CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Riverside Contracting, Inc. Gravel Test Permit
Proposed Implementation Date:	Winter 2023
Proponent:	Riverside Contracting, Inc.
Location:	N2 of Sec. 26, T22N, R1W
County:	Teton
Trust:	Montana Tech

I. TYPE AND PURPOSE OF ACTION

Riverside Contracting, Inc. (Riverside) has applied for a Gravel Test Permit located on state land to test for aggregate to explore gravel resources, referred to herein as the "Project". The Project is located in the N2 of Sec. 26, T22N, R1W and, if granted, the permit will allow for up to 20 test pits dug by a backhoe to a depth of approximately 20 feet. See **Exhibit A**, Project Location Map. The test pits would determine the gravel resource within the Project area. Gravel and dirt would be excavated from the ground and sub-surface. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit. Testing and documenting would be performed by employees of the Department of Natural Resources and Conservation (DNRC) – Trust Land Management Division and Riverside. If the Gravel Test Permit is approved, and if a gravel source is discovered during testing and Riverside would like to pursue a gravel mining permit, a separate Environmental Assessment (EA) will be conducted to determine the effects of gravel mining and therefore will not be evaluated in this EA.

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:

Provide a brief chronology of the scoping and ongoing involvement for this project.

The Project is located on state-owned land and Riverside is the proponent. Agencies involved in the permitting process include the DNRC – Trust Land Management Division. The surface lessee Dave Barta (described below) was contacted by DNRC staff and is aware of the potential Project activities. Riverside will be required to contact the Lessee before entering the tract as well.

Surface Lessee:
Sec. 26, T22N, R1W – State Lease No. 9672 – Dave Barta

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

DNRC is not aware of any other agencies with jurisdiction or other permits needed to complete this Project. If approved, the Project will be permitted under a Gravel Test Permit.

3. ALTERNATIVES CONSIDERED:

Alternative A (No Action) – Deny Riverside the requested Gravel Test Permit on state land.

Alternative B (the Proposed action) – Grant Riverside the requested Gravel Test Permit on state land.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify any cumulative impacts to soils.

Soil Properties:

There are seven types of soils found within the Project area, See **Exhibit B**, Soil Report.

(15B) Crago gravelly loam, 0 to 4 percent slopes:

These soils make up 5.2 acres of the Project area. These soils consist of very deep, more than 80 inches, well-drained soils. These soils are found within stream terraces. Available water supply, 0 to 60 inches, is about 3.00 inches; the mean annual precipitation for the region is 12 to 14 inches (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003).

(115B) Niart – Crago – Arrod gravelly loams, 0 to 4 percent slopes:

These soils make up 8.6 acres of the Project area. These soils consist of very deep, more than 80 inches (Niart and Crago), and shallow, 12 to 20 inches to restrictive layer (Arrod), well-drained soils. These soils are found within stream terraces. Available water supply, 0 to 60 inches, is about 6.10 inches (Niart), about 3.00 inches (Crago), and about 1.80 inches (Arrod); the mean annual precipitation for the region is 12 to 14 inches (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003).

(123B) Rothiemay – Niart clay loams, 0 to 4 percent slopes:

These soils make up 5.00 acres of the Project area. These soils consist of very deep, more than 80 inches, well-drained soils. These soils are found within stream terraces. Available water supply, 0 to 60 inches, is about 9.20 inches (Rothiemay) and about 7.30 inches (Niart); the mean annual precipitation for the region is 11 to 14 inches (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003).

(230B) Niart – Crago gravelly loams, 0 to 4 percent slopes:

These soils make up 28.90 acres of the Project area. These soils consist of very deep, more than 80 inches, well-drained soils. These soils are found within stream terraces. Available water supply, 0 to 60 inches, is about 6.10 inches (Niart) and 3.00 inches (Crago); the mean annual precipitation for the region is 12 to 14 inches (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003).

(330B) Niart gravelly loam, 0 to 4 percent slopes:

These soils make up 52.30 acres of the Project area. These soils consist of very deep, more than 80 inches, well-drained soils. These soils are found within stream terraces. Available water supply, 0 to 60 inches, is about 6.10 inches; the mean annual precipitation for the region is 11 to 14 inches (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003).

(576F) Delpoint – Cabbart – Crago complex, 15 to 60 percent slopes:

These soils make up 19.20 acres of the Project area. These soils consist of shallow, 20 to 40 inches to paralithic bedrock (Delpoint) and 10 to 20 inches to paralithic bedrock (Cabbart) to very deep, more than 80 inches (Crago), well-drained soils. These soils are found within hills. Available water supply, 0 to 60 inches, is about 4.90 inches (Delpoint), about 2.50 inches (Cabbart), and about 3.00 inches (Crago); the mean annual precipitation for the region is 11 to 14 inches (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003).

(589F) Megonot – Yawdim – Rock outcrop complex, 25 to 60 percent slopes:

These soils make up 11.30 acres of the Project area. These soils consist of shallow, 20 to 40 inches to paralithic bedrock (Megonot) and 10 to 20 inches to paralithic bedrock (Yawdim), well-drained soils. These soils are found

within hills. Available water supply, 0 to 60 inches, is about 2.70 inches (Megonot) and about 2.80 inches (Yawdim); the mean annual precipitation for the region is 11 to 14 inches (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003).

Construction Materials:

Gravel Source:
27.20% of soils identified within the Project area were classified as "poor" and the remaining 72.80% were classified as "fair" for a gravel source (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). "A soil rating of 'good' or 'fair' means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source" (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). See, **Exhibit B**, Soil Report for additional information.

Roadfill:
23.37% of soils identified within the Project area were classified as "poor" and the remaining 76.63% were classified as "fair" (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). "The soils are rated 'good,' 'fair,' or 'poor' as potential sources of roadfill. The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential). Normal compaction, minor processing, and other standard construction practices are assumed" (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). See, **Exhibit B**, Soil Report for additional information.

Land Management:

Reclamation Suitability:
8.66% of soils identified within the Project area were classified as "poorly suited", 29.12% of soils were identified as "moderately suited" and the remaining 62.22% were identified as "well suited**"** (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). "A 'Poorly suited' rating indicates that the soil, site, and/or climate have features that are unfavorable for reclamation. A 'Moderately suited' rating indicates that the soil has features that are generally favorable for reclamation, but there are some soil, site, or climate features that are moderately limiting. A 'Well suited' rating indicates that the soil has features that are favorable for reclamation (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). See **Exhibit B**, Soil Report for additional information.

Soil Compactibility Risk:
7.82% of soils identified within the Project area were classified as "high" and the remaining 92.18% were identified as "medium" (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003).

"Definitions of the ratings:

Medium - The potential for compaction is significant. The growth rate of seedlings may be reduced following compaction. After the initial compaction (i.e., the first equipment pass), the soil is able to support standard equipment with only minimal increases in soil density. The soil is intermediate between moisture insensitive and moisture sensitive.

High - The potential for compaction is very significant. The growth rate of seedlings will be reduced following compaction. After initial compaction, the soil is still able to support standard equipment but will continue to

compact with each subsequent" (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). See **Exhibit B**, Soil Report for additional information.

Soil Rutting Hazard:
100.00% of soils identified within the Project area were classified as "severe" (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). "Ratings are based on depth to a water table, rock fragments on or below the surface, the Unified classification of the soil, depth to a restrictive layer, and slope…'Severe' indicates that ruts form readily (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). See **Exhibit B**, Soil Report for additional information.

Soil Stability:

K – Factor:
Soils identified within the Project footprint have a weighted average Soil Erodibility (K) Factor of 0.14 (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). "The K Factor range is 0.02 to 0.69 (0.69 being the most susceptible to sheet and rill erosion by water)" (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). See **Exhibit B**, Soil Report for additional information.

Wind Erodibility Group:
Soils identified within the Project footprint have a weighted average Wind Erodibility Group (WEG) of 4.73, (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). "The WEG range is 1 – 8 (1 being the most susceptible to wind erosion and 8 being the least susceptible)" (Soil Survey of Chouteau – Conrad area, parts of Teton and Pondera Counties, Montana, 2003). See **Exhibit B**, Soil Report for additional information.

BMPs:
Gravel and dirt would be excavated from the ground and sub-surface when the ground is frozen to reduce the potential for rutting. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit. Additionally, Riverside will be required to monitor for noxious weeds.

Determination:
Effect, Not Likely to Adversely Effect. The Project has the potential to impact soils, however, given the percentage of soils that are "moderately suited" for reclamation and their low to moderate susceptibility to soil compactibility, soil rutting, and erosion, and the implementation of the BMPs described above, the Project is not expected to have negative cumulative effects on soil.

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5. WATER QUALITY, QUANTITY AND DISTRIBUTION:
Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identify cumulative effects to water resources.

Surface or Groundwater Resources:
There are eight known water rights associated with this tract of state land, see **Table 1** below and http://wrqs.dnrc.mt.gov/default.aspx for additional information. The Project area is located approximately 0.12 miles (633.60 feet) north of Tank Coulee and is approximately 94 feet above Tank Coulee in elevation. There are four known water wells located within 1 mile of the Project area's approximate center see http://mbmggwic.mtech.edu/sqlserver/v11/menus/menuData.asp?pagename=byid for additional information.

Table 1 – Known Water Rights Associated with the Tract

Water Right No.	Type	Source	Owner	Purpose
41K 30109684	Place of Use/ Surface Water Diversion	Tank Coulee	MONTANA STATE BOARD OF LAND COMMISSIONERS	Stock
41K 40869 00	Place of Use	Sun River	USA (DEPT OF INTERIOR BUREAU OF RECLAMATION)	Irrigation
41K 40870 00	Place of Use	Sun River	USA (DEPT OF INTERIOR BUREAU OF RECLAMATION) & GREENFIELDS IRRIGATION DISTRICT	Irrigation
41K 40871 00	Place of Use	Sun River	USA (DEPT OF INTERIOR BUREAU OF RECLAMATION) & GREENFIELDS IRRIGATION DISTRICT	Stock
41K 40872	Place of Use	Sun River	USA (DEPT OF INTERIOR BUREAU OF RECLAMATION) & GREENFIELDS IRRIGATION DISTRICT	Lawn & Garden
41K 40892	Place of Use	Willow Creek	USA (DEPT OF INTERIOR BUREAU OF RECLAMATION)	Irrigation
41K 40893 00	Place of Use	Willow Creek	USA (DEPT OF INTERIOR BUREAU OF RECLAMATION)	Irrigation
41K 40894 00	Place of Use	Sun River	USA (DEPT OF INTERIOR BUREAU OF RECLAMATION)	Irrigation

BMPs:
Gravel and dirt would be excavated from the ground and sub-surface when the ground is frozen to reduce the potential for rutting. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit.

Determination:
Effect, Not Likely to Adversely Effect. It is unlikely that the Project will have an impact on the surface water features, described above, through stormwater runoff of disturbed soils given the BMPs. Groundwater is not expected to be encountered during testing. Therefore, the Project is not expected to have negative cumulative effects on water quality.

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6. AIR QUALITY:
What pollutants or particulate would be produced? Identify air quality regulations or zones (e.g. Class I air shed) the project would influence. Identify cumulative effects to air quality.

Air Quality:
There are no Nonattainment areas located on or near the Project, per the Environmental Protection Agency (EPA) Nonattainment area maps (NEPAssist, 2023). The proposed activities will not result in any new air emissions.

BMPs:
Gravel and dirt would be excavated from the ground and sub-surface when the ground is frozen to reduce the potential for rutting. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit.

Determination:
No Effect. It is not anticipated that the Project would result in negative cumulative effects on air quality.

7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify cumulative effects to vegetation.

Vegetative Community:

Vegetation within the Project area consists of tame (non-native) and native grazing land. The vegetation of the non-native grazing land consists of Crested Wheatgrass (*Agropyron cristatum)* and the vegetation of the native grazing land consists of Western Wheatgrass (*Pascopyrum smithii*), Bluebunch Wheatgrass (*Pseudoroegneria spicata*), (Green Needlegrass (*Nassella viridula*), Prairie Sandreed (*Calamovilfa longifolia*), Blue Grama (*Bouteloua gracilis*), Sandberg Bluegrass (*Poa secunda sandbergii*), Prairie Junegrass (*Koeleria macrantha*), Threadleaf Sedge (*Carex filifolia*), Needle and Thread (*Hesperostipa comata*), Fringed Sagewort (*Artemisia frigida*), Silver Sagebrush (*Artemisia cana*), and various forbs. Noxious weeds were identified throughout the entire tract during a 2016 field evaluation, noxious weeds identified consists of Spotted Knapweed (*Centaurea maculosa),* Leafy Spurge (*Euphorbia esula),* Canada Thistle (*Cirsium arvense*), and Houndstongue (*Cynoglossum officinale*). The Natural Heritage Program database identified Crawe's Sedge (Carex crawei) and Fleshy Stitchwort (Stellaria crassifolia) as species of concern within Sec. 26 of T22N, R1W.

