

## 6.4.1 EXHIBIT A – Legal Description

- (1) The legal description must identify the affected land, specify affected areas and be adequate to field locate the property. Description shall be by (a), township, range, and section, to at least the nearest quarter-quarter section and (b), location of the main entrance to the site reported as latitude and longitude, or the Universal Transverse Mercator (UTM) Grid as determined from a USGS topographic map. A metes and bounds survey description is acceptable in lieu of township, range, and section. Where available, the street address or lot number(s) shall be given. This information may be available from the County Assessor's Office or U.S. Geological Survey (USGS) maps.
- (2) The main entrance to the mine site shall be located based on a USGS topographic map showing latitude and longitude or Universal Transverse Mercator (UTM). The operator will need to specify coordinates of latitude and longitude in degrees, minutes and seconds or in decimal degrees to an accuracy of at least five (5) decimal places (e.g., latitude 37.12345 N, longitude 104.45678 W). For UTM, the operator will need to specify North American Datum (NAD) 1927, NAD1983, or WGS 84, and the applicable zone, measured in meters.

All lands located within the permit boundary which may be affected include those parcels located in parts of

- SW/4, Section 34; and S/2SE/4, Section 33; all in Township 5 North; Range 66 West; and,
- W/2NE/4, and the E/2NE/4; Section 4; and the W/2NW/4 and NE/4NW/4; Section 3; all in Township 4 North; Range 65 West; all in the 6<sup>th</sup> P.M.; Weld County, Colorado, and comprising 409.234± acres, more or less as determined by American West Land Surveyors, Brighton, CO.

The mine entrance is identified on Exhibit C-2: Extraction Plan Map, and located as identified under NAD 83 Colorado State Plane North Zone:

### Lat/Long for ALL Fields:

*Central Field SW Entrance: Latitude (N) 40.41540 † Longitude (W) -104.64020*

*Central Field N Entrance: Latitude (N) 40.34816 † Longitude (W) -104.77656*

*Central Primary Entrance: Latitude (N) 40.34174 † Longitude (W) -104.77663*

*NW Field S Entrance: Latitude (N) 40.34596 † Longitude (W) -104.78363*

*NW Field E Entrance: Latitude (N) 40.34954 † Longitude (W) -104.77504*

*NE Field SW Entrance: Internal from Central Field*

Town of Milliken is adjacent to a portion of the West Boundary  
Town of Evans is overlain across portions of the combined Parcels



#### 6.4.4 EXHIBIT D – Extraction Plan

The mining plan shall supply the following information, correlated with the affected lands, map(s) and timetables:

- (a) description of the method(s) of mining to be employed in each stage of the operation as related to any surface disturbance on affected lands;
- (b) earthmoving;
- (c) all water diversions and impoundments; and
- (d) the size of area(s) to be worked at any one time.
- (e) An approximate timetable to describe the mining operation. The timetable is for the purpose of establishing the relationship between mining and reclamation during the different phases of a mining operation. An Operator/Applicant shall not be required to meet specific dates for initiation, or completion of mining in a phase as may be identified in the timetable. This does not exempt an Operator/Applicant from complying with the performance standards of Rule 3.1. If the operation is intended to be an intermittent operation as defined in Section 34-32.5-103(11)(b), C.R.S., the Applicant should include in this exhibit a statement that conforms to the provisions of Section 34-32.5-103(11)(b), C.R.S. Such timetable should include:
  - (i) an estimate of the periods of time which will be required for the various stages or phases of the operation;
  - (ii) a description of the size and location of each area to be worked during each phase; and
  - (iii) outlining the sequence in which each stage or phase of the operation will be carried out. (Timetables need not be separate and distinct from the mining plan, but may be incorporated therein.)
- (f) A map (in Exhibit C - Pre-Mining and Mining Plan Maps(s) of Affected Lands, Rule 6.4.3) may be used along with a narrative to present the following information:
  - (i) nature, depth and thickness of the deposit to be mined and the thickness and type of overburden to be removed (may be marked "CONFIDENTIAL," pursuant to Rule 1.3(3)); and
  - (ii) nature of the stratum immediately beneath the material to be mined in sedimentary deposits.
- (g) Identify the primary and secondary commodities to be mined/extracted and describe the intended use; and
- (h) name and describe the intended use of all expected incidental products to be mined/extracted by the proposed operation.
- (i) Specify if explosives will be used in conjunction with the mining (or reclamation). In consultation with the Office, the Applicant must demonstrate pursuant to Rule 6.5(4), Geotechnical Stability Exhibit, that off-site areas will not be adversely affected by blasting.
- (j) Specify the dimensions of any existing or proposed roads that will be used for the mining operation. Describe any improvements necessary on existing roads and the specifications to be used in the construction of new roads. New or improved roads must be included as part of the affected lands and permitted acreage. Affected land shall not include off-site roads which existed prior to the date on

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which notice was given or permit application was made to the office and which were constructed for purposes unrelated to the proposed mining operation and which will not be substantially upgraded to support the mining operation. Describe any associated drainage and runoff conveyance structures to include sufficient information to evaluate structure sizing.

**Prologue:** Extraction of natural resources for rock products is essential to the well-being of a community. The urban infrastructure served by development of construction materials is a local and transitional benefit. The more remote these resources are from the need, the greater the cost to the private and public community. Unlike fixed urban impacts to the landform and area ecosystems, reclamation and restoration of extracted lands allow for preservation of natural buffers, and complementary alteration of both natural and human systems.

Commencing on the family farm in 1948, the Varra family combines nearly 73± years of operational experience that serves as testimony to a history of sound and thoughtfully executed operations of this kind. For the Two Rivers Sand Gravel and Reservoir Project, lands not otherwise occupied for Developed Water Resources will be improved to the highest possible end-use. Post Extraction Uses beyond the Primary Use of Developed Water Resources will likely comprise continuing and diverse general agricultural uses; as well as possible light residential, commercial, or industrial uses; as determined by right, or as otherwise authorized by the governing authority.

The restoration of above ground lands to native grasses and attending large water bodies are a baseline asset to area wildlife terrestrials and avifauna. Beyond good will, there are continuing landowner philosophical and economic enticements to further benefit area wildlife populations and diversity to further the value and enjoyment of the modified and surrounding lands. These efforts laid down over time involve the considerable experience of the landowner, staff, and other resources, including periodic consultation with the Colorado Division of Wildlife, the U.S. Natural Resources and Conservation Service, Colorado State University Natural Resource Departments and Extension Service, and a multitude of other natural resource professionals; including those highly qualified organizations and professionals who have already contributed to the Exhibits included under this application.

**Setting:** The project area lies along and within the flood plain of the South Platte and Big Thompson Rivers. The predominant location of extraction is proximal to the geological delta found near the existing confluence of the two rivers (hence, the Two Rivers Sand Gravel and Reservoir Project (Two Rivers



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Project; or TRP); and overlies bedrock that varies in depths as shallow as 20± feet in some locations, and more commonly 30-45± feet in depth from the surface.

The permit area is flanked on its immediate western boundary by agricultural operations. To the north, residential uses expand, as remnant agriculture clings to the rising ground. Unfettered agricultural and rangeland uses still thrive as they extend beyond the permit boundary east, west, and south of the permit boundary along the alluvial influences of the two rivers. To the immediate east of the TRP, riverine lands are under active transformation into a created wetland bank. It should be understood that agricultural practices will remain active over the project area until converted by resource recovery and reclamation.

America's first Transcontinental Railroad was being discussed in the 1840's, and surveyed in the 1850's. The railroads began the transformation of the American West on 10 May 1869 at Promontory Point, Utah. Railroad routes were being planned for this location and surrounding lands likely soon after the end of America's Civil War. The lines planned over the Two Rivers parcels were never built. Other lines were built nearby, like the Union Pacific's Dent line, that runs parallel to this day along the south bank of the South Platte River; and below the TRP.

With area railroads came increased settlement, and with population the nature of the landscape became modified to complement growing market economies of agriculture and commerce since the early 1870's. We estimate the lands hugging the two rivers were farmed and the topography gradually manipulated for agriculture following the early establishment of Greeley and LaSalle, Colorado; in 1869-70.

Area crops are commonly in corn, but this has not always been the case. We postulate that near the onset of the Twentieth Century sugar beet farming began to feed the demand of area sugar beet mills, further evidenced by speculative railroad routes over and near the parcel, itself. So, the appearance of the land that we see today, is commonly different than what it appeared at the time of settlement.

In order to improve the area and extent of tillable lands, even early agricultural practices included landform modification to aid the plow. Prior floodplain modification is evidenced today by the historical placement of utilitarian levees flanking the existing agricultural fields along the outer cottonwood tree lined escarpments of each river. The levees are maintained to this day, and form perimeter access to the rivers and tillable fields.

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The later creation of farm to market County Road 396 eased access to the areas' agricultural fields, yet consequentially separates the fields at the TRP with its graveled surface, and subsequent rights-of-way and easements.

The levees, public roads, cottonwood corridors and area tributaries are visible in the different map exhibit aerial images, and will not be impacted by planned extraction. All planned operations have conforming setbacks, and levee access will remain limited to wheeled vehicles during operations.

Today, the upper terrace where extraction operations are planned, supports agricultural crops above the lower stream terrace formed further below and beyond the perimeter levees and cottonwood corridors that frame the adjacent active stream channels. The Fields designated for resource recovery (Central Field and North-West Field; as shown on Exhibit C - 2: Extraction Plan Map) lie over a nearly level upper terrace of the two rivers. The South Platte River borders the southern and eastern extent of planned extraction, and the Big Thompson River intersects the permit area north of the Fields.

The stream terrace itself is a riparian area that supports on its flanking escarpment an uneven aged stand of Cottonwood trees. The uneven aged trees suggest this segment of the river has experienced some scouring in the past from periodic, yet commonly limited, flooding; which encourages natural regeneration of Cottonwoods.

To determine the influence of past activities on groundwater, twelve (12) Piezometer Wells were located along and within the entire TRP boundary. Groundwater level information here, is based on 5.75 years of continuous monthly measurements at twelve (12) piezometer locations identified on the included Exhibit G: Water Information Map. Recorded groundwater depths vary in elevation below the surface, with a general (weighted) mean depth of  $8.40\pm$  feet.

Groundwater elevations are influenced by crop irrigation practices that run generally from April through September, and may occasionally lag into the middle of October. During this time groundwater depths may be skewed higher in elevation to the extreme North-eastern extents of Central Field, yet with few exceptions, groundwater elevations over the entire site remain significantly deeper than  $5.11\pm$  feet from the surface, year over year, over the entire TRP area.

Using the approximate surface elevation at the extreme eastern boundaries of North-West Field and Central Field, and noting that groundwater fluctuations will commonly meet at  $8.40\pm$  feet below the surface, yet rarely rise more than  $5.11\pm$  feet from the surface, we determined the Static Water Level using the

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upper limit of 5.0± feet. The Cyan colored contour shown on Exhibit G: Water Information Map represents the Static Groundwater Elevation at 4675' at North-West Field, and 4673' at Central Field. Since completed reservoirs will be lined to meet State of Colorado Water Resources specifications and requirements, and since lined basins will ultimately equalize with the surrounding groundwater elevations, the Static Water Levels shown should reasonably reflect those of the both the lined or unlined state; and represent a proper reflection of the optimal surface area of the water over the finished basins. Raptor Materials, LLC has sufficient water to meet the circumstances and obligations of both the lined and unlined states; and as reflected under Exhibit G: Water Resources Information; until and unless the reservoirs have an approved liner, the Operator will dedicate sufficient waters to secure the reclamation of the resulting basins in the unlined state.

**Planned Field Activities:** The 409.23± acre parcel boundary forms the permit boundary, as reflected on exhibit maps. All lands under its direct control within the 409.23± acre permit area, are affected lands under C.R.S. 34-32.5-103(1), respective of this permit application. As a result, any changes required in the nature of planned extraction or reclamation will be made only through the Colorado Office of Mined Land Reclamation (OMLR), by Technical Revision only. If lands are needed beyond the designated permit boundary, those lands will be secured for the active OMLR permit by Amendment.

Within the permit boundary, there are two\* (2) identifiable areas designated for primary extraction, the description of which will help to explain the nature of planned extraction and reclamation. The Primary Areas of Extraction are as follows:

162.57± Acres = Primary Extraction (\*\*\*) **Central Field:** 15-25± years (2023- '48) \*\*  
 41.04± Acres = Primary Extraction **North-West Field:** 4-8± years (2045- '53) \*\*  
 203.61± Acres = Total Primary Extraction \*  
 205.62± Acres = Affected Lands beyond planned extraction limits  
 409.23± **TOTAL**

(\*) NOTE: The third area of secondary extraction is limited to approx. 5.60± Acres for a Plant Processing/Stockpile Area Pond, as further indicated, below; and is not included in this total.

(\*\*) NOTE: Final reclamation will add up to five (5.0±) years to the anticipated Life of the Mine, subsequent to completion of extraction and removal of all marketable materials. Life of Extraction is an approximation, and could lengthen or shorten the overall life of the mine depending upon market conditions.

(\*\*\*) NOTE: Of the 162.57± Acres of Primary Extraction, 4.09± Acres comprise an existing Farm Yard & Structures with residence. These facilities may be leased or

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otherwise utilized as an Office and Support/Storage facilities for Operations, potable water and sanitation. Lands identified within a designated Extraction Limit may not be extracted, including the Farm Yard area, as circumstances warrant according to the discretion of the Operator.

Of the outlying 205.62± Acres:

15.76± Acres = Plant Processing/Stockpile Area

5.60± Acres = Secondary Extraction - Plant Processing/Stockpile Area Wash Pond

21.35± TOTAL

The remaining 184.27± acres of lands within the permitted limits may comprise planned or existing permanent access roads, levees, previously affected areas, and areas of minor to no disturbance (including public transportation corridors, right-of-way's, easements, permanent structures, river and stream terrace and cottonwood corridor buffer areas), or other farm land features or structures; or as otherwise determined from included maps and aerials. These lands may also include essential support operations, including: parked vehicles, equipment, plant site equipment and processing stockpiles, etc., not otherwise explicitly indicated or shown, but reasonably associated with operations of like kind, and may be varied in location and extent over time; or otherwise, field fit within the permit boundary as warranted.

Wetland conditions appear confined within portions of the stream terrace and bank-full stage of the rivers, and along segments internal to the Evans Canal. Extraction will form a depression (basin) within the floodplain as shown in Exhibit C-2: Extraction Plan Map. Temporary above ground fill may occur within the floodplain, and as part of this permitted activity, provided the above ground volume does not exceed the below ground volume created by extraction. All product stockpiles and processing will occur within the city limits of Evans under this application, and North and outside of the floodplain boundary of the 100-year floodplain of the Big Thompson River. The floodplain extent will be visually marked in the field to better assure the integrity of the floodplain.

Material transport of raw materials from extraction locations to the plant site will occur via conveyor (see route on Exhibit C-2: Extraction Plan Map). This will in turn serve to minimize impacts to area transportation corridors. The actual location, extent, and nature of the conveyor systems not otherwise designated in this submittal will be provided as updates in the required OMLR Annual Reports.

Known structures and landowners, including above and below ground utility owners, located on and within 200± ft. of the permit boundary, are shown on Exhibit C-1: Existing Conditions Map. Exhibit S: Stability Analysis – provides



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certification from a registered professional engineer that these structures will not be harmed by planned extraction profiles and extents.

<sup>1</sup>For lands within the Extraction Limits, only those structures, easements, and rights-of-way shown in Exhibit C-2: Extraction Plan Map, are anticipated to remain from those shown in Exhibit C-1: Existing Conditions Map. If changes to existing or possible revised structures, easements, or right-of-way are in any manner retained, or where they might occur subsequent to OMLR approval of this application, then a Technical Revision will be submitted to update Exhibit C-2: Extraction Plan Map. All established setback distances from planned activities to any remaining features will be maintained regardless.

Operations or related Processing Areas and Wash Pond are not intended to affect existing structures, Easements, or Right-of-Ways within the Planned Extraction Limits identified as remaining and are designed to avoid and retain any remaining structure, Easement or Right-of-Way on the surface, and subsurface. Future agreements may be reached allowing mining in areas currently identified as being restricted to mining containing certain structures, Easements or Right-of-Ways.

Exhibit C-1 shows and identifies all these features understood by us, and the respective Surveyed information, and correlated Observation and Title Work upon which they are based and represented on the attending Maps. The Maps are not Surveys. They are Maps and as such, they comprise a reasonable representation of all site features, but must not be relied upon by themselves exclusively for location purposes. Maps and features are not a substitute for field identification of underground structures and will rely upon location services of the 811 service. Setbacks where required will be based on the actual field locations of site features.

Exhibit C-2 shows the remaining Oil Wells and Lines within Planned Operations at the time of the Submittal. Any revisions, additions, or modifications of residual Oil Wells or Lines will be avoided as represented on updated Maps and Revisions to the Permit, and consistent with Setback Distances identified in this submittal. Removal of any Existing Structures such as the Oil and Gas structures and or lines, will be updated on required Annual Reports, or by Technical Revision, as warranted, or as otherwise directed consistent with Colorado Statute.

**Access to the Theater of Operations:** Entry into the permitted areas is dependent upon the needs and necessary management of continued agricultural activities during operations, as well as essential management and

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<sup>1</sup> Adequacy Item 18

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mobility within the active areas of extraction, processing; and correlated need for transportation of human resources, equipment, and product. Human resources for operations, heavy equipment, and haul traffic will occur based upon the desired and dynamic activities necessitated by time and circumstance within the designated Fields. Access points for continued agricultural, extraction, and plant site operations are shown \* on Exhibit C-2: Extraction Plan Map, as follows (NOTE: Access purpose and usage may change in time from that indicated here-in. Also, General Existing Dimensions and length of existing access roads are represented in the aerial images on the Exhibit Maps relative to the Access locations detailed, below. Modifications may occur as needed and will be reported in OMLR Annual Reports.):



\* Entrance 1: Farmstead entrance. Limited Access. Note: Visitors will first access operations by checking in at an established plant scale-house, not here.

Entrance 2: Primary Access to the lower boundary of Central Field.

Entrance 3: Primary Western Access to the North-West Field.

Entrance 4: Primary Eastern Access to the Wash Pond and designated Plant Site.

Entrance 5: Adjacent Parcel Existing Access.

Entrance 6: Oil & Gas Access into the Western Section of Central Field.

Entrance 7: Primary Eastern Access to the North-West Field.

Entrance 8: Primary Northern Access to Central Field.

Entrance 9: Primary Northern Access into the designated Plant Site location.

Entrance 10: Internal Access from Adjacent Lands.

Entrance X – Agricultural/Mechanical

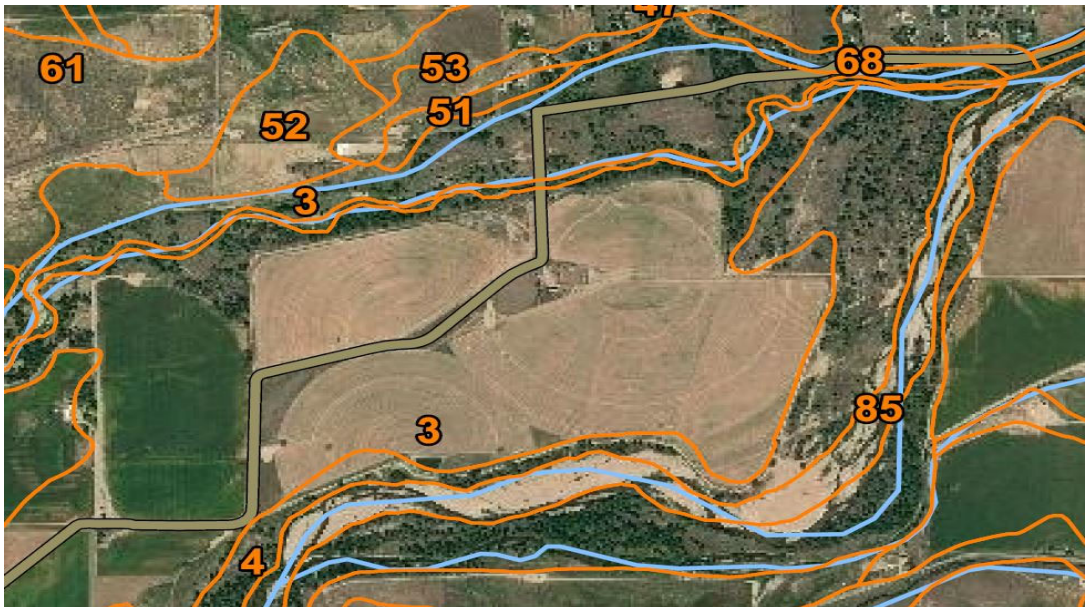
Entrance WV – Agricultural/Mechanical – Westervelt R-O-W Access to adjacent Wetland Bank

Existing roads outside of the permit boundary are shown on Exhibit C-1: Existing Conditions Map. Existing on-site internal access roads are also visible to scale in the aerial information provided under Exhibit C-2: Extraction Plan Map and other map exhibits included with this submittal. In general, Operations will predominantly utilize unmodified existing agricultural field access roads (unless otherwise indicated), which will themselves be subsequently extracted in time where they fall within the extraction limits shown on Exhibit C-2: Extraction Plan Map. No other defined roads within the Extraction Limits will occur except for the temporary paths created by extraction equipment, or otherwise determined by subsequent Revision to the permit.

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All existing agricultural roads outside of the designated extraction limits will be retained according to the desires of the landowner. The same shall form part of the final end use of the reclaimed lands, unless otherwise indicated in this submittal or by subsequent permit revision. For purposes of this submittal, all lands within the indicated permit boundary will be considered affected lands, but only those locations between the existing access roads, and which otherwise remain above the anticipated static water level of the resulting basins, will be soiled (where soil is absent) and seeded to establish vegetation consistent with the approved reclamation plan.

**Area and Site Soils:** Soil formation surrounding and within the project area varies according to diverse geologic, natural, and man-caused influences. The United States Soil Conservation Service, Soil Surveys, are the foundation source for understanding area soils as identified on Soil Survey Maps by their Soil Unit Number. Unit 3 Soil formations for Weld County are not easily typified or quantified as other soil units, for a reason; natural and man-made alteration and use of the land over time.

