OTTER CREEK COAL, LLC

APPLICATION FOR MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FOR THE OTTER CREEK MINE

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OTTER CREEK COAL, LLC

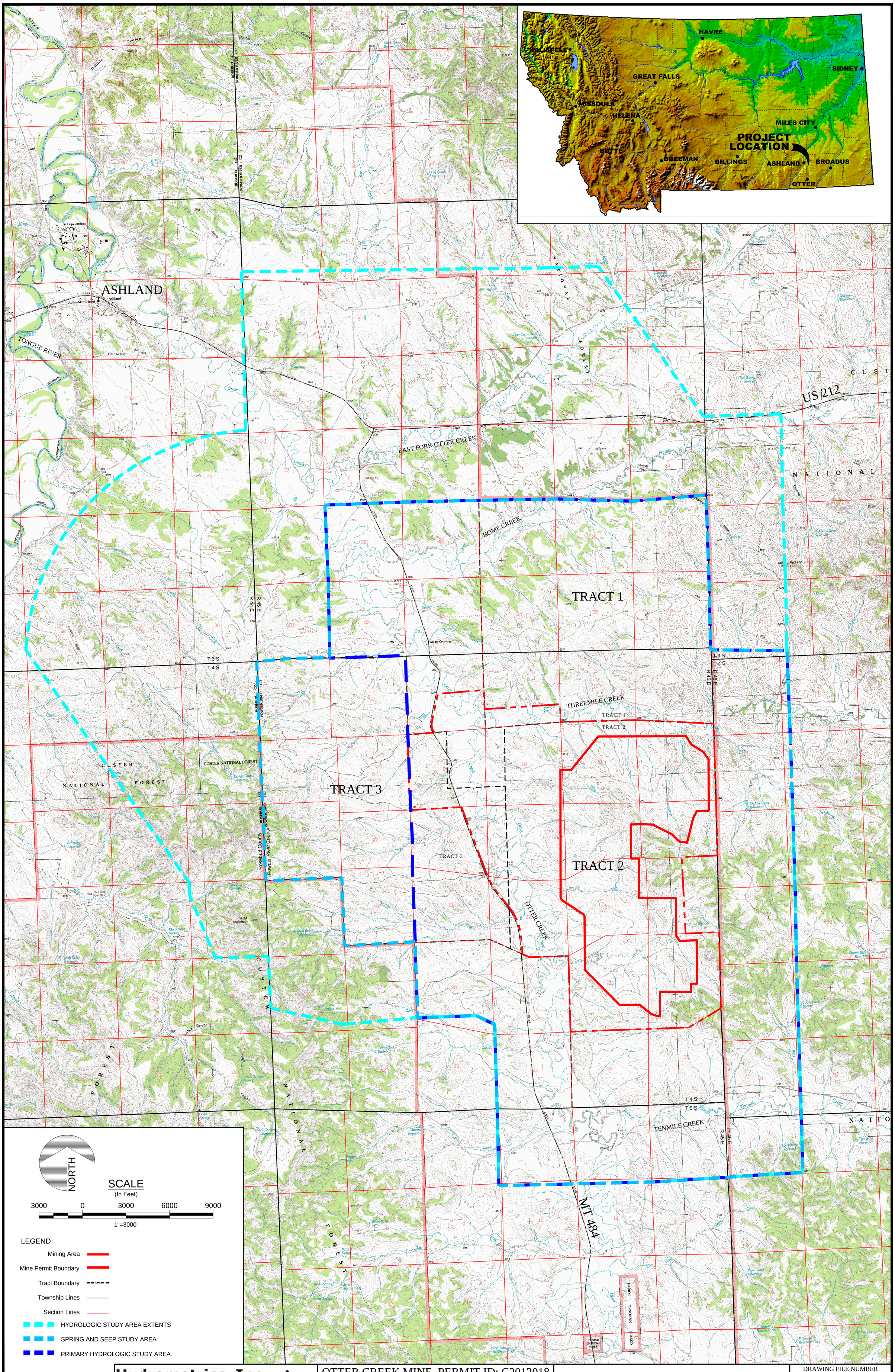
APPLICATION FOR MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FOR THE OTTER CREEK MINE

1.0 INTRODUCTION

Otter Creek Coal, LLC (OCC) is submitting this application for Montana Pollutant Discharge Elimination System (MPDES) Permit for the proposed Otter Creek Mine. Submittal of this application is in accordance with the administrative rules of Montana (ARM) 17.30.1322 *Application for a Permit*. This application will demonstrate compliance with 40 CFR 434.80 Subpart H, the Effluent Limitation Guidelines and Standards for the Western Alkaline Coal Mining Subcategory (U.S. EPA, 2001), as required by ARM 17.30.1207(3) and ARM 17.30.1345(12)(e).

An application for a Coal Strip Mining Permit submitted by OCC is pending with the Montana Department of Environmental Quality (Hydrometrics, July 2012 and Hydrometrics, November 2014b). The mining activity would be completed on the Otter Creek Coal Tracts 1, 2 and 3 located approximately five miles southeast of Ashland, Powder River County, Montana (Figure 1-1). Initial mine development will take place on Tract 2. Access to the project area is via U.S. Highway 212 and Montana Route 484. The area encompassed by the mine application comprises approximately 7,639 acres. Tracts 1 and 2 lie east of and adjacent to Otter Creek, and Tract 3 lies to the west (see Figure 1-1). Otter Creek (with its associated alluvium) is the primary hydrologic feature in the area.

The mine plan is designed to produce approximately 20 million tons of coal annually for 17 to 20 years, with total estimated recovery of about 330 million tons. Actual annual production may vary considerably depending on market conditions and/or other business



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Consulting Scientists and Engineers
Billings, Montana 59106
5602 Hesper Road
(406) 656-1172

OTTER CREEK MINE, PERMIT ID: C2012018
BASELINE REPORT 304E
TRACTS 1, 2, AND 3 BASELINE WATER RESOURCES DATA REPORT

SITE LOCATION AND STUDY AREA

DRAWING FILE NUMBER
HG1-1_REV_SITE_LOCATION_AND_STUDY_AREA_R1_2014
AUTOCAD 2000 DRAWING (DWG)
FIGURE
1-1

UPDATE TIME: 9:01 AM
GMETZGER\BIL\20141218\\\HYDRO-HLN5\DRAFT\LAND PROJECTS\OTRCR\DWG\304E\FIG1-1_REV_SITE_LOCATION_AND_STUDY_AREA_R1_2014.DWG

considerations. Otter Creek Mine will utilize conventional surface mining and reclamation procedures and techniques, with adjustments in design and implementation to address site-specific considerations.

Initial mine development is sequenced to establish access roads and incised sediment ponds to route and detain runoff for sediment control prior to further disturbance in affected watersheds. During normal operations, discharges from the exterior sediment ponds will be only in response to precipitation events greater than 10-year, 24-hour storm events. These ponds have associated outfalls which are identified in this permit application. In addition to the exterior ponds, interior ponds will be used inside the active mining area.

Interior ponds are designed to contain the 100-year, 24-hour storm event and in several cases, groundwater dewatering volumes (during Phase II operations). During extreme storm events, excess waters generated in the interior ponds will flow to the exterior sediment ponds prior to discharge. During normal operations, these interior ponds will not contribute flow to the exterior ponds.

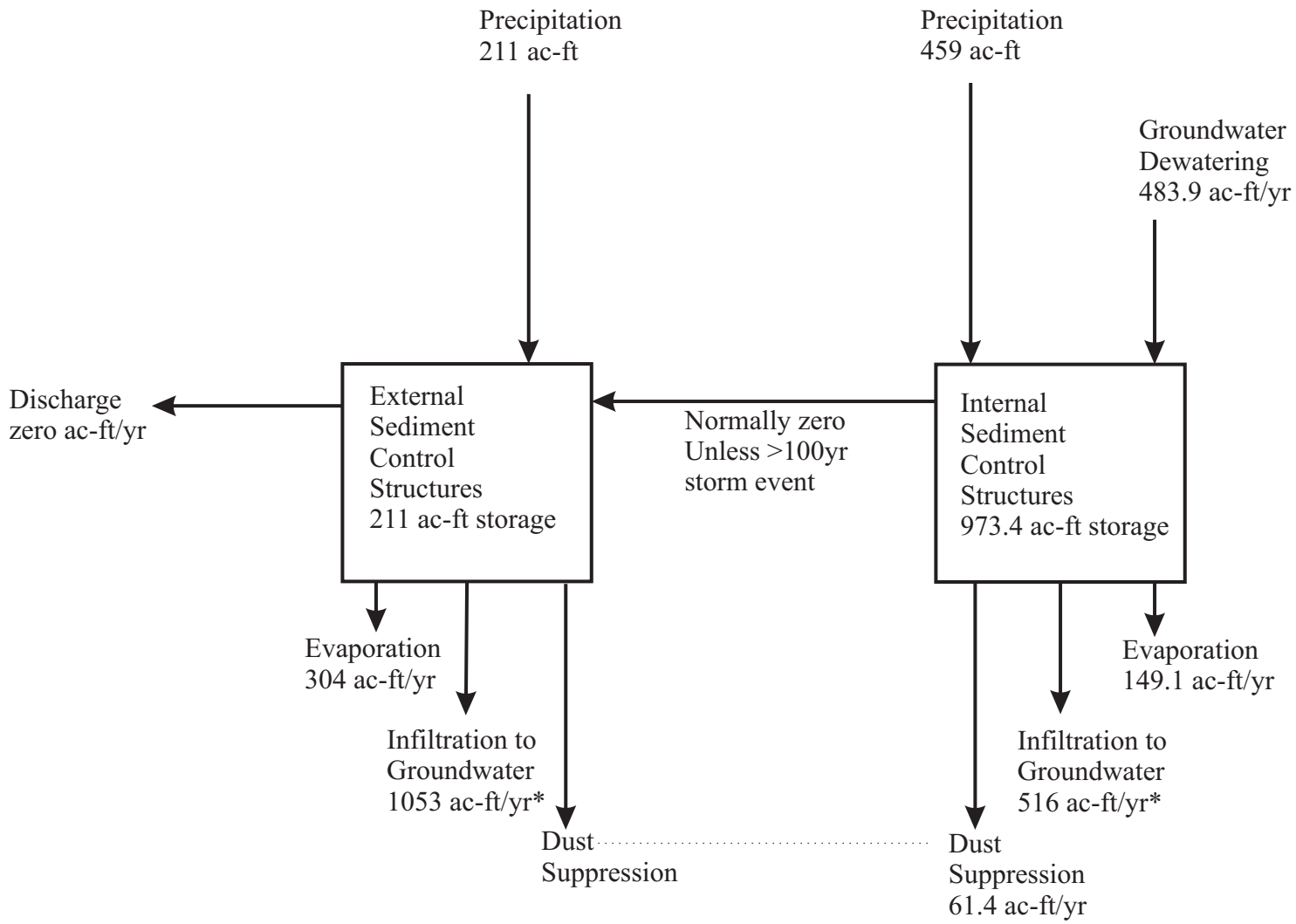
During initial box cut excavation, a sump for pit dewatering is proposed within the active pit area. The sump purpose is to store groundwater from active pit dewatering activities. Pit dewatering water will be managed internally; therefore, during normal operations only storm water runoff will be collected in sediment ponds that discharge from the facility. The pit sump will be replaced by ponds within the box cuts as mining progresses.

Mine facilities are located away from Otter Creek proper. Incised sediment ponds are proposed to control runoff from those areas. OCC is not proposing any coal beneficiation or preparation processes other than crushing. Haul trucks will deliver coal to a dump station where coal will be loaded onto a conveyer system for transport to the silos within the rail loop.

2.0 MPDES PERMIT APPLICATION

This application, that includes all of the following supporting materials, is enclosed for the Department's review:

- MT DEQ Form 1 (Appendix A) and a USGS topographic map of the vicinity (Figure 1-1).
- EPA Form 2D. Footnotes used on Form 2D are in Section 4.0 of this application narrative.
- A narrative discussion describing regulated industrial activities, expected volumes, frequencies, and durations of discharges anticipated to occur, and a sampling and monitoring plan for each outfall.
- A detailed water balance that indicates points of water generation, flow, treatment, consumption or reuse and disposal (Figure 2-1).
- Facility maps showing the facility orientation (Figure 2-2).
- A summary of ambient water quality monitoring conducted during baseline investigations (Appendices C and D).



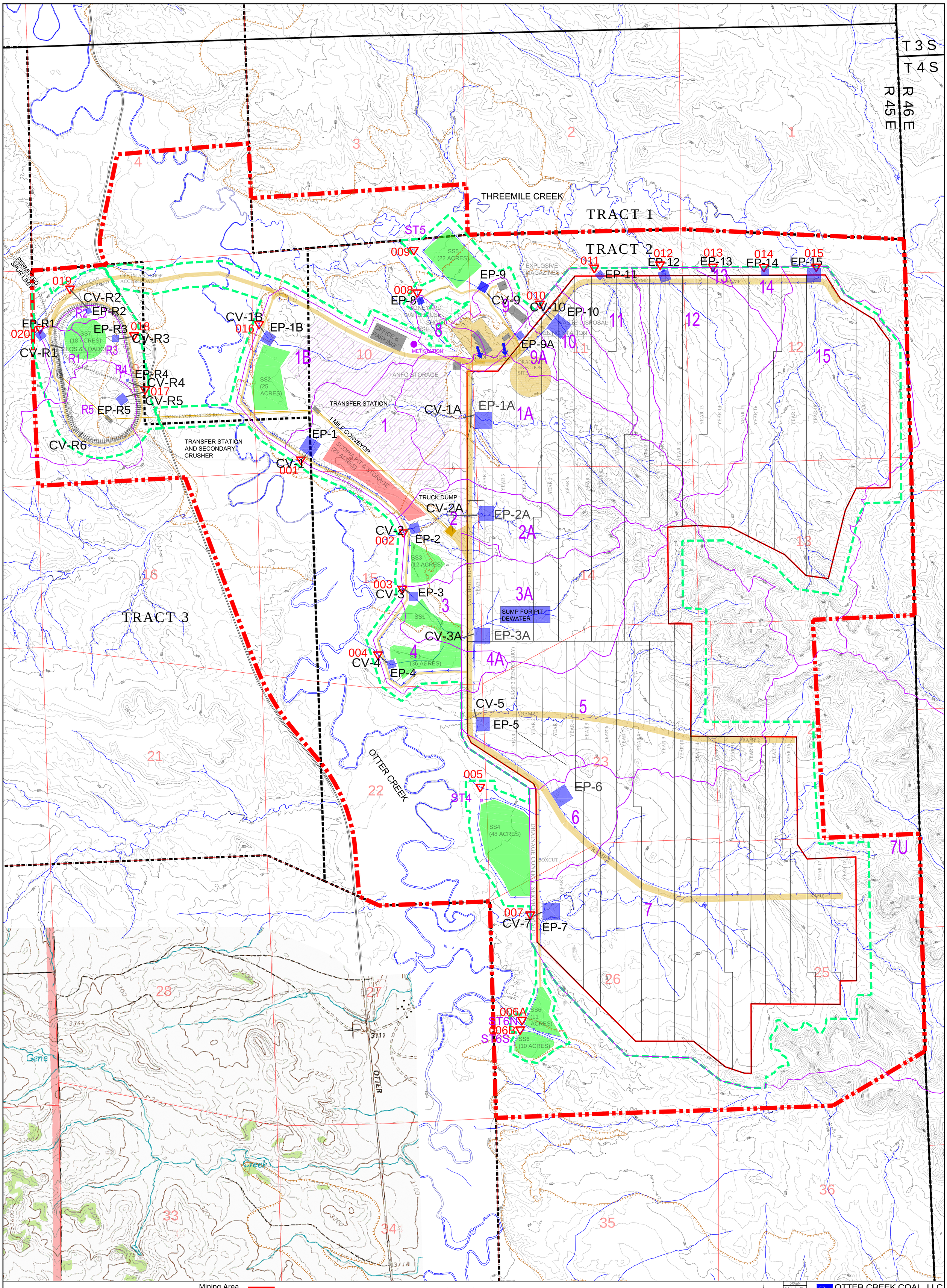
*1% of average ksat or 0.03 ft/day

Evaporation based on annualized 3.16 ft/yr

Precipitation based on 10-year/ 24-hour storm event

Otter Creek Coal MPDES Permit Application	Process Water Flow Diagram and Water Balance	Figure 2-1

k://project/10068/mpdes application/2014 application/Figure 2-1.pdf


T 3 S
T 4 S
R 45 E
R 46 E
THREEMILE CREEK
TRACT 1
TRACT 2
TRACT 3
OTTER CREEK
ST5
ST4
ST6N
ST6S
EP-1
EP-1A
EP-1B
EP-2
EP-2A
EP-3
EP-3A
EP-4
EP-5
EP-6
EP-7
EP-8
EP-9
EP-9A
EP-10
EP-11
EP-12
EP-13
EP-14
EP-15
EP-R1
EP-R2
EP-R3
EP-R4
EP-R5
CV-1
CV-1A
CV-1B
CV-2
CV-2A
CV-3
CV-3A
CV-4
CV-5
CV-7
CV-8
CV-9
CV-10
CV-R1
CV-R2
CV-R3
CV-R4
CV-R5
CV-R6
001
002
003
004
005
006A
006B
007
008
009
010
011
012
013
014
015
016
017
018
019
020
SS1
SS2 (25 ACRES)
SS3 (12 ACRES)
SS4 (48 ACRES)
SS5 (22 ACRES)
SS6 (11 ACRES)
SS6 (10 ACRES)
SS7 (18 ACRES)
SCORIA PIT & STORAGE (28 ACRES)
TRANSFER STATION
TRANSFER STATION AND SECONDARY CRUSHER
1 MILE CONVEYOR
TRUCK DUMP
ANFO STORAGE
OFFICE & PARKING
MET STATION
SUMP FOR PIT DEWATER
MAIN HAUL ROAD
RAMP 1
RAMP 2
RAMP 3
DRAINAGE CONTROL SERVICE ROAD
CONVEYOR ACCESS ROAD
OFFICE AND SHOP ACCESS ROAD
RAILROAD ACCESS ROAD
PERMITED SPUR LIMIT
EXPLOSIVE MAGAZINES
WASTE DISPOSAL
Legend:
Pre Mine Contour Major (100 feet)
Pre Mine Contour Minor (20 feet)
Pre Mine Drainageways
Mining Area
Mine Permit Boundary
Tract Boundary
Township Lines
Section Lines
Watershed Boundary
Drainage Routing
Culvert
Total Disturbance Limit
Clinker Burn Line
Rail Loop
Access Roads
Haul Roads & Ramps
Ancillary Roads
Soil Storage (SS)
Temporary Overburden Storage (TOS)
Excavated Pond
EP-5
Scoria Stockpile
Mining Cut
YEAR 1
MPDES Outfall
001
Sediment Trap
ST5
Hydrometrics, Inc.
Consulting Scientists and Engineers
Inside Tracts: Olympus October 26, 2010 Aerial Survey
Outside Tracts: USGS QUADS: Willow Crossing, Coleman Draw, King Mountain, & Yager Butte
SCALE 1"=650'
Montana State Plane NAD83 US Feet
OTTER CREEK COAL, LLC
P.O. BOX 7152 Billings, Mt. 59103
Otter Creek Mine
Permit ID: C2012018
Operational Drainage Control
MPDES Outfall Locations
DRAWN
DATE BY
9/17/14 jab
REVISED
DATE BY
11/26/14 gcm
APPROVED
DATE BY
FILE NAME:
MPDES EXHIBIT 1.DWG
LAYOUT
EXHIBIT 1
Path: I:\LAND PROJECTS\OTRCR\DWG\MPDES

3.0 MT DEQ FORM 1 AND EPA APPLICATION FORM 2D

Attached is MT DEQ Form 1 with current facility and contact information. Also attached is the EPA Application Form 2D for outfalls that are expected to be used to discharge water from this facility. During normal conditions, only storm water runoff will be discharged from the facility; pit waters will be managed internally as described in the following sections. MT DEQ Form 1 and EPA Application Form 2D are found in Appendix A of this document. The footnotes for Form 2D are found in Section 3.1 of this application.

3.1 FOOTNOTES FOR APPLICATION 2D PART V: A, B AND C

The following are footnotes for EPA Application Form 2D Part V Intake and Effluent Characteristics. Actual effluent data is not available at this time. Effluent data from other mine sites are not applicable to the Otter Creek Mine due to differences in soil types present, and water management practices. These outfalls have not yet been constructed.

4.0 NARRATIVE WATER BALANCE AND OUTFALL DISCUSSION

4.1 DESCRIPTION OF WATER BALANCE COMPONENTS

A schematic diagram of Otter Creek Mine water flows regulated under the MPDES Permit is shown in Figure 2-1 and individual water balance components are described below. Under the current mine plan, discharges from the mine will be storm generated runoff.

4.1.1 Pit Dewatering

As mentioned above, water management actions are proposed for storm water runoff to be discharged from the facility; to the maximum extent possible pit waters will be managed internally. Pit dewatering water is expected to occur continuously at a rate of 300 gpm. The main internal pit sump is proposed to manage this water. Several other internal sediment ponds will be used during the Phase II activities. The mining and reclamation plan for OCC incorporates the measures for protection of ground water quality and quantity.

Initial mine development will establish box cuts which will function as internal collection points to manage any waters generated. The haul roads are designed to route storm water into the pit proper.

4.1.2 Surface Water Drainage Control

During mine operation, the surface water drainage system is designed to confine surface runoff to the mine area with zero discharge except in response to extraordinary runoff events (>10-year, 24-hour storm). Any water discharges from the mine site would be through one of the 21 permitted MPDES discharge points. Refer to Figure 2-2 for operational drainage control features.

An access road constructed parallel to Otter Creek will intercept runoff and route it to excavated sediment ponds. These ponds will be sized to contain a 10-year, 24-hour event at a minimum for the entire upstream watershed in the pre-mining configuration. During the Phase I time period, sediment ponds EP-1, EP-1B, EP-2, EP-3, EP-4, EP-8, EP-9, EP-9A,

EP-11, EP-12, EP-13, EP-14 and EP-15 are outside the active mining area; ponds EP-R1, EP-R2, EP-R3, EP-R4 and EP-R5 are in the rail loop area. Section 5.2 describes these outfalls in detail.

Internal ponds (constructed in reclaimed spoil- Phase II drainage control actions) will be connected via drainage control ditches inside the main haul road with several connected in series. Examples of internal drainage control structures are: EP-1A, EP-2A, EP-3A, EP-5, EP-6, EP-7 and EP-10. Internal ponds are sized to contain the runoff from a 100-year, 24-hour storm event. Refer to Mine Permit Exhibit 315A attached as Appendix B.

4.1.3 Evaporation

Evaporation rates expected to be seen on the OCC mine site total 38 inches per year. The total surface areas of the exterior ponds are well over 4 million square feet. The interior ponds exceed one million square feet. On an annualized basis, with such large surface areas evaporation losses are expected to be substantial with over 453 ac-ft losses each year.

4.1.4 Groundwater Infiltration

Waters collected and stored will over time infiltrate into the subsurface. These potential losses are calculated to be over 1,500 ac-ft on an annualized basis. Infiltration losses are based on soils saturated conductivity rates and pond basal areas. Calculation of infiltration losses are based on 1% of the average saturated hydraulic conductivity rate (0.03 ft/day) of the soils present on site. This is a very conservative approach, which would account for mounding conditions and heterogeneity of the vadose zone and overburden materials over long term use. It is a reasonable expectation for infiltration losses over the annual period to be considerably larger, if water was available.

4.1.5 Dust Suppression

Dust suppression activities on site are expected to consume 100,000 gpd over a 200 day operation window. Pit dewatering water, and storm water will be source waters for dust suppression.

4.2 DESCRIPTION OF OUTFALLS

OCC proposes 21 potential outfalls for storm water management from the Otter Creek Mine. Table 4-1 provides a summary of all proposed outfall locations. Figure 2-2 shows relative locations of outfall structures.

4.2.1 Outfall 001 (45.49629^0 N, 106.17035^0 W)

During Phase I drainage control, Outfall 001 drainage area totals 574.2 acres. The sediment pond at Outfall 001 (EP-1) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 31.9 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of a culvert, with the compliance monitoring point at the downstream end of the culvert prior to discharge into an ephemeral drainage leading to Otter Creek. Regulated waters discharging from this outfall include: potential runoff from the scoria pit, ancillary service road runoff and alkaline mine drainage.

Phase II drainage control adds interior pond EP-1A. Pond EP-1A will be incised in reclaimed spoil and designed to contain the 100-year, 24-hour storm event volume, three years of sediment volume and 32 ac-ft of pit dewatering volume. The total volume of pond EP-1A is designed at 67.2 ac-ft. Should a major storm event occur (greater than the 100 year event) pond EP-1A will over flow through culvert CV-1A to pond EP-1 and out outfall 001.

4.2.2 Outfall 002 (45.49117^0 N, 106.15046^0 W)

During Phase I drainage control, Outfall 002 drainage area totals 191.6 acres. The sediment pond at Outfall 002 (EP-2) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 10.89 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events.

The outfall structure will consist of a culvert, with the compliance monitoring point at the downstream end of the culvert prior to discharge into an ephemeral drainage leading to Otter

TABLE 4-1. OTTER CREEK COAL MINE OUTFALL LISTING

Outfall	Location	Construction Phase	Trap/ Pond	Drainage Area	Storage volume	Design Flow	Treatment code	Receiving Water	Industrial activity
OO1	45.49629° N -106.17035° W	Phase 1&2	EP-1	574.2 ac	31.98 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Scoria pit - Ancillary service road - alkaline mine drainage
OO2	45.49117° N -106.16046° W	Phase 1&2	EP-2	191.6 ac	10.98 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Scoria Pit - Soil stockpiles - Ancillary service roads - alkaline mine drainage
OO3	45.48784° N -106.16156° W	Phase 1&2	EP-3	293.8 ac	6.25 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Soil stockpiles - Ancillary service roads - alkaline mine drainage
OO4	45.48349° N -106.16379° W	Phase 1	EP-4	79.0 ac	4.75 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Soil stockpiles
OO5	45.47447° N -106.15497° W	Phase 1	ST-4	47.9 ac	5.175 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Soil stockpiles
OO6A	45.45899° N -106.15067° W	Phase 1	ST-6N	11.2 ac	0.025 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Soil stockpiles
OO6B	45.45842° N -106.15101° W	Phase 1	ST-6S	9.8 ac	0.018 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Soil stockpiles
OO7	45.4651° N -106.1521° W	Phase 1&2	EP-7	2093.1 ac	44.64 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Ancillary service roads - Alkaline mine drainage
OO8	45.50731° N -106.1583° W	Phase 1	EP-8	30.6 ac	1.70 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Ancillary warehouse - shop - laydown area
OO9	45.50989° N -106.1586° W	Phase 1	EP-9 ST-5	85.4 ac	3.186 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Soil Stockpile - Alkaline mine drainage
O10	45.50662° N -106.14736° W	Phase 1&2	EP-10	78.5 ac	3.65 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Runoff from undistributed areas - Alkaline mine drainage
O11	45.50879° N -106.14253° W	Phase 1	EP-11	106.3 ac	3.27 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Runoff from undisturbed areas
O12	45.5086° N -106.13584° W	Phase 1	EP-12	285.6 ac	11.33 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Runoff from undisturbed areas
O13	45.5087° N -106.13075° W	Phase 1	EP-13	4.7 ac	0.40 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Runoff from undisturbed areas
O14	45.5085° N -106.12613° W	Phase 1	EP-14	35.1 ac	3.24 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Runoff from undisturbed areas
O15	45.50801° N -106.12084° W	Phase 1&2	EP-15	651.6 ac	22.81 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Runoff from undisturbed areas - Alkaline mine drainage
O16	45.50587° N -106.17346° W	Phase 1	EP-1B	199.8 ac	15.59 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Threemile Crk	Ancillary service road - spoil stockpiles
O17	45.50188° N -106.18416° W	Phase 1	EP-R5 EP-R4	119.8 ac	5.84 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Rail spur drainage - upland flow
O18	45.50498° N -106.18521° W	Phase 1	EP-R3	26.7 ac	2.12 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Rail spur drainage - soil stockpile
O19	45.50807° N -106.1908° W	Phase 1	EP-R2	9.0 ac	1.17 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Rail spur drainage - soil stockpile
O20	45.5055° N -106.19388° W	Phase 1	EP-R1	30.9 ac	4.62 ac-ft	10-yr 24-hr	1-U	Ephemeral Tributary to Otter Crk	Rail spur drainage - soil stockpile

Treatment Code found in EPA Form 2D Instructions

Creek. Regulated waters discharging from this outfall include: potential runoff from the scoria pit, soil stockpiles, ancillary service road runoff and alkaline mine drainage.

Phase II drainage control adds interior pond EP-2A. Pond EP-2A will be incised in reclaimed spoil and designed to contain the 100-year, 24-hour storm event volume, three years of sediment volume and 32 ac-ft of pit dewatering volume. The total volume of pond EP-1A is designed at 50.69 ac-ft. Should a major storm event occur (greater than the 100 year event) pond EP-2A will over flow through culvert CV-2A to pond EP-2 and out outfall 002.

4.2.3 Outfall 003 (45.49117^0 N, 106.15046^0 W)

Phase I Outfall 003 drainage area totals 310.8 acres. The sediment pond at Outfall 003 (EP-3) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 6.25 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of a culvert, with the compliance monitoring point at the downstream end of the culvert prior to discharge into an ephemeral drainage leading to Otter Creek. Regulated waters discharging from this outfall include: soil stockpiles, ancillary service road runoff and alkaline mine drainage.

During Phase II operations, outfall 003 will service interior drainage control ponds EP-3A, EP-5, and EP-6. All of the interior ponds are designed to contain the 100-year, 24-hour storm event, and three years of sediment storage. The ponds will be incised into the reclaimed spoils and storm water will be routed in collection ditches designed to pass the 100 year storm event. In the current configuration overflow from pond EP-6 will be routed to pond EP-5. Over flow from pond EP-5 is routed to pond EP-3A. In the event of a major storm event (greater than the 100 year event) pond EP-3A will overflow through culvert CV-3A and will discharge through outfall 003. It is also noted that pond EP-3A is designed to accommodate 32 acre-feet of pit dewatering water as well as the 100-year storm event. Pond storage volumes are: EP-3A ~ 64.8 ac-ft, EP-5 ~ 44.7 ac-ft and EP-6 ~ 88.6 ac-ft.

4.2.4 Outfall 004 (45.48389^0 N, 106.16379^0 W)

Outfall 004 drainage area totals 62.0 acres. The sediment pond at Outfall 004 (EP-4) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 4.75 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of a culvert, with the compliance monitoring point (if required), at the downstream end of the culvert prior to discharge into an ephemeral drainage leading to Otter Creek. Regulated waters discharging from this outfall include: soil stockpiles. This outfall qualifies as a Western Alkaline Coal Mining outfall for the duration of the mining activities.

4.2.5 Outfall 005 (45.47447^0 N, 106.15497^0 W)

Outfall 005 drainage area totals 47.9 acres. The sediment trap at Outfall 005 (ST-4) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the trap is 5.17 acre-feet; the trap will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway reporting to an ephemeral channel. If a compliance monitoring point is required, it will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: soil stockpile runoff. This outfall qualifies as a Western Alkaline Coal Mining outfall for the duration of the mining activities.

4.2.6 Outfall 006A (45.45899^0 N, 106.15067^0 W)

Outfall 006A drainage area totals 11.2 acres. The sediment trap at Outfall 006A (ST-6N) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the trap is 0.025 acre-feet; the trap will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway reporting to an ephemeral channel. If required, a compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: soil stockpiles. This outfall qualifies as a Western Alkaline Coal Mining outfall for the duration of the mining activities.

4.2.7 Outfall 006B (45.45842^0 N, 106.15101^0 W)

Outfall 006B drainage area totals 9.8 acres. The sediment pond at Outfall 006B (ST-6S) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the trap is 0.018 acre-feet; the trap will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway reporting to an ephemeral channel. If required, a compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: soil stockpiles. This outfall qualifies as a Western Alkaline Coal Mining outfall for the duration of the mining activities.

4.2.8 Outfall 007 (45.4651^0 N, 106.1521^0 W)

Phase I drainage control identifies Outfall 007 drainage area to total 2,093.1 acres. The sediment pond at Outfall 007 (EP-7) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 44.64 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of a culvert, with the compliance monitoring point at the downstream end of the culvert prior to discharge into an ephemeral drainage leading to Otter Creek. Regulated waters discharging from this outfall include: runoff from undisturbed areas and ancillary service road runoff.

Phase II drainage control will increase the size of pond EP-7 to 91.5 ac-ft. The pond will be incised in reclaimed spoil and sized to contain the 100-year, 24-hour storm event and three years of sediment storage. During normal operations this pond will be dry as storm water runoff from the active mining area will be the only source to the pond. In the event of a storm greater than the 100 year event, this pond will overflow through culvert CV-7 and discharge out outfall 007.

4.2.9 Outfall 008 (45.50731^0 N, 106.1583^0 W)

Outfall 008 drainage area totals 30.6 acres. The sediment pond at Outfall 008 (EP-8) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 1.7 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Threemile Creek. A compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: ancillary warehouse, shop and laydown yards.

4.2.10 Outfall 009 (45.50989^0 N, 106.1586^0 W)

Outfall 009 drainage area totals 86.7 acres. The sediment pond at Outfall 009 (EP-9) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 8.16 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Threemile Creek. A compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: runoff from soil stockpiles and alkaline mine drainage.

4.2.11 Outfall 010 (45.50662^0 N, 106.14736^0 W)

During Phase I drainage control, Outfall 010 drainage area totals 78.5 acres. The sediment pond at Outfall 010 (EP-10) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 3.65 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of culvert discharging into an ephemeral drainage leading to Threemile Creek. Regulated waters discharging from this outfall include: runoff from undisturbed areas. During Phase I activities, this outfall qualifies as a Western Alkaline Coal Mining outfall.

Phase II drainage control will increase the size of pond EP-10 to 84.06 ac-ft. The pond will be incised in reclaimed spoil and sized to contain the 100-year, 24-hour storm event, three years of sediment storage and 32 ac-ft of pit dewatering water. In the event of a storm greater than the 100-year event, this pond will overflow through culvert CV-10 and discharge out outfall 010. During Phase II activities alkaline mine drainage will be discharged through this outfall.

4.2.12 Outfall 011 (45.50879^0 N, 106.14253^0 W)

Outfall 011 drainage area totals 106.3 acres. The sediment pond at Outfall 011 (EP-11) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 3.27 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Threemile Creek. If required, a compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: runoff from undisturbed areas. During Phase I activities, this outfall qualifies as a Western Alkaline Coal Mining outfall.

This outfall will be inactive during Phase II activities. During Phase II, all internal drainage will be routed to pond EP-10 for treatment and disposal.

4.2.13 Outfall 012 (45.5086^0 N, 106.13584^0 W)

Outfall 012 drainage area totals 285.6 acres. The sediment pond at Outfall 012 (EP-12) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 11.33 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Threemile Creek. If required, a compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: runoff from undisturbed areas. During Phase I activities, this outfall qualifies as a Western Alkaline Coal Mining outfall.

This outfall will be inactive during Phase II activities. During Phase II, all internal drainage will be routed to pond EP-10 for treatment and disposal.

4.2.14 Outfall 013 (45.5087^0 N, 106.13075^0 W)

Outfall 013 drainage area totals 4.7 acres. The sediment pond at Outfall 013 (EP-13) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 0.40 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Threemile Creek. If required, a compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: runoff from undisturbed areas. During Phase I activities, this outfall qualifies as a Western Alkaline Coal Mining outfall.

This outfall will be inactive during Phase II activities. During Phase II, all internal drainage will be routed to pond EP-10 for treatment and disposal.

4.2.15 Outfall 014 (45.5085^0 N, 106.12613^0 W)

Outfall 014 drainage area totals 35.1 acres. The sediment pond at Outfall 014 (EP-14) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 3.24 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Threemile Creek. If required, a compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: runoff from undisturbed areas. During Phase I activities, this outfall qualifies as a Western Alkaline Coal Mining outfall.

This outfall will be inactive during Phase II activities. During Phase II, all internal drainage will be routed to pond EP-10 for treatment and disposal.

4.2.16 Outfall 015 (45.50801^0 N, 106.12084^0 W)

During Phase I drainage control, Outfall 015 drainage area totals 651.6 acres. The sediment pond at Outfall 015 (EP-15) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 22.81 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of a culvert, with the compliance monitoring point at the downstream end of the culvert prior to discharge into an ephemeral drainage leading to Threemile Creek. Regulated waters discharging from this outfall include: runoff from undisturbed areas. During Phase I activities, this outfall qualifies as a Western Alkaline Coal Mining outfall.

Phase II drainage control will increase the size of pond EP-15 to 141.58 ac-ft. The pond will be incised in reclaimed spoil and sized to contain the 100-year, 24-hour storm event and three years of sediment storage. In the event of a storm greater than the 100 year event, this pond will overflow through an open channel spillway and discharge out outfall 010.

4.2.17 Outfall 016 (45.50587^0 N, 106.17346^0 W)

Outfall 016 drainage area totals 199.8 acres. The sediment pond at Outfall 016 (EP-1B) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 15.59 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of a culvert, with the compliance monitoring point at the downstream end of the culvert prior to discharge into an ephemeral drainage leading to Otter Creek. Regulated waters discharging from this outfall include: runoff from alkaline mine drainage, ancillary service road drainage, and soil stockpiles.

4.2.18 Outfall 017 (45.50188^0 N, 106.18416^0 W)

Outfall 017 drainage area totals 119.8 acres. The sediment pond at Outfall 017 (EP-R5, EP-R4) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 5.84 acre-feet; the pond will

be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of a culvert, with the compliance monitoring point at the downstream end of the culvert prior to discharge into an ephemeral drainage leading to Otter Creek. Regulated waters discharging from this outfall include: runoff from the rail spur, and upland flow.

4.2.19 Outfall 018 (45.50498^0 N, 106.18521^0 W)

Outfall 018 drainage area totals 26.7 acres. The sediment pond at Outfall 018 (EP-R3) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge from the pond is 2.12 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Otter Creek. A compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: runoff from the rail spur, and soil stockpile.

4.2.20 Outfall 019 (45.50807^0 N, 106.1908^0 W)

Outfall 019 drainage area totals 9.0 acres. The sediment pond at Outfall 019 (EP-R2) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 1.17 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Otter Creek. A compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: runoff from the rail spur, and soil stockpile.

4.2.21 Outfall 020 (45.5055^0 N, 106.19388^0 W)

Outfall 020 drainage area totals 30.9 acres. The sediment pond at Outfall 020 (EP-R1) will be designed to retain runoff from the 10-year, 24-hour storm event (2.1 inches). The maximum design capacity before discharge of the pond is 4.62 acre-feet; the pond will be dry except in response to major rainfall or snowmelt runoff events. The outfall structure will consist of an open channel spillway discharging into an ephemeral drainage leading to Otter

Creek. A compliance monitoring point will be installed in the open channel to collect effluent samples and measure peak flows. Regulated waters discharging from this outfall include: runoff from the rail spur, and soil stockpile.

5.0 WATER QUALITY AND MONITORING DISCUSSION

5.1 SURFACE WATER REGULATIONS

Otter Creek drains an area of approximately 711 square miles from its headwaters in southern Powder River County, Montana to the confluence with the Tongue River, at Ashland, Montana. Otter Creek Tracts 1, 2 and 3 are in the lower portion of the drainage basin, approximately 5 miles upstream of the Tongue River confluence.

Otter Creek is a perennial stream which flows through the west side of Tract 2, west of the proposed mine area. Primary tributaries in the vicinity of the Otter Creek coal tracts include Tenmile Creek along the south boundary of Tract 2, Threemile Creek, which lies between Tract 1 and Tract 2, and Home Creek along the north boundary of Tract 1. Home Creek is ephemeral through Tract 1. However, an area of intermittent flow occurs near the confluence with Otter Creek. Shorty Creek is a Threemile Creek tributary that originates on the Custer National Forest (CNF) United States Forest Service (USFS) property northeast of Tract 2. East Fork Otter Creek is located north of the Otter Creek Coal tracts.

Proposed Outfalls 001 through 020 would discharge to smaller unnamed ephemeral drainages to Otter Creek and Threemile Creek during large storm events (greater than 10-year, 24-hour).

5.1.1 Water Use Classifications

According to the Administrative Rules of Montana (ARM) 17.30.611(1) (c), the Yellowstone River drainage from the Billings water supply intake to the North Dakota state line and including the Big Horn River drainage is defined to be a 'C-3' water.

ARM 17.30.629 defines C-3 waters as: (1) Waters classified C-3 are to be maintained suitable for bathing, swimming, and recreation, and growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers. The quality of these waters is naturally marginal for drinking, culinary, food processing purposes, agriculture and industrial water supply.

(2) No person may violate the following specific water quality standards for waters classified C-3:

(a) The water quality standard for Escherichia coli bacteria (E-coli) varies according to season, as follows:

(i) from April 1 through October 31, the geometric mean number of E-coli may not exceed 126 colony forming units per 100 milliliters and 10% of the total samples may not exceed 252 colony forming units per 100 milliliters during any 30-day period; and

(ii) from November 1 through March 31, the geometric mean number of E-coli may not exceed 630 colony forming units per 100 milliliters and 10% of the samples may not exceed 1,260 colony forming units per 100 milliliters during any 30-day period.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards specified in department Circular DEQ-7.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) The maximum allowable increase above naturally occurring turbidity is 10 nephelometric turbidity units, except as permitted in 75-5-318, MCA.