BMPs:

Gravel and dirt would be excavated from the ground and sub-surface when the ground is frozen to reduce the potential for rutting. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit. Additionally, Riverside will be required to monitor for noxious weeds.

Determination:

Effect, Not Likely to Adversely Effect. Project activities will result in a temporary disturbance of the vegetative community within the Project footprint. The BMPs proposed above will mitigate any long-term adverse effects and therefore negative cumulative effects on vegetative resources are not expected.

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify cumulative effects to fish and wildlife.

Habitat:

The Project area is not considered Critical Habitat per the EPA. The surrounding area provides habitat for a variety of big game species, predators, upland game birds, other non-game mammals, birds of prey, and various songbirds.

BMPs:

Gravel and dirt would be excavated from the ground and sub-surface when the ground is frozen to reduce the potential for rutting. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit. Additionally, Riverside will be required to monitor for noxious weeds.

Determination:

Effect, Not Likely to Adversely Effect. The Project has the potential to impact wildlife temporarily through the operation of heavy equipment during actual construction days. However, the Project will not impact wildlife forage, cover, or travel corridors. Nor will this action change the juxtaposition of wildlife forage, water, or hiding and thermal cover. Wildlife usage is expected to return to "normal" (pre-action usage) following gravel testing activities. Overall, the Project is not expected to have negative cumulative effects on wildlife or habitat.

9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:

Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify cumulative effects to these species and their habitat.

Species of Concern/Threatened/Endangered:

Federally listed mammal species that occur in Montana include Black-footed Ferret (*Mustela nigripes*), Canada Lynx (*Lynx canadensis),* Grizzly Bear (*Ursus arctos horribilis*), and Northern Long-eared Bat (*Myotis septentrionalis*). Federally listed avian species that occur in Montana include Piping Plover (*Charadrius melodus*),

Red Knot (*Calidris canutus rufa*), Whooping Crane (*Grus americana*), and Yellow-billed Cuckoo (*Coccyzus americanus*). For additional information and additional species (fish, plants, & insects) see https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=MT&stateName=Montana&statusCategory=Listed

The National Heritage Program database identifies Golden Eagle (*Aquila chrysaetos*), Suckley Cuckoo Bumble Bee (*Bombus suckleyi*), American White Pelican (*Pelecanus erythrorhynchos*), Dwarf Shrew (*Sorex nanus*), Fringed Myotis (*Myotis thysanodes*), Little Brown Myotis (*Myotis lucifugus*), Long-eared Myotis (*Myotis evotis*), Long-legged Myotis (*Myotis Volans*), Merriam's Shrew (*Sorex merriami*), Preble's Shrew (*Sorex preblei*), Townsend's Big-eared Bat (*Corynorhinus townsendii*), Great Blue Heron (*Ardea Herodias*), Sharp-tailed Grouse (*Tympanuchus phasianellus*), Great Plains Toad (*Anaxyrus cognatus*), Eastern Red Bat (*Lasiurus borealis*), Hoary Bat (*Lasiurus cinereus*), American Bittern (*Botaurus lentiginosus*), Black Tern (*Chlidonias niger*), Black-billed Cuckoo (*Coccyzus erythropthalmus*), Black-necked Stilt (*Himantopus mexicanus*), Bobolink (*Dolichonyx oryzivorus*), Brewer's Sparrow (*Spizella breweri*), Ferruginous Hawk (*Buteo regalis*), Horned Grebe (*Podiceps auritus*), Long-billed Curlew (*Numenius americanus*), Sage Thrasher (*Oreoscoptes montanus*), Sprague's Pipit (*Anthus spragueii*), Thick-billed Longspur (*Rhynchophanes mccownii*), Veery (*Catharus fuscescens*), and White-faced Ibis (*Plegadis chihi*), as a species of concern within Sec. 26, T22N, R1W.

Wetlands:
The NWI identified a Freshwater Emergent Wetland habitat with a classification code of PEM1B located approximately 332.20 feet south of the Project area, see **Exhibit C**, Wetlands Map. For a complete description of wetland classification codes, go to https://www.fws.gov/wetlands/data/Mapper.html.

BMPs:
Gravel and dirt would be excavated from the ground and sub-surface when the ground is frozen to reduce the potential for rutting. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit. Additionally, Riverside will be required to monitor for noxious weeds.

Determination:
Effect, Not Likely to Adversely Effect. The Project has the potential to impact wildlife temporarily through the operation of heavy equipment during actual construction days. However, the Project will not impact wildlife forage, cover, or travel corridors. Nor will this action change the juxtaposition of wildlife forage, water, or hiding and thermal cover. Wildlife usage is expected to return to "normal" (pre-action usage) following gravel testing activities. The Project also has the potential to impact wetlands through stormwater runoff of disturbed soils, however given the BMPs, the Project is not expected to have negative cumulative effects on wildlife or habitat.

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10. HISTORICAL AND ARCHAEOLOGICAL SITES:
Identify and determine effects to historical, archaeological or paleontological resources.

Historical and Archeological Sites:
A Class I (literature review) level review was conducted by the DNRC staff archaeologist for the area of potential effect (APE). This entailed inspection of project maps, DNRC's sites/site leads database, land use records, General Land Office Survey Plats, and control cards. The Class I search results revealed that no cultural or paleontological resources have been identified in the APE, but it should be noted that Class III level inventory work has not been conducted there to date.

Determination:
Because the area of potential effect has been largely cultivated, gravel testing activities are expected to have *No Effect to Antiquities*. No additional archaeological investigative work will be conducted in response to this proposed development. However, if previously unknown cultural or paleontological materials are identified during project related activities, all work will cease until a professional assessment of such resources can be made.

11. AESTHETICS:

Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify cumulative effects to aesthetics.

Visual and Noise:

The Project is located within 10 miles of the town of Power (population 153) and is located adjacent to 2nd Rd NE (north border) and 13th Ln NE (N2 of the west border).

BMPs:

Gravel and dirt would be excavated from the ground and sub-surface when the ground is frozen to reduce the potential for rutting. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit. Additionally, Riverside will be required to monitor for noxious weeds.

Determination:

Effect, Not Likely to Adversely Effect. The Project has the potential to have visual and noise impacts on the public who utilize the roadways. However, given the BMPs described above, it is not expected to have cumulative impacts on aesthetics.

12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:

Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify cumulative effects on environmental resources.

No Effect. The Project does not propose the use of limited natural resources and is not expected to have cumulative impacts on environmental resources. If the Gravel Test Permit is approved, and if a gravel source is discovered during testing and Riverside would like to pursue a gravel mining permit, a separate Environmental Assessment (EA) will be conducted to determine the effects of gravel mining and therefore will not be evaluated in this EA.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

Surrounding land is owned by the state with a surface use of grazing and agricultural grain production under State Lease No. 9672. Any future development in the area will likely be restricted to utility or mineral development. If testing identifies a gravel source there is potential that it could be mined in the future which could remove grazing acres from State Lease No. 9672. If the Gravel Test Permit is approved, and if a gravel source is discovered during testing and Riverside would like to pursue a gravel mining permit, a separate Environmental Assessment (EA) will be conducted to determine the effects of gravel mining and therefore will not be evaluated in this EA.

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

14. HUMAN HEALTH AND SAFETY:

Identify any health and safety risks posed by the project.

Human Health and Safety:

Personnel involved with the Project activities include Riverside personnel, where health and safety risks consist of the normal day–to–day operations of gravel pit testing.

Determination:

No Effect. Any risk to human health and safety will be restricted to Riverside personnel during the normal day–to–day operations of gravel pit testing and it is assumed Riverside will abide by all Occupational Safety and Health Administration laws.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

Identify how the project would add to or alter these activities.

Land Use:
The current land use on which the Project area is located (State Lease No. 9672) consists of 83.98 agricultural acres and 396.02 acres of grazing land, in which the Project area is located wholly within the grazing land.

Production:
The Project will benefit the Montana Tech trust in terms of a one-time application fee of $25.00. The Project will not impede the existing production of State Leases No. 9672.

BMPs:
Gravel and dirt would be excavated from the ground and sub-surface when the ground is frozen to reduce the potential for rutting. Topsoil would be saved, and the disturbance created would be reclaimed immediately upon completion of logging the test pit. Additionally, Riverside will be required to monitor for noxious weeds.

Determination:
Effect, Beneficial. The Project is expected to increase production through a one-time application fee to the Montana Tech trust and therefore, negative cumulative effects on industrial, commercial, and agriculture activities and production are not expected.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:

Estimate the number of jobs the project would create, move or eliminate. Identify cumulative effects to the employment market.

Determination:
No Effect. The Project would not result in any new jobs nor eliminate any, therefore negative cumulative effects on the employment market are not expected.

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

Estimate tax revenue the project would create or eliminate. Identify cumulative effects to taxes and revenue.

Revenues:
See **Section 15** above.

Determination:
Effect, Beneficial. The Project is expected to increase production through a one-time application fee to the Montana Tech trust and therefore, negative cumulative effects on the local and state tax base and tax revenues are not expected.

18. DEMAND FOR GOVERNMENT SERVICES:

Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify cumulative effects of this and other projects on government services

Demand for Government Services:
The Project is accessed by 2nd Rd NE (north border) and 13th Ln NE (N2 of the west border). Additional government services (e.g. fire protection, police, schools, etc.) are not for gravel pit testing. This Project is being funded by Riverside. There will be no excessive stress placed on the existing infrastructure of the area.

Determination:
No Effect. Future Project activities are not expected to impact traffic, increase demand for government services, or place excessive stress on the existing infrastructure of the area. Therefore, the Project is not expected to have negative cumulative effects on government services.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

Determination:

No Effect. The Project is in compliance with State and County laws. If approved, the Project will be granted under a Gravel Test Permit issued by the DNRC.

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:

Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify cumulative effects to recreational and wilderness activities.

Legal Access and Recreation Opportunities:

The Project is legally accessible via 2nd Rd NE (north border) and 13th Ln NE (N2 of the west border). Recreation potential consists of hunting.

Determination:

Effect, Not Likely to Adversely Effect. The Project will not result in any new permanent impacts on the surface of the land, impact access, or recreational opportunities, therefore, negative cumulative effects on access to and quality of recreational and wilderness activities are not expected.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

Estimate population changes and additional housing the project would require. Identify cumulative effects to population and housing

Determination:

No Effect. The Project will not require additional housing and is not expected to have negative cumulative effects on population and housing.

22. SOCIAL STRUCTURES AND MORES:

Identify potential disruption of native or traditional lifestyles or communities.

Social Structures:

The Project area is not located within 10 miles of a Hutterite Colony or a Native American Nation. No archeological sites were identified within the Project area, but it should be noted that Class III level inventory work has not been conducted there to date. If previously unknown cultural or paleontological materials are identified during project related activities, all work will cease until a professional assessment of such resources can be made.

Determination:

No Effect. The Project is consistent with the surrounding land use, therefore, negative cumulative effects on native or traditional lifestyles or communities are not expected.

23. CULTURAL UNIQUENESS AND DIVERSITY:

How would the action affect any unique quality of the area?

Determination:

No Effect. The Project will not result in any new activities to occur in the area and therefore it is not expected to have negative cumulative effects on the unique quality of the area.

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

Estimate the return to the trust. Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify cumulative economic and social effects likely to occur as a result of the proposed action.

The Project will benefit the Montana Tech trust in terms of a one-time application fee of $25.00. The Project will not impede the existing production of State Leases No. 9672.

Any future development in the area will likely be restricted to utility or mineral development. If testing identifies a gravel source there is potential that it could be mined in the future which could remove grazing acres from State Lease No. 9672. If the Gravel Test Permit is approved, and if a gravel source is discovered during testing and Riverside would like to pursue a gravel mining permit, a separate Environmental Assessment (EA) will be conducted to determine the effects of gravel mining and therefore will not be evaluated in this EA.