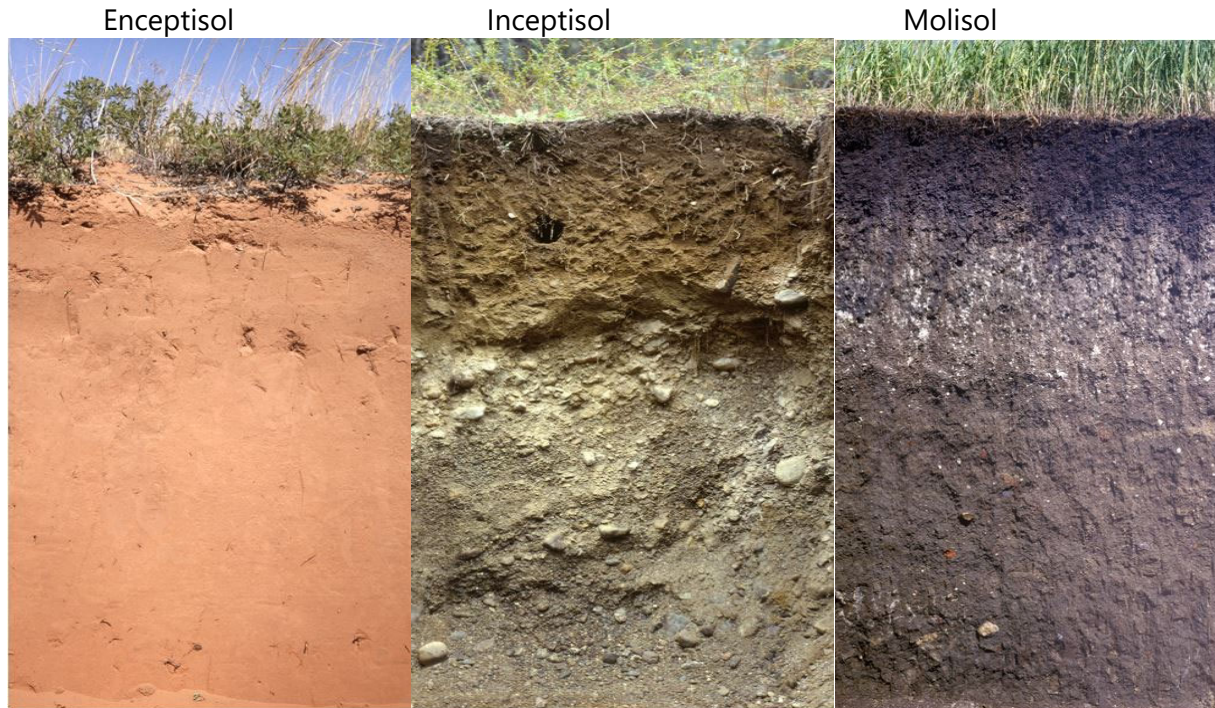


Planned extraction limits will affect predominantly Unit 3 Soils. Extract from Exhibit I/J.

Unit 3 soils commonly form within floodplains. As a result, differing states of soil formation may exist within the soil unit designation; such as soils with little horizon development like Entisols and Inceptisols. Mollisols with deep well-developed horizons may exist in the minority and the near fringe of planned extraction. Refer to graphic above, and below.



## 6.4.4 EXHIBIT D – Extraction Plan



Soil Morphology

With over a century of agricultural manipulation of area agricultural fields, prior mixing or importation of soils for land leveling, or flood plain management in the creation of levees, may have dramatically altered the original native soil profiles and properties. The native A profile of the upland terrace found within the agricultural Fields at the TRP, is predominantly modified as a plow (Ap) layer of  $6.0\pm$  to  $8.0\pm$  inches. The historic practice of incorporating manure into the plow layer should have served to maintain the organic base and quality of the cropped soils and accelerated soil horizon formation and development where it was lagging. Since the cropped soils have been irrigated, care should be taken not to salvage soils greater than  $12.0\pm$  inches in depth to avoid mixing of potential accumulated salts.

Generally, total soil depth (including all soil horizons) over the property may vary from approximately zero inches to four [ $4.0\pm$ ] feet, yet predominantly having a shallow Ap plow layer of six to eight [ $6-8\pm$ ] inches, lacking a B profile and having the potential for a mixture of silt, clay, or gravel outcrops over random areas. Gravel depth may occur from the surface to the underlying Fox Hills Sandstone varying at approximately  $30.0\pm$  to  $45.0\pm$  feet over the entire property. Suitable soil in excess of that needed for reclamation will be made commercially available to meet area infrastructure and residential demand.

Soils found within the entire project area are described more thoroughly under Exhibit I – Soils Exhibit, and the attending Exhibit I/J – Soils and



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Vegetation Map, shown not to scale, above. Additional geologic considerations are also included under Exhibit S - Stability Analysis.

**Area and Site Geology:** The area geology is typified by mixed alluvial and aeolian development, that is commonly alluvial in nature at lower elevations. As viewed in the Geologic Timeline and shown in Figure 1, below, the aggregate deposit is found between the Laramie and Fox Hills Sandstone formations, both formed during the Upper Cretaceous Period nearly 65 million years ago. The alluvium of the river valleys and aeolian sands that cap the hills formed of the Laramie formation north of the permit area are more geologically recent, developing during the Quaternary Period.

ERA	PERIOD	EPOCH	MILLIONS OF YEARS AGO			
				NOW		
Cenozoic	Quaternary	Holocene		0.1		
		Pleistocene		Late Early	0.8	
	Tertiary	Neogene	Pliocene		Late Early	1.8 3.6
			Miocene		Late Middle Early	5.3 11.2 16.4
			Oligocene		Late Early	23.7 28.5
			Eocene		Late Middle Early	33.7 41.3 49.0
			Paleocene		Late Early	54.8 61.0
		Mesozoic	Cretaceous	Late		65.0
				Early		99.0
			Jurassic	Late		144
				Middle		159
				Early		180
	Triassic		Late		206	
			Middle		227	
Early			242			
					248	

Geologic Time - Livescience.com

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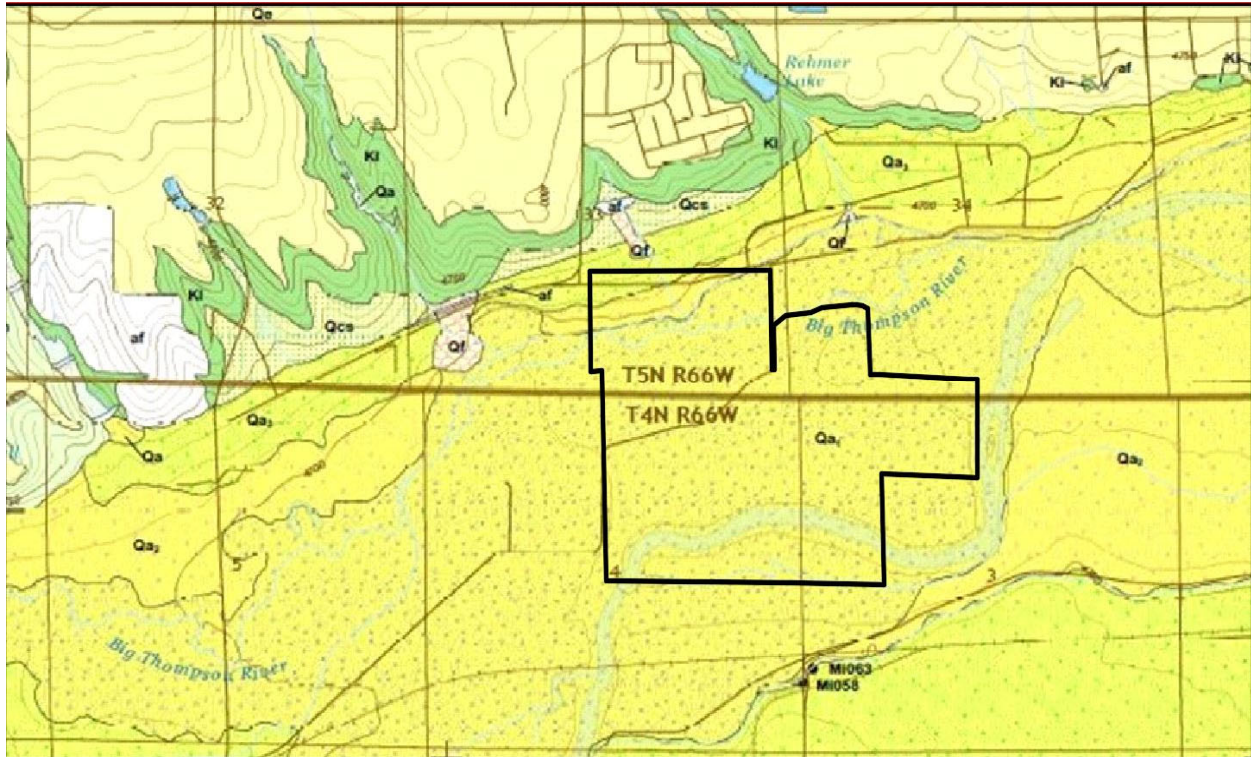


Figure 1: Area Geology Map

The areas of extraction are in the alluvium whose general morphology, area and extent are better understood in Figure 1 above, and 2 and 3, below (Colorado Geological Survey).

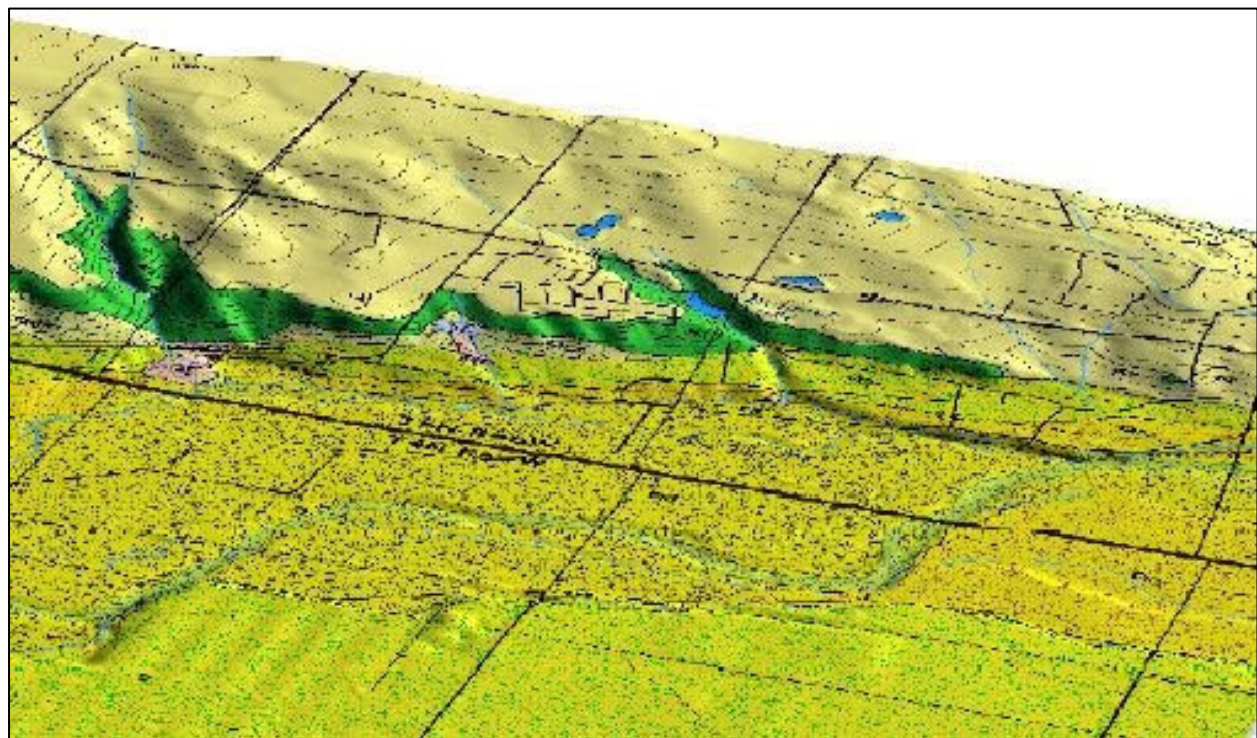


Figure 2: Area Geology 3D Oblique View

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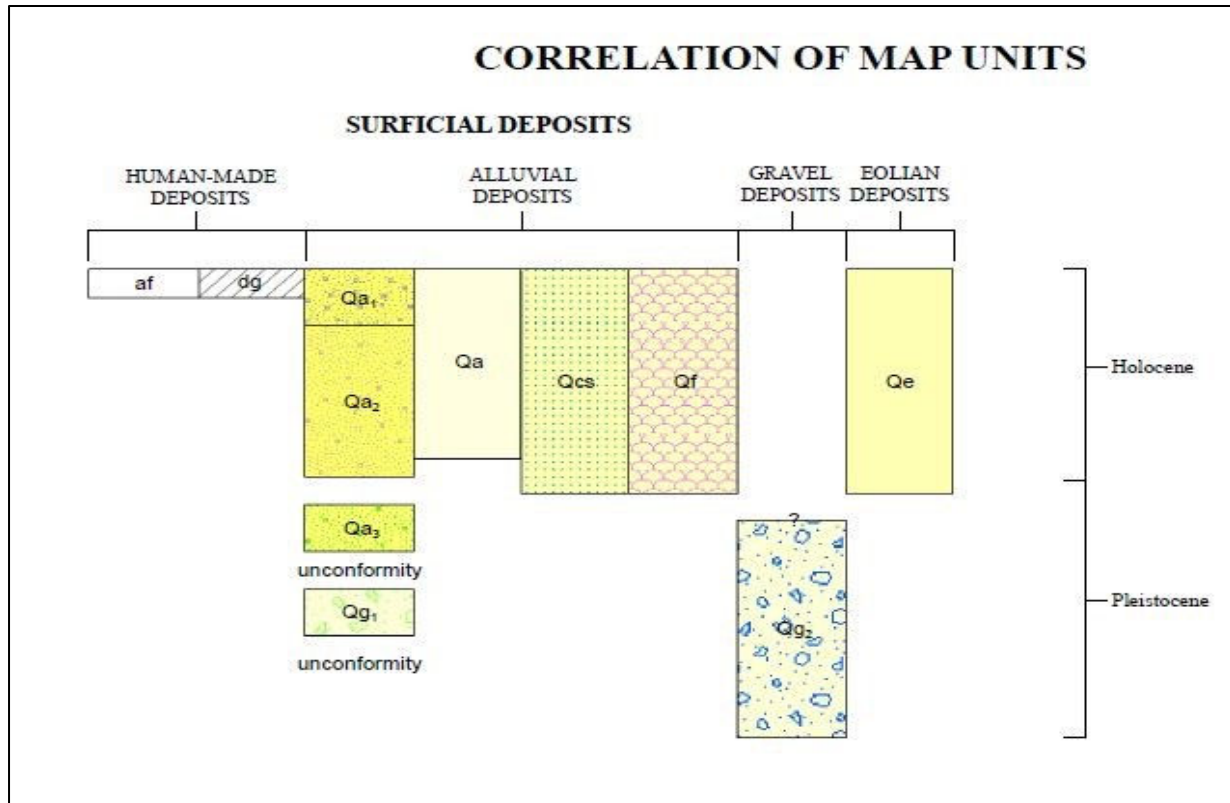


Figure 3: Surficial Deposits relative to areas shown in Figure 2, above.

The aggregate deposits of Qa1 and Qa2 (Figure 3, above) form the bulk of the deposit planned for extraction. Depths vary by field from approx. 30 to 45 feet. Depths are shallower as the adjacent hillside rises to the north; while the deposit dips deeper toward the South-East of each designated Field.

**Soil Salvage:** Resource recovery will commence by first removing the upper [A profile/plow layer] six to twelve inches of soil [six (6.0±) inches typical], combined with existing grass or crop stubble. Removal will utilize scrapers or excavators, aided by dozers where necessary, and hauled to the Northeast Section of Central Field. All extraction and surface related activities detailed in this application will occur under an approved Fugitive Dust Permit issued by the Colorado Department of Public Health and Environment (CDPHE).

Until resoiling activity occurs, where harvested soils have been stockpiled and remain undisturbed for reclamation or sale, they will be seeded with the mixture specified under Exhibit L - Table L-1: Primary/Preferred Revegetation Seed Mixture. A stabilizing cover of native vegetation may take up to three years to fully establish the desired cover. In the event the native seed mixture fails, an optional mixture of predominantly introduced species will be used as a fall back to better assure a stabilizing cover of vegetation. Still, using the



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preferred native seed mixture offers opportunity to gauge the potential performance of the selected species prior to utilizing it over larger areas requiring reclamation later in the life of the resource recovery operation.

Once vegetation is established over the initial reclamation soil stockpiles, they will likely remain untouched for the life of the operation until final reclamation of remaining affected lands takes place. Where concurrent reclamation is possible, operations will utilize soil in an over the shoulder method when practical. In this manner, reclamation is expedited without increasing soil stockpile volumes while reducing expenditures related to labor, handling, and time.

<sup>2</sup>Soil salvaged as stated above will range six to twelve inches in thickness. Resulting volumes of salvaged soil will range from 131,100± - 262,300± cubic yards for Central field, and from 33,100± - 66,300± cubic yards for the North West field. Salvaged soil will generally be stockpiled on top of the Westervelt soil storage area in the North-East section of Central field. Smaller short-term stockpiles may be created along the pit edges where regrading is imminent or in progress and resoiling will follow.

Resoiling volumes required above the waterline of the lined water storage will require much less soil. The resoiling areas are estimated at 11.19 ± acres for Central field and 4.76 ± acres for the North West field with volumes at a nominal six inches of soil cover at 9,027 ± and 3,840± cubic yards respectively. Excess soil not needed on site may be sold.

**Dewatering:** As extraction activity progresses into the aggregate profile, groundwater must generally be removed in advance through the use of pumps and subsequent discharge into area tributaries. A complete dewatering evaluation was performed by AWES in their report of 27 July 2020, as provided at the back of Exhibit G: Water Information. The report concludes that ‘the results of analytical and numerical solutions indicate that the proposed mine dewatering activities will not adversely affect the regional groundwater hydrology.’ The reader is further assured that all discharge of waters will be conducted under an approved CDPHE discharge permit.

Initial dewatering of the property in preparation for extraction and resource recovery will occur by establishment of a dewatering pump and/or well in the Southern boundary near an existing agricultural pond. The point of discharge is on Exhibit G: Water Information Map. Other discharge locations may occur in time as needed and otherwise approved under the applicable

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<sup>2</sup> Adequacy Item 23/32



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CDPHE discharge permit requirements. Subsequent CDPHE approved discharge locations will be field fit and the location updated in the following OMLR Annual Report.

**Active Resource Recovery:** Following soil salvage, the balance of the extractable deposit will be removed to the depth of the unconsolidated or weathered bedrock, transported by conveyor to the plant site pit run, and subsequently manipulated as desired by screening, crushing, washing, and other methods to size and properly dimension the earth product into diverse merchantable materials for sale. Resource recovery will commence radially North and East from a point near the existing pond and planned first discharge point shown near the Southern boundary of Central Field.

There are no fixed sequences or phases scheduled as part of the extraction plan. Instead, Fields are used instead of Phases to describe the activities, since each Field can be accessed concurrently instead of sequentially with the other; as reflected or otherwise updated as part of required OMLR Annual Reports. Under this method, extraction is 'pulsed.' As such, the rate of extraction and subsequent reclamation will slow or quicken according to influences of the markets, weather, and internal logistics. Flexibility in Operations encourages better outcomes when adapting to changing circumstance or unexpected field conditions, and may involve actively working different fields or different parts of the same field as necessary.

<sup>3</sup>For Two Rivers, there are four Fields, intended as sequential areas of extraction unless market demands warrant concurrent development:

- 121.86± Acres - Central Field – Center Section
- 15.58± Acres - Central Field – North-East Section
- 25.09± Acres - Central Field - West Section
- 41.04± Acres - North-West Field

Generally, flexibility aids integrity of operations and encourages optimizing operational activity and subsequent reclamation of affected lands. Therefore, any method that accelerates the extraction timeline will be utilized, and should be encouraged to better engage the unpredictable elements and variables that reasonably affect the capacities of the Operator.

Exhibit C-2: Extraction Plan Map, shows the location and planned extraction limits, general direction of extraction, and related features described above; along with features made obvious in the included aerial image of the permit location and surrounding lands.

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<sup>3</sup> Adequacy Item 17: Aspects of detail required. Other aspects addressed elsewhere.

#### 6.4.4 EXHIBIT D – Extraction Plan

<sup>4</sup>Exhibits C-2: Extraction Plan Map and L: Financial Warranty Map, shows Initial Extraction proposed to begin in the yellow hatch area shown on the Exhibit L Map, comprising 16± acre. The direction of extraction will follow the perimeter of the extraction limits in order to establish the perimeter keyway (dewatering trench<sup>5</sup>) for the 121.86± acre Center Section of Central Field. The perimeter extraction comprises approximately 70.21± acres and will leave an approximately 51.65± acre Core, that may be extracted as needed as keyway drainage capacity allows. The Initial Extraction area is practical as it has no encumbrances and is adjacent to the existing pond<sup>6</sup>.

The initial extraction area is bordered to the South along a near 800± foot section of oil and gas line that is pending removal; along with the two oil and gas wells, also pending removal (refer to Exhibit C for ownership details). If or while this infrastructure is still in place, extraction will not occur within 10 feet of these lines, or 25 feet from the wells, as indicated in the setbacks detailed below. Below this gas line is an existing pond and well that will be used as a Settling Basin Area, containing at present a solitary settling basin and pump as a point of discharge of groundwater. This pond may be expanded or added to below this line and may then be extracted itself once discharge is discontinued for Central Field Operations.

Perimeter Keyway Extraction will maintain a perimeter slope no steeper than 1.25H:1V, except for the perimeter shown in red along its extraction limit, and respective toe where cut slopes will not exceed 2.00H:1V; as indicated (refer to Exhibit S: Stability Analysis for additional information). At the toe of the cut perimeter slope is the keyway that runs below the extracted deposit of the basin, into the bedrock, which allows the subsurface waters to flow to the settling basin and discharge pumps necessary to keep the cut basin dry during a time of extraction and reclamation of the affected perimeter slopes.

The keyway dimensions may vary more or less from 4± to 8± feet in depth and 4± to 16± feet in width. Extraction must be broad enough to allow equipment to safely approach the toe and excise the bed dimensions where the resulting channel is sufficient to convey the groundwaters to the settling basin for discharge.

Please Note: The graphic representation of the Perimeter Keyway Extraction and Core are idealized, and may vary in shape, size, and location presented. Annual Reports will report on the nature and extent of affected lands and

<sup>4</sup> Adequacy Item 17: Modified from first adequacy response to better define the mining and reclamation plan and reference a schedule in Exhibit E.

