved wastewater treatment system(s). Commonly practiced treatment technologies will be used for managing both domestic and process waste streams, and beneficial reuse of treated effluent will be performed in a manner that is compliant with DEQ and local government regulations. The overall volume of process wastewater generated from dairy operations is estimated at approximately 13,000 gallons per day (gpd). With the 5 day/week operation, this will result in approximately 339,000 gallons of process wastewater each year.

The process wastewater will be pretreated using nutrient reduction/removal technologies, then seasonally stored in treatment/holding cells, followed by beneficial reuse in the form of land application of treated effluent on approximately 10-15 acres of cropland, either onsite or on adjacent farmland.

MFP may employ a technology called acidification to treat process wastewater before seasonal storage and beneficial reuse via land application / irrigation. Acidification is a robust, automated process commonly at dairy processing facilities and primarily consists of the following:

- Equalization
- pH adjustment
- Dissolved Air Floatation
- Sedimentation
- Solids dewatering (as needed)

The acidification process equipment, if deemed necessary, will be housed inside the processing facility before exiting to the seasonal storage ponds. All liquid whey will be stored onsite until it can be hauled away and used as feed by area ranchers. The total liquid whey production is estimated at approximately 9,720 gpd.

Domestic wastewater generation is expected to be the equivalent of approximately a single residence, or less than 300 gpd. Domestic wastewater will be treated and disposed via a conventional septic tank and drainfield, all in strict compliance with DEQ and local standards and regulations.

Water for the dairy operations, fire flows and domestic usage will be supplied to the dairy via onsite wells, a series of transmission mains and storage tanks.

The water and wastewater systems for the site must be reviewed and approved by the Montana DEQ. Fire protection will be provided via onsite storage tanks and booster pumps.

Natural gas service to the property will be provided via Energy West and electrical service will be provided by NorthWestern Energy. Telecommunications will likely be provided by Charter or CenturyLink through new service lines to the proposed development. The MFP principals are also

considering the use of wind turbines and solar farms for the generation of supplemental electrical power and are also considering a system for the possible capture and reuse of methane gas.

c) *Soil erosion, sedimentation, and stormwater run-off:*

Response: Construction and development of the dairy processing facility will include the construction of access roads, dairy processing buildings, parking lots, wastewater treatment and disposal facilities, and related items. This construction is consistent with permitted land uses in the Agricultural Zoning District. In the short-term, during construction, there will be an increased possibility of soil erosion and stormwater run-off consistent with typical construction activities. Traditional erosion and sediment control best management practices (BMPs) will be utilized during construction which will include but are not limited to silt fences, straw waddles, and storm water detention and retention ponds.

As the site disturbance will be over 1 acre, a DEQ "General Permit for Storm Water Discharges Associated with Construction Activity" permit will be required and will address and mitigate soil erosion and sedimentation during construction. This permitting process will involve the submission of a Notice of Intent (NOI) and Storm Water Pollution Prevention Plan (SWPPP) to DEQ. Additionally, the SWPPP will need to be updated and maintained throughout the course of the project. Upon completion of work and after final site stabilization has been completed, a Notice of Termination (NOT) will be submitted to DEQ, at which time the permit will officially terminated.

BMP's suggested by the DEQ will be utilized throughout construction to maintain water quality and minimize soil erosion. Following construction, stormwater runoff will be collected within onsite detention and retention/treatment basins and discharged at predevelopment rates in strict accordance with DEQ Circular 8.

Soils at the proposed dairy building are generally described by NRCS as Lawther-Gerber Complex (8%-15% slopes) and Gerber-Lawther Silty Clays (4%-8% slopes). These soils predominantly consist of silty clays and silty clay loams and they are defined as "well drained." The soils are further defined as have no frequency of flooding and no frequency of ponding. NRCS indicates these soil types have a "capacity of the most limiting layer to transmit water to transmit water" as moderately low to moderately high at 0.06-0.20 inch/hour.

The existing topography is generally rolling hills with moderate slopes. The north side of the property drains northerly toward the MDT R/W. Storm drainage from the north side of the property will eventually reach the Missouri River. The south side of the property drains south and west into Antelope Creek and eventually enters Sand Coulee Creek, which also discharges to the Missouri River just upstream and south of City of Great Falls.

Upon completion of construction, there are no anticipated significant impacts for erosion, sedimentation, and stormwater runoff. Impacts will be consistent with an increase in impervious surfaces; however, these impacts will be mitigated using appropriate BMPs, storm water detention, and other applicable regulatory requirements. Revegetation of disturbed areas combined with proper storm water collection and detention as required by the DEQ's storm water permit will minimize impacts to the site. Additionally, water leaving the site will be properly treated (i.e. sediment removal) and flows will be maintained at predevelopment rates.

d) *Protection of public, community, or private water supplies, including possible adverse effects on surface waters or ground water:*

Response: There are no public, community, or private water supplies on the property. There are a variety of private wells adjacent to the property primarily serving individual homes and agricultural operations. It appears that all such wells are located at least one mile from the proposed dairy processing facility.

The dairy operations will require process water with estimated volumes of ~13,000 gpd, which equates to 10.4 acre-feet/year. It has been demonstrated that the underlying Madison formation can easily satisfy these volumes. The depth to the Madison formation at this location is estimated to be 400-500 feet bgs (below ground surface) and the aquifer is estimated to be 350-500 feet in thickness. A well contractor will be employed to construct a test well and provide test pumping so as to demonstrate that existing wells on adjacent properties will experience no adverse impacts.

A new public water supply will then be constructed to serve the development. Well construction and protection requirements of DEQ Circulars 1 & 3 and the Administrative Rules of Montana will be strictly adhered to so as to protect the new public water supply and groundwater within the general vicinity of the project.

Surface waters in the vicinity of the project will be protected by maintaining effective runoff collection and conveyance systems to direct stormwater to onsite detention ponds where it can be detained and treated prior to discharge. Discharge will be restricted to predevelopment rates.

All wastewater treatment and/or storage ponds will be designed such that they are safeguarded against impacts to local groundwater and surface water by utilizing adequate liners and/or best management practices to avoid leaks and spills. Additionally, all setback distances as required by the Montana DEQ will be strictly maintained between water supply wells and potential hazards so as to limit contamination potential.

2. *The proposed development is a public necessity, or will not substantially impact the value of adjoining property.*

   a) *The relationship of the proposed use and the character of development to surrounding uses and development, including possible conflicts between them and how these conflicts will be resolved.*

Response: Land uses in the vicinity primarily consist of large-scale agricultural operations and associated rural residential uses. The dairy processing facility will be located more than one mile from any existing dwelling or agricultural buildings. Possible conflicts are expected to be minimal, but could include additional traffic, visual changes (additional buildings, night-time lighting), and some noise. Yet, MFP's design team will utilize buffering features to help mitigate noise and visual impacts whenever possible.

The proposed development is agriculturally based and thereby complements existing uses of the surrounding properties. Additionally, the facility is proposed to be centrally located within the relatively large subject properties which will help eliminate any potential conflicts with surrounding land uses. Visual impacts can be mitigated using strategic landscape placement and by implementing exterior lighting technologies to direct lighting downward to reduce or eliminate glare and offsite lighting "pollution." Traffic has been addressed previously in this document.

Permitted land uses in the Agricultural zoning district have the potential to create similar conflicts. Agricultural operations, by their nature, tend to generate dust and odors associated with tilling, planting, harvesting, and the use of chemicals. Commercial dairies generate their own impacts from odors and have increased waste management needs. The MFP dairy processing facilities impacts will be similar to those land uses already permitted by the zoning district and can be mitigated using readily available measures.

b) Whether the proposed development is so necessary to the public health, safety, and general welfare of the community or County as a whole as to justify it regardless of its impact on the value of adjoining property.

Response: This consideration is an alternative to the previous one and need not be met. This consideration exists to allow approval of a special use permit in the rare instance that a proposed land use is so important that its impacts should be accommodated. MFP is not making such a claim with respect to its dairy processing facility.

All development allowed by the zoning district regulations, whether as a permitted use or as one requiring a special use permit, creates some level of impact. This is expected and appropriate. All potential impacts created by MFP's dairy processing facility can and will be appropriately mitigated and minimized such that there will be no appreciable impact on public health, safety, and the general welfare of the community or County. Additionally, the facility will also provide some benefits via increased tax base and the addition of jobs for area residents and will utilize milk that is produced in and around Cascade County and throughout northcentral Montana.

3. The proposed development will be in harmony with the area in which it is located.

a) The relationship of the proposed use and the character of development to surrounding uses and development, including possible conflicts between them and how these conflicts will be resolved.

Response: Land uses in the vicinity primarily consist of large-scale agricultural operations and associated rural residential uses. As noted on Montana Cadastral (refer Exhibit B), the surrounding area is comprised of agriculturally zoned properties with areas of animal grazing, fallow land, and wild hay. Some surrounding properties contain single-family residential dwellings.

The proposed project consists of a dairy processing plant and will include spray-irrigated agricultural ground. MFP acknowledges that the dairy processing facility itself is different than land uses in the immediate vicinity. However, the dairy processing facility is a "value-added agricultural commodity processing facility" that is permitted with a special use permit. The manufacturing, processing and storage components of the dairy processing facility are specifically contemplated by the zoning district regulations. The impacts associated with its operation have been discussed in this application along with the means to mitigate such impacts such that the facility can exist in harmony with other area land uses. While not required by the County's zoning regulations, no buildings or operations will be located within one mile of existing residences. This one-mile buffer will help mitigate any perceived conflicts with the existing residences and maintain compatible land uses with the other surrounding properties. Large portions of the property will remain in agricultural production which is consistent with and in harmony with adjacent land uses.

b) Consistency with the municipal and joint land use plans incorporated by the Growth Policy.

Response: The proposed project is located within the Military Overlay District surrounding Malmstrom AF Base. The project site is located within the outer horizontal surface meaning structures are restricted in height to a maximum of 500' above the established airfield elevation which will be maintained by all proposed structures. The potential implementation of wind turbines for renewable energy generation will be coordinated with the FAA, Cascade County, and MAFB as needed.

SUP Growth Policy Criteria

Explain how the proposed use will be consistent with each of the Cascade County Growth Policy goal objectives. All objectives must be discussed. If an objective is not applicable, please explain why. The more information you can provide, the easier it is for staff and the Zoning Board of Adjustment to review the application.