EA Checklist Prepared By:	**Name:**	Michaela Hanson	**Date:**	01/03/2023
	Title:	Land Use Specialist, Conrad Unit, Central Land Office		

V. FINDINGS

25. ALTERNATIVE SELECTED:

Alternative B (the Proposed action) – Grant Riverside the requested Gravel Test Permit on state land.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

No significant impacts are expected. A temporary disturbance will occur as a result of Project activities, but it has been determined the effects will not be cumulative or significantly adverse. All identified potential impacts can be mitigated using common practices, which will be stipulated in the test permit. The proposed action satisfies the trust's fiduciary mandate while maintaining the long-term productivity of the land.

27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

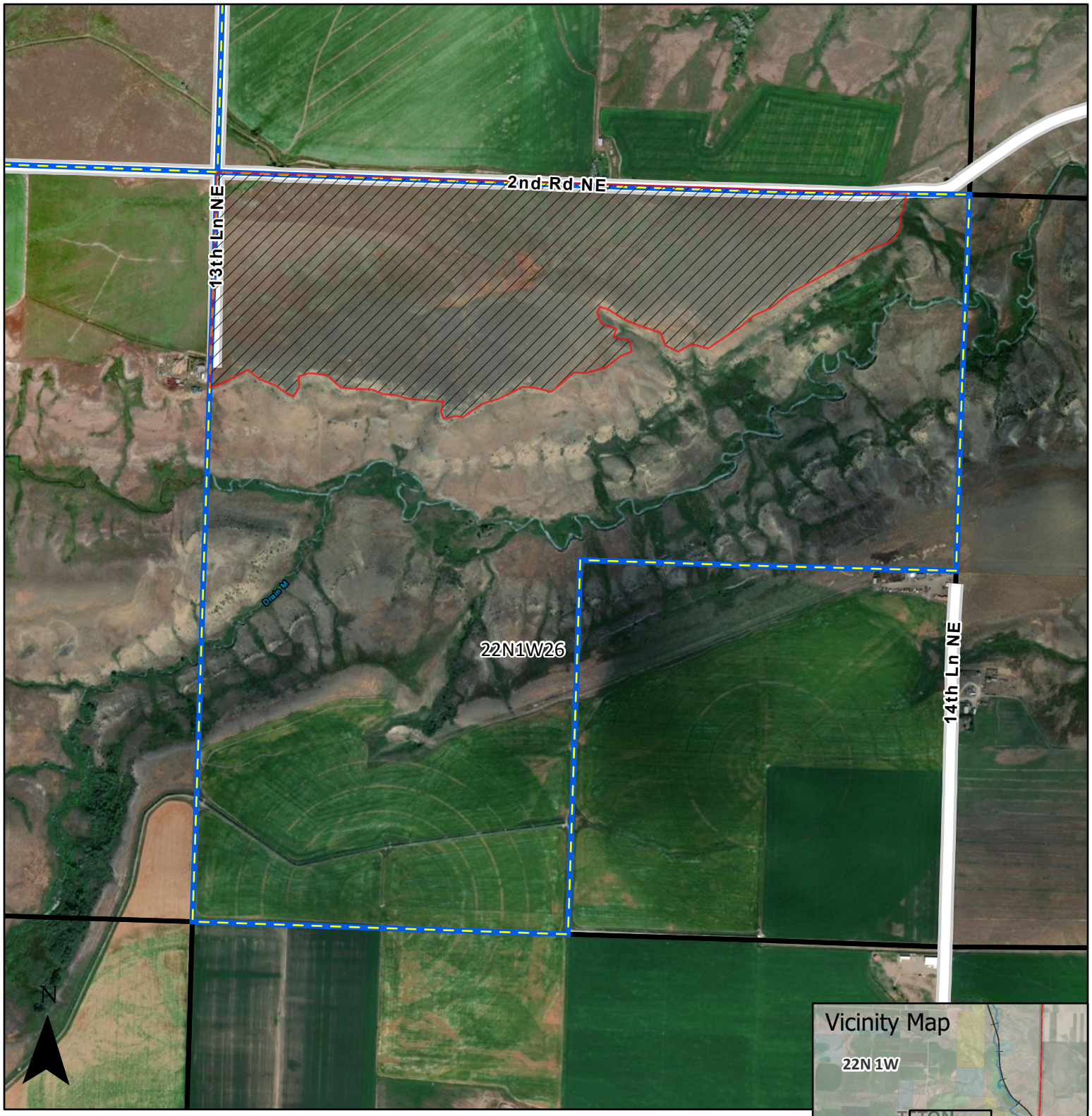
[ ] EIS [ ] More Detailed EA [X] No Further Analysis

EA Checklist Approved By:	**Name:**	Erik Eneboe
	Title:	Conrad Unit Manager, CLO, DNRC
Signature: 	**Date**:	Jan 3, 2023

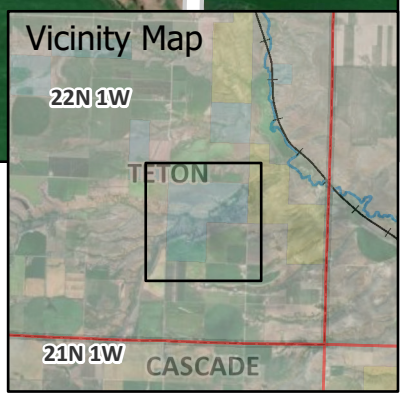
Exhibit A
Project Location Map

The Montana Department of Natural Resources & Conservation

Riverside Contracting Inc. Gravel Test Permit
Exhibit A - Project Location



Gravel Testing Area
DNRC Agreement Tracts
DNRC Surface Tracts
PLSS Township
PLSS First Division



Location: 47.632652°N , -111.699884°W

0 0.13 0.25 0.5 Miles

Exhibit B
Soil Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana

December 30, 2022

Preface

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

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

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

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

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

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

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

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

Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

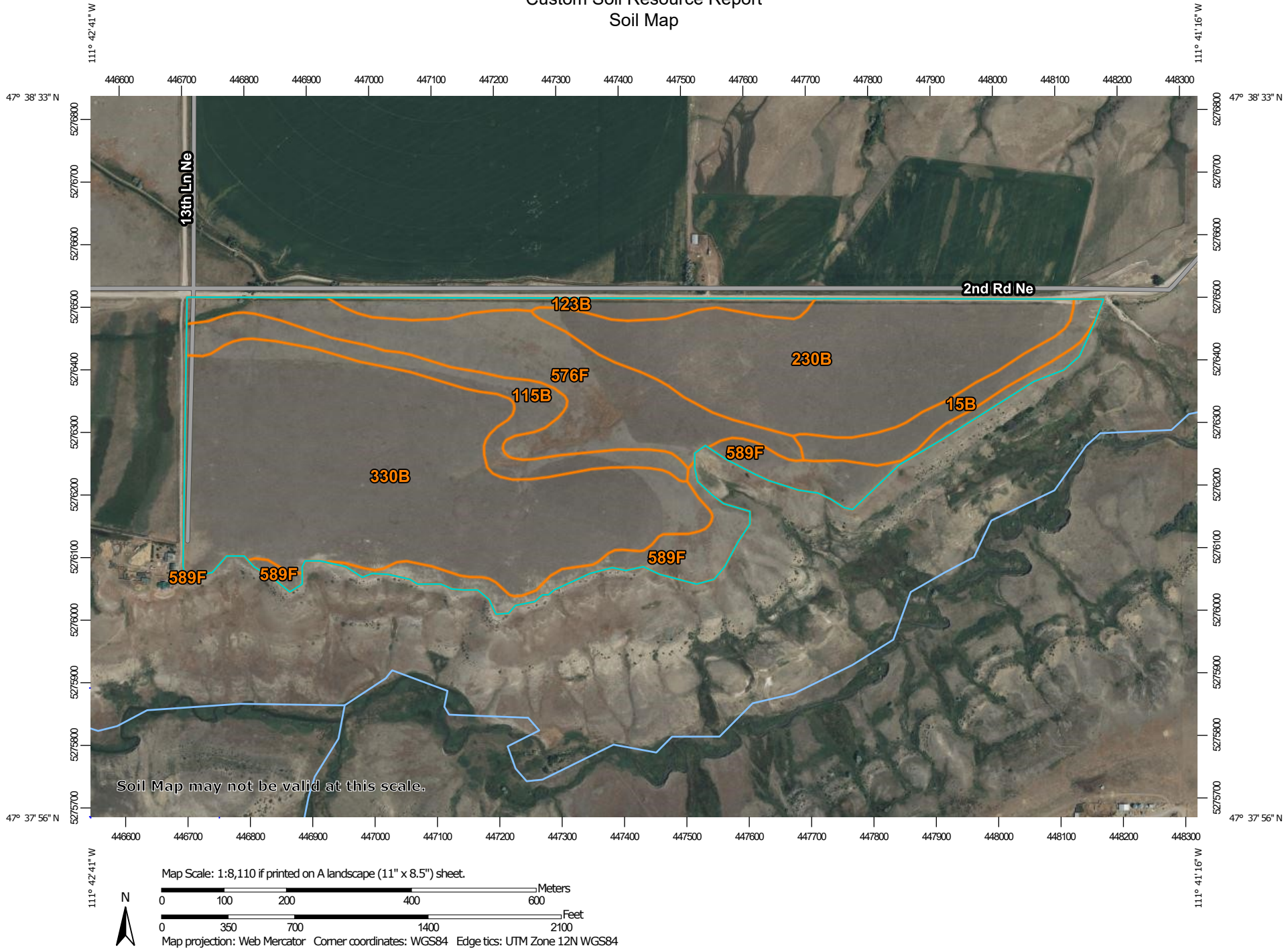
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:8,110 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 100 200 400 600

Feet
0 350 700 1400 2100

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.

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

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

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

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

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

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

Soil Survey Area: Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana
Survey Area Data: Version 20, Aug 30, 2022

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

Date(s) aerial images were photographed: Jul 6, 2021—Sep 30, 2021

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

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
15B	Crago gravelly loam, 0 to 4 percent slopes	5.2	4.0%
115B	Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes	8.6	6.6%
123B	Rothiemay-Niart clay loams, 0 to 4 percent slopes	5.0	3.8%
230B	Niart-Crago gravelly loams, 0 to 4 percent slopes	28.9	22.2%
330B	Niart gravelly loam, 0 to 4 percent slopes	52.3	40.1%
576F	Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes	19.2	14.7%
589F	Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes	11.3	8.7%
Totals for Area of Interest		**130.4**	**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.

Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana

15B—Crago gravelly loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: cphp
Elevation: 3,200 to 4,200 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Crago

Setting

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

Typical profile

A - 0 to 6 inches: gravelly loam
Bk1 - 6 to 10 inches: gravelly loam
Bk2 - 10 to 22 inches: extremely gravelly loam
Bk3 - 22 to 60 inches: extremely gravelly sandy loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
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 content: 70 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Minor Components

Arrod

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear

Across-slope shape: Linear
Ecological site: R052XN178MT - Shallow (Sw) 10-14" p.z.
Hydric soil rating: No

Rothiemay

Percent of map unit: 3 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ
Hydric soil rating: No

Niart

Percent of map unit: 3 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

115B—Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: cpfm
Elevation: 3,200 to 4,200 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Niart and similar soils: 35 percent
Crago and similar soils: 30 percent
Arrod and similar soils: 30 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Niart

Setting

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

Typical profile

A - 0 to 5 inches: gravelly loam
Bw - 5 to 10 inches: clay loam
Bk - 10 to 21 inches: clay loam
2C - 21 to 60 inches: very gravelly loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
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 content: 55 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Description of Crago

Setting

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

Typical profile

A - 0 to 6 inches: gravelly loam
Bk1 - 6 to 10 inches: gravelly loam
Bk2 - 10 to 22 inches: extremely gravelly loam
Bk3 - 22 to 60 inches: extremely gravelly sandy loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
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 content: 70 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Description of Arrod

Setting

Landform: Stream terraces

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

Typical profile

A - 0 to 7 inches: gravelly loam
Bk - 7 to 15 inches: very gravelly loam
2Bkm - 15 to 25 inches: indurated
3Bk - 25 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 12 to 20 inches to undefined
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 60 percent
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R052XN178MT - Shallow (Sw) 10-14" p.z.
Hydric soil rating: No

Minor Components

Rothiemay

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ
Hydric soil rating: No

Varney

Percent of map unit: 1 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ
Hydric soil rating: No

123B—Rothiemay-Niart clay loams, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: cpg3

Elevation: 3,200 to 4,000 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 125 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rothiemay and similar soils: 50 percent
Niart and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rothiemay

Setting

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

Typical profile

A - 0 to 5 inches: clay loam
Bw - 5 to 16 inches: clay loam
Bk - 16 to 50 inches: clay loam
BC - 50 to 60 inches: gravelly clay loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
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 content: 60 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ
Hydric soil rating: No

Description of Niart

Setting

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

Typical profile

Ap - 0 to 6 inches: clay loam
Bw - 6 to 10 inches: clay loam
Bk - 10 to 30 inches: clay loam
2C - 30 to 60 inches: very gravelly loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
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 content: 55 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Minor Components

Crago

Percent of map unit: 6 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Varney

Percent of map unit: 5 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ
Hydric soil rating: No

Arrod

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN178MT - Shallow (Sw) 10-14" p.z.
Hydric soil rating: No

230B—Niart-Crago gravelly loams, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: cpm2
Elevation: 3,200 to 4,000 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Niart

Setting

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

Typical profile

A - 0 to 5 inches: gravelly loam
Bw - 5 to 10 inches: clay loam
Bk - 10 to 21 inches: clay loam
2C - 21 to 60 inches: very gravelly loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
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 content: 55 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Description of Crago

Setting

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

Typical profile

A - 0 to 6 inches: gravelly loam
Bk1 - 6 to 10 inches: gravelly loam
Bk2 - 10 to 22 inches: extremely gravelly loam
Bk3 - 22 to 60 inches: extremely gravelly sandy loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
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 content: 70 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Minor Components

Arrod

Percent of map unit: 6 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN178MT - Shallow (Sw) 10-14" p.z.
Hydric soil rating: No

Rothiemay

Percent of map unit: 5 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ
Hydric soil rating: No

Varney

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ

Hydric soil rating: No

330B—Niart gravelly loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: cpqc
Elevation: 3,200 to 4,000 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 125 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Niart

Setting

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

Typical profile

A - 0 to 5 inches: gravelly loam
Bw - 5 to 10 inches: clay loam
Bk - 10 to 21 inches: clay loam
2C - 21 to 60 inches: very gravelly loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
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 content: 55 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Minor Components

Crago

Percent of map unit: 7 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Rothiemay

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ
Hydric soil rating: No

Arrod

Percent of map unit: 3 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN178MT - Shallow (Sw) 10-14" p.z.
Hydric soil rating: No

Varney

Percent of map unit: 1 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ
Hydric soil rating: No

576F—Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes

Map Unit Setting

National map unit symbol: cpw9
Elevation: 3,200 to 4,200 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Delpoint and similar soils: 40 percent
Cabbart and similar soils: 25 percent
Crago and similar soils: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delpoint

Setting

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

Typical profile

A - 0 to 6 inches: loam
Bw - 6 to 15 inches: loam
Bk - 15 to 30 inches: loam
Cr - 30 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
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 content: 15 percent
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R052XN168MT - Silty-Steep (SiStp) 10-14" p.z.
Hydric soil rating: No

Description of Cabbart

Setting

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

Typical profile

A - 0 to 3 inches: loam
Bk - 3 to 14 inches: loam
Cr - 14 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 35 to 60 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
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 content: 25 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0

Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R052XN178MT - Shallow (Sw) 10-14" p.z.
Hydric soil rating: No

Description of Crago

Setting

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

Typical profile

A - 0 to 6 inches: gravelly loam
Bk1 - 6 to 10 inches: gravelly loam
Bk2 - 10 to 22 inches: extremely gravelly loam
Bk3 - 22 to 60 inches: extremely gravelly sandy loam

Properties and qualities

Slope: 35 to 60 percent
Depth to restrictive feature: More than 80 inches
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 content: 70 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R046XN254MT - Limy (Ly) RRU 46-N 13-17 PZ
Hydric soil rating: No

Minor Components

Yamacall

Percent of map unit: 8 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN161MT - Silty (Si) 10-14" p.z.
Hydric soil rating: No

Rothiemay

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN252MT - Silty (Si) RRU 46-N 13-19 PZ

Hydric soil rating: No

Kremlin

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN161MT - Silty (Si) 10-14" p.z.
Hydric soil rating: No

589F—Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes

Map Unit Setting

National map unit symbol: cpwg
Elevation: 3,200 to 4,200 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Megonot and similar soils: 35 percent
Yawdim and similar soils: 30 percent
Rock outcrop: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Megonot

Setting

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

Typical profile

A - 0 to 5 inches: silty clay loam
Bw - 5 to 12 inches: silty clay loam
Bk - 12 to 21 inches: silty clay
By - 21 to 32 inches: channery silty clay
Cr - 32 to 60 inches: weathered bedrock

Properties and qualities

Slope: 25 to 60 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
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 content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

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

Description of Yawdim

Setting

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

Typical profile

A - 0 to 5 inches: silty clay loam
C - 5 to 16 inches: silty clay loam
Cr - 16 to 60 inches: weathered bedrock

Properties and qualities

Slope: 25 to 60 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
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 content: 10 percent
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R052XN179MT - Shallow Clay (SwC) 10-14" p.z.
Hydric soil rating: No

Minor Components

Cabbart

Percent of map unit: 7 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN178MT - Shallow (Sw) 10-14" p.z.
Hydric soil rating: No

Abor

Percent of map unit: 5 percent
Landform: Hills

Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN164MT - Clayey-Steep (CyStp) 10-14" p.z.
Hydric soil rating: No

Kobase

Percent of map unit: 3 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN162MT - Clayey (Cy) 10-14" p.z.
Hydric soil rating: No

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Construction Materials

Construction materials interpretations are tools designed to provide guidance to users in selecting a site for potential source of various materials. Individual soils or groups of soils may be selected as a potential source because they are close at hand, are the only source available, or they meets some or all of the physical or chemical properties required for the intended application. Example interpretations include roadfill, sand and gravel, topsoil and reclamation material.

Gravel Source

Gravel consists of natural aggregates (2 to 75 millimeters in diameter) suitable for commercial use with a minimum of processing. It is used in many kinds of construction. Specifications for each use vary widely. Only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

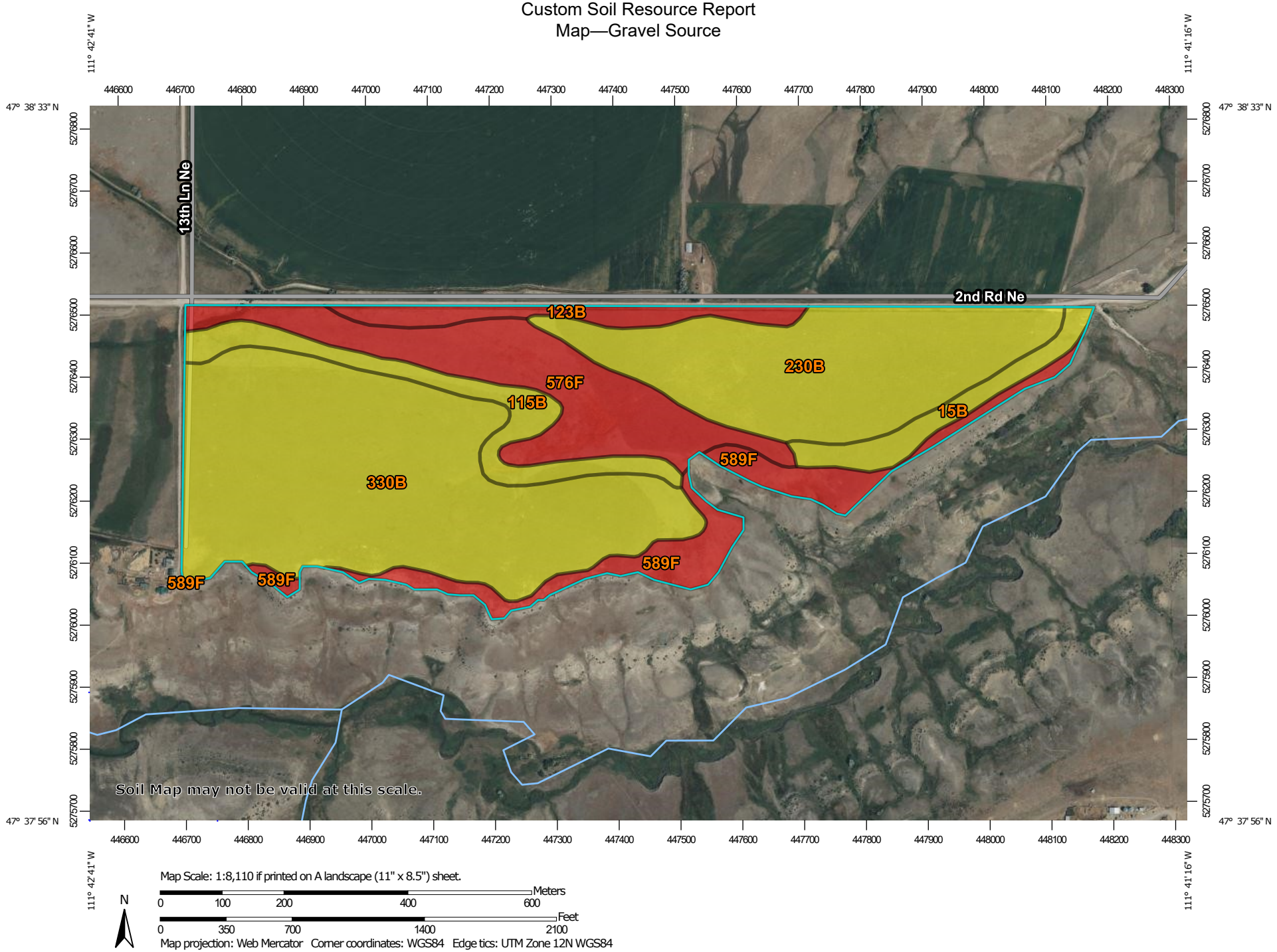
The properties used to evaluate the soil as a source of gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains gravel, the soil is considered a likely source regardless of thickness. The assumption is that the gravel layer below the depth of observation exceeds the minimum thickness. The ratings are for the whole soil, from the surface to a depth of about 6 feet. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be gravel.

The soils are rated "good," "fair," or "poor" as potential sources of gravel. A rating of "good" or "fair" means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings.

These ratings indicate the likelihood that the layer is a source of gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.