<sup>5</sup> Adequacy Item 15: Keyway clarification

<sup>6</sup> Minor edits in this paragraph in response to third adequacy review, noting updates to Exhibit C-2 and readability.

#### 6.4.4 EXHIBIT D – Extraction Plan

more properly reflect actual conditions on the ground in a given year of operations.

At anticipated production levels and production only from the Center Section of Central Field, extraction of the remaining perimeter excavation could take 6-7± years. Extraction of the core could then commence and take 6-8± years, overlapping with initial development of the next field. With sequential development, extraction of the North-East Section of Central Field could take 3-5± years, the West Section of Central Field 4-6± years, and the North-West Field, 6-8± years. Please Note: The time periods will depend on the actual rate of production required to meet market demand, and the average annual advance may also vary with thickness of the sand and gravel and ground conditions. Some flexibility may also be exercised to optimize operations around or through existing infrastructure if scheduled for removal.

Table E-1 provides a projection of mine development and regrading/reclamation. The plan as described in this Exhibit D and also in Exhibit E, is a forecast and may vary according to market conditions with mining and subsequent regrading occurring faster or slower, sometimes significantly so. The geology may also dictate changes in the rate of extraction. If efficiency demands in a higher production demand scenario, up to four separate areas could be developed in the manner described simultaneously. Such changes may happen quickly and would be addressed in the Annual Report. <sup>7</sup>In discussing this flexing of production and scaling operations up or down with OMLR staff, a concern was raised as to impacts on mule deer habitat if there were separate production areas with a larger area under active production. This has been addressed as having minimal impact in a letter from Ron Beane, Senior Wildlife Biologist with wildlife consultant ERO Resources Corp attached as an addendum to this Exhibit D.

As discussed above and considered in the letter from ERO Resources Corp, Raptor envisions up to four active mining areas (area of active extraction operations) of up to 16 acres could be in production simultaneously for an anticipated maximum active mining area of 64 acres. As noted in the ERO Resources letter, this area is only a small percentage of the riparian corridor within and adjacent to the extraction area and while Raptor would not anticipate exceeding 64 acres of active mining area, small and temporary variances may occur in response to market demands, coordinating operations around existing infrastructure, water management, or to ensure safe operations. The maximum disturbed area will continue to grow over the life of the operation as the post mining land use is lined water storage and as noted by the DRMS, until the basin is fully extracted and lined, and a leak test is

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<sup>7</sup> Adequacy Item 17: Wildlife concern

#### 6.4.4 EXHIBIT D – Extraction Plan

performed and approved by the State Engineer. Progressive regrading and lining however will be performed and is discussed in Exhibit L.

<sup>8</sup>The fifth adequacy review requested Raptor address minimization of impacts to mule deer population in the riparian corridor along the Big Thompson River during construction of the project and during winter. Raptor commits to construction activities will only be conducted during daylight hours and to not leaving open trenches or pits during construction that could result in harm to animals. Raptor also commits to limiting the use of lights on the conveyor in the riparian areas.

Additional information is provided under Exhibit C-1: Existing Conditions Map; which shows all known current and active significant man-made structures located on or within 200 feet of the permit boundary detailed under including creeks, roads, buildings, oil and gas facilities [such as tanks, batteries, wells and lines], and power and communication lines and support structures, easements and rights-of-way; located over the permitted lands or within 200 feet of the same. A listing of the adjoining surface owner's names and addresses located within these areas are listed under Exhibit C Text, correlated with those shown in the afore-mentioned Exhibit C-1: Existing Conditions Map.

The extraction limits assure through the use of setbacks that other interests are not affected by planned extraction. Extraction is set back uniformly at a minimum 10.0± feet from the edge of property lines; easements and rights-of-way; underground gas lines or other underground facilities, irrigation ditches and seep ditch, wells and other structures. <sup>9</sup>Minor variations may occur in the field over time from those represented on Exhibit Maps. The plans detailed in this application are based upon future events for which minor or temporary departures at any point in time may be evident. To the extent any significant departure in the field occurs in a time and manner not otherwise anticipated in these exhibits, the operator may cure by self-inspection, by observation from OMLR inspection in a timely manner, or by operator-initiated Revision to the Permit or otherwise via clarification in attending required OMLR Annual Reports.

Extraction will not occur closer than 125± feet<sup>10</sup> from the face of a residential structure; unless there is a written accommodation with the owner of the residential structure that allows extraction to occur within a closer stated limit. Extraction will occur no closer than 25± feet from well heads and related above ground facilities. Extraction around well heads will be concurrently backfilled to maintain a 100± foot buffer from the balance of extracted lands. At all

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<sup>8</sup> Fifth Adequacy Response

<sup>9</sup> Adequacy Item 21

<sup>10</sup> Adequacy Item 22



#### 6.4.4 EXHIBIT D – Extraction Plan

times, safety will take precedent and over-ride all other conditions in time with a matter of safety or emergency respective to any and all aspects of the approved permit.

To minimize the potential of river capture, planned setbacks from the two rivers was evaluated by Flow Technologies (refer to report at the back of Exhibit G: Water Information – titled: ‘Two Rivers Riverside Berm Failure Analysis and Flood Control Mitigation Plan’ of 22 January 2020). The report finds:

‘... that head cutting/erosion will not progress through the full length of a 100-ft riverside berms. It is important to note that should a flood occur that results in head cutting/erosion of a riverside berm, Varra Companies, Inc. will act diligently to restore the damaged areas to pre-flood conditions.

As mentioned, this analysis is conservative and riverside head cutting/erosion is based on the 100-yr flood. There is a small probability that such a flood event could occur during extraction and when the pit is dewatered.

The DRMS in a supplemental adequacy response dated November 17, 2022 challenged the validity of the engineered design approach taken by Flow Technologies despite having accepted it as valid in the past. Raptor Materials believes the approach is valid and is in the process of performing an analysis by alternate methods incorporated in HEC-RAS. This, however, will take time. Raptor has per DRMS suggestion decided to adopt the 400-foot setback from the top of the riverbanks to the top of the pit-side slope based on guidance developed using generic and non-site-specific empirical methods as adopted by the Mile High Flood District whose jurisdiction does not include the proposed operation. Raptor Materials intends after permit approval to present the results of the ongoing engineering evaluation as a Technical Revision to obtain relief from what we are confident are extreme setbacks.

During extraction, a predominantly vertical advancing pit wall (the extraction front) is not anticipated due to the use of excavators in the removal of the material deposits. Excavators provide a great deal of control over the extraction process. The maximum length of the extraction front will likely never exceed the length of one side of a quarter section of land, or 1,320± feet, or less; in any given direction. The advancing front will result in a moving face with a slope typically equal to or flatter than 1.25H:1V, and commonly not greater than 1.25H:1V along the perimeter of the extraction limits to depth.

The exception to cut perimeter slopes is shown with a distinct Red Boundary on Exhibit C-2: Extraction Plan Map, where cut slopes will not exceed 2H:1V in order to maintain integrity and stability along that designated perimeter area

#### 6.4.4 EXHIBIT D – Extraction Plan

(refer to the AWES Slope Stability Analyses of 23 December 2019, located at the back of this exhibit). Internal transport of extracted materials to conveyor systems or other internal transport; or otherwise by approved public roadways, will be used in the transportation of extracted materials to the designated plant/stockpile location, described in greater detail, below.

Acreage to be affected during the first year of extraction activities include the establishment of the initial Wash Pond and attending Settling Pond(s), Plant Site, and Initial Areas of Extraction and attending means of transportation by ground haulage or conveyor. While the acreage required for the Plant Site and Wash Pond are not expected to change, the Initial Area of Extraction will expand until concurrent reclamation follows as each location is exhausted of resource.

Although initial extraction may otherwise result in temporary slopes up to 1.25h:1v, all cut slopes will be backfilled with unconsolidated bedrock, overburden (on-site unmerchantable excess materials, or imported inert materials) and soil to advance the reclamation and completion of the desired basins. Final reclaimed slopes and grades will be concurrently established where practical to 3h:1v, or flatter, and at a minimum from 5± feet above to 10± below the expected water level of each location of extraction, and to the basin floor.

Concurrent backfilling and grading of cut perimeter slopes, while desirable, may be obstructed in time and extent by the need to maintain keyways and basin discharge during extraction. Backfilling of slopes can only occur once enough of the floor is exposed to facilitate backfilling and finished grade of extracted basin slopes without interfering with basin discharge operations. This makes concurrent backfill difficult to accurately forecast. Regardless, any completed slope remediation will be indicated in any subsequent OMLR Annual Report.

Cut slopes will cause direct precipitation to drain internally into the resulting basins and are not anticipated to result in any off-site impacts due to erosion or stormwater runoff. The gentle to near flat topography of the area landscape tends to aid in overall stability above the planned areas of extraction. While some erosion of resulting basin perimeter slopes will be evident subsequent to extraction, the advance of reclamation activity over affected lands will provide cover for both near and long-term stability of those lands remaining above water level of the finished basins. All completed slopes above the anticipated static groundwater elevation will be soiled, seeded and stabilized as provided for under Exhibit E - Reclamation Plan.

#### 6.4.4 EXHIBIT D – Extraction Plan

Of the total 203.61± acres of potential extraction, the resulting basins will function as multiple-use reservoirs with a slightly fluctuating combined water surface area covering 187.66± acres. The remaining balance of 37.3± acres of land above the anticipated high-water mark of the reservoirs, and not otherwise committed to existing or planned structures or infrastructure over the parcel, will be stabilized with vegetation; including the anticipated 15.95± acres of basin slopes reflected in the total.

NOTE: Shoreline irregularities and fill to establish and enhance the aesthetic and end-use functions of the resulting basins shown on Exhibit F: Reclamation Plan Map, are illustrative only, as this effect as to location and extent will be field-fit where practical, and may substantively different from that portrayed under the application. The actual location and extent will be identified in subsequent OMLR Annual Reports, and absent there, at the time of any applicable release of a location in part or whole from the permit. Since representations cannot be accurately portrayed in advance, Exhibit F simply identifies the near maximum extent [typical] of the resulting basins or ponds and the potential for shallows during lining and finished grading.

The estimated timetable for extraction, commencing approximately spring to winter 2023; is estimated to take 23-28± years combined, or longer, followed by an additional five years to complete reclamation; or a total estimated life of the mine of 28-33± years; ending approximately winter 2051 to 2056. This is a life of the mine operation and all timetables are estimates and may prove shorter or longer than stated. The final determination will occur five years after the deposit is exhausted and all marketable product has been removed and necessary infill completed at the location to the point of final reclamation as approved or modified under the terms of the permit is completed.

This submittal is unable to fully forecast the maximum extent of affected land expected at any given point in time, beyond an annual basis. As operational extraction and reclamation efforts will vary annually, the timing of extraction, reclamation, and life of operation as forecasts must be based on an initial estimate [refer to Exhibit L - Reclamation Costs], then subsequently verified and adjusted as reasonably determined at the time of the required OMLR Annual Report. If justified by field conditions, a rider to the warranty would follow in due course to reflect current or forecast conditions where such conditions cannot be reasonably attenuated in a timely manner prior to the due date of the next year's Annual Report. This will serve to assure flexibility and confidence in continued operations until completion of the desired end use.

Additional information on the reclamation and restoration of affected lands is identified under Exhibit E: Reclamation Plan. All reclamation will follow

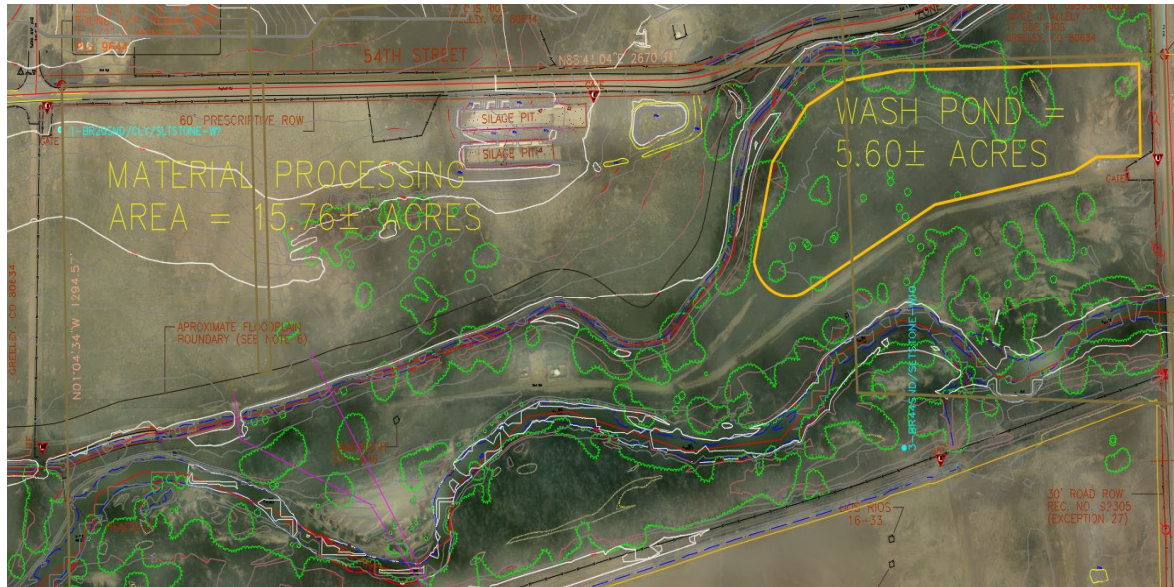
#### 6.4.4 EXHIBIT D – Extraction Plan

guidelines established under Exhibit E - Reclamation Plan and Exhibit I/J: Soils and Vegetation Information, until and unless otherwise revised. To the extent possible, pond bottoms will be left rough, with the possible introduction of logs or other non-putrescent inert material to aid in aquatic habitat and cover [Refer to Exhibit H - Wildlife Information].

**Plant Site Development & Operations:** Plant operations are generally comprised of portable equipment. A small wash pond will be established near the onset of extraction operations as shown in Exhibit C-2: Extraction Plan Map. Deposit materials are predominantly transported or conveyed from the extraction areas to the plants or surrounding yard, where subsequently processed and scaled for sale. Pit-run (unprocessed materials) may also be loaded and transported directly from the extraction areas to area markets as needed and where appropriate. Plant Site operations may also receive and process materials, and utilize fresh water supply, sourced from locations outside of the permit area or planned areas of extraction. Provisions for a material processing plant may at some point be joined by complementary processing that may include periodic use of on-site recycling facilities.

While recycling activities may occur within the approved plant site/stockpile location; concrete and/or asphalt batch plant facilities and locations are not presently determined or sought at the time of this submittal. Due to the extended life of the mine the Operator desires an essential flexibility to complement future area needs according to permit requirements and approvals applicable at the time should such facilities be sought. Any facility development of this kind will be determined at that time as identified in a later Technical Revision to the OMLR under the approved permit. These potential activities are mentioned here solely for purposes of transparency in establishing these activities as acceptable, normal, and necessary activities to meet and facilitate the delivery of essential construction material needs of the area which may occur over time during the life of the approved OMLR Construction Materials Permit Operations.

## 6.4.4 EXHIBIT D – Extraction Plan



Initial Plant Site Theater as seen in Exhibit C-2: Extraction Plan Map

With the exception of the wash pond, whose margins follow existing surface elevations; all plant site processing activities will occur on upland areas outside of the existing 100-year floodplain. These lands occur north and north-west of the existing Evans Ditch as it winds north of the Big Thompson River.

Plant activities will require a wash plant and attending wash pond to recycle wash water and receive discharge silts and other reject fines from the washed product. Plant and Wash Pond areas are identified on Exhibit C-2: Extraction Plan Map. The wash pond will function as recycling wash water and receiving basin for reject fines for the intended Plant/Processing activities. Since the basin functions in a closed system, it will not require dewatering.

Once the wash pond is established, wet plant operations can be created and join any dry plant activities in progress. Dry Plant operations can be readily established since water is not integral to their operations. Once established, wash pond water will function as a closed system. Settled materials from wash Ponds will be utilized as product or for reclamation as desired.

Plant equipment will include, but is not limited to, a crusher, screens, and conveyors, scale house and scale, and attending equipment. Resulting stockpiles of pit run and processed products may be temporarily stockpiled here with processed stockpiles, or combined as needed, until transported to market.



#### 6.4.4 EXHIBIT D – Extraction Plan

<sup>11</sup>The conveyor will be set on an elevated structure at varying heights to be situated about the 1 in 100-year flood level. An average height of 7 feet is expected. The conveyor will be supported by legs at intervals of approximately 40 feet with typically 6- x 2- x 2-foot concrete blocks sitting on ground surface used as necessary to anchor the legs. The conveyor will span the river channel and metal (or other appropriate material) pans will be installed under the conveyor structure to prevent spillage into the river. The design will be similar to other Raptor locations where an extended span has been required to cross a county road. Final conveyor specifications are to be determined however belt width is anticipated in the range 24-36”.

Ultimately, once the wash plant activities near the completion of extracted deposit material, the closed system wash pond will fill with silt and be revegetated in a manner consistent with Exhibit E - Reclamation Plan. Interim clean out of the wash pond will occur until that point, returning the inert materials to the bottom of exhausted pits, or utilizing it in part or in whole as product, or for purposes as substitute soil, soil additive, or as subsoil for reclamation.

Plant and material processing activity will divide materials into diverse and dynamic product stockpiles that will come and go with unpredictable variations in sale and production. To the extent possible, product material will surround plant activities to further lessen visual and noise impacts to surrounding properties.

Plant placement will assure that plant noise is well below that of the nearby traffic. Relative to noise, traffic travelling on area roads at 55 mph or above is approximately 70.0± decibels within 100 feet from the centerline of the Highway. Noise at ground zero at a cone crusher, as measured by a hand-held meter, is at 80.0± decibels, dropping to 70.0± decibels at 100.0± feet from the center. The level drops an additional 5.0± decibels for every 100.0± feet from the center of the crusher and surrounding plant noise, achieving residential background levels at a total setback of 400± feet.

Backup sirens and heavy equipment averaged 60.0± to 75± decibels, with similar decreases in decibel readings from the source measured in a manner similar to that indicated for the crusher and plant equipment sources. Plant stockpiles will aid muting of plant sourced noise just as noise levels at areas of extraction are buffered with increasing depth of extraction.

The location of the portable scale and scale house and correlated internal traffic at the plant site location will vary depending upon production levels and areas needed for product stockpiling. Regardless, the scale house will be

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<sup>11</sup> Adequacy Item 24

#### 6.4.4 EXHIBIT D – Extraction Plan

located along internal paths for haul trucks, where finished material will be weighed and disembarked to help build the urban matrix of roads, highways, foundations, and desirable neighborhoods communities most desire.

For a diverse list of products to be extracted and/or processed, and sold, they may include but are not limited to the more common products identified under [Table DI - Earth Products](#), or other inert or commonly useful products used for diverse construction purposes, including, but not limited to: structural fill, concrete products, road construction products; and other products to aid the residential, commercial, industrial customer; and for any other infrastructure use. Explosives - will not be utilized.

#### 6.4.5 EXHIBIT E - Reclamation Plan

- (1) In preparing the Reclamation Plan, the Operator/Applicant should be specific in terms of addressing such items as final grading (including drainage), seeding, fertilizing, revegetation (trees, shrubs, etc.), and topsoiling. Operators/Applicants are encouraged to allow flexibility in their plans by committing themselves to ranges of numbers (e.g., 6"-12" of topsoil) rather than specific figures.
- (2) The Reclamation Plan shall include provisions for, or satisfactory explanation of, all general requirements for the type of reclamation proposed to be implemented by the Operator/Applicant. Reclamation shall be required on all the affected land. The Reclamation Plans shall include:
  - (a) A description of the type(s) of reclamation the Operator/Applicant proposes to achieve in the reclamation of the affected land, why each was chosen, the amount of acreage accorded to each, and a general discussion of methods of reclamation as related to the mechanics of earthmoving;
  - (b) A comparison of the proposed post-mining land use to other land uses in the vicinity and to adopted state and local land use plans and programs. In those instances where the post-mining land use is for industrial, residential, or commercial purposes and such use is not reasonably assured, a plan for revegetation shall be submitted. Appropriate evidence supporting such reasonable assurance shall be submitted;
  - (c) A description of how the Reclamation Plan will be implemented to meet each applicable requirement of Rule 3.1;
  - (d) Where applicable, plans for topsoil segregation, preservation, and replacement; for stabilization, compaction, and grading of spoil; and for revegetation. The revegetation plan shall contain a list of the preferred species of grass, legumes, forbs, shrubs or trees to be planted, the method and rates of seeding and planting, the estimated availability of viable seeds in sufficient quantities of the species proposed to be used, and the proposed time of seeding and planting;
  - (e) A plan or schedule indicating how and when reclamation will be implemented. Such plan or schedule shall not be tied to any specific date but shall be tied to implementation or completion of different stages of the mining operation as described in Rule 6.4.4(1)(e). The plan or schedule shall include:
    - (i) An estimate of the periods of time which will be required for the various stages or phases of reclamation;

#### 6.4.5 EXHIBIT E - Reclamation Plan

- (ii) A description of the size and location of each area to be reclaimed during each phase; and
- (iii) An outline of the sequence in which each stage or phase of reclamation will be carried out.

(The schedule need not be separate and distinct from the Reclamation Plan, but may be incorporated therein.)

- (f) A description of each of the following:
  - (i) Final grading - specify maximum anticipated slope gradient or expected ranges thereof;
  - (ii) Seeding - specify types, mixtures, quantities, and expected time(s) of seeding and planting;
  - (iii) Fertilization - if applicable, specify types, mixtures, quantities and time of application;
  - (iv) Revegetation - specify types of trees, shrubs, etc., quantities, size and location; and
  - (v) Topsoiling - specify anticipated minimum depth or range of depths for those areas where topsoil will be replaced.

Acknowledged. Rule 6.4.5(1) is an advisory statement, the particulars of which are provided for, below.

**MISSION STATEMENT: Utilizing Resource Recovery of Sand and Gravel as a Method of Conservation to Establish DEVELOPED WATER RESOURCES; and to function as a Foundation for the implementation of other beneficial Multiple End-Uses over the Property.**

#### **Reclamation and Development of the Property over Time.**

The majority of sand, gravel and other earth product demand, like water, is the consequence of market forces resulting from urbanization. The commercial, industrial, transportation, and other land use matrixes arise to support and sustain a growing residential population. Governments count the roof tops for they rely upon public and commercial revenue to sustain the roads, schools, water supply and infrastructure needed to secure it. With continued growth of human habitat and development in Colorado, the products that make possible the construction and maintenance of it all, comes from the ground.