(e) A 3ºF maximum increase above naturally occurring water temperature is allowed within the range of 32ºF to 77ºF; within the range of 77ºF to 79.5ºF, no thermal discharge is allowed which will cause the water temperature to exceed 80ºF; and where the naturally occurring water temperature is 79.5ºF or greater, the maximum allowable increase in water temperature is 0.5ºF. A 2ºF per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55ºF. A 2ºF maximum decrease below naturally occurring water temperature is allowed within the range of 55ºF to 32ºF.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), settleable solids, oils or floating solids, which will or are likely to create a nuisance or render the

waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish or other wildlife.

(g) True color must not be increased more than five color units above naturally occurring color.

(h) Concentrations of carcinogenic, bioconcentrating, toxic, radioactive, nutrient, or harmful parameters may not exceed the applicable standards set forth in department Circular DEQ-7.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular DEQ-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) If site-specific criteria for aquatic life are adopted using the procedures given in 75-5-310, MCA, the criteria shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards specified in department Circular DEQ-7.

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met.

5.1.2 State Surface Water Standards

Additional state surface water standards are found in ARM 17.30.637(4) and ARM 17.30.670.

ARM 17.30.637(4) states: (4) Treatment requirements for discharges to ephemeral streams must be no less than the minimum treatment requirements set forth in ARM 17.30.1203. Ephemeral streams are subject to ARM 17.30.635 through 17.30.637, 17.30.640, 17.30.641, 17.30.645 and 17.30.646 but not to the specific water quality standards of ARM 17.30.620 through 17.30.629.

ARM 17.30.670 applies to electrical conductivity (EC - measured as specific conductance SC) and sodium adsorption ratios (SAR) for all tributaries and other surface waters in the Rosebud Creek, Tongue, Powder and Little Powder river watersheds. The monthly average numeric water quality standard for EC is 500 µS/cm and no sample may exceed an EC value of 500 µS/cm. The monthly average numeric water quality standard for SAR from March 2 through October 31 is 3.0 and no sample may exceed an SAR value of 4.5. The monthly average numeric water quality standard for SAR from November 1 through March 1 is 5.0 and no sample may exceed an SAR value of 7.5. Per 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer than natural condition of the receiving water as long as the minimum treatment requirements are met.

5.1.3 Total Maximum Daily Load

Otter Creek is listed in the 2014 listing of impaired waters in the State of Montana. Otter Creek is listed as not fully supporting aquatic life, and agriculture beneficial uses. Primary contact recreation was not assessed during the reporting year. The probable causes listed are: alteration in stream-side or littoral vegetative covers, iron and salinity.

5.1.4 Montana Water Quality Act 75-5-100 MCA

75-5-103. *(Temporary)* Definitions. Unless the context requires otherwise, in this chapter, the following definitions apply:

(13) "High-quality waters" means all state waters, except:

(a) ground water classified as of January 1, 1995, within the "III" or "IV" classifications established by the board's classification rules; and

(b) surface waters that:

(i) are not capable of supporting any one of the designated uses for their classification; or

(ii) have zero flow or surface expression for more than 270 days during most years.

75-5-306. MCA Purer than natural unnecessary -- dams -- definition. (1) It is not necessary that wastes be treated to a purer condition than the natural condition of the

receiving stream as long as the minimum treatment requirements established under this chapter are met.

(2) "Natural" refers to conditions or material present from runoff or percolation over which humans have no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Conditions resulting from the reasonable operation of dams on July 1, 1971, are natural.

75-5-401. *(Temporary)* Board rules for permits -- ground water exclusions. (1) Except as provided in subsection (5), the board shall adopt rules:… (5) Discharges of sewage, industrial wastes, or other wastes into state ground waters from the following activities or operations are not subject to the ground water permit requirements adopted under subsections (1) through (4):… (j) mining operations subject to operating permits or exploration licenses in compliance with The Strip and Underground Mine Reclamation Act, Title 82, chapter 4, part 2, or the metal mine reclamation laws, Title 82, chapter 4, part 3; or…

5.1.5 Nondegradation of Water Quality ARM 17.30.700

17.30.701 PURPOSE (1) The purpose of this subchapter is to prohibit degradation of high quality state waters, except in certain limited circumstances, by implementing the nondegradation policy set forth in 75-5-303, MCA, and providing criteria and procedures for: (a) determining which activities will degrade high quality waters. . .

5.2 WESTERN ALKALINE COAL MINING - SEDIMENT CONTROL PLAN

Pursuant to federal regulations 40 CFR 434 Subpart H (U.S. EPA, 2001), Otter Creek Coal has developed a Sediment Control Plan (SCP) (Hydrometrics, 2014a) to protect hydrologic resources before and after mining operations through implementation of best management practices. The SCP is attached in Appendix B.

Currently, the proposed mining operations will implement a phased approach during mine development. OCC is requesting approval of the sediment control plan to become effluent limits during those times the western alkaline coal mining effluent limitation guidelines

(ELGs) are applicable: reclamation areas, brushing and grubbing areas, topsoil stockpile areas, and regraded areas (40 CFR 434.81(a) through (c) and 40 CFR 434.82(a) through (c)). As activities at any outfall progress, from pre-mining activities, to active mining activities and post-mining activities; the SCP effluent limitations would apply to pre and post mining activities. Numeric ELGs and monitoring would be applicable during active mining periods.

Outfalls that would fall into the SCP effluent limitations for the duration of the mining plan would include outfalls 004, 005, 006A, and 006B. Outfalls 010, 011, 012, 013, 014 and 015 would be managed under the SCP until active mining activities commenced in the watershed. OCC proposes to submit notification of the status changes 90 days in advance of disturbance activities starting in the watersheds.

6.0 SURFACE WATER QUALITY

Results of the monitoring indicate that water flowing in tributary drainages is typically turbid with relatively high levels of suspended solids. However, it was also observed that relatively clear, sediment free water was present when runoff conditions occur when ground conditions were frozen or ice was present in channel bottoms. The presence of relatively high Total Suspended Solids (TSS) and turbidity reflects the episodic nature of runoff at the site from tributary drainages.

6.1.1 Otter Creek Tributary Monitoring

A total of 27 samples were collected and analyzed during quarterly baseline monitoring events from March 2011 through March 2013. Surface water monitoring sites SW-13, SW-14, SW-15, SW-16, SW-17, SW-18, SW-19 and SW-20 are sites in ephemeral tributaries of Otter Creek. These waters are sodium sulfate based water with no other dominant cation present. Table 6-1 contains a summary of water quality for the Otter Creek tributary surface water monitoring sites.

The water quality was near neutral (Avg. pH – 7.7), with a range of SC from 173 to 11,000 µmhos/cm, SAR of 0.09 to 21.5, and low concentrations of most metals. Concentrations of iron range from 0.05 mg/L (nondetect) to 148 mg/L. Total suspended solids demonstrate wide ranges on analysis as well; ranging from 26 mg/L to 18,100 mg/L.

Monitoring data is attached in Appendix C.

TABLE 6-1. OTTER CREEK TRIBUTARY MONITORING

Parameter	Units	Min	Max	Mean	No. samples	No. detects
ALUMINUM (AL)	mg/L	0.017	2.4	0.27	27	9
ARSENIC (AS)	mg/L	0.003	0.062	0.0087	27	9
BARIUM (BA)	mg/L	0.005	0.932	0.20	27	26
BERYLLIUM (BE)	mg/L	0.001	0.006	0.0014	27	6
BICARBONATE ALKALINITY AS HCO3	mg/L	81	590	227	27	27
BORON (B)	mg/L	0.01	1.22	0.21	27	26
CADMIUM (CD)	mg/L	0.00008	0.0016	0.00031	27	14
CALCIUM (CA)	mg/L	2	431	127	27	27
CARBONATE AS CO3	mg/L	1	63	5	27	3
CHLORIDE (CL)	mg/L	1	50	9.	27	26
CHROMIUM (CR)	mg/L	0.001	0.13	0.017	27	22
COPPER (CU)	mg/L	0.001	0.105	0.023	27	26
FLUORIDE (F)	mg/L	0.1	2	0.42	27	21
IRON (FE)	mg/L	0.05	148	17.91	27	26
LEAD (PB)	mg/L	0.0005	0.114	0.015	27	24
MAGNESIUM (MG)	mg/L	1	606	121	27	26
MANGANESE (MN)	mg/L	0.011	3.39	0.503	27	27
MERCURY (HG)	mg/L	0.00005	0.0002	8.11E-05	27	7
MOLYBDENUM (MO)	mg/L	0.005	0.006	0.0050	27	1
NICKEL (NI)	mg/L	0.01	0.12	0.02	27	15
NITRATE + NITRITE AS N	mg/L	0.01	4.55	0.69	25	23
pH - LAB	s.u.	6.7	8.9	7.7	27	27
PHOSPHORUS (P)	mg/L	0.012	4.58	0.57	10	10
POTASSIUM (K)	mg/L	1	42	16	27	26
SC (UMHOS/CM AT 25 C)	umhos/cm	173	11,000	2,564	27	27
SELENIUM (SE)	mg/L	0.001	0.008	0.002	27	12
SODIUM (NA)	mg/L	1	1,810	406	27	26
SODIUM ADSORPTION RATIO	unitless	0.09	21.5	4.59	28	28
SULFATE (SO4)	mg/L	8	6,300	1,363	27	27
TDS - CALCULATED	mg/L	190	325	257	2	2
TDS (MEASURED AT 180 C)	mg/L	163	10,000	2,445	25	25
TOTAL ALKALINITY AS CACO3	mg/L	67	520	191	27	27
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	0.05	1.44	0.28	10	5
TOTAL SUSPENDED SOLIDS	mg/L	26	18,100	1,548	25	25
TURBIDITY (NTU) - LAB	NTU	4.4	100,000	17,138	24	24
VANADIUM (V)	mg/L	0.1	0.2	0.10	27	4
ZINC (ZN)	mg/L	0.01	0.67	0.12	27	22

All metals analyzed as total recoverable except aluminum which is analyzed as dissolved.

6.1.2 Threemile Creek Tributary Monitoring

A total of 38 baseline samples were collected from six Threemile Creek tributary sites from March 2011 to May 2014. Surface water monitoring sites SW-4, SW-5, SW-6, SW-7, SW-8 and SW-9 are sited in ephemeral drainages leading from the proposed mine area. Water in the Threemile tributaries reflects runoff conditions from snowmelt and intense runoff events. The remainders of the time, the sites were dry. Higher quality water occurred during periods when the ground was frozen and sediment was immobile. Based on the results of background monitoring in ephemeral drainages, it is apparent that the tributaries to Threemile Creek provide large amounts of relatively poor quality water under intense rainfall/runoff precipitation events.

Table 6-2 contains a summary of water quality for the Threemile Creek tributaries.

Surface water in Threemile Creek tributaries are a sodium sulfate dominate water with sodium being the dominant cation. The water quality was near neutral (Avg. pH – 7.5), with a range of SC from 155 to 7,450 µmhos/cm, SAR of 0.03 to 9.36, and low concentrations of most metals. Concentrations of iron range from 0.05 mg/L (nondetect) to 87.6 mg/L. Total suspended solids demonstrate wide ranges on analysis as well; ranging from 4 mg/L to 11,000 mg/L.

Monitoring data is attached in Appendix D.

TABLE 6-2. THREEMILE CREEK TRIBUTARY MONITORING

Parameter	units	min	max	mean	No. Samples	No. detects
ALUMINUM (AL)	mg/L	0.009	0.9	0.129	37	7
ARSENIC (AS)	mg/L	0.001	0.025	0.004	38	10
BARIUM (BA)	mg/L	0.024	0.82	0.138	37	37
BERYLLIUM (BE)	mg/L	0.0008	0.003	0.001	37	3
BICARBONATE ALKALINITY AS HCO3	mg/L	77	710	313	38	38
BORON (B)	mg/L	0.02	0.39	0.109	37	37
CADMIUM (CD)	mg/L	0.00003	0.0018	0.00018	37	12
CALCIUM (CA)	mg/L	15	368	153	37	37
CARBONATE AS CO3	mg/L	1	16	2.8	38	4
CHLORIDE (CL)	mg/L	1	51	11.0	38	36
CHROMIUM (CR)	mg/L	0.001	0.109	0.009	37	20
COPPER (CU)	mg/L	0.001	0.099	0.011	37	30
FLUORIDE (F)	mg/L	0.1	2	0.36	38	33
IRON (FE)	mg/L	0.05	87.6	7.82	37	35
LEAD (PB)	mg/L	0.0003	0.059	0.0053	37	25
MAGNESIUM (MG)	mg/L	4	896	158	37	37
MANGANESE (MN)	mg/L	0.01	3.42	0.531	37	37
MERCURY (HG)	mg/L	0.000005	0.00011	5.19E-05	37	4
MOLYBDENUM (MO)	mg/L	0.005	0.006	0.005	37	3
NICKEL (NI)	mg/L	0.002	0.1	0.016	37	15
NITRATE + NITRITE AS N	mg/L	0.01	3.72	0.339	36	24
pH - LAB	s.u.	6.5	8.3	7.5	38	38
PHOSPHORUS (P)	mg/L	0.008	0.813	0.194	9	9
POTASSIUM (K)	mg/L	6	72	18	37	37
SC (UMHOS/CM AT 25 C)	umhos/cm	155	7,470	2,400	38	38
SELENIUM (SE)	mg/L	0.001	0.012	0.001	37	10
SODIUM (NA)	mg/L	1	1,850	354	37	37
SODIUM ADSORPTION RATIO	unitless	0.03	9.36	3.42	39	39
SULFATE (SO4)	mg/L	2	5,000	1,329	38	37
TDS - CALCULATED	mg/L	216	969	592	2	2
TDS (MEASURED AT 180 C)	mg/L	92	7,570	2,364	36	36
TOTAL ALKALINITY AS CACO3	mg/L	63	600	258	38	38
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	0.05	2.4	0.42	9	5
TOTAL SUSPENDED SOLIDS	mg/L	4	11,000	518	36	34
TURBIDITY (NTU) - LAB	NTU	0.7	100,000	3,214	36	36
VANADIUM (V)	mg/L	0.01	0.1	0.09	37	2
ZINC (ZN)	mg/L	0.008	0.44	0.094	37	26

All metals analyzed as total recoverable except for aluminum which is dissolved.

6.2 DISCHARGE WATER QUALITY

Characterization of effluent generated from the mine site during the development phase may not represent actual effluent generated and discharged off site during active mining. Several analytical methods have been used to approximate post mining groundwater quality and characterization of spoils. However, the results may not be an appropriate application to characterize storm water runoff which, under normal conditions, will be the discharge from the facility. OCC has conducted long term column leach tests and extensive saturated past extract analysis to define spoil water quality. Neither of these analytical tests approximates precipitation driven entrainment and transport phenomena.

A number of site specific conditions would prevent utilizing other mine site's effluent for this purpose as well. Several of these areas include:

- Soils types present on the mine site are different in characteristics than soils at other mines. These soils will weather and oxidize differently, and their ability to leach out into storm water will be different.
- The OCC mine is targeting the Knobloch coal unit. Other mines in the geographical area are not mining this coal unit. The water quality of the Knobloch aquifer is considerably different than the Rosebud, or Dietz units mined elsewhere.
- Based on water management, there is projected to be a very strong, negative water balance on the OCC site. Any discharge from the OCC site would only be in response to storm events greater than the 10-year, 24-hour event.

OCC is proposing sampling of any effluent generated during the first permit cycle to characterize the effluent generated on site.

6.3 PROPOSED PERMIT LIMITATIONS

OCC proposes the technology based limit found in 40 CFR 434 (new source performance standard (NSPS), in subpart B (40 CFR 434.20), subpart D (40 CFR 434.40), subpart F (40 CFR 434.60) and subpart H (40 CFR 434.80)) as permit limitations for the first permit cycle. Because Otter Creek is listed as impaired for iron and salinity, by definition it is not a high

quality water, thus the nondegradagation statute is limited to protecting existing beneficial uses. Additionally, the physical outfalls discharge to ephemeral drainages, which by rule are exempt from numeric water quality standards. Further, the naturally occurring levels of EC and SAR, which are used to measure salinity in Otter Creek, exceed the numeric water quality standards. The WQA and water use classification state that discharges do not need to be treated to a condition purer than the natural conditions. This leaves the technology based effluent limitation guidelines as the most appropriate effluent quality standards for discharges from the OCC mine.

7.0 MONITORING

Compliance monitoring will be conducted in accordance to the Hydrologic Monitoring Plan (Exhibit 314B) of the operational permit application.

OCC is proposing representative monitoring for a number of sites around the mine site. OCC would propose monitoring Outfalls 001, 003 and 007 on the east side of Otter Creek and outfalls 017 and 020 in the rail spur area. OCC proposes to monitor outfalls 008 and 009 in the Threemile drainage.

Outfalls 004, 005, 006A, and 006B all qualify for coverage under the Western Alkaline Coal Mining subcategory (40 CFR 434.80), which excludes monitoring (Federal Register / Vol. 67, No. 15 / Wednesday, January 23, 2002 / Rules and Regulations). During the Phase I drainage control period, Outfalls 010, 011, 012, 013, 014 and 015 will meet those qualifications as well; therefore, monitoring is not required.

OCC is proposing to monitor upstream of the mine site and downstream from the mine site during discharge events. If during the course of instream monitoring detrimental conditions arise from the discharge from the mine, additional water management activities will be implemented.

8.0 REFERENCES

Hydrometrics, Inc., 2012. Otter Creek Mine Strip Mine Permit Application. Prepared for Otter Creek Coal, LLC. July 2012.

Hydrometrics, Inc., 2014a. Sediment Control Plan. October 2014.

Hydrometrics, Inc., 2014b. Otter Creek Mine – 1st Round Acceptability Response – Prepared for Otter Creek Coal, LLC. November 19, 2014.

U.S. EPA, 2001. Development Document for Final Effluent Limitations Guidelines and Standards for the Western Alkaline Coal Mining Subcategory. EPA 821-B-01-012. December 2001.

U.S. EPA Federal Register, 2002. 40 CFR Parts 9 and 434 Coal Mining Point Source Category; Amendments to Effluent Limitations Guidelines and New Source Performance Standards; Final Rule. January 23, 2002.

APPENDIX A

MPDES PERMIT APPLICATION FORMS

Montana Department of ENVIRONMENTAL QUALITY

WATER PROTECTION BUREAU

Agency Use
Permit No.:
Date Rec'd
Amt Rec'd
Check No.
Rec'd By

FORM **1**

GENERAL INFORMATION

(See instructions before completing)

Section A – Montana Pollutant Discharge Elimination System

SPECIFIC QUESTIONS	MARK 'X' YES	MARK 'X' NO	MARK 'X' FORM ATTACHED	SPECIFIC QUESTIONS	MARK 'X' YES	MARK 'X' NO	MARK 'X' FORM ATTACHED
1. Is this facility a publicly owned treatment works which results in a discharge to state surface waters or waters of the U.S.? (FORM 2A)	○	●	☐	2. Does or will this facility (*either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to state surface waters or waters of the U.S.? (FORM 2B)	○	●	☐
3. Is this a facility which currently results in a discharge of industrial wastewater to state surface water other than those described in 1 or 2 above? (FORM 2C)	○	●	☐	4. Is this a proposed facility *(other than those described in 1 or 2 above*) which will result in a discharge of industrial wastewater to state surface waters? (FORM 2D)	●	○	✓
5. Does this facility discharge only non-process wastewater, not subject to federal effluent guidelines or new source performance standards to state surface waters? (FORM 2E)	○	●	☐	6. Does this facility discharge or propose to discharge storm water associated with industrial activity either alone or in combination with non-storm water discharges? (FORM 2F)	○	●	☐

Montana Ground Water Pollution Control System (MGWPCS)

7. Does this facility discharge sewage to ground water through infiltration, percolation or other methods of subsurface disposal? (GW-1)	○	●	☐	8. Does this facility discharge industrial wastes, or other wastes, to ground water through infiltration, percolation, or other methods of subsurface disposal? (GW-2)	○	●	☐

Section B – Facility or Activity Information

Facility Name: Otter Ceek Mine

Facility Location: 5 miles south of Ashland MT

City, State, Zip:

Telephone Number: (406) 245-0990 County: Powder River

Township: 4S Range: 45E Section: 3,4,9,10,11 ; ____ 1/4 ____ 1/4 ____ 1/4

Latitude: 45.50857N Longitude: -106.178448W

Is the facility located on Indian lands? ☐ YES ☒ NO

Section C – Facility Contact

Facility Contact Name/Title: William M.(Mike) Rowlands, Director, Otter Creek Operations

Mailing Address: PO Box 7152

City, State, Zip: Billings, MT 59103-7152

Telephone Number: (406) 245-0990 Email:

Section D – Existing or Pending Permits, Certifications, or Approvals

☐ MPDES Permit _____ ☐ 404 Permit (dredge & fill) _____
☐ UIC # _____ ☐ MGWPCS # _____
☐ Plat Approval EQ # _____ ☒ Other SMMRA permit

Section E – Nature of Business (provide a brief description)

Open Pit Coal Mine

SIC CODES (4-digit, in order of priority)

Code		A. First	Code		B. Second
1	1221	Bituminous coal surface mining	2		
Code		**C. Third**	**Code**		**D. Fourth**
3			4		

MAP: Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures (outfalls), each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area.

Section F – Applicant (Owner/Operator) Information

Applicant (Operator) Name Otter Creek Coal, LLC

Mailing Address PO Box 7152

City, State, Zip Billings MT 59103-7152

Telephone Numbers (406) 245-0990

Is the 'Operator' listed above also the owner? ☒ YES ☐ NO

Status of Applicant *(Check One)*

☐ Federal ☐ State ☒ Private ☐ Public ☐ Other *(specify)* _____

CERTIFICATION

Section G – Applicant Information: This application must be completed, signed, and certified as follows:

- For a corporation, by a principal officer of at least the level of vice president;
- For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
- For a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official.

All Applicants Must Complete the Following Certification.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system or those persons directly responsible for gathering the information, it is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

A. Name and Official Title (Type or Print)	B. Phone No.
William M.(Mike) Rowlands, Director, Otter Creek Operations	(406) 245-0990
C. Signature	**D. Date Signed**
	December 18, 2014

Form Approved. OMB No. 2040-0086. Approval expires 8-31-98.

Please print or type in the unshaded areas only	EPA I.D. NUMBER (*copy from Item 1 of Form 1*)	

Form **2D** NPDES

EPA

New Sources and New Dischargers Application for Permit to Discharge Process Wastewater

I. Outfall Location

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

Outfall Number (*list*)	Latitude			Longitude			Receiving Water (*name*)
	Deg.	Min.	Sec.	Deg.	Min.	Sec.	
See attached Table 4-1							
in narrative							

II. Discharge Date (When do you expect to begin discharging?)

III. Flows, Sources of Pollution, and Treatment Technologies

A. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

Outfall Number	1. Operations Contributing Flow (*List*)	2. Average Flow (*Include Units*)	3. Treatment (*Description or List codes from Table 2D-1*)
All	See Table 4-1 in narrative.		

B. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item III-A. Construct a water balance on the line drawing b See Figure 2-1 intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g., for certain n description of the nature and amount of any sources of water and any collection or treatment measures.

C. Except for storm runoff, leaks, or spills, will any of the discharges described in Items III-A be intermittent or seasonal?

☐ YES (*complete the following table*) ☑ NO (*go to Section IV*)

Outfall Number	1. Frequency		2. Flow		
	a. Days Per Week (*specify average*)	b. Months Per Year (*specify average*)	a. Maximum Daily Flow Rate (*in mgd*)	b. Maximum Total Volume (*specify with units*)	c. Duration (*in days*)

IV. Production

If there is an applicable production-based effluent guideline or NSPS, for each outfall list the estimated level of production (projection of actual production level, not design), expressed in the terms and units used in the applicable effluent guideline or NSPS, for each of the first 3 years of operation. If production is likely to vary, you may also submit alternative estimates (attach a separate sheet).

Year	A. Quantity Per Day	B. Units Of Measure	c. Operation, Product, Material, etc. (*specify*)
			Not applicable to coal mining activities.

 CONTINUE ON NEXT PAGE

CONTINUED FROM THE FRONT	EPA I.D. NUMBER (*copy from Item 1 of Form 1*)	Outfall Number All

V. Effluent Characteristics

A and B: These items require you to report estimated amounts (*both concentration and mass*) of the pollutants to be discharged from each of your outfalls. Each part of this item addresses a different set of pollutants and should be completed in accordance with the specific instructions for that part. Data for each outfall should be on a separate page. Attach additional sheets of paper if necessary.

General Instructions *(See table 2D-2 for Pollutants)*
Each part of this item requests you to provide an estimated daily maximum and average for certain pollutants and the source of information. Data for all pollutants in Group A, for all outfalls, must be submitted unless waived by the permitting authority. For all outfalls, data for pollutants in Group B should be reported only for pollutants which you believe will be present or are limited directly by an effluent limitations guideline or NSPS or indirectly through limitations on an indicator pollutant.

1. Pollutant	2. Maximum Daily Value *(include units)*	3. Average Daily Value *(include units)*	4. Source *(see instructions)*

Exact composition and load of pollutants discharged from the facility is not known. Please refer to Section 4.2 (Description of Outfalls) and Section 6.2 (Discharge Water Quality) of the attached narrative for additional information.

CONTINUED FROM THE FRONT	EPA I.D. NUMBER (*copy from Item 1 of Form 1*)	

C. Use the space below to list any of the pollutants listed in Table 2D-3 of the instructions which you know or have reason to believe will be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it will be present.

1. Pollutant	2. Reason for Discharge
No volatile, acid, base/neutral, or pesticides are expected to be present in the effluent discharged from the facility.	

VI. Engineering Report on Wastewater Treatment

A. If there is any technical evaluation concerning your wastewater treatment, including engineering reports or pilot plant studies, check the appropriate box below.

☐ Report Available ☑ No Report

B. Provide the name and location of any existing plant(s) which, to the best of your knowledge resembles this production facility with respect to production processes, wastewater constituents, or wastewater treatments.

Name	Location
No existing coal mine is located within the same soils types and geologic setting as the Otter Creek mine.	

 CONTINUE ON NEXT PAGE

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)

VII. Other Information *(Optional)*

Use the space below to expand upon any of the above questions or to bring to the attention of the reviewer any other information you feel should be considered in establishing permit limitations for the proposed facility. Attach additional sheets if necessary.

Attached is a narrative discribing the operation and management of the Otter Creek Mine.

VIII. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name and Official Title (*type or print*)	B. Phone No.
William M. (Mike) Rowlands, Director, Otter Creek Operations	(406) 245-0990
C. Signature	D. Date Signed
	12/18/2014

APPENDIX B

OCC SEDIMENT CONTROL PLAN

OTTER CREEK MINE
EXHIBIT 315A - APPENDIX A
PONDS AND EMBANKMENTS
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

Prepared for:

Otter Creek Coal, LLC
P.O. Box 7152
Billings, MT 59103-7152

Prepared by:

Hydrometrics, Inc.
5602 Hesper Road
Billings, MT 59106

MONTANA
GREGORY WADE
LORENSON
LICENSED
PROFESSIONAL ENGINEER
10/08/2014

October 2014

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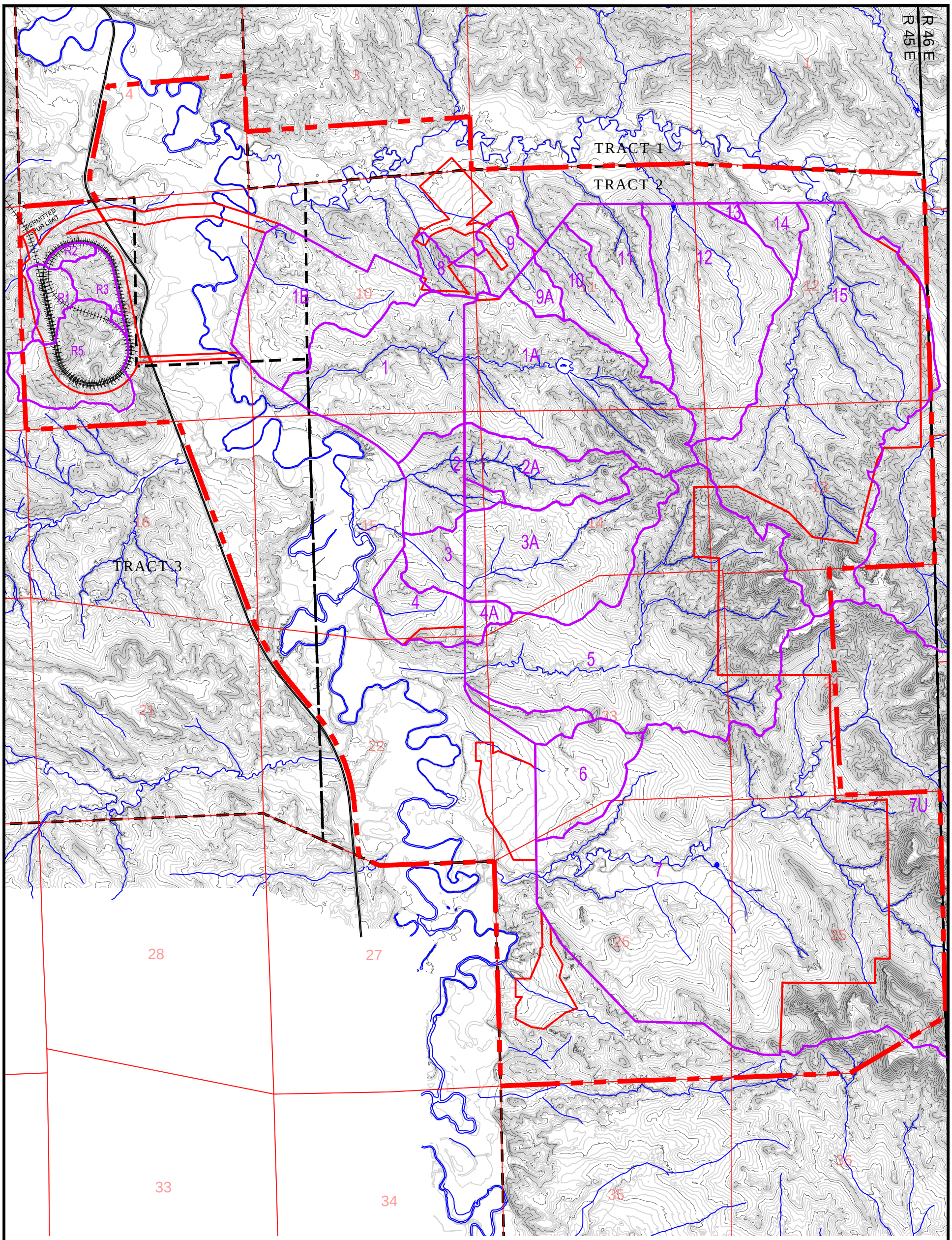
OTTER CREEK MINE
EXHIBIT 315A - APPENDIX A
PONDS AND EMBANKMENTS
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

1.0 PROJECT DESCRIPTION

This report provides guidance for the design of storm water collection ponds that intercept surface runoff and control sediment transport from watersheds impacted by mining activities at the proposed Otter Creek Mine. Areas disturbed by mining, soil storage, overburden stockpiles, and transportation facilities for the proposed Tract 2 area, including the rail loop west of Otter Creek, are addressed in this report. Figure 1-1 shows the pre-mine topography of watersheds discussed in this document.

This report's hydrologic analysis addresses runoff from the 10-year, 24-hour storm event on the impacted watersheds. The sedimentology analysis includes average annual sediment yield (AASY) and storm derived sediment yield predictions for these watersheds. Both hydrology and sedimentology analyses for these watersheds were conducted for the existing conditions prior to mining (baseline) at the proposed Otter Creek Mine as well as the operational and post-mining phases. Additional runoff analysis for the 100-year, 24-hour storm was completed for watersheds within the coal removal area. Civil Software Design program SEDCAD 4 (SEDCAD, 1998) was used to model site hydrology and calculate runoff flow and volume as well as sediment yield.

The purpose of these analyses is to model baseline, operational, and post-mining runoff and sediment yield to serve as a basis for design of operational and post-mining storm water controls and in order to demonstrate compliance with 40CFR 434.80 Subpart H, the Effluent



LEGEND:

PERMIT BOUNDARY

TRACT BOUNDARY

DISTURBANCE BOUNDARY

PRE-MINE WATERSHED

NORTH

SCALE (In Feet) 0 2200

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	PRE-MINE TOPOGRAPHY	FIGURE 1-1

Hydrometrics, Inc.
Consulting Scientists and Engineers

UPDATE TIME: 4:41 PM
GMETZGER\HEL\20141004\I:\LAND PROJECTS\OTRCR\DWG\315A\315A FIG 1-1 2-1.DWG

Limitation Guidelines and Standards for the Western Alkaline Coal Mining Subcategory (U.S. EPA, 2001).

The report addresses items related to surface runoff from mine-impacted areas that include determination of the rainfall event to be used as a basis for design of surface runoff controls, evaluation of the peak flow and volume of surface runoff that may be generated, evaluation of the average annual sediment yield and storm derived sediment yield, and development of sizing criteria for construction of surface runoff control structures. Design details are included in the appendices of this report. Unless specified otherwise in this report, temporary and permanent erosion and sediment control best management practices will be constructed in accordance with the "State of Montana Department of Transportation Erosion and Sediment Control Best Management Practices" reference manual (MDT, 2004).

2.0 DESIGN SCENARIOS

The storm water runoff and sediment yield of a watershed can reasonably be predicted using standard modeling and analysis techniques based on topography, soil type, and vegetation cover. Modeled storm water runoff and sediment yield for baseline (pre-mining) conditions, operational phases, and post-mine conditions provide a basis for the design of detention, containment, and conveyance structures as part of the overall mine plan. Runoff containment ponds, sediment traps, and conveyance structures will be installed as operational controls during initial soil salvage disturbance and will remain in place until final grading is complete. All sediment ponds will be excavated ponds, identified by the prefix EP- and the watershed number (e.g., EP-1A for the excavated pond within subwatershed 1A). Ditches and culverts are designed to convey the peak storm water flow from a 10-year, 24-hour storm. Once final grading is complete and post-mining topography is established in a watershed, operational sediment ponds will be replaced by reclamation sediment ponds or traps sized to reduce sediment yield to or below baseline conditions, determined by modeling. Modeling presented in this report is also used to determine sediment control structure configurations during the operational and reclamation phases.

2.1 BASELINE CONDITIONS

Pre-mining conditions were modeled by analyzing existing soil, vegetation, and land characteristics and were used as the basis of comparison of runoff and sediment yield expected during reclamation. Soils data was obtained from the Baseline Report 304L (Westech, 2012b) and from the Natural Resource and Conservation Service (NRCS). Vegetation information was obtained from Baseline Report 304J (Westech, 2012a). The results of baseline models are used to demonstrate compliance with Western Alkaline standards once post-mining topography has been established and final grading is complete.

2.2 OPERATIONAL DRAINAGE CONTROL

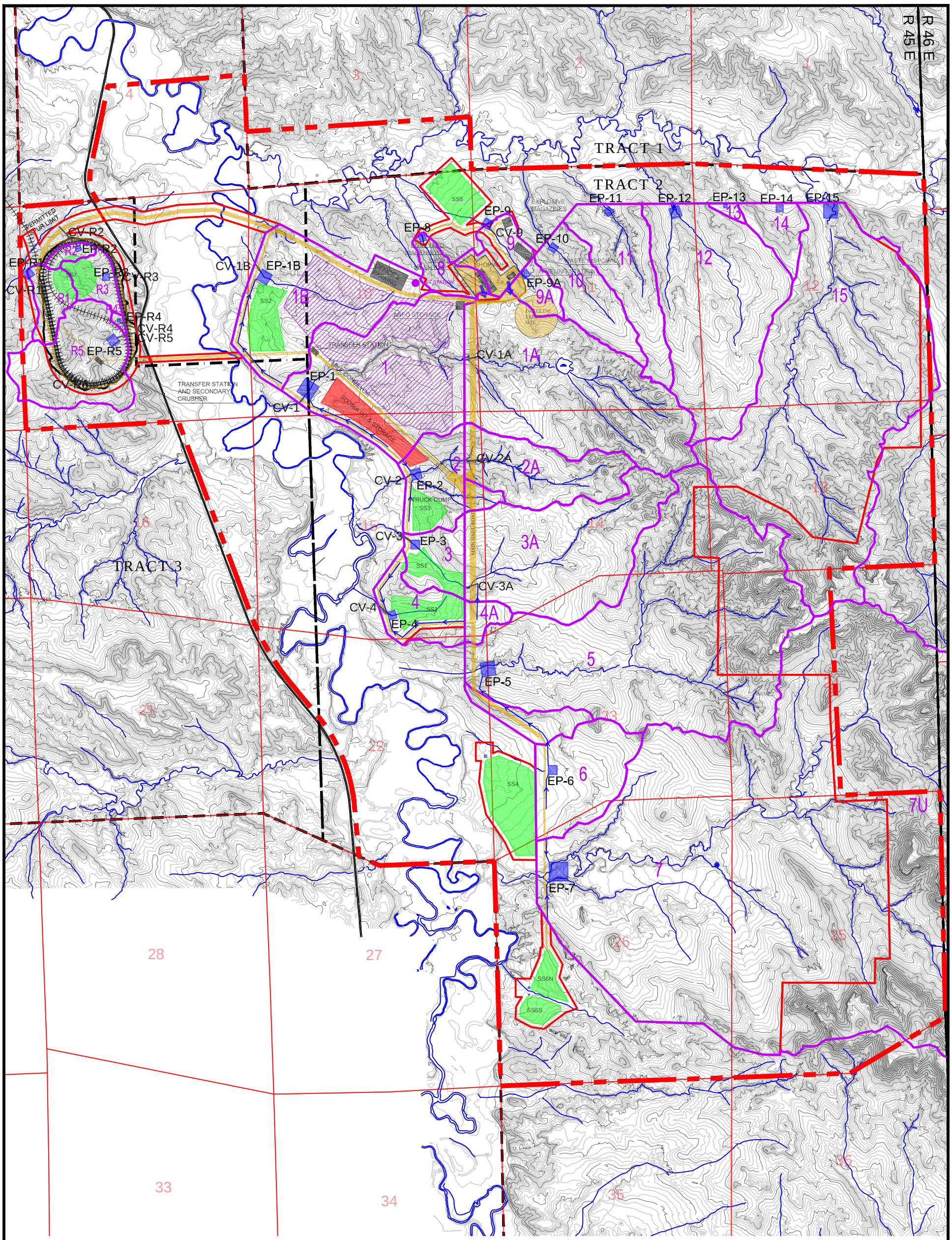
Operational drainage control will progress dynamically as mining activities advance in order to provide appropriate hydrologic control. The mining sequence as it relates to operational drainage control has been broken up into two phases, as described below.

2.2.1 First Phase of Operational Drainage Control

The first phase of operational drainage control will begin upon disturbance of each watershed, including the construction of roads, the rail loop, and mine facilities or soil stripping. During the first phase of operational drainage control, sediment ponds will be established to contain runoff from the 10-year, 24-hour storm event plus three times the average annual sediment yield for the entire watershed. Watershed boundaries and the locations of first phase of operational drainage control structures are shown on Figure 2-1.

Initial disturbance will begin in watersheds 1, 1B, 2, 3, 4, 8 and 9 during the construction of the roads and mine facilities. Sediment ponds EP-1, EP-1B, EP-2, EP-3, EP-4, EP-8 and EP-9 will be constructed for the first phase of operational drainage control in watersheds 1, 1B, 2, 3, 4, 8 and 9 and will remain in place until final grading is complete. To size the sediment ponds, it was assumed that runoff and sediment from the entire watershed, including subwatersheds 1A, 2A, 3A, 4A and 9A will be captured by these structures. Areas of the watershed downgradient of the mine pit disturbance boundary that will eventually be disturbed as well as portions of watersheds impacted by the construction of the main haul road were modeled in the bare soil condition, while the remaining portions of the watersheds were modeled in the undisturbed condition. It is likely that the areas disturbed during the first phase will be much smaller than those assumed, making the sediment pond sizes calculated in this report conservative.

Watersheds 5, 6, 7, 10, 11, 12, 13, 14 and 15 will initially be disturbed by topsoil stripping ahead of the box cut. As soil stripping crosses the divide into a subsequent watershed, a first phase sediment pond will be excavated in each watershed. To size the sediment ponds, it was assumed that a disturbed area equal to two subsequent years of planned mining



LEGEND:

RAIL LOOP

ROADS

EXCAVATED POND

RUNOFF ROUTING

CULVERT

SOIL STORAGE

TEMPORARY SPOIL STORAGE

SCORIA STOCKPILE

PRE-MINE WATERSHED

NORTH

SCALE (In Feet) 0 2200

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

PHASE ONE OPERATIONAL DRAINAGE CONTROL

FIGURE **2-1**

Hydrometrics, Inc.
Consulting Scientists and Engineers

UPDATE TIME: 4:15 PM
GMETZGER\HEL\20141004\I:\LAND PROJECTS\OTRCR\DWG\315A\315A FIG 1-1 2-1.DWG

activity within each watershed. For example, if the mining plan indicates a watershed will be disturbed in year six, the entire area impacted in years six and seven is assumed to be bare soil. The remainder of the watershed is modeled in the undisturbed state. This is a likely worst-case scenario before the mining cut affects the watershed. A disturbance area equal to three subsequent years of planned mining activity is assumed in watershed 15 since only a small portion of the watershed is disturbed within the first year of mining. Once soil has been salvaged, excavation of overburden will create a depression in the active mine pit, capturing all runoff from active mine workings in the pit and displacing the first phase sediment ponds.

