July 30, 2024

Robin Reilley
Colorado Division of Reclamation, Mining, and Safety
1313 Sherman St, Rm 215
Denver, CO 80203

RE: Lockhart Pit, File No., M-2024-017
112c Construction Materials Limited Impact Application
Adequacy 1 Response

Ms. Reilley

Kremmling All Season's Rental LLC submits this adequacy response to your June 28, 2024 adequacy review for the Lockhart Pit. Items are addressed below, with a revised set of exhibits included. Some items have been provided to CDRMS separately from this response letter.

General

Mitch Lockhart, alternative address: 37365 US Highway 40, Kremmling, CO 80459

Mitch Lockhart, email: lockhart567@gmail.com

Proof of newspaper publication and certified mail documentation for the neighbor notices have been transmitted under separate cover.

A discharge permit will be applied for following approval of the Lockhart Pit by CDRMS.

Exhibit A

The landowner for the Brig Pit has provided a letter authorizing access through his property for the Lockhart Pit. This letter can be found in Exhibit N.

The section, township, and range labels are located at the top right corner of the permit boundary on Map C-1. Some of the local soils are ID'd as 81 and 82, which may lead to some confusion. The soil IDs have been made recolored to a light grey to make them more distinct from the section numbers.

Surface owners are located on Map C-1. The "R####" in red corresponds to the property owner information in the table located at the top right of the map. Note that landowners to the north, south, and west, are more than 200-ft away from the affected area boundary. The setbacks from the property line in these directions is noted on Map C-1. The only property within 200-ft of the affected and/or permit area is the property to the east, the ownership of which is shown on Map C-1.

Exhibit C

The drainage basin boundary has been added to the map legends.

The ephemeral streams have been marked using the intermittent stream symbol that can be found in the legend.

All structures, drainages, buildings, and wells are depicted on Map C-1 as required. All structure owners are listed in the table on Map C-1, which correlates to the blue numbered labels. There is only one structure within 200-ft of the affected land.

Exhibit D

Please see the revised Exhibit D text.

The Brig Pit permit information has been added to the introduction for reference.

Exhibit E

Please see the revised Exhibit E text.

Overburden language has been edited throughout the exhibits to address the adequacy items referencing it.

Topsoil stockpile areas have been added to Map C-2.

A weed control plan is included in Exhibit E under Section 8.

Fines storage locations are shown on Map C-2.

Any references to ponds in the reclamation plan is a reference to the East and West Pod sumps shown on Map C-2.

Spot elevations have been added to Map F-1 to show the topography of the bottom of each pod.

Exhibit G

The blue triangles represent the downstream endpoint of the drainage basin, i.e., where each basin drains to. Discharge points will be determined at the time of securing the NPDES discharge permit, but potential discharge points have been added to Map C-2 for reference.

Discussion of the Rational Method hydrologic model has been added to Appendix G-1. Appendix G-1 contains all of the surface water hydrologic modelling and results.

The hydrologic legends on Map C-1 and C-2 have been customized as requested.

All hydrologic calculation inputs can be found in Appendix G-1. Each hydrograph lists all the applicable inputs for its basin, and the basin numbers correlate to the basins on each map.

Map F-1 is in the existing application. An updated copy has been attached to this adequacy response.

The erroneous reference to Map G-1 has been removed. All drainage details can be found on Maps C-1, C-2, and F-1. The summary of drainage calculations (runoff, basin area, sump capacity, etc.) has been removed from C-1. It can be seen on Map C-2 and Map F-1.

Labels have been added to Map C-2 showing the diversion ditch locations and referring to their designs in Appendix G-1.

Exhibits J & K

Please see the revised Exhibit J & K text.

Exhibit L

Exhibit L has been left unaltered for adequacy. Topsoil placement and revegetation will only be needed on the active 10 acres at the time of reclamation.

Exhibit M

Please see the revised Exhibit M.

The ponds shown on Map C-2 are sumps for stormwater control only. They will not be present in reclamation and water will not be allowed to stay in them longer than 72-hours in accordance with State law.

Exhibit N

The access letter from the owners of the Brig/Bumgarner Pit has been added. This letter authorizes the use of the Brig Pit for access to the Lockhart Pit.

Exhibit O

Parcel ownership information can be seen on Map C-1. Exhibit O correctly refers to the Lockharts as the owners of the surface and subsurface at the Lockhart Pit.

Exhibit R

A new copy of the updated CDRMS application is being posted at Grand County. A new clerk receipt will be provided to CDRMS when it is available.

Exhibit S

The only structure within 200-ft of the affected area that is not owned by the applicant is the fence along the east side of the property. The ownership of this structure is shown on Map C-1. The distance to the nearest well (290960-) is 742-ft, and is covered in Exhibit G. The owner of the well is Christina Lockhart, one of the owners of the Lockhart Pit property.

A structure agreement was provided to the fence owner, with proof of this mailing being provided to the CDRMS under separate cover. This, combined with the slope stability analysis, satisfies Rule 6.4.19.

Please feel free to contact my office with any further questions on this application.

Regards,

Ben Langenfeld, P.E.
Lewicki & Associates, PLLC
(720) 842-5321, ex. 1
benl@lewicki.biz

Attachments

Revised Exhibits and Maps

Column

See Proof on Next Page

AFFIDAVIT OF PUBLICATION

Ad #: UsMcivROcqZptUeB2Ge1
Customer: Jessica King

State of Texas, County of Bexar, ss:

Will Lamb, being first duly sworn, deposes and says: That (s)he is a duly authorized signatory of Column Software, PBC, duly authorized agent of Sky-Hi News and Middle Park Times, that the same weekly newspaper printed, in whole or in part and published in the County of Grand, State of Colorado, and has a general circulation therein; that said newspaper has been published continuously and uninterruptedly in said County of Grand for a period of more than fifty-two consecutive weeks next prior to the first publication of the annexed legal notice or advertisement; that said newspaper has been admitted to the United States mails as a periodical under the provisions of the Act of March 3, 1879, or any amendments thereof, and that said newspaper is a weekly newspaper duly qualified for publishing legal notices and advertisements within the meaning of the laws of the State of Colorado.
That the annexed legal notice or advertisement was published in the regular and entire issue of every number of said weekly newspaper for the period of 4 insertions; and that the first publication of said notice was in the issue of said newspaper dated 5 Jun 2024, 12 Jun 2024, 19 Jun 2024, 26 Jun 2024 in the issue of said newspaper. That said newspaper was regularly issued and circulated on those dates.

Total cost for publication: $158.84

Will Lamb
(Signed)_____

VERIFICATION

State of Texas
County of Bexar

NOTARY PUBLIC STATE OF TEXAS

Robert Hollie III
ID NUMBER
133582194
COMMISSION EXPIRES
February 10, 2026

Subscribed in my presence and sworn to before me on this: 06/27/2024

_____
Notary Public
Electronically signed and notarized online using the Proof platform.

PUBLIC NOTICE

Kremmling All Seasons Rentals LLC , 101 West Park Avenue, Kremmling, Colorado 80459, (970) 531-8529, has filed an application for a Regular (112) Construction Materials Operation Reclamation Permit with the Colorado Mined Land Reclamation Board under provisions of the Colorado Land Reclamation Act for the Extraction of Construction Materials. The proposed mine is known as the Lockhart Pit, and is located at or near Section 11, Township 1 North, Range 80 West, 6th Prime Meridian. The proposed date of commencement is June 2024 and the proposed date of completion is June 2064. The proposed future use of the land is dry rangeland. Additional information and tentative decision date may be obtained from the Division of Reclamation, Mining, and Safety, 1313 Sherman Street, Room 215, Denver, Colorado 80203, (303) 866-3567, or at the Grand County Clerk and Recorder's office; 308 Byers Ave, Hot Sulphur Springs, Colorado 80541, or the above-named applicant. Comments must be in writing and must be received by the Division of Reclamation, Mining, and Safety by 4:00 p.m. within 30 days of the last publication of this notice.

Please note that under the provisions of C.R.S. 34-32.5-101 et seq. Comments related to noise, truck traffic, hours of operation, visual impacts, effects on property values and other social or economic concerns are issues not subject to this Office's jurisdiction. These subjects, and similar ones, are typically addressed by your local governments, rather than the Division of Reclamation, Mining, and Safety or the Mined Land Reclamation Board.

PUBLISHED IN THE SKY-HI NEWS AND MIDDLE PARK TIMES ON WEDNESDAY, JUNE 5, 2024, WEDNESDAY, JUNE 12, 2024, WEDNESDAY, JUNE 19, 2024 AND WEDNESDAY, JUNE 26, 2024.

Lockhart Pit

112c Amendment to the Colorado Division of Reclamation, Mining, and Safety

March 2024

By:

Kremmling All Seasons Rental LLC

Represented by:

Lewicki & Associates

Table of Contents

INTRODUCTION

The Lockhart Pit is located approximately five miles east of the Town of Kremmling in Grand County, Colorado. It is located north of highway US-40 and the Colorado River. The permittee and operator of the Lockhart Pit is Kremmling All Seasons Rental LLC. Access will be via the neighboring Brig Pit. Kremmling All Seasons Rental LLC will mine the site in two pods located on the east and west sides of a local unnamed drainage. The permit and affected area will be 114.1 acres.

Figure B-1 shows the current mine area and the proposed expansion.

The Lockhart Pit will mine sand and gravel for their use as construction materials. Processing of the mined aggregates will include crushing and screening. All further processing and sales will take place at the adjacent Brig Pit (Bumgarner Ranches Gravel Pit, M-1980-027).

EXHIBIT A LEGAL DESCRIPTION

The site is located near the Town of Kremmling in Grand County, Colorado. A legal description is shown on Map C-1 which is included in Exhibit C. A general location map is shown in Exhibit B which indicates the mine entrance coordinates.

1. Legal Description

The legal description of the proposed Lockhart Pit permit boundary is provided below.

A tract of land located Sections 11 and 8, Township 1 North, Range 80 West of the 6th Principal Meridian, Grand County, State of Colorado and being more particularly described as follows:

With the east line of Section 11 having a basis of bearing S 02°06'25" W; from the northeast corner of Section 11, S 02°12'32"W a distance of 1515.3' to the Point of Beginning
Thence, N 85° 23' 39" W for a distance of 1348.1 feet;
Thence, N 85° 27' 07" W for a distance of 1114.9 feet;
Thence, S 03° 56' 59" W for a distance of 1236.5 feet;
Thence, S 03° 30' 09" W for a distance of 1085.7 feet;
Thence, S 88° 06' 06" E for a distance of 1874.5 feet;
Thence, N 02° 36' 09" E for a distance of 1043.7 feet;
Thence, S 87° 06' 20" E for a distance of 627.4 feet;
Thence N 02° 53' 40" E a distance of 1173.1 feet to the Point of Beginning;
For a total area of 114.1 acres.

2. Access

Access to the Lockhart Pit is via the Brig Pit (Bumgarner Ranches Gravel Pit, M-1980-027). The Brig Pit is owned by Gary & Jennifer Bumgarner, who have provided right of entry for access via the letter attached in Exhibit N.

EXHIBIT B INDEX MAP

Figure B-1. Lockhart Pit General Location

EXHIBIT C PREMINE AND MINE PLAN MAPS

Map C-1 Baseline Conditions

Map C-2 Mining Plan

Map C-3 Cross Sections

PROPERTY OWNERS						
PARCEL NUMBER	ACCOUNT NUMBER	NAME	ADDRESS	CITY	STATE	ZIP
144112200007	R310313	BUMGARNER, GARY W & JENNIFER L	PO BOX 276	KREMMLING	CO	80459
144112200010	R131091	BUMGARNER, GARY W & JENNIFER L	PO BOX 276	KREMMLING	CO	80459

STRUCTURE OWNERS		
NUMBER	STRUCTURE	OWNER
1	FENCES	BUMGARNER, GARY W & JENNIFER L

PERMIT AND AFFECTED AREA
114.1 acres

37.1 acres

1114.9'
N85° 27' 07"W

1348.1'
N85° 23' 39"W

1515.3'
S2° 12' 32"W

1236.5'
S3° 56' 59"W

1085.7'
S3° 30' 09"W

1043.7'
N2° 36' 09"E

1173.1'
N2° 53' 40"E

627.4'
S87° 06' 20"E

1874.5'
S88° 06' 06"E

210-FT SETBACK FROM PROPERTY LINE

210-FT SETBACK FROM PROPERTY LINE

210-FT SETBACK FROM PROPERTY LINE

T1N R80W, SEC. 11

T1N R80W, SEC. 12

R313091

R310313

R013114

R311544

R310397

BRASS CAP LS #10717

SITE ACCESS VIA BRIG PIT

BRIG PIT CDRMS BOUNDARY

BRIG PIT PRIVATE ACCESS

US-40

LEGEND

BUILDINGS AND RELATED STRUCTURES
- Building
- Fence

LAND SURVEYS
- Public Land Survey System
- Range or Township line
- Range or Township labels: R1E T2N
- Section line
- Section numbers: SEC. 1-36
- Mining claim or property boundary

ROADS AND RELATED FEATURES
- Highway
- Light duty road, paved
- Light duty road, gravel
- Railroad

RIVERS, LAKES, SHORELINES, AND CANALS
- Intermittent/Ephemeral stream/ditch
- Drainage basin boundaries
- Waterwell: Well Name

VEGETATION
- NWI Wetlands
- Soils (NRCS): 81

TRANSMISSION LINES AND PIPELINES
- Power transmission line; pole; tower

MINING FEATURES
- DRMS Permit & Affected Boundary
- 200' Offset of DRMS Permit Boundary

BASELINE CONTOURS
- Index: Approximate of indefinite
- Intermediate: Approximate of indefinite
- Supplementary

Drainage Basin Labels
- Basin
- Area
- Composite Runoff Coefficient
- Basin Destination

C-1 Baseline Map

Lockhart Pit

DRMS Permit Number: M-2024-017 — **Kremmling All Season Rentals, LLC**

Mine Entry Location:	Latitude: 40.06178	Longitude: -106.31576
State: COLORADO	County: Grand	Nearest Town: Kremmling
Section: 11	Township: 1N	Range: 80W PM: 6th
Major Watershed:	Colorado River	MSHA ID: ----

Map Scale: 1"= 200'

0 200 400

Map Georeferencing Information:	Datum: NAD83	Projection: CO NORTH
Survey Source: CO LIDAR	Drawn by: BEL	Date: 11/27/23
Imagery Source: GoogleEarth	Checked by: BEL	Date: ----
Survey Date: 2016	Approved by: BEL	Date: ----
Imagery Date: ----		

File Name: Bumgarner 240730

COLORADO LICENSED
ERWIN E. LANGE
47151
PROFESSIONAL ENGINEER
03/15/24

Lewicki & Associates
3375 West Powers Circle
Littleton, CO USA 80123
(303)-346-5196
info@lewicki.biz

Drainage Basin Labels

Basin — 1 — Area 46.2 — Composite Runoff Coefficient 0.25 — Basin Destination 1

West Pod Drainage Basins (1 & 3)				
Site Condition	Area (acres)	Runoff Coefficient	100-YR 24-HR Runoff (ac-ft)	Sump Capacity (ac-ft)*
Base	143.2	0.25	4.73	N/A
Mine	75.8	0.50	4.12	5.61
Diversion (3)	23.8	0.25	0.415	N/A
Rec.	143.2	0.25	4.73	N/A

*Volume available within sump in mining pod.

East Pod Drainage Basin (2 & 4)				
Site Condition	Area (acres)	Runoff Coefficient	100-YR 24-HR Runoff (ac-ft)	Sump Capacity (ac-ft)*
Base	37.1	0.25	0.90	N/A
Mine	29.1	0.50	1.09	1.50
Diversion (4)	7.6	0.25	0.13	N/A
Rec.	37.1	0.25	0.90	N/A

*Volume available within sump in mining pod.

C-2 Mining Map

Lockhart Pit

DRMS Permit Number: M-2024-017 — **Kremmling All Season Rentals, LLC**

Mine Entry Location:	Latitude: 40.06178	Longitude: -106.31576
State: COLORADO	County: Grand	Nearest Town: Kremmling
Section: 11	Township: 1N	Range: 80W PM: 6th
Major Watershed:	Colorado River	MSHA ID: ----

Map Scale: 1": 200'

0 200 400

N

Map Georeferencing Information: **Datum: NAD83** **Projection: CO NORTH**

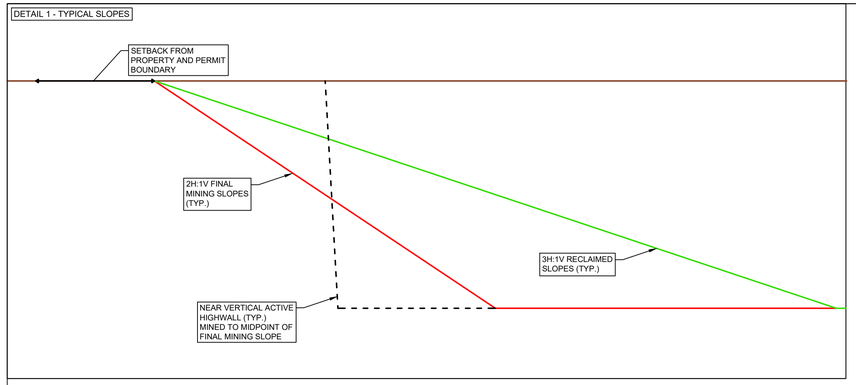
Survey Source: CO LIDAR
Imagery Source: GoogleEarth
Survey Date: 2016
Imagery Date: ----

Drawn by: BEL — Date: 11/27/23
Checked by: BEL — Date: ----
Approved by: BEL — Date: ----

File Name: Bumgarner 240730

Lewicki & Associates
3375 West Powers Circle
Littleton, CO USA 80123
(303)-346-5196
info@lewicki.biz

DETAIL 1 - TYPICAL SLOPES



LEGEND

BUILDINGS AND RELATED STRUCTURES
- Fence

ROADS AND RELATED FEATURES
- Highway
- Light duty road, gravel

RIVERS, LAKES, SHORELINES, AND CANALS
- Intermittent/Ephemeral stream/ditch
- Waterwell

MINING FEATURES
- DRMS Permit/Affected Boundary

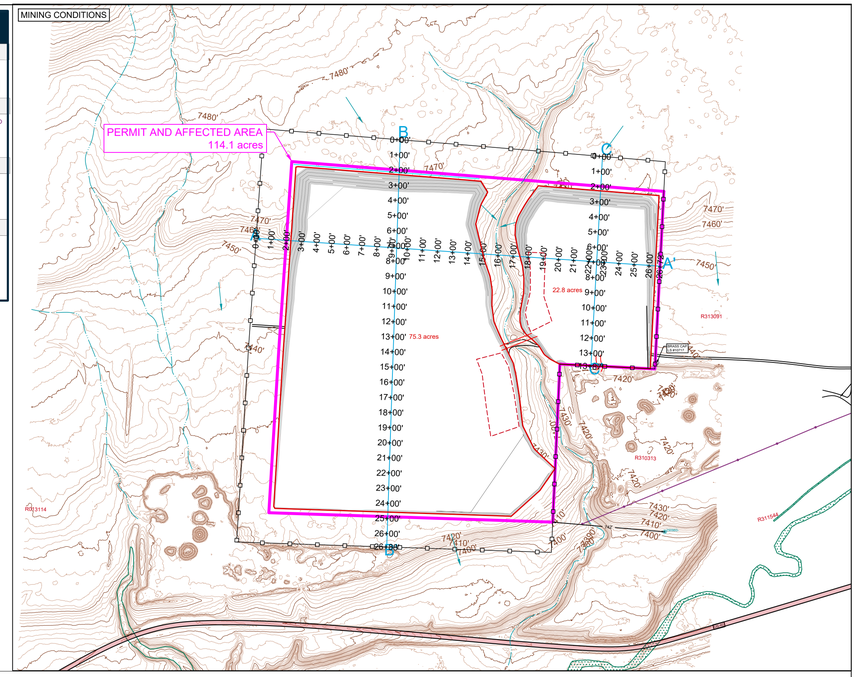
VEGETATION
- NWI Wetlands

TRANSMISSION LINES AND PIPELINES
- Power transmission line; pole; tower

BASELINE CONTOURS
- Index — Approximate of indefinite
- Intermediate — Approximate of indefinite
- Supplementary

POST-MINING CONTOURS
- Index — Approximate of indefinite
- Intermediate — Approximate of indefinite
- Dump

MINING CONDITIONS

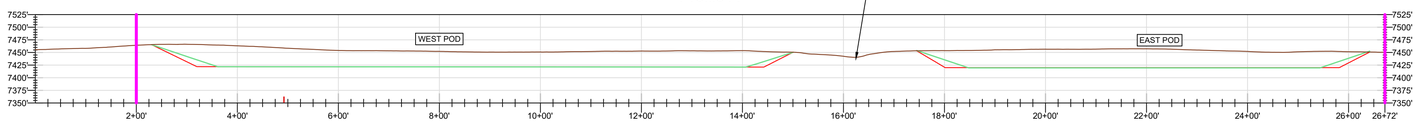


CROSS SECTION LEGEND

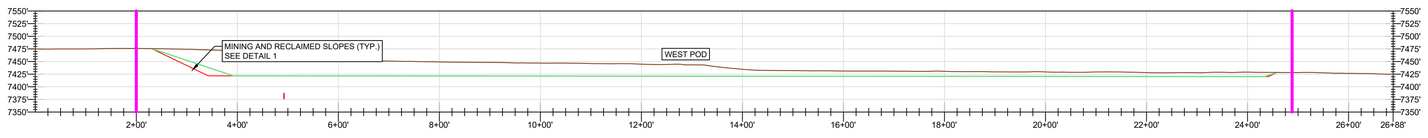
MINING FEATURES
- DRMS Permit Boundary

CROSS SECTIONS
- Baseline Topography
- Mining
- Reclamation

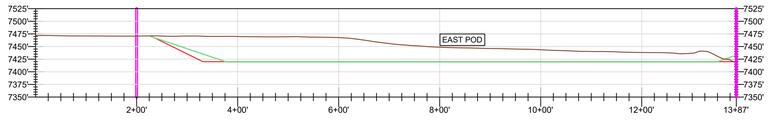
Profile A



Profile B



Profile C



C-3 Cross Sections

Lockhart Pit

DRMS Permit Number: M-2024-017 — **Kremmling All Season Rentals, LLC**

Mine Entry Location:	Latitude: 40.06178	Longitude: -106.31576
State: COLORADO	County: Grand	Nearest Town: Kremmling
Section: 11	Township: 1N	Range: 80W PM: 6th
Major Watershed:	Colorado River	MSHA ID: ----
Map Scale: 1"=400'		

0 — 400 — 800

Map Georeferencing Information: **Datum: NAD83** **Projection: CO NORTH**

Survey Source: CO LIDAR	**Drawn by:** BEL	Date: 11/27/23
Imagery Source: GoogleEarth	**Checked by:** BEL	Date: ----
Survey Date: 2016	**Approved by:** BEL	Date: ----
Imagery Date: ----		

File Name: Bumgarner 240730

Lewicki & Associates
3375 West Powers Circle Littleton, CO USA 80123 (303)-346-5196 info@lewicki.biz

COLORADO LICENSED — BRIAN E. LEWICKI — 47151 — 03/15/24 — PROFESSIONAL ENGINEER

EXHIBIT D MINING PLAN

1. General Mining Plan

The property boundary has been surveyed on site and the permit area will be surveyed prior to any site disturbance. Map C-2 shows the mining plan. Mine access will be via the existing Brig gravel pit and will use its access to public roads. Internal haul roads will facilitate access to all mining areas. Mining of the Lockhart Pit will involve roughly 114 acres of total affected area. The primary commodity to be mined is sand and gravel for use in construction materials such as crushed rock, sand, washed rock, concrete, and asphalt. Fill dirt may be incidentally produced during the operation.

The top 12 inches of material onsite is assumed to be topsoil. The underlying alluvial sand and gravel deposit ranges from 20 to 30 feet with an average thickness of 25 feet. Bedrock is encountered at an average depth of 25 feet from the top of the natural grade.

Topsoil and/or overburden will be stripped via dozer, scraper, or other earthmoving equipment prior to mining. These materials will be stockpiled separately on site to be used in reclamation. Any stockpile to be left in place longer than 90 days will be vegetated to prevent erosion. When possible, stripped topsoil and/or overburden will be directly placed on areas being reclaimed. Refer to Map C-2 for stockpile areas.

The operation is mining Pleistocene terrace alluvium that lays atop the Troublesome formation. Mining will be to a depth of 20-ft. The sand and gravel deposit will be extracted using loaders, excavators, dozers, and haul trucks. Mined material will be hauled from the active pit to the Brig Pit at the east of the site. An internal haul road will be constructed to facilitate the transport of materials. Processing of the sand and gravel includes screening, washing, crushing, and the production of concrete and asphalt.

All final mining slopes will be at a maximum 2H:1V slope where mining does not daylight. The final mining slopes will be at the outermost extents of the mining areas as shown on Map C-2. The active mining highwall will be mined at a near vertical slope until the halfway point of the toe and crest of the final mining slope. This allows for the remaining in-situ highwall material to be knocked down by dozer to create the final 2H:1V slopes. the mining slopes at 2H:1V will then be backfilled to a 3H:1V slope for reclamation (Figure D-1). No more than 1000 feet of highwall at slopes steeper than 3H:1V will exist at any point in time of mining. At a minimum, slopes will be regraded to 3H:1V if they are not within the 1000 feet being actively mined. Refer to Maps C-2, C-3, and F-1 for the final slope configurations and cross sections.

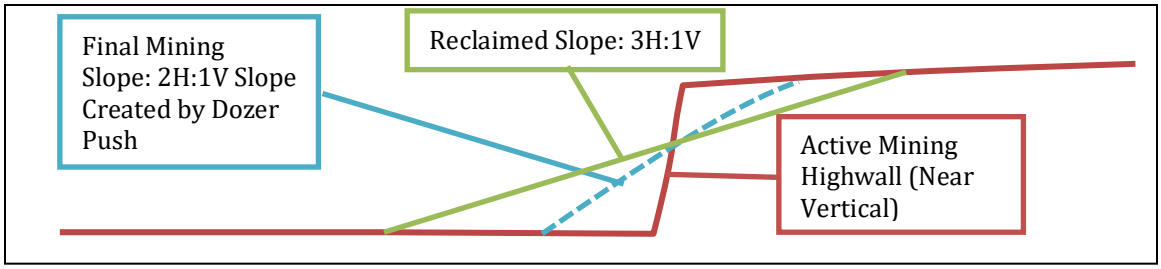


Figure D-1. Highwall Slopes

Mining is broken up into pods. Pod 1, the east area, will be mined out first. West Pod, the west area, will be mined out second. See Map C-2 for locations of each pod. Both pods are connected by an internal haul road. Reclamation will be completed as soon as possible as mining progresses. This means that any slope or area where mining is completed will be backfilled, topsoiled, disced and seeded. Once mining begins in a new pod, the remaining areas in the previous pod will be reclaimed. This reduces the overall disturbance at any point in time. There is sufficient topsoil on site to successfully reclaim the site to its final condition. Reclamation includes regrading of the site, topsoiling, and revegetation to create a final land use of rangeland.

The total disturbance area at the Lockhart Pit will be no more than 10 acres of mining area. The maximum ongoing disturbance area, which is the area that is active for operations but not yet reclaimed, will be 10 acres.

Dewatering will not be required while mining as groundwater is not anticipated to be exposed. No groundwater was encountered during exploration. The nearest existing well (290960-) is installed with a collar that is below the bottom of mining (see Map C-2). The groundwater table is at an elevation of roughly 7300', clearly well below the lowest elevation of mining. If any groundwater is exposed, mining will cease, and the mining depth will be adjusted to two feet above the groundwater level.