#### 6.4.5 EXHIBIT E - Reclamation Plan

Unconsolidated aggregate deposits simply must be taken where they are formed. The aggregate resource must be recovered from undeveloped locations first, before those locations are overtaken by ever expanding urban development; or it is lost. Now is the time and this is the geologically determined and economically feasible location from which the proposed extraction activity must occur. Hence, the **Two Rivers Sand Gravel and Reservoir Project**.

Underlying earth resources are too often squandered when human development occurs in advance of resource extraction and recovery. Extraction and resource recovery are required by Colorado law to occur in advance of development where sand and gravel deposits are present. The resource is 'recovered' to benefit inevitable and unrelenting human habitat and infrastructure expansion, while providing a more enduring indigenous buffer to the very impacts it serves.

The extraction of aggregate resource is in fact resource conservation. Beyond that, it is an essential social asset. Without earth products, transportation maintenance costs increase as infrastructure begins to fall apart. Industries begin to shrink, along with correlated revenues for state and local governments. Impacts would likely spread downstream from there, degrading schools and everything else dependent upon government revenue, as taxes increase to make up the difference. Affected populations would likely begin to flee an ever-increasing tax burden, further depreciating home values while accelerating loss of revenues from ever diminished home valuations, loss of businesses, jobs, and ultimately the very infrastructure itself. Without earth products, the economic engine and quality of life for everyone, begins to unravel.

The secondary and enduring benefit of mineral extraction is in the reclamation and restoration of extracted lands. Extraction of aggregate resources is comparatively temporary and transitional by its very nature. Reclamation at this location is geared to lay a foundation that will capture both short and long-term multiple-end use benefits that will complement the dynamic mix of surrounding land uses over time. While residential, commercial, and industrial development will eventually be inspired by economic forces over portions of the Two Rivers property; the primary end use will be the creation of essential Developed Water Resources.

An understanding of the vital importance of aggregate resources to the people of Colorado is not new, but well established; and protected. It remains the stated duty of any governing body in Colorado to aid in the lawful recovery of these vital mineral resources under Title 34. Section 22-5-80 of Weld County's Code of Regulations is consistent with Colorado law, both of which require that this resource must be recovered prior to other development which would otherwise impede access to it. Municipalities are obligated for the sake of their citizens to assert the same.

### 6.4.5 EXHIBIT E - Reclamation Plan

The subsequent development of a diverse multiple land use potential at this location, when complemented with sound environmental parameters, as advanced under this application and the attending OMLR permit exhibits, is in keeping with the spirit and intent of the policies and goals of the State of Colorado, Weld County, and the Towns of Evans and Milliken. Approval of the application will allow the resource to be accessed and utilized in a responsible and orderly manner as required under both Colorado law, and consistent with local County and Municipal Regulations.

#### **Specific Reclamation Elements and Methods:**

This application provides substantial detail of features utilizing aerial photography that is ortho-rectified to approximately 1.0± percent of surveyed accuracy. This highly accurate and detailed portrayal of planned extraction and reclamation is visible under Exhibit C-1: Existing Conditions, Exhibit C-2: Extraction Plan Map, and Exhibit F – Reclamation Map. How reclamation will occur over affected lands is further detailed under Exhibit L – Reclamation Costs.

As extraction progresses over the Fields south of the Big Thompson River, the resulting 1.25H:1V slopes (2H:1V, where indicated) created during extraction will be concurrently modified when and where practical. Concurrent reclamation is a natural incentive for Operations to speed site recovery while generally serving to lower attending financial warranty burdens. The cut slopes along the extraction limits perimeter will be finish graded by methods including pushing the resulting pit bottom with a dozer upslope, excavation, hauling and placement of pit bottom material as backfill, or backfilling using previously excavated surplus material of limited or low market value until the resulting basin slopes conform with Rule 3.1.5(7).

Since the primary end use is Developed Water Resources, the basins are intended to hold waters based upon the rights assigned by decree, or as stipulated in regulatory compliance with the Colorado Division of Water Resources, Office of the State Engineer (OSE). This may include the need to augment water sufficient to cover the anticipated exposed groundwaters of the basins in the unlined state. The entire unlined basin is or will be sufficiently covered under an approved substitute supply plan. In order to again liberate waters set aside for augmentation, the basins will at some point in the life of the activity be lined to segregate the basin from Colorado groundwaters.

Lining of basins involves the placement of low permeability compactable fill, from on-site or other suitably sourced geologic materials, into the keyway (dewatering trench<sup>1</sup>); the same keyway used to facilitate discharge to keep the basins dry and

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<sup>1</sup> Adequacy Item 15: Keyway clarification

#### 6.4.5 EXHIBIT E - Reclamation Plan

free of groundwaters at the time of extraction. The balance of the basin floors (where needed) and slopes are also covered and compacted with the same materials until it meets the standards established under the August 1999 State Engineer Guidelines for Lining Criteria. Typical to obtaining approval for the constructed liner, the lined basin must pass a 90-day leak test. Correspondence from the OSE approving the construction of the lined basin will be submitted to the OMLR on receipt; or as part of any request for release of the permit, in part or whole.

Essentially, the pushed parent rock material will form the minimum 3h:1v slopes of the basin and be compacted to a permeability of  $10^{-6}$ ; forming a lined basin that complies with Colorado Water Law and Guidelines mentioned, above. In this manner, the lined basins will maintain a required separation and accounting of stored water from the underlying ground waters. Evidence of compliance with the rules and regulations of the Colorado Division of Water Resources will be provided to the OMLR on completion of the lined basins.

Raptor has extensive experience successfully constructing lined storage reservoirs with several prior projects completed, tested and approved by the OSE. The deposit contains extensive materials suitable for use in constructing the liner including claystone, sandstone-claystone-siltstone and sandstone-siltstone bedrock, clay lenses in the sand and gravel deposit, and overburden often comprised of low plasticity sandy silty clay to silty sand. Excess topsoil has also been successfully used as a liner construction material and would be available from the temporary topsoil stockpile location in the North-East Section of Central Field. Other materials encountered within the sand and gravel deposit during excavation would be stored in temporary piles on the excavation floor. Parameters such as plasticity, percentage of fines etc. have not been determined for the deposit materials at this time but extensive experience in constructing several approved lined storage reservoirs with similar materials along the South Platte river provides high confidence in the availability of suitable materials within the extraction area.

The liner will be progressively constructed once the pit is developed sufficiently to allow regrading and any problems with the efficacy of the liner can usually be detected prior to leak testing through evidence of seeps in the constructed liner which can have remedial action taken. Similarly, although not common, seeps are sometimes observed in the bedrock floor. While these have generally in Raptor's extensive experience proved to be self-healing, where needed remedial action and spot lining and compaction would be undertaken.

Liner construction involves building a compacted low permeability core by placing and compacting suitable material in 6"± lifts. A Caterpillar 815 or 825 (or equivalent) compactor generally makes 2-4 passes to achieve suitable compaction of the core and which experience has shown provides integrity of the core both

### 6.4.5 EXHIBIT E - Reclamation Plan

laterally and vertically. This process starts in the keyway and continues until the core reaches ground level. As the core is built the internal slopes are also brought up to achieve a 3:1 or shallower slope. The exact mix of material used to construct the core is determined at the time of construction based on the materials available. Moisture adjustments required have generally been minimal in prior experience and judgements on additional water are made during construction to achieve a moisture content typically in an optimum range of 2-4 percent. The internal slopes do not necessarily have to be clay materials, but can consist of pit run, overburden, shale or a mixture of these materials. The general approach to construction of the core and regrade of a typical wall at the extraction limit is shown in the Figure 1 below.

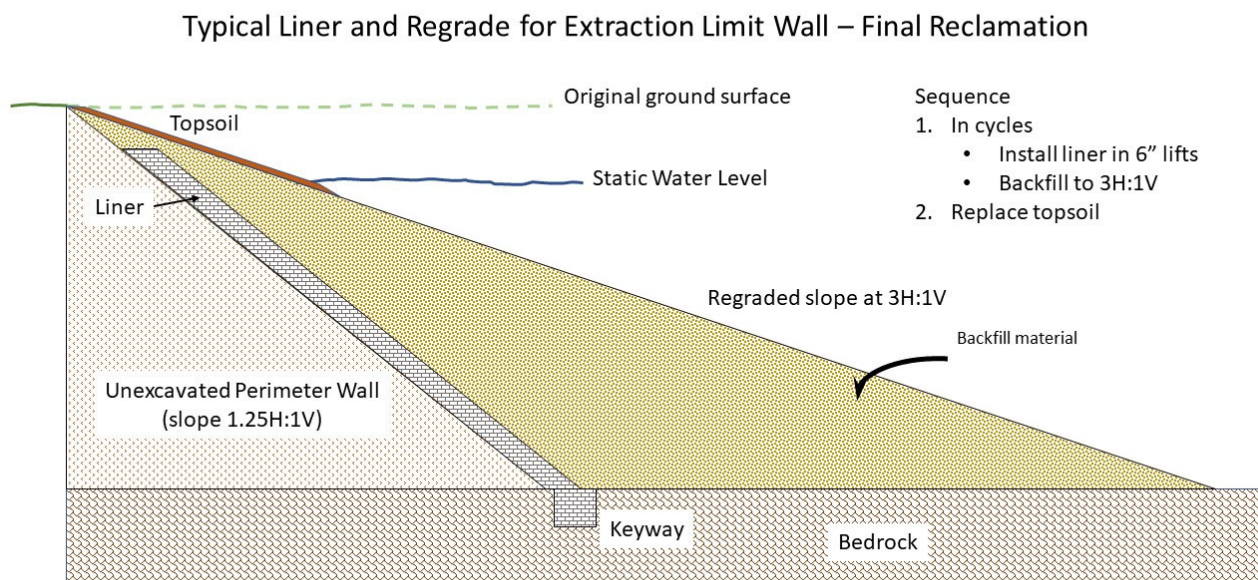


Figure 1: Typical Liner and Regrade for Extraction Limit Wall

<sup>2</sup>A Backfill Notice is included with this application as an Addendum at the back of Exhibit E - Reclamation Plan, to facilitate the fill of portions of the extracted lands for final end-use potentials beyond water storage, which may include residential, commercial or industrial structures or uses otherwise approved, now or in the future, by Weld County, Colorado; or a Colorado municipality, as applicable. The extent and nature of the water storage basin represents the maximum build-out respective of optimal extraction of commercial product and resulting final slopes.

As part of reclamation, lands situated above the anticipated final water level of the completed basins, and within 10.0± feet below the anticipated final water

<sup>2</sup> Adequacy Item 28: Paragraph removed as proposed post mining land use is lined water storage.



#### 6.4.5 EXHIBIT E - Reclamation Plan

level of the basins, will be graded to 3H:1V, or flatter. Lands below 10.0± feet from the anticipated final water level of the basins will also be graded to 3H:1V, or flatter, unless 2H:1V slopes are otherwise approved by subsequent permit revision. Naturally occurring or previously established slopes may exceed 2H:1V where not otherwise affected by extraction activities and may not be altered as part of reclamation unless necessary to facilitate the reclamation of affected lands.

All affected lands between the extraction limits and remaining above the anticipated high-water mark of the basins will be capped with a minimum of six (6.0±) inches of soil, as supported by Exhibit I & J - Soils and Vegetation Information. Timing and use of soil are detailed further under Exhibit I & J - Soils and Vegetation Information and Exhibit L - Reclamation Costs. Where compacted lands exist, and are to be revegetated, those locations will be ripped prior to re-soil application. There are no known areas of compaction at the time of this application which would require such activity; and ripping remains a contingency of the application.

The final land configuration will ultimately result in two (2) reservoir basins totaling 203.61± surface acres, with a static water elevation surface area of 187.66± acres (refer to Exhibit F: Reclamation Map). The balance of unoccupied affected lands above the anticipated static water level will be stabilized where necessary utilizing the seed mixture as shown under Exhibit L - Table L-1: Primary/Preferred Revegetation Seed Mixture. Lands not otherwise occupied for developed water resources will be later developed to the highest possible end-use, and will likely comprise a mixed use which may include other general agricultural uses as well as light residential, commercial or industrial uses.

The Primary Revegetation Seed Mixture, combines a thoughtful mingling of predominantly native grasses of diverse height, form, color and function, to assure that the reclaimed site can provide for a multiple-use benefit. Should post resource recovery land development be deferred, or even negated, all affected land remaining above the anticipated final water level of the resulting ponds will be stabilized with a diverse and durable cover of predominantly native grasses. This is compatible with, and an improvement over the diminished lands located in the floodplain of the two rivers, and area monocultures of residential bluegrass lawns and surrounding cropped land.

<sup>3</sup>Generally, warm and cool seed mixtures can be treated in a myriad of ways. In Table L-1 this distinction is indicated in the column labelled "C/W". Cool season mixtures are often planted in the fall and warm in the spring, however,

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<sup>3</sup> Adequacy Item 33

#### 6.4.5 EXHIBIT E - Reclamation Plan

exceptions may apply. Some argue warm season grasses are better broadcast, while others like them drilled with the cool season grasses.

Combined with the creation of waterfowl habitat, the baseline reclamation plan provided for under this submittal will provide less fragmentation of the area ecology than what may otherwise exist or transpire. As such, the operation will result in immediate and enduring positive impacts to area habitat as a long-term beneficial buffer against continued developmental impacts to the river ecosystem.

Consistent with previous discussions with conservationists from the Division of Wildlife; operations will result in a desirable establishment of irregularities for the finished reservoirs. For example: The basin irregularities will be provided for, both by direct concurrent grading, post mine landform grading and establishment, and use of fill from excess or residual materials and reject fines from the operations. Shallower locations due to variations in site geology may allow for the creation of other shoreline features through the placement of fill.

Due to the unpredictable nature of the anticipated geology [actual depth of material and type will vary - extraction and pond depths are approximated typical maximum extent] and other factors, it is a near misrepresentation to forecast the final appearance of the ponds, as it creates an unrealistic expectation in a regulated environment on the minds of various regulating agents, the general public, and on Operations. Simultaneously, setting false expectations about the final appearance of the ponds, beyond that already portrayed, will drain flexibility from Operations essential to the creation of more desirable effects, while simultaneously exerting pressure for needless and on-going revisions to the permit. It should be remembered that the Annual Report to the OMLR will provide a graphic record of this effort. Since the pace occurs over many years, there is ample time for reflection and analysis of the effort.

Time and timing will also come into play respective of materials to be used as fill. The utilization of fill is dependent upon the space available for deposition over completed areas of extraction in relation to the rate of creation of reject fines and or other deposit materials. Other influences will be the attending space for stockpiling, uses, or market conditions for fill material. Some locations will be more advantageous to fill at a given point in time than others, and the attending circumstances cannot be reasonably anticipated. The random nature of this limitation will actually aid in furthering the establishment of preferred non-geometric patterns of the finished ponds.

Exhibit F - Reclamation Plan Map, represents the regulated base for which reclamation must be judged as adequate for release. At the very least, the

#### 6.4.5 EXHIBIT E - Reclamation Plan

basins delineated under Exhibit F - Reclamation Plan Map, provide desirable shoreline irregularity and slopes in conformance with existing statutory requirements. Anything more is a bonus, for everyone, and every opportunity will be made to take advantage of it, as stated above. Since the creation of aesthetic effects, edge effect, and other natural landforms, remain subjective and empirical, the stated intentions and any resulting efforts to achieve such effects, beyond those identified in the approved seed mixture and as portrayed in Exhibit F - Reclamation Plan Map, is commendable, and to be encouraged.

Placement of soil and initial stabilization of affected lands with a stabilizing cover of grasses will better assure a foundation for later vertical development and establishment of cover; whether resulting from natural invasion or direct planning of trees, shrubs, and forbs. By themselves, the grasses will provide a stable foundation for later enhancements, while visibly improving wildlife habitat by interrupting area monocultures. While end use development beyond that already described cannot be fully determined or detailed at this time, the trend toward continued residential, commercial and industrial development is self-evident on surrounding lands.

Although the establishment of native grasses is a primal requirement under this permit, the incorporation of forbs, shrubs and trees remains at the discretion of the landowner. Markets and the inherent values of the landowner to enhance the multiple end use worth of the property will serve to encourage the vertical development and diversity of the area vegetation with the contribution of forbs, shrubs, and trees. The purpose is to add cover, food source for wildlife and pollinators, and stratified creatures that will come to inhabit and depend upon the natural configuration, character and extent of the finished landform and diverse stabilizing cover.

It should also be kept in mind that extraction is occurring within an area formerly occupied by monocultural crops, The cottonwoods along the lower terrace of the two rivers will be preserved in the majority. A light culling of a few cottonwoods may occur to assure the integrity of the intended conveyor line and wash basin; or as needed to assure the protection of personnel. The riverine areas will otherwise remain untouched, further complementing the utility of the reclaimed and restored expanse.

Whatever long-term development occurs at the location, and on surrounding lands, resource recovery and correlated reclamation at this location will tend to direct human densities away from the two rivers. The reduced densities will produce direct and indirect long-term wildlife benefits and diverse multiple end-use potentials involving inherent wetland development, water resources development, water fowl improvement, and other desirable effects. The long-term worth of this effect will serve to

### 6.4.5 EXHIBIT E - Reclamation Plan

increase the other long-term values for everyone in the area communities formed by the towns of Evans and Milliken; and greater Weld County.

The final acreage of land remaining for development relative to surface acres of resulting ponds is illustrated on the following Exhibit F - Reclamation Plan Map. The map details the post resource recovery land form establishment. The size of the resulting basins is a function of area geology and available resource relative to man-made obstructions that serve to prohibit a greater linkage.

<sup>4</sup>Exhibit F presents Raptor Material's current expectation of the remaining above-ground and underground structures within the Affected Area at the point the reclamation of mining related disturbance is complete. Any revisions, additions, or modifications to this forecast of what may be the outcome of mining and reclamation operations some 30-35± years from now will be updated on required Annual Reports, or by Technical Revision, as warranted, or as otherwise directed consistent with Colorado Statute.

The estimated timetable for extraction, commencing approximately spring to winter 2023; is estimated to take 23-28± years combined, or longer, followed by an additional five years to complete reclamation; or a total estimated life of the mine of 28-33± years; ending approximately winter 2051 to 2056. This is a life of the mine operation and all timetables are estimates and may prove shorter or longer than stated. The final determination will occur five years after the deposit is exhausted and all marketable product has been removed and necessary infill completed at the location to the point of final reclamation as approved or modified under the terms of the permit is completed.

<sup>5</sup>Table E-1 provides a projection of mine development and regrading/reclamation. The plan as described in Exhibit D and above in this Exhibit E, is a forecast and may vary according to market conditions with mining and subsequent regrading occurring faster or slower, sometimes significantly so. The geology may also dictate changes in the rate of extraction. If efficiency demands in a higher production demand scenario, separate areas could be developed in the manner described in Exhibit D simultaneously. Such changes may happen quickly and would be addressed in the Annual Report.

Miscellaneous considerations:

**Fertilizer** may be utilized as part of revegetation efforts. The need for fertilization and any subsequent fertilizer rates will be determined based upon soil tests taken at the time of reapplication of salvaged soil

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<sup>4</sup> Adequacy Item 41

<sup>5</sup> Adequacy Item 29



#### 6.4.5 EXHIBIT E - Reclamation Plan

to affected lands remaining above water level. Status of fertilization and soil test results can be included in OMLR Annual Reports, as warranted. Refer to Exhibit I - Soils Information.

**Weed Control** may involve a mix of mechanical or benign vinegar-based sprays as control methods. A detailed plan to control weeds is described in Exhibit I/J. Treatment and control of noxious or nuisance weeds will be reported in OMLR Annual Reports as warranted.

A **Backfill Notice** follows this page. The flexible use of inert fill will facilitate the timely reclamation of affected lands.

Continued...next page...

## 6.4.5 EXHIBIT E - Reclamation Plan

<sup>6</sup>Table E-1 - Two Rivers Mining-Regrading Schedule

Mining-Regrading Schedule		Years						
Schedule		1-5	6-10	11-15	16-20	21-25	26-30	31-35
	Area (ac)	Area Mined (ac ±)						
Central Field								
Center Section	121.9	40.0	40.0	30.0	11.9			
North-East Section	15.6			10.0	5.6			
West Section	25.1				20.0	5.1		
North West Field	41.0				2.5	34.9	3.6	
<b>Total</b>	<b>203.6</b>	<b>40.0</b>	<b>40.0</b>	<b>40.0</b>	<b>40.0</b>	<b>40.0</b>	<b>3.6</b>	<b>0.0</b>
	Length (ft)	Pit wall Created (ft ±)						
Central Field	14,311	6,200	2,800	2,800	2,511			
North West Field	6,672				1,000	5,672		
<b>Total</b>	<b>20,983</b>	<b>6,200</b>	<b>2,800</b>	<b>2,800</b>	<b>3,511</b>	<b>5,672</b>	<b>0</b>	<b>0</b>
	Length (ft)	Pit wall Regraded (ft ±)						
Central Field	14,311		3,200	3,200	3,600	4,311		
North West Field	6,672					489	5,400	783
<b>Total</b>	<b>20,983</b>	<b>0</b>	<b>3,200</b>	<b>3,200</b>	<b>3,600</b>	<b>4,800</b>	<b>5,400</b>	<b>783</b>
	Length (ft)	Pit wall Remaining (ft ±)						
Central Field	14,311	6,200	5,800	5,400	4,311	0	0	0
North West Field	6,672	0	0	0	1,000	6,183	783	0
<b>Total</b>	<b>20,983</b>	<b>6,200</b>	<b>5,800</b>	<b>5,400</b>	<b>5,311</b>	<b>6,183</b>	<b>783</b>	<b>0</b>

<sup>6</sup> Adequacy Item 29

## 6.4.5 EXHIBIT E - Reclamation Plan

### BACKFILL NOTICE:

**Inert fill** may be imported, or utilized from existing on-site sources, to meet or exceed planned post extraction land use development potentials over the project area during the life of the operation. The extent and location of fill will be field determined. All inert materials used for backfilling will be consistent with OMLR Rules and Regulations, and those of the Colorado Department of Health and Environment.