2.2.1.1 Rail Loop Operational Drainage Control

Sediment ponds in the rail loop area are also designed to contain runoff from the 10-year, 24-hour storm plus three times the average annual sediment yield. The entire drainage area contributing to ponds EP-R1, EP-R2 and EP-R4 is modeled in the disturbed condition. For ponds EP-R3 and EP-R5, the areas impacted by the rail loop, conveyor, and soil stockpile are modeled as bare soil and the remaining drainage area is modeled as undisturbed.

2.2.2 Second Phase of Operational Drainage Control

The second phase of operational drainage control begins after the box cut is established in a watershed, intercepting storm water runoff upgradient of the pit. Pre-mining watersheds 4A and 13 do not include second phase of operational drainage control sediment ponds because runoff from watershed 4A is routed to EP-3A and watershed 13 becomes part of other watersheds as part of the proposed post-mine topography. During initial mining pit development the pit will capture all storm water runoff from the watershed and will need to be dewatered to conduct mining activities. A central sump will be constructed east of the pit to store water pumped from the active mine pit area. The sump storage capacity is based on the predicted pit dewatering volume for one year of mine operation.

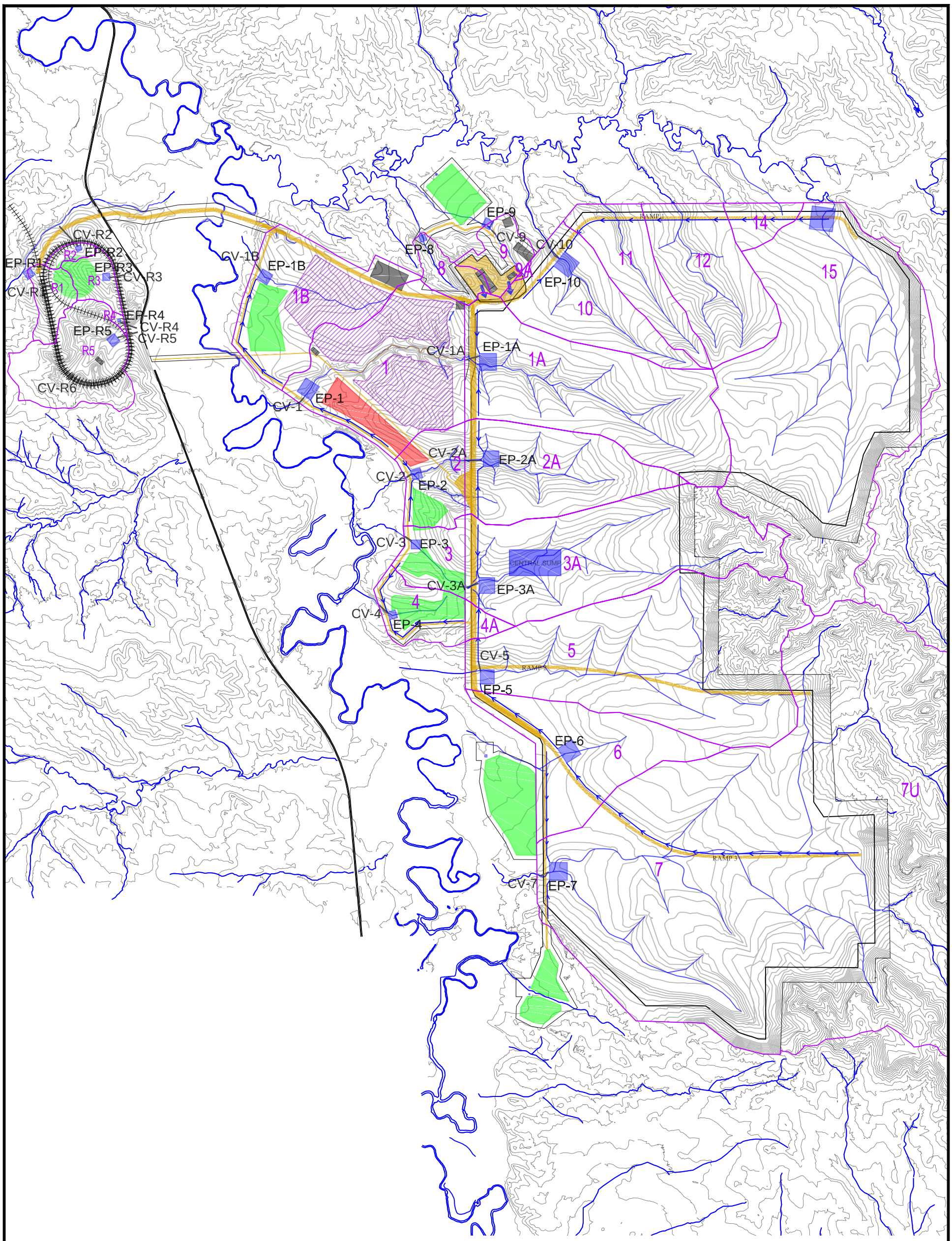
As the box cut advances upgradient and spoils are placed behind (downgradient of) the active cut, new excavated sediment ponds will be established within the former mine cut. These operational sediment ponds will be sized to provide full containment of runoff in the

watershed for all storm events up to and including the 100-year, 24-hour event plus sediment storage equal to three times the average annual sediment yield. Additional capacity is included in several second phase ponds for pit dewatering, replacing the central sump. Watershed boundaries and the location of second phase of operational drainage control structures are shown on Figure 2-2.

The contributing area and disturbance condition used to size second phase operational sediment ponds varies, depending on the mining and reclamation sequence of a given watershed. For most watersheds, the greatest runoff and sediment yield will occur once the final year of mining is completed within the watershed. Watersheds 10, 11, 12, 14 and 15 are managed differently. As the mine cut advances beyond each watershed, runoff from drainages 10, 11, 12 and a portion of 14 will be routed back along Ramp 1 to Pond EP-10 in a ditch sized to convey the peak flow from a 100-year, 24-hour storm. Runoff from watershed 15 and the remainder of watershed 14 will be contained in the pit until final grading. Pond EP-15 will be constructed during final pit closure as drainage is restored.

To simulate the worst-case runoff scenario for each pond, the reclaimed area from the previous three years is modeled as bare soil and the remaining reclaimed area is modeled in fair vegetative condition, since at least two years have passed since regrading was completed. Figure 2-3 shows the worst-case hydrologic conditions used to model operational drainage controls. Based on the proposed mine reclamation plan, a portion of watershed 12 will remain within the mine pit when the worst-case condition exists for pond EP-10.

Implementing the operational drainage controls described will result in zero discharge from the coal removal area unless the 100-year, 24-hour storm runoff volume is exceeded. If storm runoff exceeds the predicted 100-year, 24-hour storm runoff volume, runoff from ponds EP-1A, EP-2A and EP-3A is routed to sediment ponds EP-1, EP-2 and EP-3 before discharging off the mine property boundary at designated outfall locations. Designated outfalls are also located downgradient of ponds EP-7 and EP-10. Potential overflow from EP-6 is routed to EP-5, and during the second operational phase overflow from EP-5 is routed to EP-3A.



LEGEND:

RAIL LOOP

ROADS

EXCAVATED POND

RUNOFF ROUTING

CULVERT

SOIL STORAGE

TEMPORARY SPOIL STORAGE

SCORIA STOCKPILE

POST-MINE WATERSHED

NORTH

SCALE

0 (In Feet) 2200

CONTOUR INTERVALS

10' INSIDE DISTURBANCE BOUNDARY

25' OUTSIDE DISTURBANCE BOUNDARY

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

PHASE TWO OPERATIONAL DRAINAGE CONTROL

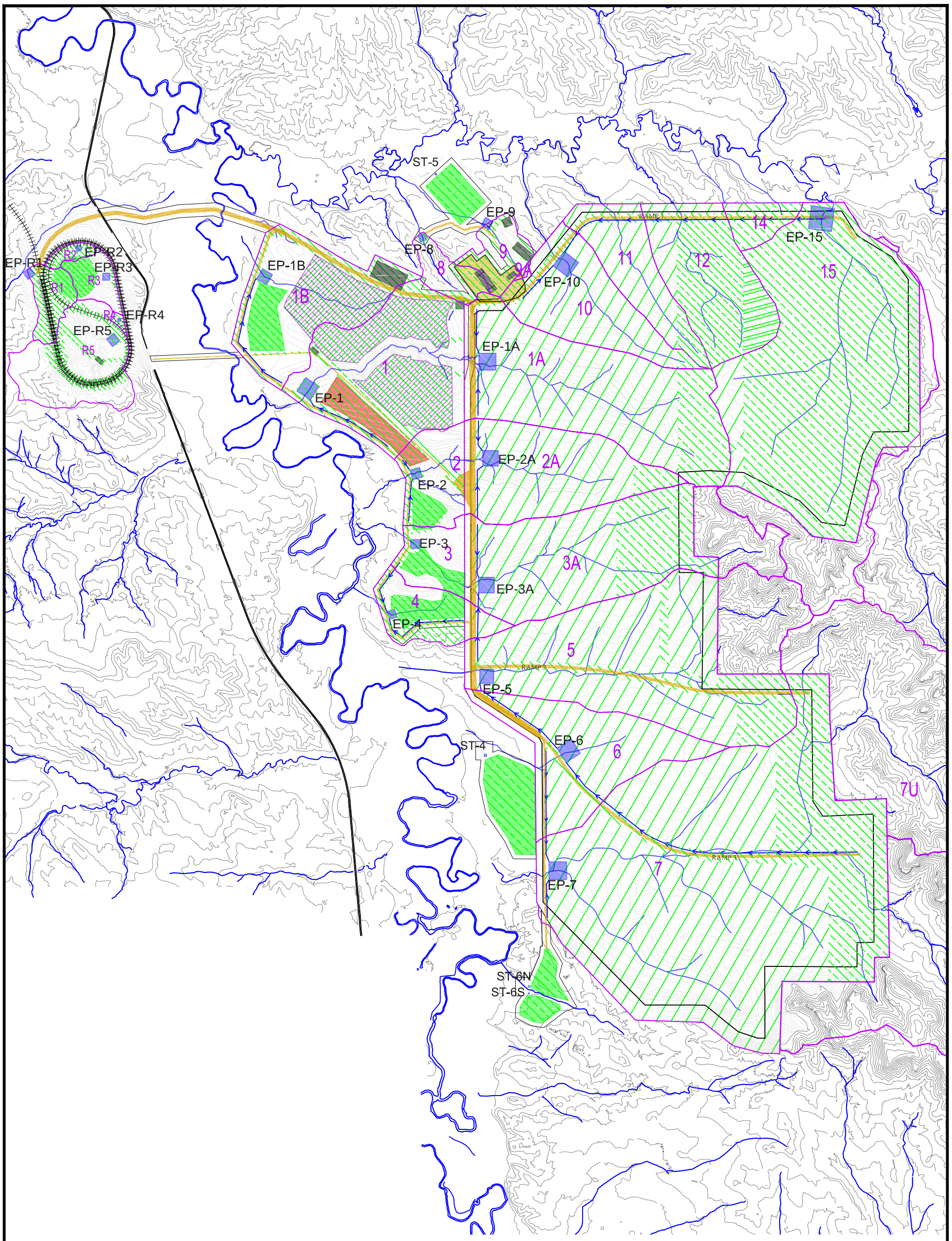
FIGURE

2-2

Hydrometrics, Inc.
Consulting Scientists and Engineers

UPDATE TIME: 4:46 PM
GMETZGER\HEL\20141006\I:\LAND PROJECTS\OTRCR\DWG\315A\315A FIG 2-2.DWG

UPDATE TIME: 9:24 AM
GMETZGER\HEL\20141008\I:\LAND PROJECTS\OTRCR\DWG\315A\315A FIG 2-3.DWG



LEGEND:

RAIL LOOP

ROADS

EXCAVATED POND

RUNOFF ROUTING

POST-MINE WATERSHED

DISTURBED HYDROLOGIC CONDTION

FAIR HYDROLOGIC CONDITION

MINE PIT

NORTH

SCALE
0 (In Feet) 2200

CONTOUR INTERVALS
10' INSIDE DISTURBANCE BOUNDARY
25' OUTSIDE DISTURBANCE BOUNDARY

Hydrometrics, Inc.
Consulting Scientists and Engineers

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND
SEDIMENTOLOGY REPORT

PHASE TWO OPERATIONAL WORST-CASE HYDROLOGIC CONDITION

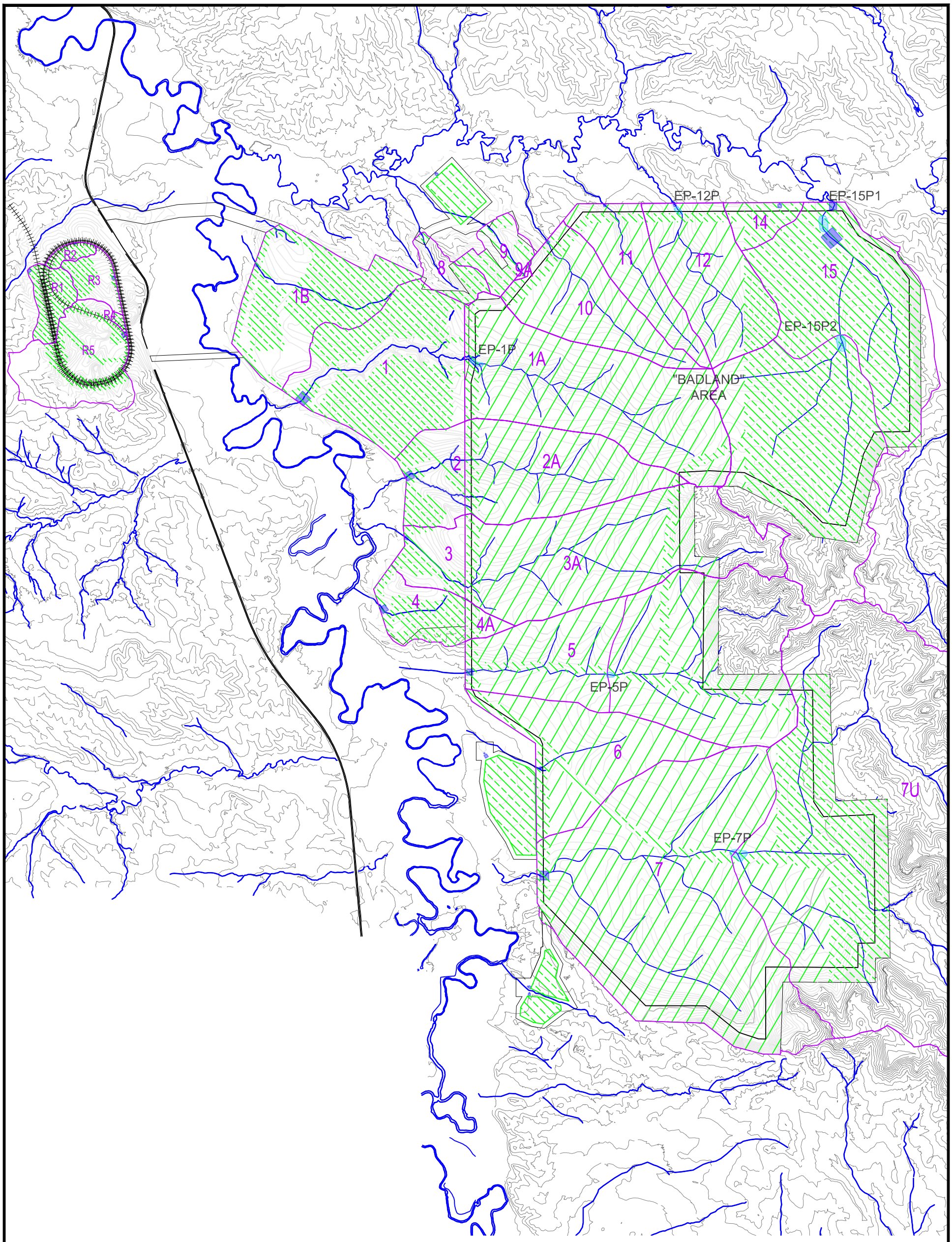
FIGURE
2-3

2.3 WESTERN ALKALINE DRAINAGE CONTROL

During the reclamation phase when final grading is complete within a watershed, sediment pond storage volume will be reduced to three times the average annual sediment yield for the worst-case scenario. In some watersheds, operational sediment ponds will remain in place for one year to allow initial vegetation regrowth before being reduced in size. Similar to the approach used for the second phase operational sediment ponds, the scenario conservatively models any area finish graded in the final three years in each watershed, including haul ramps and stockpiles, as bare soil. The remaining reclaimed area is modeled in fair vegetative condition, since at least two years have passed since regrading was completed. To represent vegetation regrowth, the area reclaimed in the last three years is modeled in poor condition the first year after final grading is complete in the watershed, fair condition the second year, and the entire watershed is modeled in good condition the third year. One exception is the "badland" area in the north end of Tract 2. Because vegetative regrowth will be limited by the steep terrain, this area is modeled in fair condition for the third and subsequent years of reclamation.

In accordance with Western Alkaline effluent limitations, post-mine sediment traps reduce sediment yield from the reclaimed area to or below pre-mining baseline levels while vegetation is reestablished. The effectiveness of sediment traps is validated by modeling disturbed watersheds with sediment traps in place. Final traps will be retained as vegetative and wildlife habitat diversity enhancement features. The traps will have a sediment storage depth of three feet when constructed. They will gradually fill with sediment, providing adequate time for the establishment of vegetation and precluding the need for disturbance in order to reclaim the structures. Post-mine sediment traps and final grading hydrologic condition are shown on Figure 2-4.

Areas in which the only disturbance is from topsoil stockpiles will also be managed to Western Alkaline standards during mine operations and reclamation. Sediment traps at the stockpiles are sized to retain four times the average annual sediment yield.



LEGEND:

RAIL LOOP

POST-RECLAMATION SEDIMENT TRAP

PERMANENT POND

POST-MINE WATERSHED

DISTURBED HYDROLOGIC CONDTION

FAIR HYDROLOGIC CONDITION

NORTH

SCALE (In Feet) 0 2200

CONTOUR INTERVALS
10' INSIDE DISTURBANCE BOUNDARY
25' OUTSIDE DISTURBANCE BOUNDARY

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

POST-RECLAMATION HYDROLOGIC CONDITION AND SEDIMENT CONTROLS

FIGURE **2-4**

Hydrometrics, Inc.
Consulting Scientists and Engineers

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GMETZGER\HEL\20141006\I:\LAND PROJECTS\OTRCR\DWG\315A\315A FIG 2-4.DWG

Perimeter ditches will be constructed to route runoff to sediment traps. Sediment logs or similar sediment control measures will be used to control sediment as necessary until vegetation is established.

2.4 PERMANENT PONDS

Mining will displace six existing ponds within the mine disturbance boundary. Permanent ponds will be constructed during final reclamation to replace the existing ponds. The ponds will provide wetland and riparian habitat in the post-mine topography as well as sediment control during final reclamation. To eliminate the need for an embankment dam, the ponds will be excavated. Each pond will be constructed with 5:1 side slopes and will have a natural footprint that matches the surrounding topography.

Pond storage capacity is based on the runoff from the 2-year, 24-hour storm in the reclaimed hydrologic condition. In addition, each pond will have sediment storage capacity that includes the average annual sediment yield in the final grading condition plus 10 times the average annual sediment yield in the fully reclaimed condition. Permanent ponds will be constructed in ephemeral drainages and will receive water from precipitation runoff. Permanent ponds are shown on Figure 2-4.

3.0 SITE HYDROLOGY

A hydrologic analysis was conducted to model the runoff and sediment yield from undisturbed, operational, and reclaimed lands. Based on the inputs discussed below, SEDCAD 4 models for each drainage area are used to estimate runoff and sediment yield for the baseline, operational, and reclamation conditions.

3.1 PRECIPITATION

Rainfall data from National Oceanic & Atmospheric Administration (NOAA, 1973) Atlas 2, published by the National Weather Service, was used to determine precipitation quantities for 10-year, 24-hour and 100-year, 24-hour precipitation events. Total cumulative rainfalls of 1.3 inches for a 2-year, 24-hour storm, 2.1 inches for a 10-year, 24-hour storm and 3.3 inches for a 100-year, 24-hour storm were obtained from the NOAA Atlas 2. The U.S. Soil Conservation Service's (SCS, 1973) Type II Storm Distribution was used to determine rainfall intensity.

3.2 STORM RUNOFF

In addition to precipitation, prediction of basin runoff in the SEDCAD 4 model requires calculation of the drainage area, the weighted soil-cover complex curve number, and the time of concentration for each drainage.

3.2.1 Drainage Area

Pre-mining and post-mining drainage areas of each of the 15 watershed areas within the mining area are listed in Table 3-1. Pre-mining drainage areas were used to calculate baseline sediment yield and the first phase of operational sediment ponds. Post-mining drainage areas were used to design the second phase operational sediment ponds and post-mining ponds and sediment control structures. Disturbed soils were considered to be any area of bare soil, whether it is during mining or during soil replacement, soil preparation and seeding.

TABLE 3-1

OTTER CREEK MINE - EXHIBIT 315A APPENDIX A

DRAINAGE AREAS

Drainage	Pre-Mining Drainage Area (acres)	Post-Mining Drainage Area (acres)
1	245.5	251.9
1A	328.6	335.6
1B	199.8	186.8
2	70.2	72.3
2A	121.4	192.1
3	46.5	51.4
3A	247.3	341.9
4	62.0	60.4
4A	17.0	----
5	657.8	498.3
6	108.7	189.9
7	2093.1	2038.2
8	30.6	32.5
9	40.2	1.4
9A	23.2	40.9
10	78.5	147.8
11	106.3	101.6
12	285.6	166.0
13	4.7	----
14	35.1	31.0
15	651.6	715.6
R1	30.9	30.9
R2	9.0	9.0
R3	26.7	26.7
R4	2.2	2.2
R5	117.6	117.6
SS4	47.9	47.9
SS5	22.0	22.0
SS6N	11.2	11.2
SS6S	9.8	9.8

3.2.2 Curve Numbers

Curve Numbers for undisturbed (baseline), disturbed, and reclaimed land were assigned in accordance with the results of a detailed baseline soils and vegetation investigations conducted by Westech Environmental, Inc. and are listed in Table 3-2. Each disturbance state (undisturbed, disturbed, and subsequent reclamation years) required further analysis in order to calculate an appropriate weighted curve number.

A weighted curve number for undisturbed conditions was calculated for each drainage by first using the Soils Baseline Report to determine the proportion of hydrologic soil types (A, B, C or D) present in the drainage (Westech, 2012b). The Baseline Vegetation Inventory of the area was used for undisturbed curve numbers to determine the proportion of ground cover types present atop each soil type (Westech, 2012a). Ground cover types used in this analysis included Agricultural land (SR + CR good), rangeland (poor, <50% cover), rangeland (fair, 50-75% cover), rangeland (good, >75% cover), brush (fair, 50-75% cover), woods (poor, <50% cover woods, (fair, 50-75% cover), and woods (good, >75% cover). The weighted curve numbers for the undisturbed condition are presented in Table 3-3.

A weighted curve number for disturbed and reclamation conditions was calculated for each drainage by weighting the curve numbers presented in Table 3-2 for the hydrologic soil types present in the drainage prior to mining. It is assumed that soils removed from these drainages during topsoil stripping will be mixed and will therefore be a blend of soil types originally found in the area. The weighted curve numbers for disturbed and reclaimed watersheds presented in Table 3-3 were used in the SEDCAD 4 model.

3.2.3 Time of Concentration

Time of concentration was calculated for each drainage by combining the lag time for overland flow and the time for channel flow within each drainage. In areas without channels, the time of concentration in is based only on the lag time for overland flow. The channel flow length and slope were assumed to be the length or slope of a defined stream channel within a watershed and were measured from a topographic map for pre-mining conditions

TABLE 3-2

OTTER CREEK MINE - EXHIBIT 315A APPENDIX A

CURVE NUMBERS

	Hydrologic Soil Group			
Undisturbed Areas	**A**	**B**	**C**	**D**
Agricultural Land (SR+CR good)	64	75	82	85
Rangeland (poor, <50% cover)	64	75	82	85
Rangeland (fair, 50-75% cover)	49	69	79	84
Rangeland (good, >75% cover)	39	61	74	80
Brush (fair, 50-75% cover)	35	56	70	77
Woods (poor, <50% cover)	57	73	82	86
Woods (fair, 50-75% cover)	43	65	76	82
Woods (good, >75% cover)	32	58	72	79
Disturbed Areas				
Bare	77	86	91	94
Reclaimed Areas				
Poor (<50% cover)	68	79	86	89
Fair (50-75% cover)	49	69	79	84
Good (>75% cover)	39	61	74	80

TABLE 3-3
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
WEIGHTED CURVE NUMBERS

		Disturbed/Reclaimed Condition			
Watershed	**Undisturbed**	**Bare**	**Poor**	**Fair**	**Good**
1	74.1	91.2	85.5	78.7	73.3
1A	74.1	91.2	85.5	78.7	73.3
1B	74.1	91.2	85.5	78.7	73.3
2	72.1	91.6	86.0	79.5	74.3
2A	72.1	91.6	86.0	79.5	74.3
3	63.3	88.5	82.2	73.8	67.1
3A	63.3	88.5	82.2	73.8	67.1
4	62.4	88.2	81.8	73.1	66.2
4A	62.4	----	----	----	----
5	67.5	89.6	83.6	75.8	69.7
6	67.6	89.7	84.0	76.3	70.4
7	70.0	89.7	84.1	76.4	70.5
8	62.8	88.1	81.6	72.9	65.9
9	73.5	92.6	87.2	81.3	76.6
10	74.6	92.7	87.4	81.6	77.0
11	69.8	91.0	85.3	78.4	72.9
12	73.2	92.4	87.0	81.0	76.2
13	56.0	----	----	----	----
14	66.4	89.7	83.6	75.9	69.7
15	74.7	92.3	87.1	80.9	76.2
Rail Loop	74.1	91.2	85.5	78.7	73.3
SS4	70.0	89.7	84.1	76.4	70.5
SS5	73.5	92.6	87.2	81.3	76.6
SS6	70.0	89.7	84.1	76.4	70.5

(Figure 1-1) and the proposed post mining topography map (Figure 2-2). Overland flow length and slope were determined by measuring the longest length and elevation change within a watershed from the edge of the drainage to the point where water would enter the channel described above or exit the mine disturbance boundary. The time of concentration calculation for channel flow was determined using the SEDCAD 4 software, and overland flow was calculated using the NRCS watershed lag method. A separate time of concentration was calculated for the upper portion of watershed 7 that remains undisturbed (7U). Table 3-4 presents the time of concentration values used in the SEDCAD 4 model.

TABLE 3-4
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
TIME OF CONCENTRATION VALUES

		Disturbed/Reclaimed			
Watershed	**Undisturbed**	**Bare**	**Poor**	**Fair**	**Good**
1	0.62	0.45	0.50	0.57	0.63
1A	0.50	0.45	0.49	0.54	0.59
1B	0.30	0.21	0.24	0.27	0.31
2	0.15	0.10	0.11	0.13	0.14
2A	0.25	0.41	0.46	0.52	0.57
3	0.32	0.19	0.22	0.26	0.30
3A	0.64	0.47	0.50	0.56	0.61
4	0.38	0.20	0.24	0.30	0.35
4A	0.30	----	----	----	----
5	0.74	0.56	0.58	0.60	0.61
6	0.30	0.42	0.50	0.61	0.70
7	1.17	0.76	0.78	0.81	0.83
7U	0.32	----	----	----	----
8	0.12	0.09	0.10	0.11	0.11
9	0.23	0.03	0.04	0.05	0.05
9A	0.13	0.10	0.11	0.12	0.13
10	0.38	0.38	0.43	0.50	0.55
11	0.65	0.39	0.47	0.56	0.64
12	0.61	0.33	0.37	0.42	0.47
13	0.25	----	----	----	----
14	0.39	0.11	0.13	0.17	0.19
15	0.77	0.71	0.74	0.77	0.79
R1	0.15	0.09	0.11	0.13	0.15
R2	0.08	0.05	0.06	0.07	0.08
R3	0.10	0.07	0.08	0.09	0.10
R4	0.07	0.04	0.05	0.06	0.07
R5	0.32	0.22	0.25	0.29	0.32
SS4	0.73	0.39	0.47	0.61	0.71
SS5	0.42	0.22	0.27	0.33	0.39
SS6N	0.26	0.14	0.17	0.22	0.26
SS6S	0.28	0.15	0.18	0.23	0.27

4.0 SEDIMENTOLOGY

The total amount of sediment that is liberated and transported from a watershed due to runoff is based on the soil type within the basin (erodibility factor (K)), the length and slope of overland flow (LS Factor), and the influence of cover material within the basin (C Factor). Based upon soils data for this area from the NRCS soil database, the following particle size distribution was used in the SEDCAD 4 model:

Particle Size (mm)	% Finer
4.76	100
2	100
0.42	85
0.074	75
0.003	0

4.1 ERODIBILITY FACTOR (K)

Soil's resistance to detachment and mobility by rainfall during a storm event affects the amount of soil that will be eroded from a basin. Soil erodibility factors (K factors) for each soil group were provided in the soil data obtained from the Soils Baseline Report (Westech, 2012b). K factors for soil types in this area ranged from 0.17 to 0.49. A baseline weighted average K factor was calculated based on the percentage of each soil type in the watershed prior to mining. Pre-mine K factors are shown in Table 4-1. During reclamation, K factors for individual drainages may change because surface soils will be mixed and blended during mining. Therefore, for the purposes of this modeling effort, a SEDCAD 4 derived K factor of 0.32 (silty clay or clay loam) was used for the mining and reclamation phases. This value is in close agreement with the site-wide pre-mine average K factor of 0.30.

TABLE 4-1

OTTER CREEK MINE - EXHIBIT 315A APPENDIX A

WEIGHTED UNDISTURBED K FACTORS

Pond	Weighted K Factor
1	0.30
1A	0.30
1B	0.30
2	0.34
2A	0.34
3	0.35
3A	0.35
4	0.36
4A	0.36
5	0.31
6	0.41
7	0.29
8	0.26
9	0.31
10	0.26
11	0.26
12	0.28
13	0.24
14	0.23
15	0.27
Rail Loop	0.29
SS4	0.41
SS5	0.31
SS6	0.29

4.2 C FACTOR

The cover material on the ground influences the C factor used in the SEDCAD model. For the undisturbed watershed, a weighted average C factor was calculated based upon the portion of the drainage vegetated with the ground cover materials listed in Table 4-2. The weighted average C factors for each drainage are presented in Table 4-3. Table 4-4 lists the C factors used for the other disturbance states, including disturbed (bare soil), first, second and subsequent years of reclamation revegetation. C factors for all conditions were obtained from the documentation included in the SEDCAD 4 model.

4.3 LS FACTOR

The length and slope of overland flow contribute to the LS Factor calculated by the SEDCAD 4 program. The LS factor is used to incorporate the effect topography has on sediment transport within a drainage. Input parameters for the SEDCAD model are the representative slope and representative length. An average representative slope and representative length for each watershed was found by measuring multiple lengths and slopes from the topographic map within each drainage. Table 4-5 presents the representative slopes and lengths for pre- and post-mining topography.

TABLE 4-2

OTTER CREEK MINE - EXHIBIT 315A APPENDIX A

C FACTORS FOR UNDISTURBED AREAS

Ag (SR+CR Good)	Range (Fair)	Range (Poor)	Brush (Fair)	Woods (Poor)	Woods (Fair)	Woods (Good)
0.013	0.07	0.13	0.038	0.09	0.04	0.008

TABLE 4-3

OTTER CREEK MINE - EXHIBIT 315A APPENDIX A

WEIGHTED UNDISTURBED C FACTORS

Pond	Weighted C-Factor
1	0.051
1A	0.051
1B	0.051
2	0.046
2A	0.046
3	0.039
3A	0.039
4	0.040
4A	0.040
5	0.039
6	0.039
7	0.046
8	0.038
9	0.038
10	0.039
11	0.039
12	0.039
13	0.038
14	0.038
15	0.040
Rail Loop	0.050
SS4	0.039
SS5	0.038
SS6	0.046

TABLE 4-4

OTTER CREEK MINE - EXHIBIT 315A APPENDIX A

DISTURBED AND RECLAIMED C FACTORS

	C Factor	% Ground Cover
Disturbed		
Bare Soil	0.45	0
Reclaimed		
1st Yr Revegetation	0.10	<50%
2nd Yr Revegetation	0.042	50% - 75%
3rd Yr Revegetation	0.020	>75%

TABLE 4-5

OTTER CREEK MINE - EXHIBIT 315A APPENDIX A

LS FACTORS

	Pre-Mine		Disturbed/Reclaimed	
Drainage	**Slope (%)**	**Length (Ft)**	**Slope (%)**	**Length (Ft)**
1	7.7	990	7.7	990
1A	12.3	760	7.2	907
1B	5.2	721	5.2	721
2	17.0	372	17.0	372
2A	14.5	786	7.1	973
3	9.6	759	9.6	759
3A	11.4	959	11.1	991
4	10.0	841	10.0	841
4A	10.5	723	----	----
5	12.0	998	9.7	819
6	8.0	986	3.1	976
7	13.5	881	8.5	867
7U	23.8	854	23.8	854
8	18.0	233	18.0	233
9	7.3	703	12.6	238
9A	11.7	300	11.7	300
10	8.2	895	4.6	925
11	7.4	864	5.0	952
12	9.9	984	6.0	851
13	6.4	350	----	----
14	9.5	777	7.0	589
15	16.4	808	15.6	936
R1	12.0	624	12.0	624
R2	11.3	354	11.3	354
R3	9.8	266	9.8	266
R4	11.7	281	11.7	281
R5	6.6	906	6.6	906
SS4	3.0	1225	3.0	1225
SS5	3.3	1257	3.3	1257
SS6N	5.0	780	5.0	780
SS6S	4.4	779	4.4	779

5.0 AVERAGE ANNUAL SEDIMENT YIELD

The average annual R method can be used to determine the average annual sediment yield from SEDCAD storm derived results. Based on the ratio of the average annual R factor to the calculated R storm value in SEDCAD, the average annual sediment yield can be calculated from the storm sediment yield using the following equation:

$$\mathbf{AASY = Y * (S * (R_a/R_s))}$$

Where AASY = the average annual sediment yield, Y = number of years, S = predicted storm sediment yield, Ra = R annual factor, and Rs = the R storm value. SEDCAD calculates the R storm value as a function of the rainfall amount and storm distribution. The 10-year, 24-hour storm event was used for sediment yield calculations. The SEDCAD 4 derived R storm value for the 10-year, 24-hour storm is 21.00. The average annual R factor is equal to 19, derived from the United Stated Department of Agriculture Isoerodent Maps included in the SEDCAD documentation. In order to covert tons of sediment predicted by the model into a volume for pond sizing, a density of 93.6 pounds per cubic foot is assumed for sediment retained in ponds and traps.

6.0 OPERATIONAL DRAINAGE AND SEDIMENT CONTROL

As discussed in Section 2, operational drainage control will be established prior to mining during soil salvage and facility construction and will remain in place until final grading is complete and post-mining topography is established. The Civil Software Design SEDCAD 4 model was used for peak flow, runoff volume, and sediment yield predictions using the parameters discussed in Sections 3 and 4. Attachment A contains the output files generated from the SEDCAD model runs.

6.1 FIRST PHASE OF OPERATIONAL DRAINAGE CONTROL

Operational drainage controls will be established concurrently with initial soil salvage in each watershed. In the first phase of operational drainage control, sediment ponds will be constructed to contain runoff from the 10-year, 24-hour storm event plus three times the average annual sediment yield. The size of first phase operational sediment traps is based on pre-mining drainage acreage, topography, and configuration. First phase operational sediment traps capture all runoff and sediment during a 10-year, 24-hour storm, making the sediment trap efficiency 100% and preventing any discharge for storms up to the 10-year, 24-hour event.

The watersheds initially impacted are 1, 1B, 2, 3, 4, 8 and 9. During construction of the rail loop watersheds R1, R2, R3, R4 and R5 will be impacted and sediment ponds will be constructed. Sediment ponds will later be constructed in watershed 9A, 10, 11, 12, 13, 14 and 15 when soil stripping activities impact those drainages ahead of the mine pit. As described in Section 2, sediment ponds are sized by making conservative assumptions for the disturbed area within each watershed. The only size requirement for operational sediment traps is, the storage volume and dimensions can be tailored for each site. Table 6-1 provides the required operational sediment trap volumes for the first phase operational sediment ponds and their locations are shown on Figure 2-1.

TABLE 6-1
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT PONDS

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-1	574.2	206.0	368.2	147.3	27.14	1.61	31.98
EP-1B	199.8	141.5	58.3	131.6	13.48	0.70	15.59
EP-2	191.7	47.6	144.1	65.0	8.12	0.92	10.89
EP-3	310.8	40.4	270.4	24.9	5.25	0.33	6.25
EP-4	62.0	48.8	13.2	35.5	3.54	0.40	4.75
EP-5	657.8	109.4	548.4	77.8	18.57	1.64	23.49
EP-6	108.7	41.2	67.5	37.3	4.22	0.29	5.10
EP-7	2093.1	35.2	2057.9	152.3	40.93	1.24	44.64
EP-8	30.6	12.5	18.1	15.5	1.28	0.14	1.70
EP-9	63.5	27.8	12.4	42.0	4.09	0.30	5.01
EP-9A	23.2	23.2	0.0	31.3	2.65	0.16	3.15
EP-10	78.5	16.8	61.7	25.3	3.26	0.13	3.65
EP-11	106.3	16.3	90.0	15.4	2.99	0.09	3.27
EP-12	285.6	43.4	242.2	58.2	9.90	0.48	11.33
EP-13	4.7	4.7	0.0	4.7	0.36	0.01	0.40
EP-14	35.1	31.6	3.5	25.5	2.50	0.24	3.24
EP-15	651.6	39.5	612.1	88.6	20.64	0.72	22.81
EP-R1	30.9	30.9	0.0	39.5	3.26	0.46	4.62
EP-R2	9.0	9.0	0.0	11.5	0.95	0.07	1.17
EP-R3	26.7	13.9	12.8	23.7	1.89	0.08	2.12
EP-R4	2.2	2.2	0.0	2.8	0.23	0.00	0.24
EP-R5	117.6	32.9	84.7	43.8	5.04	0.19	5.60

6.2 SECOND PHASE OF OPERATIONAL DRAINAGE CONTROL

The second phase of operational drainage control begins after the box cut is established in the coal removal area, as described in Section 2. Initially, a central sump will be constructed ahead of the box cut for pit dewatering storage. The central sump will be constructed when the mine pit is opened and prior to construction of the second phase operational sediment ponds. Pit water will be pumped to the sump until the pit has advanced to the point that sediment ponds can be constructed behind the pit, which is planned in the third year of mine operation. As the box cut advances and spoils are placed behind the active cut, second phase sediment ponds will be constructed to contain runoff, sediment, and pit water.

The central sump capacity is based on an average pit dewatering rate of 300 gallons per minute for 12 months, or 484 acre-feet, with the following reductions. Pit water will be used for road dust control at an estimated rate of 100,000 gallons per day for 200 days each year, for a total of 61 acre-feet of water use annually. Evaporation is estimated at 38 inches per year; therefore, based on a mid-depth surface area of 14 acres, the sump will lose 44 acre-feet per year to evaporation. The resulting designed storage capacity of the central sump is 379 acre-feet, which ignores infiltration losses.

In the second phase of operational drainage control, sediment ponds will be constructed to contain runoff from the 100-year, 24-hour storm plus three times the average annual sediment yield. The size of second phase operational sediment traps is based on post-mining drainage acreage, topography, and configuration in a worst-case hydrologic condition. Ponds EP-1A, EP-2A, EP-3A and EP-10 include an additional storage capacity of 32 acre-feet each, providing storage for approximately one month worth of pit water each. Ponds EP-5 and EP-6 do not include extra capacity for pit water storage. However, potential overflow from EP-5 and EP-6 is routed to EP-3A, so pit water may be pumped to these ponds as long as the total volume of pit water stored in all three ponds is no more than 32 acre-feet. Pit water will not be pumped to pond EP-7, and EP-15 will be constructed after final pit closure. Second phase operational sediment traps capture all runoff and sediment during a 100-year, 24-hour storm, making the sediment trap efficiency 100% and preventing any discharge for storms up

to the 100-year, 24-hour event. Table 6-2 provides the required volumes for the second phase operational sediment ponds, and their locations are shown on Figure 2-2.

Runoff from the area of watershed 7 north of Ramp 3 will be routed to EP-6, and runoff from the area of watershed 6 south of Ramp 3 will be routed to EP-7. Runoff from watersheds 10, 11, 12 and a portion of 14 will be routed to EP-10. Runoff from watershed 15 and the remainder of watershed 14 will be captured and managed in the pit until the pit is closed and drainage is restored, at which time runoff will be routed to EP-15.