No blasting will take place at Lockhart Pit. No refuse, acid, or toxic producing material are expected to be encountered in this operation. If these materials are encountered, at least two feet of inert material will be placed over the area and mining will move to a different area.

1.1. Mining Areas

The active mining area will be 10 acres. A total of 98.1 acres will be disturbed during the total life of mine. All 98.1 acres of disturbance will be reclaimed.

2. Mining Timetable

Mining operations at the Lockhart Pit are expected to take at least 40 years to complete. Market demand will determine the actual production rate, but it is expected to be between 100,000 and 200,000 tons a year. Note that these values are not permit limits and should not be construed as such. An approximate mining timetable based on this production and the mining plan is shown in Table D-1.

Table D-1 Mining Timetable

Description	Time Required
East pod mining and reclamation	10 years
West pod mining and reclamation	30 years
Total	**20 years**

Reclamation will occur concurrently with mining. Once mining in the East Pod nears completion, the East Pod will have been partially reclaimed, and initial stripping of the West Pod will begin. During the first 1-2 years of mining in West Pod, reclamation will be completed in East Pod. Reclamation will also occur concurrently with mining throughout West Pod. Final reclamation work will commence upon the completion of mining in West Pod.

3. Mine Facilities and Operation

The site will contain the following facilities and equipment (all equipment is pre-existing and used for the current mining operations taking place prior to this amendment):

Facilities:

- Portable jaw crusher
- Portable cone crusher
- Portable screen decks
- Portable stacking/transporting conveyors

Equipment:

- Front-end loaders
- Bulldozers
- Scrapers
- Haul trucks (off highway)
- Water truck(s)
- Graders
- Excavators
- Backhoes

No permanent structures will be built within the mining area. Only portable processing equipment such as a crusher will be brought into the mining pods. All other equipment will be mobile. Explosives will not be used or stored at the site.

4. Topsoil and Overburden Handling

Topsoil is roughly 12 inches thick. No overburden is anticipated to be found onsite, but plans for its management are included in this permit in case it is encountered. Topsoil will be stripped prior to mining using appropriate earth moving equipment. The equipment that may be used for stripping includes front-end loaders, dozers, excavators, scrapers, and water trucks. Topsoil and overburden will be stockpiled separately in various stockpiles throughout the site for use in reclamation. When possible, it will be directly placed on areas being reclaimed. Stockpiles that will be in place for longer than 90 days will be seeded with the permanent seed mix to prevent erosion (see Exhibit E for seed mix).

Table D-2 shows the material balance based on the average topsoil and overburden thicknesses described above. These volumes account for the estimated topsoil and overburden stripped from all pods.

Table D-2 Topsoil and Overburden Material Generated During Mining

Material Generated (CY)	
Topsoil (12" thick)	155,000
Overburden (None)	0

Stockpiled material will be used to achieve the final grading shown in the Exhibit F reclamation maps. Screening fines will be used to backfill and grade the final mining slopes at 2H:1V to their final reclaimed conditions at 3H:1V. Any excess material will be dispersed and graded across the pod floors and used to create aesthetically pleasing reclaimed slopes. Stored topsoil from pre-mine stripping will be used to replace the topsoil on all disturbed areas and slopes. Topsoil will be replaced in a single 12-inch average lift across these areas.

5. Water Information, Rights, and Augmentation

All water rights issues such as availability of water for this operation, consumption rates, dust control, etc. is presented in Exhibit G – Water Information.

6. Schedule of Operations

Mining, screening, and processing will be conducted on site with portable equipment throughout the year. Product will be sold from these activities throughout the year. The operator will not typically have night gravel mining operations, although minor truck activity and repairs may occur after hours.

7. Grand County Impacts and Environmental Impacts

Impacts to Grand County are discussed further in the Grand County Land Use Permit but are summarized below. In general, the impacts will not be increased by the changes described in this amendment.

a. Truck traffic: All material will leave Lockhart Pit via its connection to the existing Brig pit. All access and traffic matters will remain under the purview of the Brig pit.
b. Noise: The operations at the Lockhart Pit will be a continuation of the mining and processing at the existing pit with no increase in intensity or noise impacts. Operations will be maintained in a fashion to stay within state noise limits.
c. Dust: Pit activities will be watered and all operations on the site are regulated by the Air Pollution Control Division of the CDPHE.
d. The product from this mine will positively impact the local community by supplying construction materials for the foreseeable growth of this part of Grand County. Additionally, by maintaining mining activities in an area that is used to them (Brig Pit already present), the cumulative impacts to the local community are kept minimal.

a) Stormwater control structures will be maintained to protect the area surface water regime.
b) The operator will work closely with the County, Town of Kremmling, NRCS, CDPW and the DRMS to ensure that the reclamation plan is the most appropriate for achieving the post-mining land use.

EXHIBIT E RECLAMATION PLAN

1. General Reclamation Plan

The total disturbed area to be reclaimed under this permit is 98.2 acres out of the 114.1-acre permit and affected area. Reclamation of the Lockhart Pit will convert all disturbed areas to a post mining land use as dry rangeland. This is consistent with the pre-mining land use and surrounding land uses. Reclamation will occur contemporaneously as mining progresses through the site. As mining in certain areas has been completed, they will be reclaimed to reduce the total disturbance and total reclamation work at one time. Following the completion of mining, final reclamation of the entire site will commence.

The permit and affected area will not all be disturbed and require reclamation. Table E-1 below summarizes the final land uses within the affected area upon completion of reclamation.

Table E-1 Reclamation Areas

Description	Area (Acres)
Haul Roads	0.1
Revegetated (dry rangeland)	98.1
Disturbed Area Total	98.2
Undisturbed Area	15.9
Total Affected (Permit) Area	**114.1**

Reclamation of all mining areas includes backfilling and grading of slopes, topsoiling, and seeding for revegetation. Reclamation will begin as soon as mining has been completed in an area of each pod. Smaller portions of each pod may be reclaimed if they are no longer being mined or used for operations. No more than 1000 feet of highwall will remain active without being reclaimed. All final mining slopes will be backfilled and graded from a 2H:1V to their final reclaimed 3H:1V slopes. They will be graded and compacted for stabilization and to prevent erosion. Any stockpiled overburden or fines will be used for slope backfilling or dispersed and graded around the site. Stockpiled topsoil will be spread across all disturbed areas in an average 12-inch lift in a manner that restores the pre-mine soil profile. All areas will be seeded to revegetate the site as rangeland. Refer to Map F-1 for the Lockhart Pit reclamation conditions.

There will be more than enough topsoil stockpiled from on-site materials to fulfill reclamation needs. Table E-2 shows the volumes stripped prior to mining, and the volumes required for reclamation. The materials required to reclaim any existing disturbances will be stockpiled on site. To cover the 10 acres of maximum mining, 1800 CY of fines will be stockpiled on site for final backfilling. These fines will come from the screening and crushing of material mined at Lockhart Pit. Assuming a very conservative 10% fines over the entire 98.2 acres at 25-feet

deep, there will be 396,000 CY of fines generated. This is more than sufficient to conduct all needed backfilling.

Table E-2 Reclamation Volumes

	Material Available on Site			Requirements for Reclamation	
Pod	Area (acres)	Topsoil Stripped (CY)	Overburden Stripped (CY)	Topsoil Required @ 12" (CY)	Backfill Required (CY)*
East	22.8	121,000	0	121,000	75,000
West	75.3	34,000	0	34,000	101,000
Haul Road	0.1	0	0	0	0
Totals	98.2	155,000	0	155,000	176,000

*Volume calculated based on an average highwall height of 25 feet. Fines will be used for backfilling (~396,000 CY available).

1.1. Reclamation Earthwork

Average backfill push distance: 80-ft.

Average fines/topsoil haul distance: 850-ft.

Average backfill push grade: downhill at 50% (2H:1V).

Average fines/topsoil haul grade: 2%.

2. Topsoil Replacement

An average of 12 inches of topsoil will be stripped from all new mining areas, and as an average of inches of topsoil will be replaced on all disturbed areas being reclaimed. This will be stockpiled for use in reclamation or direct placed. Topsoil will be replaced on areas that have been backfilled and graded for reclamation. Stripped topsoil will be placed directly for reclamation whenever possible. Topsoil will be replaced by dozers and haul trucks. Topsoiled areas will be disced to a depth of 12-inches.

3. Haul Roads and Access

All haul roads will remain following reclamation for access to the two reclaimed mining pods. See Map F-1 for details.

4. Reclamation Timetable and Sequence

The sequence and timing of reclamation can be seen in Table E-3 below. Reclamation of the entire site is estimated to be completed in 42 years. The reclamation schedule is dependent on the rate of mining which will fluctuate due to market demands. The operator will reclaim the site concurrently with the progression of mining to limit the total disturbance.

Table E-3 Reclamation Timetable

Description	Time Required
East Pod mining and reclamation	10 years
West Pod mining and reclamation	30 years
Final site reclamation.	2 years
Total	**42 years**

5. Revegetation Plans

All areas will be mulched and seeded for revegetation following grading, topsoiling, and discing of the soil. The seed mix is shown below. Temporary seeding of stockpiles will use the following rangeland mix. The following seed mixes will be used for reclamation, unless otherwise defined by NRCS.

Fertilizer will not be used. The size of temporary seeding on topsoil stockpiles will be no more than five acres at a time.

5.1. Rangeland Seed Mix

Species	Pounds of pure live seed per acre (drilled)
Western wheatgreass	4
Galleta (floret)	4
Small Burnet	3
Indian Ricegrass	3
Bottlebrush	0.5
Rabbitbrush	0.5
Four-winged Saltbush	0.5
Total	15.5

6. Post Reclamation Site Drainage

All pods are dry mined as groundwater is not anticipated to be encountered. Surface water runoff from uphill areas of the pods will be prevented from reaching the site through stormwater berms or grading. During mining, stormwater that lands within the site will either be completely contained for evaporation and infiltration or discharged at an approved discharge point. Reclamation will allow all surface flows to return as they were prior to mining. Refer to map F-1 for the post reclamation drainage of the site.

7. Revegetation Success Criteria

Revegetation will be deemed adequate when erosion is controlled, the vegetation cover matches neighboring areas, and when it is considered satisfactory according to Division standards. This will be monitored in the two years following the completion of reclamation.

8. Monitoring Reclamation Success

Measures will be employed for the control of any noxious weed species. The objective of this weed management plan is to control undesirable plants on the Lockhart Pit property. Plants identified through the Colorado Noxious Weed Act (C.R.S 35-5.5) and the Grand County Noxious Weed List as undesirable and designated for management within the county will be removed. Any weeds identified as List A species will be eradicated. Other lower listed plants identified as noxious weeds will be managed by control measures. A Weed Control Plan will be utilized as follows:

1) Each April, a weed survey will be taken of the permit area.
2) If any patches or plants have been identified, they will be sprayed by backpack sprayer or 4-wheeler using chemicals approved for use by the weed control staff of Grand County.
3) After reclamation, weed surveys and spraying will continue until the perennial cover and production of the site have met DRMS requirements and bond release has been obtained.

The Noxious Weed booklet published by Grand County will be utilized for additional information on identification, plant-specific methods of control, and recommended herbicides. This publication serves as a reference guide.

The Division and Grand County staff will be consulted regarding any weed infestation areas and any control measures prior to their initiation. The plan does not contemplate total weed removal of List B and lesser species on the property. Rather, the goal is to prevent the spread of weeds into uninfected areas as is the primary goal of the Grand County Weed Management Plan. Past experience has shown that some initial weed cover in the first year following the retopsoiling is beneficial to the reclamation effort in rangeland sites. Weeds tend to provide shade for new grasses, are a means of holding snow on the seedbed longer, and protect seedlings from wind and water erosion until the planted species have firmly taken hold.

During all pods and areas of the mining operation the permit area will be monitored closely every year, through which the operator may determine if any additional weeds have grown. If any new species of weeds are found, Grand County and the Division will be consulted in order to formulate the best plan for the new infestation.

EXHIBIT F RECLAMATION MAPS

Map F-1 Reclamation Plan

PERMIT AND AFFECTED AREA
114.1 acres

1
143.2 0.25

2
37.1 0.2

A
A'
B
B'
C
C'

T1N R80W, SEC. 11
T1N R80W, SEC. 12

WEST POD RECLAIMED TO RANGELAND

EAST POD RECLAIMED TO RANGELAND

BRASS CAP LS #10717

BRIG PIT CDRMS BOUNDARY

BRIG PIT PRIVATE ACCESS

R313091

R000329

R310313

R311544

R013114

290960-

US-40

LEGEND

BUILDINGS AND RELATED STRUCTURES
- Building
- Fence

LAND SURVEYS
- Public Land Survey System
- Range or Township line
- Range or Township labels: R1E T2N
- Section line
- Section numbers: 1-36
- Mining claim or property boundary

ROADS AND RELATED FEATURES
- Highway
- Light duty road, paved
- Light duty road, gravel

RIVERS, LAKES, SHORELINES, AND CANALS
- Intermittent/Ephemeral stream/ditch
- Drainage basin boundaries
- Waterwell: Well Name

VEGETATION
- NWI Wetlands

TRANSMISSION LINES AND PIPELINES
- Power transmission line; pole; tower

MINING FEATURES
- DRMS Permit/Affected Boundary
- Disturbance Extent
- Berm/windrow

BASELINE CONTOURS
- Index: Approximate of indefinite
- Intermediate: Approximate of indefinite
- Supplementary

RECLAIMED CONTOURS
- Index: Approximate of indefinite
- Intermediate: Approximate of indefinite
- Dump

Standard Stormwater Control Berm Design

2 : MIN. 2.0'

Drainage Basin Labels

Basin — 1 — 46.2 0.25 — Composite Runoff Coefficient
Area

1 — Basin Destination

West Pod Drainage Basins (1 & 3)

Site Condition	Area (acres)	Runoff Coefficient	100-YR 24-HR Runoff (ac-ft)	Sump Capacity (ac-ft)*
Base	143.2	0.25	4.73	N/A
Mine	75.8	0.50	4.12	5.61
Diversion (3)	23.8	0.25	0.415	N/A
Rec.	143.2	0.25	4.73	N/A

*Volume available within sump in mining pod.

East Pod Drainage Basin (2 & 4)

Site Condition	Area (acres)	Runoff Coefficient	100-YR 24-HR Runoff (ac-ft)	Sump Capacity (ac-ft)*
Base	37.1	0.25	0.90	N/A
Mine	29.1	0.50	1.09	1.50
Diversion (4)	7.6	0.25	0.13	N/A
Rec.	37.1	0.25	0.90	N/A

*Volume available within sump in mining pod.

F-1 Reclamation Map

Lockhart Pit

DRMS Permit Number: M-2024-017 — **Kremmling All Season Rentals, LLC**

Mine Entry Location:	Latitude: 40.06178	Longitude: -106.31576
State: COLORADO	County: Grand	Nearest Town: Kremmling
Section: 11	Township: 1N	Range: 80W PM: 6th
Major Watershed:	Colorado River	MSHA ID: ----

Map Scale: 1" = 200'

0 200 400

Map Georeferencing Information:	Datum: NAD83	Projection: CO NORTH
Survey Source: CO LIDAR	**Drawn by:** BEL	Date: 11/27/23
Imagery Source: GoogleEarth	**Checked by:** BEL	Date: ----
Survey Date: 2016	**Approved by:** BEL	Date: ----
Imagery Date: ----		

File Name: Bumgarner 240730

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COLORADO LICENSED MINING ENGINEER — 47751 — 8/15/24 — PROFESSIONAL ENGINEER

EXHIBIT G WATER INFORMATION

1. General

Surface water features near the Lockhart Pit include the various ephemeral drainage channels connecting the uphill rangeland to the Colorado River to the south. These features can be seen in the Exhibit C and F maps; Maps C-1, C-2, and F-1 shows the drainage basins and patterns for the site in premine, mine, and reclaimed conditions. Groundwater is below the bottom of mining as none has been encountered during exploration or past mining operations and adjacent wells are installed below the bottom of mining. There is no risk of flooding according to the Federal Emergency Management Agency (FEMA) flood mapping services; the flood zones for the Colorado River do not reach this site. No wells are located on any area that is intended to be mined. Local wells are located far enough from mining horizontally and vertically to be unaffected by mining operations. The operator is committed to maintaining the prevailing hydrologic balance during their operations.

2. Water Quality Protection

The primary concerns surrounding water quality protection at the Lockhart Pit site are the potential impacts to the surface and groundwater from sediment, hydraulic fluids, and diesel fuel. Sediment will be controlled through the use of stormwater retention within the disturbance area through the life of the mine. The site will be graded in a manner that maintains all surficial flows within the disturbed area, in turn containing all sediment and unwanted discharges from leaving the site. Surface water control methods will be installed and maintained in accordance with a Stormwater Management Plan (SWMP) for the site. Stormwater control measures such as berms and sumps can be seen on Map C-2. Stormwater control structures will remain in place until vegetation is established in all disturbed areas uphill of a given stormwater control structure. For example, berms and ponds/sumps within the East Pod will not be removed until the East Pod has been successfully reclaimed including sufficient revegetation to control erosion.

Hydraulic fluids and diesel fuels will be contained within vehicles or with adequate storage methods that follow best practices of maintenance; these practices including regular inspections of vehicles, hydraulic lines, and any other potential spill sources. Diesel fuel will not be stored onsite. All fuels and maintenance oils will be stored at the existing Brig Pit.

Any surface water discharges of stormwater from the site will be sampled in accordance with the NPDES discharge permit. No stormwater discharges are anticipated as part of mining since the mining pods can contain the 100-YR runoff event. A stormwater discharge permit will nonetheless be secured from the Colorado Department of Public Health and Environment. Discharge outfalls will be determined at the time of NPDES permit application.

3. Floodplain

There is no floodplain or floodway present on the Lockhart Pit site according to the FEMA flood mapping services.

4. Wetlands

Wetlands identified on the National Wetlands Inventory can be seen on the Exhibit C maps. No wetlands will be disturbed by mining or reclamation operations.

5. Aquifer

There is no known aquifer present at the Lockhart Pit.

6. Surface Water

The mining operation will impact surface water in the area through the stormwater runoff that enters the site. Maps C-1, C-2, and F-1 show the drainage patterns and how they develop throughout the life of the mine. Drainage basins and their runoff volumes are listed on each map. Each mining pod will have sufficient storage capacity to contain the 100-YR runoff event that drains into it. Diversion ditches will be installed uphill of each mining pod to redirect water around the mining pods and into the local drainage.

The primary concern for surface water protection at the site is preventing the discharge of sediment, oil, and/or hydraulic fluids from the operation areas. No oils or fuels will be stored onsite. Sediment is trapped onsite using controls and best management practices by directing and controlling surface water runoff that enters the disturbed areas. More information on sediment and surface water control is provided below.

6.1. Surface Water Handling

Mining pods contain all of the disturbance at Lockhart Pit. Each mining pod has its own drainage basin, as delineated on the Exhibit C maps.

6.1.1. Mining

The disturbance area surface water runoff will drain to the active mining pit within each pod. Diversion structures will be used to divert uphill drainage around the mining pods. Map C-2 shows the anticipated drainage patterns during mining. Grading of the disturbed portions of the site to drain internally ensures that no sediment laden water flows enter the river or any other natural waterways. There is more than enough storage within the pits to contain the 100-yr storm and smaller events. Stormwater control measures in the form of berms and sumps will be implemented in all disturbed areas to prevent the uncontrolled discharge of stormwater. NPDES discharge outfalls will be permitted at each mining pod to accommodate stormwater discharge control.

Discharge from mining areas will take place within 72-HR of a storm event to prevent diversion of water rights. Discharge will be conducted via pump, weir, or pipe. The operator will sample water discharges as required by their Colo. Dept. of Public Health and Environment permits. Detaining water within active mining pods will allow for sediment to settle out and ensure clean water discharges.

6.1.2. Post Reclamation

Drainage patterns for after reclamation can be seen on Map F-1. Each pod will drain as it did prior to mining. In general, this means drainage patterns will return runoff to the drainage draw between pods. Revegetation of the pods will ensure that stormwater runoff does not generate additional sediment discharges.

6.1.3. Flood Protection

No mining takes places near the Colorado River or any other flooding waterway.

6.2. Disturbed Area Runoff

During all stages of mining, there is enough water storage capacity to contain the 100-year 24-hour storm event and prevent erosion from surface water discharge. The expected rainfall from these events at the Lockhart Pit is provided in Table G-2 below.

Table G-2 Area Storm Events (from NOAA[1])

Event Probability	Event Rainfall (inches)
100-YR 24-HR	2.33

Peak runoff for the 100-YR event was determined for premine, mine, and reclaimed conditions. Prior to mining all of the disturbed area freely drains to the drainage draws onsite. During mining, the mining pods have enough storage to contain the entire discharge from the storm event. Following reclamation, the mining pods return to freely draining in the same manner as prior to mining. Therefore, mining and reclamation will not create any additional drainage from the site.

The discharge volumes from these storm events are calculated in Appendix G-1.

All runoff calculations were conducted using the Rational Method as required by Grand County drainage criteria.

The Rational Method is a widely used technique in hydrology for estimating peak discharge from small drainage basins during storm events. It is based on the premise that peak discharge is proportional to rainfall intensity, catchment area, and a runoff coefficient that accounts for land use and soil type. The method uses the formula Q = CiA, where Q is the peak discharge (cubic feet per second or cubic meters per second), C is the runoff coefficient, i is the rainfall intensity (inches per hour or millimeters per hour), and A is the catchment area (acres or hectares). This

[1] National Oceanic and Atmospheric Administration

method is particularly useful for urban drainage design and small catchments where the time of concentration is relatively short.

The Exhibit C maps summarizes the drainage basins (A). Runoff coefficients are based on a combination of soil and land cover data (C). NOAA data on rainfall intensity (i) is used.

7. Groundwater

Groundwater will not be interacted with at the Lockhart Pit. Groundwater is located over 100-feet below the bottom of the gravel deposit based on the nearest well data. While exact groundwater levels are not known from exploration and surrounding wells, groundwater is likely well below mining. The nearest well (29060) is 321 feet deep with a static water level 90-ft deep, starting at a collar elevation of 7390' above sea level. The lowest point of mining is in East Pod at 7420' elevation, which is 30-feet above the collar elevation of the well. If any groundwater is encountered during mining, it will be covered, and the mining depth will be adjusted to two feet above the level it is found. Table G-3 below the nearest well to the permit boundary.

Table G-3

Wells within 600' of Permit Area			
Well ID	Distance to Mining (ft)	Well Depth (ft)*	Notes
29060	750	321	WL = 90-ft

8. Water Related Permits

The operator has already obtained the necessary permits regarding water for the operation. These permits are listed below. Some amendments may be required for these permits. Copies of any new permits will be provided to the Division after they have been acquired.

- Stormwater Management Plan (will be modified following approval of this amendment)
- Colorado Department of Public Health and Environment (CDPHE) Stormwater Discharge Permit (currently in place, will be modified to add outfalls at new pits)

8.1. Water Rights

No water rights are necessary for the operations at the Lockhart Pit. Mining should not impact any existing water rights as groundwater will not be interacted with. Water will be purchased as needed to supply operation needs such as dust control.

9. Water Consumption and Source

The primary consumptive water use for the Lockhart Pit is for dust control. Water for this use will be bought from a local supplier and trucked on site.

Table G-6 summarizes the estimated water consumption for the operation for various uses based on historic water use. The expansion should not cause any drastic changes to the typical water consumption at the operation.

Table G-6 Water Consumption

Consumptive Use	Max. Yearly Quantity (ac-ft)
Dust Control for roads and pits	2.00
Processing (crushing and screen plant)	0.20
Total	2.20

Appendix G-1 Hydrology Calculations

Drainage basins are shown on the Exhibit C maps. Drainage basins 1 and 2 represent the areas that drain directly to the east and west pod areas before, during, and after mining. Drainage basins 3 & 4 are for the diversion ditch drainage basins during mining only.

Runoff conditions are calculated in three conditions: premine, mining, and reclaimed. This is to show the baseline runoff condition of the site, how mine disturbance will change that, and what the post-mine runoff conditions will be.

All stormwater designs are based on the 100-YR 24-HR storm event for this area of Colorado. Runoff modelling is conducted for both operating and reclaimed conditions. Calculations of runoff, both in terms of volume and flow, are according to the Rational Method.

The Rational Method is a widely used technique in hydrology for estimating peak discharge from small drainage basins during storm events. It is based on the premise that peak discharge is proportional to rainfall intensity, catchment area, and a runoff coefficient that accounts for land use and soil type. The method uses the formula Q = CiA, where Q is the peak discharge (cubic feet per second or cubic meters per second), C is the runoff coefficient, i is the rainfall intensity (inches per hour or millimeters per hour), and A is the catchment area (acres or hectares). This method is particularly useful for catchments where the time of concentration is relatively short.

The Exhibit C maps summarize the drainage basins (A). Runoff coefficients are based on land conditions (C). NOAA data for rainfall intensity (i) is used. Runoff coefficients are typical values from ASCE[2] tables included in the hydrology software. The coefficients are based on either unimproved ground (0.20-0.25) or light industrial ground (0.5) for the vegetated and disturbed conditions of the site respectively.

Assumptions: The following assumptions are made for the Lockhart surface hydrology model.

1. NOAA rainfall intensities that are publicly available are accurate.
2. The computed maximum rate of runoff to the design point is a function of the average rainfall rate during the time of concentration to that point.
3. The hydrologic losses in the catchment are homogeneous and uniform.
4. The runoff coefficients represent the average soil antecedent moisture condition, imperviousness, and type of soil.
5. The depth of rainfall used is one that occurs from the start of the storm to at least the time of concentration, and the design rainfall depth during that time period is converted to the average rainfall intensity for that period.
6. The maximum runoff rate occurs when the entire area is contributing flow.