Goal 1: Sustain and strengthen the economic well-being of Cascade County's citizens.

Objectives:

A) Stimulate the retention of existing businesses and expansion of existing businesses, new businesses, value-added businesses, wholesale and retail businesses, and industries including agriculture, mining, manufacturing/processing and forest products.

Response: The proposed development will be agriculturally based and will use dairy products provided by area farmers and ranchers which will help boost the local agricultural economy and maintain existing ag-based businesses in the area. The proposed development will be a new addition to the agricultural industry in the area. The new value-added business will expand the potential marketplace for milk-producing entities in the state and help expand the existing dairy market while providing locally-produced dairy products for local consumption.

B) Stabilize and diversify the county's tax base by encouraging the sustainable use of its natural resources.

Response: As noted above, the proposed project will increase the County's tax base with the implementation of this project. Additionally, process water utilized within the dairy processing operations will be treated, stored and reused, beneficially to spray irrigate onsite and/or nearby crops. The wastewater treatment and spray irrigation will also ensure that local and area farmlands are maintained as part of the project. As noted previously, MFP is researching the possibility of incorporating wind turbines, solar energy, and other renewable energy alternatives to utilize sustainable resources and offset some of the energy requirements for the site.

C) Identify and pursue primary business development that complements existing business, which is compatible with communities, and utilizes available assets. Identify and pursue targeted business development opportunities to include, but not limited to, manufacturing/heavy industry, telecommunication, and youth/social services.

Response: The proposed business is primarily agriculturally based which complements the existing primary business of area residents and maintains compatibility with the surrounding area and County as a whole. The business will also utilize dairy products provided by area residents which will help strengthen the local economy.

D) Promote the development of cultural resources and tourism to broaden Cascade County's economic base.

Response: The proposed development has the potential to help develop tourism and cultural resources within the County as the added taxes collected from the development are put into beneficial use. Although the dairy facilities located within the MFP Development may consider offering promotional/educational opportunities for the public to view specific aspects of the operations in the future, the principals have adopted a comprehensive bio-security program for the entire site and have no intention at this time of

offering tours or related public viewing events. Given the facility's location and the buffer zone provided by the size of the property relative to the location of development, the dairy processing facility will have no impact on cultural resources or existing tourism opportunities.

E) Foster and stimulate well-planned entrepreneurship among the county's citizenry.

Response: The MFP Development project has the potential to act as an economic catalyst for both aligned and peripheral value-added agriculture business ventures and entrepreneurial start-ups to locate their business enterprises in Cascade County to take advantage of the capacity, infrastructure, and market access directly created by the MFP development. Cascade County is well known for its agricultural production and heritage. Adding facilities like MFP's dairy processing plant help encourage the continuation of this agricultural tradition by providing a nearby market for agricultural products.

F) Promote a strong local business environment. Encourage and strengthen business support mechanisms such as chamber of commerce, development organizations and business roundtable organizations.

Response: Extensive investment in infrastructure by the principals in MFP, working in collaboration with both the County and State, will provide the local business community, local government, and community development corporations with a necessary tool to promote business development across the region. In addition, the local chamber, economic development organizations, and business promotional groups will have the opportunity to promote development and additional investment by demonstrating the commitment made by MFP in developing its operations locally.

G) Improve local trade capture for Cascade County businesses. Promote local shopping as well as well-planned businesses and new businesses.

Response: As indicated in the initial projection compiled by principals of the MFP development, when operating at peak capacity, the dairy processing facility will directly employ 5-10 fulltime employees. The projected influx of workers and their families will have a positive economic impact on the community, including existing and expanding business enterprises such as manufacturing, wholesale, retail, distribution, etc.

H) Network with and support other economic development efforts in the region and statewide, in recognition of Cascade County's interdependence with other communities and to leverage available local resources.

Response: See previous responses.

I) Encourage the growth of the agricultural economy.

Response: The central development concept guiding the MFP project is the support and expansion of local dairy farms, stabilization of related markets and expansion of product supply chains, along with investment in agribusiness-based enterprises which directly support farmers and ranchers across the golden triangle and the state of Montana. By demonstrating its commitment to supporting the plight of Montana's most vital agricultural industries, the principals of MFP fully anticipate that both producers and an assortment of businesses which rely upon their survival and success will commit their support and resources to building on the momentum created by MFP dairy processing project.

J) Stimulate the growth of the economy by encouraging the use of alternative methods of energy production, including wind energy.

Response: The principals of MFP are committed to introducing green technology to the property in the near future, where possible and if deemed feasible. At present, MFP is in discussions with renewable energy companies and will continue to consider technologies that may be viable for the site and would complement the dairy processing facility. The design and development of the facility will reflect a commitment to incorporating alternative energy and energy efficient technology, whenever possible.

Goal 2: Protect and maintain Cascade County's rural character and the community's historic relationship with natural resource development.

Objectives:

A) Foster the continuance of agriculture and forestry in recognition of their economic contribution and the intrinsic natural beauty of grazing areas, farmlands and forests.

Response: As noted above, the ongoing agricultural operations will include irrigated farmlands for the beneficial reuse of treated effluent. Additionally, the proposed buffer around the facility will maintain existing ag-related lands to help maintain compatibility with adjacent farm and grazing lands. Additionally, the availability of additional water for irrigation of crops will help entice continued agricultural use of the property as potential crop yields are increased.

B) Preserve Cascade County's scenic beauty and conserve its forests, rangeland and streams, with their abundant wildlife and good fisheries.

Response: The property at which the proposed MFP project will occur is currently utilized for both livestock grazing and dryland farming which will be maintained to the greatest extent possible following the development. Available land following the project development will continue to be utilized for farming activities to both preserve the existing land use as well as provide an optional location for the beneficial reuse of treated effluent via spray irrigation. No streams or existing fisheries will be impacted by the proposed project.

C) Preserve Cascade County's open space setting by encouraging new development to locate near existing towns and rural settlements and by discouraging poorly designed, land subdivisions and commercial development.

Response: As noted above, the project is agriculturally based and the developed parcel will house the proposed structures, wastewater treatment and storage system components, and farmland for the beneficial reuse of treated effluent; therefore, developing the project near an existing town was not feasible. The project does include large areas of open space and farmland which will maintain the County's existing open space setting. As noted above, the facility will be located near the center of the large property and a minimum of one mile from any existing residence which will help minimize any encroachment on surrounding properties. The development is being designed by a team of trained professionals who specialize in large-scale developments and subdivisions as well as food processing plants of this nature.

D) Assure clean air, clean water, a healthful environment and good community appearance.

Response: The design firms retained for the dairy processing facility have been tasked with creating aesthetically appeasing design features, as well as incorporating native plant species and strategic placement of buildings to take full advantage of the natural contours that are considered central features to

the property. The development plan will include design measures directly targeted at mitigating odors, noise and light pollution. The principals of MFP are committed to planning and design concepts, construction materials and landscape features to ensure that clean air, water and a healthful environment are maintained during construction as well as after the dairy processing facility is in full operation.

E) Support the development of natural resources including but not limited to timber, mining, oil and gas production and renewable energy production.

Response: While MFP will not directly support development of timber, mining or oil & gas production, renewable energy options are being considered for the property if and when deemed feasible.

F) Continue to work with federal and state agencies to redevelop properties within Cascade County which are currently undergoing Superfund and Brownfield processes.

Response: The project is not located in an area undergoing Superfund or Brownfield processes.

Goal 3: Maintain agricultural economy.

Objectives:

A) Protect the most productive soil types.

Response: Refer to the attached NRCS soil report. As shown on the soil report, portions of the property acquired by MFP are considered Prime Farmland or Farmland of Statewide Importance. As noted above, a large portion of the site will, following development of the dairy processing facility, continue to be utilized for agricultural activities. Additionally, the value-added agriculture development will encourage further utilization of existing farm and rangeland within Cascade County and the surrounding area.

B) Continue to protect soils against erosion.

Response: During construction activities, the site will be required to meet Montana DEQ standards for erosion protection through the general construction storm water permitting process. A storm water pollution prevention plan (SWPPP) will be prepared by properly trained and certified personnel, and temporary Best Management Practices (BMPs) will be implemented onsite to minimize erosion during the course of construction and to prevent adverse impacts to receiving waters (i.e. Missouri River). Following construction, permanent BMPs will be implemented so as to minimize erosion on slopes within the steeper portions of the property while agricultural activities will remain on other open spaces within the property which will effectively protect against erosion.

C) Protect the floodplain from non-agricultural development.

Response: The proposed project is located outside of the FEMA flood map boundaries; however, it appears as though the lower portion of Antelope Coulee is included within the 100-year floodplain at its intersection with Sand Coulee Creek (refer to attached excerpt from FIRM panel 30013C0634E). Due to the steep banks of Antelope Coulee within the vicinity of the subject property, it is not anticipated that the floodplain is extensive within the subject property. Work activities will not occur within the active streambed or within the floodplain, and the creek will be protected from non-agricultural development.

D) Support the development of value-added agricultural industry in Cascade County utilizing the products from the regional area.

Response: As noted previously, the intent of the proposed project is to develop a value-added dairy processing facility using milk generated by area producers which directly supports the development of a value-added agriculture industry.

Goal 4: Retain the presence of the US Military in Cascade County

Objectives:

A) Encourage the federal congressional delegation to actively support maintaining the current mission status at a minimum.

Response: While the applicant's proposed development will not directly impact the US Military's operations in Cascade County, the applicant recognizes the importance and value of the current military missions and what they mean to the County and Northcentral Montana. The applicant will take an active role in local civic duties and responsibilities, as managers and employees of the plant become acquainted with and involved in the Great Falls business community (i.e., Great Falls Chamber of Commerce, Military Affairs Committee, etc.). Additionally, the location of MFP is strategically located to not adversely impact the existing or future missions at MAFB.

B) Promote the location of additional military missions in Cascade County.

Response: The applicant hereby pledges its support to Cascade County in promoting additional military missions in Cascade County. Also, please see response to Goal 4 Objective A above.

C) Encourage the reactivation of the runway at Malmstrom Air Force Base for fixed wing operations.

Response: The applicant hereby pledges its support to Cascade County in reactivating the runway at MAFB for fixed wing operations. Also, please see response to Goal 4 Objective A above. The dairy processing facility will not have any impact on the possibility of reactivating the runway. All components of the development will comply with the Military District Overlay requirements.

