

# **EXHIBIT I – SOILS INFORMATION**

Meeker Sand & Gravel: M-1976-038

Proposed mine expansion area soils information is exactly the same as in current mine permitted area. There exist four soil units which have been mapped on the proposed site (all of which exist in the current mine area as well.) Attached are soils maps for the current (I-1) and proposed expansion area (I-2). Also attached are descriptions of the soil types which exist (I-3). The local NRCS office was contacted for updated information and recommendations for seed mixes/revegetating. Their recommendations (I-4) are the same as they were for the current/original mine permit.

**EXHIBIT I-1**

Meeker Sand & Gravel: M-1976-038

Soils map for current mine.

**EXHIBIT I-2**

Meeker Sand & Gravel: M-1976-038

Soils map for proposed mine expansion.

## EXHIBIT I-3

### Meeker Sand & Gravel: M-1976-038

Soil descriptions/info for soil areas present.

Map Unit Description: Zoltay clay loam, 3 to 8 percent slopes---Rio Blanco County Area,  
Colorado

Meeker Sand & Gravel - Proposed  
Mine Expansion

## Rio Blanco County Area, Colorado

### 106—Zoltay clay loam, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* jp3v  
*Elevation:* 6,000 to 7,200 feet  
*Mean annual precipitation:* 15 to 18 inches  
*Mean annual air temperature:* 39 to 42 degrees F  
*Frost-free period:* 85 to 105 days  
*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

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

#### Description of Zoltay

##### Setting

*Landform:* Fans, terraces  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from sedimentary rock

##### Typical profile

*H1 - 0 to 13 inches:* clay loam  
*H2 - 13 to 31 inches:* cobbly clay  
*H3 - 31 to 60 inches:* cobbly clay loam

##### Properties and qualities

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* High  
*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  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Moderate (about 8.0 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 4e  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* C

## EXHIBIT I-3

### Meeker Sand & Gravel: M-1976-038

#### Soils Information (Continued)

Map Unit Description: Zoltay clay loam, 3 to 8 percent slopes---Rio Blanco County Area,  
Colorado

Meeker Sand & Gravel - Proposed  
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*Ecological site:* R048AY292CO - Deep Loam  
*Hydric soil rating:* No

#### **Minor Components**

##### **Other soils**

*Percent of map unit:* 15 percent  
*Hydric soil rating:* No

#### **Data Source Information**

Soil Survey Area: Rio Blanco County Area, Colorado  
Survey Area Data: Version 17, Sep 6, 2022



## EXHIBIT I-3

### Meeker Sand & Gravel: M-1976-038

#### Soils Information (Continued)

Map Unit Description: Zoltay clay loam, 1 to 3 percent slopes---Rio Blanco County Area, Colorado

Meeker Sand & Gravel - Proposed Mine Expansion

## Rio Blanco County Area, Colorado

### 105—Zoltay clay loam, 1 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* jp3t  
*Elevation:* 6,000 to 7,200 feet  
*Mean annual precipitation:* 15 to 18 inches  
*Mean annual air temperature:* 39 to 42 degrees F  
*Frost-free period:* 85 to 105 days  
*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

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

#### Description of Zoltay

##### Setting

*Landform:* Fans, terraces  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from sedimentary rock

##### Typical profile

*H1 - 0 to 13 inches:* clay loam  
*H2 - 13 to 31 inches:* cobbly clay  
*H3 - 31 to 60 inches:* cobbly clay loam

##### Properties and qualities

*Slope:* 1 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Medium  
*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  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Moderate (about 8.0 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 4c  
*Land capability classification (nonirrigated):* 4c  
*Hydrologic Soil Group:* C

## EXHIBIT I-3

### Meeker Sand & Gravel: M-9176-038

#### Soils Information (Continued)

Map Unit Description: Zoltay clay loam, 1 to 3 percent slopes---Rio Blanco County Area,  
Colorado

Meeker Sand & Gravel - Proposed  
Mine Expansion

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*Ecological site:* R048AY292CO - Deep Loam  
*Hydric soil rating:* No

#### **Minor Components**

##### **Other soils**

*Percent of map unit:* 15 percent  
*Hydric soil rating:* No

#### **Data Source Information**

Soil Survey Area: Rio Blanco County Area, Colorado  
Survey Area Data: Version 17, Sep 6, 2022

## EXHIBIT I-3

### Meeker Sand & Gravel: M-1976-038

#### Soils Information (Continued)

Map Unit Description: Borollic Calciorthids-Guben complex, 6 to 50 percent slopes---Rio Blanco County Area, Colorado