6.3 SEDIMENT POND CONSTRUCTION AND MAINTENANCE

Operational sediment ponds will be excavated with a minimum storage capacity as shown in Tables 6-1 and 6-2. Storage capacity is measured to the bottom of an incised spillway, which will be constructed to allow for controlled discharge to the downstream channel in the event discharge occurs. Although spillways are not required on excavated ponds their construction will ensure that storm water flows greater than the design capacity of the pond is managed and routed without causing additional erosion or damage to the pond. The spillways have been designed to be one foot deep and are modeled as broad-crested weirs with a discharge coefficient of 3.1. Spillways are designed to pass the flow from a 10-year, 24-hour storm event when the pond is completely full. Ponds will be unlined with 3(H):1(V) side slopes. First phase sediment pond depths will range from 3 to 12 feet, and preliminary designs for second phase ponds are 30 feet deep. Since the only size requirement for operational sediment traps is the storage volume and side slope stability, pond dimensions (length and width) can be tailored for each site. Sediment must be removed from ponds when it exceeds 60% of the designed sediment storage depth in accordance with ARM 17.24.639(6). Preliminary maximum sediment storage depth and minimum spillway width for each pond is identified in Table 6-3, and Attachment B includes design information for individual ponds. Upon completion of construction, ponds will be surveyed as-built to verify the volume, establish a stage storage curve, and provide guidance as to when ponds need to be pumped out and/or sediment removed.

TABLE 6-2
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT PONDS

Pond	Worst-Case Year	Drainage Area (acres)	Disturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-1A	16	324.3	63.4	242.5	34.10	0.37	32.0	67.22
EP-2A	14	183.1	13.5	152.8	18.45	0.08	32.0	50.69
EP-3A	13	342.9	94.6	198.2	29.23	1.19	32.0	64.81
EP-5	18	493.3	89.6	242.9	42.85	0.64	-	44.76
EP-6	20	1111.9	159.7	495.7	86.95	0.58	-	88.69
EP-7	20	1086.6	118.9	501.7	88.68	0.95	-	91.53
EP-10	19	426.7	174.0	372.6	49.47	0.86	32.0	84.06
EP-15	21	746.6	589.3	633.6	110.13	15.73	-	141.58

TABLE 6-3
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
OPERATIONAL DRAINAGE CONTROL SEDIMENT POND DETAILS

Pond	Drainage Control Phase	Pond Depth (ft)	Design Discharge (cfs)	Minimum Spillway Width (ft)	Maximum Sediment Storage Depth (ft)
EP-1	First	12	147.3	48	1.3
EP-1B	First	12	131.6	42	1.3
EP-2	First	12	65.0	21	2.5
EP-3	First	8	24.9	8	1.0
EP-4	First	8	35.5	11	1.6
EP-5	First	12	77.8	25	1.9
EP-6	First	6	37.3	12	0.7
EP-7	First	12	152.3	49	0.7
EP-8	First	4	15.5	5	0.7
EP-9	First	6	42.0	14	0.8
EP-9A	First	6	31.3	10	0.7
EP-10	First	6	25.3	8	0.5
EP-11	First	6	15.4	5	0.4
EP-12	First	10	58.2	19	1.0
EP-13	First	3	4.7	2	0.2
EP-14	First	6	25.5	8	1.0
EP-15	First	12	88.6	29	0.9
EP-R1	First	6	39.5	13	1.3
EP-R2	First	4	11.5	4	0.6
EP-R3	First	4	23.7	8	0.3
EP-R4	First	4	2.8	1	0.2
EP-R5	First	6	43.8	14	0.4
EP-1A	Second	30	100.9	33	18.6
EP-2A	Second	30	55.2	18	22.7
EP-3A	Second	30	78.1	25	19.8
EP-5	Second	30	93.9	30	1.8
EP-6	Second	30	160.3	52	0.6
EP-7	Second	30	168.1	54	1.0
EP-10	Second	30	174.9	56	15.8
EP-15	Second	30	336.3	108	5.7

Spillway discharge $Q = CLH^{1.5}$

6.4 SOIL STOCKPILE AREAS

Topsoil stockpiles located in areas that do not report to other sediment controls are managed under Western Alkaline effluent limitation guidelines. The four stockpiles meeting this description in Tract 2 are SS4, SS5, SS6N (north) and SS6S (south) and are shown on Figure 2-1. Soil stockpiles will be seeded with temporary vegetation, but for modeling purposes the entire stockpile is considered in the bare soil condition as a worst-case scenario.

Runoff from these stockpiles will be managed by perimeter ditches and sediment traps. Sediment logs or similar sediment control measures will be utilized around stockpiles disturbance boundary as necessary. Sediment traps are sized to retain four times the average annual sediment yield from the bare soil condition. Typical sediment trap configuration is shown in Attachment B. Sediment logs or similar sediment control measures will be installed at the sediment trap outlet to further reduce sediment transport. Sediment will be removed from traps when less than one foot of storage depth remains. Table 6-4 presents model results for the soil stockpiles and required sediment trap volumes. Model output is included in Attachment A. Section 8 discusses sediment control after stockpiles are removed during final reclamation.

TABLE 6-4
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
OPERATIONAL SOIL STOCKPILE SEDIMENT TRAPS

Stockpile	Undisturbed AASY (tons/acre/year)	Stockpile with Silt Fence AASY (tons/acre/year)	Stockpile with BMPs AASY (tons/acre/year)	Sediment Trap Volume (acre-feet)	Sediment Trap Surface Area (acres)
SS4	0.04	1.72	0.03	0.161	0.075
SS5	0.07	1.00	0.02	0.043	0.026
SS6N	0.09	1.87	0.02	0.041	0.025
SS6S	0.09	1.35	0.07	0.026	0.018

7.0 DRAINAGE CONTROL CONVEYANCE STRUCTURES

During the operational phase of mining, ditches and culverts will be constructed to convey potential runoff to sediment ponds and outfalls.

7.1 CULVERTS

Culverts are used to convey flow under roadways and the railroad loop. Culverts are identified by the CV- prefix and are shown on Figures 2-1 and 2-2 and mine Map 11. Culvert capacity, with the exception of the Otter Creek Crossing, is based on the anticipated peak runoff from a 10-year, 24-hour storm event in accordance with ARM 17.24.605(4). Required culvert capacity was based on the largest peak 10-year, 24-hour storm water flow from either the first phase (pre-mine watershed configuration) or second phase (post-mine watershed configuration) watershed modeling. In most cases sediment ponds upstream of culverts will contain runoff from either the 10-year or 100-year, 24-hour storm, depending on the mining phase, but culverts are nevertheless included to convey runoff exceeding pond capacities under road embankments. Culverts will be used as sampling points for outfalls in the event discharge occurs. Table 7-1 compares peak flows for the two design scenarios, including routing runoff from multiple watersheds where applicable. Runoff is routed through second phase operational sediment ponds with the conservative assumption that only two feet of freeboard are available in each pond prior to the 10-year, 24-hour storm event. Routing through first phase operational sediment ponds is ignored, assuming that the pond is completely full and all runoff is conveyed by the culvert.

The maximum flows from Table 7-1 and existing drainage topography were used to determine culvert sizes. All culverts were modeled as corrugated metal pipe (CMP) with a Manning's n of 0.024, typical of annular ½-inch CMP for all diameters (AISI, 1980). The exception is the Otter Creek crossing on the main access road, which is modeled as three reinforced 96 inches by 48 inches concrete box culverts with a Manning's n of 0.012, typical of finished concrete culverts flowing partially full (Chow, 1959). The Otter Creek crossing is designed to pass a 100-year flood discharge of 818 cfs, which was estimated for the

TABLE 7-1
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
PEAK CULVERT DISCHARGES

Culvert	Peak Discharge (cfs)	
	First Phase	Second Phase
CV-1	147.3	132.4
CV-1A	64.3	34.5
CV-1B	131.6	131.6
CV-2	65.0	48.0
CV-2A	31.8	5.1
CV-3	24.9	175.0
CV-3A	14.0	178.3
CV-4	35.5	35.5
CV-5	-	166.1
CV-7	-	128.9
CV-9	42.0	42.0
CV-10	-	113.9
CV-R1	39.5	39.5
CV-R2	11.5	11.5
CV-R3	23.7	23.7
CV-R4	2.8	2.8
CV-R5	43.8	43.8
CV-R6	11.2	11.2

downstream Ashland gaging site by the USGS (Parrett, 2004). The maximum flow observed at the Ashland gaging site with a 31-year period of record is 425 cfs (USGS, 2014), which is approximately equal to the 25-year flood discharge. Culvert headwater elevation is limited to two and a half feet above the top of the culvert inlet. For roads with designed profiles, the headwater is also at least three feet below the road elevation. Culvert design data is shown in Table 7-2. Culvert calculations were completed using the HY-8 model (FHWA, 2012). Culvert inlets are modeled with a conventional projecting edge and the outlet channels are modeled as a triangular ditch with a slope matching the culvert.

Culverts CV-5, CV-7, CV-9 and CV-10 cross roads that do not have designed profiles. CV-5 crosses Ramp 2 and routes overflow to EP-3A, CV-7 crosses the drainage control service road at the south end of Tract 2, CV-9 crosses the explosive magazine access road, and CV-10 crosses Ramp 1 as an emergency overflow. Since design information is not available, conservative lengths and slopes were assumed. Culverts CV-5, CV-7 and CV-10 will not need to be constructed until the second operational phase. The shop area will drain directly to watershed 1A, with the road along the south edge of the shop area superelevated to allow flow and precluding the need for a culvert. Culverts at the rail loop have a minimum diameter of 24 inches, based on BNSF requirements for culverts maintained by the customer (BNSF, 2011). Culverts are also discussed in Exhibit 321A – Transportation Facilities.

7.2 CONVEYANCE DITCHES

Roadside ditches include adequate capacity to handle runoff from the 10-year, 24-hour storm event. The main access road and main haul road have been designed with trapezoidal ditches along the shoulders, while the drainage control service roads have been designed with v-ditches along the shoulders. Both ditch configurations will have a depth of three feet and 2(H):1(V) side slopes, and the trapezoidal ditch bottom width is four feet. Manning's equation was used to calculate ditch flow capacity:

$$\mathbf{Q = (1.486/n)\ A\ R_h^{2/3}\ S^{1/2}}$$

TABLE 7-2
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
CULVERT DESIGN DATA

Culvert ID	Design Flow (cfs)	Minimum Size (in)	Road Elevation (ft)	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Slope (%)	Headwater Elevation (ft)
CV-1	147.3	60	3064	132	3054.7	3050.0	3.58	3060.9
CV-1A	64.3	42	3133.6	283	3117.0	3105.0	4.24	3121.6
CV-1B	131.6	54	3060.3	169	3050.0	3045.0	2.95	3056.5
CV-2	65.0	42	3088.3	113	3079.0	3075.0	3.56	3083.7
CV-2A	31.8	30	3153.0	419	3111.0	3100.0	2.62	3114.8
CV-3	175.0	60	3095.0	189	3084.4	3080.0	2.33	3091.8
CV-3A	178.3	60	3131.8	277	3116.5	3105.5	3.98	3124.0
CV-4	35.5	30	3083.4	279	3072.9	3065.0	2.83	3077.3
CV-5	166.1	60	-	250	-	-	1.0	-
CV-7	128.9	60	-	200	-	-	0.7	-
CV-9	42.0	36	-	120	-	-	0.7	-
CV-10	113.9	54	-	250	-	-	0.7	-
CV-R1	39.5	36	3134	302	3129.0	3119.9	4.92	3134.0
CV-R2	11.5	24	3134	619	3119.9	3079.2	6.6	3121.9
CV-R3	23.7	24	3134	332	3090.0	3077.4	3.77	3094.3
CV-R4	2.8	24	3134	402	3099.8	3053.9	11.48	3100.6
CV-R5	43.8	36	3134	477	3065.0	3053.8	2.35	3069.0
CV-R6	11.2	24	3134	175	3129.9	3121.2	4.93	3131.8
CV-OC	818	3 box, 96" x 48"	3040.86	192	3025.0	3024.5	0.26	3030.6

The table below shows the capacity of each ditch for a range of slopes, based on a Manning's n of 0.025, which is representative of an excavated channel that is either weathered and clean of vegetation or contains short grass and few weeds (Chow, 1959). Ditches are also discussed in Exhibit 321A – Transportation Facilities.

Slope (%)	V-Ditch Capacity (cfs)	Trapezoidal Ditch Capacity (cfs)	Ramp 1 & 3 Trapezoidal Ditch Capacity (cfs)
0.3	71	140	344
0.5	92	181	444
1	130	256	628
1.5	159	314	769
2	184	362	888

In some cases, ditches will route runoff between watersheds. Specifically, runoff will be routed from watershed 6 to 5 and 5 to 3A after roads are constructed. Conservatively assuming overflow from second phase operational sediment ponds results in worst-case 10-year, 24-hour peak flows of 134 cfs from watershed 6 to 5 and 166 cfs from watershed 5 to 3A. A trapezoidal ditch with a slope greater than 0.4% will therefore be constructed along this section of road. Other ditches will convey much lower 10-year, 24-hour flows from portions of watersheds. For example, peak runoff from the area of watershed 6 south of Ramp 3 routed to pond EP-7 is 5 cfs. The standard ditches are sufficient to convey such flows.

Ditches along Ramp 1 and Ramp 3 will route runoff from the 100-year, 24-hour storm to second phase operational sediment ponds EP-10 and EP-6. The Ramp 1 ditch must convey a peak flow of 315 cfs while the Ramp 3 ditch will route up to 476 cfs. To convey the potential flows, trapezoidal ditches along Ramp 1 and Ramp 3 will have an increased depth of 4.5 feet and a minimum slope of 0.6%. Ditch size may be modified based on the actual slope of constructed ramps.

8.0 RECLAMATION SEDIMENT CONTROL

Western Alkaline standards become applicable in the reclamation phase when final grading is complete. Western Alkaline effluent limitation guidelines require average annual sediment yields at or below the pre-mine baseline levels. In this reclamation phase, operational sediment ponds are reduced in volume when final grading is completed in each watershed.

8.1 BASELINE AND RECLAMATION SEDIMENT YIELD

A baseline model of each watershed estimates average annual sediment yield based on the pre-mine topography, soils, and vegetation conditions. Models of each watershed after final grading is complete are used to compare the reclamation and baseline sediment yields. The year final grading is complete is modeled by assuming any area regraded in the last three years is in the bare soil condition, and the remainder of the watershed is in fair vegetative condition. To represent vegetation regrowth, the area regraded in the last three years is modeled in poor condition the first year after final grading is complete, fair condition the second year, and good condition the third and subsequent years. Vegetation in the "badland" area in the north end of Tract 2 is modeled in fair condition at best. Model results for the reclamation stages can be compared to the baseline scenario to estimate when sediment yields return to pre-mining levels and sediment control structures are no longer needed in each watershed. The sediment model results for each scenario are shown in Table 8-1. The area weighted average annual sediment yield for all watersheds is 0.58 tons per acre per year for the baseline condition. After three or more years of vegetation regrowth the predicted weighted average annual sediment yield is 0.21 tons per acre per year. The post-reclamation sediment yield is much lower than the baseline yield, but this is primarily from the inclusion of permanent ponds in post-mine sediment models. For comparison, the post-reclamation sediment yield without permanent ponds is approximately 0.44 tons per acre per year, or 76% of the baseline sediment yield.

TABLE 8-1
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
PREDICTED AVERAGE ANNUAL SEDIMENT YIELD

Watershed	Pre-Mine Area (acres)	Baseline AASY (tons/acre/year)	Post-Mine Area (acres)	Final 3 Years Disturbed Area (acres)	Final Grading AASY (tons/acre/year)	1st Year of Revegation AASY (tons/acre/year)	2nd Year of Revegation AASY (tons/acre/year)	3rd Year of Revegation AASY (tons/acre/year)
1	574.2	0.59	587.5	219.0	5.45	0.92	0.34	0.11
1B	199.8	0.27	186.8	130.4	7.01	1.10	0.32	0.14
2	191.7	0.79	264.3	52.0	6.41	1.34	0.59	0.23
3	293.7	0.11	393.3	60.7	3.22	0.84	0.51	0.11
4	79.1	0.06	73.7	48.0	11.28	1.58	0.32	0.06
5	657.8	0.25	498.3	50.4	1.27	0.39	0.27	0.06
6	108.7	0.19	189.9	36.5	0.65	0.16	0.10	0.02
7	2093.1	0.82	2038.2	279.8	1.45	0.56	0.42	0.28
8	30.6	0.13	32.5	14.4	10.37	1.56	0.37	0.13
9	63.5	0.29	42.2	29.2	15.07	2.53	0.79	0.26
10	78.5	0.27	147.8	17.0	1.27	0.49	0.40	0.14
11	106.3	0.12	101.6	7.9	0.83	0.36	0.31	0.10
12	285.6	0.35	166.0	36.5	2.80	0.79	0.55	0.25
13	4.7	0.00	0.0	----	----	----	----	----
14	35.1	0.08	31.0	24.9	9.06	1.12	0.30	0.07
15	651.6	0.95	715.6	567.6	28.88	4.23	1.03	0.35
R1	30.9	0.72	30.9	0.0	30.07	4.75	0.94	0.27
R2	9.0	0.56	9.0	0.0	16.90	2.67	0.69	0.21
R3	26.7	0.39	26.7	0.0	5.80	1.06	0.40	0.24
R4	2.2	0.45	2.2	0.0	2.91	2.05	0.53	0.16
R5	117.6	0.33	117.6	0.0	3.23	0.67	0.33	0.26
SS4	47.9	0.04	47.9	47.9	3.22	0.46	0.09	0.02
SS5	22.0	0.07	22.0	22.0	4.29	0.65	0.17	0.05
SS6N	11.2	0.09	11.2	11.2	6.92	1.05	0.23	0.06
SS6S	9.8	0.09	9.8	9.8	7.04	1.07	0.22	0.06

8.2 RECLAMATION SEDIMENT CONTROL

To achieve Western Alkaline standards, sediment traps are constructed based on the predicted average annual sediment yield for the reclamation conditions. Adequate sediment control is achieved by implementing a variety of sediment trap sizes, depending on the predicted baseline and reclamation sediment yields. Models results are used to validate the effectiveness of traps at reducing sediment yield to pre-mine baseline levels. Final sediment traps will gradually fill in over time and will not require additional reclamation. Several drainage areas will also include permanent ponds. Typical sediment trap configurations are included in Attachment B.

8.2.1 Permanent Ponds

Watersheds 1, 5, 7, 12 and 15 will include six permanent ponds intended to replace existing ponds that will be removed by mining. The ponds will provide some sediment control as well as habitat diversity in the post-mine topography. Ponds are designed to fill with the runoff from a 2-year, 24-hour storm in the fully reclaimed condition. Each pond's storage capacity also includes the average annual sediment yield in the final grading condition and 10 times the average annual sediment yield in the fully reclaimed condition. Preliminary design information for permanent ponds is shown in Table 8-2 and Attachment B, and pond locations are shown on Figure 2-4.

8.2.2 Temporary Sediment Traps

In general, sediment traps are sized to contain three times the average annual sediment yield for the year final grading is complete. Alternate trap sizes are used when standard traps will not adequately reduce sediment yield or when a standard trap would have a surface area larger three acres. Standard traps will be used in watersheds 1, 2, 5, 6, 7, 10, 11, 12, 15, R3, R4 and R5.

Modeling predicts baseline sediment yields less than 0.1 tons per acre per year for watersheds 4 and 14 and soil stockpile areas SS4, SS5, SS6N and SS6S, which cannot be achieved through the use of a standard sediment trap. In these watersheds a pair of sediment traps will

TABLE 8-2
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
PERMANENT POND STORAGE VOLUMES

Pond	Drainage Area (acres)	Final Grading AASY (acre-feet)	Fully Reclaimed AASY (acre-feet)	Fully Reclaimed 2-yr, 24-hr Runoff (acre-feet)	Required Storage Volume (acre-feet)
EP-1P	335.6	0.21	0.02	1.73	2.16
EP-5P	349.9	0.25	0.02	0.80	1.25
EP-7P	1371.2	2.32	0.66	3.90	12.85
EP-12P	166.0	0.23	0.02	1.48	1.91
EP-15P1	715.6	8.48	0.09	2.43	11.84
EP-15P2	406.5	7.06	0.15	3.16	11.70

be constructed in series to effectively reduce sediment yield. The upper trap is sized to contain four times the average annual sediment yield for the year final grading is complete. The lower trap is sized to contain four times the predicted sediment yield discharged from the upper trap. Both traps will be allowed to fill with sediment and require no further reclamation.

Baseline sediment yield in watersheds 1B, 3, 8, 9, R1 and R2 cannot be achieved immediately after final reclamation with a standard sediment trap. In these watersheds, operational sediment ponds will be left in place for one year after final grading is complete to allow for initial vegetation regrowth. After one year, the ponds will be reduced in size to a sediment trap sized to contain two times the average annual sediment yield for the first year of revegetation.

Permanent ponds in watersheds 1, 5, 7, 12 and 15 are included in reclamation sediment models. Each of these watersheds also has a standard sediment trap located at the disturbance boundary. An additional sediment trap sized to retain the average annual sediment yield from the final grading condition is located immediately upstream of pond EP-15P1. The trap is included to reduce downstream sediment yield since most of watershed 15 will be in the disturbed condition when final grading is complete.

8.2.3 Reclamation Sediment Yield

Table 8-3 presents required sediment trap sizes and predicted sediment yield with the designated sediment controls in place. Multiple trap sizes are listed for a watershed where appropriate. The plan for reclamation sediment control is intended to meet Western Alkaline standards while minimizing the need for additional disturbance after final grading is complete.

Sediment yields for all mine areas increase due to disturbances from mining and reclamation activities. Implementation of sediment traps is effective in reducing sediment yield to or below baseline conditions in order to protect water quality. Modeling demonstrates that

TABLE 8-3
OTTER CREEK MINE - EXHIBIT 315A APPENDIX A
RECLAMATION SEDIMENT TRAP MODEL RESULTS

Watershed	Baseline AASY (tons/acre/year)	Modeled Sediment Trap Volume (acre-feet)	Modeled Sediment Trap Surface Area (acres)	AASY with Sediment Trap in Place (tons/acre/year)
1	0.59	4.52	1.613	0.46
1B	0.27	0.20	0.091	0.19
2	0.79	2.49	0.911	0.42
3	0.11	0.32	0.137	0.11
4	0.06	1.63 & 0.054	0.608 & 0.031	0.06
5	0.25	0.59	0.237	0.13
6	0.19	0.18	0.083	0.10
7	0.82	0.95	0.367	0.09
8	0.13	0.05	0.029	0.11
9	0.29	0.10	0.052	0.21
10	0.27	0.28	0.119	0.14
11	0.12	0.12	0.060	0.12
12	0.35	0.10	0.051	0.11
14	0.08	0.55 & 0.013	0.222 & 0.011	0.05
15	0.95	8.48 & 1.95	2.97 & 0.722	0.43
R1	0.72	0.14	0.068	0.63
R2	0.56	0.02	0.016	0.54
R3	0.39	0.23	0.101	0.32
R4	0.45	0.01	0.009	0.33
R5	0.33	0.56	0.225	0.19
SS4	0.04	0.30 & 0.016	0.130 & 0.012	0.04
SS5	0.07	0.19 & 0.009	0.084 & 0.008	0.07
SS6N	0.09	0.15 & 0.009	0.071 & 0.009	0.08
SS6S	0.09	0.13 & 0.004	0.064 & 0.005	0.05

revegetation is expected to reduce sediment yields to pre-mining levels by the time reclamation traps fill with sediment. The prescribed controls will be installed to comply with Western Alkaline effluent limitations.

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ATTACHMENT A

SEDCAD 4 OUTPUT

PRE-MINING BASELINE CONDITION

Subwatershed Hydrology Detail:

Stru #	SWS #	Watershed	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1	245.500	0.620	0.000	0.000	74.100	M	35.10	6.530
	1A	2	328.700	0.500	0.349	0.335	74.100	M	53.41	8.757
	Σ		**574.200**						**77.80**	**15.287**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.300	990.00	7.70	0.0510	1.0000	1	101.7	20,217	10.20	5.74
	2	0.300	760.00	12.30	0.0510	1.0000	1	327.2	48,751	24.60	13.68
	Σ							**372.2**	**33,043**	**16.68**	**8.96**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	199.800	0.300	0.000	0.000	74.100	M	41.92	5.333
	Σ	**199.800**						**41.92**	**5.333**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.300	721.00	5.20	0.0510	1.0000	1	58.7	15,910	8.03	4.07
	Σ							**58.7**	**15,910**	**8.03**	**4.07**

Subwatershed Hydrology Detail:

Stru #	SWS #	Watershed	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	2	1	70.200	0.150	0.000	0.000	72.100	M	14.76	1.609
	2A	2	121.400	0.250	0.102	0.349	72.100	M	21.84	2.750
	Σ		**191.600**						**30.90**	**4.359**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.340	372.00	17.00	0.0460	1.0000	1	61.1	58,113	29.33	13.90
	2	0.340	786.00	14.50	0.0460	1.0000	1	133.3	69,848	35.25	17.67
	Σ							**168.0**	**54,157**	**27.33**	**14.10**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.73	25.00	1,447.00	3.940	0.102
#1	**2**	**Muskingum K:**					**0.102**

Subwatershed Hydrology Detail:

Stru #	SWS # Watershed		SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	3	1	46.500	0.320	0.000	0.000	63.300	M	1.17	0.406
	3A	2	247.300	0.640	0.148	0.329	63.300	M	5.21	2.155
	Σ		**293.800**						**6.06**	**2.562**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.350	759.00	9.60	0.0390	1.0000	1	3.4	9,612	4.85	3.12
	2	0.350	959.00	11.40	0.0390	1.0000	1	37.5	18,698	9.44	6.43
	Σ							**36.9**	**15,481**	**7.81**	**5.32**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.20	21.00	1,752.00	3.280	0.148
#1	**2**	**Muskingum K:**					**0.148**

Subwatershed Hydrology Detail:

Stru #	SWS # Watershed	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	4 1	62.000	0.380	0.000	0.000	62.400	M	1.13	0.476
	4A 2	17.000	0.300	0.093	0.380	62.400	M	0.33	0.131
	Σ	**79.000**						**1.46**	**0.607**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.360	841.00	10.00	0.0400	1.0000	1	4.3	9,698	4.08	2.81
	2	0.360	723.00	10.50	0.0400	1.0000	1	1.3	10,971	4.61	3.11
	Σ							**5.3**	**9,329**	**3.92**	**2.69**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	3.21	58.00	1,809.00	5.370	0.093
#1	**2**	**Muskingum K:**					**0.093**

Subwatershed Hydrology Detail:

Stru #	SWS # Watershed		SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	5	1	498.600	0.740	0.000	0.000	67.500	M	24.14	7.190
	5A	2	159.100	0.740	0.625	0.359	67.500	M	7.70	2.294
	Σ		**657.700**						**26.02**	**9.484**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	998.00	12.00	0.0390	1.0000	1	169.2	27,712	13.99	8.66
	2	0.310	998.00	12.00	0.0390	1.0000	1	47.1	24,113	12.17	7.56
	Σ							**182.3**	**23,383**	**11.80**	**7.09**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	2.10	205.00	9,766.00	4.340	0.625
#1	**2**	**Muskingum K:**					**0.625**

Subwatershed Hydrology Detail:

Stru #	SWS # Watershed	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	7 1	1,060.700	1.170	0.000	0.000	70.000	M	59.82	19.661
	7U 2	1,032.400	0.320	1.135	0.327	70.000	M	123.11	19.210
	Σ	**2,093.100**						**147.31**	**38.871**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	881.00	13.50	0.0460	1.0000	1	590.9	34,007	17.16	11.04
	2	0.290	854.00	23.80	0.0460	1.0000	1	1,677.5	110,338	55.69	31.44
	Σ							**1,900.1**	**69,906**	**35.28**	**17.83**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.14	149.00	13,076.00	3.200	1.135
#1	**2**	**Muskingum K:**					**1.135**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	30.600	0.120	0.000	0.000	62.800	M	2.67	0.312
	Σ	**30.600**						**2.67**	**0.312**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.260	233.00	18.00	0.0380	1.0000	1	4.3	25,320	14.55	5.75
	Σ							**4.3**	**25,320**	**14.55**	**5.75**

Subwatershed Hydrology Detail:

Stru #	SWS # Watershed		SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	9	1	23.200	0.230	0.067	0.381	73.500	M	5.09	0.593
	9A	2	40.200	0.130	0.000	0.000	73.500	M	9.92	1.038
	Σ		**63.400**						**13.90**	**1.631**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	703.00	7.30	0.0380	1.0000	1	5.5	13,786	6.96	3.44
	2	0.310	300.00	11.70	0.0380	1.0000	1	15.7	23,291	11.75	5.59
	Σ							**20.1**	**19,093**	**9.64**	**4.55**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	3.33	44.00	1,323.00	5.470	0.067
#1	**1**	**Muskingum K:**					**0.067**

Subwatershed Hydrology Detail:

Stru #	SWS #	Watershed	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	6	1	108.700	0.300	0.000	0.000	67.600	M	8.94	1.589
	10	2	78.500	0.380	0.000	0.000	74.600	M	15.60	2.175
	11	3	106.300	0.650	0.000	0.000	69.800	M	8.26	1.935
	12	4	285.600	0.610	0.000	0.000	73.200	M	36.95	7.055
	13	5	4.700	0.250	0.000	0.000	56.000	M	0.01	0.010
	14	6	35.100	0.390	0.000	0.000	66.400	M	1.95	0.449
	Σ		**618.900**						**67.38**	**13.214**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.410	986.00	8.00	0.0390	1.0000	1	23.1	20,579	10.39	5.37
	2	0.260	895.00	8.20	0.0390	1.0000	1	23.7	15,258	7.70	4.02
	3	0.260	864.00	7.40	0.0390	1.0000	1	13.6	8,897	4.49	2.61
	4	0.280	984.00	9.90	0.0390	1.0000	1	111.9	20,595	10.39	5.85
	5	0.240	350.00	6.40	0.0380	1.0000	1	0.0	826	0.45	0.43
	6	0.230	777.00	9.50	0.0380	1.0000	1	3.1	8,970	4.53	2.54
	Σ							**175.4**	**17,414**	**8.79**	**4.90**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	557.000	0.770	0.000	0.000	74.700	M	75.12	15.562
	2	94.500	0.770	0.611	0.353	74.700	M	12.74	2.640
	Σ	**651.500**						**76.74**	**18.202**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	808.00	16.40	0.0400	1.0000	1	684.0	54,498	27.50	16.06
	2	0.320	808.00	16.40	0.0400	1.0000	1	93.8	43,724	22.07	13.02
	Σ							**684.1**	**47,776**	**24.11**	**13.76**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.84	165.00	8,960.00	4.070	0.611
#1	**2**	**Muskingum K:**					**0.611**

FIRST PHASE OF OPERATIONAL DRAINAGE CONTROL

Subwatershed Hydrology Detail:

Stru #	SWS #	Watershed	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1	186.500	0.450	0.000	0.000	91.200	M	128.39	15.684
	1	2	59.000	0.620	0.000	0.000	74.100	M	8.44	1.569
	1A	3	19.500	0.400	0.349	0.335	91.200	M	14.06	1.644
	1A	4	309.200	0.500	0.349	0.335	74.100	M	50.24	8.238
	Σ		**574.200**						**147.30**	**27.135**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	990.00	7.70	0.4500	1.0000	1	3,229.1	248,499	125.41	70.83
	2	0.300	990.00	7.70	0.0510	1.0000	1	20.6	17,059	8.61	4.85
	3	0.320	760.00	12.30	0.4500	1.0000	1	571.0	390,121	196.89	113.91
	4	0.300	760.00	12.30	0.0510	1.0000	1	305.5	48,402	24.43	13.58
	Σ							**3,637.5**	**210,556**	**106.26**	**47.02**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.32	57.00	4,332.00	3.440	0.349
#1	**3**	**Muskingum K:**					**0.349**
#1	4	8. Large gullies, diversions, and low flowing streams	1.32	57.00	4,332.00	3.440	0.349
#1	**4**	**Muskingum K:**					**0.349**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	141.500	0.210	0.000	0.000	91.200	M	120.99	11.924
	2	58.300	0.300	0.000	0.000	74.100	M	12.23	1.556
	Σ	**199.800**						**131.62**	**13.480**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	721.00	5.20	0.4500	1.0000	1	1,569.9	168,940	88.17	48.01
	2	0.300	721.00	5.20	0.0510	1.0000	1	14.8	13,736	6.93	3.51
	Σ							**1,584.7**	**157,065**	**81.94**	**43.01**

Subwatershed Hydrology Detail:

Stru #	SWS #	Watershed	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	2	1	33.700	0.100	0.000	0.000	91.600	M	43.73	3.637
	2	2	36.600	0.150	0.000	0.000	72.100	M	7.70	0.839
	2A	3	13.900	0.190	0.102	0.349	91.600	M	12.41	1.208
	2A	4	107.500	0.250	0.102	0.349	72.100	M	19.34	2.435
	Σ		**191.700**						**64.97**	**8.120**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	372.00	17.00	0.4500	1.0000	1	1,454.7	444,030	255.11	145.14
	2	0.340	372.00	17.00	0.0460	1.0000	1	29.5	53,838	27.17	12.87
	3	0.320	786.00	14.50	0.4500	1.0000	1	563.7	508,889	267.58	152.54
	4	0.340	786.00	14.50	0.0460	1.0000	1	116.3	68,864	34.75	17.42
	Σ							**2,081.8**	**401,367**	**222.17**	**92.57**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.73	25.00	1,447.00	3.940	0.102
#1	**3**	**Muskingum K:**					**0.102**
#1	4	8. Large gullies, diversions, and low flowing streams	1.73	25.00	1,447.00	3.940	0.102
#1	**4**	**Muskingum K:**					**0.102**

Subwatershed Hydrology Detail:

Stru #	SWS #	Watershed	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	4A	1	6.700	0.140	0.148	0.329	88.200	M	5.08	0.480
	4A	2	10.300	0.300	0.148	0.329	62.400	M	0.20	0.079
	Σ		**17.000**						**4.97**	**0.560**
#1	3	1	19.100	0.190	0.000	0.000	88.500	M	14.35	1.381
	3	2	27.400	0.320	0.000	0.000	63.300	M	0.69	0.239
	3A	3	14.600	0.380	0.148	0.329	88.500	M	9.05	1.045
	3A	4	232.700	0.640	0.148	0.329	63.300	M	4.91	2.028
	Σ		**310.800**						**24.94**	**5.254**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.320	723.00	10.50	0.4500	1.0000	1	125.4	314,495	164.75	91.23
	2	0.360	723.00	10.50	0.0400	1.0000	1	0.8	10,303	5.20	3.52
	Σ							**114.2**	**286,517**	**144.60**	**69.51**
#1	1	0.320	759.00	9.60	0.4500	1.0000	1	291.0	260,636	135.60	74.40
	2	0.350	759.00	9.60	0.0390	1.0000	1	1.9	9,023	4.55	2.93
	3	0.320	959.00	11.40	0.4500	1.0000	1	359.6	388,649	196.14	113.01
	4	0.350	959.00	11.40	0.0390	1.0000	1	35.1	18,563	9.37	6.38
	Σ							**750.1**	**267,621**	**136.68**	**49.77**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.20	21.00	1,752.00	3.280	0.148
#1	**3**	**Muskingum K:**					**0.148**
#1	4	8. Large gullies, diversions, and low flowing streams	1.20	21.00	1,752.00	3.280	0.148
#1	**4**	**Muskingum K:**					**0.148**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	48.800	0.200	0.000	0.000	88.200	M	35.50	3.441
	2	13.200	0.380	0.000	0.000	62.400	M	0.24	0.101
	Σ	**62.000**						**35.52**	**3.543**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	841.00	10.00	0.4500	1.0000	1	904.3	317,287	164.23	90.68
	2	0.360	841.00	10.00	0.0400	1.0000	1	0.8	8,061	4.07	2.80
	Σ							**905.1**	**317,188**	**164.17**	**88.22**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	548.400	0.740	0.000	0.000	67.500	M	26.55	7.908
	2	159.100	0.740	0.625	0.359	67.500	M	7.70	2.294
	3	109.400	0.680	0.000	0.000	89.600	M	55.65	8.368
	Σ	**816.900**						**77.76**	**18.570**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	998.00	12.00	0.0390	1.0000	1	188.2	28,026	14.14	8.76
	2	0.310	998.00	12.00	0.0390	1.0000	1	47.1	24,113	12.17	7.56
	3	0.320	998.00	12.00	0.4500	1.0000	1	3,501.5	442,109	223.12	134.68
	Σ							**3,697.7**	**360,383**	**181.88**	**67.17**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	2.10	205.00	9,766.00	4.340	0.625
#1	**2**	**Muskingum K:**					**0.625**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	67.500	0.300	0.000	0.000	67.600	M	5.55	0.987
	2	41.200	0.170	0.000	0.000	89.700	M	33.95	3.230
	Σ	**108.700**						**37.34**	**4.217**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.410	986.00	8.00	0.0390	1.0000	1	13.6	19,444	9.81	5.08
	2	0.320	986.00	8.00	0.4500	1.0000	1	648.4	248,907	130.88	71.88
	Σ							**661.9**	**235,617**	**123.79**	**56.59**

Subwatershed Hydrology Detail:

Stru #	SWS # Watershed		SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	7	1	1,025.500	1.170	0.000	0.000	70.000	M	57.83	19.008
	7U	2	1,032.400	0.320	1.135	0.327	70.000	M	123.11	19.210
	7	3	35.200	1.100	0.000	0.000	89.700	M	13.52	2.706
	Σ		**2,093.100**						**152.26**	**40.925**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	881.00	13.50	0.0460	1.0000	1	569.0	33,872	17.09	11.00
	2	0.290	854.00	23.80	0.0460	1.0000	1	1,677.5	110,338	55.69	31.44
	3	0.320	881.00	13.50	0.4500	1.0000	1	913.6	352,310	177.80	111.89
	Σ							**2,789.2**	**141,580**	**71.45**	**24.66**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.14	149.00	13,076.00	3.200	1.135
#1	**2**	**Muskingum K:**					**1.135**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	18.100	0.120	0.000	0.000	62.800	M	1.58	0.184
	2	12.500	0.090	0.000	0.000	88.100	M	13.91	1.095
	Σ	**30.600**						**15.49**	**1.280**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.260	233.00	18.00	0.0380	1.0000	1	2.4	23,789	13.67	5.40
	2	0.320	233.00	18.00	0.4500	1.0000	1	316.2	345,233	198.35	109.06
	Σ							**318.6**	**332,395**	**190.97**	**94.50**

Subwatershed Hydrology Detail:

Stru #	SWS # Watershed		SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	9A	1	23.200	0.230	0.067	0.381	73.500	M	5.09	0.593
	9	2	12.400	0.130	0.000	0.000	73.500	M	3.06	0.320
	9	3	27.800	0.100	0.000	0.000	92.600	M	37.52	3.181
	Σ		**63.400**						**41.99**	**4.094**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	703.00	7.30	0.0380	1.0000	1	5.5	13,786	6.96	3.44
	2	0.310	300.00	11.70	0.0380	1.0000	1	4.2	20,250	10.22	4.86
	3	0.320	300.00	11.70	0.4500	1.0000	1	676.1	256,000	147.08	82.50
	Σ							**685.8**	**243,001**	**139.37**	**65.28**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	23.200	0.120	0.000	0.000	92.600	M	31.31	2.654
	Σ	**23.200**						**31.31**	**2.654**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	703.00	7.30	0.4500	1.0000	1	370.3	174,134	100.04	55.68
	Σ							**370.3**	**174,134**	**100.04**	**55.68**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	61.700	0.380	0.000	0.000	74.600	M	12.26	1.710
	2	16.800	0.250	0.000	0.000	92.700	M	14.93	1.554
	Σ	**78.500**						**25.28**	**3.264**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	895.00	8.20	0.0390	1.0000	1	21.5	17,657	8.91	4.65
	2	0.320	895.00	8.20	0.4500	1.0000	1	270.3	217,044	112.59	62.07
	Σ							**291.8**	**169,544**	**87.78**	**32.59**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	90.000	0.650	0.000	0.000	69.800	M	7.00	1.639
	2	16.300	0.370	0.000	0.000	91.000	M	11.91	1.356
	Σ	**106.300**						**15.39**	**2.994**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.260	864.00	7.40	0.0390	1.0000	1	11.3	8,722	4.40	2.56
	2	0.320	864.00	7.40	0.4500	1.0000	1	194.6	180,324	91.01	50.46
	Σ							**205.9**	**157,143**	**79.31**	**24.55**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	242.200	0.610	0.000	0.000	73.200	M	31.34	5.983
	2	43.400	0.450	0.000	0.000	92.400	M	32.05	3.915
	Σ	**285.600**						**58.20**	**9.898**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.280	984.00	9.90	0.0390	1.0000	1	93.0	20,195	10.19	5.74
	2	0.320	984.00	9.90	0.4500	1.0000	1	979.8	296,636	149.71	84.76
	Σ							**1,072.8**	**209,417**	**105.69**	**38.16**

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Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	4.700	0.110	0.000	0.000	86.000	M	4.72	0.362
	Σ	**4.700**						**4.72**	**0.362**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	350.00	6.40	0.4500	1.0000	1	27.0	101,309	58.21	30.57
	Σ							**27.0**	**101,309**	**58.21**	**30.57**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	3.500	0.390	0.000	0.000	66.400	M	0.19	0.045
	2	31.600	0.190	0.000	0.000	89.700	M	25.44	2.456
	Σ	**35.100**						**25.49**	**2.501**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.230	777.00	9.50	0.0380	1.0000	1	0.2	6,810	3.44	1.93
	2	0.320	777.00	9.50	0.4500	1.0000	1	551.3	275,307	143.84	79.21
	Σ							**551.5**	**274,846**	**143.59**	**77.86**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	517.600	0.770	0.000	0.000	74.700	M	69.81	14.461
	2	39.500	0.680	0.495	0.346	92.300	M	23.64	3.541
	3	94.500	0.770	0.611	0.353	74.700	M	12.74	2.640
	Σ	**651.600**						**88.60**	**20.643**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.270	808.00	16.40	0.0400	1.0000	1	531.6	45,743	23.09	13.47
	2	0.320	808.00	16.40	0.4500	1.0000	1	1,758.0	506,684	255.71	155.88
	3	0.270	808.00	16.40	0.0400	1.0000	1	79.1	36,994	18.67	11.01
	Σ							**1,625.1**	**129,962**	**65.59**	**28.25**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.62	110.00	6,801.00	3.810	0.495
#1	**2**	**Muskingum K:**					**0.495**