D) Refer to the Joint Land Use Study for resolving conflicts and promoting mission compatible development.

Response: The applicant hereby acknowledges there are certain building placement and height restrictions adjacent to and in the vicinity of Malmstrom Air Force Base. Such restrictions are further defined within the Joint Land Use Study. The applicant is prepared to resolve any potential conflicts so as to ensure mission-compatible development. The subject property is located within the Outer Horizontal Surface as detailed within the Joint Land Use Study and therefore vertical obstructions cannot exceed 500 feet tall from the established airfield elevation which should pose no design challenges to the dairy processing facility. Also, please see response to Goal 4 Objective A above.

Goal 5: Preserve and enhance the rural, friendly and independent lifestyle currently enjoyed by Cascade County's citizens.

Objectives:

A) Maintain Cascade County's citizens' independent lifestyle and minimize local governmental intervention, to the extent possible, consistent with the requirements of a continually evolving economy and constantly changing population.

Response: The proposed project will not impact the County's citizen's independent lifestyle and will not require local governmental intervention.

B) Preserve and promote Cascade County's rich cultural heritage, rooted in natural resource development and reflected in its numerous cultural/historic sites and archaeological areas.

Response: As noted previously, the principals of MFP are committed to making a significant investment in bringing green technology to the dairy processing facility. This commitment to green energy will reduce the natural impacts associated with the project and will help maintain the existing natural resources. Additionally, to the greatest extent possible, the treatment of process wastewater and reuse of effluent will allow MFP to recycle and beneficially use the water for agricultural purposes. The proposed project will be located on previously cultivated ground which will minimize the potential for impacting existing historical or archaeological sites. The Montana State Historical Society (SHPO) was contacted regarding potential cultural resources at the proposed project site and their response stated that no cultural resources were located within their files for the property. Per the SHPO response letter, "As long as there will be no new ground disturbance or alteration to structures over fifty years of age we feel that there is a low likelihood cultural properties will be impacted."

C) Promote fire prevention measures throughout the county, giving special emphasis to the extreme fire hazards present at the wild land-urban interface.

Response: The project will incorporate onsite storage and pumps to provide onsite fire prevention measures to the structures. Additionally, the onsite fire storage may be available for adjacent properties in the event of emergencies, if necessary, as a hydrant can be placed onsite for local fire department use. The fire storage which may be used for regional firefighting activities will benefit all residents and land owners in the general vicinity of the project.

D) Encourage the continued development of educational programs and facilities, recreational opportunities and spaces and health services for all county residents.

Response: The principals of the MFP development intend to develop training and apprenticeship opportunities with Montana State University and local colleges to aid in the preparation of local residents for job opportunities offered at the MFP. These educational programs will also work to educate the community on the MFP and its operation. While the project will not directly impact the development of educational programs and facilities, recreational opportunities and spaces, and health services, it will help the County continue to develop those programs and opportunities for the County's residents through the added tax base and the additional budget available through the collection of those taxes.

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bsc&e
BIG SKY CIVIL & ENVIRONMENTAL, INC
ENGINEERS - PLANNERS - DESIGNERS - LAND SURVEYORS - ENVIRONMENTAL SPECIALISTS

1324 13th Ave. SW
P.O. BOX 3625
GREAT FALLS, MT 59403
(406)727-2185 OFFICE
(406)727-3656 FAX
www.bigskyce.com

PROFESSIONAL SEAL

BY: KJM
DATE: 4/17/19

OWNER:

MADISON FOOD PARK, LLC

PROJECT NAME:

MADISON FOOD PARK

SHEET TITLE:

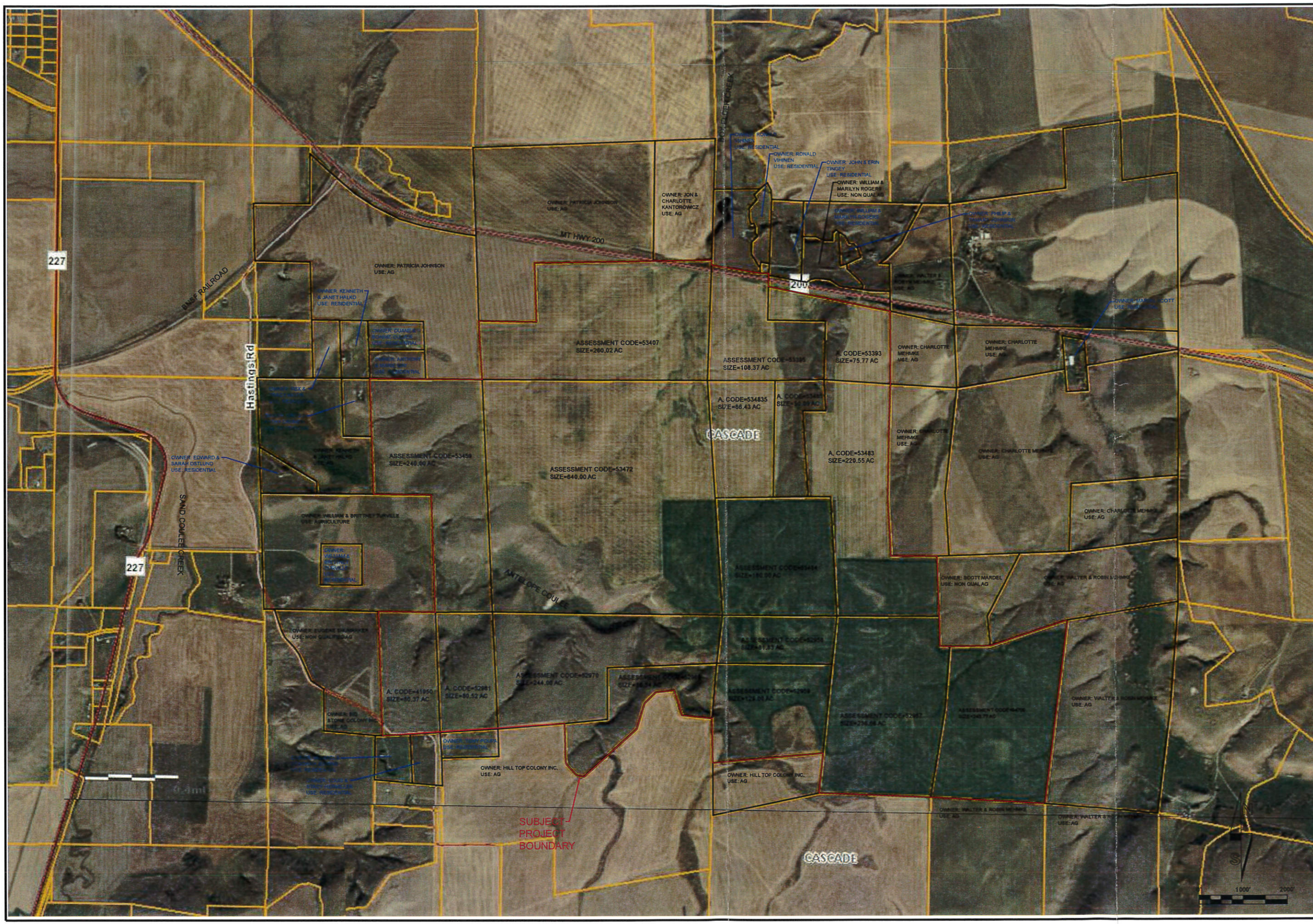
SITE AERIAL MAP DAIRY/CHEESE PLANT

DRAWING INFORMATION:

OFFICE PROJECT NUMBER:	17BN
OWNER FILE NUMBER:	XXXX
CADD FILE NAME:	17BN-BASE
ASSOCIATED PROJECTS:	XXXX

FIGURE:

EXHIBIT A



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(406)727-3656 FAX
www.bigskyce.com

PROFESSIONAL SEAL

BY: KJM

DATE: 4/17/19

OWNER:

MADISON FOOD PARK, LLC

PROJECT NAME:

MADISON FOOD PARK

SHEET TITLE:

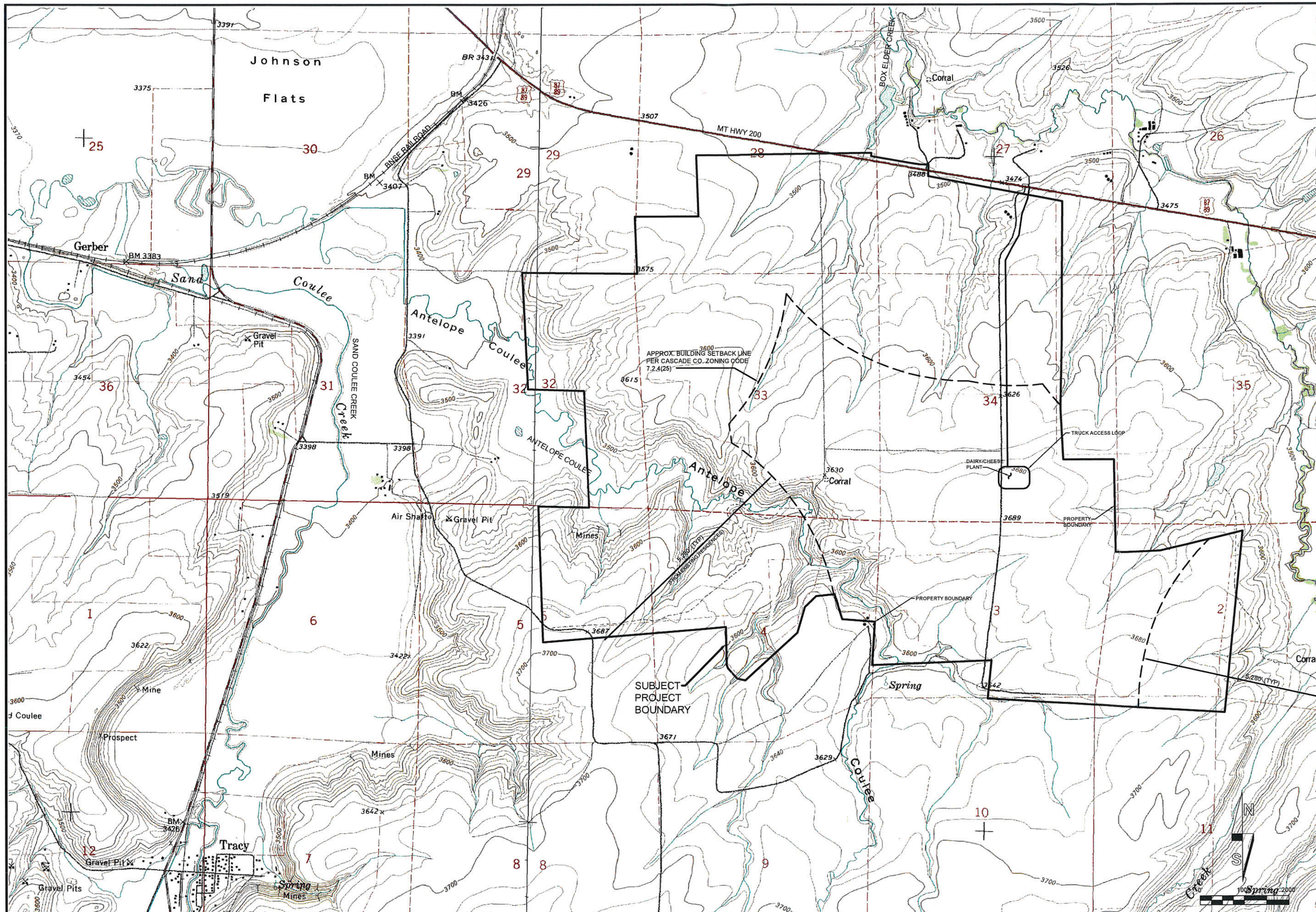
PROPERTY OWNERSHIP & LAND USE MAP DAIRY/CHEESE PLANT