111° 42'41" W
111° 41'16" W
47° 38' 33" N
47° 37' 56" N
446600
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447100
447200
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5276600
5276500
5276400
5276300
5276200
5276100
5276000
5275900
5275800
5275700
13th Ln Ne
2nd Rd Ne
123B
230B
576F
115B
15B
589F
330B
589F
589F
589F
Soil Map may not be valid at this scale.
Map Scale: 1:8,110 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0
100
200
400
600
Feet
0
350
700
1400
2100
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 Rating Polygons

- Poor
- Fair
- Good
- Not rated or not available

Soil Rating Lines

- Poor
- Fair
- Good
- Not rated or not available

Soil Rating Points

- Poor
- Fair
- Good
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana
Survey Area Data: Version 20, Aug 30, 2022

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

Date(s) aerial images were photographed: Jul 6, 2021—Sep 30, 2021

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

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Gravel Source

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
15B	Crago gravelly loam, 0 to 4 percent slopes	Fair	Crago (90%)	Bottom layer (0.38)	5.2	4.0%
				Thickest layer (0.38)		
			Niart (3%)	Thickest layer (0.00)		
				Bottom layer (0.25)		
115B	Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes	Fair	Niart (35%)	Thickest layer (0.00)	8.6	6.6%
				Bottom layer (0.25)		
			Crago (30%)	Bottom layer (0.38)		
				Thickest layer (0.38)		
123B	Rothiemay-Niart clay loams, 0 to 4 percent slopes	Poor	Rothiemay (50%)	Bottom layer (0.00)	5.0	3.8%
				Thickest layer (0.00)		
			Varney (5%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
230B	Niart-Crago gravelly loams, 0 to 4 percent slopes	Fair	Niart (55%)	Thickest layer (0.00)	28.9	22.2%
				Bottom layer (0.25)		
			Crago (30%)	Bottom layer (0.38)		
				Thickest layer (0.38)		
330B	Niart gravelly loam, 0 to 4 percent slopes	Fair	Niart (85%)	Thickest layer (0.00)	52.3	40.1%
				Bottom layer (0.25)		
			Crago (7%)	Bottom layer (0.38)		
				Thickest layer (0.38)		
576F	Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes	Poor	Delpoint (40%)	Bottom layer (0.00)	19.2	14.7%
				Thickest layer (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Cabbart (25%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
			Yamacall (8%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
			Rothiemay (5%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
			Kremlin (2%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
589F	Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes	Poor	Megonot (35%)	Bottom layer (0.00)	11.3	8.7%
				Thickest layer (0.00)		
			Yawdim (30%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
			Cabbart (7%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
			Abor (5%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
			Kobase (3%)	Bottom layer (0.00)		
				Thickest layer (0.00)		
Totals for Area of Interest					**130.4**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Fair	94.9	72.8%
Poor	35.4	27.2%
Totals for Area of Interest	**130.4**	**100.0%**

Rating Options—Gravel Source

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Roadfill Source

Roadfill is soil material that is excavated in one place and used in road embankments in another place. The soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments. The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

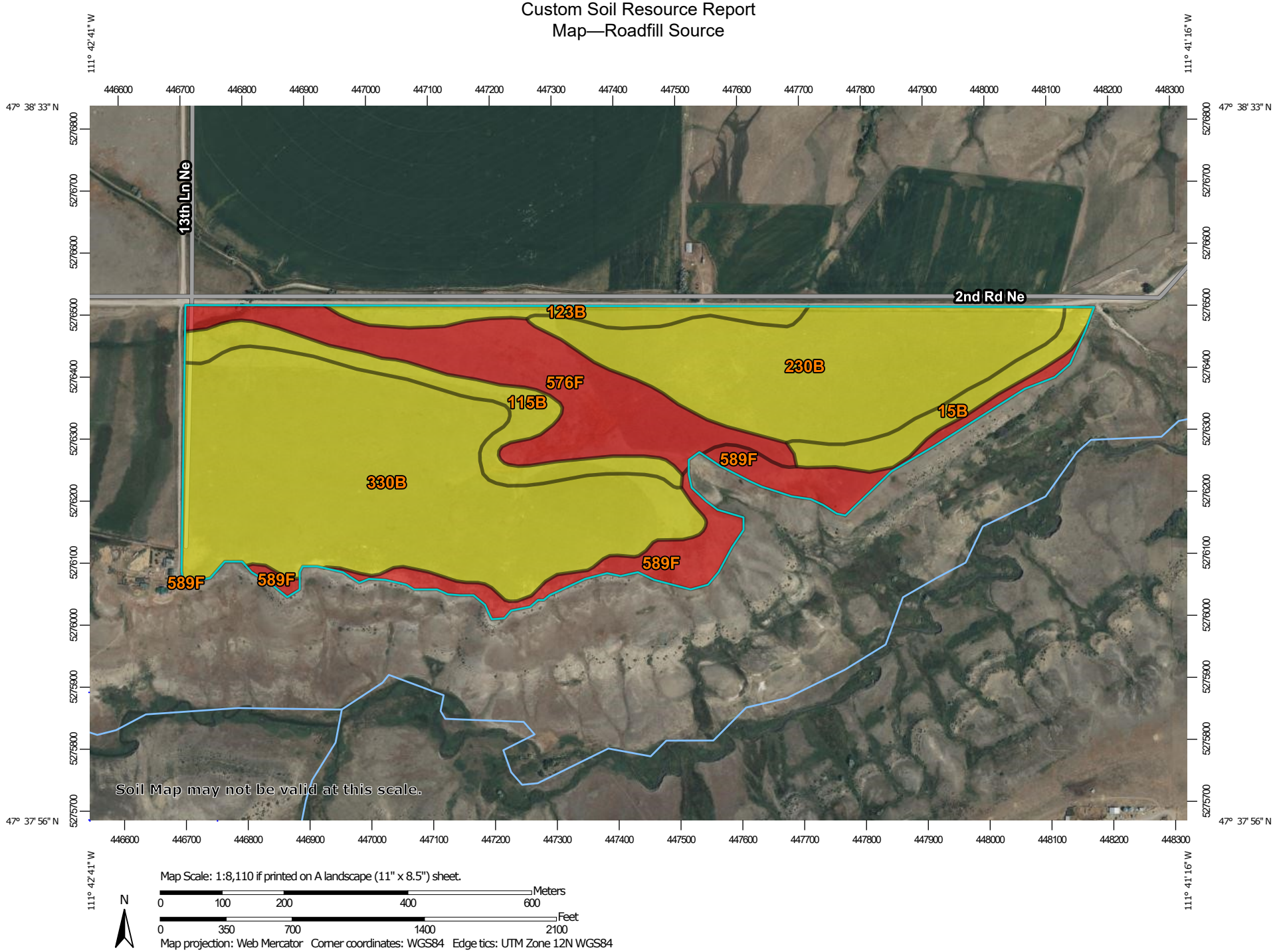
The soils are rated "good," "fair," or "poor" as potential sources of roadfill. The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential). Normal compaction, minor processing, and other standard construction practices are assumed.

Numerical ratings between 0.00 and 0.99 are given after the specified features. These numbers indicate the degree to which the features limit the soils as sources of roadfill. The lower the number, the greater the limitation.

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Map—Roadfill Source



Map Scale: 1:8,110 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 100 200 400 600

Feet
0 350 700 1400 2100

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 Rating Polygons
- Poor
- Fair
- Good
- Not rated or not available

Soil Rating Lines
- Poor
- Fair
- Good
- Not rated or not available

Soil Rating Points
- Poor
- Fair
- Good
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana
Survey Area Data: Version 20, Aug 30, 2022

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

Date(s) aerial images were photographed: Jul 6, 2021—Sep 30, 2021

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

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Roadfill Source

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
15B	Crago gravelly loam, 0 to 4 percent slopes	Fair	Crago (90%)	Dusty (0.94)	5.2	4.0%
			Arrod (4%)	Dusty (0.92)		
			Rothiemay (3%)	Shrink-swell (0.87)		
				Dusty (0.89)		
			Niart (3%)	Dusty (0.90)		
115B	Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes	Fair	Niart (35%)	Dusty (0.90)	8.6	6.6%
			Crago (30%)	Dusty (0.94)		
			Arrod (30%)	Dusty (0.92)		
			Rothiemay (4%)	Shrink-swell (0.87)		
				Dusty (0.89)		
			Varney (1%)	Dusty (0.89)		
123B	Rothiemay-Niart clay loams, 0 to 4 percent slopes	Fair	Rothiemay (50%)	Shrink-swell (0.87)	5.0	3.8%
				Dusty (0.89)		
			Niart (35%)	Dusty (0.89)		
			Crago (6%)	Dusty (0.94)		
			Varney (5%)	Dusty (0.89)		
			Arrod (4%)	Dusty (0.92)		
230B	Niart-Crago gravelly loams, 0 to 4 percent slopes	Fair	Niart (55%)	Dusty (0.90)	28.9	22.2%
			Crago (30%)	Dusty (0.94)		
			Arrod (6%)	Dusty (0.92)		
			Rothiemay (5%)	Shrink-swell (0.87)		
				Dusty (0.89)		
			Varney (4%)	Dusty (0.89)		
330B	Niart gravelly loam, 0 to 4 percent slopes	Fair	Niart (85%)	Dusty (0.90)	52.3	40.1%
			Crago (7%)	Dusty (0.94)		
			Rothiemay (4%)	Shrink-swell (0.87)		
				Dusty (0.89)		
			Arrod (3%)	Dusty (0.92)		
			Varney (1%)	Dusty (0.89)		
576F	Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes	Poor	Delpoint (40%)	Depth to bedrock (0.00)	19.2	14.7%
				Slope (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Low strength (0.78)		
				Shrink-swell (0.87)		
				Dusty (0.93)		
			Cabbart (25%)	Depth to bedrock (0.00)		
				Slope (0.00)		
				Shrink-swell (0.87)		
				Dusty (0.93)		
			Crago (20%)	Slope (0.00)		
				Dusty (0.94)		
589F	Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes	Poor	Megonot (35%)	Slope (0.00)	11.3	8.7%
				Depth to bedrock (0.00)		
				Low strength (0.00)		
				Shrink-swell (0.13)		
				Dusty (0.77)		
			Yawdim (30%)	Depth to bedrock (0.00)		
				Slope (0.00)		
				Low strength (0.00)		
				Shrink-swell (0.13)		
				Dusty (0.76)		
			Cabbart (7%)	Depth to bedrock (0.00)		
				Slope (0.00)		
				Shrink-swell (0.87)		
				Dusty (0.93)		
			Abor (5%)	Low strength (0.00)		
				Depth to bedrock (0.00)		
				Slope (0.00)		
				Shrink-swell (0.13)		
				Dusty (0.77)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Kobase (3%)	Low strength (0.00)		
				Shrink-swell (0.13)		
				Dusty (0.77)		
Totals for Area of Interest					**130.4**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Fair	99.9	76.6%
Poor	30.5	23.4%
Totals for Area of Interest	**130.4**	**100.0%**

Rating Options—Roadfill Source

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Land Management

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Reclamation Suitability (MT)

This interpretation is designed to evaluate the suitability of soil map unit components for reclamation following disturbance such as by surface mining. It is the process of restoring land to a natural or economically usable state.

Factors considered in this interpretation include:

- Available water capacity for the 0 to 100 centimeter soil depth range

- Salinity of the surface layer, as determined by electrical conductivity

- Sodicity of the surface layer, as determined by the sodium adsorption ratio

- Mean annual precipitation

- Depth to root-restricting material

- Water erosion hazard, as determined by multiplying the erodibility "Kw" factor of the surface layer by the representative slope gradient (percent)

- Wind erosion hazard, as determined by the Wind Erodibility Index

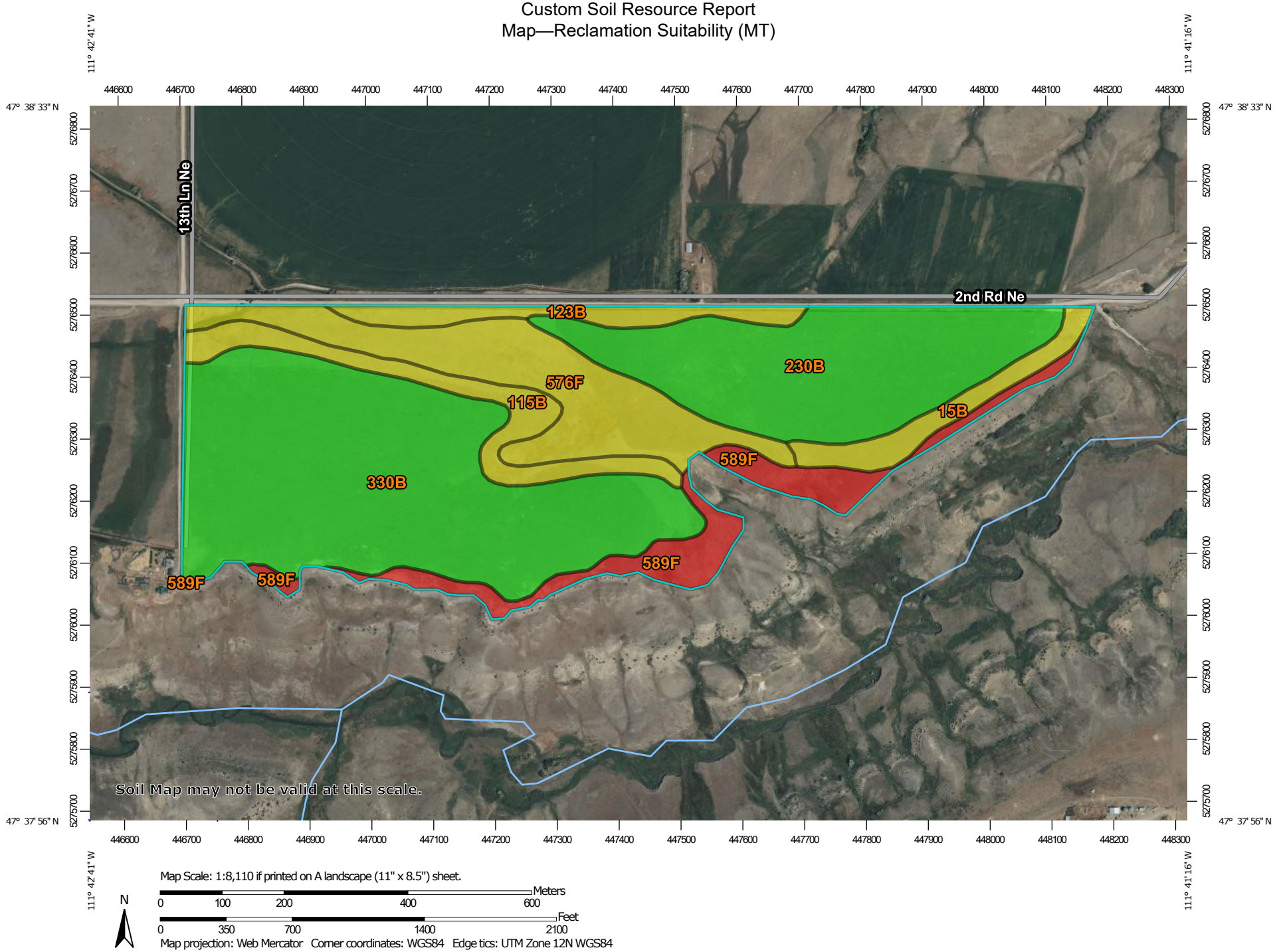
The ratings are both verbal and numerical. Rating class terms indicate the soil reclamation suitability. A "Poorly suited" rating indicates that the soil, site, and/or climate have features that are unfavorable for reclamation. A "Moderately suited" rating indicates that the soil has features that are generally favorable for reclamation, but there are some soil, site, or climate features that are moderately limiting. A "Well suited" rating indicates that the soil has features that are favorable for reclamation.