SECOND PHASE OF OPERATIONAL DRAINAGE CONTROL

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	63.400	0.450	0.288	0.367	91.200	M	81.22	9.982
	2	260.900	0.540	0.000	0.000	78.700	M	176.59	24.121
	Σ	**324.300**						**242.50**	**34.103**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.45	119.00	4,864.00	4.690	0.288
#1	**1**	**Muskingum K:**					**0.288**
#1	2	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#1	**2**	**Muskingum K:**					**0.000**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	63.400	0.450	0.288	0.367	91.200	M	43.64	5.332
	2	260.900	0.540	0.000	0.000	78.700	M	65.43	9.867
	Σ	**324.300**						**102.75**	**15.199**

10-year, 24-hour storm

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	907.00	7.20	0.4500	1.0000	1	865.5	198,710	83.57	47.28
	2	0.320	907.00	7.20	0.0420	1.0000	1	143.1	19,126	8.04	4.46
	Σ							**838.4**	**85,705**	**36.04**	**16.67**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.45	119.00	4,864.00	4.690	0.288
#1	**1**	**Muskingum K:**					**0.288**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	13.500	0.410	0.175	0.363	91.600	M	18.18	2.165
	2	169.500	0.520	0.000	0.000	79.500	M	122.00	16.286
	Σ	**183.000**						**139.09**	**18.450**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.28	65.00	2,855.00	4.520	0.175
#1	**1**	**Muskingum K:**					**0.175**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	13.500	0.410	0.175	0.363	91.600	M	9.88	1.165
	2	169.500	0.520	0.000	0.000	79.500	M	46.59	6.793
	Σ	**183.000**						**56.15**	**7.958**

10-year, 24-hour storm

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	973.00	7.10	0.4500	1.0000	1	164.0	175,386	73.76	41.29
	2	0.320	973.00	7.10	0.0420	1.0000	1	98.0	19,061	8.02	4.44
	Σ							**176.7**	**32,698**	**13.75**	**6.80**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.28	65.00	2,855.00	4.520	0.175
#1	**1**	**Muskingum K:**					**0.175**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	94.600	0.470	0.214	0.356	88.500	M	107.56	13.389
	2	184.800	0.560	0.000	0.000	73.800	M	91.94	13.406
	3	63.500	0.640	0.302	0.378	63.300	M	12.33	2.433
	Σ	**342.900**						**198.21**	**29.228**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	3.09	177.00	5,730.00	5.270	0.302
#1	**3**	**Muskingum K:**					**0.302**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	94.600	0.470	0.214	0.356	88.500	M	53.96	6.780
	2	184.800	0.560	0.000	0.000	73.800	M	27.10	4.799
	3	63.500	0.640	0.302	0.378	63.300	M	1.34	0.553
	Σ	**342.900**						**79.47**	**12.132**

10-year, 24-hour storm

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	991.00	11.10	0.4500	1.0000	1	2,736.6	439,864	184.99	108.50
	2	0.320	991.00	11.10	0.0420	1.0000	1	143.2	39,084	16.44	9.13
	3	0.350	959.00	11.40	0.0390	1.0000	1	8.2	15,898	6.69	4.55
	Σ							**2,690.4**	**303,691**	**127.72**	**62.79**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	3.09	177.00	5,730.00	5.270	0.302
#1	**3**	**Muskingum K:**					**0.302**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	89.600	0.560	0.360	0.349	89.600	M	97.93	13.242
	2	307.900	0.600	0.000	0.000	75.800	M	167.19	24.755
	3	95.800	0.740	0.337	0.366	67.500	M	25.47	4.857
	Σ	**493.300**						**242.86**	**42.854**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.72	88.00	5,103.00	3.930	0.360
#1	**1**	**Muskingum K:**					**0.360**
#1	3	8. Large gullies, diversions, and low flowing streams	2.42	137.00	5,665.00	4.660	0.337
#1	**3**	**Muskingum K:**					**0.337**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	89.600	0.560	0.360	0.349	89.600	M	50.48	6.854
	2	307.900	0.600	0.000	0.000	75.800	M	54.55	9.389
	3	95.800	0.740	0.337	0.366	67.500	M	4.64	1.381
	Σ	**493.300**						**94.52**	**17.624**

10-year, 24-hour storm

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	819.00	9.70	0.4500	1.0000	1	1,530.8	260,174	109.42	63.77
	2	0.320	819.00	9.70	0.0420	1.0000	1	177.9	24,741	10.41	5.82
	3	0.310	998.00	12.00	0.0390	1.0000	1	26.7	22,744	9.57	5.93
	Σ							**1,431.0**	**130,023**	**54.68**	**24.27**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.72	88.00	5,103.00	3.930	0.360
#1	**1**	**Muskingum K:**					**0.360**
#1	3	8. Large gullies, diversions, and low flowing streams	2.42	137.00	5,665.00	4.660	0.337
#1	**3**	**Muskingum K:**					**0.337**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	159.700	0.760	0.490	0.326	89.700	M	148.39	23.695
	2	301.000	0.610	0.100	0.336	76.300	M	166.84	24.795
	3	651.200	0.320	0.788	0.325	70.000	M	322.45	38.463
	Σ	**1,111.900**						**495.70**	**86.953**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.35	17.00	1,257.00	3.480	0.100
#1	**2**	**Muskingum K:**					**0.100**
#1	3	8. Large gullies, diversions, and low flowing streams	1.11	100.00	8,969.00	3.160	0.788
#1	**3**	**Muskingum K:**					**0.788**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	159.700	0.760	0.490	0.326	89.700	M	76.76	12.288
	2	301.000	0.610	0.100	0.336	76.300	M	55.71	9.534
	3	651.200	0.320	0.788	0.325	70.000	M	77.65	12.117
	Σ	**1,111.900**						**162.66**	**33.939**

10-year, 24-hour storm

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	976.00	3.10	0.4500	1.0000	1	528.6	52,882	22.24	13.09
	2	0.320	976.00	3.10	0.0420	1.0000	1	35.8	4,907	2.06	1.16
	3	0.290	854.00	23.80	0.0460	1.0000	1	1,001.2	106,209	44.67	24.83
	Σ							**1,304.1**	**55,363**	**23.28**	**11.72**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.35	17.00	1,257.00	3.480	0.100
#1	**2**	**Muskingum K:**					**0.100**
#1	3	8. Large gullies, diversions, and low flowing streams	1.11	100.00	8,969.00	3.160	0.788
#1	**3**	**Muskingum K:**					**0.788**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	118.900	0.760	0.537	0.346	89.700	M	110.48	17.641
	2	586.700	0.810	0.000	0.000	76.400	M	277.22	48.530
	3	381.100	0.320	0.538	0.370	70.000	M	188.70	22.510
	Σ	**1,086.700**						**501.70**	**88.681**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.62	120.00	7,393.00	3.820	0.537
#1	**1**	**Muskingum K:**					**0.537**
#1	3	8. Large gullies, diversions, and low flowing streams	2.63	248.00	9,425.00	4.860	0.538
#1	**3**	**Muskingum K:**					**0.538**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	118.900	0.760	0.537	0.346	89.700	M	57.15	9.149
	2	586.700	0.810	0.000	0.000	76.400	M	92.39	18.710
	3	381.100	0.320	0.538	0.370	70.000	M	45.44	7.091
	Σ	**1,086.700**						**170.53**	**34.950**

10-year, 24-hour storm

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	867.00	8.50	0.4500	1.0000	1	1,620.5	204,302	85.92	51.45
	2	0.320	867.00	8.50	0.0420	1.0000	1	295.6	19,753	8.31	4.86
	3	0.290	854.00	23.80	0.0460	1.0000	1	549.4	102,730	43.20	23.32
	Σ							**2,139.7**	**90,820**	**38.20**	**18.48**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.62	120.00	7,393.00	3.820	0.537
#1	**1**	**Muskingum K:**					**0.537**
#1	3	8. Large gullies, diversions, and low flowing streams	2.63	248.00	9,425.00	4.860	0.538
#1	**3**	**Muskingum K:**					**0.538**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	17.700	0.380	0.000	0.000	92.700	M	25.32	2.952
	2	130.100	0.500	0.000	0.000	81.600	M	106.01	13.751
	3	19.700	0.390	0.168	0.312	91.000	M	26.42	3.081
	4	81.900	0.560	0.168	0.312	78.400	M	53.55	7.466
	5	108.100	0.330	0.300	0.316	92.400	M	158.80	17.901
	6	30.200	0.420	0.300	0.316	81.000	M	25.75	3.113
	7	5.300	0.110	0.469	0.322	89.700	M	11.49	0.986
	8	2.600	0.170	0.469	0.322	75.900	M	2.27	0.214
	Σ	**395.600**						**372.56**	**49.465**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#1	**2**	**Muskingum K:**					**0.000**
#1	3	8. Large gullies, diversions, and low flowing streams	0.88	15.00	1,706.09	2.810	0.168
#1	**3**	**Muskingum K:**					**0.168**
#1	4	8. Large gullies, diversions, and low flowing streams	0.88	15.00	1,706.00	2.810	0.168
#1	**4**	**Muskingum K:**					**0.168**
#1	5	8. Large gullies, diversions, and low flowing streams	0.95	30.00	3,154.24	2.920	0.300
#1	**5**	**Muskingum K:**					**0.300**
#1	6	8. Large gullies, diversions, and low flowing streams	0.95	30.00	3,154.24	2.920	0.300
#1	**6**	**Muskingum K:**					**0.300**
#1	7	8. Large gullies, diversions, and low flowing streams	1.06	55.00	5,207.00	3.080	0.469
#1	**7**	**Muskingum K:**					**0.469**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	17.700	0.380	0.000	0.000	92.700	M	14.14	1.624
	2	130.100	0.500	0.000	0.000	81.600	M	43.83	6.023
	3	19.700	0.390	0.168	0.312	91.000	M	14.15	1.639
	4	81.900	0.560	0.168	0.312	78.400	M	19.60	3.032
	5	108.100	0.330	0.300	0.316	92.400	M	88.25	9.789
	6	30.200	0.420	0.300	0.316	81.000	M	10.51	1.345
	7	5.300	0.110	0.469	0.322	89.700	M	6.35	0.511
	8	2.600	0.170	0.469	0.322	75.900	M	0.81	0.081
	Σ	**395.600**						**178.39**	**24.044**

10-year, 24-hour storm

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	925.00	4.60	0.4500	1.0000	1	156.1	124,168	52.22	28.65
	2	0.320	925.00	4.60	0.0420	1.0000	1	57.1	12,572	5.29	2.92
	3	0.320	952.00	5.00	0.4500	1.0000	1	172.1	133,162	56.00	31.21
	4	0.320	952.00	5.00	0.0420	1.0000	1	27.2	11,767	4.95	2.77
	5	0.320	851.00	6.00	0.4500	1.0000	1	1,464.8	186,422	78.86	43.99
	6	0.320	851.00	6.00	0.0420	1.0000	1	13.7	13,534	5.69	3.13
	7	0.320	589.00	7.00	0.4500	1.0000	1	54.7	138,228	66.18	36.08
	8	0.320	589.00	7.00	0.0420	1.0000	1	0.6	11,356	4.78	2.45
	Σ							**1,945.8**	**114,588**	**48.58**	**24.42**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#1	**2**	**Muskingum K:**					**0.000**
#1	3	8. Large gullies, diversions, and low flowing streams	0.88	15.00	1,706.09	2.810	0.168
#1	**3**	**Muskingum K:**					**0.168**
#1	4	8. Large gullies, diversions, and low flowing streams	0.88	15.00	1,706.00	2.810	0.168
#1	**4**	**Muskingum K:**					**0.168**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	5	8. Large gullies, diversions, and low flowing streams	0.95	30.00	3,154.24	2.920	0.300
#1	**5**	**Muskingum K:**					**0.300**
#1	6	8. Large gullies, diversions, and low flowing streams	0.95	30.00	3,154.24	2.920	0.300
#1	**6**	**Muskingum K:**					**0.300**
#1	7	8. Large gullies, diversions, and low flowing streams	1.06	55.00	5,207.00	3.080	0.469
#1	**7**	**Muskingum K:**					**0.469**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	23.200	0.110	0.000	0.000	89.700	M	50.30	4.317
	2	7.900	0.170	0.000	0.000	75.900	M	6.89	0.650
	Σ	**31.100**						**56.51**	**4.967**
#1	1	566.100	0.710	0.000	0.000	92.300	M	601.19	92.934
	2	33.400	0.770	0.474	0.358	80.900	M	20.85	3.417
	3	116.000	0.770	0.474	0.358	74.700	M	50.98	8.815
	Σ	**746.600**						**633.58**	**110.133**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.47	9.00	614.00	3.630	0.046
#1	**1**	**Muskingum K:**					**0.000**
#1	3	8. Large gullies, diversions, and low flowing streams	0.88	15.00	1,706.09	2.810	0.168
#1	**3**	**Muskingum K:**					**0.474**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	23.200	0.110	0.000	0.000	89.700	M	27.78	2.238
	2	7.900	0.170	0.000	0.000	75.900	M	2.47	0.247
	Σ	**31.100**						**29.78**	**2.486**
#1	1	566.100	0.710	0.000	0.000	92.300	M	330.55	50.720
	2	33.400	0.770	0.474	0.358	80.900	M	8.34	1.473
	3	116.000	0.770	0.474	0.358	74.700	M	15.64	3.241
	Σ	**746.600**						**341.80**	**57.919**

10-year, 24-hour storm

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.320	589.00	7.00	0.4500	1.0000	1	285.6	163,294	78.18	42.67
	2	0.320	589.00	7.00	0.0420	1.0000	1	2.2	13,696	5.76	2.80
	Σ							**287.9**	**153,719**	**73.53**	**38.78**
#1	1	0.320	936.00	15.60	0.4500	1.0000	1	35,144.0	656,297	276.02	171.11
	2	0.320	936.00	15.60	0.0420	1.0000	1	57.6	48,098	20.23	11.92
	3	0.270	808.00	16.40	0.0400	1.0000	1	99.6	37,966	15.97	9.40
	Σ							**35,432.1**	**640,910**	**269.85**	**153.71**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.47	9.00	614.00	3.630	0.046
#1	**1**	**Muskingum K:**					**0.000**
#1	3	8. Large gullies, diversions, and low flowing streams	0.88	15.00	1,706.09	2.810	0.168
#1	**3**	**Muskingum K:**					**0.474**

SECOND PHASE CONVEYANCE STRUCTURE MODELS

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	63.400	0.450	0.288	0.367	91.200	M	43.64	5.332
	2	260.900	0.540	0.000	0.000	78.700	M	65.43	9.867
	Σ	**324.300**						**102.75**	**15.199**
#3	Σ	**324.300**						**34.48**	**8.112**
#2	1	186.500	0.450	0.000	0.000	91.200	M	128.39	15.684
	2	59.000	0.620	0.000	0.000	74.100	M	8.44	1.569
	Σ	**569.800**						**134.41**	**25.365**
#4	Σ	**569.800**						**132.35**	**25.365**

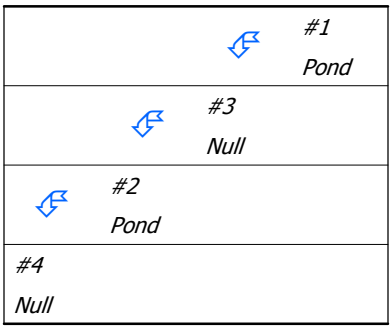
10-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.45	119.00	4,864.00	4.690	0.288
#1	**1**	**Muskingum K:**					**0.288**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#3	0.000	0.000	EP-1A
Pond	#2	==>	#4	0.000	0.000	EP-1
Null	#3	==>	#2	0.349	0.355	CV-1A
Null	#4	==>	End	0.000	0.000	CV-1



Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	13.500	0.410	0.175	0.363	91.600	M	9.88	1.165
	2	169.500	0.520	0.000	0.000	79.500	M	46.59	6.793
	Σ	**183.000**						**56.15**	**7.958**
#3	Σ	**183.000**						**5.13**	**2.290**
#2	1	33.700	0.100	0.000	0.000	91.600	M	43.73	3.637
	2	36.600	0.150	0.000	0.000	72.100	M	7.70	0.839
	Σ	**253.300**						**49.30**	**6.766**
#4	Σ	**253.300**						**47.96**	**6.766**

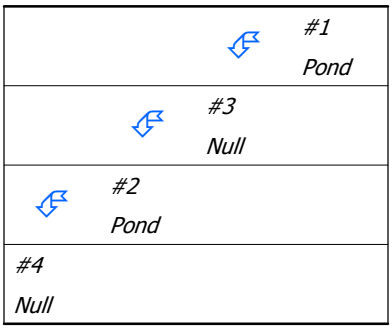
10-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.28	65.00	2,855.00	4.520	0.175
#1	**1**	**Muskingum K:**					**0.175**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#3	0.000	0.000	EP-2A
Pond	#2	==>	#4	0.000	0.000	EP-2
Null	#3	==>	#2	0.102	0.349	CV-2A
Null	#4	==>	End	0.000	0.000	CV-2



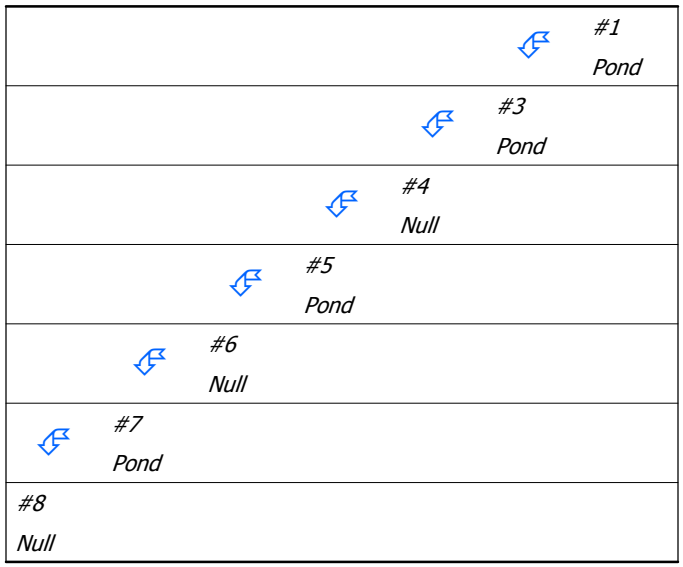
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	159.700	0.760	0.490	0.326	89.700	M	76.76	12.288
	2	301.000	0.610	0.100	0.336	76.300	M	55.71	9.534
	3	651.200	0.320	0.788	0.325	70.000	M	77.65	12.117
	∑	**1,111.900**						**162.66**	**33.939**
#3	1	89.600	0.560	0.360	0.349	89.600	M	50.48	6.854
	2	307.900	0.600	0.000	0.000	75.800	M	54.55	9.389
	3	95.800	0.740	0.337	0.366	67.500	M	4.64	1.381
	∑	**1,605.200**						**169.52**	**42.666**
#4	**∑**	**1,605.200**						**166.08**	**37.550**
#5	1	94.600	0.470	0.214	0.356	88.500	M	53.96	6.780
	2	184.800	0.560	0.000	0.000	73.800	M	27.10	4.799
	3	63.500	0.640	0.302	0.378	63.300	M	1.34	0.553
	∑	**1,948.100**						**180.98**	**49.682**
#6	**∑**	**1,948.100**						**178.27**	**42.797**
#7	1	19.100	0.190	0.000	0.000	88.500	M	14.35	1.381
	2	27.400	0.320	0.000	0.000	63.300	M	0.69	0.239
	∑	**1,994.600**						**176.06**	**44.418**
#8	**∑**	**1,994.600**						**175.02**	**44.418**

10-year, 24-hour storm

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#3	0.093	0.404	EP-6
Pond	#3	==>	#4	0.000	0.000	EP-5
Null	#4	==>	#5	0.208	0.277	CV-5
Pond	#5	==>	#6	0.000	0.000	EP-3A
Null	#6	==>	#7	0.148	0.329	CV-3A
Pond	#7	==>	#8	0.000	0.000	EP-3
Null	#8	==>	End	0.000	0.000	CV-3



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	9. Small streams flowing bankfull	0.63	15.00	2,400.00	7.11	0.093
#1	**Muskingum K:**					**0.093**
#4	8. Large gullies, diversions, and low flowing streams	0.50	8.00	1,590.00	2.12	0.208
#4	**Muskingum K:**					**0.208**
#6	8. Large gullies, diversions, and low flowing streams	1.20	21.00	1,752.00	3.28	0.148
#6	**Muskingum K:**					**0.148**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	118.900	0.760	0.537	0.346	89.700	M	57.15	9.149
	2	586.700	0.810	0.000	0.000	76.400	M	92.39	18.710
	3	381.100	0.320	0.538	0.370	70.000	M	45.44	7.091
	Σ	**1,086.700**						**170.53**	**34.950**
#2	Σ	**1,086.700**						**128.87**	**25.854**

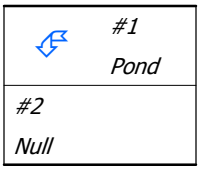
10-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.62	120.00	7,393.00	3.820	0.537
#1	**1**	**Muskingum K:**					**0.537**
#1	3	8. Large gullies, diversions, and low flowing streams	2.63	248.00	9,425.00	4.860	0.538
#1	**3**	**Muskingum K:**					**0.538**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	EP-7
Null	#2	==>	End	0.000	0.000	CV-7



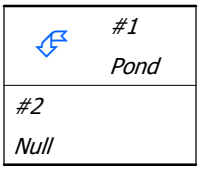
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	17.700	0.380	0.000	0.000	92.700	M	14.14	1.624
	2	130.100	0.500	0.000	0.000	81.600	M	43.83	6.023
	3	19.700	0.390	0.168	0.312	91.000	M	14.15	1.639
	4	81.900	0.560	0.168	0.312	78.400	M	19.60	3.032
	5	108.100	0.330	0.300	0.316	92.400	M	88.25	9.789
	6	30.200	0.420	0.300	0.316	81.000	M	10.51	1.345
	7	5.300	0.110	0.469	0.322	89.700	M	6.35	0.511
	8	2.600	0.170	0.469	0.322	75.900	M	0.81	0.081
	Σ	**395.600**						**178.39**	**24.044**
#2	Σ	**395.600**						**113.90**	**15.561**

10-year, 24-hour storm

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	EP-10
Null	#2	==>	End	0.000	0.000	CV-10



Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	159.700	0.760	0.490	0.326	89.700	M	148.39	23.695
	2	226.600	0.610	0.100	0.336	76.300	M	125.60	18.666
	3	651.200	0.320	0.788	0.325	70.000	M	322.45	38.463
	Σ	**1,037.500**						**475.73**	**80.824**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	1.35	17.00	1,257.00	3.480	0.100
#1	**2**	**Muskingum K:**					**0.100**
#1	3	8. Large gullies, diversions, and low flowing streams	1.11	100.00	8,969.00	3.160	0.788
#1	**3**	**Muskingum K:**					**0.788**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	8.900	0.380	0.000	0.000	92.700	M	12.73	1.484
	2	65.100	0.500	0.000	0.000	81.600	M	53.05	6.881
	3	19.700	0.390	0.168	0.312	91.000	M	26.42	3.081
	4	81.900	0.560	0.168	0.312	78.400	M	53.55	7.466
	5	108.100	0.330	0.300	0.316	92.400	M	158.80	17.901
	6	30.200	0.420	0.300	0.316	81.000	M	25.75	3.113
	7	5.300	0.110	0.469	0.322	89.700	M	11.49	0.986
	8	2.600	0.170	0.469	0.322	75.900	M	2.27	0.214
	Σ	**321.800**						**315.33**	**41.127**

100-year, 24-hour storm

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#1	**2**	**Muskingum K:**					**0.000**
#1	3	8. Large gullies, diversions, and low flowing streams	0.88	15.00	1,706.09	2.810	0.168
#1	**3**	**Muskingum K:**					**0.168**
#1	4	8. Large gullies, diversions, and low flowing streams	0.88	15.00	1,706.00	2.810	0.168
#1	**4**	**Muskingum K:**					**0.168**
#1	5	8. Large gullies, diversions, and low flowing streams	0.95	30.00	3,154.24	2.920	0.300
#1	**5**	**Muskingum K:**					**0.300**
#1	6	8. Large gullies, diversions, and low flowing streams	0.95	30.00	3,154.24	2.920	0.300
#1	**6**	**Muskingum K:**					**0.300**
#1	7	8. Large gullies, diversions, and low flowing streams	1.06	55.00	5,207.00	3.080	0.469
#1	**7**	**Muskingum K:**					**0.469**

FINAL GRADING

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	25.000	0.450	0.000	0.000	91.200	M	17.21	2.102
	2	310.600	0.540	0.000	0.000	78.700	M	77.89	11.746
EP-1P	Σ	**335.600**						**93.86**	**13.849**
#2	1	193.000	0.450	0.000	0.000	91.200	M	132.86	16.231
	2	59.000	0.620	0.000	0.000	74.100	M	8.44	1.569
	Σ	**587.600**						**166.37**	**31.649**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	907.00	7.20	0.4500	1.0000	1	305.2	180,523	91.11	51.04
	2	0.320	907.00	7.20	0.0420	1.0000	1	173.9	19,527	9.85	5.46
	Σ							**479.1**	**53,725**	**27.11**	**12.65**
#2	1	0.320	990.00	7.70	0.4500	1.0000	1	3,355.4	249,421	125.88	71.11
	2	0.300	990.00	7.70	0.0510	1.0000	1	20.6	17,059	8.61	4.85
	Σ							**3,538.2**	**225,643**	**113.88**	**39.23**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	130.400	0.210	0.000	0.000	91.200	M	111.50	10.989
	2	56.400	0.300	0.000	0.000	74.100	M	11.83	1.505
	Σ	**186.800**						**121.78**	**12.494**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	721.00	5.20	0.4500	1.0000	1	1,432.6	167,403	72.80	39.63
	2	0.300	721.00	5.20	0.0510	1.0000	1	14.2	13,682	5.75	2.91
	Σ							**1,446.9**	**155,095**	**67.43**	**35.33**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	15.000	0.410	0.000	0.000	91.600	M	10.98	1.295
	2	177.100	0.520	0.000	0.000	79.500	M	48.68	7.097
2A	Σ	**192.100**						**59.01**	**8.392**
#2	1	37.000	0.100	0.000	0.000	91.600	M	48.01	3.994
	2	35.300	0.150	0.000	0.000	72.100	M	7.42	0.809
2	Σ	**264.400**						**75.51**	**13.195**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	973.00	7.10	0.4500	1.0000	1	184.6	178,514	75.08	41.78
	2	0.320	973.00	7.10	0.0420	1.0000	1	103.0	19,161	8.06	4.46
	Σ							**287.5**	**52,968**	**22.28**	**10.44**
#2	1	0.320	372.00	17.00	0.4500	1.0000	1	1,615.2	448,138	214.56	122.13
	2	0.340	372.00	17.00	0.0460	1.0000	1	28.3	53,610	22.55	10.68
	Σ							**1,872.9**	**401,644**	**189.09**	**44.01**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	33.200	0.470	0.000	0.000	88.500	M	18.94	2.379
	2	245.200	0.560	0.000	0.000	73.800	M	35.96	6.368
	3	63.500	0.640	0.000	0.000	63.300	M	1.34	0.553
3A	Σ	**341.900**						**53.77**	**9.300**
#2	1	27.500	0.190	0.000	0.000	88.500	M	20.66	1.989
	2	23.900	0.320	0.000	0.000	63.300	M	0.60	0.209
3	Σ	**393.300**						**60.10**	**11.498**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	991.00	11.10	0.4500	1.0000	1	847.0	397,768	167.29	97.13
	2	0.320	991.00	11.10	0.0420	1.0000	1	196.5	40,411	17.00	9.44
	3	0.350	959.00	11.40	0.0390	1.0000	1	8.2	15,945	6.71	4.55
	Σ							**1,051.7**	**210,476**	**88.52**	**33.20**
#2	1	0.320	759.00	9.60	0.4500	1.0000	1	437.6	271,024	117.50	64.55
	2	0.350	759.00	9.60	0.0390	1.0000	1	1.6	8,876	3.73	2.40
	Σ							**1,398.5**	**240,233**	**102.01**	**35.86**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	5.600	0.200	0.000	0.000	88.200	M	4.07	0.395
	2	7.600	0.300	0.000	0.000	73.100	M	1.42	0.187
4A	Σ	**13.200**						**5.21**	**0.581**
#1	1	48.000	0.200	0.000	0.000	88.200	M	34.92	3.385
	2	12.400	0.380	0.000	0.000	62.400	M	0.23	0.095
4	Σ	**73.600**						**39.02**	**4.061**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.320	841.00	10.00	0.4500	1.0000	1	80.0	252,027	130.45	71.48
	2	0.320	841.00	10.00	0.0420	1.0000	1	2.7	21,148	10.67	5.39
	Σ							**82.8**	**213,576**	**110.46**	**50.90**
#1	1	0.320	841.00	10.00	0.4500	1.0000	1	887.7	316,737	163.94	90.52
	2	0.360	841.00	10.00	0.0400	1.0000	1	0.7	8,001	4.04	2.78
	Σ							**918.2**	**294,191**	**152.15**	**78.69**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	29.100	0.560	0.000	0.000	89.600	M	16.39	2.226
	2	225.000	0.600	0.000	0.000	75.800	M	39.87	6.861
	3	95.800	0.740	0.130	0.383	67.500	M	4.64	1.381
EP-5P	Σ	**349.900**						**58.06**	**10.468**
#2	1	21.300	0.560	0.000	0.000	89.600	M	12.00	1.629
	2	127.100	0.600	0.000	0.000	75.800	M	22.52	3.876
	Σ	**498.300**						**81.95**	**15.973**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	819.00	9.70	0.4500	1.0000	1	434.4	231,907	97.53	56.24
	2	0.320	819.00	9.70	0.0420	1.0000	1	125.2	23,836	10.02	5.61
	3	0.310	998.00	12.00	0.0390	1.0000	1	26.7	22,766	9.57	5.93
	Σ							**572.4**	**89,250**	**37.54**	**16.51**
#2	1	0.320	819.00	9.70	0.4500	1.0000	1	306.3	224,149	94.27	54.31
	2	0.320	819.00	9.70	0.0420	1.0000	1	66.0	22,271	9.37	5.24
	Σ							**696.8**	**95,787**	**40.29**	**13.20**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	3.42	89.00	2,599.00	5.550	0.130
#1	**3**	**Muskingum K:**					**0.130**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	36.500	0.420	0.000	0.000	89.700	M	23.57	2.817
	2	153.400	0.610	0.000	0.000	76.300	M	28.39	4.859
	Σ	**189.900**						**48.91**	**7.675**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	976.00	3.10	0.4500	1.0000	1	119.4	55,613	23.39	12.90
	2	0.320	976.00	3.10	0.0420	1.0000	1	16.8	4,542	1.91	1.07
	Σ							**136.2**	**32,442**	**13.64**	**5.44**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	249.900	0.760	0.000	0.000	89.700	M	120.11	19.229
	2	116.600	0.810	0.000	0.000	76.400	M	18.36	3.718
	3	1,004.600	0.320	0.287	0.354	70.000	M	119.79	18.693
EP-7P	Σ	**1,371.100**						**244.44**	**41.640**
#2	1	29.900	0.760	0.000	0.000	89.700	M	14.37	2.301
	2	609.500	0.810	0.000	0.000	76.400	M	95.98	19.437
	3	27.700	0.320	0.287	0.354	70.000	M	3.30	0.515
	Σ	**2,038.200**						**316.54**	**63.893**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	867.00	8.50	0.4500	1.0000	1	3,723.5	223,555	94.02	55.91
	2	0.320	867.00	8.50	0.0420	1.0000	1	48.4	16,294	6.85	4.01
	3	0.290	854.00	23.80	0.0460	1.0000	1	1,627.0	116,417	48.96	26.11
	Σ							**5,238.3**	**170,635**	**71.76**	**37.11**
#2	1	0.320	867.00	8.50	0.4500	1.0000	1	345.3	176,833	74.37	43.99
	2	0.320	867.00	8.50	0.0420	1.0000	1	308.5	19,843	8.35	4.88
	3	0.290	854.00	23.80	0.0460	1.0000	1	29.2	76,917	32.35	17.15
	Σ							**3,273.0**	**79,073**	**33.26**	**15.55**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.88	80.00	4,247.00	4.110	0.287
#1	**3**	**Muskingum K:**					**0.287**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	18.100	0.120	0.000	0.000	62.800	M	1.58	0.184
	2	14.400	0.090	0.000	0.000	88.100	M	16.02	1.262
	Σ	**32.500**						**17.60**	**1.446**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.260	233.00	18.00	0.0380	1.0000	1	2.4	23,789	13.67	5.40
	2	0.320	233.00	18.00	0.4500	1.0000	1	370.6	350,316	201.27	110.73
	Σ							**372.9**	**337,723**	**194.03**	**97.65**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.400	0.030	0.060	0.384	92.600	M	1.89	0.160
	2	13.000	0.130	0.000	0.000	73.500	M	3.21	0.336
	3	27.800	0.100	0.000	0.000	92.600	M	37.52	3.181
	Σ	**42.200**						**41.81**	**3.676**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	238.00	12.60	0.4500	1.0000	1	22.9	178,388	102.49	57.15
	2	0.310	300.00	11.70	0.0380	1.0000	1	4.4	20,364	10.28	4.89
	3	0.320	300.00	11.70	0.4500	1.0000	1	676.1	256,000	147.08	82.50
	Σ							**703.4**	**240,876**	**138.28**	**74.52**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	3.51	43.00	1,224.00	5.620	0.060
#1	**1**	**Muskingum K:**					**0.060**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	122.300	0.500	0.000	0.000	81.600	M	41.20	5.662
	2	8.500	0.500	0.000	0.000	81.600	M	2.86	0.393
	3	17.000	0.380	0.000	0.000	92.700	M	13.58	1.560
	Σ	**147.800**						**56.72**	**7.615**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	925.00	4.60	0.0420	1.0000	1	53.3	12,480	6.30	3.48
	2	0.320	840.00	7.70	0.0420	1.0000	1	4.2	14,098	7.11	3.93
	3	0.320	925.00	4.60	0.4500	1.0000	1	149.2	123,597	62.38	34.22
	Σ							**206.7**	**41,822**	**21.11**	**9.96**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	85.000	0.560	0.000	0.000	78.400	M	20.35	3.146
	2	8.700	0.560	0.000	0.000	78.400	M	2.08	0.322
	3	7.900	0.390	0.000	0.000	91.000	M	5.68	0.657
	Σ	**101.600**						**27.17**	**4.125**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	952.00	5.00	0.0420	1.0000	1	28.4	11,896	5.00	2.78
	2	0.320	900.00	7.20	0.0420	1.0000	1	3.0	12,452	5.24	2.91
	3	0.320	952.00	5.00	0.4500	1.0000	1	61.9	121,009	50.89	28.08
	Σ							**93.3**	**42,077**	**17.70**	**6.92**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	105.900	0.420	0.000	0.000	81.000	M	36.87	4.717
	2	23.600	0.420	0.000	0.000	81.000	M	8.22	1.051
	3	36.500	0.330	0.000	0.000	92.400	M	29.80	3.305
EP-10P	Σ	**166.000**						**73.29**	**9.073**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	851.00	6.00	0.0420	1.0000	1	55.7	15,939	6.70	3.64
	2	0.320	570.00	11.40	0.0420	1.0000	1	23.3	29,738	12.51	6.80
	3	0.320	851.00	6.00	0.4500	1.0000	1	434.2	166,727	70.53	38.86
	Σ							**513.2**	**85,062**	**35.95**	**17.17**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	24.900	0.110	0.000	0.000	89.700	M	29.81	2.402
	2	6.100	0.170	0.000	0.000	75.900	M	1.90	0.191
	Σ	**31.000**						**31.36**	**2.593**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	589.00	7.00	0.4500	1.0000	1	309.2	164,593	78.80	43.01
	2	0.320	589.00	7.00	0.0420	1.0000	1	1.7	13,280	5.59	2.72
	Σ							**310.9**	**157,507**	**75.36**	**40.11**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	278.000	0.710	0.000	0.000	92.300	M	162.32	24.907
	2	33.300	0.770	0.000	0.000	80.900	M	8.32	1.469
	3	95.200	0.770	0.262	0.363	74.700	M	12.84	2.660
EP-15P2	Σ	**406.500**						**177.41**	**29.036**
#2	1	289.500	0.710	0.000	0.000	92.300	M	169.04	25.938
	2	19.600	0.770	0.000	0.000	74.700	M	2.64	0.548
EP-15P1	Σ	**715.600**						**322.35**	**55.521**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	936.00	15.60	0.4500	1.0000	1	15,846.8	615,848	259.01	159.68
	2	0.320	936.00	15.60	0.0420	1.0000	1	57.4	48,479	20.39	11.91
	3	0.270	808.00	16.40	0.0400	1.0000	1	79.8	37,259	15.67	9.18
	Σ							**15,904.2**	**578,933**	**243.48**	**140.32**
#2	1	0.320	936.00	15.60	0.4500	1.0000	1	16,582.8	618,107	259.96	160.32
	2	0.270	808.00	16.40	0.0400	1.0000	1	13.6	31,068	13.07	7.61
	Σ							**22,842.6**	**452,796**	**190.43**	**110.96**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	2.25	96.00	4,258.00	4.500	0.262
#1	**3**	**Muskingum K:**					**0.262**