DRAWING INFORMATION:

OFFICE PROJECT NUMBER:	17BN
OWNER FILE NUMBER:	XXXX
CADD FILE NAME:	17BN-BASE
ASSOCIATED PROJECTS:	XXXX

FIGURE:

EXHIBIT B



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PROFESSIONAL SEAL

BY: KJM

DATE: 4/17/19

OWNER:

MADISON FOOD PARK, LLC

PROJECT NAME:

MADISON FOOD PARK

SHEET TITLE:

SITE CONTOUR MAP DAIRY/CHEESE PLANT

DRAWING INFORMATION:

OFFICE PROJECT NUMBER:	17BN
OWNER FILE NUMBER:	XXXX
CADD FILE NAME:	17BN-BASE
ASSOCIATED PROJECTS:	XXXX

FIGURE:

EXHIBIT C

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PROFESSIONAL SEAL

BY: KJM
DATE: 4/17/19

OWNER:

MADISON FOOD PARK, LLC

PROJECT NAME:

MADISON FOOD PARK

SHEET TITLE:

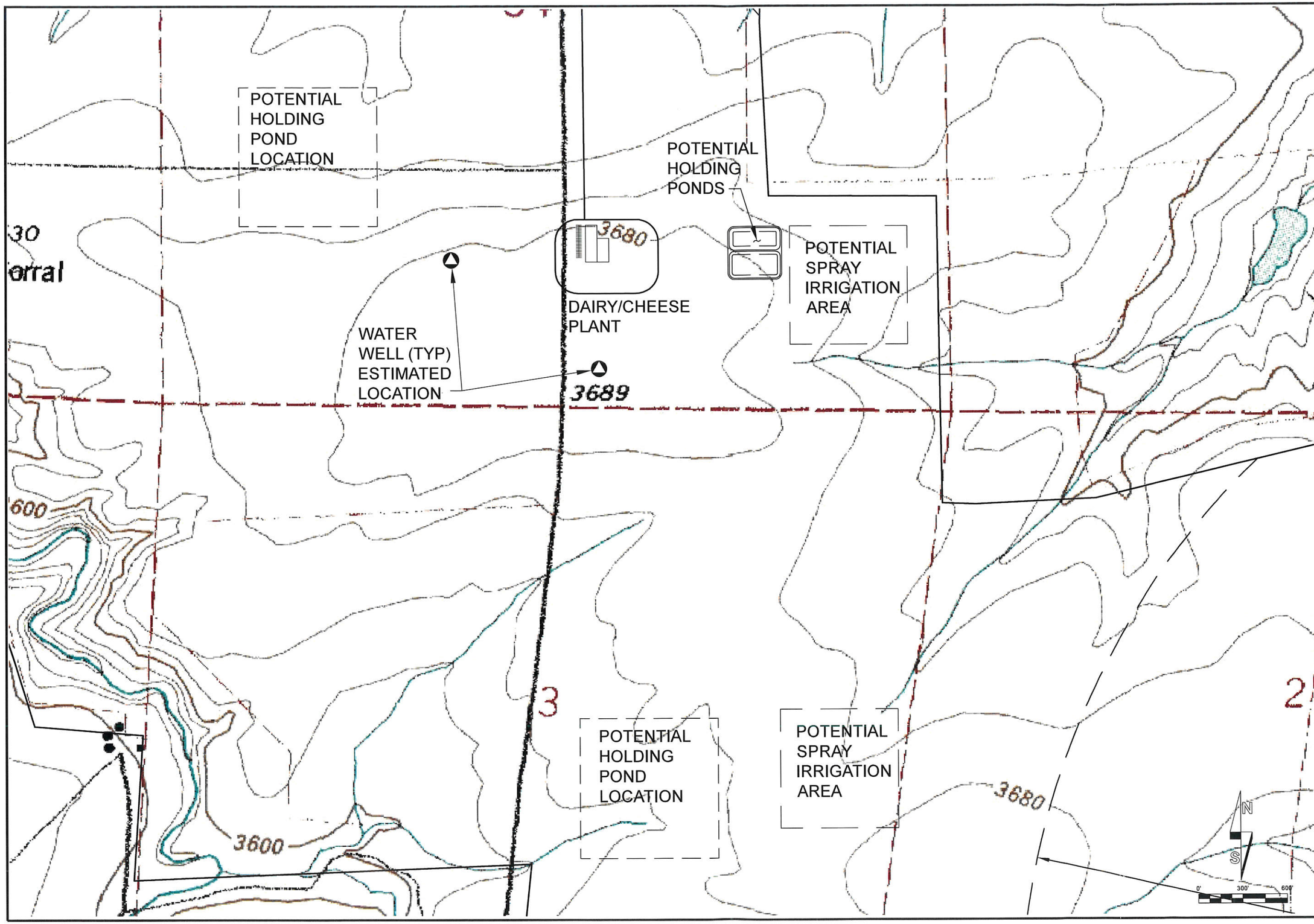
DRAFT SITE MAP DAIRY/CHEESE PLANT

DRAWING INFORMATION:

OFFICE PROJECT NUMBER:	17BN
OWNER FILE NUMBER:	XXXX
CADD FILE NAME:	17BN-BASE
ASSOCIATED PROJECTS:	XXXX

FIGURE:

EXHIBIT D



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(406)727-2185 OFFICE
(406)727-3656 FAX
www.bigskyce.com

PROFESSIONAL SEAL

BY: KJM
DATE: 4/17/19

OWNER:
MADISON FOOD PARK, LLC

PROJECT NAME:
MADISON FOOD PARK

SHEET TITLE:
SITE CONTOUR MAP DAIRY/CHEESE PLANT

DRAWING INFORMATION:
OFFICE PROJECT NUMBER: 17BN
OWNER FILE NUMBER: XXXX
CADD FILE NAME: 17BN-BASE
ASSOCIATED PROJECTS: XXXX

FIGURE:
EXHIBIT E

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Montana State Plane Zone (FIPS zone 2500). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from NAIP Orthophotography produced with a one meter ground resolution from photography dated 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

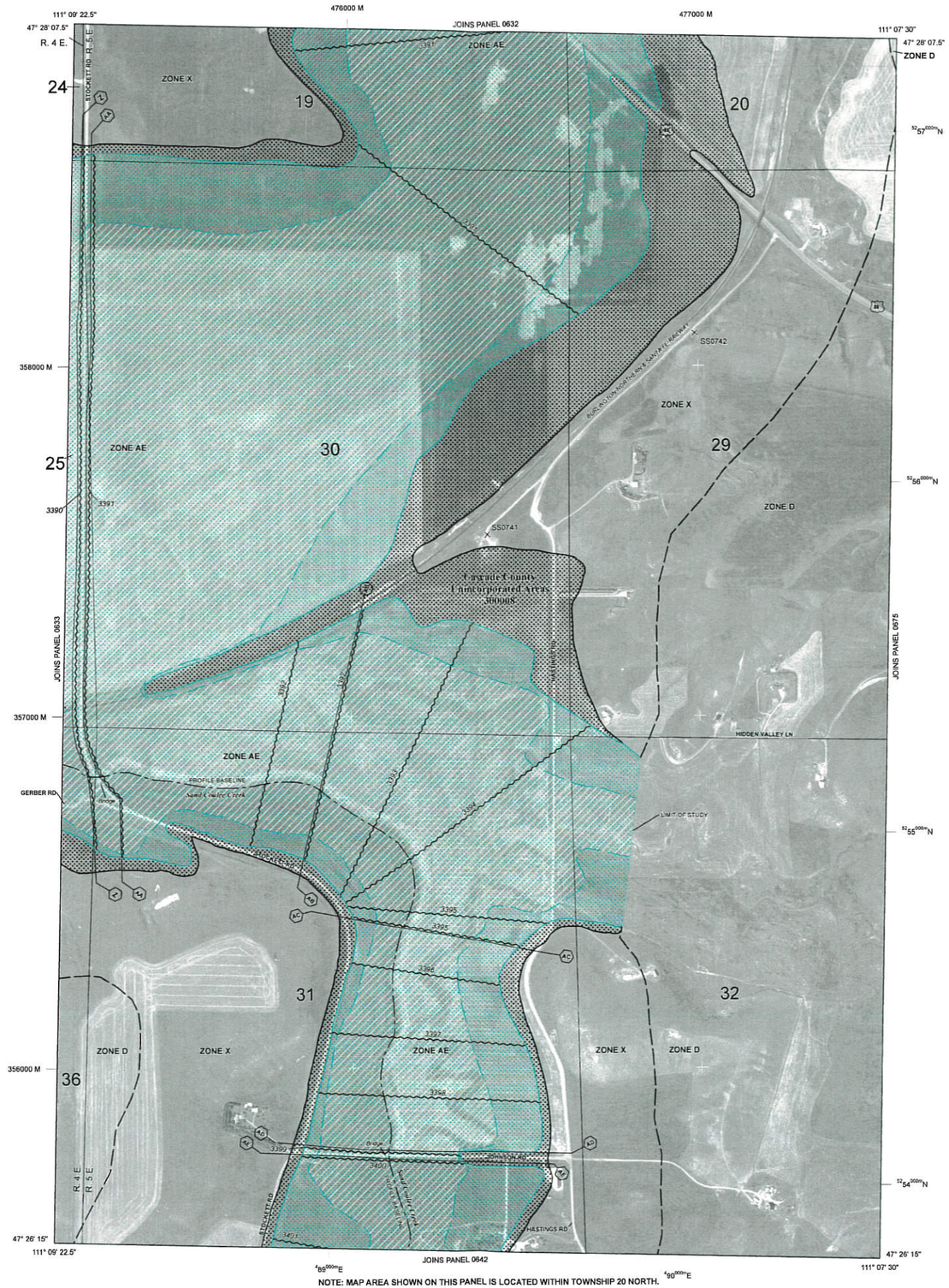
NOTICE TO MAP USERS

FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period or at the final Consultation Coordination Officer's meeting. Approved requests for changes will be shown on the final printed FIRM.