Numerical ratings indicate the reclamation suitability of the soil. The ratings are shown in decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which the combination of soil, site, and climate features has the greatest positive impact on restoration potential (0.00) and the point at which the features are very unfavorable (1.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Map—Reclamation Suitability (MT)



MAP LEGEND

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

Soils

Soil Rating Polygons
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Soil Rating Lines
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Soil Rating Points
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Soil Survey Area: Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana
Survey Area Data: Version 20, Aug 30, 2022

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

Date(s) aerial images were photographed: Jul 6, 2021—Sep 30, 2021

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

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Reclamation Suitability (MT)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
15B	Crago gravelly loam, 0 to 4 percent slopes	Moderately suited	Crago (90%)	Droughtiness (0.98)	5.2	4.0%
			Arrod (4%)	Droughtiness (0.97)		
				Rooting Depth (0.27)		
115B	Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes	Moderately suited	Arrod (30%)	Droughtiness (0.97)	8.6	6.6%
				Rooting Depth (0.27)		
			Crago (30%)	Droughtiness (0.98)		
123B	Rothiemay-Niart clay loams, 0 to 4 percent slopes	Moderately suited	Rothiemay (50%)	Wind Erosion (0.50)	5.0	3.8%
			Niart (35%)	Wind Erosion (0.50)		
			Crago (6%)	Droughtiness (0.98)		
			Arrod (4%)	Droughtiness (0.97)		
				Rooting Depth (0.27)		
230B	Niart-Crago gravelly loams, 0 to 4 percent slopes	Well suited	Niart (55%)		28.9	22.2%
			Rothiemay (5%)			
			Varney (4%)			
330B	Niart gravelly loam, 0 to 4 percent slopes	Well suited	Niart (85%)		52.3	40.1%
			Varney (1%)			
576F	Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes	Moderately suited	Delpoint (40%)	Water Erosion (0.86)	19.2	14.7%
				Wind Erosion (0.50)		
			Yamacall (8%)	Wind Erosion (0.50)		
			Rothiemay (5%)	Wind Erosion (0.50)		
			Kremlin (2%)	Wind Erosion (0.50)		
589F	Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes	Poorly suited	Megonot (35%)	Water Erosion (1.00)	11.3	8.7%
				Droughtiness (0.70)		
				Wind Erosion (0.50)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Yawdim (30%)	Water Erosion (1.00)		
				Droughtiness (0.60)		
				Rooting Depth (0.27)		
			Rock outcrop (20%)	Vegetation Not Supported (1.00)		
				Water Erosion (1.00)		
				Wind Erosion (1.00)		
			Cabbart (7%)	Water Erosion (1.00)		
				Droughtiness (0.87)		
				Rooting Depth (0.63)		
				Wind Erosion (0.50)		
			Abor (5%)	Water Erosion (1.00)		
				Wind Erosion (0.50)		
Totals for Area of Interest					**130.4**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Well suited	81.1	62.2%
Moderately suited	37.9	29.1%
Poorly suited	11.3	8.7%
Totals for Area of Interest	**130.4**	**100.0%**

Rating Options—Reclamation Suitability (MT)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Compactibility Risk

This interpretation is designed to predict the potential for soil compaction from operation of ground-based equipment for forest harvesting and site preparation

activities when soils are moist. Soils are rated based on their susceptibility to compaction from the operation of ground-based equipment for planting, harvesting, and site preparation activities. Soil compaction is the process in which soil particles are pressed together more closely than in the original state. Typically, the soil must be moist to be compacted because the mineral grains must slide together. Compaction reduces the abundance mostly of large pores in the soil by damaging the structure of the soil. This produces several effects that are unwanted in forest soils since large pores are most effective at transmitting water and air through the soil. Compaction also increases the soil strength, which can limit root penetration and growth. The ability of soil to hold water is adversely affected by compaction since the large pores hold water. The degree of compaction of a soil is measured by its bulk density, which is the mass per unit volume, generally expressed in grams per cubic centimeter.

Compacted soils are less favorable for good plant growth because of high soil bulk density and hardness, reduced pore space, and poor aeration and drainage. Root penetration and growth is decreased in compacted soils because the hardness or strength of these soils prevents the expansion of roots. Supplies of air, water, and nutrients that roots need are also reduced when compaction decreases soil porosity and drainage.

Interpretative ratings are based on soil properties in the upper 12 inches of the profile. Factors considered are soil texture, soil organic matter content, soil structure, rock fragment content, and the existing bulk density. Each of these properties contributes to a soil’s ability to resist compaction. Organic matter in the soil provides resistance to compaction and the resilience to overcome the effects with time. Soil structure adds strength through discrete aggregates; it is the aggregates that are deformed or destroyed by the forces of compaction, thus strong soil structure lowers the susceptibility to compaction. Similarly, rock fragments in the soil can bridge and provide a framework to resist compaction. Finally, if a soil is already dense, further compaction is more difficult.

The ratings are both verbal and numerical. Rating class terms indicate the soil compaction potential.

Definitions of the ratings:

Low - The potential for compaction is insignificant. The soil is able to support standard equipment with minimal compaction. The soil is moisture insensitive, exhibiting only small changes in density with changing moisture content.

Medium - The potential for compaction is significant. The growth rate of seedlings may be reduced following compaction. After the initial compaction (i.e., the first equipment pass), the soil is able to support standard equipment with only minimal increases in soil density. The soil is intermediate between moisture insensitive and moisture sensitive.

High - The potential for compaction is very significant. The growth rate of seedlings will be reduced following compaction. After initial compaction, the soil is still able to support standard equipment but will continue to compact with each subsequent

pass of the equipment. The soil is moisture sensitive, exhibiting large changes in density with changing moisture content.

Numerical ratings indicate the soil compaction potential. The ratings are shown in decimal fractions ranging from 1.00 to 0.00. They indicate gradations between the point where compaction potential is highest (1.00) and the point at which compaction potential is lowest (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

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References:

Adams, P.W. 1981. Compaction of forest soils. Oregon State University Extension Publication PNW 217.

Adams, P.W. 1998. Soil compaction on woodland properties. Oregon State University Extension Publication EC 1109.

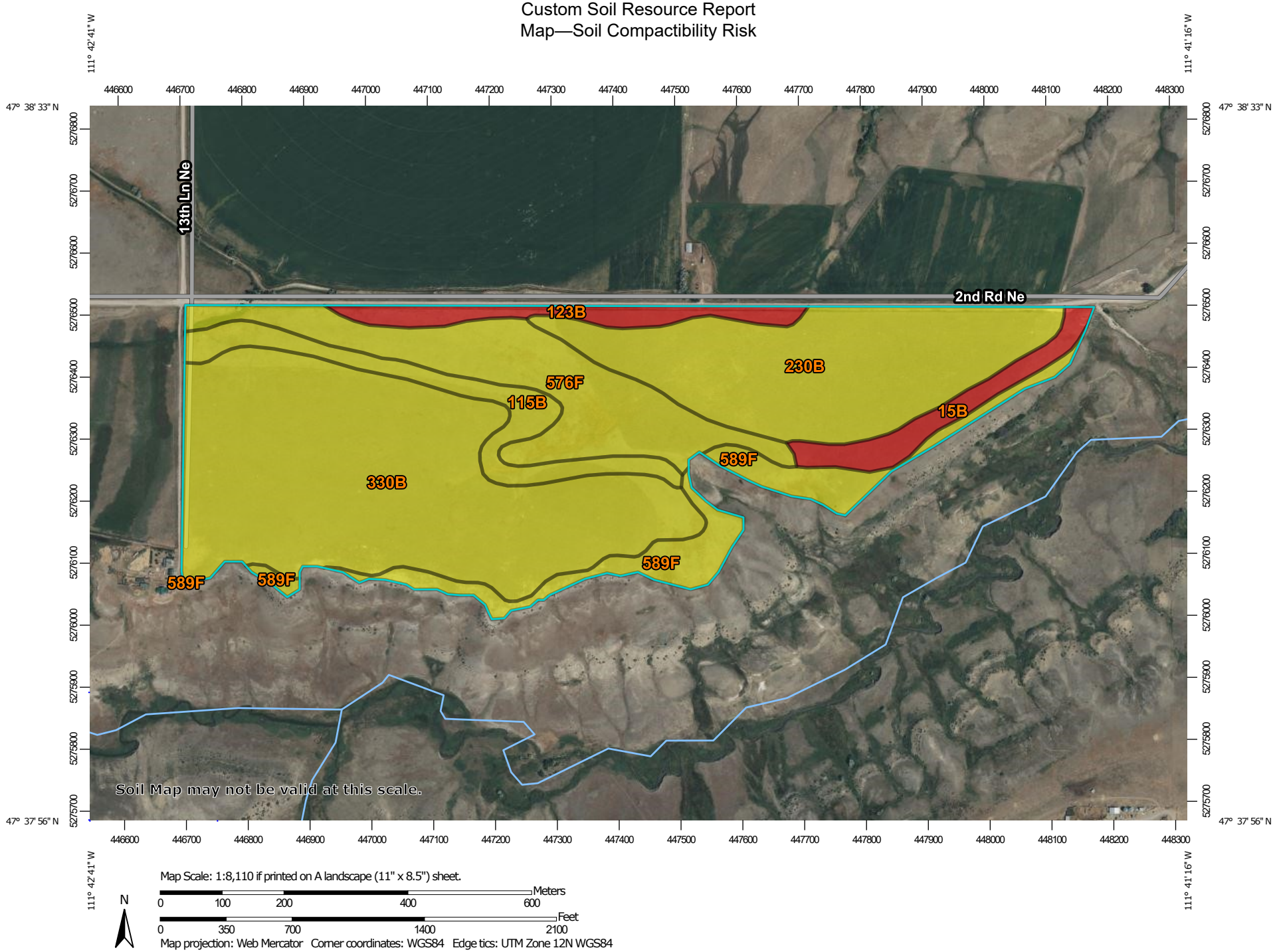
Boyer, D. 1997. Guidelines for soil resource protection and restoration for timber harvest and post-harvest activities. U.S Forest Service, Pacific Northwest Region, Watershed Management.

Froehlich, H.A., and D.H. McNab. 1983. Minimizing soil compaction in Pacific Northwest forests. Proceedings of Sixth North American Forest Soils Conference, University of Tennessee.

Geist, J.M., J.W. Hazard, and K.W. Seidel. 1989. Assessing physical conditions of some Pacific Northwest volcanic ash soils after forest harvest. Soil Science Society of America Journal 53:946-950.

Page-Dumrose, D.S. 1993. Susceptibility of volcanic ash influenced soils in northern Idaho to mechanical compaction. U.S. Forest Service Intermountain Research Station. Research Note INT-409.