All **backfill material** will be placed with sufficient fines to minimize voids and settling of backfilled areas and slopes. There are no known or expected acid forming or toxic producing materials or refuse at this location, nor will materials known to possess such qualities be knowingly utilized for fill. Any other refuse or reject materials that do not meet the definition of inert and requiring removal and disposal will be placed in closed containers and taken to an appropriate landfill for disposal, unless it is otherwise 'inert,' per **Rule 3.1.5(9)**, of the OMLR Rules and Regulations.

**All materials**, whether extracted on-site or imported, will be handled in such a manner so as to prevent any unauthorized release of pollutants to surface or ground water resources. All fill will be integrated to meet or exceed the reclamation plan and correlated end uses authorized under the approved Colorado Office of Mined Land Reclamation permit.

All fill above the anticipated static water level of the resulting basins will be soiled and stabilized according to the approved reclamation plan, or as otherwise allowed according to allowed under this application or locally approved land uses. The location and extent of fill utilized over extracted lands will be designated in required OMLR Annual Reports, permit revision, or as part of any request for release of the permitted area, in part or whole.

I, Garrett C. Varra, hereby attest that the material to be utilized as inert fill in the area described as the Two Rivers Sand, Gravel and Reservoir Project; is clean and inert as defined in **Rule 1.1(20)**, of the OMLR Rules and Regulations.

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Garrett C. Varra, General Manager  
Raptor Materials LLC

#### 6.4.6 EXHIBIT F - Reclamation Plan Map

The map(s) of the proposed affected land, by all phases of the total scope of the mining operation, shall indicate the following:

- (a) The expected physical appearance of the area of the affected land, correlated to the proposed mining and reclamation timetables. The map must show proposed topography of the area with contour lines of sufficient detail to portray the direction and rate of slope of all reclaimed lands; and
- (b) Portrayal of the proposed final land use for each portion of the affected lands.

Please refer to the included Reclamation Map.



#### 6.4.7 EXHIBIT G - Water Information

- (1) If the operation is not expected to directly affect surface or groundwater systems, a statement of that expectation shall be submitted.
- (2) If the operation is expected to directly affect surface or groundwater systems, the Operator/Applicant shall:
  - (a) Locate on the map (in Exhibit C) tributary water courses, wells, springs, stock water ponds, reservoirs, and ditches on the affected land and on adjacent lands where such structures may be affected by the proposed mining operations;
  - (b) Identify all known aquifers; and
  - (c) Submit a brief statement or plan showing how water from de-watering operations or from runoff from disturbed areas, piled material and operating surfaces will be managed to protect against pollution of either surface or groundwater (and, where applicable, control pollution in a manner that is consistent with water quality discharge permits), both during and after the operation.
- (3) The Operator/Applicant shall provide an estimate of the project water requirements including flow rates and annual volumes for the development, mining and reclamation phases of the project.
- (4) The Operator/Applicant shall indicate the projected amount from each of the sources of water to supply the project water requirements for the mining operation and reclamation.
- (5) The Operator/Applicant shall affirmatively state that the Operator/Applicant has acquired (or has applied for) a National Pollutant Discharge Elimination System (NPDES) permit from the Water Quality Control Division at the Colorado Department of Health, if necessary.

(1) Operations will not adversely affect surface and groundwater systems. <sup>1</sup>Measures described in the Two Rivers Application and particularly in this Exhibit G, and also in Exhibits D and E are intended to minimize disturbances to the prevailing hydrologic balance of the affected land and of the surrounding area and to the quantity or quality of water in surface and groundwater systems both during and after the mining operation and during reclamation. The manner and method of extraction is detailed under Exhibit D – Extraction Plan. Anticipated effects on surface flows are anticipated to be minor to none. Essentially, the flood plain covers a majority of the property and unless under flood conditions, upland overland flows are generally diverted by levees, surrounding roads, or grassed drainage channels; or otherwise by draining internally into existing or planned basins.

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<sup>1</sup> Adequacy Item 43: Minimization of impacts.

#### 6.4.7 EXHIBIT G - Water Information

- a) <sup>2</sup>Considerable efforts are made to control storm flows, including the use of grassed waterways. Some rilling will occur on cut slopes, but the sediment is inbound. A minor 6-inch furrow above cut slopes will create a 1-foot swale that could minimize such rilling, especially valuable on reclaimed slopes above the final estimated water level of the basins.

The stormwater management plan referenced in Exhibit I & J will address broader water management covering the material processing area and any piles of soil or inert fill constructed external to the excavations.

- b) Impacts to groundwater and area wells from groundwater discharge during mining was evaluated by AWES, LLC in their 27 July 2020 report, as included in this submittal. The report concludes:

'The results of analytical and numerical solutions indicate that the proposed mine dewatering activities will not adversely affect the regional groundwater hydrology. Based on the location of registered water wells, the saturated aquifer thickness west of the mine is sufficient to provide adequate well yields. The predicted drawdown associated with the mine dewatering represents the worst-case scenario and a substantial amount of time will be required before maximum drawdowns will occur.'

<sup>3</sup>Additional groundwater evaluation is documented in an August 30, 2022 letter report addressing initial adequacy items and an August 31, 2022 revised Dewatering Evaluation from AWES, LLC, both provided as addenda to Exhibit G. The estimated time to reach steady state drawdown due to the mining activity is summarized as follows:

'Assuming a saturated thickness of 35 feet, a transmissivity of 4375 ft<sup>2</sup>/day, an effective porosity of 0.27 and a radius of influence of 4000 feet the time to reach steady state is calculated to be 273 days. However dewatering will be progressive during mining and an estimated 1000 days will be required to achieve this radius of influence during early dewatering operations.'

- c) <sup>4</sup>POST RECLAMATION IMPACTS have been minimized:
- i. The AWES report of 27 July 2020 evidences that there will be no measurable impacts of either shadowing or mounding of the resulting lined basin. The operation therefore includes lining of the basin during reclamation of the resulting basin. Satisfaction of Colorado State Standards as to the integrity and functionality of the resulting lined basin

<sup>2</sup> Adequacy Item 43: Prevention of significant runoff

<sup>3</sup> Supplemental Groundwater Adequacy Item 13

<sup>4</sup> Adequacy Item 28: Various edits in this section clarifying post mining land use as lined reservoir

#### 6.4.7 EXHIBIT G - Water Information

will be made in cooperation with the Colorado Division of Water Resources, and any resulting submittals and approvals made available to the OMLR at the time of the Annual Report, or by separate cover. No measurable impacts to the prevailing hydrologic balance are foreseen.

- ii. The Flow Technologies Report of 22 January 2020, provides a plan of modified basin design to be incorporated into this submittal as a means to minimize erosion of the basin berms while optimizing the integrity of the basin from the South Platte and Big Thompson Rivers during a 100-year flood event. The DRMS in a supplemental adequacy response dated November 17, 2022 challenged the validity of the engineered design approach taken by Flow Technologies despite having accepted it as valid in the past. Raptor Materials believes the approach is valid and is in the process of performing an analysis by alternate methods incorporated in HEC-RAS. This, however, will take time. Raptor has per DRMS suggestion decided to adopt the 400-foot setback from the top of the riverbanks to the top of the pit-side slope based on guidance developed using generic and non-site-specific empirical methods as adopted by the Mile High Flood District whose jurisdiction does not include the proposed operation. Raptor Materials intends after permit approval to present the results of the ongoing engineering evaluation as a Technical Revision to obtain relief from what we are confident are extreme setbacks.

- (2) (a) Please refer to Exhibit C-1: Existing Conditions Map. <sup>5</sup>Wells are also shown on Exhibit G: Water Information Map and a table providing well details is included as an addendum to this Exhibit G.
- (b) The known aquifer under the site is the stream alluvium.
- (c) Discharge water will be dissipated with hard surface riprap or established grassed waterways. Other waters are retained by internal pit drainage, directed by vegetated berms or established waterways or through the maintenance or establishment of a stabilizing cover of vegetation, or as otherwise established under an approved Colorado Department of Health stormwater permit and/or stormwater discharge permit.

<sup>6</sup>Stockpiling of soil, overburden, or product above the existing ground elevation will not occur in a manner understood to obstruct flood waters where they might occur within the existing floodplain. It is understood and agreed here-in that their longitudinal dimensions if they occur there should extend parallel to anticipated flood flows where they exceed a cone or other shape that might find its existence contrary to intent by volume beyond that which could be understood to be temporary, or transitory; especially outside of seasonality where flooding might be more reasonably anticipated.

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<sup>5</sup> Supplemental Groundwater Adequacy Item 4

<sup>6</sup> Adequacy Item 45: Floodplain management, including conveyor crossing discussion

## 6.4.7 EXHIBIT G - Water Information

As stated in Exhibit D, the conveyor will be set on an elevated structure at varying heights to be situated about the 1 in 100-year flood level. An average height of 7 feet is expected. The conveyor will be supported by legs at intervals of approximately 20 feet with typically 6- x 2- x 2-foot concrete blocks sitting on ground surface used as necessary to anchor the legs. The conveyor will span the river channel and metal (or other appropriate material) pans will be installed under the conveyor structure to prevent spillage into the river. The design will be similar to other Raptor locations where an extended span has been required to cross a county road. Final conveyor specifications are to be determined however belt width is anticipated in the range 24-36”.

<sup>7</sup>Included as an addendum is the Headwaters Corporation report (July 2019) for what is generally referred to as the Westervelt project which was a stream and floodplain restoration project downstream and adjacent to the Two Rivers project at the confluence of the South Platte and Big Thomson rivers. As described in Exhibit I-J, approximately 200,000± cu.yd. of material excavated in the execution of this project was stockpiled in a 28± acre area comprising most of the North-East section of the Central Field. The Headwaters report discusses the excavation and placement of this material and expected hydrological impacts.

<sup>8</sup>A groundwater monitoring plan has been prepared for the Two Rivers project and is attached as an addendum to this Exhibit G.

- (3) The three components of the project water requirements are water removed for dust control, water removed with the product, and evaporation from exposed ground water. Dust will be controlled using truck sprinklers, and the estimated frequency is one to ten loads per day depending upon field conditions. Dust will be controlled using truck sprinklers, and the estimated frequency varies daily according to seasonal influences of rain, snow, freezing, and temperatures (Refer to Seasonal Temperatures and Precipitation. At 3,000 gallons of truck capacity, the annual demand is 10.6 acre-feet. (Refer to following Chart (days of hot, freezing, rainy and snowy days derived from:

<https://www.bestplaces.net/weather/county/colorado/weld>):

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<sup>7</sup> Adequacy Item 45: Headwaters addendum explanation

<sup>8</sup> Adequacy Item 46



## 6.4.7 EXHIBIT G - Water Information

	* not including Sundays & Holidays										3,000 gallons per Truck		Dust Suppression
Month	Active Days*	Hot Days	Freezing Days	Rainy Days	Snowy Days		# Days	# Trucks per day	Total Trucks per month	# gallons per Month	total gallons per year		Total Acre Feet
January	25	0	31	4	3		39	18	1	18	54,000		0.16
February	23	0	27	4	3		34	16	1	16	48,000		0.15
March	28	0	26	6	4		36	17	2	34	102,000		0.31
April	26	0	14	8	2		24	16	3	48	144,000		0.44
May	25	1	2	10	0		9	14	5	70	210,000		0.64
June	26	7	0	9	0		2	24	10	240	720,000		2.21
July	25	16	0	7	0		-9	25	10	250	750,000		2.3
August	27	12	0	8	0		-4	27	10	270	810,000		2.48
September	25	4	1	7	0		4	21	5	105	315,000		0.97
October	25	0	13	5	1		19	19	3	57	171,000		0.52
November	23	0	26	5	3		34	15	2	30	90,000		0.28
December	25	0	31	4	3		38	18	1	18	54,000		0.16
	303	40	171	77	19		226	230		1156	Annually	3,468,000	10.6 Acre Feet
										1040 Trucks	Apr - Oct =	3,120,000	90% or 9.6 Acre Feet

After the water table is encountered, the water removed with the estimated 1,200,000 tons of product is 35.32 acre-feet per year. The estimated net evaporation is 2.64 feet per year. At the maximum potentially exposed ground water of 217.44± acres, the annual evaporation is 574.25± acre-feet. The monthly distribution of these estimates is shown in the following table. The reclamation plan provides that the pits will<sup>9</sup> be lined after being mined. The lined pits will not require replacement water and will be used for storage. There may be incidental demand for water to establish vegetation on the site after lining is completed. However, the ultimate demand for water will be zero.

Continued... next page...

<sup>9</sup> Adequacy Item 28

## 6.4.7 EXHIBIT G - Water Information

MONTH	PRODUCT (9.59 GAL. WATER/TON)		DUST CONTROL		NET EVAPOATION		
	Tons	af	Trucks	af	ac	x %ev	af
November	60,000	1.77	<b>30</b>	0.28	187.66	0.104	19.52
December	54,000	1.59	<b>18</b>	0.16	187.66	0.000	0.00
January	54,000	1.59	<b>18</b>	0.16	187.66	0.000	0.00
February	93,000	2.73	<b>16</b>	0.15	187.66	0.113	21.21
March	127,500	3.75	<b>34</b>	0.31	187.66	0.138	25.90
April	138,000	4.06	<b>48</b>	0.44	187.66	0.221	41.47
May	139,500	4.11	<b>70</b>	0.64	187.66	0.288	54.05
June	135,000	3.97	<b>240</b>	2.21	187.66	0.413	77.50
July	127,500	3.75	<b>250</b>	2.30	187.66	0.453	85.01
August	118,500	3.49	<b>270</b>	2.48	187.66	0.418	78.44
September	93,000	2.73	<b>105</b>	0.97	187.66	0.294	55.17
October	60,000	1.77	<b>57</b>	0.52	187.66	0.199	37.34
Apr-Oct	811,500	23.88	1040	9.56			428.99
<b>TOTAL</b>	<b>1,200,000</b>	<b>35.32</b>	<b>1156</b>	<b>10.62</b>			<b>495.61</b>

- (4) Water available for supply are from Six sources: Beeline, Big Thompson, South Platte Ditch, Hayseed Ditch as decreed in Case No. 90CW174, four shares of the Rural Ditch Company as decreed in Case No. 03CW306, five shares of Last Chance Ditch Company, 25.0 shares of Godding Ditch Company, and water decreed in Case No. 01CW274. From April through October, water use at the site will be replaced to the stream system using the historical consumptive use credits from any of the sources and/or from storage.

## 6.4.7 EXHIBIT G - Water Information

Because storage is available to regulate the supplies, only the annual historical consumptive use for the sources is shown in the following table.

Source	Annual Consumptive Use, a-f
Beeline	87
Big Thompson & South Platte	274
Hayseed	123
Rural	434
Last Chance	1,191
Godding	384
Total =	2,493

The storage sites are lined pits described in Case No. 01CW274 decree. Water available under these storage decrees will also be stored and used for VCI operations. The storage facilities are listed in the following table. Those currently lined and approved by the state are 112, Von Ohlen, and Dakolios.

### VCI STORAGE FACILITIES (All Values in Acre-Feet)

Reservoir	Active Capacity, a-f	Dead Storage, a-f
112	1,552	0
Dakolios	1,104	0
Von Ohlen	1,300	0
Kurtz	4,000	0
Total	NOT TO EXCEED 7,500 A-F PER YEAR plus refill of 3,000 a-f	0

- (5) <sup>10</sup>A Colorado Wastewater Discharge Permit System Permit has been applied for with the Colorado Department of Health, and an approved permit issued September 27, 2022. The application and permit are provided as an addendum to this Exhibit. Dewatering activities are discussed in Exhibit D.

<sup>10</sup> Adequacy Item 44

#### 6.4.7 EXHIBIT G - Water Information

- (6) The application provides for the lining of the extracted basins (please refer to the AWES Dewatering Evaluation Report of 27 July 2020). Lining will involve the utilization of suitably derived on-site materials to meet final 3H:1V slopes. Subsequently, the same materials may be compacted to satisfy standards for lined basins as established and governed by the Colorado Department of Water Resources Office of the State Engineer. Once operations near completion of any lined basin, the OSE will be contacted and the lined basins will be approved by the OSE prior to use. The OSE approval letter will be provided to the OMLR as a condition of the permit as evidence that the lined basin has met the specifications necessary to pass a liner test as part of the OSE approval process. Consistent with conclusion in the AWES Report, lining of the completed basins will have 'will have a de-minimis effect on groundwater hydrology.' The report continues, adding that, 'Predicted post lining head levels immediately up and downgradient of the barrier walls are within the range of normal seasonal water table elevation changes.'

**NOTE:** Information showing baseline piezometer well readings and respective locations immediately follow this page. <sup>11</sup>The table has been updated from the original application with data extended through June 2022, and the well names conformed to those on Exhibit C-1: Existing Conditions Map and Exhibit G: Water Information Map.

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<sup>11</sup> Adequacy – Dewatering Review Item 3

#### 6.4.8 EXHIBIT H - Wildlife Information

- (1) In developing the wildlife information, the Operator/Applicant may wish to contact the local wildlife conservation officer. The Operator/Applicant shall include in this Exhibit, a description of the game and non-game resources on and in the vicinity of the application area, including:
  - (a) a description of the significant wildlife resources on the affected land;
  - (b) seasonal use of the area;
  - (c) the presence and estimated population of threatened or endangered species from either federal or state lists; and
  - (d) a description of the general effect during and after the proposed operation on the existing wildlife of the area, including but not limited to temporary and permanent loss of food and habitat, interference with migratory routes, and the general effect on the wildlife from increased human activity, including noise.
- (2) The application may be reviewed and commented upon by the State of Colorado Division of Wildlife (DOW). If the DOW has comments, they must be provided prior to the end of the public comment period specified in Subsection 1.7.1(2)(a) to be considered by the Board and Office.

Wildlife residents and visitors observed on area lands, but not on site at the time of the inspection, include the occasional fall/winter roosting of Bald Eagle on nearby mature cottonwood trees, but with no evidence of nesting. Other resident birds of prey have been seen in the area, including hawks and owls. Game species such as wild turkey and white-tailed deer will traverse the river bottom, open spaces and fields nearby; as will fur bearers such as bank beaver, fox, racoon, rabbit, squirrels, and other non-game species.

No significant impacts to wildlife or habitat loss is anticipated by planned operations due to the abundant natural conditions of the surrounding lands, general expanse of the project area and glacial speed of disturbance during planned operations. Still, like the mechanical attributes of the contemporaneous agricultural fields, temporary displacement of wildlife may occur over the immediate area of affected lands during active operations; while on-site speed limits will be posted at 15 mph to better assure the safety of wildlife in proximity to the activity. The abundant edge effect of surrounding unaffected vegetation along the two rivers and other open areas of the surrounding fields should more than compensate for any annoyance.

Extensive operational setbacks from riverine locations provide ample protection to area wildlife within the adjacent riverine locations, while the balance of wildlife is culled on area roadways from increasing densities and unchecked lawlessness of urbanized traffic. Slower enforced speed limits along such corridors and migration routes in general, combined with a perpetual retention of the gravel surface of Weld County Road 396 will help limit wildlife mortality and disturbance.



#### 6.4.8 EXHIBIT H - Wildlife Information

Any planned regional civilian recreational intrusion into the remaining secluded wildlife habitat of the riverine areas should be discouraged. Trails are best placed above the riverine habitat, unless a wildlife void is desired. Where recreational trails are desired, placement should be along banks with greater urban development, with designed setbacks for encroachment on trails from further development.

The imitation of reclamation and restoration experience from operations such as this can be used in diverse applications in urban-centric endeavors. Methods might include the encouragement of native grasses and plants for landscapes, or as a means to invigorate habitat along recreational trails; while allowing vast areas to remain as a means to invigorate the impacted portions of trails already made comparatively sterile from frequent human visitation.

For the stretch of the South Platte River, the South Bank would appear the most amenable for such a design. Without similar sensitivity in the expansion of trails, reduction of paved roadways and decreased densities of human habitat, the urban matrix will certainly come to accomplish what good practices at this location attempts to avoid and reverse. Trails and urban development must not intrude in a manner that would prevent the extraction of a valuable mineral deposit. There is a compelling interest for all citizens of the State of Colorado to reserve these areas to assure their continued economic vitality.

Planned reclamation at the Two Rivers Project is well correlated with both state and federal perspectives, and will serve to provide a number of benefits to the community and to various wildlife species, especially waterfowl; including a return of native vegetation, cover, edge effect and creation of water bodies that will serve as additional sources for food, cover, and resting surfaces. The planned seed mixture will further add to the diversity of height, form, color and function of the resulting vegetative cover.

An inspection of the location for any potential Preble's meadow jumping mouse and Ute ladies' tresses orchid was performed on 18 March 2020; as detailed in a report of 21 July 2018, by Ron Beane, Senior Wildlife Biologist, and Moneka Worah, Natural Resources Specialist with ERO Resources Corp. Subsequent review by U.S. Fish and Wildlife Service has been pending ever since. An updated report of 24 March 2022 has been submitted to U.S. Fish and Wildlife Service, and we anticipate their review and approval as early as this Spring, 2022. Both reports are included at the back of this Exhibit.

Recent policy of the Division of Parks and Wildlife (DOP&W) no longer provides for a pre-submittal report. Regardless, District Wildlife Manager, Mike Grooms; visited the location on 29 September 2021, to discuss and orient to the potential influences and benefits that the planned project extraction and concurrent reclamation may have on

#### **6.4.8 EXHIBIT H - Wildlife Information**

seasonal and perennial resident wildlife and area wildlife visitors to, or in proximity of, the location. While no immediate impacts to critical nesting or migration of area wildlife are presently known along the reach of the two rivers as they occur within the project location, annual observations may occur in cooperation with the Division of Wildlife to assure impacts are considered and reasonable accommodation of field operations can be timely adjusted to accommodate a compelling benefit where and when practicable.

All pertinent correspondence or related clearance letters are included at the back of this Exhibit, or as otherwise provided under Exhibit M – Other Permits.

## 6.4.5 EXHIBIT I/J – Soils and Vegetation Information

### 6.4.9 EXHIBIT I - Soils Information

- (1) In consultation with the Soil Conservation Service or other qualified person, the Operator/Applicant shall indicate on a map (in Exhibit C) or by a statement, the general type, thickness and distribution of soil over the affected land. Such description will address suitability of topsoil (or other material) for establishment and maintenance of plant growth. The above information shall satisfy "completeness" requirements for purposes of determination of date of filing.
- (2) If necessary, at its discretion, the Board may require additional information on soils or other growth media to be stockpiled and used in revegetation to be submitted subsequent to the filing and notification of "completeness" of the application.