[2] American Society of Civil Engineers

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

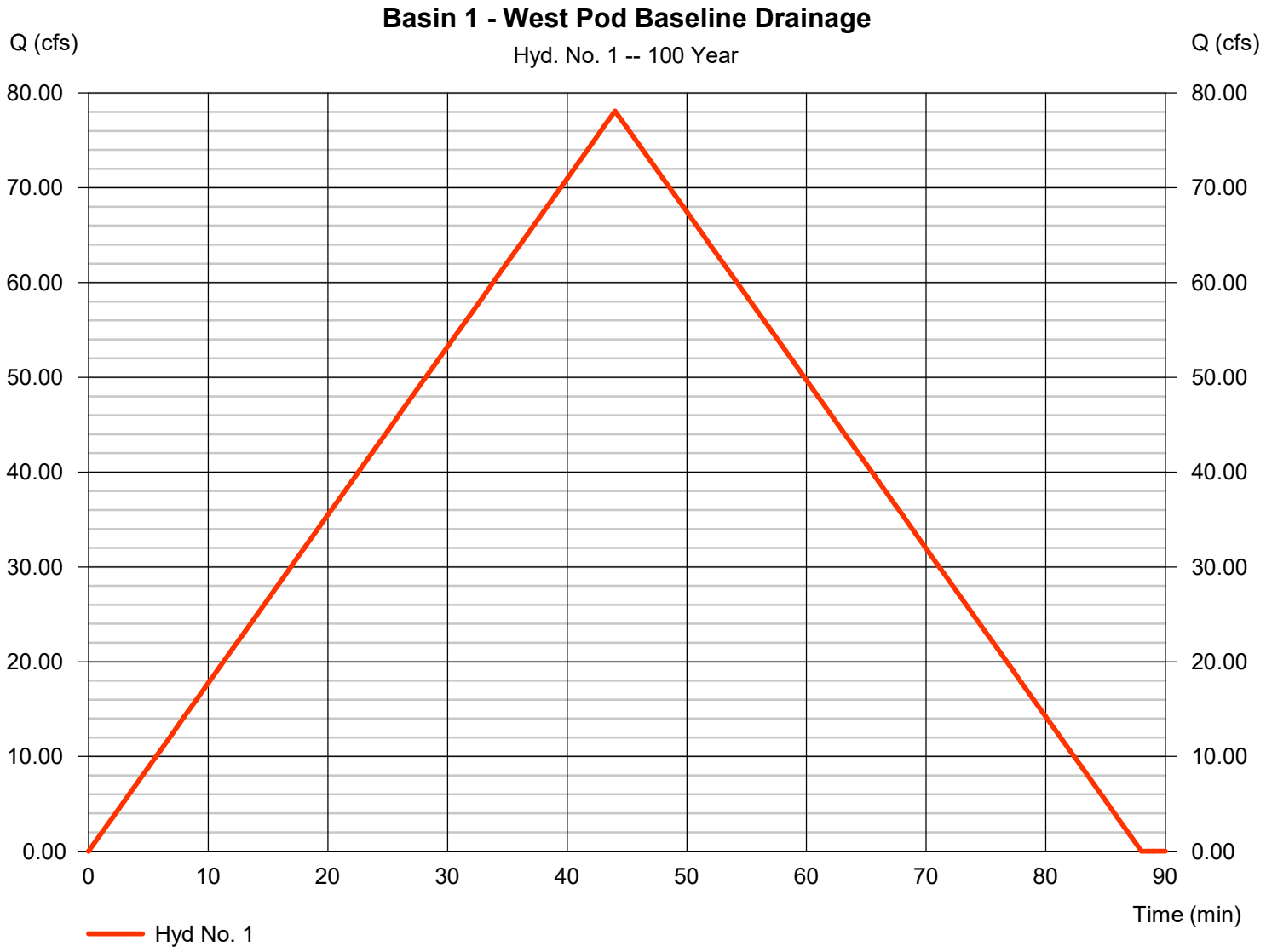
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	Rational	78.10	1	44	4.733	------	------	------	Basin 1 - West Pod Baseline Drainag
2	Rational	115.07	1	26	4.121	------	------	------	Basin 1 - West Pod Mining Drainage
3	Rational	78.10	1	44	4.733	------	------	------	Basin 1 - West Pod Reclaimed Draina
4	Rational	32.65	1	20	0.899	------	------	------	Basin 2 - East Pod Baseline Drainage
5	Rational	65.77	1	12	1.087	------	------	------	Basin 2 - East Pod Mining Drainage
6	Rational	32.65	1	20	0.899	------	------	------	Basin 2 - East Pod Reclaimed Draina
7	Rational	18.81	1	16	0.415	------	------	------	Basin 3 - West Pod Diversion
8	Rational	6.006	1	16	0.132	------	------	------	Basin 4 - East Pod Diversion

Hydrograph Report

Hyd. No. 1

Basin 1 - West Pod Baseline Drainage

Hydrograph type	=	Rational	Peak discharge	=	78.10 cfs
Storm frequency	=	100 yrs	Time to peak	=	44 min
Time interval	=	1 min	Hyd. volume	=	4.733 acft
Drainage area	=	143.200 ac	Runoff coeff.	=	0.25
Intensity	=	2.182 in/hr	Tc by TR55	=	44.00 min
IDF Curve	=	Kremmling.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No. 1

Basin 1 - West Pod Baseline Drainage

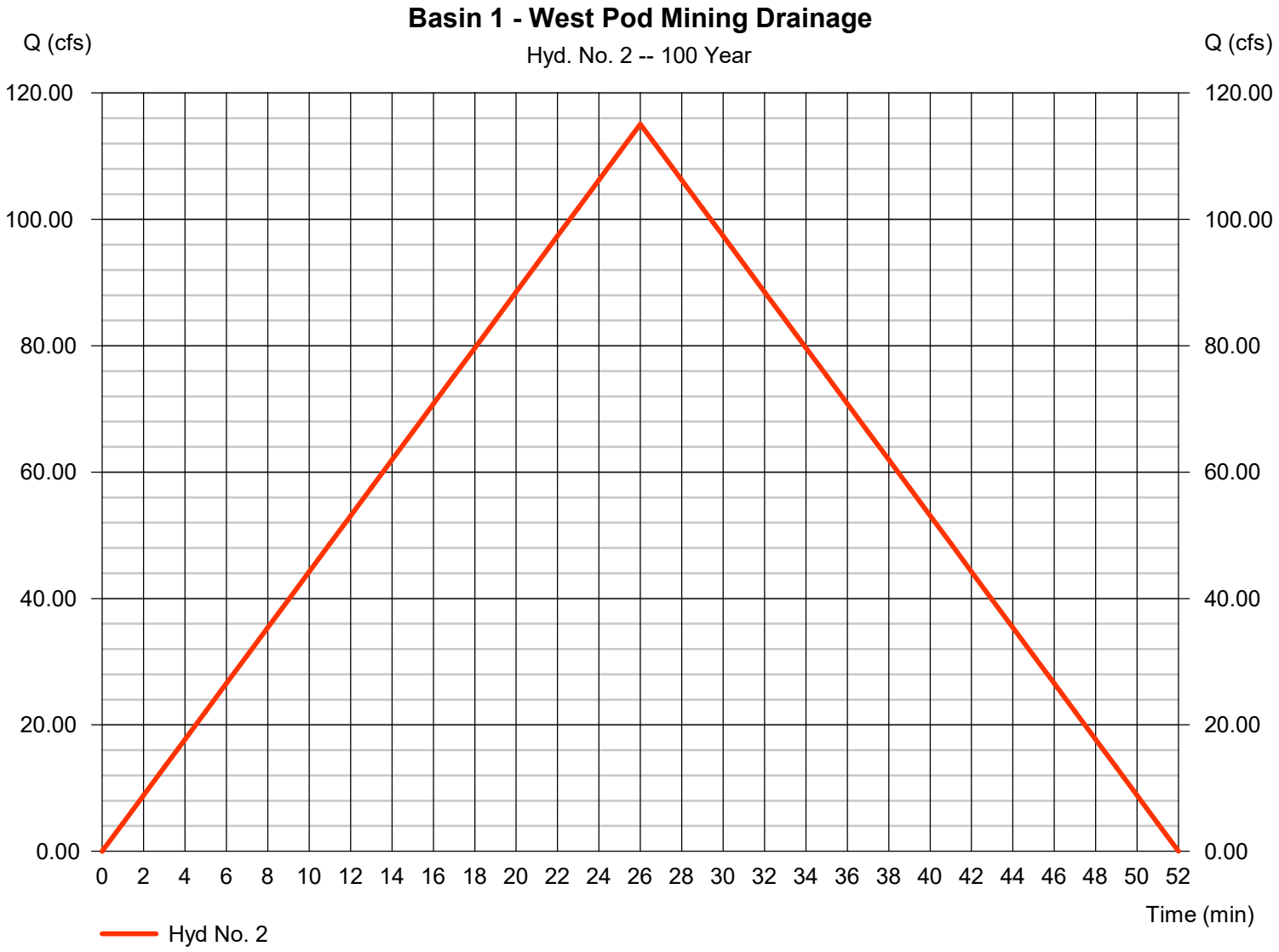
Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 5200.00		0.00		0.00		
Watercourse slope (%)	= 1.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.98		0.00		0.00		
Travel Time (min)	**= 43.86**	**+**	**0.00**	**+**	**0.00**	**=**	**43.86**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Total Travel Time, Tc							**44.00 min**

Hydrograph Report

Hyd. No. 2

Basin 1 - West Pod Mining Drainage

Hydrograph type	=	Rational	Peak discharge	=	115.07 cfs
Storm frequency	=	100 yrs	Time to peak	=	26 min
Time interval	=	1 min	Hyd. volume	=	4.121 acft
Drainage area	=	75.800 ac	Runoff coeff.	=	0.5
Intensity	=	3.036 in/hr	Tc by TR55	=	26.00 min
IDF Curve	=	Kremmling.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hyd. No. 2

Basin 1 - West Pod Mining Drainage

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 2500.00		0.00		0.00		
Watercourse slope (%)	= 1.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.61		0.00		0.00		
Travel Time (min)	**= 25.82**	**+**	**0.00**	**+**	**0.00**	**=**	**25.82**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Total Travel Time, Tc							**26.00 min**

Hydrograph Report

Hyd. No. 3

Basin 1 - West Pod Reclaimed Drainage

Hydrograph type	=	Rational	Peak discharge	=	78.10 cfs
Storm frequency	=	100 yrs	Time to peak	=	44 min
Time interval	=	1 min	Hyd. volume	=	4.733 acft
Drainage area	=	143.200 ac	Runoff coeff.	=	0.25
Intensity	=	2.182 in/hr	Tc by TR55	=	44.00 min
IDF Curve	=	Kremmling.IDF	Asc/Rec limb fact	=	1/1

TR55 Tc Worksheet

Hyd. No. 3

Basin 1 - West Pod Reclaimed Drainage

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 5200.00		0.00		0.00		
Watercourse slope (%)	= 1.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.98		0.00		0.00		
Travel Time (min)	**= 43.86**	**+**	**0.00**	**+**	**0.00**	**=**	**43.86**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

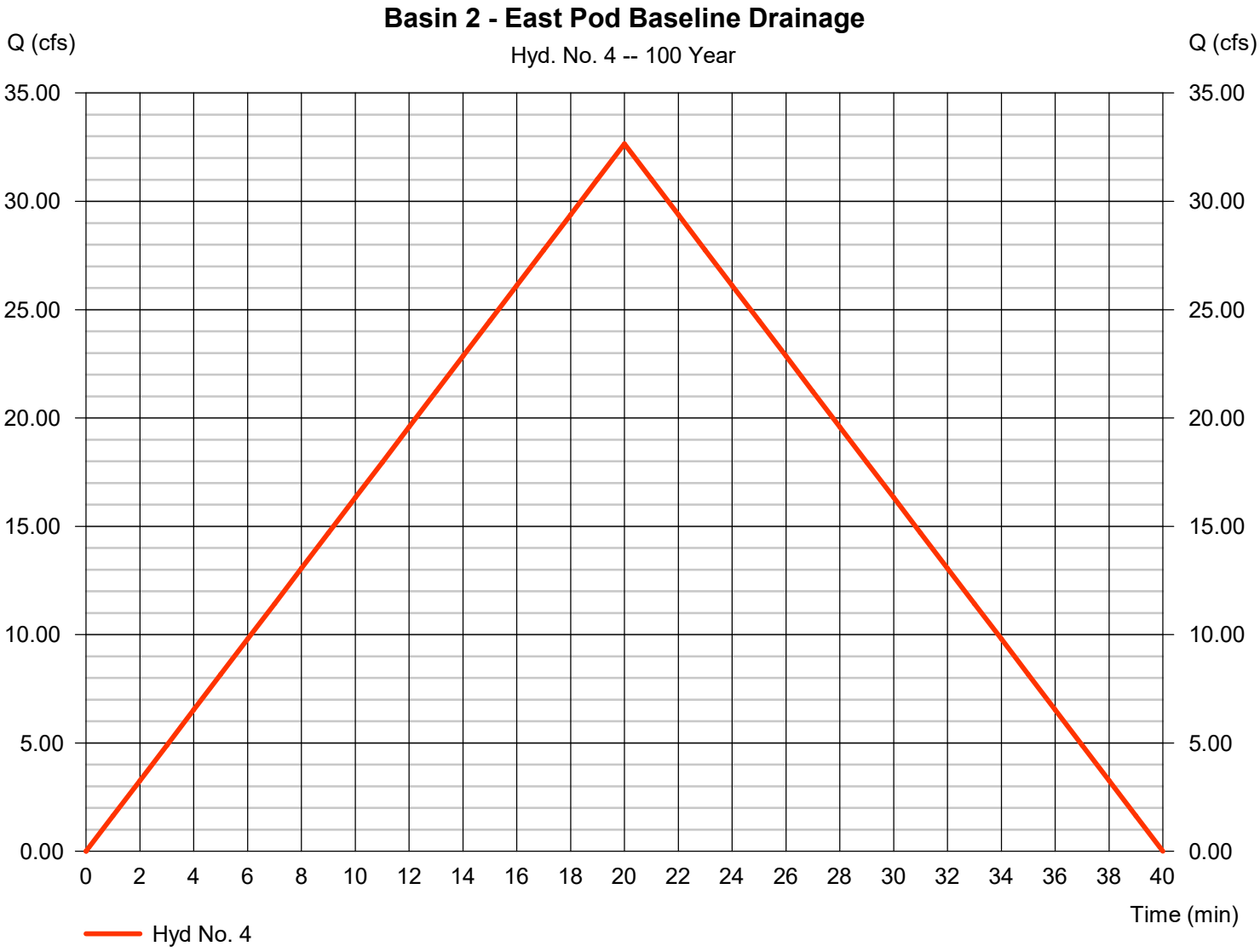
Total Travel Time, Tc ..... 44.00 min

Hydrograph Report

Hyd. No. 4

Basin 2 - East Pod Baseline Drainage

Hydrograph type	=	Rational	Peak discharge	=	32.65 cfs
Storm frequency	=	100 yrs	Time to peak	=	20 min
Time interval	=	1 min	Hyd. volume	=	0.899 acft
Drainage area	=	37.100 ac	Runoff coeff.	=	0.25
Intensity	=	3.520 in/hr	Tc by TR55	=	20.00 min
IDF Curve	=	Kremmling.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hyd. No. 4

Basin 2 - East Pod Baseline Drainage

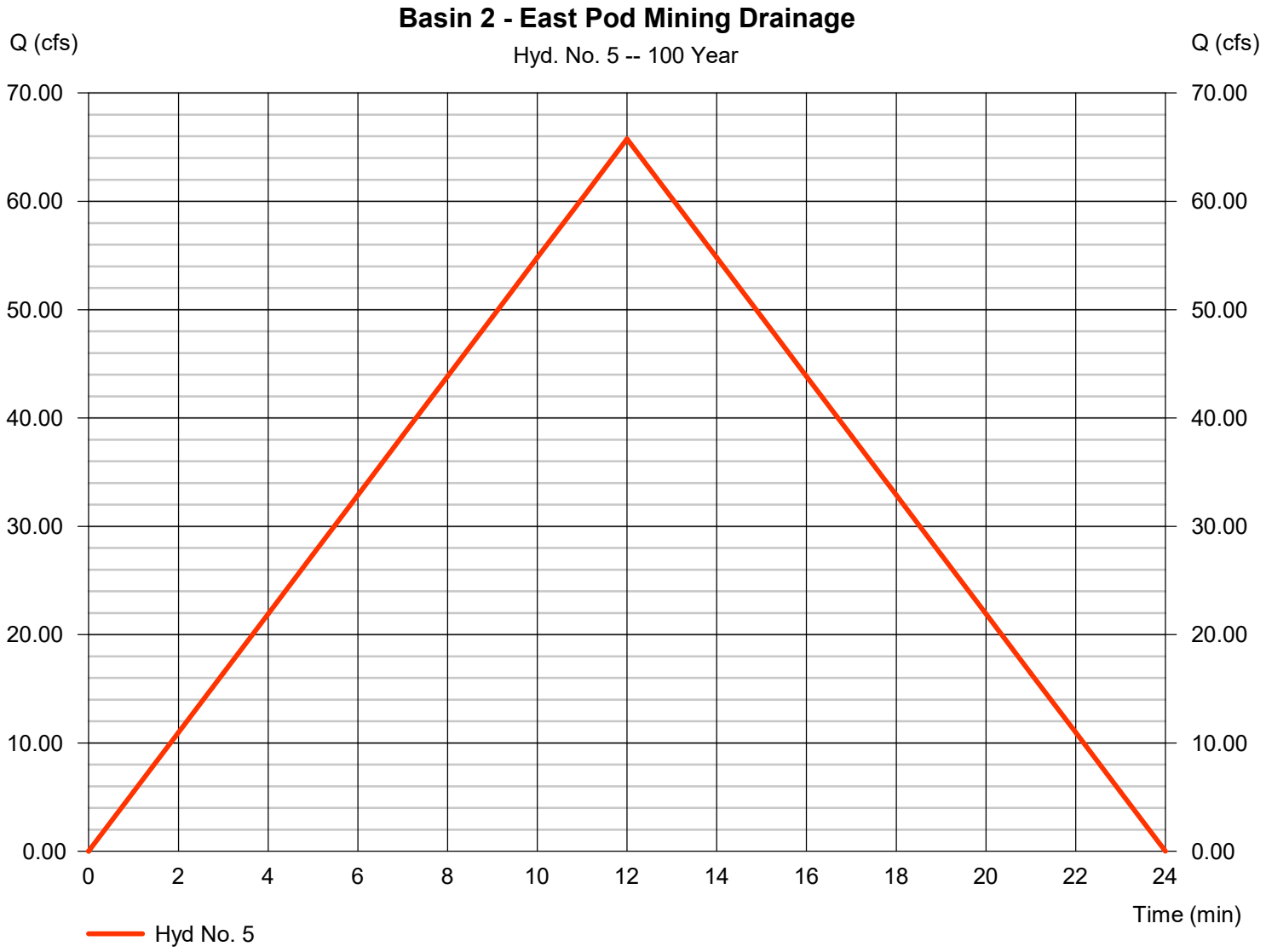
Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 2500.00		0.00		0.00		
Watercourse slope (%)	= 1.67		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.09		0.00		0.00		
Travel Time (min)	**= 19.98**	**+**	**0.00**	**+**	**0.00**	**=**	**19.98**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Total Travel Time, Tc							**20.00 min**

Hydrograph Report

Hyd. No. 5

Basin 2 - East Pod Mining Drainage

Hydrograph type	=	Rational	Peak discharge	=	65.77 cfs
Storm frequency	=	100 yrs	Time to peak	=	12 min
Time interval	=	1 min	Hyd. volume	=	1.087 acft
Drainage area	=	29.100 ac	Runoff coeff.	=	0.5
Intensity	=	4.520 in/hr	Tc by TR55	=	12.00 min
IDF Curve	=	Kremmling.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hyd. No. 5

Basin 2 - East Pod Mining Drainage

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 1200.00		0.00		0.00		
Watercourse slope (%)	= 1.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.61		0.00		0.00		
Travel Time (min)	**= 12.40**	**+**	**0.00**	**+**	**0.00**	**=**	**12.40**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

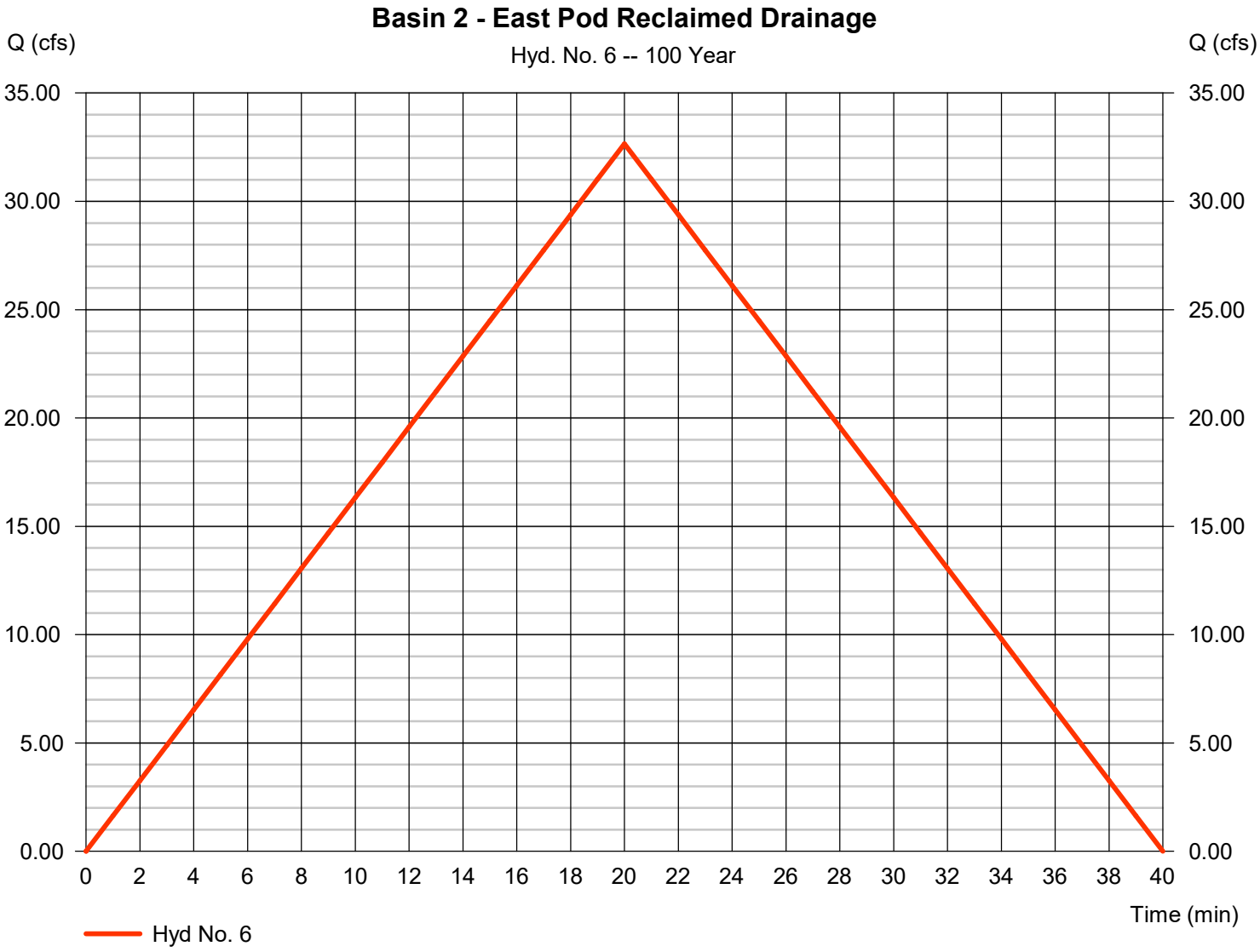
Total Travel Time, Tc ..... 12.00 min

Hydrograph Report

Hyd. No. 6

Basin 2 - East Pod Reclaimed Drainage

Hydrograph type	=	Rational	Peak discharge	=	32.65 cfs
Storm frequency	=	100 yrs	Time to peak	=	20 min
Time interval	=	1 min	Hyd. volume	=	0.899 acft
Drainage area	=	37.100 ac	Runoff coeff.	=	0.25
Intensity	=	3.520 in/hr	Tc by TR55	=	20.00 min
IDF Curve	=	Kremmling.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hyd. No. 6

Basin 2 - East Pod Reclaimed Drainage

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 2500.00		0.00		0.00		
Watercourse slope (%)	= 1.67		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.09		0.00		0.00		
Travel Time (min)	**= 19.98**	**+**	**0.00**	**+**	**0.00**	**=**	**19.98**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

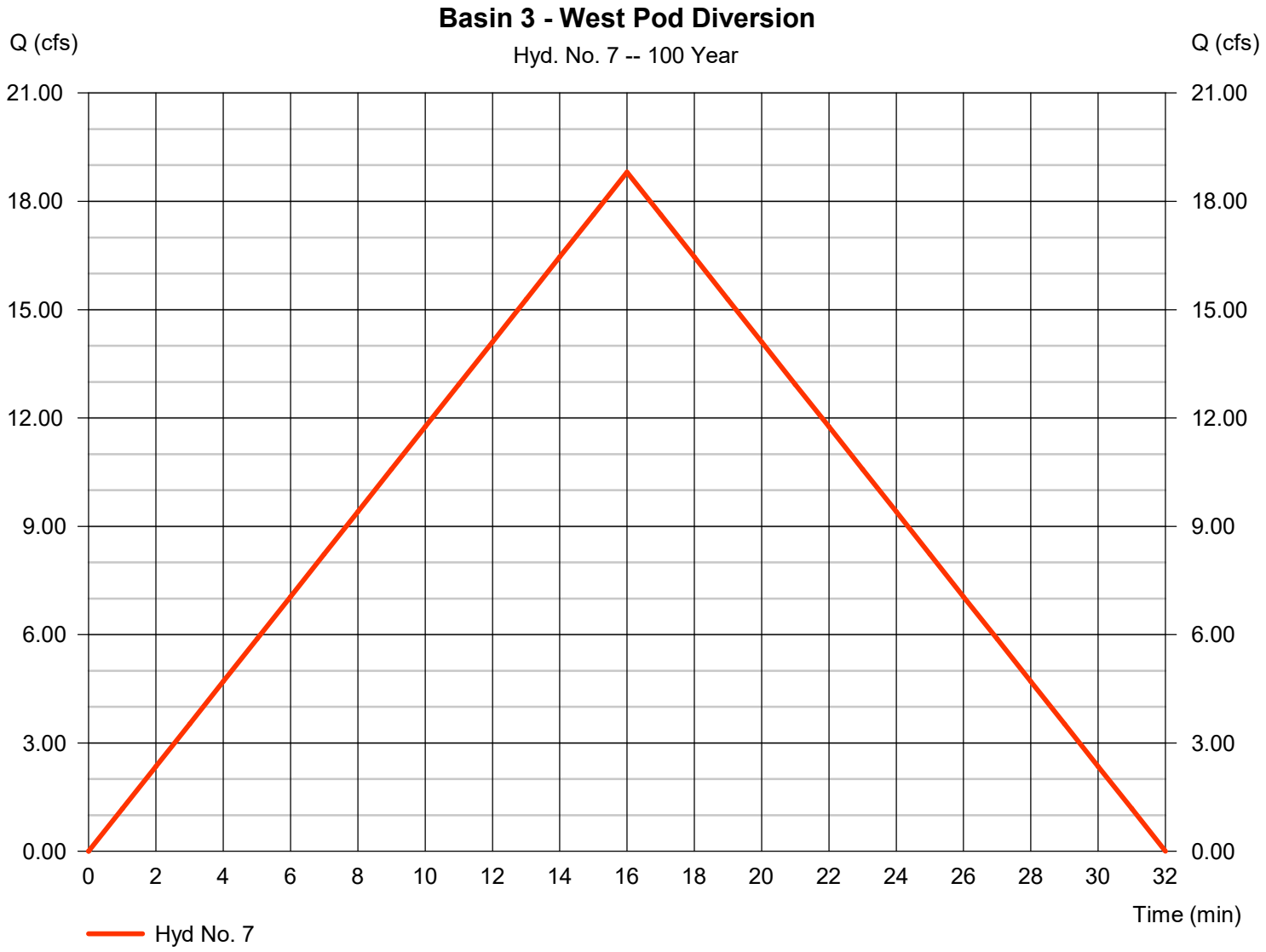
Total Travel Time, Tc ..... 20.00 min

Hydrograph Report

Hyd. No. 7

Basin 3 - West Pod Diversion

Hydrograph type	=	Rational	Peak discharge	=	18.81 cfs
Storm frequency	=	100 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	0.415 acft
Drainage area	=	23.800 ac	Runoff coeff.	=	0.2
Intensity	=	3.952 in/hr	Tc by TR55	=	16.00 min
IDF Curve	=	Kremmling.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hyd. No. 7

Basin 3 - West Pod Diversion

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 1000.00		0.00		0.00		
Watercourse slope (%)	= 0.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.14		0.00		0.00		
Travel Time (min)	**= 14.61**	**+**	**0.00**	**+**	**0.00**	**=**	**14.61**
Channel Flow							
X sectional flow area (sqft)	= 3.00		0.00		0.00		
Wetted perimeter (ft)	= 3.00		0.00		0.00		
Channel slope (%)	= 0.50		0.00		0.00		
Manning's n-value	= 0.020		0.015		0.015		
Velocity (ft/s)	=5.27						
			0.00				
					0.00		
Flow length (ft)	({0})450.0		0.0		0.0		
Travel Time (min)	**= 1.42**	**+**	**0.00**	**+**	**0.00**	**=**	**1.42**