Map—Soil Compactibility Risk



MAP LEGEND

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

Soils

Soil Rating Polygons
- High
- Medium
- Low
- Not rated or not available

Soil Rating Lines
- High
- Medium
- Low
- Not rated or not available

Soil Rating Points
- High
- Medium
- Low
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

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MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Soil Compactibility Risk

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
15B	Crago gravelly loam, 0 to 4 percent slopes	High	Crago (90%)	Soil texture, 0-12 inches (1.00)	5.2	4.0%
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (1.00)		
115B	Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes	Medium	Niart (35%)	Soil texture, 0-12 inches (1.00)	8.6	6.6%
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (0.93)		
			Arrod (30%)	Soil texture, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (1.00)		
				Rock fragments, 0-12 inches (1.00)		
			Rothiemay (4%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (0.95)		
			Varney (1%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		
				Organic matter content, 0-30 cm (0.83)		
				Bulk density-compactibility to 30cm (0.78)		
				Soil structure grade, 0-12 inches (0.50)		
123B	Rothiemay-Niart clay loams, 0 to 4 percent slopes	High	Rothiemay (50%)	Soil texture, 0-12 inches (1.00)	5.0	3.8%
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (1.00)		
			Crago (6%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (1.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
230B	Niart-Crago gravelly loams, 0 to 4 percent slopes	Medium	Niart (55%)	Soil texture, 0-12 inches (1.00)	28.9	22.2%
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (0.93)		
			Arrod (6%)	Soil texture, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (1.00)		
				Rock fragments, 0-12 inches (1.00)		
			Rothiemay (5%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (0.95)		
			Varney (4%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		
				Organic matter content, 0-30 cm (0.83)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Bulk density-compactibility to 30cm (0.78)		
				Soil structure grade, 0-12 inches (0.50)		
330B	Niart gravelly loam, 0 to 4 percent slopes	Medium	Niart (85%)	Soil texture, 0-12 inches (1.00)	52.3	40.1%
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (0.93)		
			Arrod (3%)	Soil texture, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (1.00)		
				Rock fragments, 0-12 inches (1.00)		
			Varney (1%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		
				Organic matter content, 0-30 cm (0.83)		
				Bulk density-compactibility to 30cm (0.78)		
				Soil structure grade, 0-12 inches (0.50)		
576F	Delpoint-Cabbart-Crago complex, 15 to	Medium	Delpoint (40%)	Soil texture, 0-12 inches (1.00)	19.2	14.7%

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
	60 percent slopes			Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (0.94)		
			Cabbart (25%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Organic matter content, 0-30 cm (1.00)		
				Bulk density-compactibility to 30cm (0.93)		
			Kremlin (2%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (0.93)		
589F	Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes	Medium	Yawdim (30%)	Soil texture, 0-12 inches (1.00)	11.3	8.7%
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Organic matter content, 0-30 cm (1.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Bulk density-compactibility to 30cm (0.87)		
			Cabbart (7%)	Soil texture, 0-12 inches (1.00)		
				Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Organic matter content, 0-30 cm (1.00)		
				Bulk density-compactibility to 30cm (0.93)		
			Abor (5%)	Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Bulk density-compactibility to 30cm (1.00)		
				Organic matter content, 0-30 cm (1.00)		
				Soil texture, 0-12 inches (0.50)		
			Kobase (3%)	Rock fragments, 0-12 inches (1.00)		
				Soil structure grade, 0-12 inches (1.00)		
				Organic matter content, 0-30 cm (1.00)		
				Bulk density-compactibility to 30cm (0.72)		
				Soil texture, 0-12 inches (0.50)		
Totals for Area of Interest					**130.4**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Medium	120.2	92.2%

Rating	Acres in AOI	Percent of AOI
High	10.1	7.8%
Totals for Area of Interest	**130.4**	**100.0%**

Rating Options—Soil Compactibility Risk

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Rutting Hazard

The ratings in this interpretation indicate the hazard of surface rut formation through the operation of forestland equipment. Soil displacement and puddling (soil deformation and compaction) may occur simultaneously with rutting.

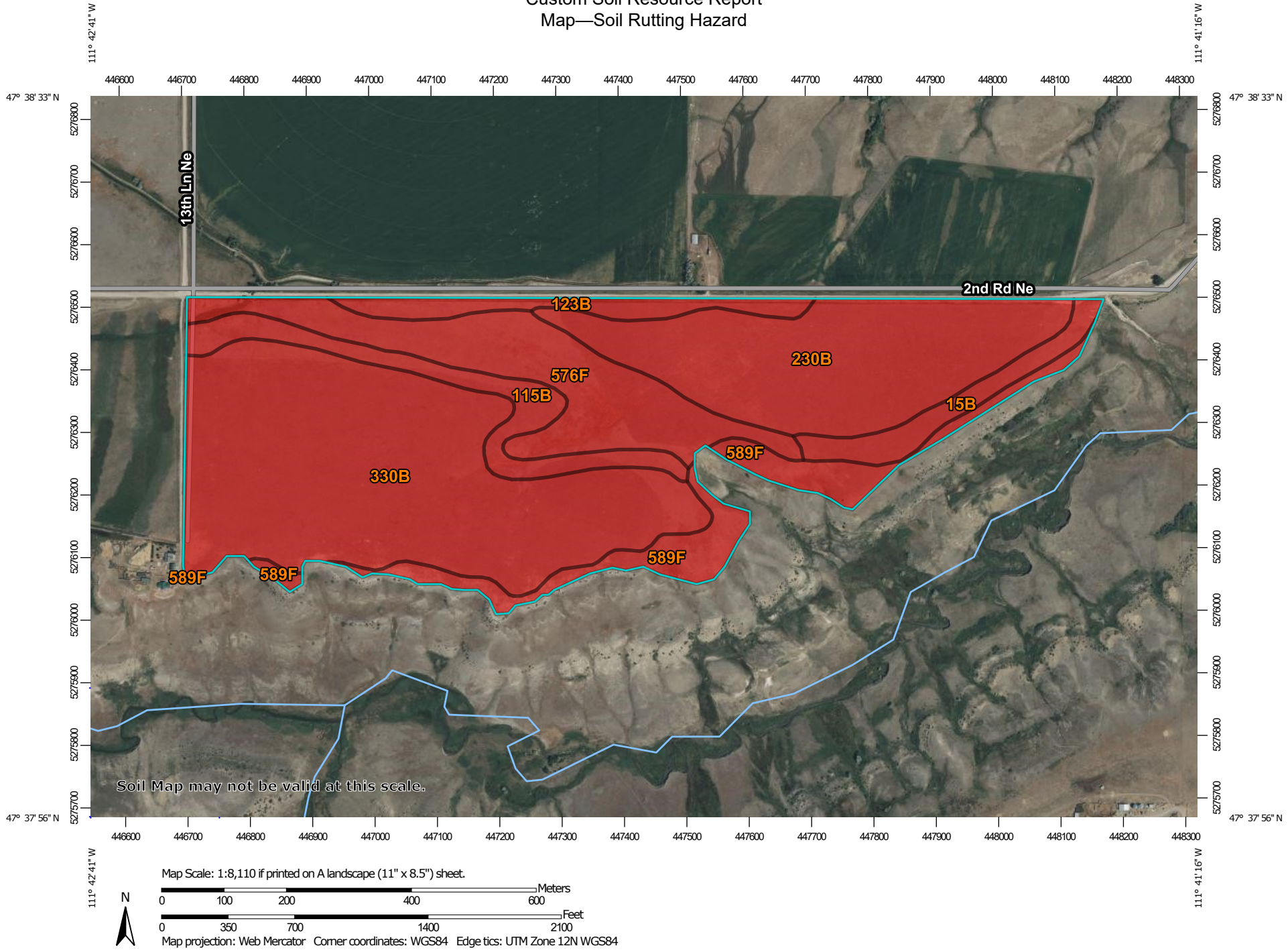
Ratings are based on depth to a water table, rock fragments on or below the surface, the Unified classification of the soil, depth to a restrictive layer, and slope. The hazard is described as slight, moderate, or severe. A rating of "slight" indicates that the soil is subject to little or no rutting. "Moderate" indicates that rutting is likely. "Severe" indicates that ruts form readily.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Custom Soil Resource Report
Map—Soil Rutting Hazard



Map Scale: 1:8,110 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 100 200 400 600

Feet
0 350 700 1400 2100

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 Rating Polygons

- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Lines

- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Points

- Severe
- Moderate
- Slight
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana
Survey Area Data: Version 20, Aug 30, 2022

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

Date(s) aerial images were photographed: Jul 6, 2021—Sep 30, 2021

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

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Soil Rutting Hazard

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
15B	Crago gravelly loam, 0 to 4 percent slopes	Severe	Crago (90%)	Low strength (1.00)	5.2	4.0%
			Arrod (4%)	Low strength (1.00)		
			Rothiemay (3%)	Low strength (1.00)		
			Niart (3%)	Low strength (1.00)		
115B	Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes	Severe	Niart (35%)	Low strength (1.00)	8.6	6.6%
			Crago (30%)	Low strength (1.00)		
			Arrod (30%)	Low strength (1.00)		
			Rothiemay (4%)	Low strength (1.00)		
			Varney (1%)	Low strength (1.00)		
123B	Rothiemay-Niart clay loams, 0 to 4 percent slopes	Severe	Rothiemay (50%)	Low strength (1.00)	5.0	3.8%
			Niart (35%)	Low strength (1.00)		
			Crago (6%)	Low strength (1.00)		
			Varney (5%)	Low strength (1.00)		
			Arrod (4%)	Low strength (1.00)		
230B	Niart-Crago gravelly loams, 0 to 4 percent slopes	Severe	Niart (55%)	Low strength (1.00)	28.9	22.2%
			Crago (30%)	Low strength (1.00)		
			Arrod (6%)	Low strength (1.00)		
			Rothiemay (5%)	Low strength (1.00)		
			Varney (4%)	Low strength (1.00)		
330B	Niart gravelly loam, 0 to 4 percent slopes	Severe	Niart (85%)	Low strength (1.00)	52.3	40.1%
			Crago (7%)	Low strength (1.00)		
			Rothiemay (4%)	Low strength (1.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Arrod (3%)	Low strength (1.00)		
			Varney (1%)	Low strength (1.00)		
576F	Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes	Severe	Delpoint (40%)	Low strength (1.00)	19.2	14.7%
			Cabbart (25%)	Low strength (1.00)		
			Crago (20%)	Low strength (1.00)		
			Yamacall (8%)	Low strength (1.00)		
			Rothiemay (5%)	Low strength (1.00)		
			Kremlin (2%)	Low strength (1.00)		
589F	Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes	Severe	Megonot (35%)	Low strength (1.00)	11.3	8.7%
			Yawdim (30%)	Low strength (1.00)		
			Cabbart (7%)	Low strength (1.00)		
			Abor (5%)	Low strength (1.00)		
			Kobase (3%)	Low strength (1.00)		
Totals for Area of Interest					**130.4**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Severe	130.4	100.0%
Totals for Area of Interest	**130.4**	**100.0%**