Cascade County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
Tributary A	3.0	Missouri River (Near Hardy)	3.1
Cottonwood Creek	3.0	Missouri River (Near Ulm)	3.0
Sand Coulee Creek	3.0	Missouri River (At Great Falls)	3.0
Sun River (Near Vaughn)	3.0	Sand Coulee Creek (Northside of Railroad)	3.0
Sun River (Near Great Falls)	3.0	Sand Coulee Fork	3.0
Sun River (Near Simms)	3.1	Belt Creek	3.0
Gibson Flats	3.0	Sun River Overflow	3.0

Example: To convert Cottonwood Creek elevations to NAVD 88, 3.0 feet were added to the NGVD 29 elevations.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 20 NORTH.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M	1000-meter ticks: Montana State Plane Zone (FIPS Zone 2500), Lambert Conformal Conic projection
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone Zone 12
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
March 19, 2013

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0634E

FIRM

FLOOD INSURANCE RATE MAP

CASCADE COUNTY, MONTANA AND INCORPORATED AREAS

PANEL 634 OF 1800
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

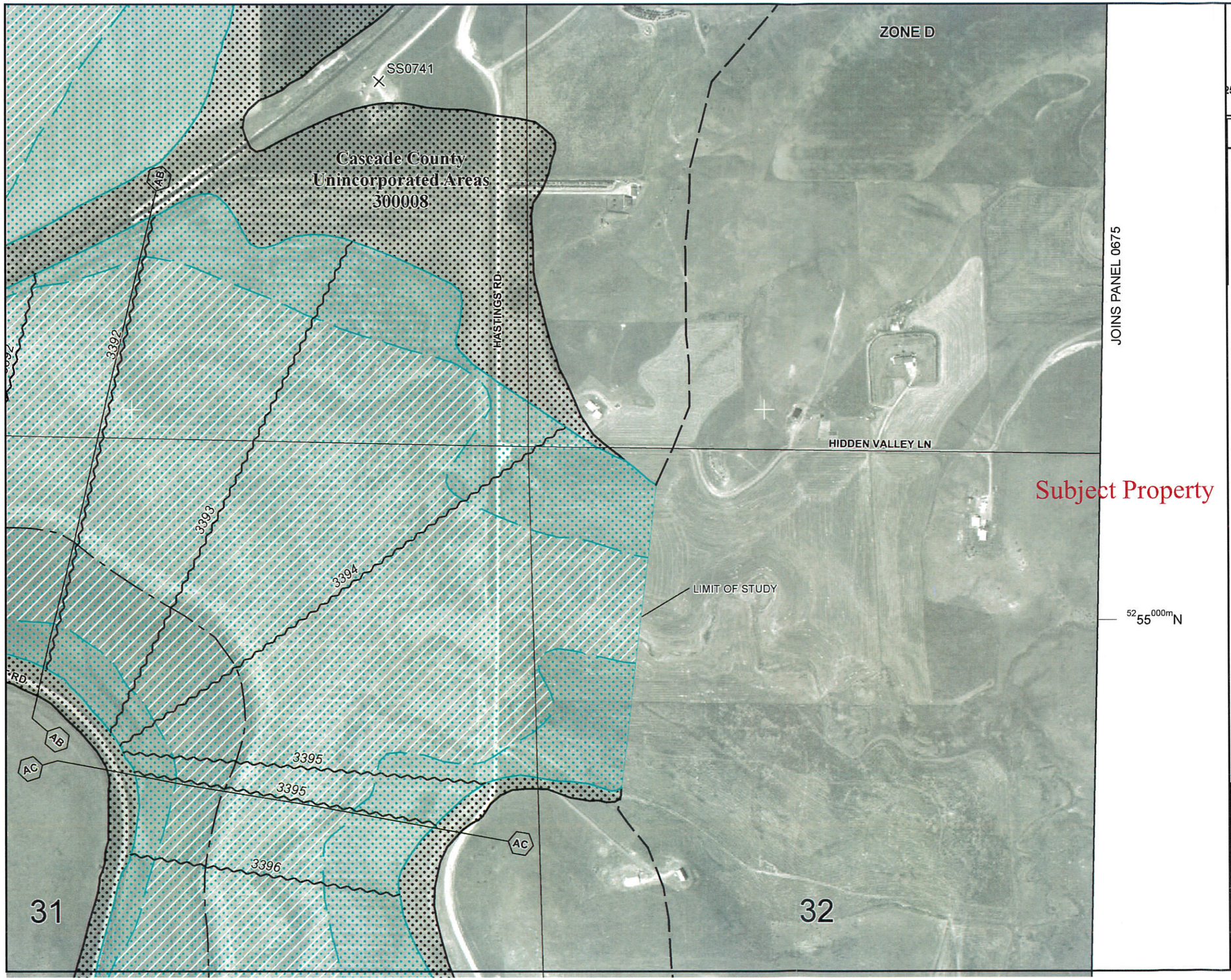
COMMUNITY	NUMBER	PANEL	SUFFIX
CASCADE COUNTY, Unincorporated Areas	300005	0634	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
30013C0634E

EFFECTIVE DATE
MARCH 19, 2013

Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0634E

FIRM

FLOOD INSURANCE RATE MAP

CASCADE COUNTY, MONTANA

AND INCORPORATED AREAS

PANEL 634 OF 1800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASCADE COUNTY, Unincorporated Areas	300008	0634	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
30013C0634E

EFFECTIVE DATE
MARCH 19, 2013

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

SECTION 16. HEIGHT MILITARY OVERLAY DISTRICT (MOD)

The only purpose and intent of this section is to promote cooperation between Cascade County, property owners, and Malmstrom Air Force Base in order to reduce potential conflicts and protect the current and future military missions and Missile Alert Facilities (MAFs) and Launch Facilities (LFs) of Malmstrom Air Force Base by restricting height of structures near these facilities as outlined in the Malmstrom Joint Land Use Study. Figures 4.1-2 Height Military Overlay District & 4.1-3 Proposed Height MODs are hereby incorporated into and made a part of these regulations.

16.1 MAFB RUNWAY AREA

The following height limits are based on the elevation of the helicopter runway at Malmstrom (3,526 ft.) which is based on the North American Vertical Datum of 1988 (NAVD 88).

MOD-A (Clear Zone Surface)

No structures greater than 50 feet in height.

MOD-B (Transitional Surface)

No structures greater than 50 feet in height.

MOD-C (Inner Horizontal Surface)

No structures greater than 150 feet in height.

MOD-D (Conical Surface)

No structures greater than 150 feet in height.

MOD-E (Approach/Departure Clearance Surface)

No structures greater than 50 feet in height.

MOD-F (Outer Horizontal Surface)

No structures greater than 500 feet in height.

Any proposed structures exceeding the above heights will require the approval of a variance by the Zoning Board of Adjustment. A copy of the application will be sent to Malmstrom for review and comments. Any comments or recommended mitigations will be forwarded to the Zoning Board of Adjustment to consider with their decision. If no comments are received within 15 working days, it will be determined Malmstrom's reviewing staff had no objections. A height variance may only be denied due to a concern expressed by the US Military that cannot be mitigated to the Military's satisfaction.

16.2 MISSILE ALERT FACILITIES (MAFS) AND LAUNCH FACILITIES (LFS)

No structures shall be allowed within the 1,200 foot buffer around each MAF and LF.

Any proposed structures over 50 feet in height between 1,200 feet and 2,400 feet of a MAF or LF will require the approval of a variance by the Zoning Board of Adjustment. A copy of the application will be sent to Malmstrom for review and comments. Any comments or recommended mitigations will be forwarded to the Zoning Board of Adjustment to consider with their decision. If no comments are received within 15 working days, it will be determined Malmstrom's reviewing staff had no objections. A height variance may only be denied due to a concern expressed by the US Military that cannot be mitigated to the Military's satisfaction.

16.3 EXCEPTIONS

A subdivision, rezoning and/or location/conformance permit application to accommodate a use inconsistent with the provisions of this section of these regulations shall not be approved unless the applicant places a covenant on the involved property wherein the property owner shall hold the City, County and Malmstrom Air Force Base harmless for any damages caused by normal and anticipated normal airport operations.