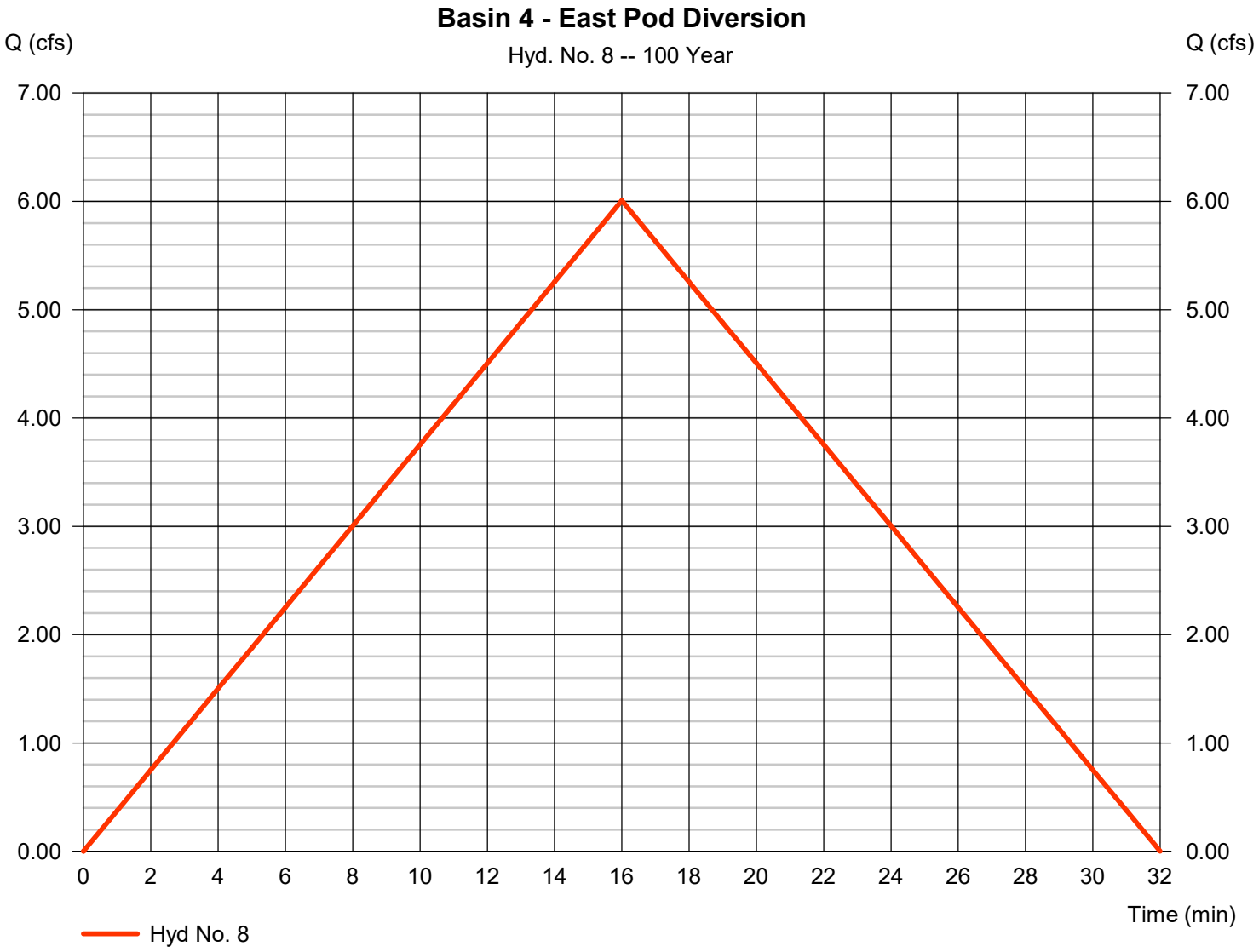
Total Travel Time, Tc ..... 16.00 min

Hydrograph Report

Hyd. No. 8

Basin 4 - East Pod Diversion

Hydrograph type	=	Rational	Peak discharge	=	6.006 cfs
Storm frequency	=	100 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	0.132 acft
Drainage area	=	7.600 ac	Runoff coeff.	=	0.2
Intensity	=	3.952 in/hr	Tc by TR55	=	16.00 min
IDF Curve	=	Kremmling.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hyd. No. 8

Basin 4 - East Pod Diversion

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 1.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 1900.00		0.00		0.00		
Watercourse slope (%)	= 1.80		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.16		0.00		0.00		
Travel Time (min)	**= 14.63**	**+**	**0.00**	**+**	**0.00**	**=**	**14.63**
Channel Flow							
X sectional flow area (sqft)	= 3.00		0.00		0.00		
Wetted perimeter (ft)	= 3.00		0.00		0.00		
Channel slope (%)	= 1.80		0.00		0.00		
Manning's n-value	= 0.020		0.015		0.015		
Velocity (ft/s)	=10.00						
			0.00				
					0.00		
Flow length (ft)	({0})690.0		0.0		0.0		
Travel Time (min)	**= 1.15**	**+**	**0.00**	**+**	**0.00**	**=**	**1.15**

Total Travel Time, Tc ..... 16.00 min

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 19 2024

East Pod Diversion Ditch Design - 100YR, 24HR Event

Trapezoidal

Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 7470.00
Slope (%)	= 1.80
N-Value	= 0.020

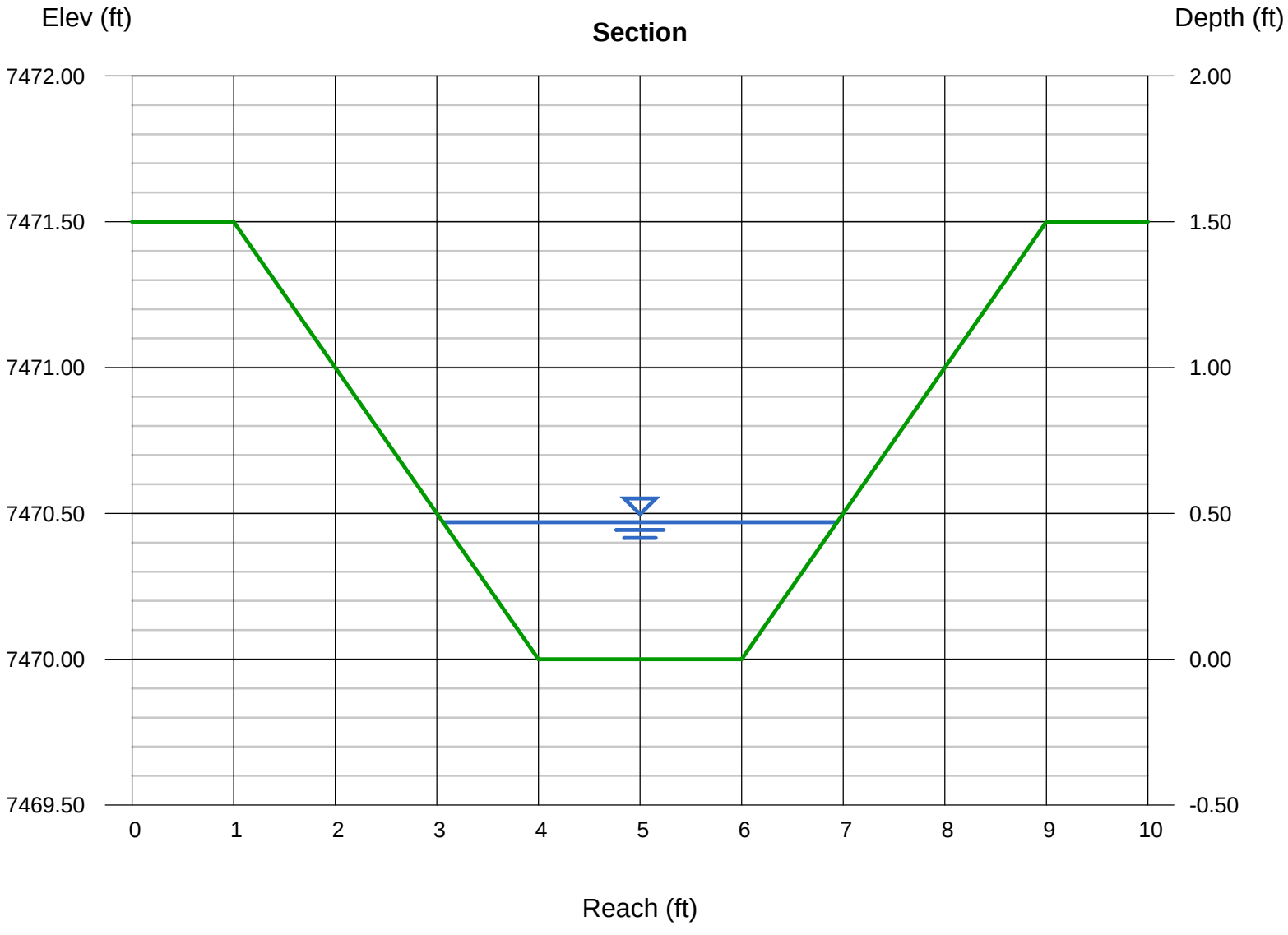
Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.50

Highlighted

Depth (ft)	= 0.47
Q (cfs)	= 6.500
Area (sqft)	= 1.38
Velocity (ft/s)	= 4.70
Wetted Perim (ft)	= 4.10
Crit Depth, Yc (ft)	= 0.57
Top Width (ft)	= 3.88
EGL (ft)	= 0.81

Length = 585-ft
Lining = Excavated earth



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 19 2024

West Pod Diversion Ditch - 100YR Event

Trapezoidal

Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7470.00
Slope (%)	= 1.00
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 19.00

Length = 1214-ft
Lining = Excavated earth

Highlighted

Depth (ft)	= 0.81
Q (cfs)	= 19.00
Area (sqft)	= 3.74
Velocity (ft/s)	= 5.08
Wetted Perim (ft)	= 6.62
Crit Depth, Yc (ft)	= 0.88
Top Width (ft)	= 6.24
EGL (ft)	= 1.21

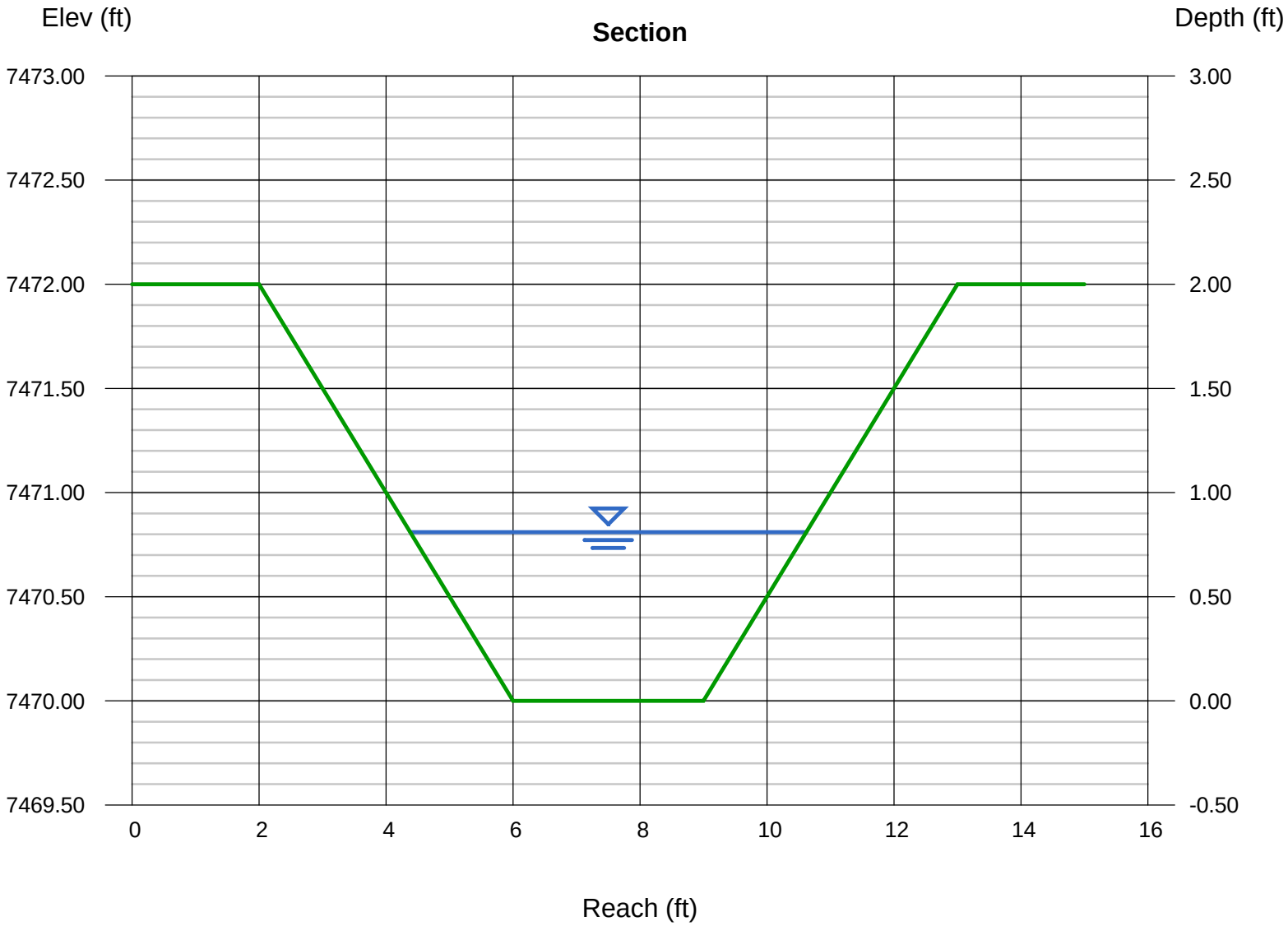


EXHIBIT H WILDLIFE INFORMATION

1. Introduction

Wildlife habitat fragmentation has already occurred at the Lockhart Pit due to the long-term presence of mining, agriculture, and US 40. Colorado Parks and Wildlife (CPW) habitat and range mapping has been used to develop this wildlife analysis. The CPW will be consulted as part of the county and amendment permitting processes.

2. Description of Significant Wildlife Resources on the Affected Land

Small animals such as rodents and small birds reside on the dryland terraces on and near the site. The overall area is used by deer, elk, mountain lion, bear, and other common mountain species of Colorado. There is one potentially active bald eagle nests within one mile of the site according to CPW data, but no known nest has been identified within 1/2-mile of the expansion area.

3. Seasonal Use of the Area

All significant wildlife resources are year-round in their usage.

4. Presence and Estimated Population of Threatened or Endangered Species

No federally listed threatened and endangered species and/or habitat were identified on the affected land.

5. Effect of Proposed Operation on Existing Wildlife

Impacts on wildlife use from the proposed project would include direct temporary elimination of potential habitat within the affected area during mining, and temporary localized displacement associated with additional noise and lighting from the proposed project. This localized loss of habitat would not disrupt regional migration or significant movement patterns and would not threaten the overall health and viability of a species. Additionally, critical habitat, critical winter range, and calving areas will not be affected as these resources are not present within the affected area. Nearby lands are also disturbed for various uses, and as such the Lockhart Pit expansion will not be of a significant impact on area wildlife habitat.

The affected area will be fully reclaimed at the conclusion of mining which will restore some degree of wildlife habitat over time. Timely reclamation will also help to reduce the total impact to wildlife. The proposed reclaimed land use is the same as it was prior to mining, therefore the wildlife habitat potential of the site will not be fundamentally changing.

6. Impacts to Fish

Mining will not take place in any water ways or natural lakes where fish may be present. Surface water controls will protect offsite drainages and potential downstream fish habitats from sediment discharges.

7. Fencing

Fencing exists at the property perimeter as part of agricultural uses. No additional fencing will be built as part of mining or reclamation operations.

EXHIBIT I SOILS INFORMATION

1. General

A soil report was generated using the United States Department of Agriculture's NRCS Web Soil Survey (WSS)[3] and is included in this exhibit as Appendix I-1 at the end of this exhibit. The WSS provides soil data and information produced by the National Cooperative Soil Survey. The majority of the soil on the property is Levitt loam and Tine gravelly sandy loam. Soils are mapped on Map C-1.

2. Suitability for Reclamation Revegetation

The two soil types provide up to 12 inches of suitable material for revegetation. Neither are considered prime farmland according to the NRCS survey. However, they are suitable for the post mine land use of dry rangeland. The A-horizon of the soil profile was used as the basis for determining the topsoil stripping depth during mining operations.

[3] https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

Appendix I-1 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 Grand County Area, Colorado

Bumgarner

November 27, 2023

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

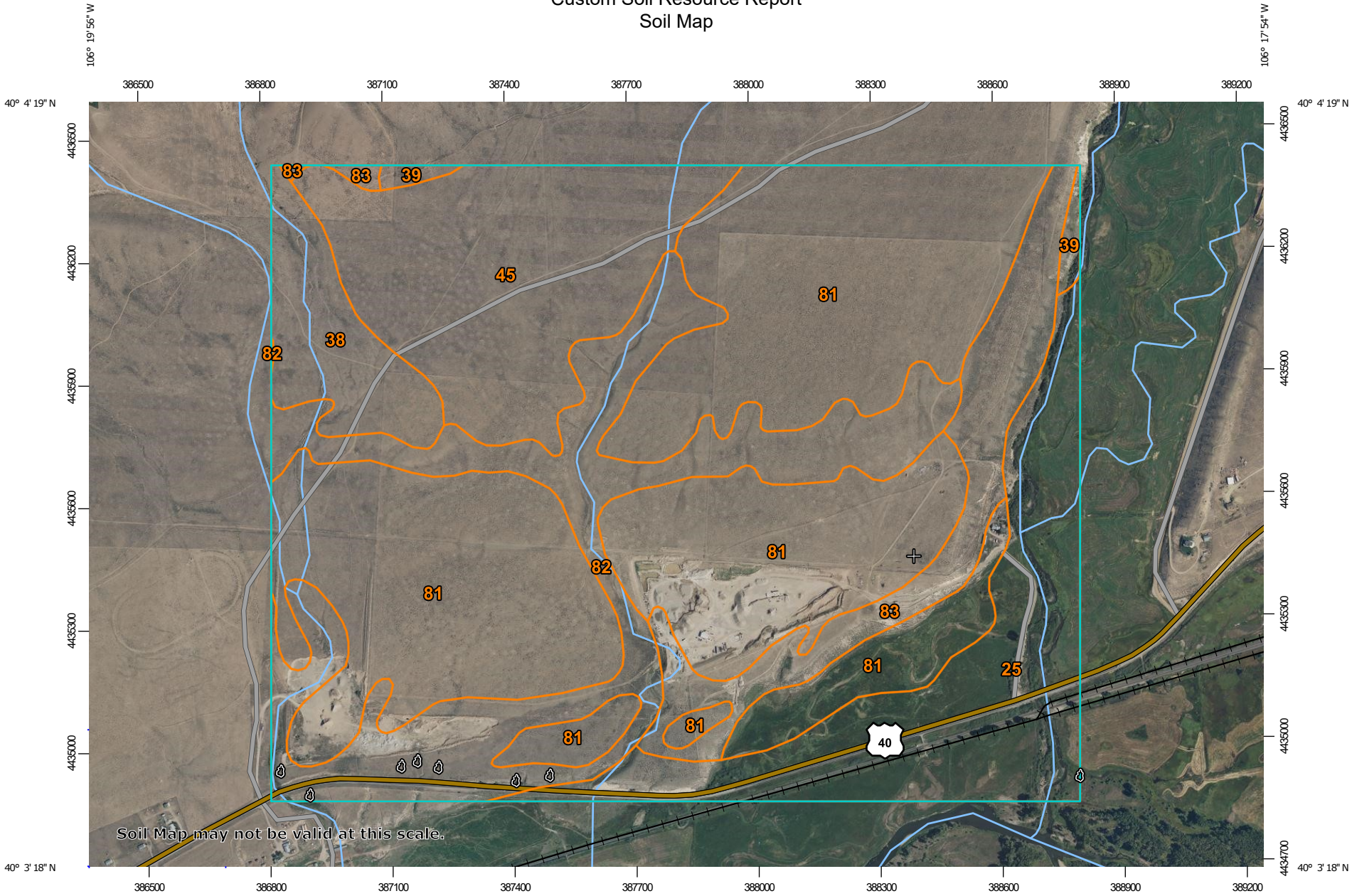
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:13,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N 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: Grand County Area, Colorado
Survey Area Data: Version 17, Aug 23, 2023

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

Date(s) aerial images were photographed: Jul 2, 2021—Aug 25, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
25	Cumulic Cryaquolls, nearly level	103.4	13.5%
38	Harsha loam, 6 to 15 percent slopes	35.2	4.6%
39	Harsha loam, 15 to 50 percent slopes, eroded	4.6	0.6%
45	Leavitt loam, 0 to 6 percent slopes	107.7	14.0%
81	Tine gravelly sandy loam, 0 to 3 percent slopes	342.4	44.6%
82	Tine cobbly sandy loam, 3 to 15 percent slopes	121.0	15.7%
83	Tine cobbly sandy loam, 15 to 55 percent slopes	54.2	7.1%
Totals for Area of Interest		**768.6**	**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.

Grand County Area, Colorado

25—Cumulic Cryaquolls, nearly level

Map Unit Setting

National map unit symbol: jq1m
Elevation: 7,500 to 8,500 feet
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 30 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Cumulic Cryaquolls

Setting

Landform: Flood plains
Landform position (three-dimensional): Dip, rise, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium and/or alluvial outwash

Typical profile

H1 - 0 to 20 inches: variable
H2 - 20 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 6.00 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): 6w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Cryaquolls

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Histic cryaquolls

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

38—Harsha loam, 6 to 15 percent slopes

Map Unit Setting

National map unit symbol: jq22
Elevation: 7,500 to 8,500 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 37 to 42 degrees F
Frost-free period: 35 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Harsha

Setting

Landform: Terraces, fans, mountainsides
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Local alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 5 inches: loam
H2 - 5 to 40 inches: clay loam
H3 - 40 to 60 inches: 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: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R048BY231CO - Dry Mountain Loam
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent
Hydric soil rating: No

39—Harsha loam, 15 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: jq23
Elevation: 7,500 to 8,500 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 37 to 42 degrees F
Frost-free period: 35 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Harsha, Eroded

Setting

Landform: Fans, mountainsides
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Local alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 2 inches: loam
H2 - 2 to 37 inches: clay loam
H3 - 37 to 60 inches: loam

Properties and qualities

Slope: 15 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 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: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R048BY235CO - Dry Exposure
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent
Hydric soil rating: No

45—Leavitt loam, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2tz4p
Elevation: 7,460 to 9,020 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 37 to 42 degrees F
Frost-free period: 30 to 75 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Leavitt

Setting

Landform: Colluvial aprons
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from sedimentary rock

Typical profile

A - 0 to 7 inches: loam
AB - 7 to 12 inches: loam
Bt - 12 to 26 inches: gravelly clay loam
Btk - 26 to 33 inches: clay loam
CBk - 33 to 59 inches: clay loam

Properties and qualities

Slope: 0 to 6 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 (0.21 to 0.71 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R048AY228CO - Mountain Loam
Hydric soil rating: No

Minor Components

Lymanson

Percent of map unit: 10 percent
Landform: Colluvial aprons
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R048AY228CO - Mountain Loam
Hydric soil rating: No

Tine

Percent of map unit: 5 percent

81—Tine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: jq3m
Elevation: 7,500 to 8,500 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 37 to 42 degrees F
Frost-free period: 35 to 75 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Tine

Setting

Landform: Terraces, fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium outwash

Typical profile

H1 - 0 to 14 inches: gravelly sandy loam
H2 - 14 to 23 inches: very cobbly loamy sand
H3 - 23 to 60 inches: extremely bouldery sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: R048BY231CO - Dry Mountain Loam
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent
Hydric soil rating: No

82—Tine cobbly sandy loam, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: jq3n
Elevation: 7,500 to 8,500 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 37 to 42 degrees F
Frost-free period: 35 to 75 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Tine

Setting

Landform: Terraces, fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium outwash

Typical profile

H1 - 0 to 14 inches: cobbly sandy loam
H2 - 14 to 23 inches: very cobbly loamy sand
H3 - 23 to 60 inches: extremely bouldery sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R048BY231CO - Dry Mountain Loam
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent
Hydric soil rating: No

83—Tine cobbly sandy loam, 15 to 55 percent slopes

Map Unit Setting

National map unit symbol: jq3p
Elevation: 7,500 to 8,500 feet
Mean annual precipitation: 11 to 14 inches

Mean annual air temperature: 37 to 42 degrees F
Frost-free period: 35 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Tine

Setting

Landform: Breaks
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Alluvium outwash

Typical profile

H1 - 0 to 14 inches: cobbly sandy loam
H2 - 14 to 60 inches: very cobbly loamy sand

Properties and qualities

Slope: 15 to 55 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R048BY231CO - Dry Mountain Loam
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent
Hydric soil rating: No

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EXHIBIT J VEGETATION INFORMATION

1. Existing Vegetation Community

The existing plant communities at the Lockhart Pit consist of one main type: dry rangeland. The rangeland community consists of various western grasses and forbs. An ephemeral drainage divides the mining area into two pods. The local rangeland vegetation communities are shown in the figure below.

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Figure 2 – Typical rangeland vegetation

The rangeland vegetation includes rabbitbrush, mountain brome, rocky mountain fescue, western wheatgrass and other species common in this region. Sagebrush and other small shrubs can be found scattered throughout the site. Vegetation cover ranges from 40-70%. Most species top out at 8-12 inches in height.

The vegetation community is consistent across the site, being the same for each soil type found onsite as well.

2. Production & Carrying Capacity

The following annual average production and carrying capacity data was derived from the NRCS Web Soil Survey. The site is not currently used, nor will be used after reclamation for grazing. The average range production in the areas that will be disturbed and reclaimed are as follows:

Average Annual Range Production (Normal Year):

- East Pod & West Pod fields: 1550 pounds per acre per year

EXHIBIT K CLIMATE INFORMATION

The climate at the Lockhart Pit is consistent with climate data of Kremmling, CO just 2.7 miles west of the site. The pit elevation is approximately 7420 feet above sea level. The climate of Kremmling, CO and surrounding areas is defined as a Continental Subarctic Climate by the Koppen Climate Classification system. This climate type is characteristically dominated by long, cold winters with occasional precipitation of mostly snow. Mean temperatures throughout the year are sub-freezing for six to eight months. Summers are short and dry with mild temperatures in the area. The typical growing season is approximately 80 days. Prevailing winds are typically from the west. Table K-1 summarized the Kremmling, CO climate data based on records from 1908-2016[4].

Table K-1 Climate Data of Kremmling, Colorado, approximately 2.7 miles west of the Lockhart Pit

	Average Temperature (F)		Average Precipitation (in)	
	Maximum	**Minimum**	**Total precip.**	**Total snow**
January	28.3	-0.5	0.79	10.6
February	32.1	2.0	0.55	8.5
March	43.0	15.0	0.67	7.0
April	54.2	23.6	0.94	4.4
May	64.3	30.9	1.26	1.0
June	75.1	37.2	1.06	0.1
July	81.5	43.6	1.44	0.0
August	79	41.7	1.53	0.0
September	71.8	32.7	1.15	0.1
October	59.9	22.7	0.9	2.6
November	42.3	12.7	0.74	7.1
December	29.7	1.7	0.83	10.0
Yearly (avg)	**55.1**	**21.9**	**11.9**	**51.6**

[4] Western Regional Climates Center. Kremmling, CO (054664) Station. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?co4664

EXHIBIT L RECLAMATION COSTS

The Lockhart Pit will have a bond to cover the worst-case reclamation scenario. Prior to opening the first proposed pod. The worst-case reclamation scenario will occur at the end of mine life when the West Pod requires final reclamation. Concurrent reclamation means that the East Pod will be reclaimed and that only the last 10 acres of disturbance and final high wall need reclaiming in the West Pod.