### 6.4.10 EXHIBIT J - Vegetation Information

- (1) The Operator/Applicant shall include in this Exhibit a narrative of the following items:
  - (a) descriptions of present vegetation types, which include quantitative estimates of cover and height for the principal species in each life-form represented (i.e., trees, tall shrubs, low shrubs, grasses, forbs);
  - (b) the relationship of present vegetation types to soil types, or alternatively, the information may be presented on a map; and
  - (c) estimates of average annual production for hay meadows and croplands, and carrying capacity for range lands on or in the vicinity of the affected land, if the choice of reclamation is for range or agriculture.
- (2) The Operator/Applicant shall show the relation of the types of vegetation to existing topography on a map in Exhibit C. In providing such information, the Operator/Applicant may want to contact the local Soil Conservation District.

Exhibit I & J – Soils & Vegetation Map, identifies the type and extent of soils over the project site and surrounding lands. Areas designated for resource recovery within the extraction limits will remove all recoverable soils. A portion of the available soils will be utilized for reclamation from a portion of either existing or future soil stockpiles, or suitable *in situ* soils, as circumstances warrant. The balance of soils not otherwise needed for reclamation of affected lands remaining above the anticipated static water level of the completed basins will be made available to meet the demands of the market.

Interpretation of current soil conditions and vegetation suitable for reclamation relies in part on information and correlated available data from the U.S. Soil Conservation Service (SCS) Soil Surveys and updated digital information of the same by the renamed U.S. Natural Resources

## 6.4.5 EXHIBIT I/J – Soils and Vegetation Information

Conservation Service (NRCS). Range Site Descriptions (uniquely designated for each Soil Unit as shown by number and boundary on Exhibit I/J: Soils and Vegetation Map) and other related soil and ecosystem information taken from these publications. The information extracted from this source is included at the back of this exhibit.

### **SOIL LEGEND of on-site soils** (Refer to Exhibit I/J: Soils & Vegetation Map):

**SOIL UNIT #3.** AQUOLLS & AQUEPTS, GRAVELLY SUBSTRATUM; CAPABILITY SUBCLASS VIw; SALT MEADOW RANGE SITE DESCRIPTION [A Horizon = 0-48" Depth - Atypical - Will vary randomly - poorly formed in alluvial floodplain]

**SOIL UNIT #4.** AQUOLLS & AQUEPTS, flooded bottoms and depressions, 0% SLOPES; NO CAPABILITY SUBCLASS; AQUOLLS in SALT MEADOW & AQUEPTS in WET MEADOW RANGE SITE DESCRIPTION [A Horizon = 0-60" Depth - Atypical - Will vary randomly - poorly formed in alluvial floodplain]

**SOIL UNIT #51.** OTERO SANDY LOAM, 1-3% SLOPE; CAPABILITY SUBCLASS IIIe IRRIGATED & VIe NON-IRRIGATED; SANDY PLAINS RANGE SITE DESCRIPTION [A Horizon = 0-12" Depth]

**SOIL UNIT #52.** OTERO SANDY LOAM, 3-5% SLOPE; CAPABILITY SUBCLASS IIIe IRRIGATED & VIe NON-IRRIGATED; SANDY PLAINS RANGE SITE DESCRIPTION [A Horizon = 0-12" Depth]

**SOIL UNIT #53.** OTERO SANDY LOAM, 5-9% SLOPE; CAPABILITY SUBCLASS IVe IRRIGATED & VIe NON-IRRIGATED; SANDY PLAINS RANGE SITE DESCRIPTION [A Horizon = 0-12" Depth]

Interpretations of former native conditions of soils and vegetation are offset and updated by present day field investigations, aerial images, and other resources. Ultimately, what is applied relies upon an arena of experience that draws upon an empirical understanding of the web of environmental, technical, economic, industrial and regulatory factors acting in concert with historical land use influences that depart from the SCS/NRCS records reflected in the Soil Legend, above; and as shown on Exhibit I/J: Soils and Vegetation Map. The combined effort eventually finds itself as applied and established over the completed and newly adapted landscape of the future; as projected in the diverse exhibits made part of this application.

The attending narrative descriptions in the included Soil Survey addendums and extracts, detail the native soils, vegetations, and associated ecological conditions likely prevalent over unaltered lands of like kind, and as they might present themselves over the identified parcels. The identified vegetation is an indicator of what did, or may, grow on the represented soils under native undisturbed soil conditions. This information is utilized to create the seed mixture(s) proposed under Exhibit L - Table L-1: Primary/Preferred Revegetation Seed Mixture. The species selected for reseeding are selected as offering the best genetic potential for establishment of a diverse and enduring stabilizing cover in the reclamation and restoration of the affected lands.

## 6.4.5 EXHIBIT I/J – Soils and Vegetation Information

A portion of *in situ* soils may be used in an over the shoulder method to re-soil the completed banks of basin slopes or other upland areas in time. Commonly, soils will be parked in stockpiles until ready for application in a manner more fully described below.

Consistent with existing zoned agricultural practices, soil from an adjacent wetland bank was approved by the City of Evans, and completed in early 2021. The City of Evans approved (refer to the Addendum at the back of this Exhibit) the placement of these soils within the floodplain of the upper North-East portion of Central Field, as shown on Exhibit C-2: Extraction Plan Map. These orphan soils are in place, seeded, and the area remains under continuing agricultural production, yet are no longer part of the area floodplain. The current extent of this 200,000± cu.yd. stockpile is represented on Exhibit L: Financial Warranty Map. This stockpile location area will also receive a portion of soils removed from planned extraction locations over other areas of Central and North-West Fields. It should be noted that a monoculture of cultivated corn occupies a majority of the planned areas of extraction, and will gradually be turned out of production through extraction. This soil may be utilized to line the resulting basins, for reclamation of affected lands above the static water level, or for market as warranted.

<sup>1</sup>As described in Exhibit D, wetland conditions appear confined within portions of the stream terrace and bank-full stage of the rivers, and along segments internal to the Evans Canal. Excavation and processing activities will not take place within these areas.

Under Exhibit M is an approved U.S. Army Corps of Engineers report designating 'No Permit Required.'

If and when a conveyor is built upon the projected line, the footings are not expected to exceed the requirements for a Nationwide Permit, but if they will, a Nationwide Permit will be applied for and secured prior to affecting such areas. If a Nationwide Permit is necessary, the OMLR will be provided with the necessary justification or approval under an OMLR Technical Revision to that end.

At this time there is little to find in dominant preferred species of cover typifying the cropped fields or riverine areas. Beyond the row crops, the former pasturelands appear impacted by overgrazing, monocultures of smooth brome, annuals, and other comparatively recent impacts. Reclamation will not return the former Fields to agricultural crop production. Further, present day impacts over the planned Processing and Wash Pond locations do not reflect representative or realistic percent cover of a desirable matrix of native vegetation communities intended for reclamation. Consequently, the reclamation target will be to establish a stabilizing foliar cover of predominantly native vegetation (refer to seed mixture) of approximately 20 percent [determined as measured at the stem three inches above the ground surface respective of the foliar diameter of the established grass species, as determined by ocular estimates, or utilizing standard vegetation cover analysis such as line transect, as warranted].

For clarity, topsoil is generally regarded as the plow layer (upper six inches) on agricultural soils, or the A-1 soil profile horizon otherwise. The solum, or soil, includes the topsoil plus all other material found above the regolith of the parent rock, and generally no deeper than the optimal

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<sup>1</sup> Adequacy Item 49



#### 6.4.5 EXHIBIT I/J – Soils and Vegetation Information

depth of roots of perennial plants and trees, or which otherwise meets the definition of soil. One soil differs from another soil by its unique properties and characteristics (such as horizon profile development, structure, texture, color, percent organic matter, chemical composition, etc.) and is identified as such by soil scientists, and detailed in available SCS (NRCS) Soil Survey documents.

The affected soils to be extracted as permitted are designated under the soil survey to fall predominantly under [Unit 3](#): Aquolls and Aquents, gravelly substratum; and may include minor components of Unit 10: Blankard sandy loam (refer to extracts and tables from the 1980 Weld County Soil Survey – Southern Part). Occurring in flood plain locations, as they do at this location, while described as 'deep,' would apply more commonly to the Mollisols that appear to form a minor component of the area soils, while the majority of the location is more characteristic of Aquolls, Aquent or Entisol soil formations, which are commonly poorly formed soils in floodplain locations, and lacking a typical profile or horizon development; or, in the case of the Blankard Series, having a shallow A-profile of 0-5 inches in depth overlying sand and gravel. The lack of a deep, well developed soil profile is in part due to alluvial flooding which both scours and lays down sediment of diverse textural classes over time, but which lacks the appearance of an Inceptisol which is also commonly associated with flood plain locations. Deeper profiles may occur, however they are difficult to map under the best of conditions as they may vary every three (3) feet.

Fundamentally, previous crop production activities over Unit 3 soils created a plow layer over the majority of Central Field, to an approximate depth of six inches; and likely contains the greater percentage of desirable organic matter and texture amenable to plant establishment and sustainability. These former rangelands turned to croplands have no predictable soil profile of consequence as you progress increasingly below the cropped layer. Other minor areas of impact over the remaining acres found within the parcel, have poorly developed soils whose depths vary from zero to eight inches. While anomalous pockets of deeper soil depths may occur, for purposes of this submittal, we will assume a soil depth to the plow layer of six inches over affected lands, excluding any obvious previously disturbed ground where soil has been removed (trenches, structures, etc.). Regardless, there is sufficient soil to assure a reseed depth of approximately six inches over the basin banks above the anticipated static water level of the reservoirs. The predominantly Otero Series soils underlying planned processing and product stockpile and transportation north of the Evans Canal are shallow soils of a foot or less over eolian deposits and alluvium; or sandstone bedrock, as in the case for the Tassel Series Soils. These soils are best left undisturbed where possible and simply reclaimed in place once processing and related activities are completed.

For purposes of this submittal, all lands within the indicated permit boundary will be considered affected lands, but only those locations between the existing access roads, and which otherwise remain above the anticipated static water level of the resulting basins, will be soiled and seeded to establish vegetation consistent with the approved reclamation plan. All other previously disturbed lands outside of this area may be seeded to establish the desired vegetative cover where reaffected by planned activities, but in its previously disturbed state will not receive additional soil resources beyond what already remains, if any. Fortunately, the act of extraction serves to return affected lands to a stable configuration, and in a manner that creates a more enduring and beneficial habitat of indigenous vegetation and abundant water.

#### 6.4.5 EXHIBIT I/J – Soils and Vegetation Information

Soil salvage will commence with the removal of the surface layer of soil to a mean depth of 6.0± inches, depending upon equipment and equipment operator limitations. Additional depths of soil (to the extent it occurs) will be removed in like manner until commercially viable overburden and aggregate are reached, unless already exposed as a result of poor soil development or flood based deposition. Soil salvage will be conducted primarily with excavators, but may include other heavy equipment such as bulldozers as warranted. To minimize the undesirable effects of soil blowing and loss, and to avoid damage to the soil resource via compaction, soil will be stripped wherever possible when soil is moist, and not dry or wet.

Any portion of the solum suitable for plant regrowth will be utilized to meet the minimum depth of soil replacement for reclamation, with the excess made commercially available for export from the property. Generally, soil will be retained in sufficient volume to reclaim all lands remaining between the anticipated static water level of the basins and existing access roads which surround them at any given point in time during resource recovery operations. As detailed under Exhibit L – Reclamation Costs, the initial exposure of lands requiring revegetation will be approximately 8.5± acres in the extraction area, and 21.35± acres requiring 24,049± cu.yds of soil. Total replacement volume required for Central and North-West Fields combined together with the processing area, is 30,089± cu.yds of soil.

Once removed from its native location, soil retained for reclamation will be stockpiled over the North-East portion of Central Field, in an area already improved above the prior floodplain; or otherwise windrowed along the perimeter of the basin area of extraction or area to be resoiled and seeded with the reclamation seed mixture specified under Exhibit L - Table L-1: Primary/Preferred Revegetation Seed Mixture, or as otherwise determined under an approved revision. Stabilization of inactive soil stockpiles will provide an opportunity to gauge the performance of the seed mixture while attempting to provide a stabilizing cover of vegetation over the stockpiled soil until it is ready for replacement on finished slopes and affected lands remaining above the anticipated static water level of the completed reservoir basins.

Direct precipitation from short duration high intensity rainstorm events, and wind, are the common erosion forces opposed to soil stability over *in situ* or established perimeter basin slopes at this location. The more uncommon flood event is considered under Exhibit G: Water Information, in the included Flow Technologies, Flood Control Mitigation Plan of 22 January 2020. Never the less, with few exceptions, the natural forces are commonly slight since the location geology and agricultural uses form a nearly flat table beyond the slopes of the extracted basins.

Further, extraction will result in basin slopes that cause water from direct precipitation to drain internally, minimizing concentrated flows to existing area drainageways outside of the basin areas; while acting as detention and temporarily lowering any intersecting flood velocity and peak flows during a flood event. Additional conservation measures will be taken for common storm events to assure site stability and protection of off-site areas. An example would be directing overland flows, beyond the influence of the extracted basins, to existing or established grassed water ways. The operator's stormwater management plan may address additional detailed information about maintaining on-site stability consistent with its pending Colorado Department of Health stormwater permit.

The measures taken to stabilize soil stockpiles described above, should be adequate for controlling erosion from wind and direct precipitation at those locations. Wind born effects are reduced by

#### 6.4.5 EXHIBIT I/J – Soils and Vegetation Information

surface roughing during continued development of agricultural row crops, or from the natural consequence of extraction activity, itself. Due to the flat topography of the parcel, the interception of upland overland flows by local irrigation ditches and surrounding roads, there is little upland watershed that would impact these locations as a result of nominal storm related events.

The greater threat of erosion will be to resoiled slopes pending establishment of vegetation during reclamation. While some sheet and rill erosion can be anticipated on unprotected areas following seed bed preparation and seeding, planned conservation measures should help to limit erosion potential that would threaten the revegetation efforts.

Prior to resoiling, the foundation material that will underlie the soil will be sculpted to establish initial soil stabilization features, and left rough to aid in re-soil adherence. Soil will be placed over a 12-18± inch minimum friable, or otherwise unconsolidated, subsoil. A 12-18± inch swale with slopes of 3H:1V or flatter will be placed above finished slopes where necessary to direct any upland surface flows around the finished slopes to an established stable drainage corridor or grass-way.

Resoiled areas will be allowed sufficient time to settle prior to seeding. Seeding will commonly follow in the fall or spring as detailed under Exhibit E – Reclamation Plan. Resoiling will occur when soil moisture is adequate to prevent blowing, yet dry enough to prevent compaction. Part of the soil rebuilding process on the reconstituted soils will be in establishing structure to the soils to facilitate plant-soil-water relationships. Overly compacted soils will tend to limit soil structure development and create a poor seedbed for later establishment, so revegetation may be deferred if soils to be reclaimed are manipulated while wet, instead of moist.

Once applied to the surface, the new soils will be exposed to the raw forces of erosion until adequate vegetative cover and root mass develops. Erosion requires both detachment and transportation in order to occur. Running water, wind, and raindrop impact are the main forces of erosion acting upon the soil. The use of a sterile hybrid live cover crop will aid in the stabilization of the soil by allowing a quick vegetative cover to become established in advance of the native grasses. The hybrid will also serve as an aid to reduce competition resulting from the establishment and growth of unwanted pioneer species (weeds) on disturbed ground.

The attending reclamation seed mixture, and as approved, has a provision for the use of a sterile hybrid grass in lieu of mulch. Mulch, even when crimped with specialized equipment, is subject to being blown off the property, or reduced to an ineffective stubble. Often, it has been observed to intercept rainfall where it quickly evaporates from the stubble surface, limiting the benefits of light precipitation by preventing infiltration and percolation of moisture to the root zone. The hybrid on the other hand will establish quickly, but since it is sterile, will not continue to compete with the emerging native grasses. After two to three years, the hybrid grass will begin to die out just as the native grasses emerge and improve their dominance over the revegetated areas.

Increasing Organic matter, such as the incorporation of manure into fallow soils, will aid in the restructuring of the new soils by increasing the moisture and fertility holding capacity of the upper profile seed bed, while simultaneously facilitating healthier plant-soil-water relations and overall root development of the emerging grasses. As the roots of the emerging grasses develop and

#### 6.4.5 EXHIBIT I/J – Soils and Vegetation Information

mature over time, the resulting root mass will serve to build upon the base percent organic matter content of the new soils, thereby increasing the potential for long term survival and spread of the established grasses. Soil testing may occur on the new soils to better gauge the need or success of any applied organic soil amendments respective of the resulting vegetative cover.

The addition of fertilizer may also aid in the establishment, growth and survival of the emerging grasses. Fertilizer may be applied to the seeded areas at rates determined from soil tests of the reapplied soils. To this end, soils may be sampled as needed. Sampling will utilize a hand auger and approved NRCS soil sample bags, and utilizing recommended procedures. Any soil testing will be conducted by the CSU Soil Laboratory in Ft. Collins, Colorado. The tests will be used to monitor soil quality and suitability of any amendments. Fertilizer may be withheld until after emergence to deter the encouragement of weed species. The use, composition and rates of fertilization will be determined prior to the time of seeding where appropriate, and may be reported in the OMLR Annual Reports, as appropriate.

#### WEED MANAGEMENT PLAN:

##### Mapping and Identification:

Field identification and location of targeted weed species is fundamental to determining the extent and character of weed infestation; and in the subsequent development of a treatment plan. Due to the complex nature of identification, assistance with identification and mapping will be sought from among Weld County Weed and Pest Division; Colorado State University Cooperative Extension Service; U.S. Natural Resources and Conservation Service; as well as on-line and internal resources.

Mapping will attempt to identify general areas of infestation within the permit boundary, and vectors of infestation from inside or outside the permit boundary. Vectors are a consideration in prevention of future infestation, which may affect on-site behaviors, including method and means of access within permitted lands. An expectation that vectors from adjacent lands must be treated by adjacent landowners if treatment on permitted lands is to be fruitful is part of continuing treatment considerations.

Since the list of noxious weed continues to grow; and considering the development of new treatments; this management plan is intended to retain the flexibility needed to meet future conditions and capabilities in the arena of weed management and control. <sup>2</sup>Weed management will be under the supervision of a certified weed management specialist. All applicable requirements currently in force at the time will be adhered to. The primary species to be identified, mapped (if found), and treated will include those species on the State of Colorado noxious weed list, as updated. List A species will be eradicated and List B Species will be controlled. Weed management efforts will also attend to current guidance from the Weld County Department of Public Works.

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<sup>2</sup> Adequacy Item 34/50

#### 6.4.5 EXHIBIT I/J – Soils and Vegetation Information

It should be noted that many weeds are sourced and vectored from adjacent lands and waterways. Weed management will suffer to diminishing effects that may beyond the capacities of the Operator to ameliorate if responsible weed management fails on those lands. Consideration of due diligence should apply respective of on-site efforts and limitations due to sources and vectors beyond the reach of the Operator.

##### Treatment:

Once the nature and extent of weeds have been mapped, and vectors identified; a course of treatment options will be considered in order of priority of economy and effectiveness. The overall object of weed management will be to control weeds by establishing a healthy competitive stand of vegetation that wins the competition for plant available water. This effort is linked to on-site soil management; including monitoring of soil fertility and percent organic matter on problem lands; relative to distribution and amount of field available moisture on affected areas.

Physical weed control at the site will utilize non-chemical means, unless, due to weed morphology, or other factors, circumstance require application of other methods or an approved herbicide. If chemical weed control is utilized, it will be conducted in compliance with manufacturer's recommendations and in conformance with applicable federal, state, or local laws. Chemical treatment of weeds will be the last option considered except where all other methods of competitive control fails; including mechanical cutting, tilling, or removal of noxious weeds.

Where possible, pre-emergent weed control chemicals will be utilized. An exception to chemical weed control would be operator applied concentrated vinegar based organic weed control that does not harm soil or water. This is especially advantageous in application near water bodies.

In general, weeds will be mowed or mechanically removed before a seed head can develop. This will take priority over recently seeded areas expressing emergent grasses. Where mechanical means fail; chemical applications may follow according to recommendations from previously stated sources, and applied accordingly (see above) to prevent damage to grasses, aquatic species and wildlife. An example of Chemical treatment and primary noxious weeds can be found at the Colorado State University Extension Service website: <http://www.ext.colostate.edu/>.

Still, predominant weed control efforts will focus upon prevention, principally through the establishment of a diverse stabilizing cover of grasses, as described earlier. Regardless of control methodology, the intent of mechanical and chemical methods will be to prevent weed species from reproducing vegetatively, or by seed in percentages that threaten the preferred species. In general, the idea is to aid the grasses in out competing weed species for plant available water and nutrients in the new soils, until such a time that the grasses are fully established over the applied areas, are dominant over the weeds, and capable of self-regeneration. It should be understood that some weeds will remain. Total eradication of weeds is unlikely under the best circumstances, and is not a reasonable expectation or likely outcome.



#### 6.4.11 EXHIBIT K – Climate

Provide a description of the significant climatological factors for the locality.

The following climatic data is derived from text and tables extracted from the 1980 Weld County Soil Survey – Southern Part.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Greeley and Ft. Lupton for the period 1951 to 1974. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

The average winter temperature is 29° F. Average summer temperature is 70° F., and the average daily maximum temperature is 87° F. Of the total annual precipitation of nine (9) inches, seventy-five percent falls between April and September, which comprise the growing season for most crops. Average seasonal snowfall is 40 inches. The prevailing winds are from the south. Average wind speed is highest at 10.4 mph. in August.

**6.4.12 EXHIBIT L - Reclamation Costs**

- (1) All information necessary to calculate the costs of reclamation must be submitted and broken down into the various major phases of reclamation. The information provided by the Operator/Applicant must be sufficient to calculate the cost of reclamation that would be incurred by the state.
- (2) The Office may request the Operator/Applicant to provide additional, reasonable data to substantiate said Operator/Applicant's estimate of the cost of reclamation for all Affected Lands.