FIRST YEAR AFTER FINAL GRADING

(POOR CONDITION)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	25.000	0.500	0.000	0.000	85.500	M	11.34	1.490
	2	310.600	0.540	0.000	0.000	78.700	M	77.89	11.746
	Σ	**335.600**						**88.97**	**13.237**
#2	1	193.000	0.500	0.000	0.000	85.500	M	87.58	11.505
	2	59.000	0.620	0.000	0.000	74.100	M	8.44	1.569
	Σ	**587.600**						**140.52**	**26.311**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	907.00	7.20	0.1000	1.0000	1	44.3	38,735	19.55	10.90
	2	0.320	907.00	7.20	0.0420	1.0000	1	173.9	19,527	9.85	5.46
	Σ							**218.2**	**21,958**	**11.08**	**6.08**
#2	1	0.320	990.00	7.70	0.1000	1.0000	1	486.7	54,797	27.66	15.45
	2	0.300	990.00	7.70	0.0510	1.0000	1	20.6	17,059	8.61	4.85
	Σ							**595.4**	**47,295**	**23.87**	**8.31**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	130.400	0.240	0.000	0.000	85.500	M	77.03	7.839
	2	56.400	0.300	0.000	0.000	74.100	M	11.83	1.505
	Σ	**186.800**						**87.32**	**9.344**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	721.00	5.20	0.1000	1.0000	1	213.4	37,116	18.79	10.02
	2	0.300	721.00	5.20	0.0510	1.0000	1	14.2	13,682	6.90	3.50
	Σ							**227.6**	**34,273**	**17.34**	**8.98**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	15.000	0.460	0.000	0.000	86.000	M	7.32	0.922
	2	177.100	0.520	0.000	0.000	79.500	M	48.68	7.097
	Σ	**192.100**						**56.00**	**8.019**
#2	1	37.000	0.110	0.000	0.000	86.000	M	37.13	2.850
	2	35.300	0.150	0.000	0.000	72.100	M	7.42	0.809
	Σ	**264.400**						**65.88**	**11.678**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	973.00	7.10	0.1000	1.0000	1	27.1	38,551	16.21	8.98
	2	0.320	973.00	7.10	0.0420	1.0000	1	103.0	19,161	8.06	4.46
	Σ							**130.0**	**21,713**	**9.13**	**4.98**
#2	1	0.320	372.00	17.00	0.1000	1.0000	1	257.4	121,627	58.23	30.64
	2	0.340	372.00	17.00	0.0460	1.0000	1	28.3	53,610	22.55	10.68
	Σ							**390.7**	**100,284**	**46.03**	**11.05**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	33.200	0.500	0.000	0.000	82.200	M	11.75	1.600
	2	245.200	0.560	0.000	0.000	73.800	M	35.96	6.368
	3	63.500	0.640	0.000	0.000	63.300	M	1.34	0.553
	Σ	**341.900**						**47.77**	**8.521**
#2	1	27.500	0.220	0.000	0.000	82.200	M	13.17	1.332
	2	23.900	0.320	0.000	0.000	63.300	M	0.60	0.209
	Σ	**393.300**						**52.02**	**10.061**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	991.00	11.10	0.1000	1.0000	1	115.3	92,363	38.84	21.71
	2	0.320	991.00	11.10	0.0420	1.0000	1	196.5	40,411	17.00	9.44
	3	0.350	959.00	11.40	0.0390	1.0000	1	8.2	15,945	6.71	4.55
	Σ							**320.1**	**52,500**	**22.08**	**11.45**
#2	1	0.320	759.00	9.60	0.1000	1.0000	1	60.5	62,416	26.25	13.80
	2	0.350	759.00	9.60	0.0390	1.0000	1	1.6	8,876	3.73	2.40
	Σ							**364.7**	**49,613**	**20.87**	**11.06**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	5.600	0.240	0.000	0.000	81.800	M	2.54	0.265
	2	7.600	0.300	0.000	0.000	73.100	M	1.42	0.187
	Σ	**13.200**						**3.89**	**0.452**
#1	1	48.000	0.240	0.000	0.000	81.800	M	21.81	2.271
	2	12.400	0.380	0.000	0.000	62.400	M	0.23	0.095
	Σ	**73.600**						**25.05**	**2.818**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.320	841.00	10.00	0.1000	1.0000	1	10.9	56,438	28.48	15.01
	2	0.320	841.00	10.00	0.0420	1.0000	1	2.7	21,148	10.67	5.39
	Σ							**13.6**	**44,678**	**22.55**	**11.05**
#1	1	0.320	841.00	10.00	0.1000	1.0000	1	120.7	72,551	36.62	19.33
	2	0.360	841.00	10.00	0.0400	1.0000	1	0.7	8,001	4.04	2.78
	Σ							**128.5**	**66,746**	**33.69**	**16.62**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	29.100	0.580	0.000	0.000	83.600	M	10.64	1.537
	2	225.000	0.600	0.000	0.000	75.800	M	39.87	6.861
	3	95.800	0.740	0.130	0.383	67.500	M	4.64	1.381
	Σ	**349.900**						**52.63**	**9.780**
#2	1	21.300	0.580	0.000	0.000	83.600	M	7.79	1.125
	2	127.100	0.600	0.000	0.000	75.800	M	22.52	3.876
	Σ	**498.300**						**73.84**	**14.780**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	819.00	9.70	0.1000	1.0000	1	61.6	51,221	21.54	12.20
	2	0.320	819.00	9.70	0.0420	1.0000	1	125.2	23,836	10.02	5.61
	3	0.310	998.00	12.00	0.0390	1.0000	1	26.7	22,766	9.57	5.93
	Σ							**198.7**	**27,079**	**11.39**	**6.24**
#2	1	0.320	819.00	9.70	0.1000	1.0000	1	43.4	49,376	20.77	11.76
	2	0.320	819.00	9.70	0.0420	1.0000	1	66.0	22,271	9.37	5.24
	Σ							**213.5**	**25,478**	**10.72**	**4.44**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	3.42	89.00	2,599.00	5.550	0.130
#1	**3**	**Muskingum K:**					**0.130**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	36.500	0.500	0.000	0.000	84.000	M	14.85	1.978
	2	153.400	0.610	0.000	0.000	76.300	M	28.39	4.859
	Σ	**189.900**						**42.42**	**6.837**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	976.00	3.10	0.1000	1.0000	1	16.8	11,232	4.72	2.62
	2	0.320	976.00	3.10	0.0420	1.0000	1	16.8	4,542	1.91	1.07
	Σ							**33.6**	**6,851**	**2.88**	**1.52**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	249.900	0.780	0.000	0.000	84.100	M	80.07	13.614
	2	116.600	0.810	0.000	0.000	76.400	M	18.36	3.718
	3	1,004.600	0.320	0.287	0.354	70.000	M	119.79	18.693
	Σ	**1,371.100**						**207.88**	**36.025**
#2	1	29.900	0.780	0.000	0.000	84.100	M	9.58	1.629
	2	609.500	0.810	0.000	0.000	76.400	M	95.98	19.437
	3	27.700	0.320	0.287	0.354	70.000	M	3.30	0.515
	Σ	**2,038.200**						**277.51**	**57.606**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	867.00	8.50	0.1000	1.0000	1	543.5	49,276	20.72	12.17
	2	0.320	867.00	8.50	0.0420	1.0000	1	48.4	16,294	6.85	4.01
	3	0.290	854.00	23.80	0.0460	1.0000	1	1,627.0	116,417	48.96	26.11
	Σ							**2,095.7**	**78,189**	**32.88**	**17.63**
#2	1	0.320	867.00	8.50	0.1000	1.0000	1	50.4	38,363	16.13	9.46
	2	0.320	867.00	8.50	0.0420	1.0000	1	308.5	19,843	8.35	4.88
	3	0.290	854.00	23.80	0.0460	1.0000	1	29.2	76,917	32.35	17.15
	Σ							**1,263.3**	**27,204**	**11.44**	**6.73**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.88	80.00	4,247.00	4.110	0.287
#1	**3**	**Muskingum K:**					**0.287**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	18.100	0.120	0.000	0.000	62.800	M	1.58	0.184
	2	14.400	0.100	0.000	0.000	81.600	M	11.34	0.835
	Σ	**32.500**						**12.92**	**1.019**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.260	233.00	18.00	0.0380	1.0000	1	2.4	23,789	13.67	5.40
	2	0.320	233.00	18.00	0.1000	1.0000	1	53.8	92,643	53.23	26.54
	Σ							**56.2**	**86,336**	**49.60**	**22.73**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.400	0.040	0.060	0.384	87.200	M	1.49	0.116
	2	13.000	0.130	0.000	0.000	73.500	M	3.21	0.336
	3	27.800	0.110	0.000	0.000	87.200	M	29.62	2.306
	Σ	**42.200**						**33.50**	**2.758**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	238.00	12.60	0.1000	1.0000	1	3.7	43,823	25.18	13.40
	2	0.310	300.00	11.70	0.0380	1.0000	1	4.4	20,364	10.28	4.89
	3	0.320	300.00	11.70	0.1000	1.0000	1	109.9	64,970	37.33	19.75
	Σ							**118.1**	**60,686**	**34.71**	**17.68**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	122.300	0.500	0.000	0.000	81.600	M	41.20	5.662
	2	8.500	0.500	0.000	0.000	81.600	M	2.86	0.393
	3	17.000	0.430	0.000	0.000	87.400	M	9.37	1.141
	Σ	**147.800**						**53.10**	**7.196**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	925.00	4.60	0.0420	1.0000	1	53.3	12,480	6.30	3.48
	2	0.320	840.00	7.70	0.0420	1.0000	1	4.2	14,098	7.11	3.93
	3	0.320	925.00	4.60	0.1000	1.0000	1	22.6	26,197	13.22	7.29
	Σ							**80.1**	**14,904**	**7.52**	**4.11**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	85.000	0.560	0.000	0.000	78.400	M	20.35	3.146
	2	8.700	0.560	0.000	0.000	78.400	M	2.08	0.322
	3	7.900	0.470	0.000	0.000	85.300	M	3.64	0.465
	Σ	**101.600**						**25.82**	**3.933**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	952.00	5.00	0.0420	1.0000	1	28.4	11,896	5.00	2.78
	2	0.320	900.00	7.20	0.0420	1.0000	1	3.0	12,452	5.24	2.91
	3	0.320	952.00	5.00	0.1000	1.0000	1	8.8	25,030	10.53	5.83
	Σ							**40.2**	**13,671**	**5.75**	**3.15**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	105.900	0.420	0.000	0.000	81.000	M	36.87	4.717
	2	23.600	0.420	0.000	0.000	81.000	M	8.22	1.051
	3	36.500	0.370	0.000	0.000	87.000	M	20.71	2.388
	Σ	**166.000**						**65.03**	**8.156**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	851.00	6.00	0.0420	1.0000	1	55.7	15,939	6.70	3.64
	2	0.320	570.00	11.40	0.0420	1.0000	1	23.3	29,738	12.51	6.80
	3	0.320	851.00	6.00	0.1000	1.0000	1	65.7	36,618	15.40	8.42
	Σ							**144.8**	**24,143**	**10.15**	**5.45**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	24.900	0.130	0.000	0.000	83.600	M	14.28	1.340
	2	6.100	0.170	0.000	0.000	75.900	M	1.90	0.191
	Σ	**31.000**						**16.18**	**1.531**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	589.00	7.00	0.1000	1.0000	1	36.8	38,361	16.53	8.62
	2	0.320	589.00	7.00	0.0420	1.0000	1	1.7	13,280	5.59	2.72
	Σ							**38.5**	**35,436**	**15.26**	**7.88**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	278.000	0.740	0.000	0.000	87.100	M	114.32	18.280
	2	33.300	0.770	0.000	0.000	80.900	M	8.32	1.469
	3	95.200	0.770	0.262	0.363	74.700	M	12.84	2.660
	Σ	**406.500**						**129.73**	**22.408**
#2	1	289.500	0.740	0.000	0.000	87.100	M	119.05	19.036
	2	19.600	0.770	0.000	0.000	74.700	M	2.64	0.548
	Σ	**715.600**						**230.61**	**41.992**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	936.00	15.60	0.1000	1.0000	1	2,432.7	158,113	66.50	39.25
	2	0.320	936.00	15.60	0.0420	1.0000	1	57.4	48,479	20.39	11.91
	3	0.270	808.00	16.40	0.0400	1.0000	1	79.8	37,259	15.67	9.18
	Σ							**2,499.1**	**141,454**	**59.49**	**33.10**
#2	1	0.320	936.00	15.60	0.1000	1.0000	1	2,545.7	158,834	66.80	39.43
	2	0.270	808.00	16.40	0.0400	1.0000	1	13.6	31,068	13.07	7.61
	Σ							**3,345.3**	**104,126**	**43.79**	**23.96**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	2.25	96.00	4,258.00	4.500	0.262
#1	**3**	**Muskingum K:**					**0.262**

SECOND YEAR AFTER FINAL GRADING

(FAIR CONDITION)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	335.600	0.540	0.000	0.000	78.700	M	84.16	12.692
	Σ	**335.600**						**84.16**	**12.692**
#2	1	193.000	0.570	0.000	0.000	78.700	M	47.05	7.303
	2	59.000	0.620	0.000	0.000	74.100	M	8.44	1.569
	Σ	**587.600**						**119.50**	**21.564**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	907.00	7.20	0.0420	1.0000	1	189.7	19,708	9.95	5.51
	Σ							**189.7**	**19,708**	**9.95**	**5.51**
#2	1	0.320	990.00	7.70	0.0420	1.0000	1	112.0	20,086	10.14	5.66
	2	0.300	990.00	7.70	0.0510	1.0000	1	20.6	17,059	8.61	4.85
	Σ							**223.8**	**20,462**	**10.33**	**3.84**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	130.400	0.270	0.000	0.000	78.700	M	44.18	4.957
	2	56.400	0.300	0.000	0.000	74.100	M	11.83	1.505
	Σ	**186.800**						**55.66**	**6.463**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	721.00	5.20	0.0420	1.0000	1	50.9	14,498	7.32	3.79
	2	0.300	721.00	5.20	0.0510	1.0000	1	14.2	13,682	6.90	3.50
	Σ							**65.1**	**14,287**	**7.21**	**3.73**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	37.000	0.130	0.000	0.000	79.500	M	15.81	1.511
	2	35.300	0.150	0.000	0.000	72.100	M	7.42	0.809
	3	192.100	0.520	0.102	0.349	79.500	M	52.80	7.698
	Σ	**264.400**						**61.32**	**10.018**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	372.00	17.00	0.0420	1.0000	1	52.7	50,078	21.27	10.75
	2	0.340	372.00	17.00	0.0460	1.0000	1	28.3	53,610	22.55	10.68
	3	0.320	973.00	7.10	0.0420	1.0000	1	112.8	19,281	8.11	4.51
	Σ							**173.0**	**27,819**	**11.74**	**5.32**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.73	25.00	1,447.00	3.940	0.102
#1	**3**	**Muskingum K:**					**0.102**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	27.500	0.260	0.000	0.000	73.800	M	5.93	0.718
	2	23.900	0.320	0.000	0.000	63.300	M	0.60	0.209
	3	278.400	0.560	0.148	0.329	73.800	M	40.83	7.230
	4	63.500	0.640	0.148	0.329	63.300	M	1.34	0.553
	Σ	**393.300**						**43.69**	**8.710**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	759.00	9.60	0.0420	1.0000	1	11.5	23,514	9.89	4.93
	2	0.350	759.00	9.60	0.0390	1.0000	1	1.6	8,876	3.73	2.40
	3	0.320	991.00	11.10	0.0420	1.0000	1	226.6	40,659	17.10	9.58
	4	0.350	959.00	11.40	0.0390	1.0000	1	8.2	15,901	6.69	4.55
	Σ							**220.8**	**34,139**	**14.36**	**7.77**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.20	21.00	1,752.00	3.280	0.148
#1	**3**	**Muskingum K:**					**0.148**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	13.200	0.300	0.000	0.000	73.100	M	2.47	0.324
	Σ	**13.200**						**2.47**	**0.324**
#1	1	48.000	0.300	0.000	0.000	73.100	M	8.99	1.179
	2	12.400	0.380	0.000	0.000	62.400	M	0.23	0.095
	Σ	**73.600**						**11.18**	**1.599**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.320	841.00	10.00	0.0420	1.0000	1	5.1	22,583	11.40	5.75
	Σ							**5.1**	**22,583**	**11.40**	**5.75**
#1	1	0.320	841.00	10.00	0.0420	1.0000	1	21.5	26,327	13.29	6.71
	2	0.360	841.00	10.00	0.0400	1.0000	1	0.7	8,001	4.04	2.78
	Σ							**26.0**	**24,294**	**12.26**	**6.00**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	254.100	0.600	0.000	0.000	75.800	M	45.02	7.749
	2	95.800	0.740	0.130	0.383	67.500	M	4.64	1.381
	Σ	**349.900**						**47.25**	**9.130**
#2	1	148.400	0.600	0.000	0.000	75.800	M	26.29	4.525
	Σ	**498.300**						**65.89**	**13.655**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	819.00	9.70	0.0420	1.0000	1	143.5	24,183	10.17	5.69
	2	0.310	998.00	12.00	0.0390	1.0000	1	26.7	22,766	9.57	5.93
	Σ							**144.0**	**20,187**	**8.49**	**4.85**
#2	1	0.320	819.00	9.70	0.0420	1.0000	1	78.6	22,685	9.54	5.33
	Σ							**149.4**	**18,178**	**7.65**	**3.37**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	36.500	0.610	0.000	0.000	76.300	M	6.76	1.156
	2	153.400	0.610	0.000	0.000	76.300	M	28.39	4.859
	Σ	**189.900**						**35.15**	**6.015**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	976.00	3.10	0.0420	1.0000	1	3.4	3,825	1.61	0.90
	2	0.320	976.00	3.10	0.0420	1.0000	1	16.8	4,542	1.91	1.07
	Σ							**20.2**	**4,404**	**1.85**	**1.04**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	366.500	0.810	0.000	0.000	76.400	M	57.71	11.688
	2	1,004.600	0.320	0.287	0.354	70.000	M	119.79	18.693
	Σ	**1,371.100**						**169.09**	**30.381**
#2	1	639.400	0.810	0.000	0.000	76.400	M	100.69	20.391
	2	27.700	0.320	0.287	0.354	70.000	M	3.30	0.515
	Σ	**2,038.200**						**235.93**	**51.287**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	867.00	8.50	0.0420	1.0000	1	174.5	18,677	7.85	4.59
	2	0.290	854.00	23.80	0.0460	1.0000	1	1,627.0	116,417	48.96	26.11
	Σ							**1,632.3**	**76,244**	**32.07**	**16.30**
#2	1	0.320	867.00	8.50	0.0420	1.0000	1	325.5	19,956	8.39	4.91
	2	0.290	854.00	23.80	0.0460	1.0000	1	29.2	76,917	32.35	17.15
	Σ							**939.7**	**22,440**	**9.44**	**5.63**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	18.100	0.120	0.000	0.000	62.800	M	1.58	0.184
	2	14.400	0.110	0.000	0.000	72.900	M	6.06	0.434
	Σ	**32.500**						**7.64**	**0.619**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.260	233.00	18.00	0.0380	1.0000	1	2.4	23,789	13.67	5.40
	2	0.320	233.00	18.00	0.0420	1.0000	1	11.0	43,237	24.84	10.63
	Σ							**13.4**	**39,240**	**22.54**	**9.07**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.400	0.050	0.060	0.384	81.300	M	1.08	0.079
	2	13.000	0.130	0.000	0.000	73.500	M	3.21	0.336
	3	27.800	0.120	0.000	0.000	81.300	M	21.50	1.579
	Σ	**42.200**						**24.95**	**1.995**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	238.00	12.60	0.0420	1.0000	1	1.1	19,588	11.25	5.58
	2	0.310	300.00	11.70	0.0380	1.0000	1	4.4	20,364	10.28	4.89
	3	0.320	300.00	11.70	0.0420	1.0000	1	31.2	29,267	16.81	8.28
	Σ							**36.7**	**27,746**	**15.71**	**7.61**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	139.300	0.500	0.000	0.000	81.600	M	46.92	6.449
	2	8.500	0.500	0.000	0.000	81.600	M	2.86	0.393
	Σ	**147.800**						**49.79**	**6.842**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	925.00	4.60	0.0420	1.0000	1	61.7	12,675	6.40	3.54
	2	0.320	840.00	7.70	0.0420	1.0000	1	4.2	14,098	7.11	3.93
	Σ							**65.9**	**12,757**	**6.44**	**3.56**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	92.900	0.560	0.000	0.000	78.400	M	22.24	3.439
	2	8.700	0.560	0.000	0.000	78.400	M	2.08	0.322
	Σ	**101.600**						**24.32**	**3.761**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	952.00	5.00	0.0420	1.0000	1	31.4	12,022	6.07	3.37
	2	0.320	900.00	7.20	0.0420	1.0000	1	3.0	12,452	6.28	3.49
	Σ							**34.4**	**12,059**	**6.09**	**3.38**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	142.400	0.420	0.000	0.000	81.000	M	49.57	6.342
	2	23.600	0.420	0.000	0.000	81.000	M	8.22	1.051
	Σ	**166.000**						**57.79**	**7.394**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	851.00	6.00	0.0420	1.0000	1	77.7	16,512	6.94	3.77
	2	0.320	570.00	11.40	0.0420	1.0000	1	23.3	29,738	12.51	6.80
	Σ							**101.0**	**18,401**	**7.74**	**4.20**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	31.000	0.170	0.000	0.000	75.900	M	9.68	0.970
	Σ	**31.000**						**9.68**	**0.970**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	589.00	7.00	0.0420	1.0000	1	10.4	16,122	6.78	3.30
	Σ							**10.4**	**16,122**	**6.78**	**3.30**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	311.300	0.770	0.000	0.000	80.900	M	77.76	13.730
	2	95.200	0.770	0.262	0.363	74.700	M	12.84	2.660
	Σ	**406.500**						**85.91**	**16.390**
#2	1	289.500	0.770	0.000	0.000	80.900	M	72.31	12.769
	2	19.600	0.770	0.000	0.000	74.700	M	2.64	0.548
	Σ	**715.600**						**147.14**	**29.706**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	936.00	15.60	0.0420	1.0000	1	701.4	63,017	26.50	15.51
	2	0.270	808.00	16.40	0.0400	1.0000	1	79.8	37,259	15.67	9.18
	Σ							**719.4**	**55,449**	**23.32**	**13.36**
#2	1	0.320	936.00	15.60	0.0420	1.0000	1	646.6	62,484	26.28	15.38
	2	0.270	808.00	16.40	0.0400	1.0000	1	13.6	31,068	13.07	7.61
	Σ							**818.4**	**39,215**	**16.49**	**8.44**

THIRD AND SUBSEQUENT YEARS AFTER FINAL GRADING

(GOOD CONDITION)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	297.200	0.590	0.000	0.000	73.300	M	39.70	7.410
	2	38.400	0.540	0.000	0.000	78.700	M	9.63	1.452
	Σ	**335.600**						**49.02**	**8.862**
#2	1	193.000	0.630	0.000	0.000	73.300	M	24.81	4.804
	2	59.000	0.620	0.000	0.000	74.100	M	8.44	1.569
	Σ	**587.600**						**72.01**	**15.235**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	907.00	7.20	0.0200	1.0000	1	43.8	7,766	3.92	2.19
	2	0.320	520.00	7.70	0.0420	1.0000	1	13.5	12,306	6.21	3.44
	Σ							**57.4**	**8,591**	**4.34**	**2.40**
#2	1	0.320	990.00	7.70	0.0200	1.0000	1	29.5	7,973	4.02	2.27
	2	0.300	990.00	7.70	0.0510	1.0000	1	20.6	17,059	8.61	4.85
	Σ							**72.9**	**8,963**	**4.52**	**1.77**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	130.400	0.240	0.000	0.000	85.500	M	77.03	7.839
	2	56.400	0.300	0.000	0.000	74.100	M	11.83	1.505
	Σ	**186.800**						**87.32**	**9.344**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	721.00	5.20	0.1000	1.0000	1	213.4	37,116	18.79	10.02
	2	0.300	721.00	5.20	0.0510	1.0000	1	14.2	13,682	6.90	3.50
	Σ							**227.6**	**34,273**	**17.34**	**8.98**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	37.000	0.140	0.000	0.000	74.300	M	9.93	1.021
	2	35.300	0.150	0.000	0.000	72.100	M	7.42	0.809
	3	192.100	0.570	0.102	0.349	74.300	M	29.61	5.199
	Σ	**264.400**						**36.11**	**7.029**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	372.00	17.00	0.0200	1.0000	1	15.5	23,225	9.77	4.68
	2	0.340	372.00	17.00	0.0460	1.0000	1	28.3	53,610	22.55	10.68
	3	0.320	973.00	7.10	0.0200	1.0000	1	31.2	7,909	3.33	1.85
	Σ							**68.5**	**23,751**	**9.99**	**3.00**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.73	25.00	1,447.00	3.940	0.102
#1	**3**	**Muskingum K:**					**0.102**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	27.500	0.300	0.000	0.000	67.100	M	2.05	0.381
	2	23.900	0.320	0.000	0.000	63.300	M	0.60	0.209
	3	278.400	0.610	0.148	0.329	67.100	M	13.79	3.847
	4	63.500	0.640	0.148	0.329	63.300	M	1.34	0.553
	Σ	**393.300**						**16.47**	**4.990**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	759.00	9.60	0.0200	1.0000	1	2.1	7,854	3.30	1.72
	2	0.350	759.00	9.60	0.0390	1.0000	1	1.6	8,876	3.73	2.40
	3	0.320	991.00	11.10	0.0200	1.0000	1	41.3	12,924	5.44	3.30
	4	0.350	959.00	11.40	0.0390	1.0000	1	8.2	15,901	6.69	4.55
	Σ							**49.1**	**11,441**	**4.81**	**3.03**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.20	21.00	1,752.00	3.280	0.148
#1	**3**	**Muskingum K:**					**0.148**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	13.200	0.350	0.000	0.000	66.200	M	0.74	0.166
	Σ	**13.200**						**0.74**	**0.166**
#1	1	48.000	0.350	0.000	0.000	66.200	M	2.71	0.602
	2	12.400	0.380	0.000	0.000	62.400	M	0.23	0.095
	Σ	**73.600**						**3.46**	**0.863**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.320	841.00	10.00	0.0200	1.0000	1	0.8	6,787	3.43	1.89
	Σ							**0.8**	**6,787**	**3.43**	**1.89**
#1	1	0.320	841.00	10.00	0.0200	1.0000	1	3.6	7,921	4.00	2.20
	2	0.360	841.00	10.00	0.0400	1.0000	1	0.7	8,001	4.04	2.78
	Σ							**4.9**	**7,329**	**3.70**	**2.12**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	254.100	0.610	0.000	0.000	69.700	M	20.19	4.581
	2	95.800	0.740	0.130	0.383	67.500	M	4.64	1.381
	Σ	**349.900**						**23.01**	**5.963**
#2	1	148.400	0.610	0.000	0.000	69.700	M	11.79	2.675
	Σ	**498.300**						**32.02**	**8.638**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	819.00	9.70	0.0200	1.0000	1	32.5	9,055	3.81	2.19
	2	0.310	998.00	12.00	0.0390	1.0000	1	26.7	22,766	9.57	5.93
	Σ							**45.3**	**8,709**	**3.66**	**2.34**
#2	1	0.320	819.00	9.70	0.0200	1.0000	1	17.8	8,491	3.57	2.05
	Σ							**34.8**	**5,715**	**2.40**	**1.24**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	189.900	0.700	0.000	0.000	70.400	M	15.49	3.657
	Σ	**189.900**						**15.49**	**3.657**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	976.00	3.10	0.0200	1.0000	1	4.9	1,674	0.70	0.41
	Σ							**4.9**	**1,674**	**0.70**	**0.41**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	366.500	0.830	0.000	0.000	70.500	M	27.42	7.127
	2	1,004.600	0.320	0.287	0.354	70.000	M	119.79	18.693
	Σ	**1,371.100**						**138.09**	**25.820**
#2	1	639.400	0.830	0.000	0.000	70.500	M	47.83	12.433
	2	27.700	0.320	0.287	0.354	70.000	M	3.30	0.515
	Σ	**2,038.200**						**171.10**	**38.769**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	867.00	8.50	0.0200	1.0000	1	41.5	7,103	2.99	1.80
	2	0.290	854.00	23.80	0.0460	1.0000	1	1,627.0	116,417	48.96	26.11
	Σ							**1,494.0**	**86,290**	**36.29**	**17.52**
#2	1	0.320	867.00	8.50	0.0200	1.0000	1	77.4	7,593	3.19	1.92
	2	0.290	854.00	23.80	0.0460	1.0000	1	29.2	76,917	32.35	17.15
	Σ							**620.0**	**17,482**	**7.35**	**4.92**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	18.100	0.120	0.000	0.000	62.800	M	1.58	0.184
	2	14.400	0.110	0.000	0.000	65.900	M	2.60	0.218
	Σ	**32.500**						**4.18**	**0.402**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.260	233.00	18.00	0.0380	1.0000	1	2.4	23,789	13.67	5.40
	2	0.320	233.00	18.00	0.0200	1.0000	1	2.2	19,786	11.37	4.30
	Σ							**4.6**	**21,301**	**12.24**	**4.81**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.400	0.050	0.060	0.384	76.600	M	0.79	0.057
	2	13.000	0.130	0.000	0.000	73.500	M	3.21	0.336
	3	27.800	0.130	0.000	0.000	76.600	M	9.31	0.919
	Σ	**42.200**						**12.79**	**1.311**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	238.00	12.60	0.0200	1.0000	1	0.4	9,819	5.64	2.59
	2	0.310	300.00	11.70	0.0380	1.0000	1	4.4	20,364	10.28	4.89
	3	0.320	300.00	11.70	0.0200	1.0000	1	7.7	12,589	6.35	3.10
	Σ							**12.2**	**14,003**	**7.07**	**3.43**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	139.300	0.550	0.000	0.000	77.000	M	29.39	4.651
	2	8.500	0.500	0.000	0.000	81.600	M	2.86	0.393
	Σ	**147.800**						**32.09**	**5.045**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	925.00	4.60	0.0200	1.0000	1	18.8	5,388	2.72	1.50
	2	0.320	840.00	7.70	0.0420	1.0000	1	4.2	14,098	7.11	3.93
	Σ							**23.0**	**6,126**	**3.09**	**1.69**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	92.900	0.640	0.000	0.000	72.900	M	11.27	2.237
	2	8.700	0.560	0.000	0.000	78.400	M	2.08	0.322
	Σ	**101.600**						**13.23**	**2.559**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	952.00	5.00	0.0200	1.0000	1	8.0	4,647	2.35	1.33
	2	0.320	900.00	7.20	0.0420	1.0000	1	3.0	12,452	6.28	3.49
	Σ							**11.1**	**5,828**	**2.94**	**1.60**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	142.400	0.470	0.000	0.000	76.200	M	30.15	4.479
	2	23.600	0.420	0.000	0.000	81.000	M	8.22	1.051
	Σ	**166.000**						**37.79**	**5.530**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	851.00	6.00	0.0200	1.0000	1	23.1	7,008	2.95	1.59
	2	0.320	570.00	11.40	0.0420	1.0000	1	23.3	29,738	12.51	6.80
	Σ							**46.4**	**12,007**	**5.05**	**2.58**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	31.000	0.190	0.000	0.000	69.700	M	4.49	0.564
	Σ	**31.000**						**4.49**	**0.564**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	589.00	7.00	0.0200	1.0000	1	2.4	6,557	2.76	1.31
	Σ							**2.4**	**6,557**	**2.76**	**1.31**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	240.800	0.790	0.000	0.000	76.200	M	37.68	7.562
	2	70.500	0.770	0.000	0.000	80.900	M	17.61	3.109
	3	95.200	0.770	0.262	0.363	74.700	M	12.84	2.660
	Σ	**406.500**						**64.35**	**13.331**
#2	1	289.500	0.790	0.000	0.000	76.200	M	45.30	9.091
	2	19.600	0.770	0.000	0.000	74.700	M	2.64	0.548
	Σ	**715.600**						**103.80**	**22.969**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	936.00	15.60	0.0200	1.0000	1	159.5	26,387	11.10	6.47
	2	0.320	340.00	19.10	0.0420	1.0000	1	92.2	36,980	15.55	9.07
	3	0.270	808.00	16.40	0.0400	1.0000	1	79.8	37,259	15.67	9.18
	Σ							**314.8**	**28,570**	**12.02**	**7.24**
#2	1	0.320	936.00	15.60	0.0200	1.0000	1	196.0	26,970	11.34	6.62
	2	0.270	808.00	16.40	0.0400	1.0000	1	13.6	31,068	13.07	7.61
	Σ							**276.6**	**16,374**	**6.89**	**3.71**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	2.25	96.00	4,258.00	4.500	0.262
#1	**3**	**Muskingum K:**					**0.262**

FINAL RECLAMATION SEDIMENT TRAPS

Subwatershed Hydrology Detail:

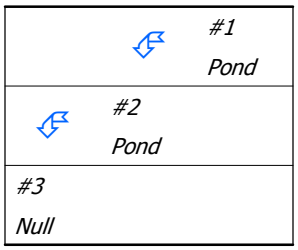
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	25.000	0.450	0.000	0.000	91.200	M	17.21	2.102
	2	310.600	0.540	0.000	0.000	78.700	M	77.89	11.746
	Σ	**335.600**						**93.86**	**13.849**
#2	1	193.000	0.450	0.000	0.000	91.200	M	132.86	16.231
	2	59.000	0.620	0.000	0.000	74.100	M	8.44	1.569
	Σ	**587.600**						**138.89**	**29.608**
#3	Σ	**587.600**						**138.79**	**29.608**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	907.00	7.20	0.4500	1.0000	1	305.2	180,523	75.92	42.53
	2	0.320	907.00	7.20	0.0420	1.0000	1	173.9	19,527	8.21	4.55
	Σ							**479.1**	**53,725**	**22.60**	**10.54**
#2	1	0.320	990.00	7.70	0.4500	1.0000	1	3,355.4	249,421	104.90	59.25
	2	0.300	990.00	7.70	0.0510	1.0000	1	20.6	17,059	7.17	4.04
	Σ							**3,393.0**	**240,146**	**101.00**	**33.27**
#3	Σ							**296.1**	**29,200**	**12.28**	**5.99**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.349	0.335	EP-1AP
Pond	#2	==>	#3	0.000	0.000	1 Trap
Null	#3	==>	End	0.000	0.000	Outfall



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.32	57.00	4,332.29	3.44	0.349
#1	**Muskingum K:**					**0.349**

Subwatershed Hydrology Detail:

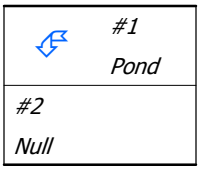
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	130.400	0.240	0.000	0.000	85.500	M	77.03	7.839
	2	56.400	0.300	0.000	0.000	74.100	M	11.83	1.505
	Σ	**186.800**						**87.32**	**9.344**
#2	Σ	**186.800**						**87.18**	**9.344**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	721.00	5.20	0.1000	1.0000	1	213.4	37,116	15.66	8.35
	2	0.300	721.00	5.20	0.0510	1.0000	1	14.2	13,682	5.75	2.91
	Σ							**227.6**	**34,273**	**14.45**	**7.48**
#2	Σ							**39.7**	**6,867**	**2.89**	**2.01**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	1B Trap
Null	#2	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

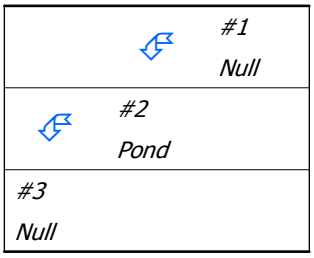
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	15.000	0.410	0.000	0.000	91.600	M	10.98	1.295
	2	177.100	0.520	0.000	0.000	79.500	M	48.68	7.097
	Σ	**192.100**						**59.01**	**8.392**
#2	1	37.000	0.100	0.000	0.000	91.600	M	48.01	3.994
	2	35.300	0.150	0.000	0.000	72.100	M	7.42	0.809
	Σ	**264.400**						**75.51**	**13.195**
#3	Σ	**264.400**						**71.34**	**13.195**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	973.00	7.10	0.4500	1.0000	1	184.6	178,514	75.08	41.78
	2	0.320	973.00	7.10	0.0420	1.0000	1	103.0	19,161	8.06	4.46
	Σ							**287.5**	**52,968**	**22.28**	**10.44**
#2	1	0.320	372.00	17.00	0.4500	1.0000	1	1,615.2	448,138	214.56	122.13
	2	0.340	372.00	17.00	0.0460	1.0000	1	28.3	53,610	22.55	10.68
	Σ							**1,872.9**	**401,644**	**189.09**	**44.01**
#3	Σ							**122.9**	**56,785**	**23.88**	**11.26**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.102	0.349	2A
Pond	#2	==>	#3	0.000	0.000	2 Trap
Null	#3	==>	End	0.000	0.000	Outfall



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.73	25.00	1,447.00	3.94	0.102
#1	**Muskingum K:**					**0.102**

Subwatershed Hydrology Detail:

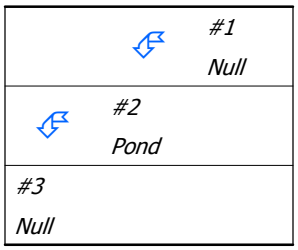
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	33.200	0.500	0.000	0.000	82.200	M	11.75	1.600
	2	245.200	0.560	0.000	0.000	73.800	M	35.96	6.368
	3	63.500	0.640	0.000	0.000	63.300	M	1.34	0.553
	Σ	**341.900**						**47.77**	**8.521**
#2	1	27.500	0.220	0.000	0.000	82.200	M	13.17	1.332
	2	23.900	0.320	0.000	0.000	63.300	M	0.60	0.209
	Σ	**393.300**						**52.02**	**10.061**
#3	Σ	**393.300**						**52.01**	**10.061**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	991.00	11.10	0.1000	1.0000	1	115.3	92,363	38.84	21.71
	2	0.320	991.00	11.10	0.0420	1.0000	1	196.5	40,411	17.00	9.44
	3	0.350	959.00	11.40	0.0390	1.0000	1	8.2	15,945	6.71	4.55
	Σ							**320.1**	**52,500**	**22.08**	**11.45**
#2	1	0.320	759.00	9.60	0.1000	1.0000	1	60.5	62,416	26.25	13.80
	2	0.350	759.00	9.60	0.0390	1.0000	1	1.6	8,876	3.73	2.40
	Σ							**364.7**	**49,613**	**20.87**	**11.06**
#3	Σ							**49.2**	**8,938**	**3.76**	**2.50**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.148	0.329	3A
Pond	#2	==>	#3	0.000	0.000	3 Trap
Null	#3	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

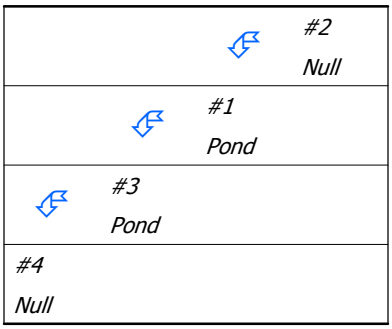
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	5.600	0.200	0.000	0.000	88.200	M	4.07	0.395
	2	7.600	0.300	0.000	0.000	73.100	M	1.42	0.187
	Σ	**13.200**						**5.21**	**0.581**
#1	1	48.000	0.200	0.000	0.000	88.200	M	34.92	3.385
	2	12.400	0.380	0.000	0.000	62.400	M	0.23	0.095
	Σ	**73.600**						**39.02**	**4.061**
#3	Σ	**73.600**						**39.05**	**4.061**
#4	Σ	**73.600**						**39.01**	**4.061**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.320	841.00	10.00	0.4500	1.0000	1	80.0	252,027	108.71	59.57
	2	0.320	841.00	10.00	0.0420	1.0000	1	2.7	21,148	8.89	4.49
	Σ							**82.8**	**213,576**	**92.05**	**42.41**
#1	1	0.320	841.00	10.00	0.4500	1.0000	1	887.7	316,737	136.62	75.43
	2	0.360	841.00	10.00	0.0400	1.0000	1	0.7	8,001	3.36	2.32
	Σ							**918.2**	**294,191**	**126.79**	**65.57**
#3	Σ							**30.5**	**19,187**	**8.07**	**3.49**
#4	Σ							**5.1**	**3,701**	**1.56**	**0.56**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#3	0.000	0.000	4 Trap 1
Null	#2	==>	#1	0.098	0.366	4A
Pond	#3	==>	#4	0.000	0.000	4 Trap 2
Null	#4	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	29.100	0.560	0.000	0.000	89.600	M	16.39	2.226
	2	225.000	0.600	0.000	0.000	75.800	M	39.87	6.861
	3	95.800	0.740	0.130	0.383	67.500	M	4.64	1.381
	Σ	**349.900**						**58.06**	**10.468**
#2	1	21.300	0.560	0.000	0.000	89.600	M	12.00	1.629
	2	127.100	0.600	0.000	0.000	75.800	M	22.52	3.876
	Σ	**498.300**						**78.77**	**14.903**
#3	Σ	**498.300**						**78.36**	**14.903**

Subwatershed Sedimentology Detail:

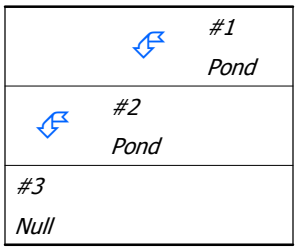
Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	819.00	9.70	0.4500	1.0000	1	434.4	231,907	97.53	56.24
	2	0.320	819.00	9.70	0.0420	1.0000	1	125.2	23,836	10.02	5.61
	3	0.310	998.00	12.00	0.0390	1.0000	1	26.7	22,766	9.57	5.93
	Σ							**572.4**	**89,250**	**37.54**	**16.51**
#2	1	0.320	819.00	9.70	0.4500	1.0000	1	306.3	224,149	94.27	54.31
	2	0.320	819.00	9.70	0.0420	1.0000	1	66.0	22,271	9.37	5.24
	Σ							**445.4**	**115,441**	**48.55**	**9.03**
#3	Σ							**71.6**	**22,424**	**9.43**	**3.52**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	3.42	89.00	2,599.00	5.550	0.130
#1	**3**	**Muskingum K:**					**0.130**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.246	0.343	EP-5P
Pond	#2	==>	#3	0.000	0.000	5 Trap
Null	#3	==>	End	0.000	0.000	Outfall



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.52	50.00	3,285.00	3.70	0.246
#1	**Muskingum K:**					**0.246**

Subwatershed Hydrology Detail:

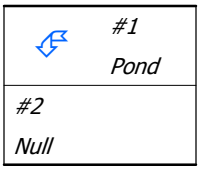
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	36.500	0.420	0.000	0.000	89.700	M	23.57	2.817
	2	153.400	0.610	0.000	0.000	76.300	M	28.39	4.859
	Σ	**189.900**						**48.91**	**7.675**
#2	Σ	**189.900**						**48.78**	**7.675**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	976.00	3.10	0.4500	1.0000	1	119.4	55,613	23.39	12.90
	2	0.320	976.00	3.10	0.0420	1.0000	1	16.8	4,542	1.91	1.07
	Σ							**136.2**	**32,442**	**13.64**	**5.44**
#2	Σ							**21.4**	**6,680**	**2.81**	**1.52**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	6 Trap
Null	#2	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	249.900	0.760	0.000	0.000	89.700	M	120.11	19.229
	2	116.600	0.810	0.000	0.000	76.400	M	18.36	3.718
	3	1,004.600	0.320	0.287	0.354	70.000	M	119.79	18.693
	Σ	**1,371.100**						**244.44**	**41.640**
#2	1	29.900	0.760	0.000	0.000	89.700	M	14.37	2.301
	2	609.500	0.810	0.000	0.000	76.400	M	95.98	19.437
	3	27.700	0.320	0.287	0.354	70.000	M	3.30	0.515
	Σ	**2,038.200**						**217.40**	**53.323**
#3	Σ	**2,038.200**						**217.13**	**53.323**

Subwatershed Sedimentology Detail:

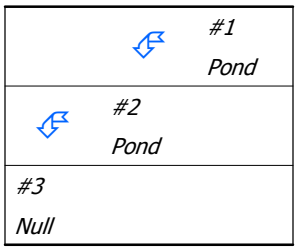
Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	867.00	8.50	0.4500	1.0000	1	3,723.5	223,555	94.02	55.91
	2	0.320	867.00	8.50	0.0420	1.0000	1	48.4	16,294	6.85	4.01
	3	0.290	854.00	23.80	0.0460	1.0000	1	1,627.0	116,417	48.96	26.11
	Σ							**5,238.3**	**170,635**	**71.76**	**37.11**
#2	1	0.320	867.00	8.50	0.4500	1.0000	1	345.3	176,833	74.37	43.99
	2	0.320	867.00	8.50	0.0420	1.0000	1	308.5	19,843	8.35	4.88
	3	0.290	854.00	23.80	0.0460	1.0000	1	29.2	76,917	32.35	17.15
	Σ							**714.4**	**55,197**	**23.21**	**4.10**
#3	Σ							**202.7**	**18,275**	**7.69**	**2.05**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.88	80.00	4,247.00	4.110	0.287
#1	**3**	**Muskingum K:**					**0.287**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.341	0.344	EP-7P
Pond	#2	==>	#3	0.000	0.000	7 Trap
Null	#3	==>	End	0.000	0.000	Outfall