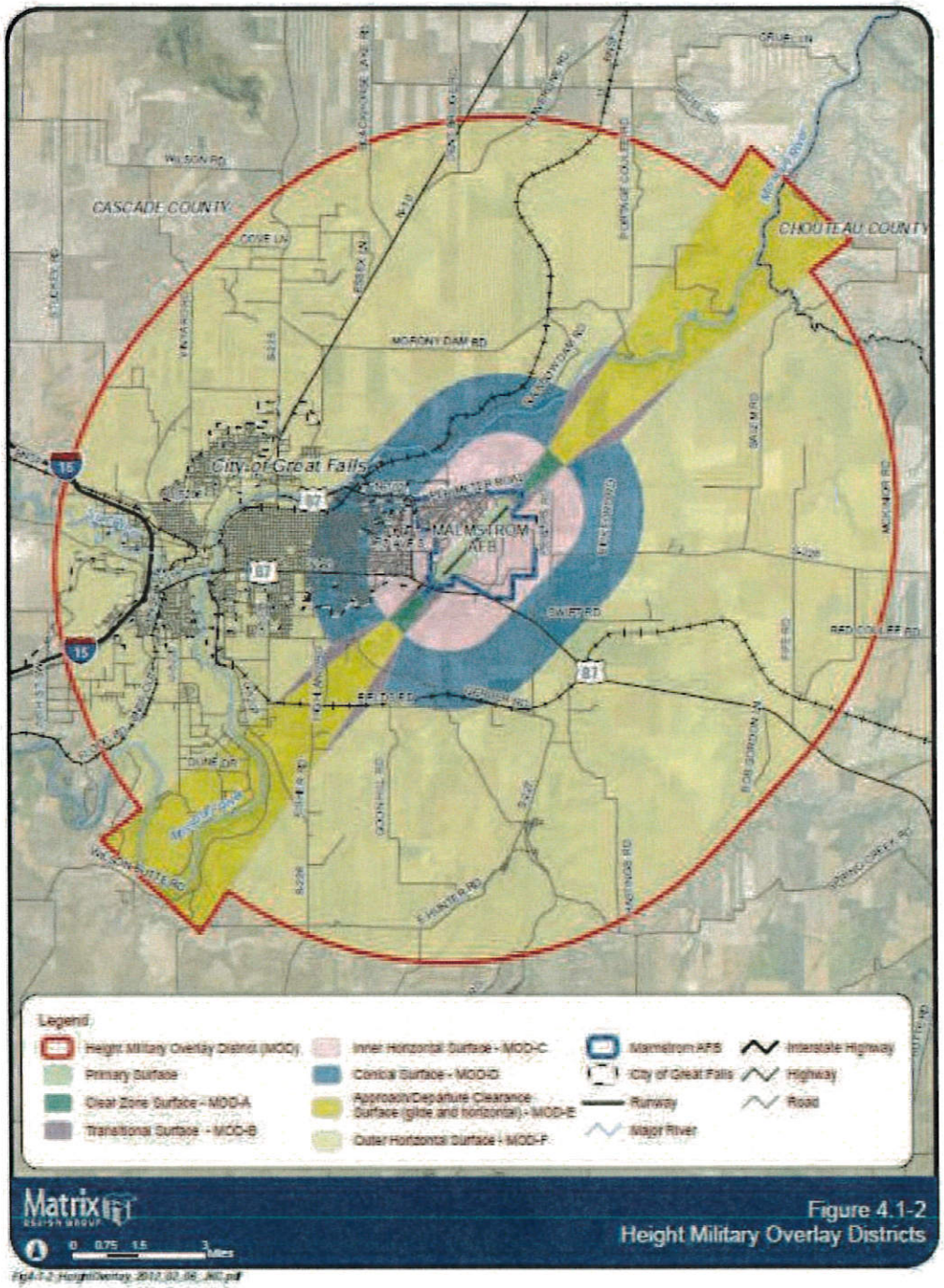


Figure 4.1-2
Height Military Overlay Districts

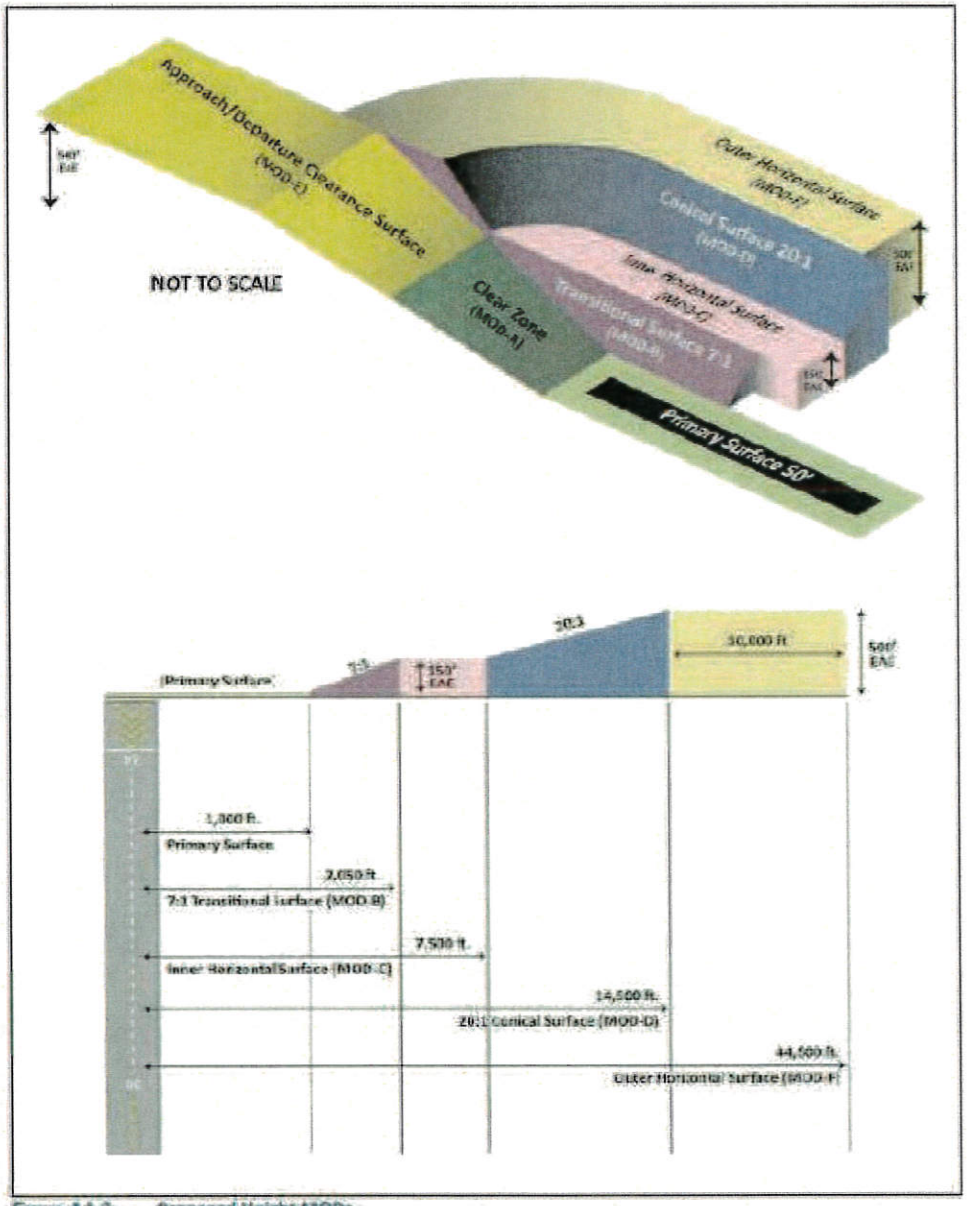


Figure 4.1-3. Proposed Height MODs

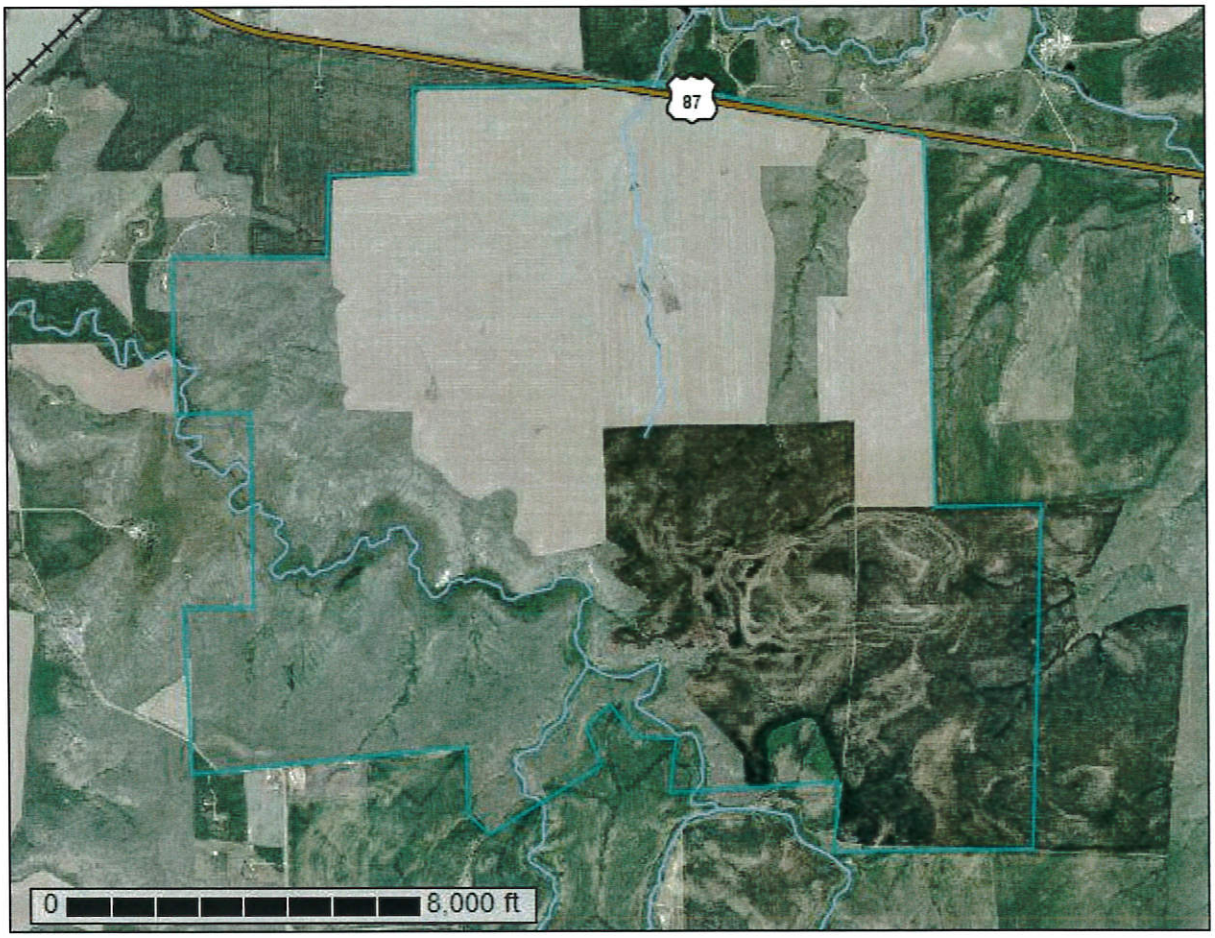
United States Department of Agriculture

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 Cascade County Area, Montana



July 11, 2017

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.