**Summary of Reclamation Costs:**

\$ 12,427.45±	Site Discharge
\$ 130,002.96±	Total Grading per Extraction Front.
\$ 321,033.08±	Total Liner Construction Expense
\$ 20,359.20±	Total Re-soiling (inc. Processing area)
\$ 5,449.27±	Total Re-vegetation Expense (inc. Processing area)
\$ 74,552.68±	<u>Total Processing/Conveyor Removal Expense</u>
\$ 563,824.65±	Sub-Total
\$ 10,000.00±	<u>Possible Mobilization and Demobilization Costs (pending OMLR estimate)</u>
\$ 573,924.65±	<b>Sub-Total Direct Costs</b>
\$ 139,640.23±	<u>Possible Indirect Costs Pending DRMS Indirect Costs @ 24.335 % of Total Reclamation Costs</u>
<b><u>\$ 713,464.87±</u></b>	<b><u>Grand Total – Financial Warranty Amount – Pending OMLR Review and estimates including estimated expenses for State of Colorado Mobilization and Demobilization and other ‘Indirect’ cost determinations by the Office.</u></b>

**SUMMARY OVERVIEW:**

Table 1 - Primary Data on Area of Total Proposed Affected Lands and Reclaimed Features:

Entity	Central Field	North-West Field	Combined
Extraction – finished basin (Acres)	162.57	41.04	203.61
Static Water Area – surface (Acres)	151.38	36.28	187.66
Static Water Area – elevation (ft.)	4,673	4,675	
Basin Lands Above Static Water Level (Acres)	11.19	4.76	15.95
Basin Area Volume (cu.yds.)	7,278,366	1,649,937	8,928,303
Static Water Level Volume (Gallons)	1,470,040,694	333,244,376	1,803,285,070
Static Water Level Volume (Acre Feet)	4,511.4	1,022.7	5,534.1
Plant Processing Area (Acres)			15.76
Wash Pond Area (Acres)			5.60
Total Lands Above Static Water Level (Acres)			37.31

## 6.4.12 EXHIBIT L - Reclamation Costs

**NOTE Well:** All lands within the 409.234± acre permit area are considered as affected lands under C.R.S. 34-32.5-103(1) respective of this permit application and any subsequent permit revisions or amendments to the permit as originally approved. Previously affected ground prior to on-set of Operations under this permit will not be reclaimed under the terms of this permit unless otherwise re-affected beyond their original state. Public Lands and other easements and Right-of-Ways are offset from operations and while they may fall within the 409.234± acre parcel – are excepted from the permit conditions to the extent of their approved setbacks.

The following estimates utilize assumptions based upon the pre-disturbed state of the application for purposes of determining estimated costs of reclamation and correlated financial warranty. Where appropriate, information is generalized and approximated from similar estimates determined by the Colorado Office of Mined Land Reclamation (OMLR), as indicated.

### **RECLAMATION EXPOSURE:**

Based upon the Extraction and Reclamation Plans of this application, the status and trend of activities and affected land; and related calculations to estimate reclamation liability, are determined as follows.

Please Note: Due to the difficulty of calculating heavy equipment costs similar to the Division's software program, unit costs from previous and reasonably current Division estimates of like or similar kind have been utilized to create a reasonably close estimate. The per unit basis from Division records are shown along with other sources used or referenced to determine unit costs, at the back of this exhibit.

### **METHOD OF EXTRACTION:**

Before concurrent grading, resoiling, and revegetation for reclamation can commence, a perimeter keyway (dewatering trench<sup>1</sup>) must first circumnavigate the area where the perimeter slopes form along the extraction limits. For Two Rivers, this includes four sequential areas of extraction:

- 121.86± Acres - Central Field – Center Section
- 15.58± Acres - Central Field – North-East Section
- 25.09± Acres - Central Field - West Section
- 41.04± Acres - North-West Field

<sup>1</sup> Adequacy Item 15: Keyway clarification

#### 6.4.12 EXHIBIT L - Reclamation Costs

Exhibit L: Financial Warranty Map, shows Initial Extraction will begin in the yellow hatch area shown on the Exhibit L Map, comprising 16± acres. The direction of extraction will follow the perimeter of the extraction limits in order to establish the perimeter keyway for the 121.86± acre Center Section of Central Field. The perimeter extraction comprises approximately 70.21± acres and will leave an approximately 51.65± acre Core, that may be extracted as needed as keyway drainage capacity allows.

The initial extraction area is bordered to the South adjacent to a near 800± foot section of oil and gas line that is pending removal; along with the two oil and gas wells, also pending removal (refer to Exhibit C for ownership details). Extraction will not occur within 10 feet of these lines, or 25 feet from the wells, as indicated in the setbacks detailed under Exhibit D: Extraction Plan. Below this gas line is an existing pond and well that will be used as a Settling Basin Area, containing at present a solitary settling basin and pump as a point of discharge of groundwater. This pond may be expanded or added to below this line.

Perimeter Keyway Extraction will maintain a perimeter slope no steeper than 1.25H:1V, except for the perimeter shown in red along its extraction limit, and respective toe where cut slopes will not exceed 2.00H:1V; as indicated (refer to Exhibit S: Stability Analysis for additional information). At the toe of the cut perimeter slope is the keyway that runs below the extracted deposit of the basin, into the bedrock, which allows the subsurface waters to flow to the settling basin and discharge pumps necessary to keep the cut basin dry during a time of extraction and reclamation of the affected perimeter slopes.

The keyway dimensions may vary more or less from 4± to 8± feet in depth and 4± to 16± feet in width. Extraction must be broad enough to allow equipment to safely approach the toe and excise the bed dimensions where the resulting channel is sufficient to convey the groundwaters to the settling basin for discharge.

**Please Note:** The graphic representation of the Perimeter Keyway Extraction and Core are idealized, and may vary in shape and size presented. Annual Reports will report on the nature and extent of affected lands and more properly reflect actual conditions on the ground in a given year of operations.

#### UNITS OF DISTURBANCE:

The life of the operation is based upon a base rate of extraction approximating 8.0± acres of disturbance in a given year. This time will pulse with the market and may average 8.0± acres, but could be faster or slower. Starting out, initial warranty necessary to cover the costs of reclamation for the extent of disturbance in a given year will also vary in time and circumstance, as the initial disturbance is generally less at the onset. So, a rate of disturbance can be estimated and the warranty adjusted incrementally with time and circumstance.

## 6.4.12 EXHIBIT L - Reclamation Costs

Starting out in the initial projected 5 years of Operations, and incrementally thereafter, necessary warranty can be estimated and adjusted in incremental Units based upon the projected Life of the Operation. Essentially, a 28-33± year Life of Operations assumes a rate of extraction of approximately 8.0± acres per year.

Considering the Mining-Regrading Schedule included as Table E-1 in Exhibit E, and the general development concept shown on Exhibit L: Financial Warranty Map, Raptor estimates for the initial 5-year period, development of an initial 40-acre excavation and development of a “Core” area in the Center Section of Central Field will result in creation of approximately 6,200-foot of external perimeter pit wall. No reclamation or lining is anticipated in the initial 5-year period.

Raptor estimates for Financial Warranty purposes an approximately 4,020-foot wall excavated at 2H:1V and a 2,180-foot wall at 1.25:1V slopes.

It is important to note that the financial warranty estimates the closure cost of the operation at the end of the expected first 5-year period. It is assumed in this initial estimate that no reclamation activities (regrading, lining, topsoiling) will take place. The cost estimate then reflects reclaiming the projected excavation at that point in time. The actual extents and shape of the excavation may change, and actual progress will be addressed in the annual reports.

Raptor will update this Exhibit L, the reclamation cost estimate, and any other exhibits as required for purposes of determining financial warranty prior to disturbance reaching the limits projected in the initial 5 years of Operations as described in this Exhibit and shown conceptually on Exhibit map C-2 and L.

In the following breakdown of components for estimating reclamation cost, factoring of the 5-year projected disturbance against the final pits is used where appropriate to obtain a reasonable estimate of work required. Various approaches to obtain the necessary quantities exist, but Raptor believes the approaches and quantities are reasonable and alternate approaches would be no more certain as to the accuracy obtained. This is simply due to the variable nature of the deposit and the need to field fit the excavation to ensure safety in the conditions encountered.

### **DEWATERING:**

Raptor assumes that the pit would be in an unlined state and if operations had ceased, would recharge to static water level requiring dewatering of the pit to allow reclamation operations to be completed.

100 hp. 4,500 gal./min. pump x (up to) 3 pumps @ 24 hours/day



## 6.4.12 EXHIBIT L - Reclamation Costs

Volumes:

Total Central Field Volume at Static Water Level =	1,470,040,694± gallons
Area of Central Field at Static Water Level =	151.38 surface water acres
Central Field average storage =	9,710,931 gal./acre
For the initial 5-year excavation:	
	9,710,931 gal./acre
	<u>x 40.0± acres</u>
	388,437,229± gallons

Total Cost for initial 40.0± acres of Discharge = 388,437,229± ± gallons x \$ 0.000026/gal. discharge (refer to Kurtz est. utilizing similar pump and rates.)

**\$ 10,099.37**-Initial Discharge Cost for 40± acres

It is assumed that ongoing dewatering will be required during reclamation of the pit and Raptor has allowed for 30 days once the pit has been dewatered.

The estimated inflow rate to the fully excavated pits has been estimated at 15,190,000 gallons/day. The estimate is based on modeling of the groundwater by AWES in support of Exhibit G: Water Information. A memo summarizing the basis of the estimate is attached as a new addendum. The initial 40-acre excavation area represents approximately 19.6% of total extraction area (203.acres). Total discharge to maintain dry conditions for reclamation then is:

15,190,000 gallons/day x 19.6% x 30 days = 89,541,681± gallons

Cost for 30 working days of Discharge = 89,541,681± gallons x \$ 0.000026/gal. discharge (refer to Kurtz est. utilizing similar pump and rates.)

**\$ 2,328.08** 30 days Dewatering Cost for 40± acres

**\$ 12,427.45** Total Dewatering Cost for 40± acres

**Please Note:** <sup>2</sup>The basins will be lined or otherwise segregated from the area groundwater, in order to liberate the water otherwise retained to supplement loss from evaporation in the unlined state.

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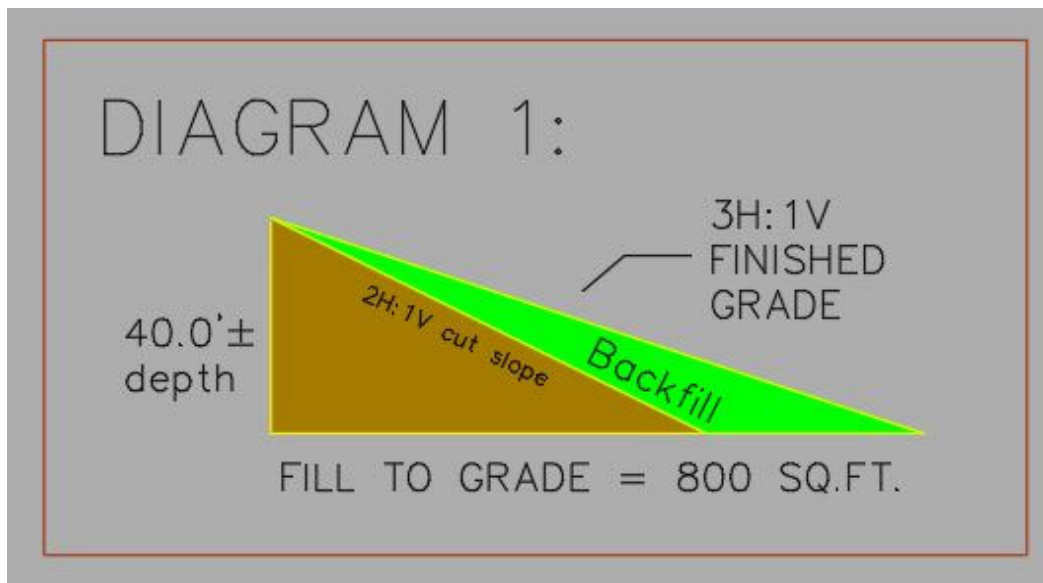
<sup>2</sup> Adequacy Item 28

## 6.4.12 EXHIBIT L - Reclamation Costs

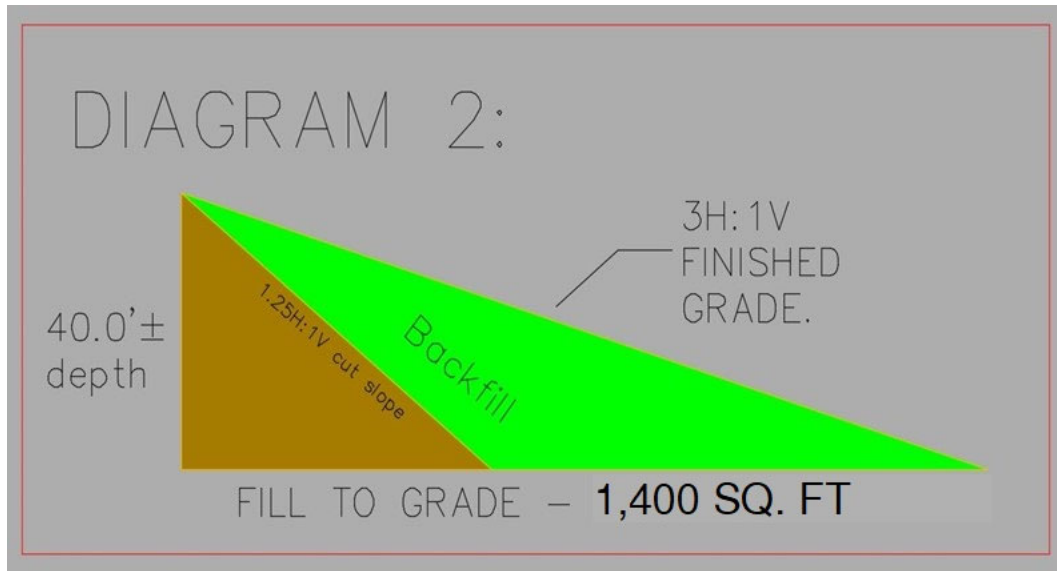
### GRADING:

As stated above, Raptor conservatively estimates for Financial Warranty purposes an approximately 4,020-foot wall excavated at 2H:1V and a 2,180-foot wall at 1.25:1V slopes along the extraction limits flanking WCR 396; and 2H:1V along the South Platte River levee, as shown on Exhibit D: Extraction Plan, and Exhibit L: Financial Warranty Map.

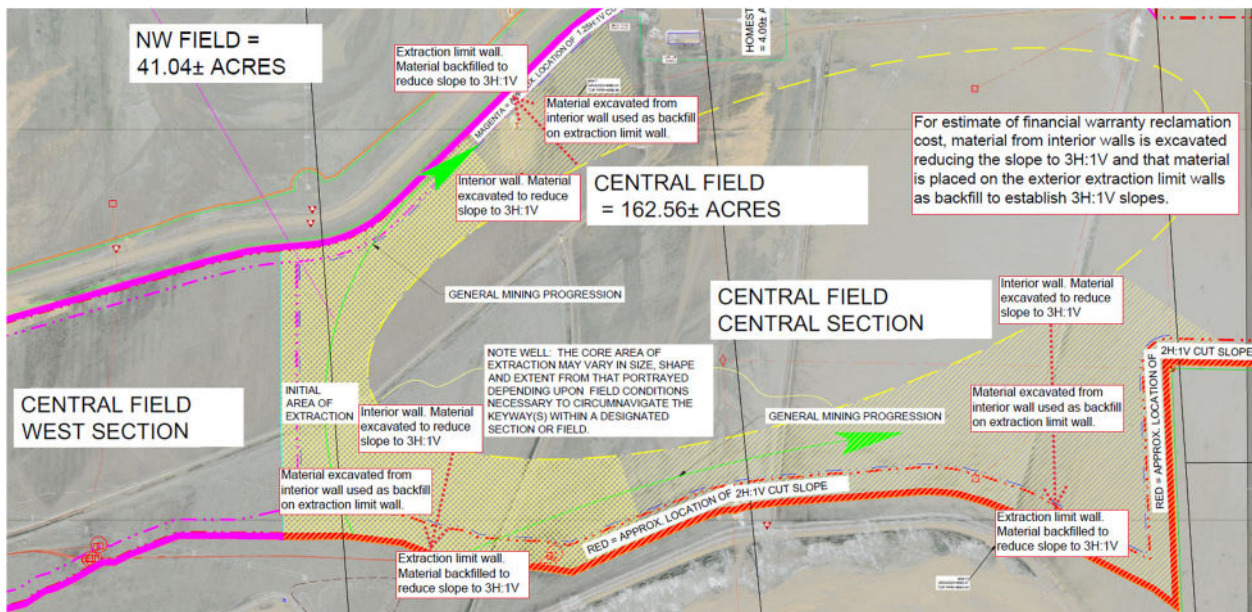
Actual volume of fill required to grade at 3H:1V for a respective cut slope is determined in the graphics, below. Square Foot volume of backfill x linear feet of slope divided by 27 will yield the required cubic yards needed for each section of highwall. A rate per Loose Cubic Yard of fill taken from the previously approved values determined by the OMLR, is used to better ensure the integrity of the resulting values.



6.4.12 EXHIBIT L - Reclamation Costs



Hauls are expected to be very short excavating material from the core area where material is readily available to establish final grade on those walls at 3H:1V and placed on the exterior walls to establish the required grades. It is estimated that there would be approximately 4,610-foot of core and side slopes in addition to the 6,200-foot extraction limit wall. Due to the very short hauls it may only require a wheel loader operating in load/carry/dump mode with a supporting Tracked Dozer. At most, the method of fill will utilize one (1) Excavator/Loader, two (2) Haul Trucks, together with a supporting Tracked Dozer and one (1) Sheep's Foot Compactor. The concept for establishing the regraded slopes for financial warranty purposes is shown in the following figure.



Approach to regrading interior and extraction limit slopes for financial warranty purposes.

#### 6.4.12 EXHIBIT L - Reclamation Costs

Assuming a mean depth of advancing cut of **1.25H:1V** at the extraction limits of 40.0± feet depth:

2,180± lin.ft. (extraction limit) x 1,400.00± sq.ft. (required fill – Diagram 1, above) = 113,037± LCY

113,037± LCY  
x \$ 0.56± per LCY.

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\$ 63,300.74± fill along an 2,180-foot extraction limit cut at 1.25H:1V.

Assuming a mean depth of advancing cut of **2:1V** at the extraction limits of 40.0± feet depth:

4,020± lin.ft. (extraction limit) x 800.00± sq.ft. (required fill – Diagram 1, above) = 119,111± LCY

119,111± LCY  
x \$ 0.56± per LCY.

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\$ 66,702.22 Sub Total-Grading to 3H:1V along an 4,020-foot extraction limit cut at 2H:1V

\$ 63,300.74 Sub Total-Grading to 3H:1V along an 2,180-foot extraction limit cut at 1.25H:1V.  
+ \$ 66,702.22 Sub Total-Grading to 3H:1V along an 4,020-foot extraction limit cut at 2H:1V.  
**\$130,002.96** Total – Initial Grading.

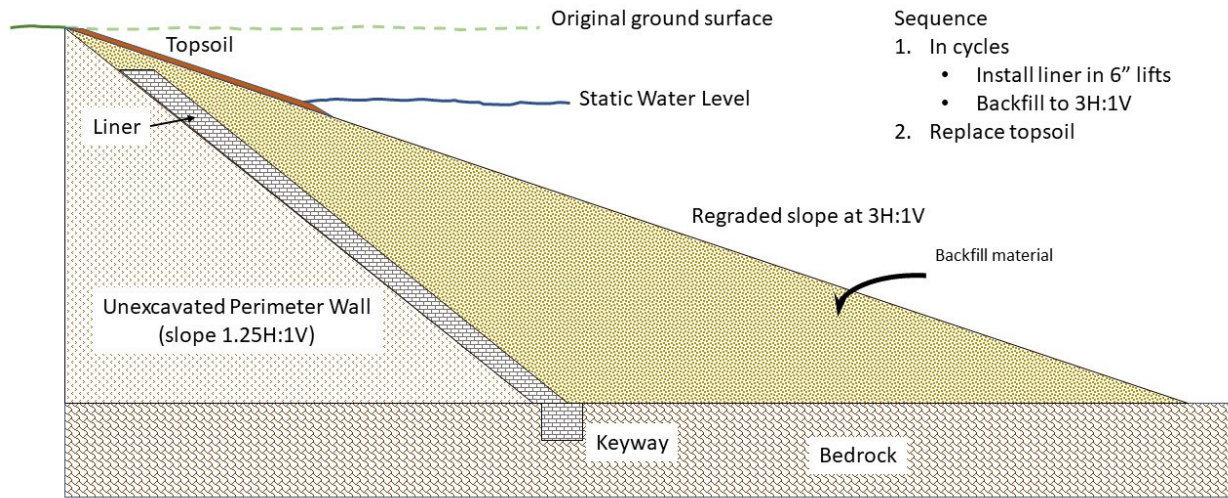
#### Liner Installation:

Raptor has made allowance for liner installation on the regraded slope. Assumptions are that a 4-foot-thick liner will be keyed into bedrock at the base of the regraded slope and up the slope to approximately 5-foot below the original surface elevation. The keyway dimensions in bedrock are assumed to be 4x4-foot.

For the exterior walls at extraction limits, the regrade and liner installation is as described in Exhibit E. For interior walls around the core, for the purposes of financial warranty estimate, regrading is performed as described above, and then the liner will be installed. Typical liner installation as described previously in Exhibit E is shown in the following figure. The volume of liner material required will vary according to the slope of the wall the liner is installed on. The volume of liner material is conservatively estimated based on the perimeter length at the top of the liner.

## 6.4.12 EXHIBIT L - Reclamation Costs

Typical Liner and Regrade for Extraction Limit Wall – Final Reclamation



Typical Liner and Regrade for Extraction Limit Wall

Raptor conservatively estimates for Financial Warranty purposes an approximately 4,020-foot wall excavated at 2H:1V, a 2,180-foot wall at 1.25:1V slopes, and a 4,610-foot wall at 3H:1V.

Perimeter liner at 2H:1V, 4,020 lin.ft. x 78 sq.ft./ft x 4 ft. / 27 = 46,610 CY of liner placed at an estimated cost of \$2.20/CY = \$ 102,541.11.

Perimeter liner at 1.25H:1V, 2,180 lin.ft. x 56 sq.ft./ft x 4 ft. / 27 = 18,095 CY of liner placed at an estimated cost of \$2.20/CY = \$ 39,808.46.

Perimeter liner at 3H:1V, 4,610 lin.ft. x 111 sq.ft./ft x 4 ft. / 27 = 75,590 CY of liner placed at an estimated cost of \$2.20/CY = \$ 166,298.33.

Keyway at the base of the 3:1 slope is estimated at 9,500 lin.ft. x 16 sq.ft. / 27 = 5,630 CY of liner placed an estimated cost of \$2.20/CY = \$12,385.19.