Reclamation at this stage will include backfilling and grading the final mine slopes. Final topsoiling and vegetation planting will be required on the final 10 acres of the West Pod. As the operation will not contain any processing area or facilities, no structures will need to be removed.

A detailed breakdown of the reclamation cost is shown in Table L-1.

Table L-1 East Pod Reclamation Bond Calculation

Description	Material Quantity	Unit	Unit Cost	Cost
West Pod highwall backfilling and grading.	12,000	CY	$1.50	$18,000
Topsoiling and grading 12 inches deep the disturbed area of 10 acres total.	16,133	CY	$1.50	$24,200
Discing of topsoil to a depth of 12 inches over 10 acres.	10	acres	$250	$2,500
Seeding of 10 acre disturbance area. Assume a 25% failure rate via the unit cost.	10	acres	$325	$3,250
Mulching and crimping of mulch over 10 acre disturbance area	10	acres	$1000	$10,000
Weed control management for two years.	N/A	N/A	$750	$1200
Subtotal				$59,150
DRMS cost (28%)				$16,562
Total				**$**75,712

* Labor to complete each task is included in each unit cost.

EXHIBIT M OTHER PERMITS REQUIRED

The following permits are necessary to authorize operations at the Lockhart Pit. All necessary permits will be secured for the operation of the Lockhart Pit.

1. Grand County Land Use Permit
2. NPDES storm water discharge permit.
3. APEN – A fugitive air emissions permit is needed from the Colorado Department of Public Health and Environment
4. Spill Prevention Control and Countermeasure (SPCC) Plan

EXHIBIT N RIGHT OF ENTRY

RECEPTION#: 2023007538, 11/01/2023 at 10:13:25 AM, 1 OF 1, R$13.00, , , Jolene S. Linke, Grand County Clerk and Recorder, Colorado

QUITCLAIM DEED

THIS DEED is dated November, 1ST, 2023, and is made between GARY W. BUMGARNER and JENNIFER L. BUMGARNER, the "Grantors," and MICHAEL A. LOCKHART and CHRISTINA L. LOCKHART, the "Grantees," whose legal address is P.O. Box 223, Kremmling, CO 80459.

WITNESS, that the Grantors, for good and valuable consideration (less than $500.00), the receipt and sufficiency of which is hereby acknowledged, do hereby remise, release, sell and QUITCLAIM unto the Grantees, and the Grantees' heirs and assigns, forever, not in tenancy in common but **in joint tenancy**, all the right, title, interest, claim and demand which the Grantors have in and to the real property, together with any improvements thereon, located in the County of Grand, State of Colorado, described as follows:

Township 1 North, Range 80 West of the 6th P.M.
Section 11: N1/2SE1/4, S1/2NE1/4

TO HAVE AND TO HOLD the same, together with all and singular the appurtenances and privileges thereunto belonging, or in anywise thereunto appertaining, and all the estate, right, title, interest and claim whatsoever of the Grantors, either in law or equity, to the only proper use, benefit and behoof of the Grantees, and the Grantees' heirs and assigns, forever.

IN WITNESS WHEREOF, the Grantor has executed this deed on the date set forth above.

Gary W. Bumgarner

Gary W. Bumgarner

Nov 1, 2023

Date

Jennifer L. Bumgarner

Jennifer L. Bumgarner

Nov. 1, 2023

Date

STATE OF COLORADO)
) ss.
County of Grand)

The foregoing instrument was acknowledged before me this 1ST day of November, 2023, by Gary W. Bumgarner and Jennifer L. Bumgarner.

Witness my hand and official seal.
My commission expires:

CATHERINE E. TROTTER
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20224028101
MY COMMISSION EXPIRES 07/20/2026

Catherine E Trotter

Notary Public

July 27, 2024

Gary Bumgarner (Bumgarner), owner of parcel 1441-122-00-007 in Grand County, Colorado, location of the Bumgarner Ranches Gravel Pit (Mined Land Reclamation Board Permit ID M-1980-027) , and his heirs, designees, and beneficiaries, hereby give Christina and Michael Lockhart (Lockhart), the owners of parcel 1441-122-00-011, home of the Lockhart Pit (Mined Land Reclamation Board Permit ID M-2024-017), and their heirs, designees, and beneficiaries, the right to access, cross, or in any other manner use the Bumgarner owned parcel for the purpose of mining and reclamation activities on the Lockhart owned parcel. Road will be maintained in current condition and alignment at a current speed of 15 miles per hour.

Gary Bumgarner — Gary Bumgarner

July 27, 2024 — Date

EXHIBIT O OWNERS OF AFFECTED LAND AND MINERAL TO BE MINED

The owner(s) of record of affected land (surface area) and owners of substance to be mined are Michael and Christina Lockhart.

EXHIBIT P MUNICIPALITIES WITHIN TWO MILES

No municipalities are located within two miles. Kremmling, CO is 2.7 miles away.

EXHIBIT Q PROOF OF MAILING OF NOTICES TO THE BOARD OF COUNTY COMMISSIONERS AND SOIL CONSERVATION DISTRICT

Notices were filed with the Routt County Board of Commissioners and the Routt County Conservation District in support of this permit application.

Board of County Commissioners
P.O. Box 264
Hot Sulphur Springs, CO 80451

Middle Park Conservation District
PO Box 265
106 S. 2nd St
Kremmling, CO 80459

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 4834 9624 20

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 4834 9624 00

ARTICLE ADDRESS TO:

Grand County BOCC
308 E Byers Ave
Hot Slphr Spr CO 80451

FEES

Postage per piece	$0.640
Certified Fee	$4.400
Return Receipt Fee	$3.650
Total Postage & Fees:	**$8.690**

TOWNER POST OFFICE
APR 10 2024
AURORA, CO. 80015

Postmark Here

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 4834 9527 42

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 4834 9527 84

ARTICLE ADDRESS TO:

Middle Park Conservation District
PO Box 265
Kremmling CO 80459-0265

FEES

Postage per piece	$0.640
Certified Fee	$4.400
Return Receipt Fee	$3.650
Total Postage & Fees:	**$8.690**

TOWNER POST OFFICE
APR 10 2024
AURORA, CO. 80015

Postmark Here

EXHIBIT R PROOF OF FILING WITH COUNTY CLERK

A return receipt from the Grand County Clerk & Recorder is attached.

Grand County Clerk and Recorder Office
P.O. Box 120
Hot Sulphur Springs, CO 80451

EXHIBIT S
PERMANENT MAN-MADE STRUCTURES

All man-made structures are listed and shown on Map C-1. Landowner boundaries can also be found on Map C-1. Proof of delivery of structure agreements is attached to this exhibit. If a structure agreement is unobtainable, defer to the Geotechnical Stability Exhibit which indicates that all structures will be protected.

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9415 5118 9956 4456 8423 03

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 4456 8423 95

FEES

Postage per piece	$2.960
Certified Fee	$4.400
Return Receipt Fee	$3.650
Total Postage & Fees:	**$11.010**

ARTICLE ADDRESS TO:

Gary & Jennifer Bumgarner
PO Box 276
Kremmling CO 80459

TOWER POST OFFICE
JUN 07 2022
AURORA, CO. 80015
Postmark Here

USPS TRACKING #
DENVER CO 802
9490 9118 9956 4456 8423 95

First-Class Mail
Postage & Fees Paid
USPS
Permit No.G-10

UNITED STATES POSTAL SERVICE

PS Form 3811 Facsimile, July 2015 (SDC 3930)

Benjamin Langenfeld
Lewicki & Associates
4654 S Espana St
Centennial CO 80015-5819

RULE 1.6.2(1)(B)

Prior to the submittal of the application, a sign was erected at the entrance to the site that contains the required information dictated by Rule 1.6.2(1)(b).

Please see attached sign certification.

NOTICE

This site is the location of a proposed construction materials operation. Kremmling All Seasons Rentals LLC, whose address and phone number is 101 West Park Avenue, Kremmling, Colorado 80459, (970) 531-8529, has applied for a Reclamation Permit with the Colorado Mined Land Reclamation Board. Anyone wishing to comment on the application may view the application at the Grand County Clerk and Recorder's Office at 308 Byers Ave, Hot Sulphur Springs, Colorado 80541, and should send comments prior to the end of the public comment period to the Division of Reclamation, Mining, and Safety, 1313 Sherman St, Room 215, Denver, Colorado 80203.

Certification:

I, Mitch Lockhart, hereby certify that I posed a sign containing the above notice for the proposed permit area known as the Lockhart Mine, on (date) 4/24/2024.

Mitch Lockhart

SIGNATURE

5/7/2024

DATE

RULE 6.5: GEOTECHNICAL STABILITY EXHIBIT

There are no known geologic hazards on the proposed site. Based on a slope stability analysis, buildings or other structures within 200' of the Lockhart Pit mining area will not be affected by mining excavation. Sufficient buffers will be maintained to neighboring property lines. Maps C-2 and F-1 shows these buffers. Map C-3 shows the mining and reclamation slopes of the mine. A standardized mining and reclaimed slope was analyzed for stability based on the maximum depth of sand and gravel. No overburden is anticipated to be found onsite.

The material properties are derived from Table 2.5 in the SME Mining Reference Handbook[5], as there is no site-specific sample data of the material available. Therefore, all materials are matched to a classification from this table that best matches the materials in terms of description. The native alluvial material is best classified as sand and gravel with a mixed grain size. From the SME table, sand and gravel with a mixed grain size has an internal angle of friction of 45 degrees and no cohesion.

The final mining (2H:1V), final reclamation (3H:1V), and active highwall (near vertical) slopes were analyzed. Mining will be conducted at the active highwall angle until the highwall has reached the half-way point of the final mining slope. Then the vertical active highwall slope will be knocked down to the final mining slope of 2H:1V. Then, the mining slope at 2H:1V it will be backfilled with to the final reclamation slope of 3H:1V.

1. Mining and Reclamation Slopes

Factor of Safety is expressed in terms of strength divided by stress as a ratio. It is arrived at by an iterative computer process where a slope failure is assumed, the strength and stress of that slope failure are calculated, and those values are compared to determine a lowest factor of safety. In the case of the Lockhart Pit slope stability analysis, the Bishop's Method of Slices was the iterative calculation used, and the software GALENA was used to model slopes and calculate the factor of safety. Since both pods onsite will be mining and reclaiming the same deposit a single, standardized slope can be used to evaluate the slope stability at the Lockhart Pit.

Figure GS-1 shows the standardized slopes evaluated in GALENA: the full mining slope and the permanent reclaimed slope.

The lowest factor of safety for permanent slopes was 3.03 at Final Reclamation. The distance between the closest slope edge or failure circle and the nearest structure is shown Table GS-1.

GALENA data tables and analysis result figures are attached as Appendix GS-1.

[5] Original source: Houk and Bray 1977

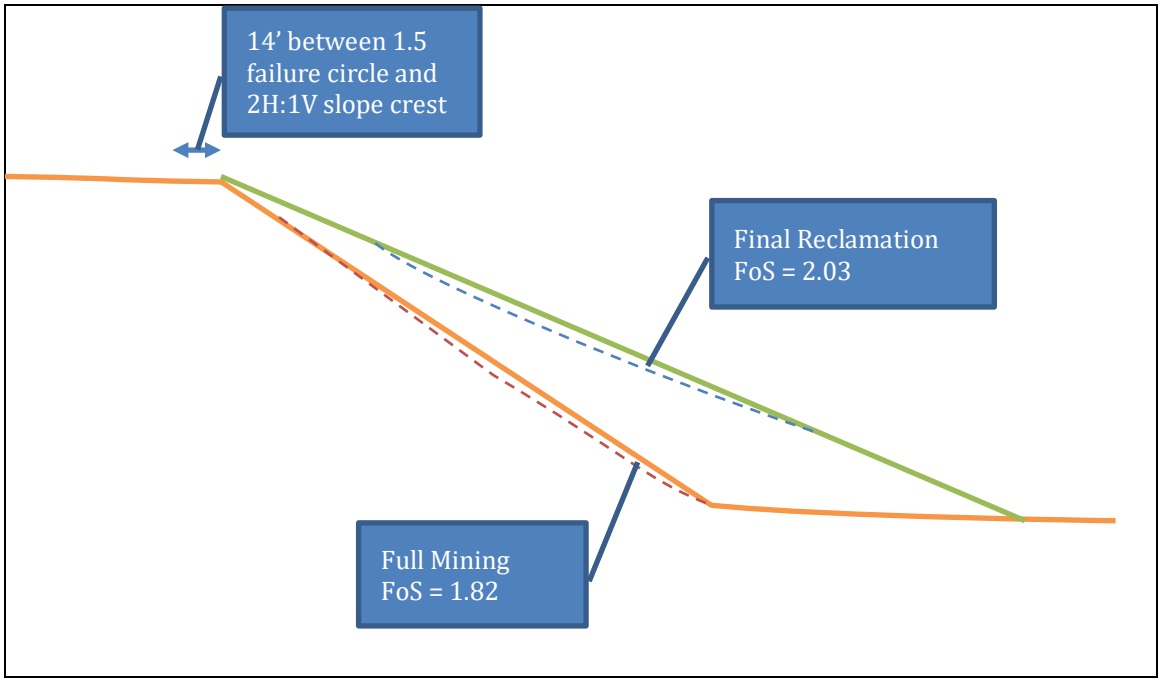


Figure GS-1. Slope Stability Analysis Results

Table GS-1. Factors of Safety for Slope Stability

Slope Condition	Lowest Factor of Safety	Distance from Failure Circle to Nearest Structure
Full Mining	2.00	Roughly 100-ft to the property line, where a fence is.
Final Reclamation	3.01	Roughly 100-ft to the property line, where a fence is.

3. Conclusion

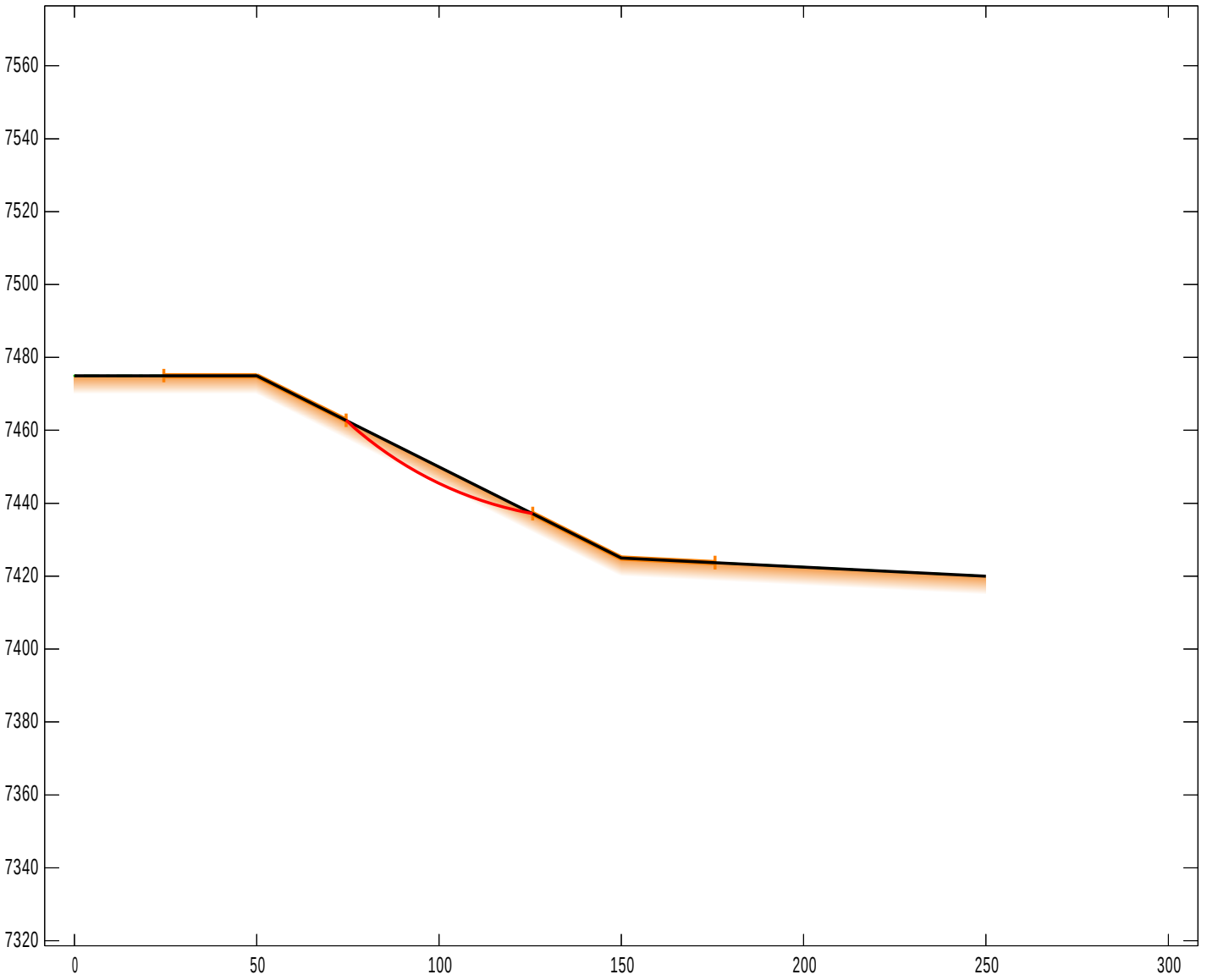
The Full Mining and Final Reclamation slopes both have a minimum factor of safety (FoS) of greater than 1.5. The failure circles of these slopes at their lowest FoS are within the disturbance area of the pit. No failure circle reaches the permit boundary or offsite structures.

The slope stability analysis in this permit has been prepared according to appropriate engineering standards and practices.

Ben Langenfeld, P.E.

P.E.# 0047151

APPENDIX GS-1 GALENA INFORMATION



GALENA Version 7.1

Licensed to: Greg Lewicki and Associates

Material Keys

1: Sand and gravel, mixed grain size

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 2.08

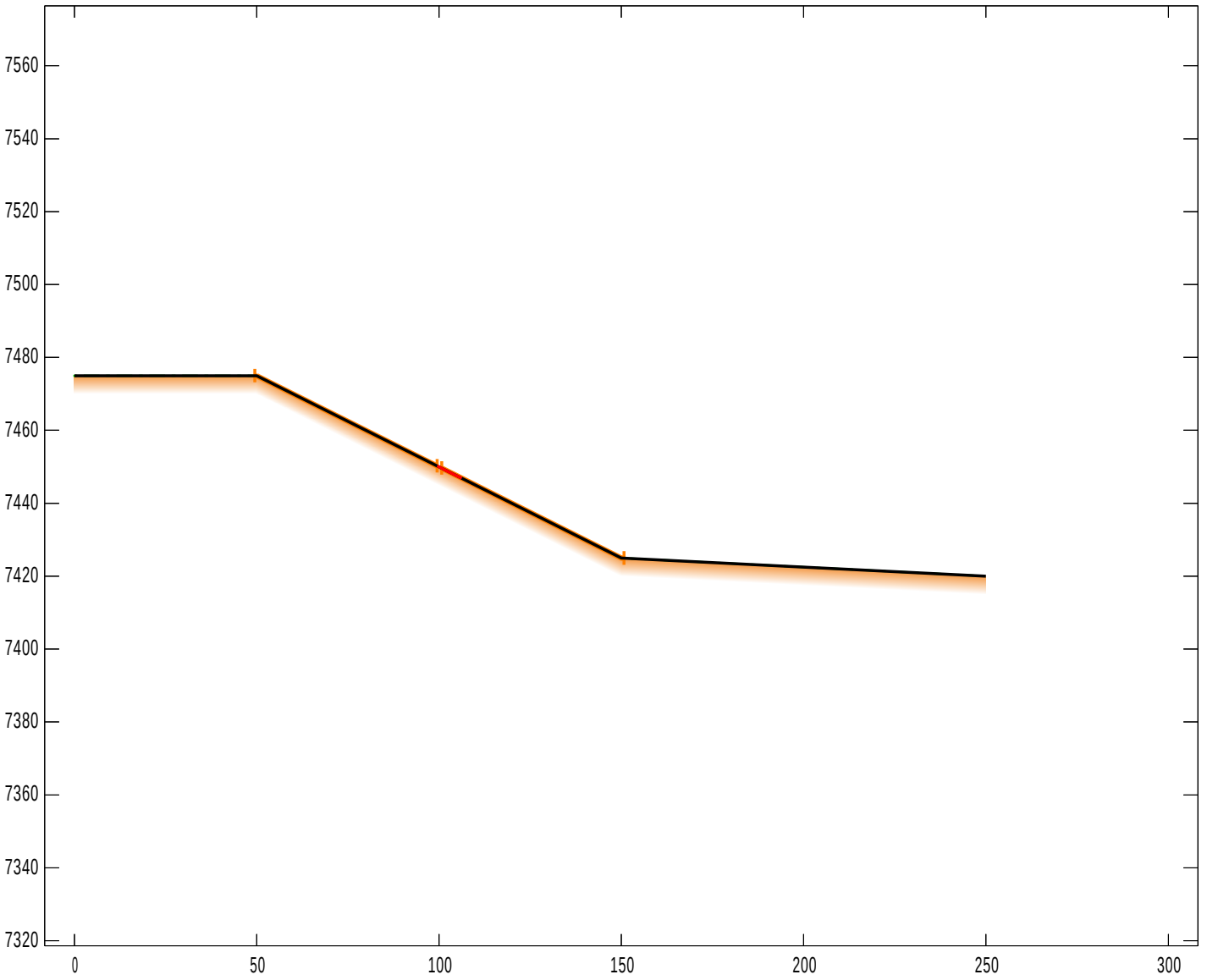
Edited: 4 Mar 2024

Processed: 4 Mar 2024

Project Lockhart Mining and Reclamation Slope
Mining Slope

File: G:\benl_000\Documents\Modl1.gmf

Lewicki & Associates



GALENA Version 7.1

Licensed to: Greg Lewicki and Associates

Material Keys

1: Sand and gravel, mixed grain size

Analysis 2

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular (Critical Seed)

Results

Critical Factor of Safety: 2.00

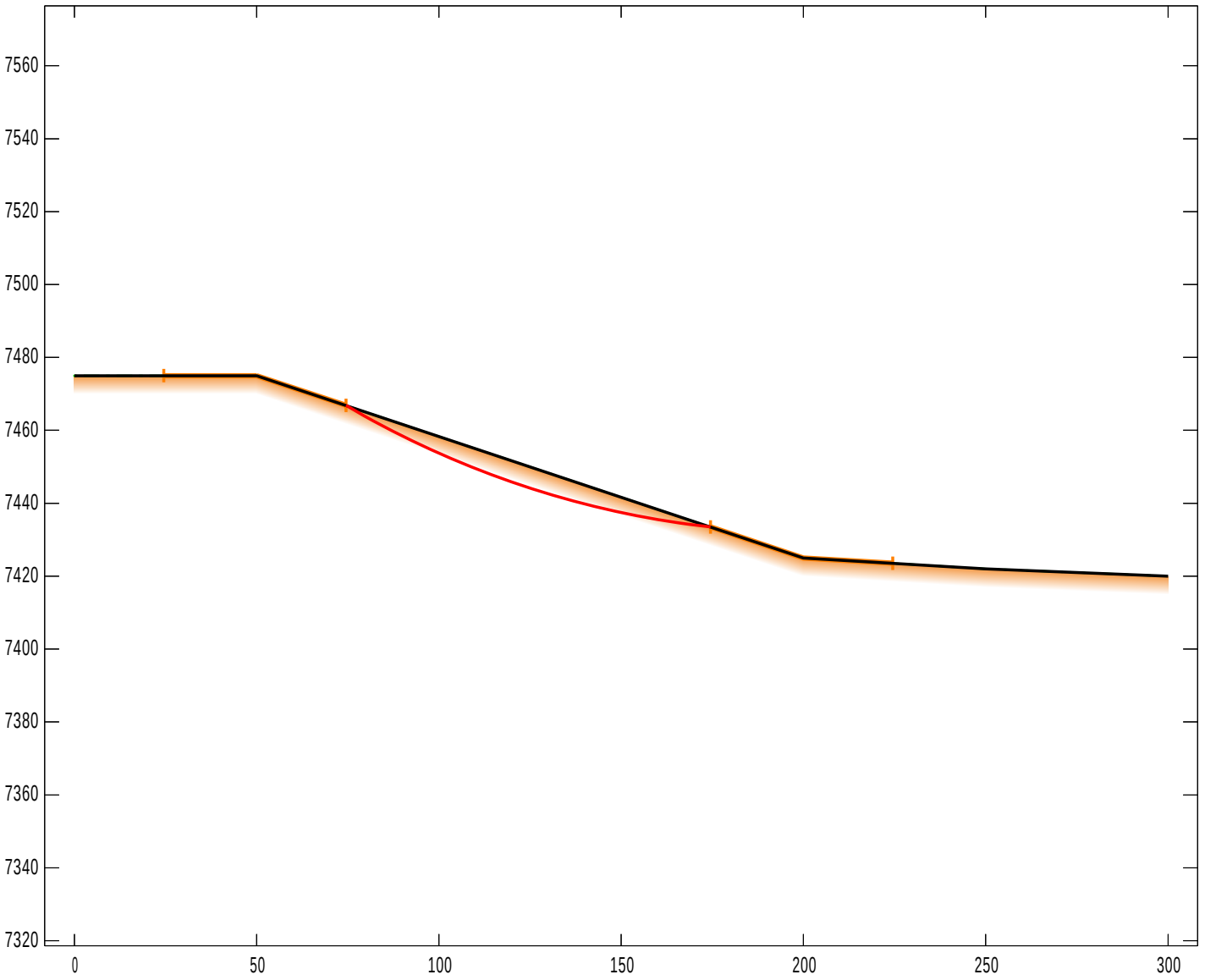
Edited: 4 Mar 2024

Processed: 4 Mar 2024

Project Lockhart Mining and Reclamation Slope
Mining Slope

File: G:\benl_000\Documents\Modl1.gmf

Lewicki & Associates



GALENA Version 7.1

Licensed to: Greg Lewicki and Associates

Material Keys

1: Sand and gravel, mixed grain size

Analysis 3

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 3.06

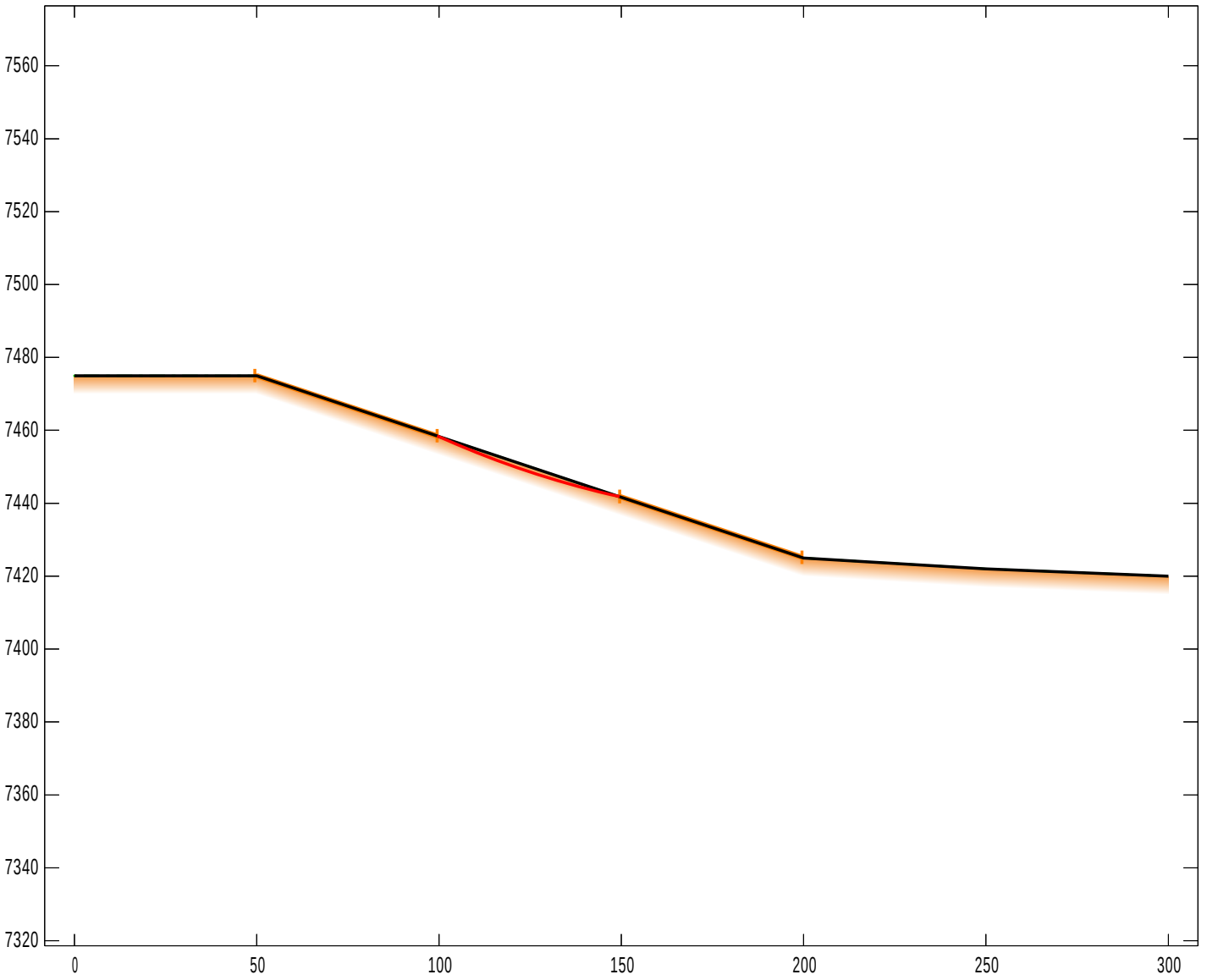
Edited: 4 Mar 2024

Processed: 4 Mar 2024

Project Lockhart Mining and Reclamation Slope
Reclaimed Slope

File: G:\benl_000\Documents\Modl1.gmf

Lewicki & Associates



GALENA Version 7.1

Licensed to: Greg Lewicki and Associates

Material Keys

1: Sand and gravel, mixed grain size

Analysis 4

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular (Critical Seed)