Meeker Sand & Gravel - Proposed Mine Expansion

## Rio Blanco County Area, Colorado

### 11—Borollic Calciorthids-Guben complex, 6 to 50 percent slopes

#### Map Unit Setting

*National map unit symbol:* jp3y  
*Elevation:* 5,800 to 6,900 feet  
*Mean annual precipitation:* 15 to 18 inches  
*Mean annual air temperature:* 41 to 44 degrees F  
*Frost-free period:* 80 to 105 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Borollic calciorthids and similar soils:* 60 percent  
*Guben and similar soils:* 30 percent  
*Minor components:* 10 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Borollic Calciorthids

##### Setting

*Landform:* Terraces  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Very calcareous, mixed source alluvium and/or glacial outwash

##### Typical profile

*H1 - 0 to 4 inches:* channery loam  
*H2 - 4 to 11 inches:* clay loam  
*H3 - 11 to 60 inches:* silt loam

##### Properties and qualities

*Slope:* 25 to 50 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* High  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 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:* Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* High (about 9.0 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified



## EXHIBIT I-3

### Meeker Sand & Gravel: M-1976-038

#### Soils Information (Continued)

Map Unit Description: Borollic Calciorthids-Guben complex, 6 to 50 percent slopes---Rio Blanco County Area, Colorado

Meeker Sand & Gravel - Proposed Mine Expansion

*Land capability classification (nonirrigated): 7e*  
*Hydrologic Soil Group: C*  
*Ecological site: R048AY287CO - Stony Foothills*  
*Hydric soil rating: No*

#### Description of Guben

##### Setting

*Landform: Terraces*  
*Landform position (three-dimensional): Tread*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Parent material: Very calcareous, mixed source alluvium and/or glacial outwash*

##### Typical profile

*H1 - 0 to 11 inches: loam*  
*H2 - 11 to 15 inches: very gravelly sandy clay loam*  
*H3 - 15 to 23 inches: very gravelly sandy loam*  
*H4 - 23 to 60 inches: very cobbly sandy loam*

##### Properties and qualities

*Slope: 6 to 15 percent*  
*Depth to restrictive feature: More than 80 inches*  
*Drainage class: Well drained*  
*Runoff class: Medium*  
*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)*  
*Depth to water table: More than 80 inches*  
*Frequency of flooding: None*  
*Frequency of ponding: None*  
*Calcium carbonate, maximum content: 30 percent*  
*Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)*  
*Available water supply, 0 to 60 inches: Low (about 5.5 inches)*

##### Interpretive groups

*Land capability classification (irrigated): None specified*  
*Land capability classification (nonirrigated): 6e*  
*Hydrologic Soil Group: B*  
*Ecological site: R048AY306UT - Upland Loam (Wyoming Big Sagebrush)*  
*Hydric soil rating: No*

#### Minor Components

##### Other soils

*Percent of map unit: 10 percent*

## EXHIBIT I-3

### Meeker Sand & Gravel: M-1976-038

#### Soils Information (Continued)

Map Unit Description: Borollic Calciorthids-Guben complex, 6 to 50 percent slopes---Rio Blanco County Area, Colorado

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*Hydric soil rating:* No

#### Data Source Information

Soil Survey Area: Rio Blanco County Area, Colorado  
Survey Area Data: Version 17, Sep 6, 2022

## EXHIBIT I-4

### Meeker Sand & Gravel: M-1976-038

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Requested By: Meeker Sand and Gravel

Date: May 11, 2023

Document Created By: Stormy Concoby

Location: Rio Blanco,

County

Purpose: The purpose of this document is to provide a summary of the soil types present and vegetation species that historically were present within the project area. This document also provides a seeding recommendation for the reclamation of an existing and proposed gravel pit expansion.