### **\$ 321,033.08** Total Liner Installation Cost

NOTE: This is a conservative approach to the estimation of reclamation cost for financial warrant at the projected 5-year disturbance. The distance of 2H:1V wall is maximized which has a higher lining cost than wall at 1.25H:1V. Also, if sufficient backfill material were available or accessible on site from either topsoil or overburden material in temporary stockpiles, or readily accessible from bedrock exposed, backfilling all the



#### 6.4.12 EXHIBIT L - Reclamation Costs

slopes with available material and installing the liner in typical fashion as described in Exhibit E would be significantly less expensive.

#### **Soil Demand AND Re-soiling of Affected Lands (refer to Exhibit D):**

Soil demand is limited to the cut basin slopes remaining above the static water level. For Central Field, the total area above the anticipated static water level of the basins is 11.19 ± acres.

To estimate the area involved in resoiling the Center Section of Central Field – we'll use a percentage of the total perimeter length of the extraction limits involved:

14,311 Total perimeter length Central Field

6,200 External perimeter length Center–Central Field–extraction limits

4,610 Internal perimeter length on core area

10,810 Combined perimeter length

$10,810 \div 14,311 = 76\%$

$11.19 \text{ acres} \times 76\% = 8.5 \pm \text{ acres}$  requiring resoiling and revegetation (see Establishment of Vegetation over Affected Lands, below).

At a depth of 0.5± feet, total volume = 8.5± acres x 0.5± feet of soil replacement, is:

$8.5 \pm \text{ acres} \times 43,560.0 \pm \text{ sq.ft./acre} \div 27 \text{ cu.ft./cu.yd.} = 6,857 \pm \text{ cu.yds. @ } 0.5' \text{ depth.}$

The majority of soil placement can occur using the average placement distance of 600 ft., or less along embankments, (utilizing the same assumptions utilized at either Kurtz or Heintzelman Projects).

6,857± cu.yds of soil demand  
x \$ 0.843 per LCY.

\$ 5,780.17 to replace 0.5± feet of soil over the existing affected lands remaining above the anticipated final water level at the Center of Central Field along the perimeter cut slopes at the extraction limits.

<sup>3</sup>Although Raptor does not anticipate the areas of soil replacement to be extensively compacted, an allowance for disking or scarifying 25% of the area at a cost of \$28.5/acre.

$8.5 \pm \text{ acres} \times 25\% \times \$28.50/\text{acre} = \$60.60$

<sup>3</sup> Adequacy Item 52

### 6.4.12 EXHIBIT L - Reclamation Costs

The processing area will also require soil replacement over the entire 21.35 acre area.

$$21.35\pm \text{ acres} \times 43,560.0\pm \text{ sq.ft./acre} \div 27 \text{ cu.ft./cu.yd.} = 17,222\pm \text{ cu.yds. @ } 0.5' \text{ depth.}$$

$$\begin{array}{r} 17,222\pm \text{ cu.yds of soil demand} \\ \times \$ \quad 0.843 \text{ per LCY.} \\ \hline \end{array}$$

\$ 14,518.43 to replace 0.5± feet of soil over the existing affected lands in the processing area.

<sup>4</sup>Raptor assumes disking or scarifying this entire area at a cost of \$28.5/acre.

$$21.35\pm \text{ acres} \times 100\% \times \$28.50/\text{acre} = \$608.48$$

**\$ 20,359.20** Total Soil Replacement Cost

NOTE: Total Soil Demand for the entire Central Field and the North-West Field:

11.19± Acres Central Field

4.76± Acres North-West Field

15.95± Acres Total – Combined Soil Replacement Demand

15.95± Acres x 43,560 sq.ft./acre ÷ 27 cu.ft./cu.yd. = 25,732.67± cu.yds. @ 1' depth. 25,732.67± cu.yds. @ 1' depth soil ÷ 2 = 12,866.33± total cu.yds soil required at 6 inches in depth at Central and North-West Fields for all basin slopes remaining above the anticipated static water level and below the extraction limits.

### **Establishment of Vegetation over Affected Lands:**

The demand establishment of vegetation over the affected lands will also diminish proportionately with the planned extraction of the Tracts. For now, the total exposure is estimated as indicated above to be 8.5± acres for the Center Section of Central Field (see Soil Demand):

NOTE: The cost for seed is estimated on Exhibit L - Table L-1: Primary/Preferred Re-vegetation Seed Mixture; however, the costs are known to fluctuate seasonally – and are estimates based on prior seasons. The seed mixture includes a substitute for mulch in the inclusion of a wheatgrass hybrid. The Division has historically agreed with and approved the inclusion of this hybrid as a substitute for mulch. The Optional Seed Mix will be used if the Primary Mixture fails, but costs less, so that cost is accounted for. These costs are as follows:

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<sup>4</sup> Adequacy Item 52

**6.4.12 EXHIBIT L - Reclamation Costs**

\$ 58.72± Preferred Seed Mix  
x 8.5± acres

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\$ 499.12± Sub-Total Seed

The cost for applying seed is based upon information derived in proximity to the Northern Colorado economy. Costs for tilling, fertilizing and seeding are based upon estimates from Longs Peak Equipment Co. These costs, including labor, are reflected as follows:

\$ 25.00± per acre Tilling  
\$ 20.00± per acre Fertilizing  
\$ 20.00± per acre Seeding

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\$ 65.00± per acre Total Application Cost per Acre.  
x 8.5± acres

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\$ 552.5± Sub-Total – Application Costs

\$ 1,051.62± Sub-Total Re-vegetation (seed + application) Costs.  
Assume a 50± percent failure and add half the expense back into the total for reseeded, or:  
\$ 525.81± Sub-Total Re-seeding costs

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\$ 1,577.43± Excavation Area Re-vegetation Expense

Re-vegetation of the 21.35 acre processing area is also estimated.

\$ 58.72± Preferred Seed Mix  
x 21.35± acres

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\$ 1,253.67± Sub-Total Seed

\$ 65.00± per acre Total Application Cost per Acre.  
x 21.35± acres

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\$ 1,387.75± Sub-Total – Application Costs

\$ 2,641.42± Sub-Total Re-vegetation (seed + application) Costs.  
Assume a 50± percent failure and add half the expense back into the total for reseeded, or:  
\$ 1,320.71± Sub-Total Re-seeding costs

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\$ 3,962.13± Processing Area Re-vegetation Expense

**\$ 5,449.27 Total Re-vegetation Cost**

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## 6.4.12 EXHIBIT L - Reclamation Costs

### Processing Area and Decommissioning:

Raptor has estimated decommissioning costs for the Processing Area and Conveyor that will deliver mined material to that area. All plant and equipment in the processing area is portable and would have more value than the cost of loading and removing it.

Decommissioning will involve the removal of concrete pads for processing equipment, concrete supports for truck scales and temporary buildings, and the conveyor infrastructure and belting.

Three 12-inch-thick concrete pads are assumed in the processing area with dimensions 15- x 30-feet, 15- x 60-feet, and 15- x 25-feet. Demolition and removal costs are estimated at \$1.70/sq.ft. for 12" concrete pads.

The truck scale will have concrete supports with an estimated volume of 10 CY. Additionally temporary buildings for the scale house/site entrance area and processing area will have concrete support blocks with estimated at 8 CY of concrete. Estimated costs for the concrete supports is \$65.00/CY.

Concrete pads: 1,725 sq.ft. x \$1.70/sq.ft. = \$ 2,932.50

Concrete supports: 18 CY x \$65.00/CY = \$ 1,170.00

The decommissioning cost estimate for the conveyor structure is based on previous estimates provided by Divide Construction for other Raptor (previously Varra) operations and presented in Financial Warranty estimates. The costs have been updated to current using US Army Corps of Engineers Civil Works Construction Cost Index System (CWCCIS) indices.

The regular conveyor structure in 40-foot sections supported on concrete blocks is estimated to be 1,787± lin.ft. with an additional three extended span elevated truss sections 125-foot in length for crossing WCR296 and the Big Thompson River. Decommissioning costs for the regular conveyor structure is estimated at \$ 8.75/lin.ft. and the extended spans at \$ 18,270.00 each.

Conveyor decommissioning: 1,787± lin.ft. x \$ 8.75/lin.ft. = \$ 15,640.18

Conveyor extended spans: 3 x \$ 18,270.00 each = \$ 54,810.00

**\$ 74,552.68** Total Processing and Conveyor Decommissioning Cost

## 6.4.12 EXHIBIT L - Reclamation Costs

### **OTHER MISCELLANEOUS COSTS:**

Mobilization and demobilization costs are based upon the Division's estimates, which are pending – but estimated in the summary at the beginning of this Exhibit L at \$10,000.

#### Demolition of Structures:

**None.** Building Permits for structures will be obtain where required from the Weld County Building Department.

**Please Note: Since there is no possibility of the applicant in fully reproducing the Division's methods, utilizing similarities from past OMLR calculations is the most viable and accurate means available for the applicant to derive reasonable estimates of per unit costs and should result in estimates very reliable with that of the Division.**



Extraction of the Core following completion of the Perimeter Extraction Keyway



### 6.4.13 EXHIBIT M - Other Permits and Licenses

A statement identifying which of the following permits, licenses and approvals the Operator/Applicant holds or will be seeking in order to conduct the proposed mining and reclamation operations: effluent discharge permits, air quality emissions permits, radioactive source material licenses, the State Historic Preservation Office clearance, disposal of dredge and fill material (404) permits, permit to construct a dam, well permits, explosives permits, highway access permits, U.S. Forest Service permits, Bureau of Land Management permits, county zoning and land use permits, and city zoning and land use permits.

- Colorado Department of Health Storm Water Permit Approved (COG502213).
- Colorado Department of Health Emission Permit N/A – Concrete Batch Plant.
- Colorado Department of Health Emission Permit Pending Operations – Portable Equipment – Dry Plant
- Colorado Department of Health Emission Permit Pending Operations – Wet Plant
- Colorado Department of Health Emission Permit Approved (22WE0392) – Fugitive Dust – Mining Operations and related activities.
- Weld County Special Use Permit N/A.
- Colorado Division of Water Resources Well Permit Pending.
- State Historic Preservation Office clearance Pending.
- U.S. Department of the Army Corps of Engineers No Permit Required Correspondence of 21 June 2021.
- Planned operations will not utilize or encounter materials, sources, or authorities over related lands and do not require permits for the following: radioactive source materials, construction of a dam, explosives, highway access, U.S. Forest Service, Bureau of Land Management, city zoning or land use.

Refer to Approval from the City of Evans: Pending.

- Note: Any necessary permits for other planned or potential activities, including asphalt batch plants, recycling facilities and operations, etc., will be acquired prior to on-set of such plants, facilities or operations. All future permits will be submitted to the Division to update this list as necessary.

Refer to Approval for Recycling Facilities and Operations from the City of Evans: Pending.

**6.4.14 EXHIBIT N - Source of Legal Right to Enter**

The source of the Operator's/Applicant's legal right to enter and initiate a mining operation on the affected land. (Same requirements as Rule 6.3.7).

As landowner(s) to all lands to be permitted for extraction under a Colorado Division of Reclamation Mining and Safety (DRMS), Office of Mined Land Reclamation (OMLR) permit, my signature below testifies that Raptor Materials, LLC., has the legal right to enter and mine with respect to all lands under permit M-2022-013; Two Rivers Sand, Gravel and Reservoir Project.

Signed: Kevin Jeakins

**Kevin Jeakins**, Vice-President  
Raptor Materials, LLC.

Signed and dated this 29<sup>th</sup> day of August, 2022.

State of Colorado)

)ss

County of Weld)

The foregoing instrument was acknowledged before me this 29<sup>th</sup> day of August, 2022,  
by Kevin Jeakins as Vice President  
of Raptor Materials, LLC.

JESSICA HOOVER  
NOTARY PUBLIC  
STATE OF COLORADO  
NOTARY ID 20044035571  
MY COMMISSION EXPIRES OCTOBER 4, 2024

Jess Hoover  
Notary Public

My Commission expires: 10/4/24

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**6.4.15 EXHIBIT O - Owner(s) of Record of Affected Land (Surface Area) and Owners of Substance to be Mined**

**Owner(s) of Record of Affected Land (Surface Area):**

Raptor Materials, LLC  
8120 Gage Street  
Frederick, CO 80516

**Owner(s) of Substance to be Mined:**

Raptor Materials, LLC  
8120 Gage Street  
Frederick, CO 80516

NOTE: Refer to Exhibit C-1: Existing Conditions Map for information regarding Other Owners of Record.

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#### **6.4.16 EXHIBIT P - Municipalities Within Two Miles**

A list of any municipality(s) within two miles of the proposed mining operation and address of the general office of each municipality.

Town of Milliken  
1101 Broad Street  
Milliken, CO 80543

City of Evans  
1100 37<sup>th</sup> Street  
Evans, Colorado 80620



**6.4.18 EXHIBIT Q - Proof of Mailing of Notices to Board of County Commissioners and Conservation District**

Proof that notice, of the permit application was sent to the Board of County Commissioners and, if the mining operation is within the boundaries of a Conservation District, to the Board of Supervisors of the local Conservation District, pursuant to Rule 1.6.2(1)(a)(ii).

Office of the Board of Weld County Commissioners  
c/o Weld County Clerk to the Board  
1150 O Street  
Greeley, Colorado 80632

Subject: Colorado Division of Reclamation Mining and Safety (DRMS) Office of Mined Land Reclamation (OMLR Permit application for Varra Companies, Inc. – Two Rivers Sand, Gravel and Reservoir Project.

**NOTICE TO THE BOARD of WELD COUNTY COMMISSIONERS**

Varra Companies, Inc. (the ‘Applicant/Operator’) has applied for a Regular (112) reclamation permit from the Colorado Mined Land Reclamation Board (the ‘Board’) to conduct the extraction of construction materials operations in Weld County. The attached information is being provided to notify you of the location and nature of the proposed operation. The entire application is on file with the Division of Reclamation, Mining, and Safety (the ‘Division’) and the Weld County Clerk to the Board.

The applicant/operator proposes to reclaim the affected land to commercial Developed Water Resources and other Mixed Uses. Pursuant to Section 34-32.5-116(4)(m), C.R.S., the Board may confer with the local Conservation Districts before approving of the post-mining land use. Accordingly, the Board would appreciate your comments on the proposed operation. Please note that, in order to preserve your right to a hearing before the Board on this application, you must submit written comments on the application within twenty (20) days of the date of last publication of notice pursuant to Section 34-32.5-112(10), C.R.S.

If you would like to discuss the proposed post-mining land use, or any other issue regarding this application, please contact the Division of Reclamation, Mining, and Safety, 1313 Sherman Street, Room 215, Denver, Colorado 80203, (303) 866-3567.

Your signature below acknowledges receipt of the above referenced permit application form.

**RECEIVED**

Date Received: \_\_\_\_\_,

Received By: \_\_\_\_\_

Weld County Clerk to the Board of Weld County Commissioners  
**WELD COUNTY COMMISSIONERS**



Exhibit Q – Proof of Notice to the Board of Supervisors – West Greeley Soil Conservation District

Proof that notice, of the permit application was sent to the Board of County Commissioners and, if the mining operation is within the boundaries of a Conservation District, to the Board of Supervisors of the local Conservation District, pursuant to Rule 1.6.2(1)(a)(ii).

West Greeley Soil Conservation District  
Board of Supervisors  
ATTN: Kandee Nourse, District Manager  
4302 West 9<sup>th</sup> Street Road  
Greeley, Colorado 80631

Subject: Colorado Division of Reclamation Mining and Safety (DRMS), Office of Mined Land Reclamation (OMLR), Permit application for Varra Companies, Inc. – Two Rivers Sand, Gravel and Reservoir Project.

NOTICE TO THE BOARD OF SUPERVISORS  
WEST GREELEY SOIL CONSERVATION DISTRICT

Varra Companies, Inc. (the ‘Applicant/Operator’) has applied for a Regular (112) reclamation permit from the Colorado Mined Land Reclamation Board (the ‘Board’) to conduct the extraction of construction materials operations in Weld County. The attached information is being provided to notify you of the location and nature of the proposed operation. The entire application is on file with the Division of Reclamation, Mining, and Safety (the ‘Division’) and the Weld County Clerk to the Board.

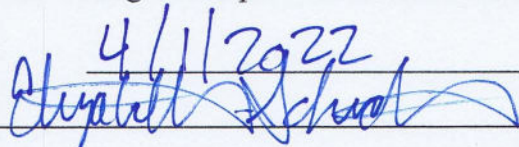
The applicant/operator proposes to reclaim the affected land to Developed Water Resources and other Mixed Uses. Pursuant to Section 34-32.5-116(4)(m), C.R.S., the Board may confer with the local Conservation Districts before approving of the post-mining land use. Accordingly, the Board would appreciate your comments on the proposed operation. Please note that, in order to preserve your right to a hearing before the Board on this application, you must submit written comments on the application within twenty (20) days of the date of last publication of notice pursuant to Section 34-32.5-112(10), C.R.S.

If you would like to discuss the proposed post-mining land use, or any other issue regarding this application, please contact the Division of Reclamation, Mining, and Safety, 1313 Sherman Street, Room 215, Denver, Colorado 80203, (303) 866-3567.

Your signature below acknowledges receipt of the above referenced permit application form.

Date Received:

Received By:

4/11/2022  
  
Office of Board of Supervisors – West Greeley Soil Conservation District.



**6.4.18 EXHIBIT R - Proof of Filing with County Clerk and Recorder**

An affidavit or receipt indicating the date on which the application was placed with the local County Clerk and Recorder for public review, pursuant to Subparagraph 1.6.2(1)(c).

Proof of filing with the County Clerk, pursuant to Subparagraph 1.6.2(1)(c):

Weld County Clerk to the Board  
1150 O Street  
Greeley, Colorado 80632

Subject: Colorado Division of Reclamation Mining and Safety (DRMS), Office of Mined Land Reclamation (OMLR) Permit application for Varra Companies, Inc. – Two Rivers Sand, Gravel and Reservoir Project.

Your signature below acknowledges receipt of the above referenced permit application.

The application will be placed for public inspection and review by your Office. The information will be made available to the public until final agency action by the OMLR Board, as defined by C.R.S. 24-4-105(14).

Date Received: \_\_\_\_\_

**RECEIVED**

**APR 01 2022**

Received By: \_\_\_\_\_

**WELD COUNTY  
COMMISSIONERS**

Office of Weld County Clerk to the Board

#### **6.4.19 EXHIBIT S - Permanent Man-made Structures**

Where the affected lands are within two hundred (200) feet of any significant, valuable and permanent man-made structure, the applicant shall:

- (a) provide a notarized agreement between the applicant and the person(s) having an interest in the structure, that the applicant is to provide compensation for any damage to the structure; or
- (b) where such an agreement cannot be reached, the applicant shall provide an appropriate engineering evaluation that demonstrates that such structure shall not be damaged by activities occurring at the mining operation; or
- (c) where such structure is a utility, the Applicant may supply a notarized letter, on utility letterhead, from the owner(s) of the utility that the mining and reclamation activities, as proposed, will have "no negative effect" on their utility.

#### **6.5 GEOTECHNICAL STABILITY EXHIBIT**

- (1) On a site-specific basis, an Applicant shall be required to provide a geotechnical evaluation of all geologic hazards that have the potential to affect any proposed impoundment, slope, embankment, highwall, or waste pile within the affected area. A geologic hazard is one of several types of adverse geologic conditions capable of causing damage or loss of property and life. The Applicant may also be required to provide a geotechnical evaluation of all geologic hazards, within or in the vicinity of the affected lands, which may be de-stabilized or exacerbated by mining or reclamation activities.
- (2) On a site-specific basis, an Applicant shall be required to provide engineering stability analyses for proposed final reclaimed slopes, highwalls, waste piles and embankments. An Applicant may also be required to provide engineering stability analyses for certain slopes configuration as they will occur during operations, including, but not limited to embankments. Information for slope stability analyses may include, but would not be limited to, slope angles and configurations, compaction and density, physical characteristics of earthen materials, pore pressure information, slope height, post-placement use of site, and information on structures or facilities that could be adversely affected by slope failure.
- (3) Where there is the potential for off-site impacts due to failure of any geologic structure or constructed earthen facility, which may be caused by mining or reclamation activities, the Applicant shall demonstrate through appropriate geotechnical and stability analyses that off-site areas will be protected with appropriate factors of safety incorporated into the

#### 6.4.19 EXHIBIT S - Permanent Man-made Structures

analysis. The minimum acceptable safety factors will be subject to approval by the Office, on a case-by-case basis, depending upon the degree of certainty of soil or rock strength determinations utilized in the stability analysis, depending upon the consequences associated with a potential failure, and depending upon the potential for seismic activity at each site.

- (4) At sites where blasting is part of the proposed mining or reclamation plan, the Applicant shall demonstrate through appropriate blasting, vibration, geotechnical, and structural engineering analyses, that off-site areas will not be adversely affected by blasting.

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<sup>1</sup>The notarised agreements between the applicant and the person(s) having an interest in the structure, that the applicant is to provide compensation for any damage to the structure obtained as of January 03, 2023 are attached as an addendum to this Exhibit S. These are unchanged from previous submission of June 13, 2022 on file as an addendum to the application. Notarized agreements obtained are with:

- DCP Midstream
- Weld County Public Works
- City of Aurora Water Department
- JDLB Farm LLC
- City of Evans
- Central Weld Country Water District

A complete list of structure owners is shown on Exhibit C-1: Existing Conditions Map and are attached as an addendum to this Exhibit S.

To assure the stability of any significant, valuable, and permanent man-made structures that may exist within 200 feet of planned extraction activity, a complete and thorough stability analysis was performed by American Water Engineering Services, LLC. (AWES). Their reports of 23 December 2019 and 10 August 2022, are based upon on-site samples collected from the intended areas of extraction. Copies of the AWES reports are included at the back of this exhibit.

The included AWES report verifies that the maximum planned extraction slopes of 1.25H:1V (and 2H:1V to the extent indicated by a Red Boundary along the Eastern Extraction Limit and a portion of the Southern Extraction Limit in Central Field) will not pose a hazard to such structures. The location of the extent of the 2H:1V extraction slope limits is shown in RED as indicated on the Exhibit C-2: Extraction Plan Map.

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<sup>1</sup> Adequacy Item 57

#### 6.4.19 EXHIBIT S - Permanent Man-made Structures

To the extent practical, operational setbacks will be observed consistent with those detailed under Exhibit D: Extraction Plan. Grading and reclamation of completed areas of extraction will reduce extracted slopes to a minimum of 3H:1V, or flatter, over a majority of the extraction area, in conformance with Rule 3.1.5(7).