Rating Options—Soil Rutting Hazard

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

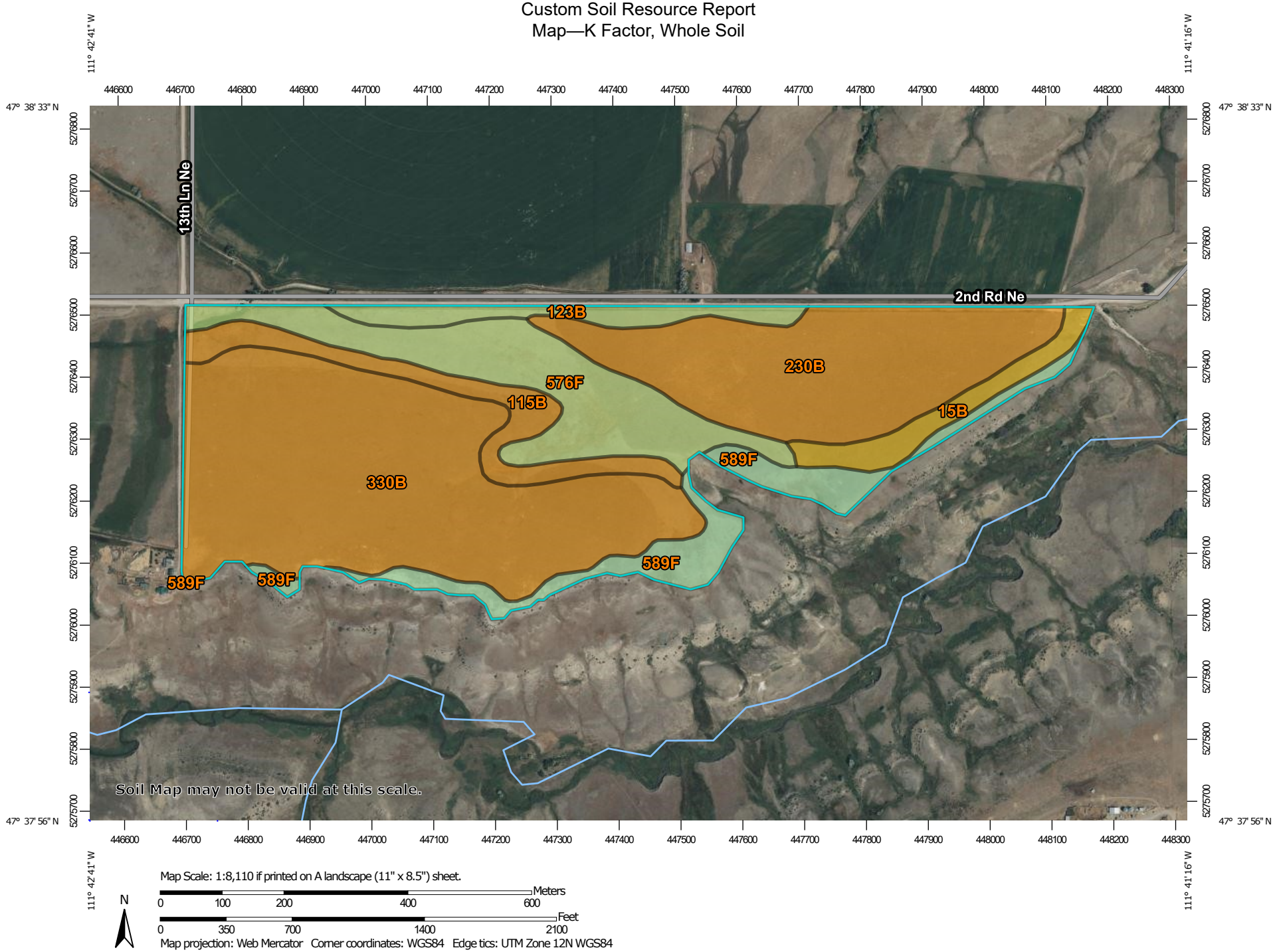
Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Factor K does not apply to organic horizons and is not reported for those layers.


111° 42'41" W
111° 41'16" W
47° 38' 33" N
47° 37' 56" N
446600
446700
446800
446900
447000
447100
447200
447300
447400
447500
447600
447700
447800
447900
448000
448100
448200
448300
5276800
5276700
5276600
5276500
5276400
5276300
5276200
5276100
5276000
5275900
5275800
5275700
13th Ln Ne
2nd Rd Ne
123B
230B
576F
115B
15B
589F
330B
589F
589F
589F
Soil Map may not be valid at this scale.
Map Scale: 1:8,110 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0
100
200
400
600
Feet
0
350
700
1400
2100
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 Rating Polygons
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Lines
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Points
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana
Survey Area Data: Version 20, Aug 30, 2022

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

Date(s) aerial images were photographed: Jul 6, 2021—Sep 30, 2021

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

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—K Factor, Whole Soil

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
15B	Crago gravelly loam, 0 to 4 percent slopes	.15	5.2	4.0%
115B	Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes	.10	8.6	6.6%
123B	Rothiemay-Niart clay loams, 0 to 4 percent slopes	.24	5.0	3.8%
230B	Niart-Crago gravelly loams, 0 to 4 percent slopes	.10	28.9	22.2%
330B	Niart gravelly loam, 0 to 4 percent slopes	.10	52.3	40.1%
576F	Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes	.24	19.2	14.7%
589F	Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes	.28	11.3	8.7%
Totals for Area of Interest			**130.4**	**100.0%**

Rating Options—K Factor, Whole Soil

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

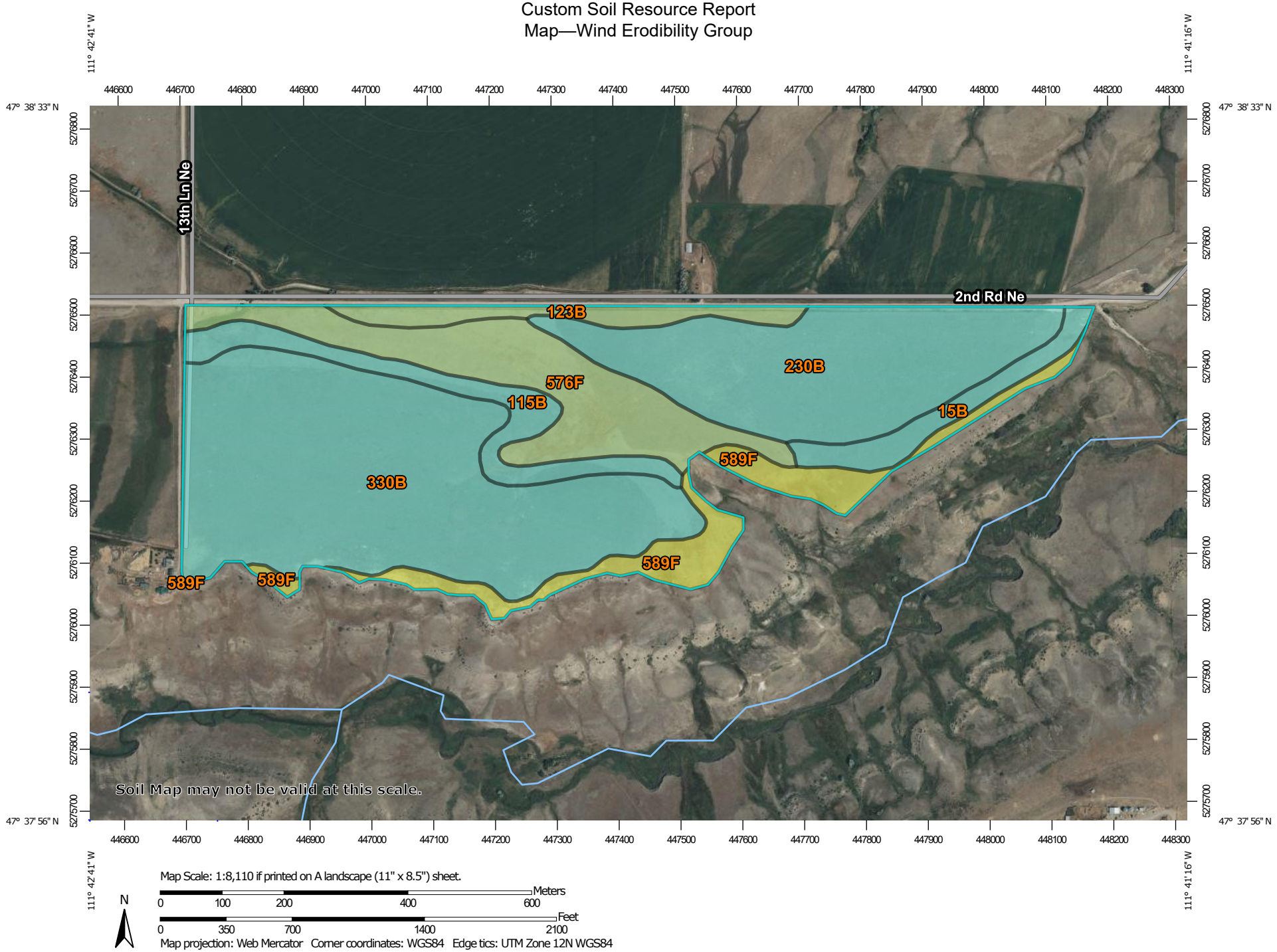
Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Wind Erodibility Group

A wind erodibility group (WEG) consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Map—Wind Erodibility Group



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

1
2
3
4
4L
5
6
7
8
Not rated or not available

Soil Rating Lines

1
2
3
4
4L
5
6
7
8
Not rated or not available

Soil Rating Points

1
2
3
4
4L
5
6
7
8
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana
Survey Area Data: Version 20, Aug 30, 2022

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Date(s) aerial images were photographed: Jul 6, 2021—Sep 30, 2021

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MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Wind Erodibility Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
15B	Crago gravelly loam, 0 to 4 percent slopes	5	5.2	4.0%
115B	Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes	5	8.6	6.6%
123B	Rothiemay-Niart clay loams, 0 to 4 percent slopes	4L	5.0	3.8%
230B	Niart-Crago gravelly loams, 0 to 4 percent slopes	5	28.9	22.2%
330B	Niart gravelly loam, 0 to 4 percent slopes	5	52.3	40.1%
576F	Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes	4L	19.2	14.7%
589F	Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes	4	11.3	8.7%
Totals for Area of Interest			**130.4**	**100.0%**

Rating Options—Wind Erodibility Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Construction Materials

This folder contains a collection of tabular reports that present soil interpretations related to sources of construction materials. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Construction materials interpretations are tools designed to provide guidance to users in selecting a site for potential source of various materials. Individual soils or groups of soils may be selected as a potential source because they are close at hand, are the only source available, or they meets some or all of the physical or chemical properties required for the intended application. Example interpretations include roadfill, sand and gravel, topsoil and reclamation material.

Source of Sand and Gravel

This table gives information about the soils as potential sources of gravel and sand. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. Only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness. The ratings are for the whole soil, from the surface to a depth of about 6 feet.

The soils are rated *good*, *fair*, or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Source of Sand and Gravel

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.00 to 0.99. The larger the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel]

Source of Sand and Gravel–Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana					
Map symbol and soil name	Pct. of map unit	Potential as a source of gravel		Potential as a source of sand	
		Rating class and limiting features	Value	Rating class and limiting features	Value
15B—Crago gravelly loam, 0 to 4 percent slopes					
Crago	90	Fair		Fair	
		Bottom layer	0.38	Bottom layer	0.04
		Thickest layer	0.38	Thickest layer	0.04
115B—Niart-Crago-Arrod gravelly loams, 0 to 4 percent slopes					
Niart	35	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.25	Thickest layer	0.00
Arrod	30	Not rated		Fair	
				Bottom layer	0.07
				Thickest layer	0.09
Crago	30	Fair		Fair	
		Bottom layer	0.38	Bottom layer	0.04
		Thickest layer	0.38	Thickest layer	0.04

Source of Sand and Gravel–Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana					
Map symbol and soil name	Pct. of map unit	Potential as a source of gravel		Potential as a source of sand	
		Rating class and limiting features	Value	Rating class and limiting features	Value
123B—Rothiemay-Niart clay loams, 0 to 4 percent slopes					
Rothiemay	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Niart	35	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.13	Thickest layer	0.00
230B—Niart-Crago gravelly loams, 0 to 4 percent slopes					
Niart	55	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.25	Thickest layer	0.00
Crago	30	Fair		Fair	
		Bottom layer	0.38	Bottom layer	0.04
		Thickest layer	0.38	Thickest layer	0.04
330B—Niart gravelly loam, 0 to 4 percent slopes					
Niart	85	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.25	Thickest layer	0.00
576F—Delpoint-Cabbart-Crago complex, 15 to 60 percent slopes					
Delpoint	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Cabbart	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Crago	20	Fair		Fair	
		Bottom layer	0.38	Bottom layer	0.04
		Thickest layer	0.38	Thickest layer	0.04

Source of Sand and Gravel–Choteau-Conrad Area; Parts of Teton and Pondera Counties, Montana					
Map symbol and soil name	Pct. of map unit	Potential as a source of gravel		Potential as a source of sand	
		Rating class and limiting features	Value	Rating class and limiting features	Value
589F—Megonot-Yawdim-Rock outcrop complex, 25 to 60 percent slopes					
Megonot	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Yawdim	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rock outcrop	20	Not rated		Not rated	

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Exhibit C
Wetland Map

U.S. Fish and Wildlife Service
National Wetlands Inventory

Exhibit C - Wetland Map

January 3, 2023

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

End of Documentation