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199—Ticell-Castner complex, 0 to 4 percent slopes 37
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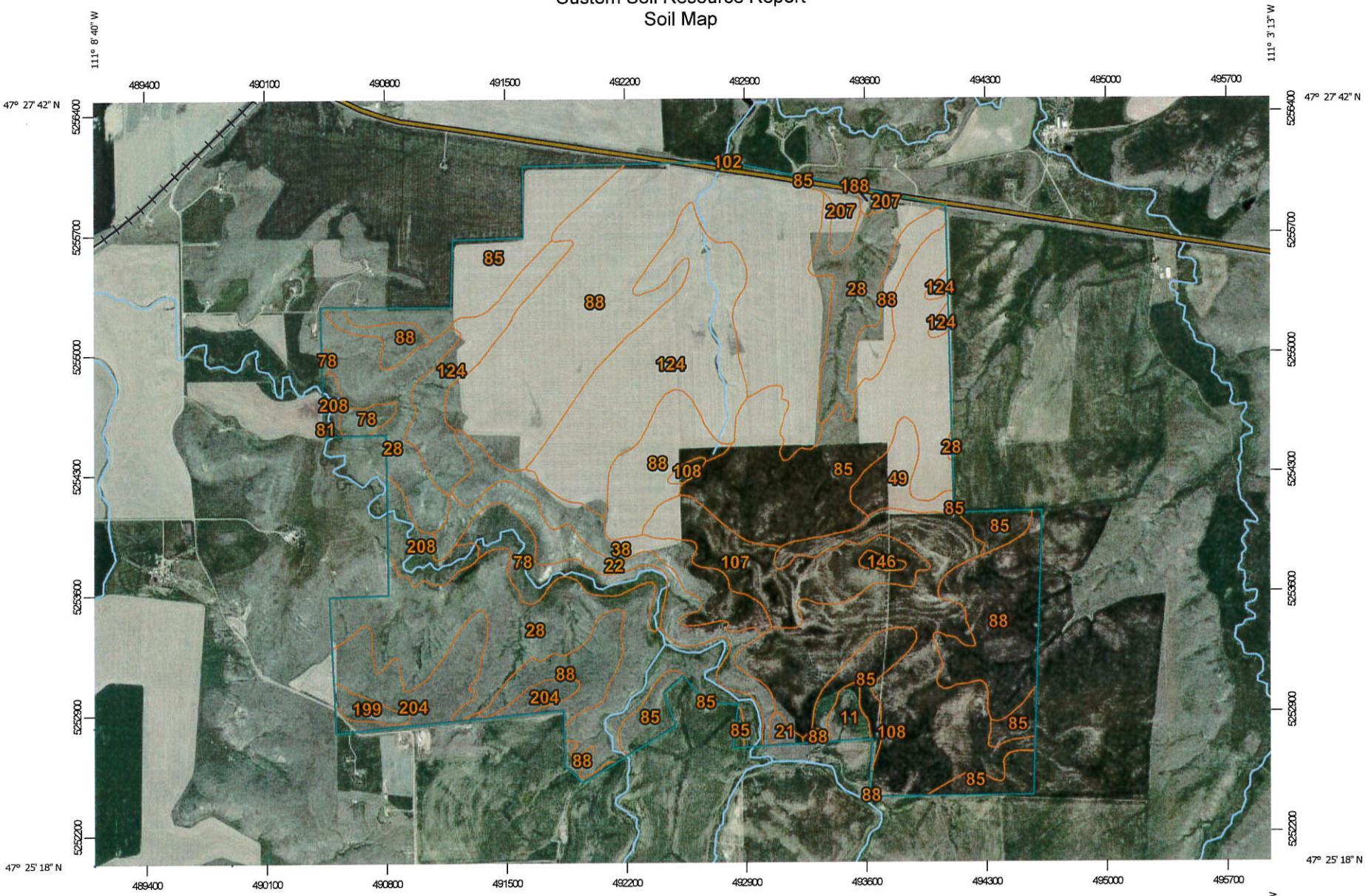
207—Twin Creek loam, 2 to 8 percent slopes 41
208—Twin Creek silty clay loam, 0 to 2 percent slopes 43

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: 1:31,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 450 900 1800 2700

Feet: 0 1500 3000 6000 9000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N 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.

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: Cascade County Area, Montana
Survey Area Data: Version 12, Sep 28, 2015

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

Date(s) aerial images were photographed: Jun 13, 2010—Aug 26, 2010

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

Cascade County Area, Montana (MT613)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
11	Acel silty clay loam, 0 to 2 percent slopes	14.7	0.5%
21	Big Timber-Castner complex, 8 to 30 percent slopes	5.7	0.2%
22	Big Timber-Castner complex, 30 to 70 percent slopes	88.5	3.0%
28	Bitton and Roy soils, 10 to 65 percent slopes	449.9	15.4%
38	Castner-Sinnigam complex, 2 to 15 percent slopes	86.8	3.0%
49	Darret-Castner complex, 2 to 8 percent slopes	37.4	1.3%
78	Fergus clay loam, 2 to 4 percent slopes	73.0	2.5%
81	Fergus-Absher silty clay loams, 0 to 2 percent slopes	0.1	0.0%
85	Gerber silty clay loam, 0 to 4 percent slopes	480.9	16.5%
88	Gerber-Lawther silty clays, 4 to 8 percent slopes	778.4	26.7%
102	Hillon clay loam, 15 to 45 percent slopes	0.0	0.0%
107	Ipano-Ticell loams, 0 to 4 percent slopes	113.1	3.9%
108	Ipano-Ticell loams, 4 to 10 percent slopes	299.3	10.3%
124	Lawther-Gerber complex, 8 to 15 percent slopes	316.7	10.9%
146	McKenzie silty clay loam	5.0	0.2%
188	Tally fine sandy loam, 8 to 15 percent slopes	3.3	0.1%
199	Ticell-Castner complex, 0 to 4 percent slopes	12.9	0.4%
204	Timberg-Castner complex, 2 to 10 percent slopes	88.8	3.0%
207	Twin Creek loam, 2 to 8 percent slopes	18.9	0.6%
208	Twin Creek silty clay loam, 0 to 2 percent slopes	44.8	1.5%
Totals for Area of Interest		**2,918.2**	**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.

Cascade County Area, Montana

11—Acel silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2sy7l
Elevation: 2,590 to 3,940 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 100 to 125 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Acel and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Acel

Setting

Landform: Till plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial deposits

Typical profile

A - 0 to 6 inches: silty clay loam
Bt - 6 to 20 inches: silty clay
Bk - 20 to 66 inches: silty clay loam
2By - 66 to 79 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 3 percent
Salinity, maximum in profile: Slightly saline (4.0 to 6.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 8.0
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Clayey (Cy) 10-14" p.z. (R052XN162MT)
Hydric soil rating: No

Minor Components

Nishon

Percent of map unit: 6 percent
Landform: Potholes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Overflow (Ov) 10-14" p.z. (R052XN166MT)
Hydric soil rating: Yes

Ethridge

Percent of map unit: 3 percent
Landform: Till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Gerdrum

Percent of map unit: 1 percent
Landform: Till plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Claypan (Cp) 10-14" p.z. (R052XN086MT)
Hydric soil rating: No

21—Big Timber-Castner complex, 8 to 30 percent slopes

Map Unit Setting

National map unit symbol: cgrc
Elevation: 3,100 to 4,500 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Big timber and similar soils: 55 percent
Castner and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Big Timber

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: clay loam
C - 6 to 15 inches: gravelly clay loam
Cr - 15 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 30 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Description of Castner

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A1 - 0 to 6 inches: channery loam
A2 - 6 to 10 inches: extremely channery loam
Bk - 10 to 16 inches: extremely channery loam
R - 16 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Minor Components

Darret

Percent of map unit: 8 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 46-C 10-14" p.z. (R046XC503MT)
Hydric soil rating: No

Timberg

Percent of map unit: 7 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 46-C 10-14" p.z. (R046XC503MT)
Hydric soil rating: No

22—Big Timber-Castner complex, 30 to 70 percent slopes

Map Unit Setting

National map unit symbol: cgrq
Elevation: 3,100 to 4,500 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Big timber and similar soils: 55 percent
Castner and similar soils: 25 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Big Timber

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: clay loam
C - 6 to 15 inches: gravelly clay loam
Cr - 15 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock

Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Description of Castner

Setting
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile
A1 - 0 to 6 inches: channery loam
A2 - 6 to 10 inches: extremely channery loam
Bk - 10 to 16 inches: extremely channery loam
R - 16 to 60 inches: unweathered bedrock

Properties and qualities
Slope: 30 to 70 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Minor Components

Rock outcrop
Percent of map unit: 15 percent
Hydric soil rating: No

Roy
Percent of map unit: 5 percent

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

28—Bitton and Roy soils, 10 to 65 percent slopes

Map Unit Setting

National map unit symbol: cgsc
Elevation: 3,400 to 5,300 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Bitton and similar soils: 45 percent
Roy and similar soils: 45 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bitton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: stony loam
Bk - 7 to 40 inches: very stony loam
C - 40 to 60 inches: very stony clay loam

Properties and qualities

Slope: 10 to 65 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Description of Roy

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: stony loam
Bt - 6 to 32 inches: very stony clay loam
Bk - 32 to 60 inches: very stony sandy clay loam

Properties and qualities

Slope: 10 to 65 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.9 mmhos/cm)
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Minor Components

Castner

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Sinnigam

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

38—Castner-Sinnigam complex, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: cgsq
Elevation: 3,400 to 4,600 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Castner and similar soils: 65 percent
Sinnigam and similar soils: 15 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Castner

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A1 - 0 to 6 inches: channery loam
A2 - 6 to 10 inches: extremely channery loam
Bk - 10 to 16 inches: extremely channery loam
R - 16 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Description of Sinnigam

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: very stony loam
Bt - 6 to 17 inches: very stony clay
R - 17 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Minor Components

Absarokee

Percent of map unit: 7 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Roy

Percent of map unit: 7 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Reeder