- 1) Soils – three soil units (11, 105, & 106) are within the project area. The mean annual precipitation is 15 to 18 inches.
  - a. Soil Map Unit 11: The Borollic Calciorthids-Guben complex, 6% to 50% slopes, consists of two soil types and minor components (60% Borollic Calciorthids, 30% Guben, and 10% minor components) that are intermixed. The Soil Map Unit 11 is very calcareous and formed from a mixed source of alluvium and glacial outwash. The Borollic Calciorthids-Guben complex soils are normally located in uplands and terraces.
    - i. The Borollic Calicorthid soils are well drained with a high runoff potential. The Borollic Calicorthid soils first soil horizon is 0 to 4 inches deep consisting of a channery loam. The second soil horizon is 4 to 11 inches of clay loam. The third horizon is 11 to 60 inches of silt loam. There is a presence of calcic horizon in Borollic Calicorthid soils; calcic horizons are an illuvial horizon where secondary carbonates and other carbonates have accumulated. Calcic horizons are 15 centimeters or more and consist of 15% or more of calcium carbonates. The Borollic Calicorthid soils can have up to 60% calcium carbonates. The maximum salinity is slight saline to moderate saline (4.0 to 8.0 mmhos/cm).
    - ii. Guben soils are very deep, well drained with a medium runoff potential. The first soil horizon is 0 inches to 11 inches of loam. The second soil horizon is from 11 inches to 15 inches of very gravelly sandy clay loam. The third soil horizon is from 15 inches to 23 inches of very gravelly sandy loam. The fourth horizon is 23 inches to 60 inches of very cobbly sandy loam. The Guben soil series has a calcic horizon with up to 30% calcium carbonate. The Guben soils are nonsaline to very slightly saline (0.60 to 2.00 in/hr).
  - b. Soil Map Unit 105: The Zoltay clay loams, 1% to 3% slopes, are well drained and have a medium runoff potential. The Zoltay clay loams are located in fans and terrace. The Zoltay clay loams form from alluvium materials derived from sedimentary rock. Horizon one is zero to thirteen inches of clay loam. The second horizon is 13 to 31 inches of cobbly clay. The third horizon is 31 to 60 inches of cobbly clay loam. The maximum concentration of calcium carbonate

1) Reclamation Recommendations –

- a. Each soil map unit has an ecological site associated that describes the historic vegetative species present.
  - i. Soil Map Unit 11: The ecological site present is the Stony Foothills (R048AY287CO). If the site was undisturbed, the following percentage of composition by plant weight would be expected: western wheatgrass (15%), bluebunch wheatgrass (10%), Galleta (10%), Indian ricegrass (5%), Needle-and-thread (5%), junegrass (5%), squirreltail (5%), forbs (5%), black and big sagebrush (15%), fringed sagebrush (5 %), serviceberry (5%), rabbitbrush (5%), and pinyon and Juniper (up to 10%). The ecological optimum ground cover is approximately 25%.
  - ii. Soil Map Unit 105 and 106: The ecological site present is Deep Clay Loam (R048AY292CO). If the site was undisturbed, the following percentage of composition by plant weight would be expected: western wheatgrass (40%), lettermans needlegrass (20%), muttongrass (15%), slender wheatgrass (15%), nodding brome (10%), silver lupine (5%), mules-ears (5%), Indian paintbrush (5%), sulfur buckwheat (5%), big sagebrush (5%), serviceberry (5%), snowberry (2%), and others (10%). The approximate ground cover for the Deep Clay Loam ecological sites is 35%.
- b. The following grass species are recommended to be used to reseed the site. This recommendation is in pounds of pure live seed.

Species	Variety	Pounds (PLS/Acre)
Western Wheatgrass	Arriba	3.2
Thickspike Wheatgrass	Critana	2.2
Streambank Wheatgrass	Siberian	2.2
Russian Wildrye	Vinal	2
Smooth Bromegrass	Regar	1.3
Total Pounds PLS/Acre 10.9		

\*Smooth Bromegrass can become competitive and overtake native species.

- i. The addition of topsoil on the project site will improve the establishment of the seeding. Topsoil should be evenly dispersed across the project site. If the project is seeded by drilling, the project site may require earthwork to improve conditions for drilling. Some areas within the project may require broadcasting instead of drilling where steeper slopes are present.
- ii. Mulching is recommended at approximately 3,000 pounds of clean (weed free) straw per acre with a crimper.
- iii. Scouting and monitoring for invasive vegetative species will be necessary for the establishment of the seeding mix. If chemicals are used to treat the vegetative weed pressures, the chemical label needs to be checked to ensure that the

- chemical will not have a negative effect on the planted species. The label will direct the application, storage, disposal, and safety measures for the chemical.
- iv. It is recommended that the site does not allow livestock grazing and excessive soil disturbance for one to two years to promote the establishment of the seeding.

References:

Soil Survey Staff. 2022. Keys to Soil Taxonomy, 13th edition. USDA Natural Resources Conservation Service.

Natural Resources and Conservation Service . (n.d.). Web soil survey.  
<https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>