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.58	73.00	4,624.00	3.76	0.341
#1	**Muskingum K:**					**0.341**

Subwatershed Hydrology Detail:

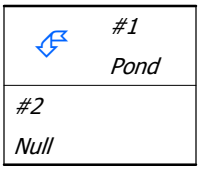
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	18.100	0.120	0.000	0.000	62.800	M	1.58	0.184
	2	14.400	0.100	0.000	0.000	81.600	M	11.34	0.835
	Σ	**32.500**						**12.92**	**1.019**
#2	Σ	**32.500**						**12.80**	**1.019**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.260	233.00	18.00	0.0380	1.0000	1	2.4	23,789	11.39	4.50
	2	0.320	233.00	18.00	0.1000	1.0000	1	53.8	92,643	44.36	22.11
	Σ							**56.2**	**86,336**	**41.34**	**18.94**
#2	Σ							**4.0**	**8,287**	**3.49**	**2.12**

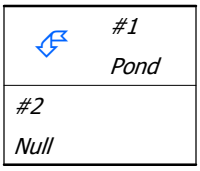
Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	8 Trap
Null	#2	==>	End	0.000	0.000	Outfall



Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	8 Trap
Null	#2	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

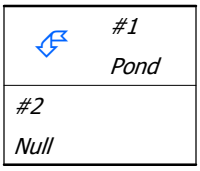
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.400	0.040	0.060	0.384	87.200	M	1.49	0.116
	2	13.000	0.130	0.000	0.000	73.500	M	3.21	0.336
	3	27.800	0.110	0.000	0.000	87.200	M	29.62	2.306
	Σ	**42.200**						**33.50**	**2.758**
#2	Σ	**42.200**						**33.28**	**2.758**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	238.00	12.60	0.1000	1.0000	1	3.7	43,823	20.98	11.16
	2	0.310	300.00	11.70	0.0380	1.0000	1	4.4	20,364	8.56	4.07
	3	0.320	300.00	11.70	0.1000	1.0000	1	109.9	64,970	31.11	16.45
	Σ							**118.1**	**60,686**	**28.92**	**14.73**
#2	Σ							**9.9**	**8,979**	**3.78**	**0.28**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	9 Trap
Null	#2	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

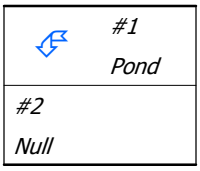
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	122.300	0.500	0.000	0.000	81.600	M	41.20	5.662
	2	8.500	0.500	0.000	0.000	81.600	M	2.86	0.393
	3	17.000	0.380	0.000	0.000	92.700	M	13.58	1.560
	Σ	**147.800**						**56.72**	**7.615**
#2	Σ	**147.800**						**56.73**	**7.615**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	925.00	4.60	0.0420	1.0000	1	53.3	12,480	5.25	2.90
	2	0.320	840.00	7.70	0.0420	1.0000	1	4.2	14,098	5.93	3.28
	3	0.320	925.00	4.60	0.4500	1.0000	1	149.2	123,597	51.98	28.52
	Σ							**206.7**	**41,822**	**17.59**	**8.30**
#2	Σ							**23.2**	**6,791**	**2.86**	**1.84**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	10 Trap
Null	#2	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

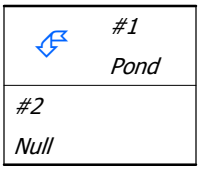
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	85.000	0.560	0.000	0.000	78.400	M	20.35	3.146
	2	8.700	0.560	0.000	0.000	78.400	M	2.08	0.322
	3	7.900	0.390	0.000	0.000	91.000	M	5.68	0.657
	Σ	**101.600**						**27.17**	**4.125**
#2	Σ	**101.600**						**27.14**	**4.125**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	952.00	5.00	0.0420	1.0000	1	28.4	11,896	5.00	2.78
	2	0.320	900.00	7.20	0.0420	1.0000	1	3.0	12,452	5.24	2.91
	3	0.320	952.00	5.00	0.4500	1.0000	1	61.9	121,009	50.89	28.08
	Σ							**93.3**	**42,077**	**17.70**	**6.92**
#2	Σ							**11.0**	**7,969**	**3.35**	**1.73**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	11 Trap
Null	#2	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

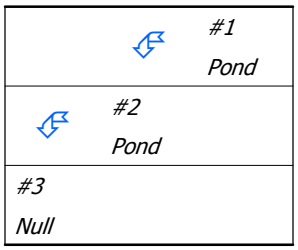
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	105.900	0.420	0.000	0.000	81.000	M	36.87	4.717
	2	23.600	0.420	0.000	0.000	81.000	M	8.22	1.051
	3	36.500	0.330	0.000	0.000	92.400	M	29.80	3.305
	Σ	**166.000**						**73.29**	**9.073**
#2	Σ	**166.000**						**84.42**	**7.388**
#3	Σ	**166.000**						**83.91**	**7.388**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	851.00	6.00	0.0420	1.0000	1	55.7	15,939	6.70	3.64
	2	0.320	570.00	11.40	0.0420	1.0000	1	23.3	29,738	12.51	6.80
	3	0.320	851.00	6.00	0.4500	1.0000	1	434.2	166,727	70.53	38.86
	Σ							**513.2**	**85,062**	**35.95**	**17.17**
#2	Σ							**76.4**	**22,514**	**9.47**	**5.80**
#3	Σ							**20.1**	**6,665**	**2.80**	**1.98**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	EP-12P
Pond	#2	==>	#3	0.000	0.000	12 Trap
Null	#3	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

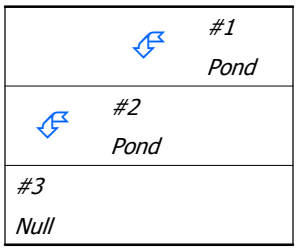
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	24.900	0.110	0.000	0.000	89.700	M	29.81	2.402
	2	6.100	0.170	0.000	0.000	75.900	M	1.90	0.191
	Σ	**31.000**						**31.36**	**2.593**
#2	Σ	**31.000**						**31.09**	**2.593**
#3	Σ	**31.000**						**30.95**	**2.593**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	589.00	7.00	0.4500	1.0000	1	309.2	164,593	78.80	43.01
	2	0.320	589.00	7.00	0.0420	1.0000	1	1.7	13,280	5.59	2.72
	Σ							**310.9**	**157,507**	**75.36**	**40.11**
#2	Σ							**7.1**	**7,359**	**3.10**	**0.05**
#3	Σ							**1.7**	**3,697**	**1.55**	**0.03**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	14 Trap 1
Pond	#2	==>	#3	0.000	0.000	14 Trap 2
Null	#3	==>	End	0.000	0.000	Outfall



Subwatershed Hydrology Detail:

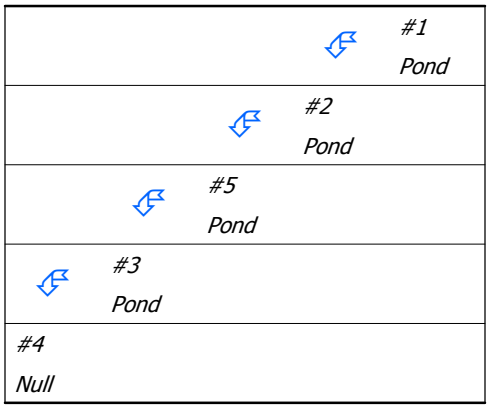
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	278.000	0.710	0.000	0.000	92.300	M	162.32	24.907
	2	33.300	0.770	0.000	0.000	80.900	M	8.32	1.469
	3	95.200	0.770	0.262	0.363	74.700	M	12.84	2.660
	Σ	**406.500**						**177.41**	**29.036**
#2	1	289.500	0.710	0.000	0.000	92.300	M	169.04	25.938
	2	19.600	0.770	0.000	0.000	74.700	M	2.64	0.548
	Σ	**715.600**						**313.57**	**50.812**
#5	Σ	**715.600**						**308.48**	**50.812**
#3	Σ	**715.600**						**308.34**	**50.812**
#4	Σ	**715.600**						**309.34**	**50.812**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	936.00	15.60	0.4500	1.0000	1	15,846.8	615,848	259.01	159.68
	2	0.320	936.00	15.60	0.0420	1.0000	1	57.4	48,479	20.39	11.91
	3	0.270	808.00	16.40	0.0400	1.0000	1	79.8	37,259	15.67	9.18
	Σ							**15,904.2**	**578,933**	**243.48**	**140.32**
#2	1	0.320	936.00	15.60	0.4500	1.0000	1	16,582.8	618,107	259.96	160.32
	2	0.270	808.00	16.40	0.0400	1.0000	1	13.6	31,068	13.07	7.61
	Σ							**19,101.5**	**635,860**	**267.42**	**99.39**
#5	Σ							**2,248.4**	**119,416**	**50.22**	**19.56**
#3	Σ							**1,384.8**	**44,939**	**18.90**	**8.33**
#4	Σ							**528.4**	**20,203**	**8.50**	**4.33**

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.217	0.350	EP-15P2
Pond	#2	==>	#5	0.000	0.000	EP-15P1 Upstream Trap
Pond	#3	==>	#4	0.000	0.000	15 Trap
Null	#4	==>	End	0.000	0.000	Outfall
Pond	#5	==>	#3	0.000	0.000	EP-15P1



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.77	55.00	3,110.00	3.98	0.217
#1	**Muskingum K:**					**0.217**

PERMANENT PONDS

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	25.000	0.450	0.000	0.000	91.200	M	17.21	2.102
	2	310.600	0.540	0.000	0.000	78.700	M	77.89	11.746
	Σ	**335.600**						**93.86**	**13.849**

10-year, 24-hour storm

Final Grading

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	907.00	7.20	0.4500	1.0000	1	305.2	180,523	75.92	42.53
	2	0.320	907.00	7.20	0.0420	1.0000	1	173.9	19,527	8.21	4.55
	Σ							**479.1**	**53,725**	**22.60**	**10.54**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	335.600	0.590	0.000	0.000	73.300	M	44.83	8.367
	Σ	**335.600**						**44.83**	**8.367**

10-year, 24-hour storm

Fully Reclaimed

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	907.00	7.20	0.0200	1.0000	1	50.2	7,879	3.31	1.85
	Σ							**50.2**	**7,879**	**3.31**	**1.85**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	335.600	0.590	0.000	0.000	73.300	M	4.11	1.729
	Σ	**335.600**						**4.11**	**1.729**

2-year, 24-hour storm

Fully Reclaimed

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	29.100	0.560	0.000	0.000	89.600	M	16.39	2.226
	2	225.000	0.600	0.000	0.000	75.800	M	39.87	6.861
	3	95.800	0.740	0.130	0.383	67.500	M	4.64	1.381
	Σ	**349.900**						**58.06**	**10.468**

10-year, 24-hour storm

Final Grading

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	819.00	9.70	0.4500	1.0000	1	434.4	231,907	97.53	56.24
	2	0.320	819.00	9.70	0.0420	1.0000	1	125.2	23,836	10.02	5.61
	3	0.310	998.00	12.00	0.0390	1.0000	1	26.7	22,766	9.57	5.93
	Σ							**572.4**	**89,250**	**37.54**	**16.51**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	3.42	89.00	2,599.00	5.550	0.130
#1	**3**	**Muskingum K:**					**0.130**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	254.200	0.610	0.000	0.000	69.700	M	20.20	4.583
	2	95.800	0.740	0.130	0.383	67.500	M	4.64	1.381
	Σ	**350.000**						**23.02**	**5.964**

10-year, 24-hour storm

Fully Reclaimed

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	819.00	9.70	0.0200	1.0000	1	32.5	9,056	3.81	2.19
	2	0.310	998.00	12.00	0.0390	1.0000	1	26.7	22,766	9.57	5.93
	Σ							**45.3**	**8,708**	**3.66**	**2.34**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	3.42	89.00	2,599.00	5.550	0.130
#1	**2**	**Muskingum K:**					**0.130**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	254.100	0.610	0.000	0.000	69.700	M	0.89	0.655
	2	95.800	0.740	0.130	0.383	67.500	M	0.18	0.140
	Σ	**349.900**						**1.01**	**0.795**

2-year, 24-hour storm

Fully Reclaimed

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	3.42	89.00	2,599.00	5.550	0.130
#1	**2**	**Muskingum K:**					**0.130**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	249.900	0.760	0.000	0.000	89.700	M	120.11	19.229
	2	116.600	0.810	0.000	0.000	76.400	M	18.36	3.718
	3	1,004.600	0.320	0.287	0.354	70.000	M	119.79	18.693
	Σ	**1,371.100**						**244.44**	**41.640**

10-year, 24-hour storm

Final Grading

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	867.00	8.50	0.4500	1.0000	1	3,723.5	223,555	112.82	67.10
	2	0.320	867.00	8.50	0.0420	1.0000	1	48.4	16,294	8.22	4.81
	3	0.290	854.00	23.80	0.0460	1.0000	1	1,627.0	116,417	58.75	31.33
	Σ							**5,238.3**	**170,635**	**86.12**	**44.54**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	1.88	80.00	4,247.00	4.110	0.287
#1	**3**	**Muskingum K:**					**0.287**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	366.600	0.830	0.000	0.000	70.500	M	27.43	7.129
	2	1,004.600	0.320	0.287	0.354	70.000	M	119.79	18.693
	Σ	**1,371.200**						**138.10**	**25.822**

10-year, 24-hour storm

Fully Reclaimed

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	867.00	8.50	0.0200	1.0000	1	41.5	7,104	3.59	2.16
	2	0.290	854.00	23.80	0.0460	1.0000	1	1,627.0	116,417	58.75	31.33
	Σ							**1,494.0**	**86,286**	**43.55**	**21.02**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	366.600	0.830	0.000	0.000	70.500	M	1.60	1.123
	2	1,004.600	0.320	0.287	0.354	70.000	M	4.28	2.775
	Σ	**1,371.200**						**5.83**	**3.898**

2-year, 24-hour storm

Fully Reclaimed

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	105.900	0.420	0.000	0.000	81.000	M	36.87	4.717
	2	23.600	0.420	0.000	0.000	81.000	M	8.22	1.051
	3	36.500	0.330	0.000	0.000	92.400	M	29.80	3.305
	Σ	**166.000**						**73.29**	**9.073**

10-year, 24-hour storm

Final Grading

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	851.00	6.00	0.0420	1.0000	1	55.7	15,939	6.70	3.64
	2	0.320	570.00	11.40	0.0420	1.0000	1	23.3	29,738	12.51	6.80
	3	0.320	851.00	6.00	0.4500	1.0000	1	434.2	166,727	70.53	38.86
	Σ							**513.2**	**85,062**	**35.95**	**17.17**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	142.400	0.470	0.000	0.000	76.200	M	30.15	4.479
	2	23.600	0.420	0.000	0.000	81.000	M	8.22	1.051
	Σ	**166.000**						**37.79**	**5.530**

10-year, 24-hour storm

Fully Reclaimed

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	851.00	6.00	0.0200	1.0000	1	23.1	7,008	2.95	1.59
	2	0.320	570.00	11.40	0.0420	1.0000	1	23.3	29,738	12.51	6.80
	Σ							**46.4**	**12,007**	**5.05**	**2.58**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	142.400	0.470	0.000	0.000	76.200	M	4.44	1.136
	2	23.600	0.420	0.000	0.000	81.000	M	2.15	0.342
	Σ	**166.000**						**6.39**	**1.478**

2-year, 24-hour storm

Fully Reclaimed

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	278.000	0.710	0.000	0.000	92.300	M	162.32	24.907
	2	33.300	0.770	0.000	0.000	80.900	M	8.32	1.469
	3	95.200	0.770	0.262	0.363	74.700	M	12.84	2.660
EP-15P2	Σ	**406.500**						**177.41**	**29.036**
#2	1	289.500	0.710	0.000	0.000	92.300	M	169.04	25.938
	2	19.600	0.770	0.000	0.000	74.700	M	2.64	0.548
EP-15P1	Σ	**715.600**						**313.57**	**50.812**

10-year, 24-hour storm

Final Grading

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	936.00	15.60	0.4500	1.0000	1	15,846.8	615,848	259.01	159.68
	2	0.320	936.00	15.60	0.0420	1.0000	1	57.4	48,479	20.39	11.91
	3	0.270	808.00	16.40	0.0400	1.0000	1	79.8	37,259	15.67	9.18
	Σ							**15,904.2**	**578,933**	**243.48**	**140.32**
#2	1	0.320	936.00	15.60	0.4500	1.0000	1	16,582.8	618,107	259.96	160.32
	2	0.270	808.00	16.40	0.0400	1.0000	1	13.6	31,068	13.07	7.61
	Σ							**19,101.5**	**635,860**	**267.42**	**99.39**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	2.25	96.00	4,258.00	4.500	0.262
#1	**3**	**Muskingum K:**					**0.262**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	240.800	0.790	0.000	0.000	74.700	M	31.98	6.723
	2	70.500	0.770	0.000	0.000	80.900	M	17.61	3.109
	3	95.200	0.770	0.262	0.363	74.700	M	12.84	2.660
EP-15P2	Σ	**406.500**						**58.68**	**12.492**
#2	1	289.500	0.790	0.000	0.000	76.200	M	45.30	9.091
	2	19.600	0.770	0.000	0.000	74.700	M	2.64	0.548
EP-15P1	Σ	**715.600**						**47.94**	**17.422**

10-year, 24-hour storm

Fully Reclaimed

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	936.00	15.60	0.0200	1.0000	1	136.2	25,321	10.65	6.22
	2	0.320	936.00	15.60	0.0420	1.0000	1	132.9	52,948	22.27	13.02
	3	0.270	808.00	16.40	0.0400	1.0000	1	79.8	37,259	15.67	9.18
	Σ							**334.1**	**33,121**	**13.93**	**8.19**
#2	1	0.320	936.00	15.60	0.0200	1.0000	1	196.0	26,970	11.34	6.62
	2	0.270	808.00	16.40	0.0400	1.0000	1	13.6	31,068	13.07	7.61
	Σ							**209.6**	**27,193**	**11.44**	**3.70**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	2.25	96.00	4,258.00	4.500	0.262
#1	**3**	**Muskingum K:**					**0.262**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	240.800	0.790	0.000	0.000	74.700	M	3.98	1.545
	2	70.500	0.770	0.000	0.000	80.900	M	4.45	1.006
	3	95.200	0.770	0.262	0.363	74.700	M	1.59	0.611
EP-15P2	Σ	**406.500**						**9.21**	**3.162**
#2	1	289.500	0.790	0.000	0.000	76.200	M	6.93	2.306
	2	19.600	0.770	0.000	0.000	74.700	M	0.33	0.126
EP-15P1	Σ	**715.600**						**7.25**	**2.432**

2-year, 24-hour storm

Fully Reclaimed

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	3	8. Large gullies, diversions, and low flowing streams	2.25	96.00	4,258.00	4.500	0.262
#1	**3**	**Muskingum K:**					**0.262**

SOIL STOCKPILE AREAS

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1 Baseline	1	47.900	0.730	0.000	0.000	70.000	M	3.58	0.889
Disturbed	2	47.900	0.390	0.000	0.000	89.700	M	31.78	3.691
Poor	3	47.900	0.470	0.000	0.000	84.100	M	20.21	2.612
Fair	4	47.900	0.610	0.000	0.000	76.400	M	8.96	1.529
Good	5	47.900	0.710	0.000	0.000	70.500	M	3.93	0.931
	Σ	**239.500**						**63.51**	**9.651**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	1,225.00	3.00	0.0460	1.0000	1	2.1	2,938	1.48	0.88
	2	0.320	1,225.00	3.00	0.4500	1.0000	1	170.7	60,850	30.71	16.86
	3	0.320	1,225.00	3.00	0.1000	1.0000	1	24.3	12,335	6.23	3.44
	4	0.320	1,225.00	3.00	0.0420	1.0000	1	4.8	4,114	2.08	1.16
	5	0.320	1,225.00	3.00	0.0200	1.0000	1	1.1	1,471	0.74	0.43
	Σ							**203.0**	**36,863**	**18.60**	**7.73**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	47.900	0.355	0.000	0.000	87.500	M	28.50	3.240
	Σ	**47.900**						**28.50**	**3.240**
#2	Σ	**47.900**						**17.39**	**3.240**
#3	Σ	**47.900**						**17.38**	**3.240**
#4	Σ	**47.900**						**17.32**	**3.240**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	150.00	33.00	0.4500	1.0000	1	1,462.2	490,365	206.23	119.24
	Σ				Stockpile			**1,462.2**	**490,365**	**206.23**	**119.24**
#2	Σ				Stockpile with silt fence			**90.8**	**106,311**	**44.71**	**8.52**
#3	Σ				Sediment trap outlet			**4.6**	**11,998**	**5.05**	**0.14**
#4	Σ				Sediment trap with silt fence			**1.6**	**2,915**	**1.23**	**0.16**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	47.900	0.390	0.000	0.000	89.700	M	31.78	3.691
	Σ	**47.900**						**31.78**	**3.691**
#2	Σ	**47.900**						**31.66**	**3.691**
#3	Σ	**47.900**						**31.67**	**3.691**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	1,225.00	3.00	0.4500	1.0000	1	170.7	60,850	25.59	14.05
	Σ				Final grading			**170.7**	**60,850**	**25.59**	**14.05**
#2	Σ				Upper sediment trap outlet			**8.9**	**8,289**	**3.49**	**0.11**
#3	Σ				Lower sediment trap outlet			**2.2**	**2,198**	**0.92**	**0.22**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1 Baseline	1	22.000	0.420	0.000	0.000	73.500	M	3.67	0.559
Disturbed	2	22.000	0.220	0.000	0.000	92.600	M	20.07	2.019
Poor	3	22.000	0.270	0.000	0.000	87.200	M	14.00	1.463
Fair	4	22.000	0.330	0.000	0.000	81.300	M	8.65	1.001
Good	5	22.000	0.390	0.000	0.000	76.600	M	5.31	0.714
	Σ	**110.000**						**49.71**	**5.756**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	1,257.00	3.34	0.0380	1.0000	1	1.6	4,005	2.02	1.07
	2	0.320	1,257.00	3.34	0.4500	1.0000	1	104.5	69,072	36.14	19.50
	3	0.320	1,257.00	3.34	0.1000	1.0000	1	15.9	14,767	7.45	4.00
	4	0.320	1,257.00	3.34	0.0420	1.0000	1	4.1	5,665	2.86	1.52
	5	0.320	1,257.00	3.34	0.0200	1.0000	1	1.2	2,408	1.22	0.64
	Σ							**127.3**	**35,613**	**18.52**	**8.37**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	22.000	0.240	0.000	0.000	87.500	M	14.77	1.497
	Σ	**22.000**						**14.77**	**1.497**
#2	Σ	**22.000**						**10.72**	**1.497**
#3	Σ	**22.000**						**10.71**	**1.497**
#4	Σ	**22.000**						**10.61**	**1.497**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	150.00	33.00	0.4500	1.0000	1	654.5	485,042	206.33	117.10
	Σ				Stockpile			**654.5**	**485,042**	**206.33**	**117.10**
#2	Σ				Stockpile with silt fence			**24.4**	**52,815**	**22.21**	**5.82**
#3	Σ				Sediment trap outlet			**2.8**	**9,902**	**4.16**	**1.69**
#4	Σ				Sediment trap with silt fence			**0.6**	**2,064**	**0.87**	**0.13**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	22.000	0.219	0.000	0.000	92.600	M	20.09	2.019
	Σ	**22.000**						**20.09**	**2.019**
#2	Σ	**22.000**						**19.98**	**2.019**
#3	Σ	**22.000**						**19.95**	**2.019**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	1,257.00	3.34	0.4500	1.0000	1	104.5	69,133	30.15	16.26
	Σ				Final grading			**104.5**	**69,133**	**30.15**	**16.26**
#2	Σ				Upper sediment trap outlet			**4.8**	**6,321**	**2.66**	**0.05**
#3	Σ				Lower sediment trap outlet			**1.8**	**2,363**	**0.99**	**0.29**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1 Baseline	1	11.200	0.260	0.000	0.000	70.000	M	1.48	0.209
Disturbed	2	11.200	0.140	0.000	0.000	89.700	M	9.26	0.879
Poor	3	11.200	0.170	0.000	0.000	84.100	M	6.60	0.622
Fair	4	11.200	0.220	0.000	0.000	76.400	M	3.34	0.360
Good	5	11.200	0.260	0.000	0.000	70.500	M	1.60	0.219
	Σ	**56.000**						**21.90**	**2.288**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	780.00	5.00	0.0380	1.0000	1	1.1	8,073	4.07	2.01
	2	0.320	780.00	5.00	0.4500	1.0000	1	85.7	127,489	67.09	36.34
	3	0.320	780.00	5.00	0.1000	1.0000	1	13.0	29,143	15.07	7.88
	4	0.320	780.00	5.00	0.0420	1.0000	1	2.8	11,305	5.71	2.84
	5	0.320	780.00	5.00	0.0200	1.0000	1	0.7	4,492	2.27	1.12
	Σ							**103.3**	**72,281**	**37.89**	**17.05**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	11.200	0.160	0.000	0.000	87.500	M	8.17	0.770
	Σ	**11.200**						**8.17**	**0.770**
#2	Σ	**11.200**						**7.19**	**0.770**
#3	Σ	**11.200**						**7.18**	**0.770**
#4	Σ	**11.200**						**7.01**	**0.770**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	150.00	33.00	0.4500	1.0000	1	321.9	470,636	205.08	115.19
	Σ				Stockpile			**321.9**	**470,636**	**205.08**	**115.19**
#2	Σ				Stockpile with silt fence			**23.2**	**53,491**	**22.50**	**11.51**
#3	Σ				Sediment trap outlet			**1.3**	**4,620**	**1.94**	**0.10**
#4	Σ				Sediment trap with silt fence			**0.3**	**1,208**	**0.51**	**0.11**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	11.200	0.140	0.000	0.000	89.700	M	9.26	0.879
	Σ	**11.200**						**9.26**	**0.879**
#2	Σ	**11.200**						**9.27**	**0.879**
#3	Σ	**11.200**						**9.28**	**0.879**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	780.00	5.00	0.4500	1.0000	1	85.7	127,489	55.91	30.28
	Σ				Final grading			**85.7**	**127,489**	**55.91**	**30.28**
#2	Σ				Upper sediment trap outlet			**5.2**	**16,355**	**6.88**	**2.48**
#3	Σ				Lower sediment trap outlet			**1.0**	**2,356**	**0.99**	**0.55**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	Baseline 1	11.200	0.260	0.000	0.000	70.000	M	1.48	0.209
	Disturbed 2	11.200	0.140	0.000	0.000	89.700	M	9.26	0.879
	Poor 3	11.200	0.170	0.000	0.000	84.100	M	6.60	0.622
	Fair 4	11.200	0.220	0.000	0.000	76.400	M	3.34	0.360
	Good 5	11.200	0.260	0.000	0.000	70.500	M	1.60	0.219
	Σ	**56.000**						**21.90**	**2.288**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.310	778.00	4.40	0.0380	1.0000	1	1.0	7,149	3.61	1.78
	2	0.320	778.00	4.40	0.4500	1.0000	1	75.9	113,525	59.74	32.31
	3	0.320	778.00	4.40	0.1000	1.0000	1	11.5	25,834	13.36	6.98
	4	0.320	778.00	4.40	0.0420	1.0000	1	2.4	10,013	5.05	2.52
	5	0.320	778.00	4.40	0.0200	1.0000	1	0.6	3,978	2.01	0.99
	Σ							**91.4**	**64,200**	**33.65**	**15.13**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	9.800	0.200	0.000	0.000	87.500	M	6.83	0.662
	Σ	**9.800**						**6.83**	**0.662**
#2	Σ	**9.800**						**6.03**	**0.662**
#3	Σ	**9.800**						**6.03**	**0.662**
#4	Σ	**9.800**						**5.93**	**0.662**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	150.00	33.00	0.4500	1.0000	1	270.3	461,084	198.36	111.47
	Σ				Stockpile			**270.3**	**461,084**	**198.36**	**111.47**
#2	Σ				Stockpile with silt fence			**14.5**	**40,408**	**16.99**	**8.57**
#3	Σ				Sediment trap outlet			**2.8**	**10,141**	**4.26**	**2.38**
#4	Σ				Sediment trap with silt fence			**0.8**	**3,312**	**1.39**	**0.39**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	11.200	0.140	0.000	0.000	89.700	M	9.26	0.879
	Σ	**11.200**						**9.26**	**0.879**
#2	Σ	**11.200**						**9.27**	**0.879**
#3	Σ	**11.200**						**9.27**	**0.879**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	778.00	4.40	0.4500	1.0000	1	75.9	113,525	49.79	26.92
	Σ				Final grading			**75.9**	**113,525**	**49.79**	**26.92**
#2	Σ				Upper sediment trap outlet			**2.5**	**8,178**	**3.44**	**0.05**
#3	Σ				Lower sediment trap outlet			**0.5**	**1,650**	**0.69**	**0.21**

RAIL LOOP

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1 Baseline	1	30.900	0.150	0.000	0.000	74.100	M	8.13	0.839
Disturbed	2	30.900	0.090	0.000	0.000	91.200	M	39.45	3.258
Poor	3	30.900	0.110	0.000	0.000	85.500	M	30.22	2.307
Fair	4	30.900	0.130	0.000	0.000	78.700	M	12.39	1.192
Good	5	30.900	0.150	0.000	0.000	73.300	M	7.46	0.785
	Σ	**154.500**						**92.16**	**8.381**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	624.00	12.00	0.0500	1.0000	1	24.7	44,628	22.52	10.80
	2	0.290	624.00	12.00	0.4500	1.0000	1	1,025.6	364,108	209.19	117.74
	3	0.290	624.00	12.00	0.1000	1.0000	1	161.9	96,019	55.17	28.80
	4	0.290	624.00	12.00	0.0420	1.0000	1	32.0	38,990	19.81	9.92
	5	0.290	624.00	12.00	0.0200	1.0000	1	9.1	17,824	9.00	4.27
	Σ							**1,253.3**	**235,574**	**134.50**	**58.43**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	30.900	0.110	0.000	0.000	85.500	M	30.22	2.307
	Σ	**30.900**						**30.22**	**2.307**
#2	Σ	**30.900**						**30.02**	**2.307**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	624.00	12.00	0.1000	1.0000	1	161.9	96,019	45.97	24.00
	Σ					Final grading		**161.9**	**96,019**	**45.97**	**24.00**
#2	Σ					Sediment trap outlet		**21.6**	**16,618**	**6.99**	**4.73**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1 Baseline	1	9.000	0.080	0.000	0.000	74.100	M	4.20	0.300
Disturbed	2	9.000	0.050	0.000	0.000	91.200	M	11.49	0.949
Poor	3	9.000	0.060	0.000	0.000	85.500	M	8.80	0.672
Fair	4	9.000	0.070	0.000	0.000	78.700	M	5.91	0.427
Good	5	9.000	0.080	0.000	0.000	73.300	M	3.92	0.281
	Σ	**45.000**						**34.32**	**2.628**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	354.00	11.30	0.0500	1.0000	1	5.6	31,222	17.94	7.83
	2	0.290	354.00	11.30	0.4500	1.0000	1	168.9	219,815	126.29	70.04
	3	0.290	354.00	11.30	0.1000	1.0000	1	26.7	55,218	31.72	16.49
	4	0.290	354.00	11.30	0.0420	1.0000	1	6.9	25,103	14.42	6.83
	5	0.290	354.00	11.30	0.0200	1.0000	1	2.1	12,659	7.27	3.12
	Σ							**210.2**	**125,922**	**72.35**	**32.60**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	9.000	0.060	0.000	0.000	85.500	M	8.80	0.672
	Σ	**9.000**						**8.80**	**0.672**
#2	Σ	**9.000**						**8.80**	**0.672**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	354.00	11.30	0.1000	1.0000	1	26.7	55,218	26.44	13.74
	Σ					Final grading		**26.7**	**55,218**	**26.44**	**13.74**
#2	Σ					Sediment trap outlet		**5.4**	**13,541**	**5.69**	**4.20**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	26.700	0.010	0.000	0.000	74.100	M	12.46	0.891
	Σ	**26.700**						**12.46**	**0.891**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	266.00	9.77	0.0500	1.0000	1	11.4	21,472	12.34	5.38
	Σ							**11.4**	**21,472**	**12.34**	**5.38**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	12.800	0.010	0.000	0.000	74.100	M	5.97	0.427
	2	13.900	0.070	0.000	0.000	91.200	M	17.74	1.465
	Σ	**26.700**						**23.72**	**1.892**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	266.00	9.80	0.0500	1.0000	1	5.0	19,761	11.35	4.95
	2	0.290	266.00	9.80	0.4500	1.0000	1	166.0	144,484	83.01	45.70
	Σ							**171.0**	**122,476**	**70.37**	**36.72**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	12.800	0.010	0.000	0.000	74.100	M	5.97	0.427
	2	13.900	0.080	0.000	0.000	85.500	M	13.60	1.038
	Σ	**26.700**						**19.57**	**1.465**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	266.00	9.80	0.0500	1.0000	1	5.0	19,761	11.35	4.95
	2	0.290	266.00	9.80	0.1000	1.0000	1	26.2	35,418	20.35	10.55
	Σ							**31.2**	**30,660**	**17.61**	**8.92**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	12.800	0.010	0.000	0.000	74.100	M	5.97	0.427
	2	13.900	0.090	0.000	0.000	78.700	M	9.12	0.659
	Σ	**26.700**						**15.09**	**1.086**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	266.00	9.80	0.0500	1.0000	1	5.0	19,761	11.35	4.95
	2	0.290	266.00	9.80	0.0420	1.0000	1	6.8	16,031	9.21	4.36
	Σ							**11.8**	**17,508**	**10.06**	**4.59**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	12.800	0.010	0.000	0.000	74.100	M	5.97	0.427
	2	13.900	0.100	0.000	0.000	73.300	M	6.06	0.434
	Σ	**26.700**						**12.03**	**0.861**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	266.00	9.80	0.0500	1.0000	1	5.0	19,761	11.35	4.95
	2	0.290	266.00	9.80	0.0200	1.0000	1	2.0	8,070	4.64	1.99
	Σ							**7.1**	**13,887**	**7.98**	**3.46**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	12.800	0.010	0.000	0.000	74.100	M	5.97	0.427
	2	13.900	0.070	0.000	0.000	91.200	M	17.74	1.465
	Σ	**26.700**						**23.72**	**1.892**
#2	Σ	**26.700**						**23.54**	**1.892**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	266.00	9.80	0.0500	1.0000	1	5.0	19,761	9.46	4.12
	2	0.290	266.00	9.80	0.4500	1.0000	1	166.0	144,484	69.18	38.08
	Σ					Final grading		**171.0**	**122,476**	**58.64**	**30.60**
#2	Σ					Sediment trap outlet		**9.5**	**13,401**	**5.64**	**0.27**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1 Baseline	1	2.200	0.070	0.000	0.000	74.100	M	1.03	0.073
Disturbed	2	2.200	0.040	0.000	0.000	91.200	M	2.81	0.232
Poor	3	2.200	0.050	0.000	0.000	85.500	M	2.15	0.164
Fair	4	2.200	0.060	0.000	0.000	78.700	M	1.44	0.104
Good	5	2.200	0.070	0.000	0.000	73.300	M	0.96	0.069
	Σ	**11.000**						**8.39**	**0.642**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	281.00	11.70	0.0500	1.0000	1	1.1	24,144	13.87	6.05
	2	0.290	281.00	11.70	0.1000	1.0000	1	7.1	40,636	23.35	12.75
	3	0.290	281.00	11.70	0.1000	1.0000	1	5.0	42,799	24.59	12.77
	4	0.290	281.00	11.70	0.0420	1.0000	1	1.3	19,404	11.15	5.28
	5	0.290	281.00	11.70	0.0200	1.0000	1	0.4	9,774	5.62	2.41
	Σ							**14.9**	**32,050**	**18.41**	**9.68**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	2.200	0.040	0.000	0.000	91.200	M	2.81	0.232
	Σ	**2.200**						**2.81**	**0.232**
#2	Σ	**2.200**						**2.82**	**0.232**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	281.00	11.70	0.1000	1.0000	1	7.1	40,636	19.46	10.62
	Σ					Final grading		**7.1**	**40,636**	**19.46**	**10.62**
#2	Σ					Sediment trap outlet		**0.8**	**7,904**	**3.32**	**1.53**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	117.600	0.320	0.000	0.000	74.100	M	23.98	3.139
	Σ	**117.600**						**23.98**	**3.139**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	906.00	6.62	0.0500	1.0000	1	42.7	19,470	9.83	5.02
	Σ							**42.7**	**19,470**	**9.83**	**5.02**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	84.700	0.320	0.000	0.000	74.100	M	17.27	2.261
	2	32.900	0.220	0.000	0.000	91.200	M	27.91	2.783
	Σ	**117.600**						**43.79**	**5.044**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	906.00	6.62	0.0500	1.0000	1	29.5	18,724	9.45	4.82
	2	0.290	906.00	6.62	0.4500	1.0000	1	390.0	178,689	93.04	50.83
	Σ							**419.5**	**136,213**	**70.77**	**30.61**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	84.700	0.320	0.000	0.000	74.100	M	17.27	2.261
	2	32.900	0.250	0.000	0.000	85.500	M	19.20	1.975
	Σ	**117.600**						**35.54**	**4.236**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	906.00	6.62	0.0500	1.0000	1	29.5	18,724	9.45	4.82
	2	0.290	906.00	6.62	0.1000	1.0000	1	57.9	39,891	20.13	10.76
	Σ							**87.5**	**30,086**	**15.18**	**7.60**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	84.700	0.320	0.000	0.000	74.100	M	17.27	2.261
	2	32.900	0.290	0.000	0.000	78.700	M	10.88	1.247
	Σ	**117.600**						**27.65**	**3.508**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	906.00	6.62	0.0500	1.0000	1	29.5	18,724	9.45	4.82
	2	0.290	906.00	6.62	0.0420	1.0000	1	13.7	15,465	7.81	4.07
	Σ							**43.3**	**17,312**	**8.74**	**4.55**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	84.700	0.320	0.000	0.000	74.100	M	17.27	2.261
	2	32.900	0.320	0.000	0.000	73.300	M	6.13	0.822
	Σ	**117.600**						**23.40**	**3.083**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	906.00	6.62	0.0500	1.0000	1	29.5	18,724	9.45	4.82
	2	0.290	906.00	6.62	0.0200	1.0000	1	3.8	6,596	3.33	1.69
	Σ							**33.3**	**15,559**	**7.85**	**3.99**

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	84.700	0.320	0.000	0.000	74.100	M	17.27	2.261
	2	32.900	0.220	0.000	0.000	91.200	M	27.91	2.783
	Σ	**117.600**						**43.79**	**5.044**
#2	Σ	**117.600**						**43.79**	**5.044**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.290	906.00	6.62	0.0500	1.0000	1	29.5	18,724	7.87	4.02
	2	0.290	906.00	6.62	0.4500	1.0000	1	390.0	178,689	77.54	42.36
	Σ					Final grading		**419.5**	**136,213**	**58.98**	**25.51**
#2	Σ					Sediment trap outlet		**25.3**	**15,691**	**6.60**	**3.58**

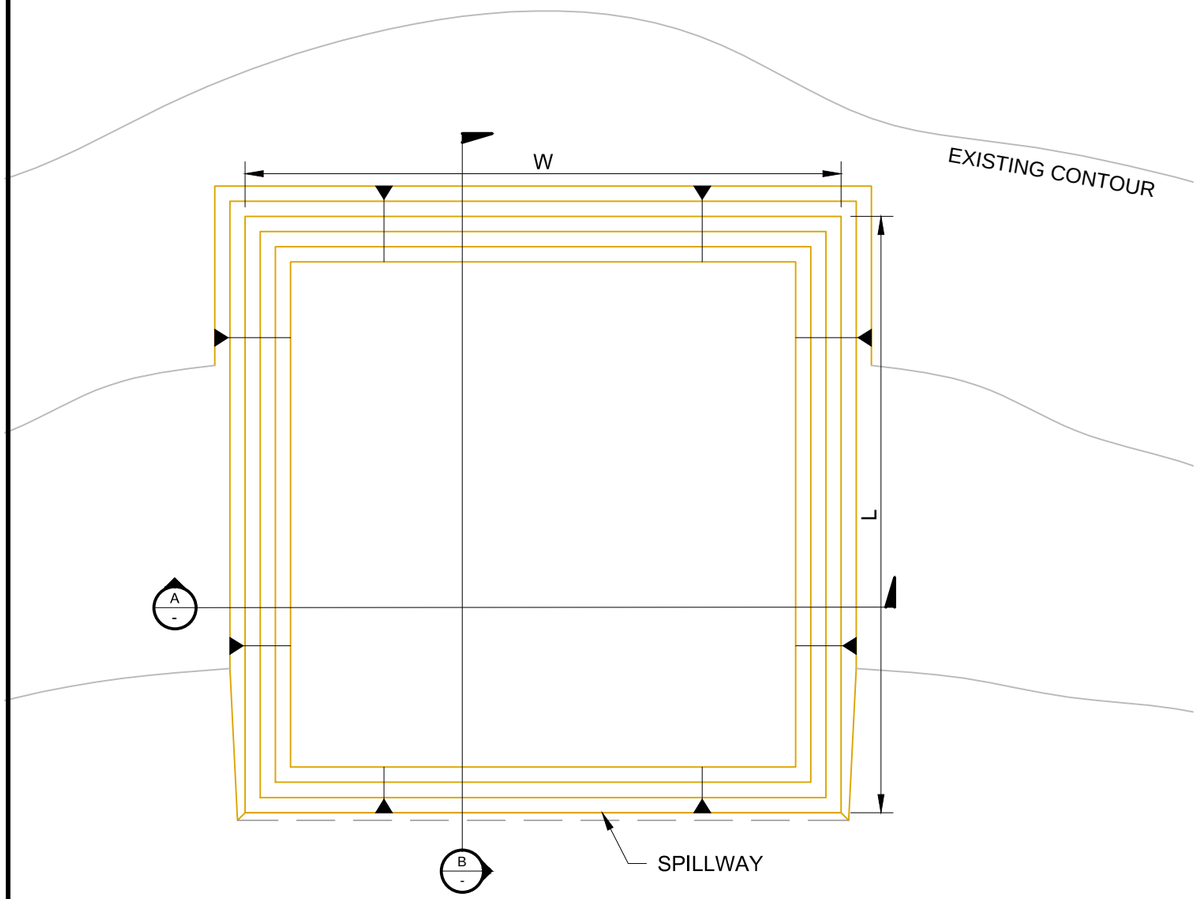
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	47.700	0.230	0.000	0.000	74.100	M	11.17	1.281
	Σ	**47.700**						**11.17**	**1.281**