Results

Critical Factor of Safety: 3.01

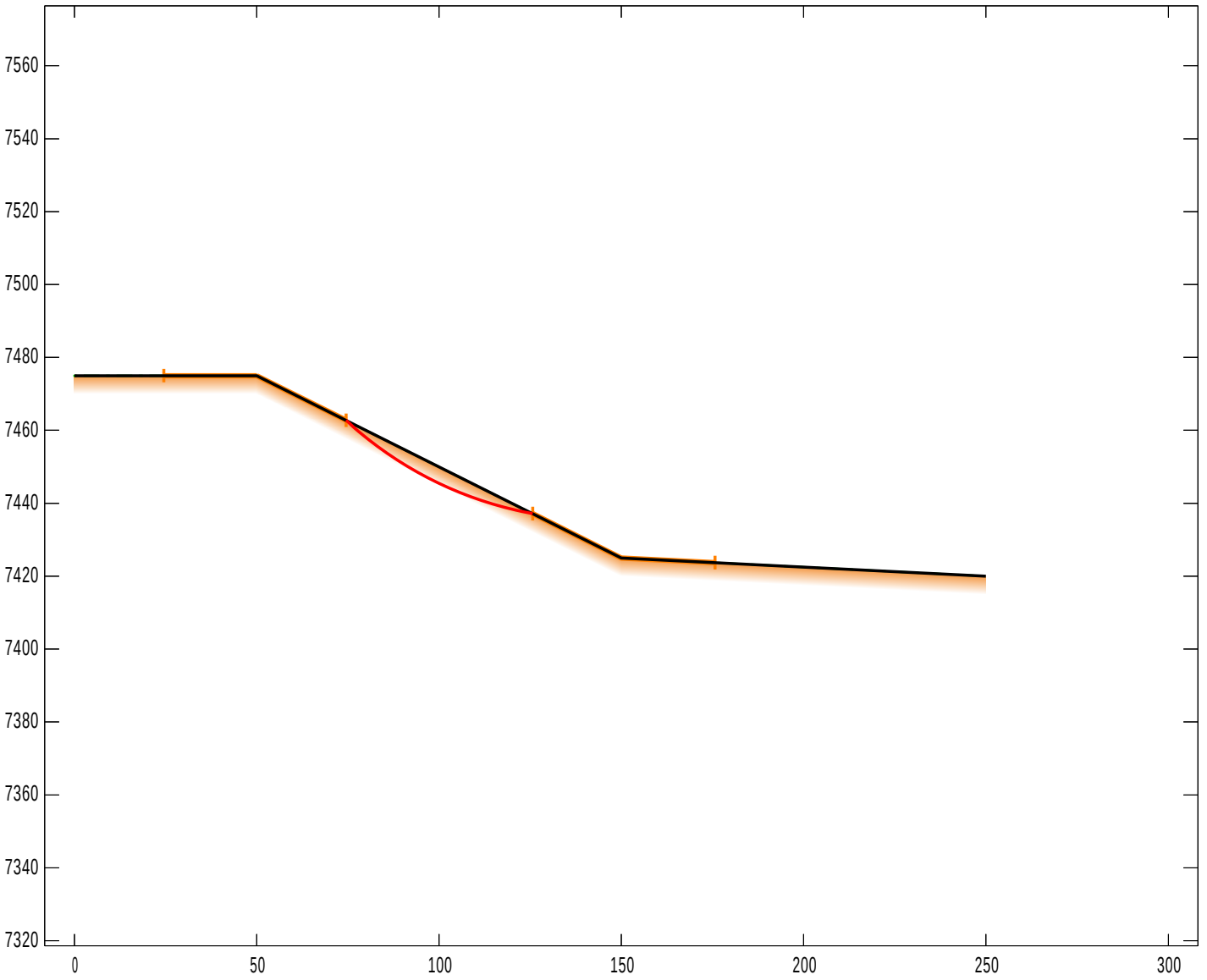
Edited: 4 Mar 2024

Processed: 4 Mar 2024

Project Lockhart Mining and Reclamation Slope
Reclaimed Slope

File: G:\benl_000\Documents\Modl1.gmf

Lewicki & Associates



GALENA Version 7.1

Licensed to: Greg Lewicki and Associates

Material Keys

1: Sand and gravel, mixed grain size

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 2.08

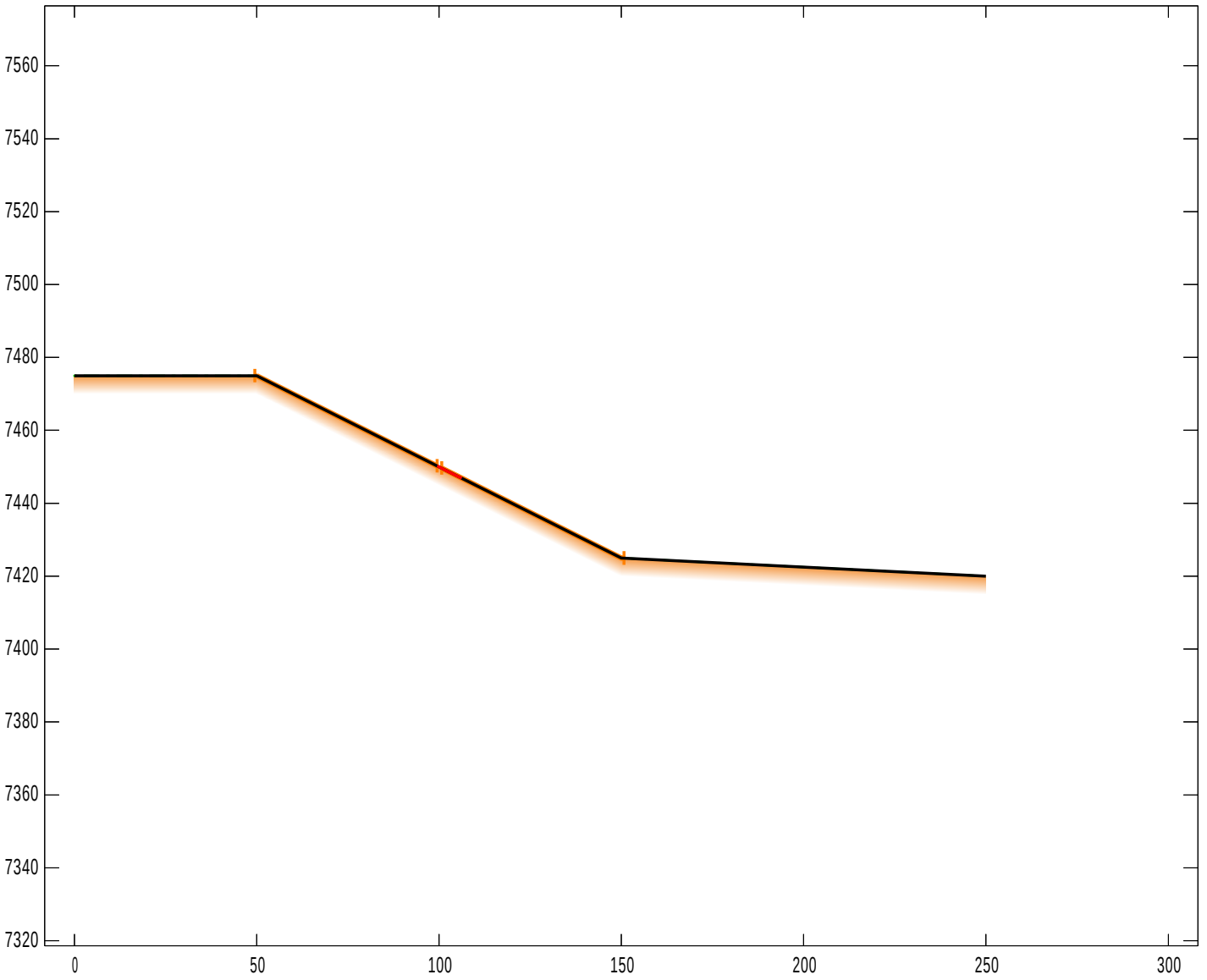
Edited: 4 Mar 2024

Processed: 4 Mar 2024

Project Lockhart Mining and Reclamation Slope
Mining Slope

File: G:\benl_000\Documents\Modl1.gmf

Lewicki & Associates



GALENA Version 7.1

Licensed to: Greg Lewicki and Associates

Material Keys

1: Sand and gravel, mixed grain size

Analysis 2

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular (Critical Seed)

Results

Critical Factor of Safety: 2.00

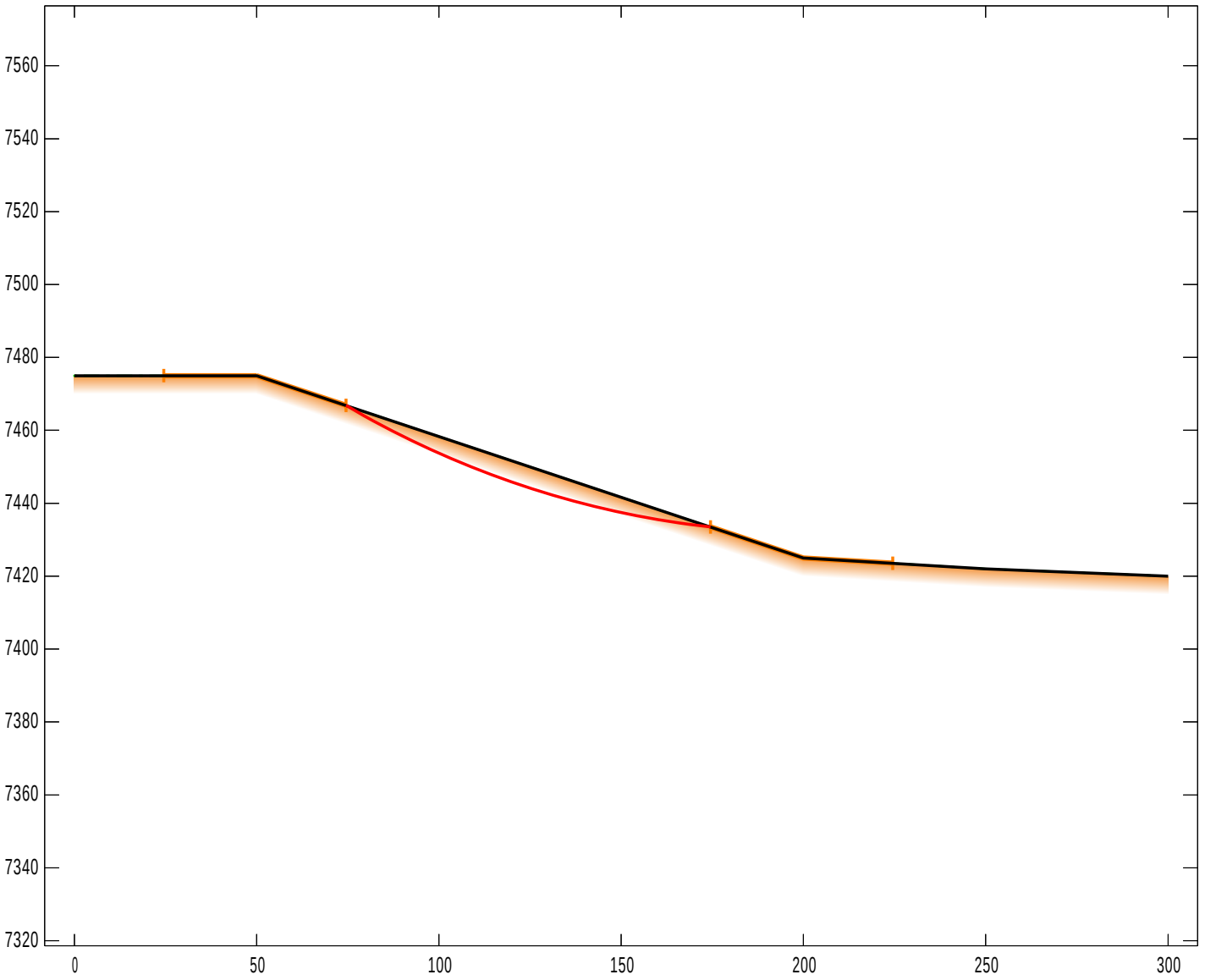
Edited: 4 Mar 2024

Processed: 4 Mar 2024

Project Lockhart Mining and Reclamation Slope
Mining Slope

File: G:\benl_000\Documents\Modl1.gmf

Lewicki & Associates



GALENA Version 7.1

Licensed to: Greg Lewicki and Associates

Material Keys

1: Sand and gravel, mixed grain size

Analysis 3

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 3.06

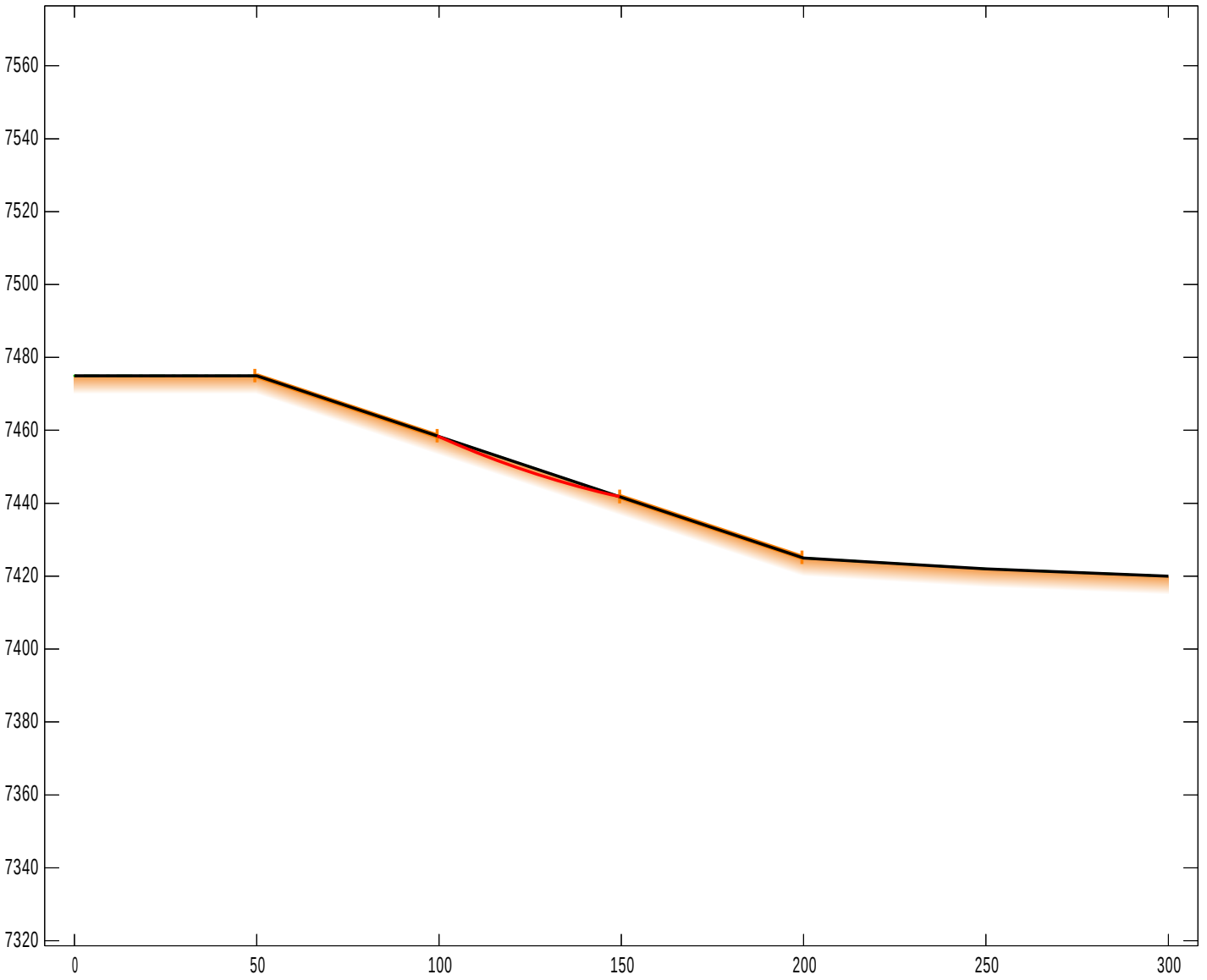
Edited: 4 Mar 2024

Processed: 4 Mar 2024

Project Lockhart Mining and Reclamation Slope
Reclaimed Slope

File: G:\benl_000\Documents\Modl1.gmf

Lewicki & Associates



GALENA Version 7.1

Licensed to: Greg Lewicki and Associates

Material Keys

1: Sand and gravel, mixed grain size

Analysis 4

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular (Critical Seed)

Results

Critical Factor of Safety: 3.01

Edited: 4 Mar 2024

Processed: 4 Mar 2024

Project Lockhart Mining and Reclamation Slope
Reclaimed Slope

File: G:\benl_000\Documents\Modl1.gmf

Lewicki & Associates

GALENA 7.1 Analysis Results Version: 7.10.1.04 Licensee: Greg Lewicki and Associates

Project: Lockhart Mining and Reclamation Slope
File: G:\ben1_000\Documents\Modl1.gmf Processed:
04 Mar 2024 16:52:31

DATA: Analysis 1 - Mining Slope

Material Properties (2 materials)

Material: 1 (Mohr-Coulomb Isotropic) - Sand and gravel, mixed grain size

Cohesion	Phi	UnitWeight	Ru
0.00	45.0	110.00	Auto

Material: 2 (Mohr-Coulomb Isotropic) - Loose sand, mixed grain size

Cohesion	Phi	UnitWeight	Ru
0.00	34.0	99.00	Auto

Water Properties

Unit weight of water: 62.400 Unit weight of water/medium above ground: 0.000

Material Profiles (1 profile)

Profile: 1 (2 points) Material beneath: 1 - Sand and gravel, mixed grain size

0.00	7475.00	300.00	7475.00

Slope Surface (4 points)

0.00	7475.00	50.00	7475.00	150.00	7425.00	250.00	7420.00

Phreatic Surface (2 points)

0.00	7300.00	300.00	7300.00

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R

Intersects:	XL:	49.50	YL:	7475.00	XR:	150.70	YR: 7424.96
Centre:	XC:	136.68	YC:	7523.98	Radius:	R:	100.00

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	50.00	50.00	5.00
Trial positions within range:	10	10	5

- -

RESULTS: Analysis 1 - Mining Slope

Bishop Simplified Method of Analysis - Circular Failure Surface

Critical Failure Surface Search using Multiple Circle Generation Techniques

Factor of Safety for initial failure surface approximation: 2.386

There were: 501 successful analyses from a total of 501 trial surfaces

Critical (minimum) Factor of Safety: 2.08

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	74.50	7462.75	125.70	7437.15	144.12	7537.98	102.50	2.081	<-- Critical Surface
2	74.50	7462.75	125.70	7437.15	143.53	7536.82	101.25	2.083	
3	74.50	7462.75	125.70	7437.15	142.95	7535.65	100.00	2.085	
4	74.50	7462.75	125.70	7437.15	142.37	7534.48	98.75	2.088	
5	74.50	7462.75	125.70	7437.15	141.78	7533.31	97.50	2.090	
6	74.50	7462.75	131.26	7434.37	146.47	7535.74	102.50	2.101	
7	68.94	7465.53	125.70	7437.15	140.91	7538.52	102.50	2.101	
8	74.50	7462.75	131.26	7434.37	145.88	7534.56	101.25	2.103	
9	68.94	7465.53	125.70	7437.15	140.32	7537.34	101.25	2.103	
10	74.50	7462.75	131.26	7434.37	145.29	7533.38	100.00	2.106	
11	68.94	7465.53	125.70	7437.15	139.73	7536.16	100.00	2.106	
12	68.94	7465.53	125.70	7437.15	139.14	7534.98	98.75	2.109	

13	74.50	7462.75	131.26	7434.37	144.70	7532.20	98.75	2.109
14	74.50	7462.75	131.26	7434.37	144.11	7531.02	97.50	2.112
15	68.94	7465.53	125.70	7437.15	138.55	7533.80	97.50	2.112
16	63.39	7468.31	125.70	7437.15	137.66	7538.95	102.50	2.123
17	68.94	7465.53	131.26	7434.37	143.21	7536.17	102.50	2.123
18	74.50	7462.75	136.81	7431.59	148.77	7533.39	102.50	2.123
19	74.50	7462.75	136.81	7431.59	148.17	7532.20	101.25	2.126
20	68.94	7465.53	131.26	7434.37	142.62	7534.98	101.25	2.126
21	63.39	7468.31	125.70	7437.15	137.06	7537.76	101.25	2.126
22	68.94	7465.53	131.26	7434.37	142.02	7533.79	100.00	2.130
23	74.50	7462.75	136.81	7431.59	147.58	7531.01	100.00	2.130
24	63.39	7468.31	125.70	7437.15	136.47	7536.57	100.00	2.130
25	74.50	7462.75	136.81	7431.59	146.98	7529.82	98.75	2.133
26	63.39	7468.31	125.70	7437.15	135.87	7535.38	98.75	2.133
27	68.94	7465.53	131.26	7434.37	141.42	7532.60	98.75	2.133
28	74.50	7462.75	136.81	7431.59	146.38	7528.62	97.50	2.137
29	68.94	7465.53	131.26	7434.37	140.83	7531.40	97.50	2.137
30	63.39	7468.31	125.70	7437.15	135.27	7534.18	97.50	2.137
31	74.50	7462.75	142.37	7428.82	151.02	7530.95	102.50	2.148
32	68.94	7465.53	136.81	7431.59	145.46	7533.73	102.50	2.148
33	63.39	7468.31	131.26	7434.37	139.91	7536.51	102.50	2.148
34	57.83	7471.08	125.70	7437.15	134.35	7539.28	102.50	2.148
35	74.50	7462.75	142.37	7428.82	150.41	7529.75	101.25	2.152
36	68.94	7465.53	136.81	7431.59	144.86	7532.52	101.25	2.152
37	63.39	7468.31	131.26	7434.37	139.30	7535.30	101.25	2.152
38	57.83	7471.08	125.70	7437.15	133.75	7538.08	101.25	2.152
39	63.39	7468.31	131.26	7434.37	138.70	7534.09	100.00	2.156
40	57.83	7471.08	125.70	7437.15	133.14	7536.87	100.00	2.156
41	74.50	7462.75	142.37	7428.82	149.81	7528.54	100.00	2.156
42	68.94	7465.53	136.81	7431.59	144.26	7531.32	100.00	2.156
43	74.50	7462.75	142.37	7428.82	149.21	7527.33	98.75	2.160
44	63.39	7468.31	131.26	7434.37	138.10	7532.88	98.75	2.160
45	57.83	7471.08	125.70	7437.15	132.54	7535.66	98.75	2.160
46	68.94	7465.53	136.81	7431.59	143.65	7530.11	98.75	2.160
47	57.83	7471.08	125.70	7437.15	131.93	7534.45	97.50	2.165
48	63.39	7468.31	131.26	7434.37	137.49	7531.67	97.50	2.165
49	68.94	7465.53	136.81	7431.59	143.04	7528.89	97.50	2.165
50	74.50	7462.75	142.37	7428.82	148.60	7526.12	97.50	2.165
51	52.28	7473.86	125.70	7437.15	130.99	7539.51	102.50	2.175
52	57.83	7471.08	131.26	7434.37	136.55	7536.74	102.50	2.175
53	74.50	7462.75	147.92	7426.04	153.21	7528.40	102.50	2.175
54	63.39	7468.31	136.81	7431.59	142.10	7533.96	102.50	2.175
55	68.94	7465.53	142.37	7428.82	147.66	7531.18	102.50	2.175
56	52.28	7473.86	125.70	7437.15	130.38	7538.29	101.25	2.180
57	57.83	7471.08	131.26	7434.37	135.94	7535.51	101.25	2.180
58	74.50	7462.75	147.92	7426.04	152.60	7527.18	101.25	2.180
59	68.94	7465.53	142.37	7428.82	147.05	7529.96	101.25	2.180
60	63.39	7468.31	136.81	7431.59	141.49	7532.74	101.25	2.180
61	52.28	7473.86	125.70	7437.15	129.77	7537.07	100.00	2.185
62	74.50	7462.75	147.92	7426.04	151.99	7525.96	100.00	2.185
63	57.83	7471.08	131.26	7434.37	135.33	7534.29	100.00	2.185
64	63.39	7468.31	136.81	7431.59	140.88	7531.51	100.00	2.185
65	68.94	7465.53	142.37	7428.82	146.44	7528.73	100.00	2.185
66	74.50	7462.75	153.48	7424.83	154.10	7527.32	102.50	2.188
67	57.83	7471.08	131.26	7434.37	134.71	7533.06	98.75	2.190
68	74.50	7462.75	147.92	7426.04	151.38	7524.73	98.75	2.190
69	68.94	7465.53	142.37	7428.82	145.82	7527.51	98.75	2.190
70	52.28	7473.86	125.70	7437.15	129.16	7535.84	98.75	2.190
71	63.39	7468.31	136.81	7431.59	140.27	7530.28	98.75	2.190
72	74.50	7462.75	153.48	7424.83	153.50	7526.08	101.25	2.194
73	57.83	7471.08	131.26	7434.37	134.10	7531.83	97.50	2.196
74	74.50	7462.75	147.92	7426.04	150.76	7523.50	97.50	2.196
75	68.94	7465.53	142.37	7428.82	145.21	7526.28	97.50	2.196
76	63.39	7468.31	136.81	7431.59	139.65	7529.05	97.50	2.196
77	52.28	7473.86	125.70	7437.15	128.54	7534.61	97.50	2.196
78	74.50	7462.75	153.48	7424.83	152.90	7524.82	100.00	2.200
79	74.50	7462.75	159.03	7424.55	154.41	7526.94	102.50	2.204
80	74.50	7462.75	153.48	7424.83	152.30	7523.57	98.75	2.206
81	52.28	7473.86	131.26	7434.37	133.14	7536.85	102.50	2.206
82	63.39	7468.31	142.37	7428.82	144.25	7531.30	102.50	2.206
83	57.83	7471.08	136.81	7431.59	138.69	7534.08	102.50	2.206
84	68.94	7465.53	147.92	7426.04	149.80	7528.52	102.50	2.206
85	74.50	7462.75	159.03	7424.55	153.83	7525.66	101.25	2.211
86	63.39	7468.31	142.37	7428.82	143.63	7530.06	101.25	2.212
87	68.94	7465.53	147.92	7426.04	149.18	7527.28	101.25	2.212
88	52.28	7473.86	131.26	7434.37	132.52	7535.61	101.25	2.212
89	57.83	7471.08	136.81	7431.59	138.07	7532.84	101.25	2.212
90	74.50	7462.75	153.48	7424.83	151.69	7522.31	97.50	2.212
91	57.83	7471.08	136.81	7431.59	137.45	7531.59	100.00	2.218
92	52.28	7473.86	131.26	7434.37	131.89	7534.37	100.00	2.218
93	63.39	7468.31	142.37	7428.82	143.00	7528.81	100.00	2.218