Percent of map unit: 6 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

49—Darret-Castner complex, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: cgt3
Elevation: 3,400 to 4,700 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Darret and similar soils: 60 percent
Castner and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Darret

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: silty clay loam
Bt - 7 to 18 inches: silty clay
Bk - 18 to 28 inches: silty clay loam
Cr - 28 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 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 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Description of Castner

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A1 - 0 to 6 inches: channery loam
A2 - 6 to 10 inches: extremely channery loam
Bk - 10 to 16 inches: extremely channery loam
R - 16 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Minor Components

Big timber

Percent of map unit: 8 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Sinnigam

Percent of map unit: 7 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

78—Fergus clay loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: cgv4
Elevation: 3,300 to 4,200 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Fergus and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fergus

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: clay loam
Bt - 6 to 25 inches: silty clay loam
Bk - 25 to 42 inches: silty clay loam
C - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.9 mmhos/cm)
Available water storage in profile: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Minor Components

Twin creek

Percent of map unit: 10 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-N 13-19" p.z. (R046XN252MT)
Hydric soil rating: No

81—Fergus-Absher silty clay loams, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: cgv8
Elevation: 3,400 to 4,000 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Fergus and similar soils: 70 percent
Absher and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fergus

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: silty clay loam
Bt - 6 to 25 inches: silty clay loam
Bk - 25 to 42 inches: silty clay loam
C - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.9 mmhos/cm)
Available water storage in profile: High (about 9.3 inches)

Interpretive groups
Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Description of Absher

Setting
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile
E - 0 to 2 inches: silty clay loam
Btn - 2 to 11 inches: clay
Bknyz - 11 to 60 inches: clay
Byz - 60 to 70 inches: stratified clay to loamy sand

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Strongly saline (16.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 70.0
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups
Land capability classification (irrigated): 7s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Dense Clay (DC) 10-14" p.z. (R052XN172MT)
Hydric soil rating: No

Minor Components

Twin creek
Percent of map unit: 10 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-N 13-19" p.z. (R046XN252MT)
Hydric soil rating: No

85—Gerber silty clay loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: cgvd
Elevation: 3,000 to 4,000 feet
Mean annual precipitation: 11 to 18 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Gerber and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gerber

Setting

Landform: Till plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: silty clay loam
Bt - 7 to 14 inches: silty clay
Bk - 14 to 32 inches: silty clay loam
C - 32 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Minor Components

Acel

Percent of map unit: 4 percent
Landform: Outwash terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Abor

Percent of map unit: 3 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Lawther

Percent of map unit: 3 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

88—Gerber-Lawther silty clays, 4 to 8 percent slopes

Map Unit Setting

National map unit symbol: cgvh
Elevation: 3,100 to 3,800 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Gerber and similar soils: 55 percent
Lawther and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gerber

Setting

Landform: Till plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: silty clay
Bt - 7 to 14 inches: silty clay
Bk - 14 to 32 inches: silty clay loam
C - 32 to 60 inches: clay loam

Properties and qualities

Slope: 4 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Description of Lawther

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: silty clay
Bw - 6 to 16 inches: silty clay
Bk - 16 to 35 inches: silty clay
By - 35 to 60 inches: silty clay

Properties and qualities

Slope: 4 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Minor Components

Acel

Percent of map unit: 10 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

102—Hillon clay loam, 15 to 45 percent slopes

Map Unit Setting

National map unit symbol: cgmj
Elevation: 3,000 to 3,800 feet
Mean annual precipitation: 11 to 18 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Hillon and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hillon

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 5 inches: clay loam
Bk - 5 to 28 inches: clay loam
C - 28 to 60 inches: clay loam

Properties and qualities

Slope: 15 to 45 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent

Gypsum, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Clayey-Steep (CyStp) 10-14" p.z. (R052XN164MT)
Hydric soil rating: No

Minor Components

Gerber
Percent of map unit: 4 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) 10-14" p.z. (R052XN162MT)
Hydric soil rating: No

Scobey
Percent of map unit: 4 percent
Landform: Till plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)
Hydric soil rating: No

Rock outcrop
Percent of map unit: 2 percent
Hydric soil rating: No

107—Ipano-Ticell loams, 0 to 4 percent slopes

Map Unit Setting
National map unit symbol: cgmp
Elevation: 3,500 to 4,600 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition
Ipano and similar soils: 55 percent
Ticell and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ipano

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 8 inches: loam
Bk1 - 8 to 19 inches: silt loam
2Bk2 - 19 to 34 inches: channery loam
2R - 34 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Description of Ticell

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: loam
Bk - 6 to 15 inches: silt loam
R - 15 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Castner

Percent of map unit: 10 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Absarokee

Percent of map unit: 8 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Work

Percent of map unit: 7 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

108—Ipano-Ticell loams, 4 to 10 percent slopes

Map Unit Setting

National map unit symbol: cgmq
Elevation: 3,500 to 4,600 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Ipano and similar soils: 55 percent
Ticell and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ipano

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 8 inches: loam
Bk1 - 8 to 19 inches: silt loam
2Bk2 - 19 to 34 inches: channery loam
2R - 34 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 4 to 10 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Description of Ticell

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: loam
Bk - 6 to 15 inches: silt loam
R - 15 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 4 to 10 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Minor Components

Castner

Percent of map unit: 10 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Absarokee

Percent of map unit: 8 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Work

Percent of map unit: 7 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

124—Lawther-Gerber complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: cgn9
Elevation: 3,400 to 3,800 feet
Mean annual precipitation: 11 to 18 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Lawther and similar soils: 65 percent
Gerber and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lawther

Setting

Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: silty clay
Bw - 6 to 16 inches: silty clay
Bk - 16 to 35 inches: silty clay
By - 35 to 60 inches: silty clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Clayey (Cy) 10-14" p.z. (R052XN162MT)
Hydric soil rating: No

Description of Gerber

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: silty clay loam
Bt - 7 to 14 inches: silty clay
Bk - 14 to 32 inches: silty clay loam
C - 32 to 60 inches: clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Clayey (Cy) RRU 58A-E 15-19" p.z. (R058AE388MT)
Hydric soil rating: No

Minor Components

Hillon

Percent of map unit: 10 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)
Hydric soil rating: No

146—McKenzie silty clay loam

Map Unit Setting

National map unit symbol: cgp2
Elevation: 3,100 to 4,600 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 34 to 45 degrees F
Frost-free period: 110 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Mckenzie and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mckenzie

Setting

Landform: Depressions
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: silty clay loam
Bz1 - 7 to 14 inches: clay
Bz2 - 14 to 60 inches: clay

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): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 5 percent
Gypsum, maximum in profile: 3 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water storage in profile: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: Overflow (Ov) 10-14" p.z. (R052XN166MT)
Hydric soil rating: Yes

Minor Components

Acel

Percent of map unit: 10 percent
Landform: Outwash terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

188—Tally fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: cgqk
Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Tally and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tally

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: fine sandy loam
Bk - 22 to 40 inches: fine sandy loam
C - 40 to 60 inches: sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: Draft Sandy (Sy) RRU 46-C 15-19" p.z. (R046XC505MT)
Hydric soil rating: No

Minor Components

Castner

Percent of map unit: 10 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

199—Ticell-Castner complex, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: cgqy
Elevation: 3,300 to 4,000 feet
Mean annual precipitation: 11 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Ticell and similar soils: 45 percent
Castner and similar soils: 30 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ticell

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: loam
Bk - 6 to 15 inches: silt loam
R - 15 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Description of Castner

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A1 - 0 to 6 inches: channery loam
A2 - 6 to 10 inches: extremely channery loam
Bk - 10 to 16 inches: extremely channery loam
R - 16 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Minor Components

Azaar

Percent of map unit: 10 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Sandy (Sy) RRU 46-C 15-19" p.z. (R046XC505MT)
Hydric soil rating: No

Ipano

Percent of map unit: 10 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

204—Timberg-Castner complex, 2 to 10 percent slopes

Map Unit Setting

National map unit symbol: cgr5
Elevation: 3,400 to 3,800 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Timberg and similar soils: 60 percent
Castner and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Timberg

Setting

Landform: Plains

Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: silty clay loam
Bw - 7 to 12 inches: silty clay loam
Bk - 12 to 35 inches: silty clay loam
Cr - 35 to 60 inches: weathered bedrock

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.9 mmhos/cm)
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: Clayey (Cy) RRU 46-C 10-14" p.z. (R046XC503MT)
Hydric soil rating: No

Description of Castner

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A1 - 0 to 6 inches: channery loam
A2 - 6 to 10 inches: extremely channery loam
Bk - 10 to 16 inches: extremely channery loam
R - 16 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: D
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Minor Components

Bitton
Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Fergus
Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Ticell
Percent of map unit: 5 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow (Sw) RRU 46-C 13-19" p.z. (R046XC506MT)
Hydric soil rating: No

Darret
Percent of map unit: 5 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 46-C 10-14" p.z. (R046XC503MT)
Hydric soil rating: No

207—Twin Creek loam, 2 to 8 percent slopes

Map Unit Setting
National map unit symbol: cgr8
Elevation: 3,300 to 4,200 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Twin creek and similar soils: 90 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Twin Creek

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: loam
Bw - 7 to 25 inches: loam
Bk - 25 to 45 inches: loam
C - 45 to 60 inches: clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Silty (Si) RRU 46-N 10-14" p.z. (R046XN236MT)
Hydric soil rating: No

Minor Components

Perma

Percent of map unit: 4 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Fergus

Percent of map unit: 3 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Straw

Percent of map unit: 3 percent
Landform: Flood plains

Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

208—Twin Creek silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: cgr9
Elevation: 3,300 to 3,600 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Twin creek and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Twin Creek

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: silty clay loam
Bw - 7 to 25 inches: loam
Bk - 25 to 45 inches: loam
C - 45 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Ecological site: Silty (Si) RRU 46-N 10-14" p.z. (R046XN236MT)
Hydric soil rating: No

Minor Components

Fergus
Percent of map unit: 4 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Clayey (Cy) RRU 46-N 13-19" p.z. (R046XN247MT)
Hydric soil rating: No

Straw
Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-C 13-19" p.z. (R046XC508MT)
Hydric soil rating: No

Timberg
Percent of map unit: 2 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 46-C 10-14" p.z. (R046XC503MT)
Hydric soil rating: No