94	68.94	7465.53	147.92	7426.04	148.56	7526.04	100.00	2.218
95	74.50	7462.75	159.03	7424.55	153.25	7524.38	100.00	2.218
96	68.94	7465.53	153.48	7424.83	150.75	7527.29	102.50	2.222
97	52.28	7473.86	131.26	7434.37	131.27	7533.12	98.75	2.224
98	63.39	7468.31	142.37	7428.82	142.38	7527.57	98.75	2.224
99	57.83	7471.08	136.81	7431.59	136.83	7530.34	98.75	2.224

Critical Failure Surface (circle 1)

Intersects: XL: 74.50 YL: 7462.75 XR: 125.70 YR: 7437.15
Centre: XC: 144.12 YC: 7537.98 Radius: R: 102.50
Generated failure surface: (20 points)
74.50 7462.75 76.77 7460.71 79.10 7458.74 81.49 7456.84
83.94 7455.01
86.43 7453.25 88.98 7451.57 91.58 7449.97 94.23 7448.44
96.92 7447.00
99.65 7445.63 102.42 7444.35 105.22 7443.15 108.07 7442.03
110.94 7441.00
113.84 7440.05 116.77 7439.20 119.73 7438.43 122.70 7437.74
125.70 7437.15

Slice Geometry and Properties - Critical Failure Surface (circle 1, 38 slices)

Slice	X-S	Base						PoreWater	Normal	Test
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	74.50	0.26	41.9	1.14	1.53	1	0.00	45.0	28.19	0.00	17.33	0.94
2	75.64	0.77	41.9	1.14	1.53	1	0.00	45.0	84.74	0.00	52.11	0.94
3	76.77	1.29	40.2	1.17	1.53	1	0.00	45.0	141.75	0.00	86.46	0.93
4	77.94	1.76	40.2	1.17	1.53	1	0.00	45.0	193.41	0.00	117.97	0.93
5	79.10	2.25	38.5	1.19	1.53	1	0.00	45.0	247.91	0.00	150.13	0.92
6	80.30	2.68	38.5	1.19	1.53	1	0.00	45.0	294.37	0.00	178.25	0.92
7	81.49	3.14	36.8	1.22	1.53	1	0.00	45.0	345.33	0.00	207.81	0.92
8	82.71	3.51	36.8	1.22	1.53	1	0.00	45.0	386.17	0.00	232.38	0.92
9	83.94	3.93	35.1	1.25	1.53	1	0.00	45.0	432.85	0.00	259.05	0.91
10	85.19	4.25	35.1	1.25	1.53	1	0.00	45.0	467.67	0.00	279.88	0.91
11	86.43	4.63	33.4	1.27	1.53	1	0.00	45.0	509.21	0.00	303.43	0.91
12	87.71	4.89	33.4	1.27	1.53	1	0.00	45.0	537.69	0.00	320.35	0.91
13	88.98	5.21	31.7	1.30	1.53	1	0.00	45.0	573.35	0.00	340.39	0.91
14	90.28	5.41	31.7	1.30	1.53	1	0.00	45.0	595.19	0.00	353.31	0.91
15	91.58	5.68	30.0	1.32	1.53	1	0.00	45.0	624.34	0.00	369.67	0.90
16	92.90	5.81	30.0	1.32	1.53	1	0.00	45.0	639.03	0.00	378.37	0.90
17	94.23	6.01	28.3	1.34	1.53	1	0.00	45.0	660.98	0.00	390.65	0.90
18	95.57	6.08	28.3	1.34	1.53	1	0.00	45.0	668.57	0.00	395.13	0.90
19	96.92	6.21	26.6	1.37	1.53	1	0.00	45.0	682.81	0.00	403.19	0.90
20	98.28	6.21	26.6	1.37	1.53	1	0.00	45.0	682.73	0.00	403.15	0.90
21	99.65	6.26	24.9	1.39	1.53	1	0.00	45.0	688.73	0.00	406.68	0.90
22	101.03	6.19	24.9	1.39	1.53	1	0.00	45.0	681.07	0.00	402.10	0.90
23	102.42	6.17	23.1	1.40	1.53	1	0.00	45.0	678.39	0.00	400.93	0.90
24	103.82	6.02	23.2	1.40	1.53	1	0.00	45.0	662.63	0.00	391.56	0.90
25	105.22	5.92	21.4	1.42	1.53	1	0.00	45.0	650.95	0.00	385.37	0.90
26	106.65	5.70	21.4	1.42	1.53	1	0.00	45.0	627.21	0.00	371.32	0.90
27	108.07	5.51	19.7	1.44	1.53	1	0.00	45.0	606.17	0.00	359.80	0.91

28	109.50	5.22	19.7	1.44	1.53	1	0.00	45.0	574.07	0.00	340.75	0.91
29	110.94	4.94	18.0	1.45	1.53	1	0.00	45.0	543.52	0.00	323.81	0.91
30	112.39	4.57	18.0	1.45	1.53	1	0.00	45.0	503.06	0.00	299.66	0.91
31	113.84	4.21	16.3	1.47	1.53	1	0.00	45.0	462.79	0.00	276.89	0.91
32	115.31	3.76	16.3	1.47	1.53	1	0.00	45.0	414.00	0.00	247.70	0.91
33	116.77	3.31	14.6	1.48	1.53	1	0.00	45.0	364.03	0.00	218.98	0.92
34	118.25	2.79	14.6	1.48	1.53	1	0.00	45.0	306.66	0.00	184.47	0.92
35	119.73	2.25	12.9	1.49	1.53	1	0.00	45.0	246.96	0.00	149.49	0.92
36	121.22	1.65	12.9	1.49	1.53	1	0.00	45.0	181.03	0.00	109.59	0.92
37	122.70	1.02	11.2	1.50	1.53	1	0.00	45.0	111.72	0.00	68.13	0.93
38	124.20	0.34	11.2	1.50	1.53	1	0.00	45.0	37.24	0.00	22.71	0.93

X-S Area: 155.79 Path Length: 58.01 X-S Weight: 17136.52

DATA: Analysis 2 - Mining Slope

Material Properties (2 materials)

Material: 1 (Mohr-Coulomb Isotropic) - Sand and gravel, mixed grain size

Cohesion	Phi	UnitWeight	Ru
0.00	45.0	110.00	Auto

Material: 2 (Mohr-Coulomb Isotropic) - Loose sand, mixed grain size

Cohesion	Phi	UnitWeight	Ru
0.00	34.0	99.00	Auto

Water Properties

Unit weight of water: 62.400 Unit weight of water/medium above ground: 0.000

Material Profiles (1 profile)

Profile: 1 (2 points) Material beneath: 1 - Sand and gravel, mixed grain size

0.00 7475.00 300.00 7475.00

Slope Surface (4 points)

0.00 7475.00 50.00 7475.00 150.00 7425.00 250.00 7420.00

Phreatic Surface (2 points)

0.00 7300.00 300.00 7300.00

Failure Surface (Critical, from previous analysis)

Initial circular surface for critical search defined by: XL,XR,R

Intersects: XL: 74.50 YL: 7462.75 XR: 125.70 YR: 7437.15

Centre: XC: 144.12 YC: 7537.98 Radius: R: 102.50

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	50.00	50.00	5.00
Trial positions within range:	10	10	5

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RESULTS: Analysis 2 - Mining Slope

Bishop Simplified Method of Analysis - Circular Failure Surface

Critical Failure Surface Search using Multiple Circle Generation Techniques

Factor of Safety for initial failure surface approximation: 2.081

There were: 470 successful analyses from a total of 501 trial surfaces
31 analyses terminated due to unacceptable geometry

Critical (minimum) Factor of Safety: 2.00

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	99.50	7450.25	106.26	7446.87	148.69	7540.18	102.50	2.001	<-- Critical Surface
2	99.50	7450.25	106.26	7446.87	149.25	7541.30	103.75	2.001	
3	93.94	7453.03	100.70	7449.65	143.13	7542.95	102.50	2.001	
4	99.50	7450.25	106.26	7446.87	149.81	7542.41	105.00	2.001	
5	99.50	7450.25	106.26	7446.87	147.57	7537.94	100.00	2.001	
6	93.94	7453.03	100.70	7449.65	142.57	7541.84	101.25	2.001	
7	93.94	7453.03	100.70	7449.65	143.69	7544.07	103.75	2.001	
8	93.94	7453.03	100.70	7449.65	142.01	7540.72	100.00	2.001	
9	99.50	7450.25	106.26	7446.87	148.13	7539.06	101.25	2.001	
10	93.94	7453.03	100.70	7449.65	144.25	7545.19	105.00	2.001	
11	99.50	7450.25	111.81	7444.09	152.51	7540.88	105.00	2.004	
12	88.39	7455.81	100.70	7449.65	141.40	7546.44	105.00	2.004	
13	93.94	7453.03	106.26	7446.87	146.96	7543.66	105.00	2.004	
14	99.50	7450.25	111.81	7444.09	151.95	7539.76	103.75	2.004	
15	88.39	7455.81	100.70	7449.65	140.84	7545.32	103.75	2.004	
16	93.94	7453.03	106.26	7446.87	146.40	7542.54	103.75	2.004	
17	93.94	7453.03	106.26	7446.87	145.84	7541.42	102.50	2.004	
18	88.39	7455.81	100.70	7449.65	140.28	7544.20	102.50	2.004	
19	93.94	7453.03	106.26	7446.87	145.28	7540.30	101.25	2.004	
20	99.50	7450.25	111.81	7444.09	151.39	7538.64	102.50	2.004	
21	99.50	7450.25	111.81	7444.09	150.83	7537.52	101.25	2.005	
22	88.39	7455.81	100.70	7449.65	139.72	7543.08	101.25	2.005	
23	88.39	7455.81	100.70	7449.65	139.16	7541.96	100.00	2.005	
24	99.50	7450.25	111.81	7444.09	150.27	7536.40	100.00	2.005	
25	93.94	7453.03	106.26	7446.87	144.72	7539.18	100.00	2.005	
26	88.39	7455.81	106.26	7446.87	144.07	7544.83	105.00	2.009	
27	93.94	7453.03	111.81	7444.09	149.62	7542.05	105.00	2.009	
28	99.50	7450.25	117.37	7441.32	155.18	7539.27	105.00	2.009	
29	82.83	7458.58	100.70	7449.65	138.51	7547.60	105.00	2.009	
30	93.94	7453.03	111.81	7444.09	149.06	7540.93	103.75	2.009	
31	88.39	7455.81	106.26	7446.87	143.51	7543.70	103.75	2.009	
32	82.83	7458.58	100.70	7449.65	137.95	7546.48	103.75	2.009	
33	99.50	7450.25	117.37	7441.32	154.62	7538.15	103.75	2.009	
34	82.83	7458.58	100.70	7449.65	137.39	7545.36	102.50	2.009	
35	93.94	7453.03	111.81	7444.09	148.50	7539.80	102.50	2.009	
36	99.50	7450.25	117.37	7441.32	154.05	7537.03	102.50	2.009	
37	88.39	7455.81	106.26	7446.87	142.94	7542.58	102.50	2.009	
38	82.83	7458.58	100.70	7449.65	136.83	7544.24	101.25	2.010	
39	93.94	7453.03	111.81	7444.09	147.94	7538.68	101.25	2.010	
40	99.50	7450.25	117.37	7441.32	153.49	7535.90	101.25	2.010	
41	88.39	7455.81	106.26	7446.87	142.38	7541.46	101.25	2.010	
42	82.83	7458.58	100.70	7449.65	136.27	7543.11	100.00	2.010	
43	88.39	7455.81	106.26	7446.87	141.82	7540.33	100.00	2.010	
44	99.50	7450.25	117.37	7441.32	152.93	7534.78	100.00	2.010	
45	93.94	7453.03	111.81	7444.09	147.38	7537.56	100.00	2.010	
46	82.83	7458.58	106.26	7446.87	141.14	7545.91	105.00	2.016	
47	93.94	7453.03	117.37	7441.32	152.25	7540.35	105.00	2.016	
48	88.39	7455.81	111.81	7444.09	146.69	7543.13	105.00	2.016	
49	77.28	7461.36	100.70	7449.65	135.58	7548.69	105.00	2.016	
50	99.50	7450.25	122.92	7438.54	157.80	7537.58	105.00	2.016	
51	99.50	7450.25	122.92	7438.54	157.24	7536.45	103.75	2.016	
52	77.28	7461.36	100.70	7449.65	135.02	7547.56	103.75	2.016	
53	93.94	7453.03	117.37	7441.32	151.68	7539.23	103.75	2.016	
54	88.39	7455.81	111.81	7444.09	146.13	7542.00	103.75	2.016	
55	82.83	7458.58	106.26	7446.87	140.57	7544.78	103.75	2.016	
56	99.50	7450.25	122.92	7438.54	156.67	7535.32	102.50	2.016	
57	93.94	7453.03	117.37	7441.32	151.12	7538.10	102.50	2.016	
58	88.39	7455.81	111.81	7444.09	145.56	7540.88	102.50	2.016	
59	82.83	7458.58	106.26	7446.87	140.01	7543.65	102.50	2.016	
60	77.28	7461.36	100.70	7449.65	134.45	7546.43	102.50	2.016	
61	88.39	7455.81	111.81	7444.09	145.00	7539.75	101.25	2.017	
62	93.94	7453.03	117.37	7441.32	150.56	7536.97	101.25	2.017	
63	99.50	7450.25	122.92	7438.54	156.11	7534.20	101.25	2.017	
64	82.83	7458.58	106.26	7446.87	139.45	7542.53	101.25	2.017	
65	77.28	7461.36	100.70	7449.65	133.89	7545.31	101.25	2.017	
66	99.50	7450.25	122.92	7438.54	155.55	7533.07	100.00	2.017	
67	82.83	7458.58	106.26	7446.87	138.88	7541.40	100.00	2.017	
68	88.39	7455.81	111.81	7444.09	144.44	7538.62	100.00	2.017	
69	93.94	7453.03	117.37	7441.32	149.99	7535.85	100.00	2.017	
70	77.28	7461.36	100.70	7449.65	133.33	7544.18	100.00	2.017	
71	71.72	7464.14	100.70	7449.65	132.61	7549.69	105.00	2.024	
72	88.39	7455.81	117.37	7441.32	149.27	7541.35	105.00	2.024	
73	99.50	7450.25	128.48	7435.76	160.38	7535.80	105.00	2.024	

74	93.94	7453.03	122.92	7438.54	154.83	7538.57	105.00	2.024
75	77.28	7461.36	106.26	7446.87	138.16	7546.91	105.00	2.024
76	82.83	7458.58	111.81	7444.09	143.72	7544.13	105.00	2.024
77	99.50	7450.25	128.48	7435.76	159.82	7534.66	103.75	2.024
78	93.94	7453.03	122.92	7438.54	154.26	7537.44	103.75	2.024
79	77.28	7461.36	106.26	7446.87	137.60	7545.77	103.75	2.024
80	71.72	7464.14	100.70	7449.65	132.04	7548.55	103.75	2.024
81	82.83	7458.58	111.81	7444.09	143.15	7543.00	103.75	2.024
82	88.39	7455.81	117.37	7441.32	148.71	7540.22	103.75	2.024
83	77.28	7461.36	106.26	7446.87	137.03	7544.64	102.50	2.025
84	71.72	7464.14	100.70	7449.65	131.47	7547.42	102.50	2.025
85	82.83	7458.58	111.81	7444.09	142.59	7541.87	102.50	2.025
86	99.50	7450.25	128.48	7435.76	159.25	7533.53	102.50	2.025
87	93.94	7453.03	122.92	7438.54	153.70	7536.31	102.50	2.025
88	88.39	7455.81	117.37	7441.32	148.14	7539.09	102.50	2.025
89	71.72	7464.14	100.70	7449.65	130.91	7546.29	101.25	2.025
90	99.50	7450.25	128.48	7435.76	158.69	7532.40	101.25	2.025
91	82.83	7458.58	111.81	7444.09	142.02	7540.73	101.25	2.025
92	88.39	7455.81	117.37	7441.32	147.57	7537.96	101.25	2.025
93	77.28	7461.36	106.26	7446.87	136.46	7543.51	101.25	2.025
94	93.94	7453.03	122.92	7438.54	153.13	7535.18	101.25	2.025
95	82.83	7458.58	111.81	7444.09	141.45	7539.60	100.00	2.026
96	88.39	7455.81	117.37	7441.32	147.01	7536.82	100.00	2.026
97	71.72	7464.14	100.70	7449.65	130.34	7545.16	100.00	2.026
98	99.50	7450.25	128.48	7435.76	158.12	7531.27	100.00	2.026
99	93.94	7453.03	122.92	7438.54	152.56	7534.04	100.00	2.026

Critical Failure Surface (circle 1)

Intersects: XL: 99.50 YL: 7450.25 XR: 106.26 YR: 7446.87
Centre: XC: 148.69 YC: 7540.18 Radius: R: 102.50
Generated failure surface: (20 points)
99.50 7450.25 99.85 7450.06 100.20 7449.87 100.55 7449.68
100.90 7449.50
101.25 7449.31 101.61 7449.13 101.96 7448.95 102.31 7448.77
102.67 7448.59
103.02 7448.41 103.38 7448.23 103.74 7448.06 104.10 7447.88
104.45 7447.71
104.81 7447.54 105.17 7447.37 105.53 7447.20 105.89 7447.04
106.26 7446.87

Slice Geometry and Properties - Critical Failure Surface (circle 1, 38 slices)

Slice	X-S	Base						PoreWater	Normal	Test
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	99.50	0.00	28.5	0.17	0.20	1	0.00	45.0	0.08	0.00	0.34	0.90
2	99.67	0.00	28.6	0.17	0.20	1	0.00	45.0	0.23	0.00	1.01	0.90
3	99.85	0.00	28.4	0.17	0.20	1	0.00	45.0	0.37	0.00	1.65	0.90
4	100.02	0.00	28.3	0.17	0.20	1	0.00	45.0	0.50	0.00	2.24	0.89
5	100.20	0.01	28.1	0.18	0.20	1	0.00	45.0	0.62	0.00	2.80	0.89
6	100.37	0.01	28.1	0.18	0.20	1	0.00	45.0	0.74	0.00	3.35	0.89
7	100.55	0.01	27.8	0.18	0.20	1	0.00	45.0	0.85	0.00	3.82	0.89
8	100.73	0.01	28.0	0.18	0.20	1	0.00	45.0	0.95	0.00	4.29	0.89
9	100.90	0.01	27.7	0.18	0.20	1	0.00	45.0	1.05	0.00	4.72	0.89
10	101.08	0.01	27.7	0.18	0.20	1	0.00	45.0	1.13	0.00	5.06	0.89
11	101.25	0.01	27.5	0.18	0.20	1	0.00	45.0	1.20	0.00	5.41	0.89
12	101.43	0.01	27.5	0.18	0.20	1	0.00	45.0	1.28	0.00	5.75	0.89
13	101.61	0.01	27.2	0.18	0.20	1	0.00	45.0	1.34	0.00	6.03	0.89
14	101.78	0.01	27.2	0.18	0.20	1	0.00	45.0	1.39	0.00	6.24	0.89
15	101.96	0.01	27.0	0.18	0.20	1	0.00	45.0	1.44	0.00	6.46	0.89
16	102.14	0.01	27.0	0.18	0.20	1	0.00	45.0	1.47	0.00	6.59	0.89
17	102.31	0.01	26.9	0.18	0.20	1	0.00	45.0	1.50	0.00	6.73	0.89

18	102.49	0.01	26.7	0.18	0.20	1	0.00	45.0	1.51	0.00	6.78	0.89
19	102.67	0.01	26.6	0.18	0.20	1	0.00	45.0	1.52	0.00	6.83	0.89
20	102.85	0.01	26.6	0.18	0.20	1	0.00	45.0	1.52	0.00	6.83	0.89
21	103.02	0.01	26.4	0.18	0.20	1	0.00	45.0	1.52	0.00	6.84	0.89
22	103.20	0.01	26.4	0.18	0.20	1	0.00	45.0	1.50	0.00	6.76	0.89
23	103.38	0.01	26.1	0.18	0.20	1	0.00	45.0	1.49	0.00	6.69	0.89
24	103.56	0.01	26.1	0.18	0.20	1	0.00	45.0	1.44	0.00	6.47	0.89
25	103.74	0.01	25.9	0.18	0.20	1	0.00	45.0	1.40	0.00	6.31	0.89
26	103.92	0.01	25.9	0.18	0.20	1	0.00	45.0	1.35	0.00	6.09	0.89
27	104.10	0.01	25.6	0.18	0.20	1	0.00	45.0	1.29	0.00	5.81	0.89
28	104.27	0.01	25.7	0.18	0.20	1	0.00	45.0	1.23	0.00	5.54	0.89
29	104.45	0.01	25.5	0.18	0.20	1	0.00	45.0	1.15	0.00	5.16	0.89
30	104.63	0.01	25.5	0.18	0.20	1	0.00	45.0	1.07	0.00	4.82	0.89
31	104.81	0.01	25.2	0.18	0.20	1	0.00	45.0	0.98	0.00	4.39	0.89
32	104.99	0.01	25.3	0.18	0.20	1	0.00	45.0	0.87	0.00	3.91	0.89
33	105.17	0.01	25.0	0.18	0.20	1	0.00	45.0	0.76	0.00	3.44	0.89
34	105.35	0.01	25.0	0.18	0.20	1	0.00	45.0	0.64	0.00	2.88	0.89
35	105.53	0.00	24.8	0.18	0.20	1	0.00	45.0	0.51	0.00	2.31	0.89
36	105.71	0.00	24.7	0.18	0.20	1	0.00	45.0	0.38	0.00	1.70	0.89
37	105.89	0.00	24.7	0.18	0.20	1	0.00	45.0	0.23	0.00	1.05	0.90
38	106.07	0.00	24.5	0.18	0.20	1	0.00	45.0	0.08	0.00	0.35	0.90

X-S Area: 0.35 Path Length: 7.55 X-S Weight: 38.55

DATA: Analysis 3 - Reclaimed Slope

Material Properties (2 materials)

Material: 1 (Mohr-Coulomb Isotropic) - Sand and gravel, mixed grain size
Cohesion Phi UnitWeight Ru
0.00 45.0 110.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - Loose sand, mixed grain size
Cohesion Phi UnitWeight Ru
0.00 34.0 99.00 Auto

Water Properties

Unit weight of water: 62.400 Unit weight of water/medium above ground: 0.000

Material Profiles (1 profile)

Profile: 1 (2 points) Material beneath: 1 - Sand and gravel, mixed grain size
0.00 7475.00 300.00 7475.00

Slope Surface (5 points)

0.00 7475.00 50.00 7475.00 200.00 7425.00 250.00 7422.00 300.00 7420.00

Phreatic Surface (2 points)

0.00 7300.00 300.00 7300.00

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 49.50 YL: 7475.00 XR: 199.50 YR: 7425.17

Centre: XC: 199.28 YC: 7675.17 Radius: R: 250.00

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	50.00	50.00	5.00
Trial positions within range:	10	10	5

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RESULTS: Analysis 3 - Reclaimed Slope

Bishop Simplified Method of Analysis - Circular Failure Surface

Critical Failure Surface Search using Multiple Circle Generation Techniques

Factor of Safety for initial failure surface approximation: 3.142

There were: 498 successful analyses from a total of 501 trial surfaces
3 analyses terminated due to unacceptable geometry

Critical (minimum) Factor of Safety: 3.06

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	74.50	7466.83	174.50	7433.50	202.59	7684.43	252.50	3.060	<-- Critical Surface
2	74.50	7466.83	174.50	7433.50	202.18	7683.22	251.25	3.060	
3	74.50	7466.83	174.50	7433.50	201.78	7682.01	250.00	3.061	
4	74.50	7466.83	174.50	7433.50	201.38	7680.79	248.75	3.061	
5	74.50	7466.83	174.50	7433.50	200.97	7679.58	247.50	3.062	
6	68.94	7468.69	174.50	7433.50	199.61	7684.75	252.50	3.067	
7	74.50	7466.83	180.06	7431.65	205.16	7682.90	252.50	3.067	
8	74.50	7466.83	180.06	7431.65	204.76	7681.68	251.25	3.067	
9	68.94	7468.69	174.50	7433.50	199.20	7683.53	251.25	3.067	
10	74.50	7466.83	180.06	7431.65	204.35	7680.46	250.00	3.068	
11	68.94	7468.69	174.50	7433.50	198.80	7682.32	250.00	3.068	
12	68.94	7468.69	174.50	7433.50	198.39	7681.10	248.75	3.069	
13	74.50	7466.83	180.06	7431.65	203.95	7679.25	248.75	3.069	
14	74.50	7466.83	180.06	7431.65	203.54	7678.03	247.50	3.069	
15	68.94	7468.69	174.50	7433.50	197.99	7679.88	247.50	3.069	
16	68.94	7468.69	180.06	7431.65	202.17	7683.18	252.50	3.074	
17	74.50	7466.83	185.61	7429.80	207.73	7681.33	252.50	3.074	
18	63.39	7470.54	174.50	7433.50	196.61	7685.03	252.50	3.074	
19	68.94	7468.69	180.06	7431.65	201.76	7681.96	251.25	3.075	
20	63.39	7470.54	174.50	7433.50	196.21	7683.81	251.25	3.075	
21	74.50	7466.83	185.61	7429.80	207.32	7680.11	251.25	3.075	
22	68.94	7468.69	180.06	7431.65	201.36	7680.74	250.00	3.076	
23	74.50	7466.83	185.61	7429.80	206.91	7678.89	250.00	3.076	
24	63.39	7470.54	174.50	7433.50	195.80	7682.59	250.00	3.076	
25	63.39	7470.54	174.50	7433.50	195.40	7681.37	248.75	3.076	
26	74.50	7466.83	185.61	7429.80	206.51	7677.67	248.75	3.076	
27	68.94	7468.69	180.06	7431.65	200.95	7679.52	248.75	3.076	
28	63.39	7470.54	174.50	7433.50	194.99	7680.15	247.50	3.077	
29	68.94	7468.69	180.06	7431.65	200.54	7678.30	247.50	3.077	
30	74.50	7466.83	185.61	7429.80	206.10	7676.45	247.50	3.077	
31	68.94	7468.69	185.61	7429.80	204.72	7681.57	252.50	3.082	
32	74.50	7466.83	191.17	7427.94	210.28	7679.72	252.50	3.082	
33	57.83	7472.39	174.50	7433.50	193.61	7685.28	252.50	3.082	
34	63.39	7470.54	180.06	7431.65	199.17	7683.42	252.50	3.082	
35	74.50	7466.83	191.17	7427.94	209.87	7678.50	251.25	3.083	
36	68.94	7468.69	185.61	7429.80	204.31	7680.35	251.25	3.083	
37	63.39	7470.54	180.06	7431.65	198.76	7682.20	251.25	3.083	
38	57.83	7472.39	174.50	7433.50	193.20	7684.05	251.25	3.083	
39	68.94	7468.69	185.61	7429.80	203.91	7679.13	250.00	3.084	
40	63.39	7470.54	180.06	7431.65	198.35	7680.98	250.00	3.084	
41	57.83	7472.39	174.50	7433.50	192.79	7682.83	250.00	3.084	
42	74.50	7466.83	191.17	7427.94	209.46	7677.27	250.00	3.084	
43	63.39	7470.54	180.06	7431.65	197.94	7679.75	248.75	3.085	
44	74.50	7466.83	191.17	7427.94	209.05	7676.05	248.75	3.085	
45	57.83	7472.39	174.50	7433.50	192.39	7681.61	248.75	3.085	
46	68.94	7468.69	185.61	7429.80	203.50	7677.90	248.75	3.085	
47	63.39	7470.54	180.06	7431.65	197.54	7678.53	247.50	3.085	
48	74.50	7466.83	191.17	7427.94	208.65	7674.83	247.50	3.085	
49	68.94	7468.69	185.61	7429.80	203.09	7676.68	247.50	3.085	
50	57.83	7472.39	174.50	7433.50	191.98	7680.38	247.50	3.085	
51	63.39	7470.54	185.61	7429.80	201.71	7681.78	252.50	3.090	
52	74.50	7466.83	196.72	7426.09	212.82	7678.08	252.50	3.090	

53	57.83	7472.39	180.06	7431.65	196.15	7683.63	252.50	3.090
54	52.28	7474.24	174.50	7433.50	190.59	7685.49	252.50	3.090
55	68.94	7468.69	191.17	7427.94	207.26	7679.93	252.50	3.090
56	74.50	7466.83	196.72	7426.09	212.41	7676.85	251.25	3.091
57	63.39	7470.54	185.61	7429.80	201.30	7680.56	251.25	3.091
58	57.83	7472.39	180.06	7431.65	195.74	7682.41	251.25	3.091
59	68.94	7468.69	191.17	7427.94	206.85	7678.70	251.25	3.091
60	52.28	7474.24	174.50	7433.50	190.19	7684.26	251.25	3.091
61	74.50	7466.83	196.72	7426.09	212.00	7675.63	250.00	3.092
62	52.28	7474.24	174.50	7433.50	189.78	7683.03	250.00	3.092
63	63.39	7470.54	185.61	7429.80	200.89	7679.33	250.00	3.092
64	68.94	7468.69	191.17	7427.94	206.44	7677.48	250.00	3.092
65	57.83	7472.39	180.06	7431.65	195.33	7681.18	250.00	3.092
66	68.94	7468.69	191.17	7427.94	206.03	7676.25	248.75	3.093
67	57.83	7472.39	180.06	7431.65	194.92	7679.95	248.75	3.093
68	52.28	7474.24	174.50	7433.50	189.37	7681.81	248.75	3.093
69	63.39	7470.54	185.61	7429.80	200.48	7678.10	248.75	3.093
70	74.50	7466.83	196.72	7426.09	211.59	7674.40	248.75	3.093
71	57.83	7472.39	180.06	7431.65	194.51	7678.73	247.50	3.094
72	74.50	7466.83	196.72	7426.09	211.18	7673.17	247.50	3.094
73	63.39	7470.54	185.61	7429.80	200.07	7676.87	247.50	3.094
74	52.28	7474.24	174.50	7433.50	188.96	7680.58	247.50	3.094
75	68.94	7468.69	191.17	7427.94	205.62	7675.02	247.50	3.094
76	74.50	7466.83	207.83	7424.53	214.54	7676.94	252.50	3.098
77	74.50	7466.83	202.28	7424.86	213.12	7673.38	248.75	3.099
78	52.28	7474.24	180.06	7431.65	193.12	7683.81	252.50	3.099
79	57.83	7472.39	185.61	7429.80	198.68	7681.96	252.50	3.099
80	68.94	7468.69	196.72	7426.09	209.79	7678.25	252.50	3.099
81	63.39	7470.54	191.17	7427.94	204.23	7680.11	252.50	3.099
82	74.50	7466.83	207.83	7424.53	214.15	7675.70	251.25	3.099
83	74.50	7466.83	202.28	7424.86	212.72	7672.14	247.50	3.100
84	52.28	7474.24	180.06	7431.65	192.71	7682.58	251.25	3.100
85	63.39	7470.54	191.17	7427.94	203.82	7678.88	251.25	3.100
86	57.83	7472.39	185.61	7429.80	198.27	7680.73	251.25	3.100
87	68.94	7468.69	196.72	7426.09	209.38	7677.02	251.25	3.100
88	74.50	7466.83	207.83	7424.53	213.75	7674.46	250.00	3.101
89	52.28	7474.24	180.06	7431.65	192.30	7681.35	250.00	3.101
90	57.83	7472.39	185.61	7429.80	197.86	7679.50	250.00	3.101
91	68.94	7468.69	196.72	7426.09	208.97	7675.79	250.00	3.101
92	63.39	7470.54	191.17	7427.94	203.41	7677.64	250.00	3.101
93	74.50	7466.83	207.83	7424.53	213.36	7673.22	248.75	3.102
94	52.28	7474.24	180.06	7431.65	191.89	7680.12	248.75	3.102
95	63.39	7470.54	191.17	7427.94	203.00	7676.41	248.75	3.102
96	68.94	7468.69	196.72	7426.09	208.56	7674.56	248.75	3.102
97	57.83	7472.39	185.61	7429.80	197.45	7678.26	248.75	3.102
98	74.50	7466.83	207.83	7424.53	212.97	7671.98	247.50	3.103
99	63.39	7470.54	191.17	7427.94	202.59	7675.18	247.50	3.103

Critical Failure Surface (circle 1)

Intersects: XL: 74.50 YL: 7466.83 XR: 174.50 YR: 7433.50
Centre: XC: 202.59 YC: 7684.43 Radius: R: 252.50
Generated failure surface: (20 points)
74.50 7466.83 79.35 7464.05 84.26 7461.38 89.22 7458.81
94.24 7456.36
99.32 7454.02 104.44 7451.79 109.61 7449.67 114.83 7447.67
120.10 7445.79
125.40 7444.02 130.74 7442.37 136.11 7440.84 141.52 7439.43
146.96 7438.14
152.42 7436.97 157.91 7435.92 163.42 7434.99 168.95 7434.18
174.50 7433.50

Slice Geometry and Properties - Critical Failure Surface (circle 1, 38 slices)

Slice	X-S	Base						PoreWater	Normal	Test
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	74.50	0.71	29.9	2.42	2.79	1	0.00	45.0	77.59	0.00	26.96	0.97
2	76.92	2.12	29.8	2.42	2.79	1	0.00	45.0	233.15	0.00	81.01	0.97
3	79.35	3.50	28.6	2.45	2.79	1	0.00	45.0	384.73	0.00	133.09	0.97
4	81.80	4.77	28.6	2.45	2.79	1	0.00	45.0	524.84	0.00	181.55	0.97
5	84.26	6.04	27.3	2.48	2.79	1	0.00	45.0	663.99	0.00	228.81	0.96
6	86.74	7.16	27.3	2.48	2.79	1	0.00	45.0	788.14	0.00	271.59	0.96

7	89.22	8.30	26.0	2.51	2.79	1	0.00	45.0	913.49	0.00
313.74	0.96									
8	91.73	9.28	26.0	2.51	2.79	1	0.00	45.0	1021.23	0.00
350.73	0.96									
9	94.24	10.29	24.8	2.54	2.79	1	0.00	45.0	1131.76	0.00
387.58	0.96									
10	96.78	11.12	24.8	2.54	2.79	1	0.00	45.0	1222.65	0.00
418.74	0.96									
11	99.32	11.98	23.5	2.56	2.79	1	0.00	45.0	1317.32	0.00
450.08	0.95									
12	101.88	12.65	23.5	2.56	2.79	1	0.00	45.0	1390.95	0.00
475.23	0.95									
13	104.44	13.35	22.2	2.59	2.79	1	0.00	45.0	1468.85	0.00
500.94	0.95									
14	107.03	13.86	22.2	2.59	2.79	1	0.00	45.0	1524.42	0.00
519.89	0.95									
15	109.61	14.40	21.0	2.61	2.79	1	0.00	45.0	1584.51	0.00
539.66	0.95									
16	112.22	14.74	21.0	2.61	2.79	1	0.00	45.0	1621.93	0.00
552.40	0.95									
17	114.83	15.12	19.7	2.63	2.79	1	0.00	45.0	1663.59	0.00
566.07	0.95									
18	117.46	15.29	19.7	2.63	2.79	1	0.00	45.0	1682.38	0.00
572.49	0.95									
19	120.10	15.50	18.4	2.65	2.79	1	0.00	45.0	1704.95	0.00
579.94	0.95									
20	122.75	15.50	18.4	2.65	2.79	1	0.00	45.0	1704.95	0.00
579.94	0.95									
21	125.40	15.52	17.2	2.67	2.79	1	0.00	45.0	1707.68	0.00
580.94	0.95									
22	128.07	15.35	17.2	2.67	2.79	1	0.00	45.0	1688.32	0.00
574.36	0.95									
23	130.74	15.19	15.9	2.69	2.79	1	0.00	45.0	1670.55	0.00
568.68	0.95									
24	133.42	14.84	15.9	2.69	2.79	1	0.00	45.0	1632.01	0.00
555.53	0.95									
25	136.11	14.49	14.6	2.70	2.79	1	0.00	45.0	1593.42	0.00
542.98	0.95									
26	138.82	13.96	14.6	2.70	2.79	1	0.00	45.0	1535.18	0.00
523.16	0.95									
27	141.52	13.41	13.4	2.72	2.79	1	0.00	45.0	1475.60	0.00
503.64	0.95									
28	144.24	12.71	13.4	2.72	2.79	1	0.00	45.0	1397.77	0.00
477.07	0.95									
29	146.96	11.97	12.1	2.73	2.79	1	0.00	45.0	1316.86	0.00
450.41	0.96									
30	149.69	11.08	12.1	2.73	2.79	1	0.00	45.0	1218.98	0.00
416.93	0.96									
31	152.42	10.15	10.8	2.74	2.79	1	0.00	45.0	1116.43	0.00
382.82	0.96									
32	155.17	9.08	10.8	2.74	2.79	1	0.00	45.0	998.78	0.00
342.48	0.96									
33	157.91	7.95	9.6	2.76	2.79	1	0.00	45.0	874.72	0.00
300.88	0.96									
34	160.67	6.70	9.6	2.76	2.79	1	0.00	45.0	736.92	0.00
253.48	0.96									
35	163.42	5.38	8.3	2.77	2.79	1	0.00	45.0	591.43	0.00
204.16	0.96									
36	166.19	3.94	8.3	2.77	2.79	1	0.00	45.0	433.54	0.00
149.66	0.96									
37	168.95	2.43	7.0	2.77	2.79	1	0.00	45.0	266.79	0.00
92.48	0.97									
38	171.73	0.81	7.0	2.77	2.79	1	0.00	45.0	88.93	0.00
30.82	0.97									
X-S Area:	390.63	Path Length:	106.19			X-S Weight:	42969.32			

DATA: Analysis 4 - Reclaimed Slope

Material Properties (2 materials)

Material: 1 (Mohr-Coulomb Isotropic) - Sand and gravel, mixed grain size

Cohesion	Phi	UnitWeight	Ru
0.00	45.0	110.00	Auto

Material: 2 (Mohr-Coulomb Isotropic) - Loose sand, mixed grain size

Cohesion	Phi	UnitWeight	Ru
0.00	34.0	99.00	Auto

Water Properties

Unit weight of water: 62.400 Unit weight of water/medium above ground: 0.000

Material Profiles (1 profile)

Profile: 1 (2 points) Material beneath: 1 - Sand and gravel, mixed grain size
0.00 7475.00 300.00 7475.00

Slope Surface (5 points)

0.00 7475.00 50.00 7475.00 200.00 7425.00 250.00 7422.00
300.00 7420.00

Phreatic Surface (2 points)

0.00 7300.00 300.00 7300.00

Failure Surface (Critical, from previous analysis)

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 74.50 YL: 7466.83 XR: 174.50 YR: 7433.50
Centre: XC: 202.59 YC: 7684.43 Radius: R: 252.50

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	50.00	50.00	5.00
Trial positions within range:	10	10	5

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RESULTS: Analysis 4 - Reclaimed Slope

Bishop Simplified Method of Analysis - Circular Failure Surface
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Critical Failure Surface Search using Multiple Circle Generation Techniques

Factor of Safety for initial failure surface approximation: 3.060

There were: 501 successful analyses from a total of 501 trial surfaces

Critical (minimum) Factor of Safety: 3.01

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	99.50	7458.50	149.50	7441.83	204.71	7690.79	255.00	3.014	<-- Critical Surface
2	99.50	7458.50	149.50	7441.83	204.31	7689.59	253.75	3.014	
3	99.50	7458.50	149.50	7441.83	203.91	7688.40	252.50	3.015	
4	99.50	7458.50	149.50	7441.83	203.51	7687.21	251.25	3.015	
5	99.50	7458.50	149.50	7441.83	203.12	7686.02	250.00	3.015	
6	99.50	7458.50	155.06	7439.98	207.38	7689.55	255.00	3.018	
7	93.94	7460.35	149.50	7441.83	201.83	7691.41	255.00	3.018	
8	99.50	7458.50	155.06	7439.98	206.98	7688.36	253.75	3.018	
9	93.94	7460.35	149.50	7441.83	201.43	7690.21	253.75	3.018	
10	93.94	7460.35	149.50	7441.83	201.03	7689.02	252.50	3.018	
11	99.50	7458.50	155.06	7439.98	206.59	7687.17	252.50	3.018	
12	99.50	7458.50	155.06	7439.98	206.19	7685.97	251.25	3.018	
13	93.94	7460.35	149.50	7441.83	200.63	7687.83	251.25	3.018	
14	99.50	7458.50	155.06	7439.98	205.79	7684.78	250.00	3.018	
15	93.94	7460.35	149.50	7441.83	200.24	7686.63	250.00	3.018	
16	88.39	7462.20	149.50	7441.83	198.94	7692.00	255.00	3.021	
17	99.50	7458.50	160.61	7438.13	210.05	7688.29	255.00	3.021	
18	93.94	7460.35	155.06	7439.98	204.49	7690.14	255.00	3.021	
19	99.50	7458.50	160.61	7438.13	209.65	7687.10	253.75	3.022	
20	88.39	7462.20	149.50	7441.83	198.54	7690.80	253.75	3.022	
21	93.94	7460.35	155.06	7439.98	204.09	7688.95	253.75	3.022	
22	88.39	7462.20	149.50	7441.83	198.14	7689.60	252.50	3.022	
23	99.50	7458.50	160.61	7438.13	209.25	7685.90	252.50	3.022	
24	93.94	7460.35	155.06	7439.98	203.70	7687.75	252.50	3.022	
25	99.50	7458.50	160.61	7438.13	208.85	7684.70	251.25	3.022	
26	88.39	7462.20	149.50	7441.83	197.74	7688.41	251.25	3.022	
27	93.94	7460.35	155.06	7439.98	203.30	7686.56	251.25	3.022	
28	88.39	7462.20	149.50	7441.83	197.34	7687.21	250.00	3.022	
29	99.50	7458.50	160.61	7438.13	208.45	7683.51	250.00	3.022	
30	93.94	7460.35	155.06	7439.98	202.90	7685.36	250.00	3.022	
31	99.50	7458.50	166.17	7436.28	212.70	7687.00	255.00	3.026	

32	93.94	7460.35	160.61	7438.13	207.15	7688.85	255.00	3.026
33	88.39	7462.20	155.06	7439.98	201.59	7690.70	255.00	3.026
34	82.83	7464.06	149.50	7441.83	196.04	7692.55	255.00	3.026
35	93.94	7460.35	160.61	7438.13	206.75	7687.65	253.75	3.026
36	99.50	7458.50	166.17	7436.28	212.30	7685.80	253.75	3.026
37	82.83	7464.06	149.50	7441.83	195.64	7691.35	253.75	3.026
38	88.39	7462.20	155.06	7439.98	201.19	7689.50	253.75	3.026
39	82.83	7464.06	149.50	7441.83	195.24	7690.16	252.50	3.026
40	93.94	7460.35	160.61	7438.13	206.35	7686.45	252.50	3.026
41	99.50	7458.50	166.17	7436.28	211.90	7684.60	252.50	3.026
42	88.39	7462.20	155.06	7439.98	200.79	7688.30	252.50	3.026
43	88.39	7462.20	155.06	7439.98	200.39	7687.11	251.25	3.026
44	93.94	7460.35	160.61	7438.13	205.95	7685.25	251.25	3.026
45	82.83	7464.06	149.50	7441.83	194.84	7688.96	251.25	3.026
46	99.50	7458.50	166.17	7436.28	211.50	7683.40	251.25	3.026
47	99.50	7458.50	166.17	7436.28	211.11	7682.21	250.00	3.027
48	82.83	7464.06	149.50	7441.83	194.44	7687.76	250.00	3.027
49	88.39	7462.20	155.06	7439.98	199.99	7685.91	250.00	3.027
50	93.94	7460.35	160.61	7438.13	205.55	7684.06	250.00	3.027
51	77.28	7465.91	149.50	7441.83	193.12	7693.07	255.00	3.030
52	82.83	7464.06	155.06	7439.98	198.68	7691.22	255.00	3.030
53	99.50	7458.50	171.72	7434.43	215.35	7685.67	255.00	3.030
54	88.39	7462.20	160.61	7438.13	204.24	7689.37	255.00	3.030
55	93.94	7460.35	166.17	7436.28	209.79	7687.52	255.00	3.030
56	99.50	7458.50	171.72	7434.43	214.95	7684.47	253.75	3.030
57	88.39	7462.20	160.61	7438.13	203.84	7688.17	253.75	3.030
58	93.94	7460.35	166.17	7436.28	209.39	7686.32	253.75	3.030
59	77.28	7465.91	149.50	7441.83	192.72	7691.88	253.75	3.030
60	82.83	7464.06	155.06	7439.98	198.28	7690.02	253.75	3.030
61	88.39	7462.20	160.61	7438.13	203.44	7686.97	252.50	3.031
62	93.94	7460.35	166.17	7436.28	208.99	7685.12	252.50	3.031
63	77.28	7465.91	149.50	7441.83	192.32	7690.68	252.50	3.031
64	99.50	7458.50	171.72	7434.43	214.55	7683.27	252.50	3.031
65	82.83	7464.06	155.06	7439.98	197.88	7688.82	252.50	3.031
66	77.28	7465.91	149.50	7441.83	191.92	7689.48	251.25	3.031
67	82.83	7464.06	155.06	7439.98	197.48	7687.62	251.25	3.031
68	99.50	7458.50	171.72	7434.43	214.15	7682.07	251.25	3.031
69	93.94	7460.35	166.17	7436.28	208.59	7683.92	251.25	3.031
70	88.39	7462.20	160.61	7438.13	203.04	7685.77	251.25	3.031
71	77.28	7465.91	149.50	7441.83	191.52	7688.28	250.00	3.031
72	93.94	7460.35	166.17	7436.28	208.19	7682.72	250.00	3.031
73	99.50	7458.50	171.72	7434.43	213.75	7680.87	250.00	3.031
74	88.39	7462.20	160.61	7438.13	202.64	7684.57	250.00	3.031
75	82.83	7464.06	155.06	7439.98	197.08	7686.42	250.00	3.031
76	77.28	7465.91	155.06	7439.98	195.76	7691.71	255.00	3.035
77	93.94	7460.35	171.72	7434.43	212.42	7686.16	255.00	3.035
78	88.39	7462.20	166.17	7436.28	206.87	7688.01	255.00	3.035
79	71.72	7467.76	149.50	7441.83	190.20	7693.56	255.00	3.035
80	99.50	7458.50	177.28	7432.57	217.98	7684.31	255.00	3.035
81	82.83	7464.06	160.61	7438.13	201.31	7689.86	255.00	3.035
82	99.50	7458.50	177.28	7432.57	217.58	7683.10	253.75	3.035
83	88.39	7462.20	166.17	7436.28	206.47	7686.81	253.75	3.035
84	82.83	7464.06	160.61	7438.13	200.91	7688.66	253.75	3.035
85	77.28	7465.91	155.06	7439.98	195.36	7690.51	253.75	3.035
86	71.72	7467.76	149.50	7441.83	189.80	7692.36	253.75	3.035
87	93.94	7460.35	171.72	7434.43	212.02	7684.96	253.75	3.035
88	93.94	7460.35	171.72	7434.43	211.62	7683.75	252.50	3.036
89	82.83	7464.06	160.61	7438.13	200.51	7687.46	252.50	3.036
90	88.39	7462.20	166.17	7436.28	206.07	7685.61	252.50	3.036
91	77.28	7465.91	155.06	7439.98	194.95	7689.31	252.50	3.036
92	99.50	7458.50	177.28	7432.57	217.18	7681.90	252.50	3.036
93	71.72	7467.76	149.50	7441.83	189.40	7691.16	252.50	3.036
94	88.39	7462.20	166.17	7436.28	205.66	7684.40	251.25	3.036
95	77.28	7465.91	155.06	7439.98	194.55	7688.11	251.25	3.036
96	71.72	7467.76	149.50	7441.83	189.00	7689.96	251.25	3.036
97	99.50	7458.50	177.28	7432.57	216.78	7680.70	251.25	3.036
98	93.94	7460.35	171.72	7434.43	211.22	7682.55	251.25	3.036
99	82.83	7464.06	160.61	7438.13	200.11	7686.25	251.25	3.036

Critical Failure Surface (circle 1)

Intersects: XL: 99.50 YL: 7458.50 XR: 149.50 YR: 7441.83
Centre: XC: 204.71 YC: 7690.79 Radius: R: 255.00
Generated failure surface: (20 points)
99.50 7458.50 102.04 7457.37 104.59 7456.26 107.15 7455.19
109.72 7454.14
112.31 7453.12 114.90 7452.12 117.51 7451.16 120.12 7450.22
122.75 7449.31
125.39 7448.44 128.03 7447.59 130.69 7446.76 133.35 7445.97
136.02 7445.21

138.70 7444.48 141.39 7443.77 144.09 7443.10 146.79 7442.45
149.50 7441.83

Slice Geometry and Properties - Critical Failure Surface (circle 1, 38 slices)

Slice	X-S	Base							PoreWater	Normal	Test
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	99.50	0.09	24.1	1.27	1.39	1	0.00	45.0	10.02	0.00	6.88	0.95
2	100.77	0.27	24.1	1.27	1.39	1	0.00	45.0	30.06	0.00	20.63	0.95
3	102.04	0.45	23.4	1.27	1.39	1	0.00	45.0	49.17	0.00	33.72	0.95
4	103.31	0.61	23.4	1.27	1.39	1	0.00	45.0	67.04	0.00	45.98	0.95
5	104.59	0.77	22.8	1.28	1.39	1	0.00	45.0	84.20	0.00	57.70	0.95
6	105.87	0.91	22.8	1.28	1.39	1	0.00	45.0	99.89	0.00	68.44	0.95
7	107.15	1.05	22.2	1.29	1.39	1	0.00	45.0	114.99	0.00	78.73	0.95
8	108.44	1.17	22.2	1.29	1.39	1	0.00	45.0	128.60	0.00	88.04	0.95
9	109.72	1.29	21.5	1.29	1.39	1	0.00	45.0	141.59	0.00	96.88	0.95
10	111.01	1.39	21.6	1.29	1.39	1	0.00	45.0	152.90	0.00	104.61	0.95
11	112.31	1.49	20.9	1.30	1.39	1	0.00	45.0	163.80	0.00	112.00	0.95
12	113.60	1.57	20.9	1.30	1.39	1	0.00	45.0	172.93	0.00	118.26	0.95
13	114.90	1.65	20.3	1.30	1.39	1	0.00	45.0	181.69	0.00	124.20	0.95
14	116.21	1.71	20.3	1.30	1.39	1	0.00	45.0	188.48	0.00	128.82	0.95
15	117.51	1.77	19.7	1.31	1.39	1	0.00	45.0	194.99	0.00	133.24	0.95
16	118.82	1.81	19.7	1.31	1.39	1	0.00	45.0	199.63	0.00	136.40	0.95
17	120.12	1.85	19.1	1.31	1.39	1	0.00	45.0	203.85	0.00	139.25	0.95
18	121.44	1.87	19.1	1.31	1.39	1	0.00	45.0	206.11	0.00	140.81	0.95
19	122.75	1.89	18.4	1.32	1.39	1	0.00	45.0	208.08	0.00	142.15	0.95
20	124.07	1.89	18.4	1.32	1.39	1	0.00	45.0	208.01	0.00	142.09	0.95
21	125.39	1.89	17.8	1.32	1.39	1	0.00	45.0	207.61	0.00	141.82	0.95
22	126.71	1.87	17.8	1.32	1.39	1	0.00	45.0	205.34	0.00	140.28	0.95
23	128.03	1.84	17.2	1.33	1.39	1	0.00	45.0	202.55	0.00	138.39	0.95
24	129.36	1.80	17.2	1.33	1.39	1	0.00	45.0	197.92	0.00	135.22	0.95
25	130.69	1.75	16.6	1.33	1.39	1	0.00	45.0	192.64	0.00	131.66	0.95
26	132.02	1.69	16.6	1.33	1.39	1	0.00	45.0	185.70	0.00	126.91	0.95
27	133.35	1.62	15.9	1.34	1.39	1	0.00	45.0	178.04	0.00	121.73	0.95
28	134.69	1.53	15.9	1.34	1.39	1	0.00	45.0	168.64	0.00	115.29	0.95
29	136.02	1.44	15.3	1.34	1.39	1	0.00	45.0	158.63	0.00	108.53	0.95
30	137.36	1.33	15.3	1.34	1.39	1	0.00	45.0	146.83	0.00	100.44	0.95
31	138.70	1.22	14.7	1.34	1.39	1	0.00	45.0	134.34	0.00	91.95	0.95
32	140.05	1.09	14.7	1.34	1.39	1	0.00	45.0	120.12	0.00	82.23	0.95
33	141.39	0.96	14.1	1.35	1.39	1	0.00	45.0	105.18	0.00	72.06	0.95
34	142.74	0.81	14.1	1.35	1.39	1	0.00	45.0	88.61	0.00	60.69	0.95
35	144.09	0.65	13.4	1.35	1.39	1	0.00	45.0	70.99	0.00	48.67	0.95
36	145.44	0.47	13.4	1.35	1.39	1	0.00	45.0	52.12	0.00	35.73	0.95

37	146.79	0.29	12.8	1.35	1.39	1	0.00	45.0	32.02	0.00	21.97	0.95
38	148.15	0.10	12.8	1.35	1.39	1	0.00	45.0	10.62	0.00	7.29	0.95

X-S Area: 47.85 Path Length: 52.80 X-S Weight: 5263.92