CV-6 flow calculation

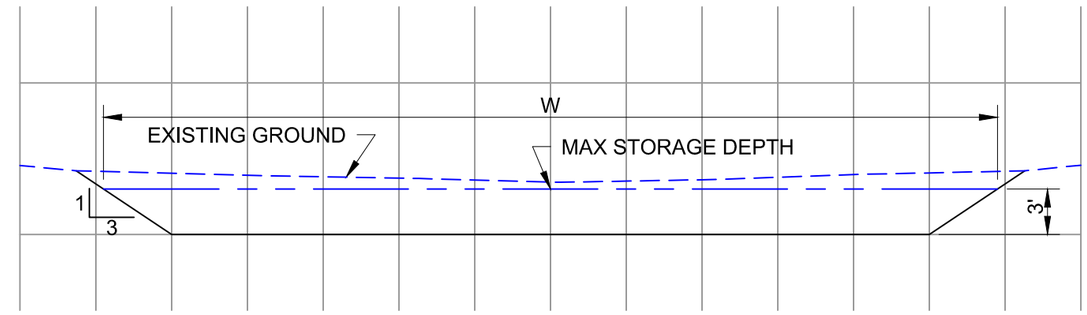
ATTACHMENT B

SEDIMENT TRAP AND POND CONFIGURATIONS



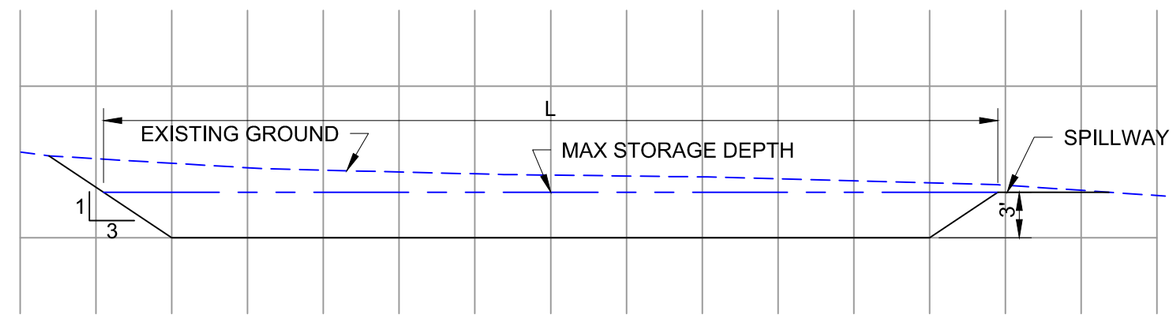
TYPICAL POST-MINING SEDIMENT TRAP

NTS



A - SECTION

TYPICAL POST-MINING SEDIMENT TRAP
NTS



B - SECTION

TYPICAL POST-MINING SEDIMENT TRAP
NTS

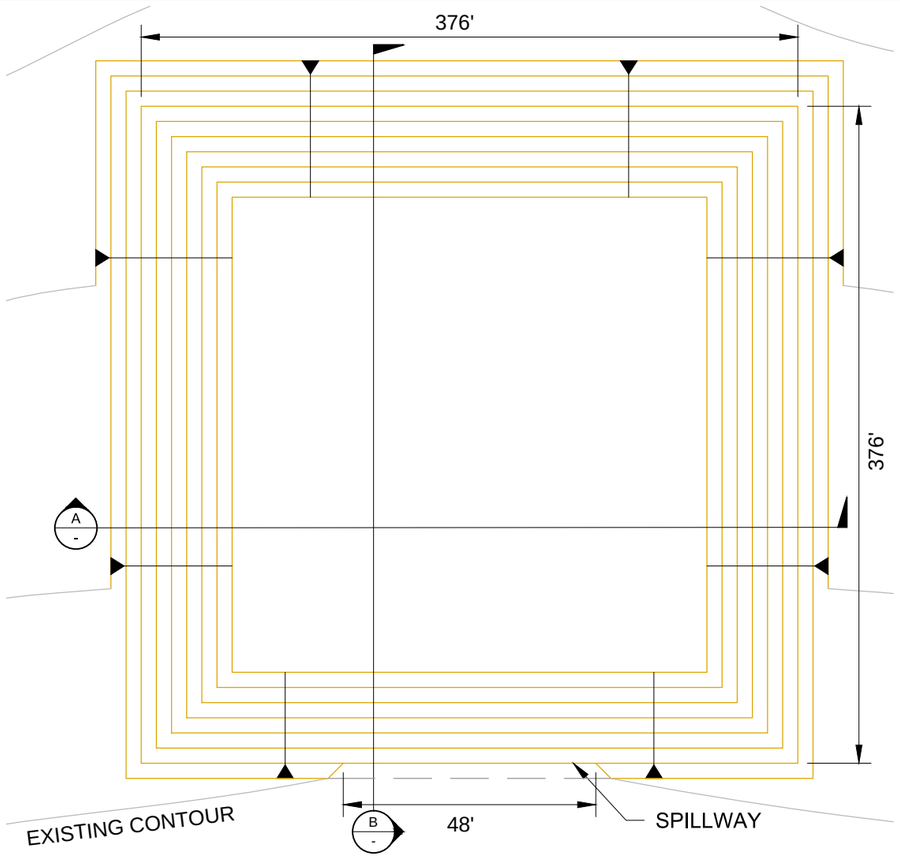
NOTES:

1. CONSTRUCT SEDIMENT TRAPS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. MAXIMUM STORAGE DEPTH IS 3'. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. OPERATIONAL SOIL STOCKPILES MANAGED TO WESTERN ALKALINE STANDARDS (SS-4, SS-5, & SS-6) USE TYPICAL SEDIMENT TRAPS WITH SILT FENCE INSTALLED BELOW SPILLWAY OUTFALL.
4. SEDIMENT TRAP SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME AND SURFACE AREA REQUIREMENTS ARE MET. LENGTH MUST BE GREATER THAN OR EQUAL TO WIDTH.

TO CALCULATE TRAP DIMENSIONS FROM SURFACE AREA FOR A SQUARE TRAP, USE THE RELATIONSHIP:
L = W = SQRT(43560*A)
WHERE
A = REQUIRED SURFACE AREA (ACRES)
L = W = TOP DIMENSION (FEET) OF SEDIMENT TRAP STORAGE AREA

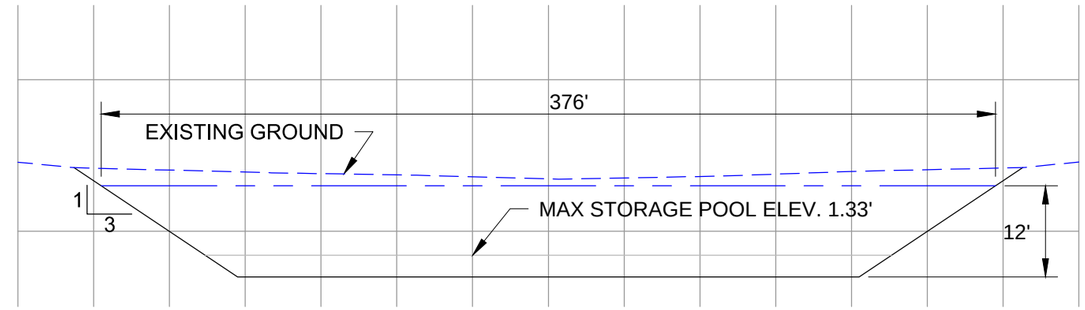
STORAGE VOLUME CALCULATED USING PRISMOIDAL FORMULA:
V=(L*W+4(L-9)(W-9)+(L-18)(W-18))/2

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	TYPICAL POST-MINING SEDIMENT TRAPS	FIGURE B-1



TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

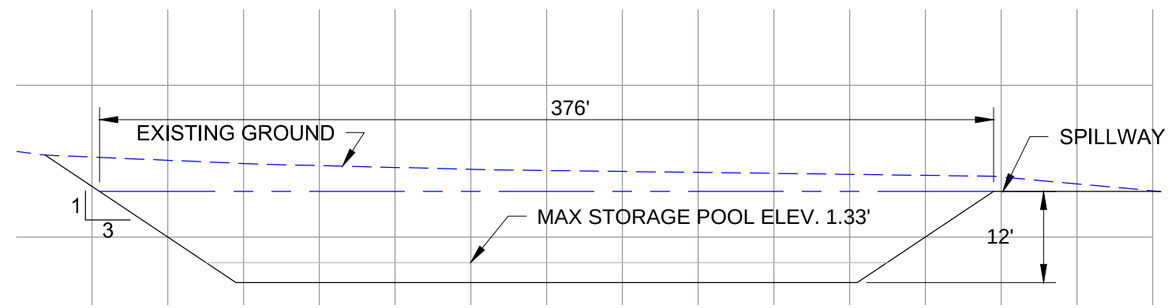
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
1	245.5	74.1	91.2	0.30	0.051	7.7	990
1A	328.7	74.1	91.2	0.30	0.050	12.3	760

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	4.4
4.00	9.2
6.00	14.4
8.00	19.9
10.00	25.8
12.00	32.2

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-1	574.2	206.0	368.2	147.3	27.14	1.61	31.98

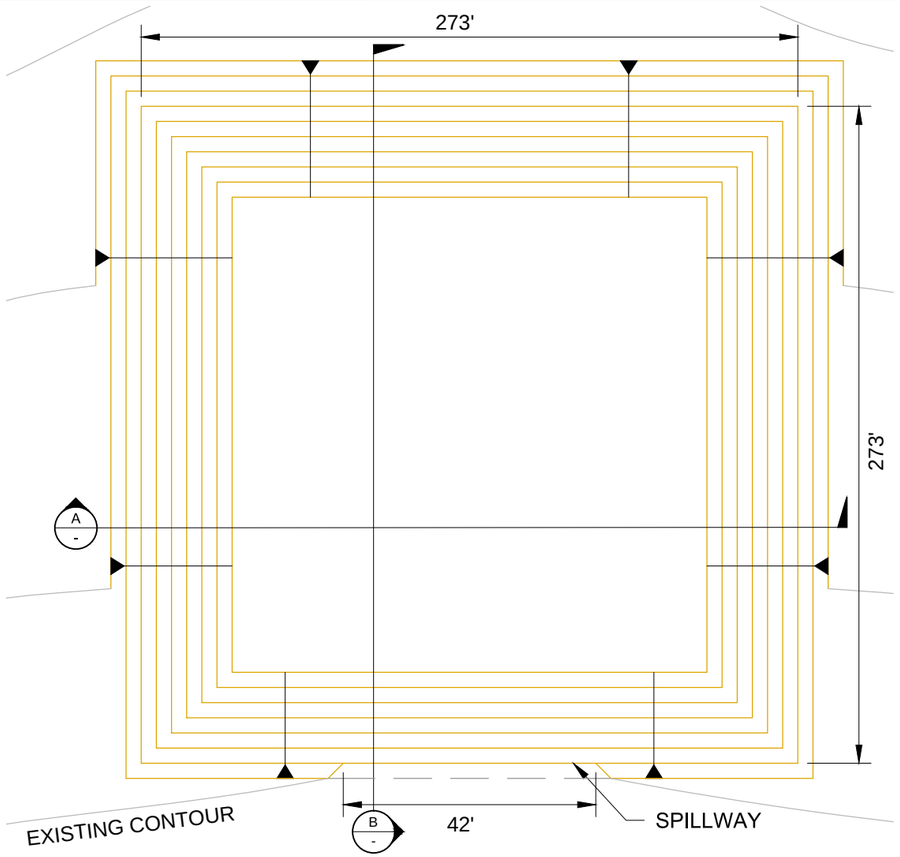
OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-1 CONFIGURATION

FIGURE **B-2**

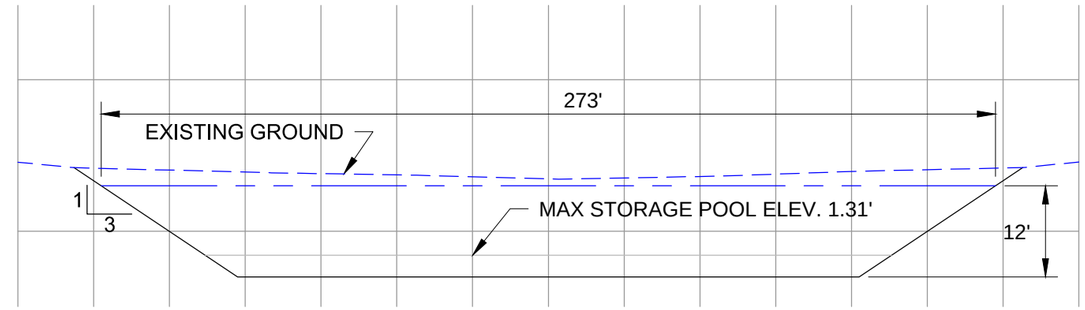
UPDATE TIME: 4:20 PM
GLORENSON\HEL\20140812\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

Hydrometrics, Inc.
Consulting Scientists and Engineers

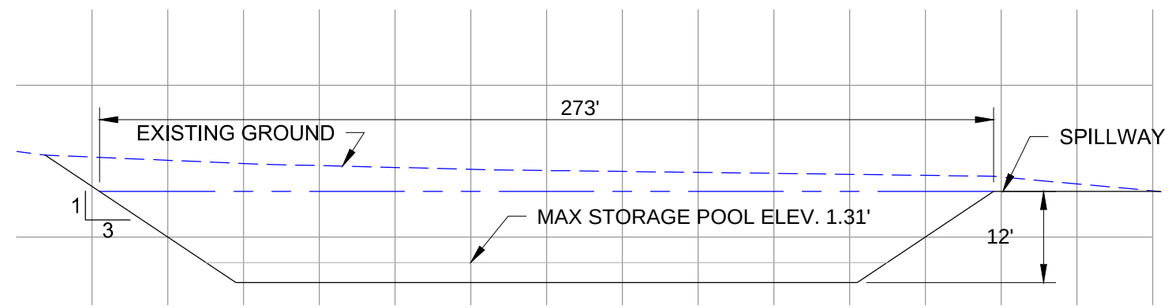


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION
TYPICAL SECTION
NTS



B - SECTION
TYPICAL SECTION
NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
1B	199.8	74.1	91.2	0.30	0.051	5.2	721

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	2.0
4.00	4.2
6.00	6.6
8.00	9.3
10.00	12.3
12.00	15.6

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-1B	199.8	141.5	58.3	131.6	13.48	0.70	15.59

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-1B CONFIGURATION

FIGURE
B-3

UPDATE TIME: 4:20 PM
GLORENSON\HEL\20140812\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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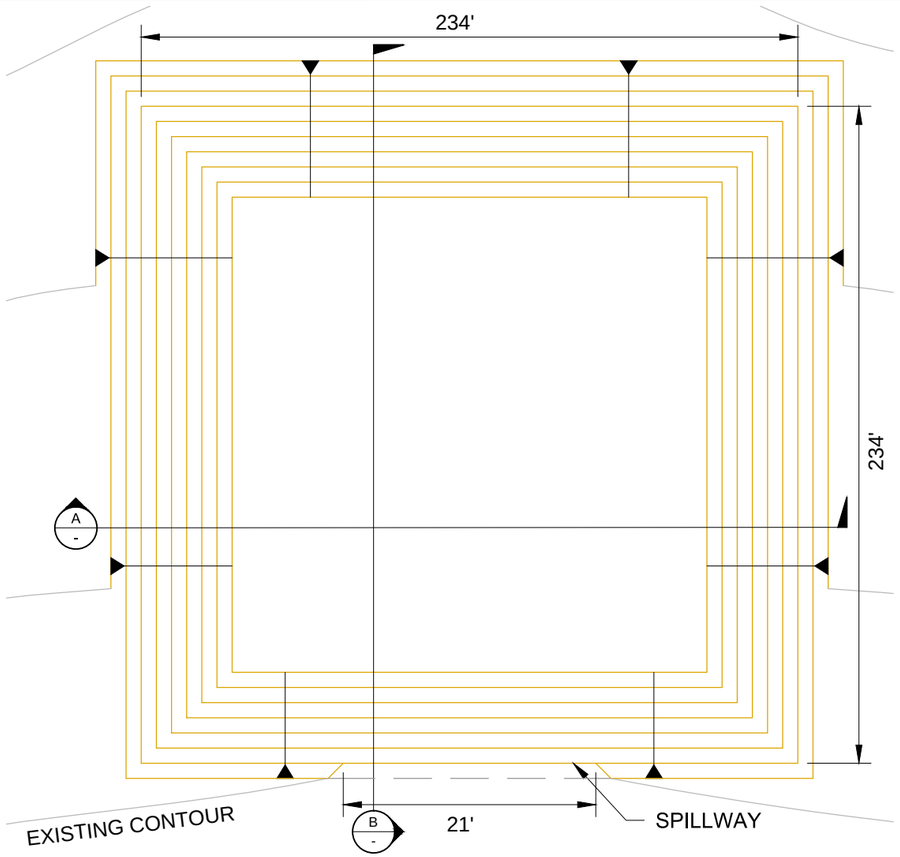
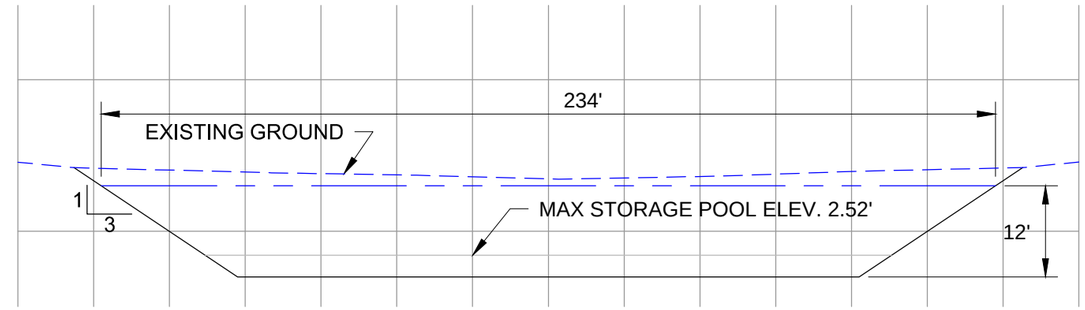
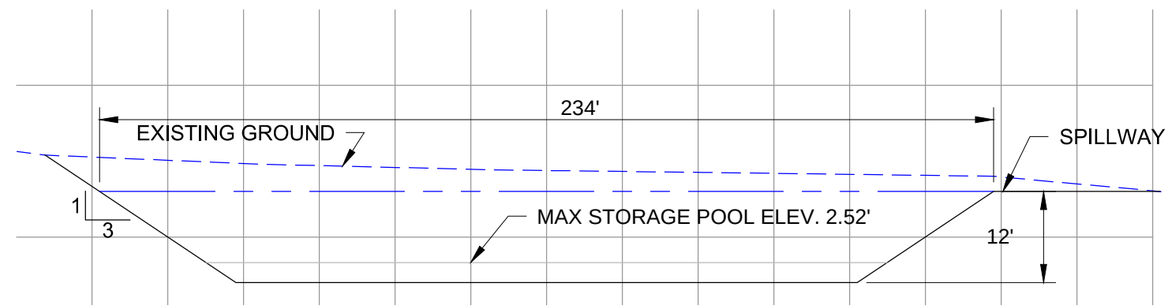


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION
TYPICAL SECTION
NTS



B - SECTION
TYPICAL SECTION
NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.3
4.00	2.8
6.00	4.5
8.00	6.4
10.00	8.5
12.00	10.9

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
2	70.3	72.1	91.6	0.34	0.046	17.0	372
2A	121.4	72.1	91.6	0.34	0.046	14.5	786

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-2	191.7	47.6	144.1	65.0	8.12	0.92	10.89

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-2 CONFIGURATION	FIGURE B-4

UPDATE TIME: 4:21 PM
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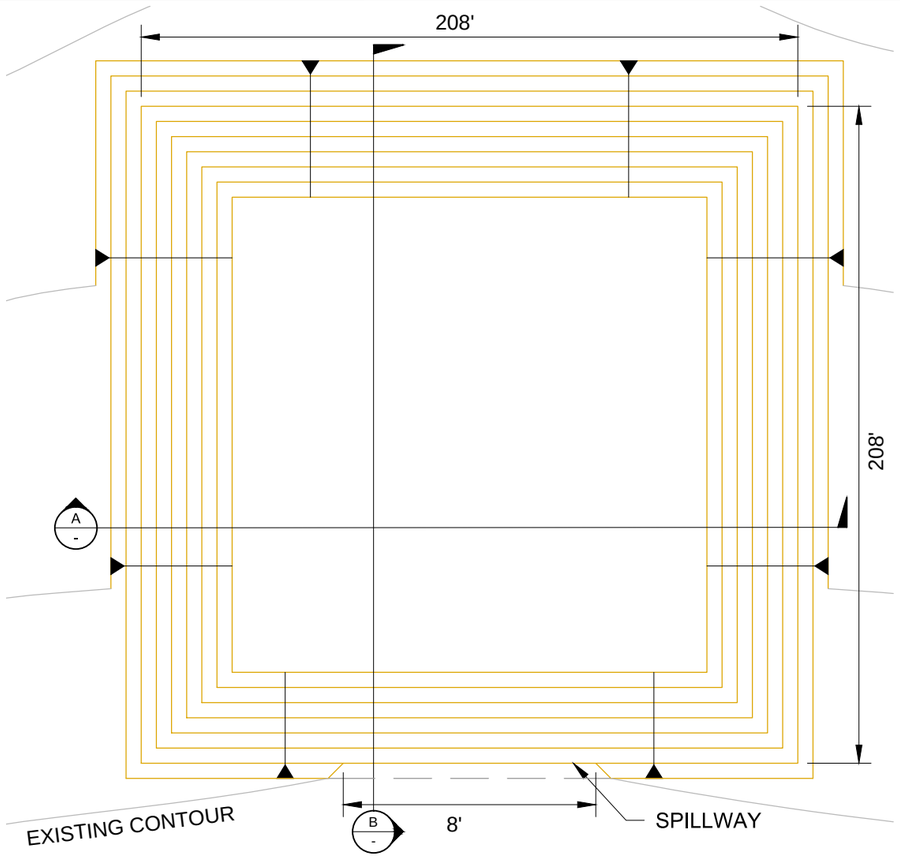
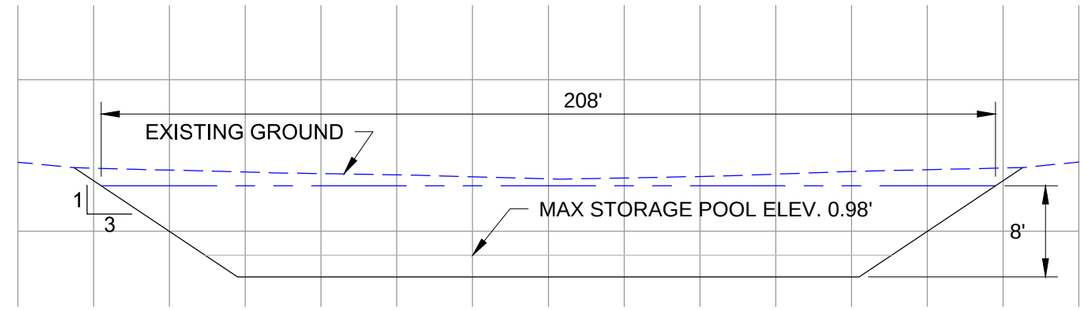


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION

TYPICAL SECTION

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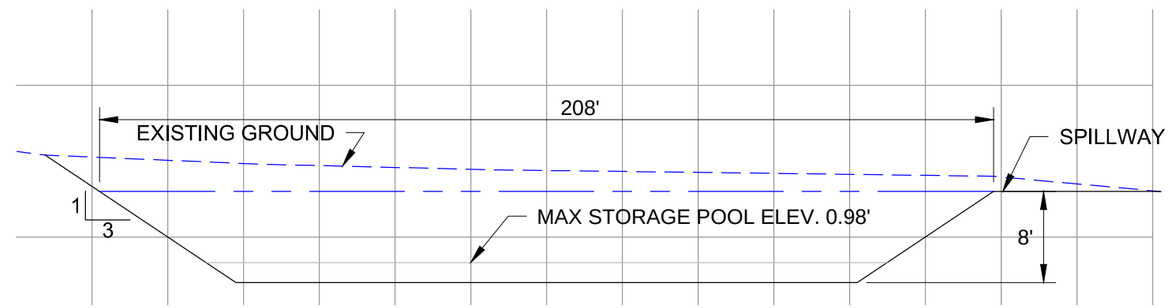

B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
3	46.5	63.3	88.5	0.35	0.039	9.6	759
3A	247.3	63.3	88.5	0.35	0.039	11.4	959
4A	17.0	62.4	88.2	0.36	0.040	10.5	723

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.3
4.00	2.7
6.00	4.4
8.00	6.3

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-3	310.8	33.7	260.0	24.9	5.25	0.33	6.25

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-3 CONFIGURATION

FIGURE **B-5**

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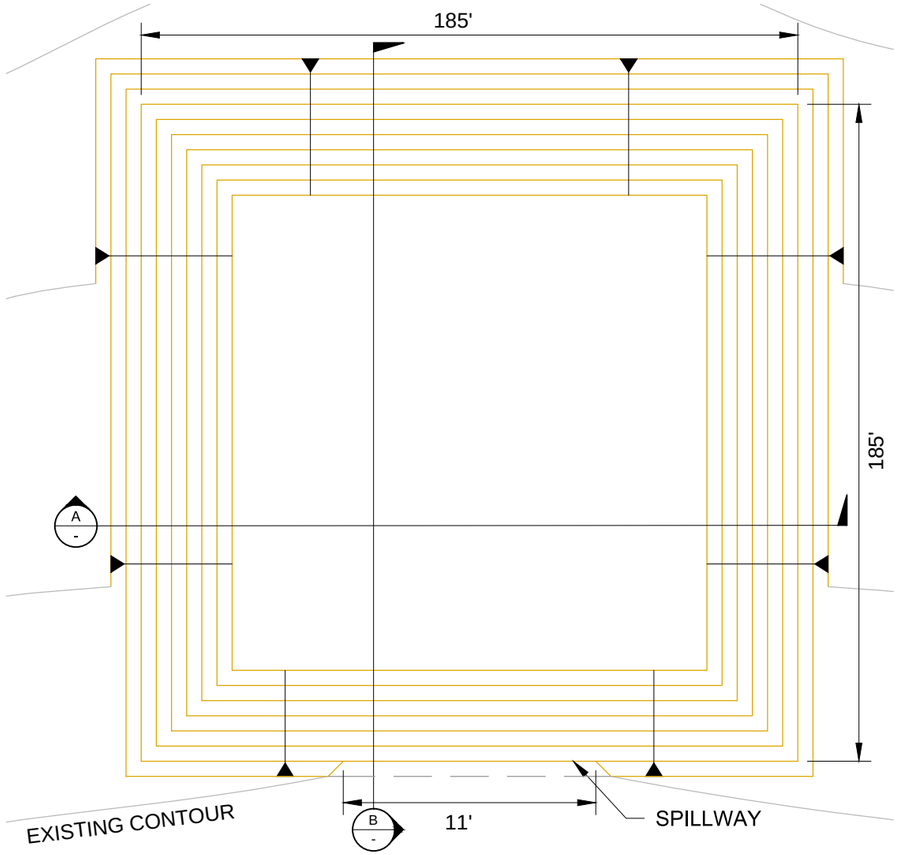
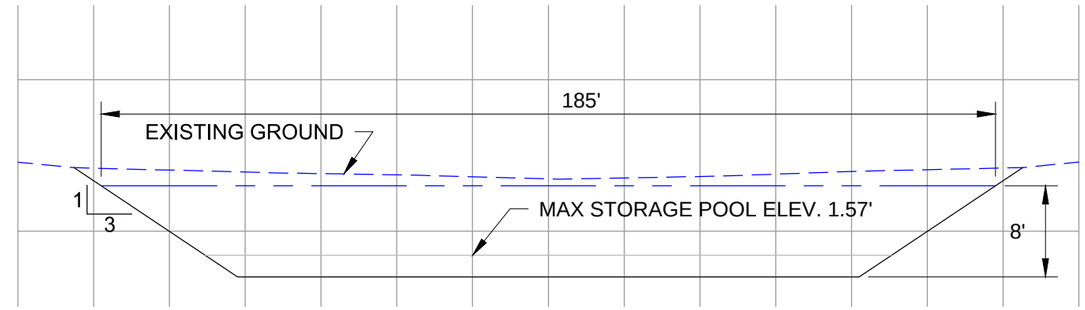


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION

TYPICAL SECTION

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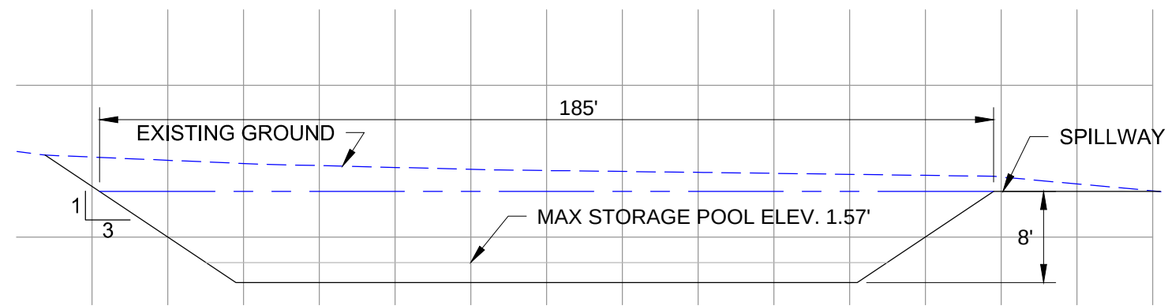

B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
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5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
4	62.0	62.4	88.2	0.36	0.040	10.0	841

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	0.9
4.00	2.0
6.00	3.3
8.00	4.8

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-4	62.0	55.5	23.5	35.5	3.54	0.40	4.75

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-4 CONFIGURATION

FIGURE **B-6**

UPDATE TIME: 6:18 PM
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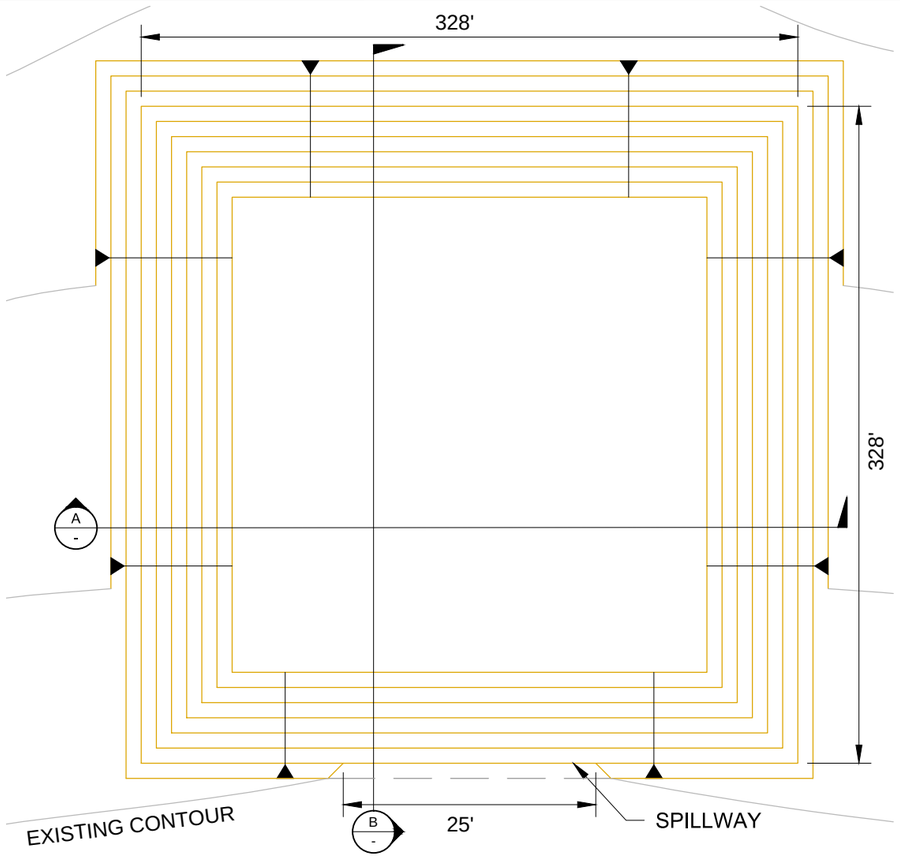
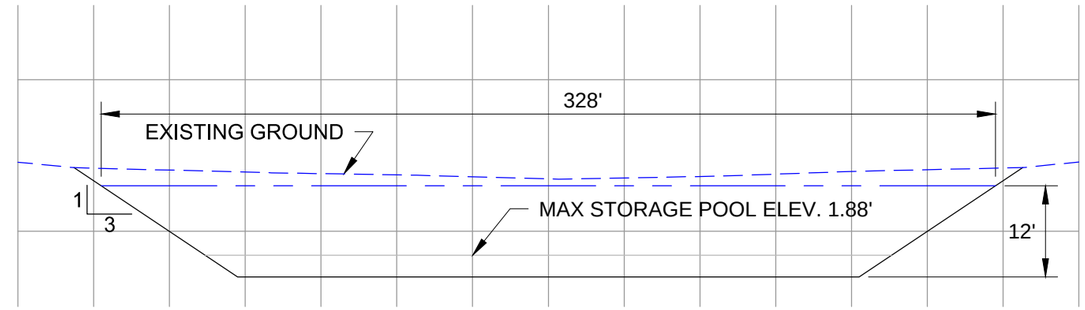


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION

TYPICAL SECTION

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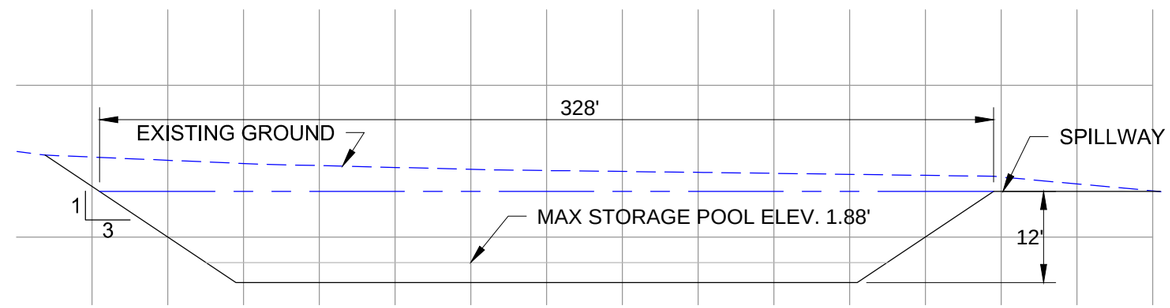

B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
5	816.9	67.5	89.6	0.31	0.039	12.0	998

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	3.2
4.00	6.6
6.00	10.4
8.00	14.4
10.00	18.8
12.00	23.6

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-5	657.8	109.4	548.4	77.8	18.57	1.64	23.49

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-5 CONFIGURATION

FIGURE **B-7**

UPDATE TIME: 6:19 PM
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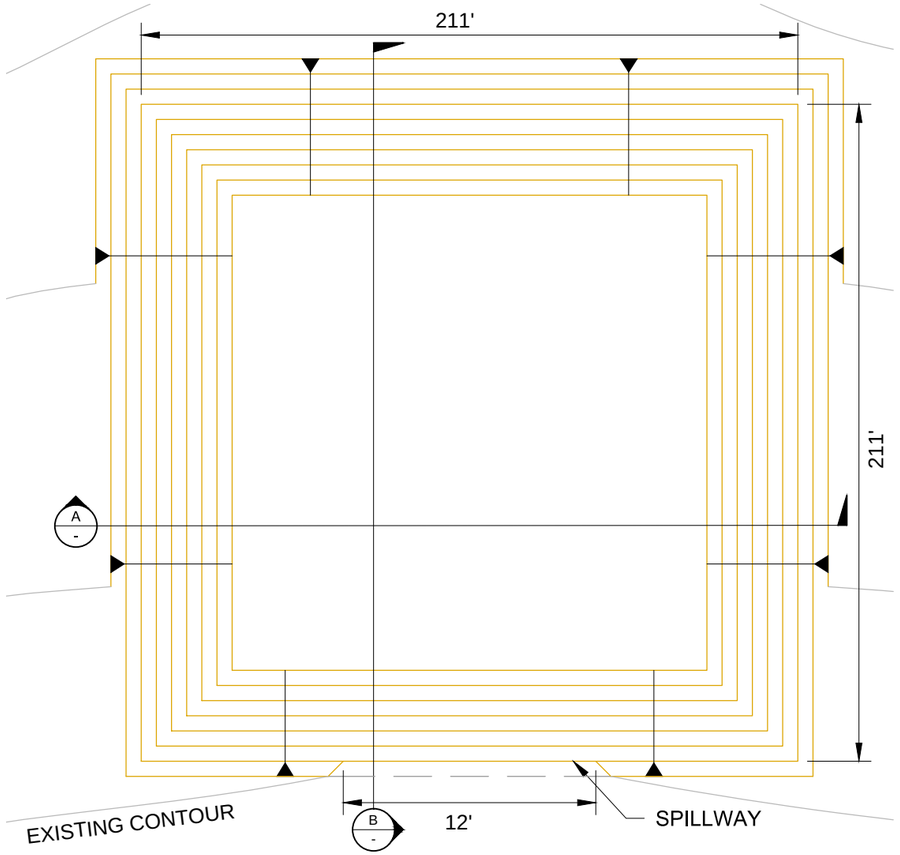
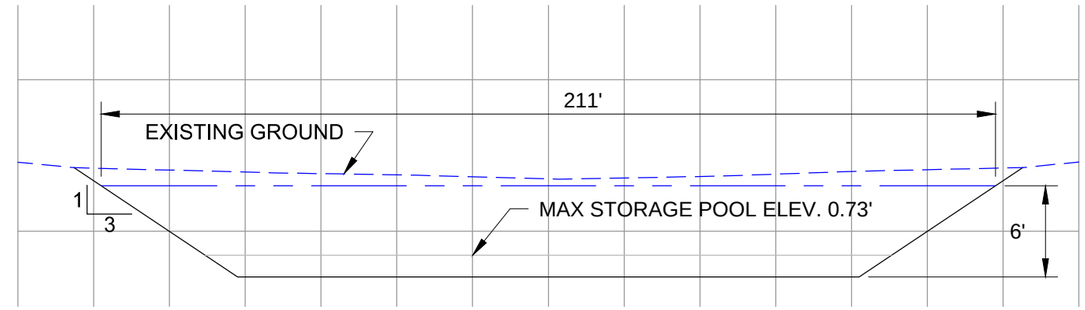


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION
TYPICAL SECTION
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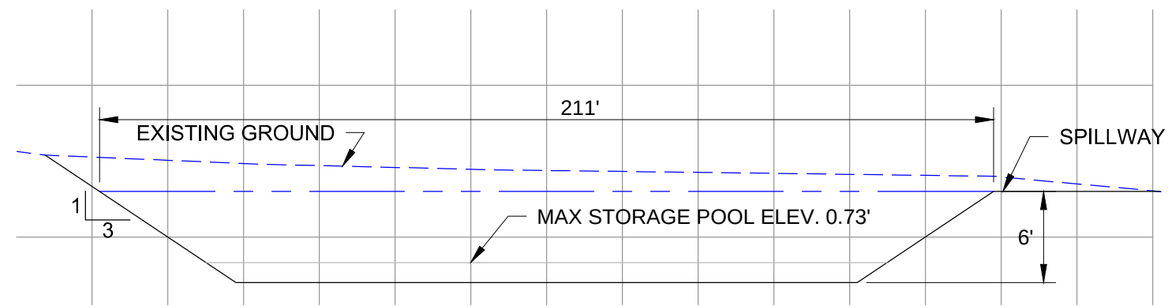

B - SECTION
TYPICAL SECTION
NTS

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
6	108.7	67.6	89.7	0.41	0.039	8.0	986

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
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POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.5
4.00	3.2
6.00	5.1

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-6	108.7	41.2	67.5	37.3	4.22	0.29	5.10

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-6 CONFIGURATION

FIGURE
B-8

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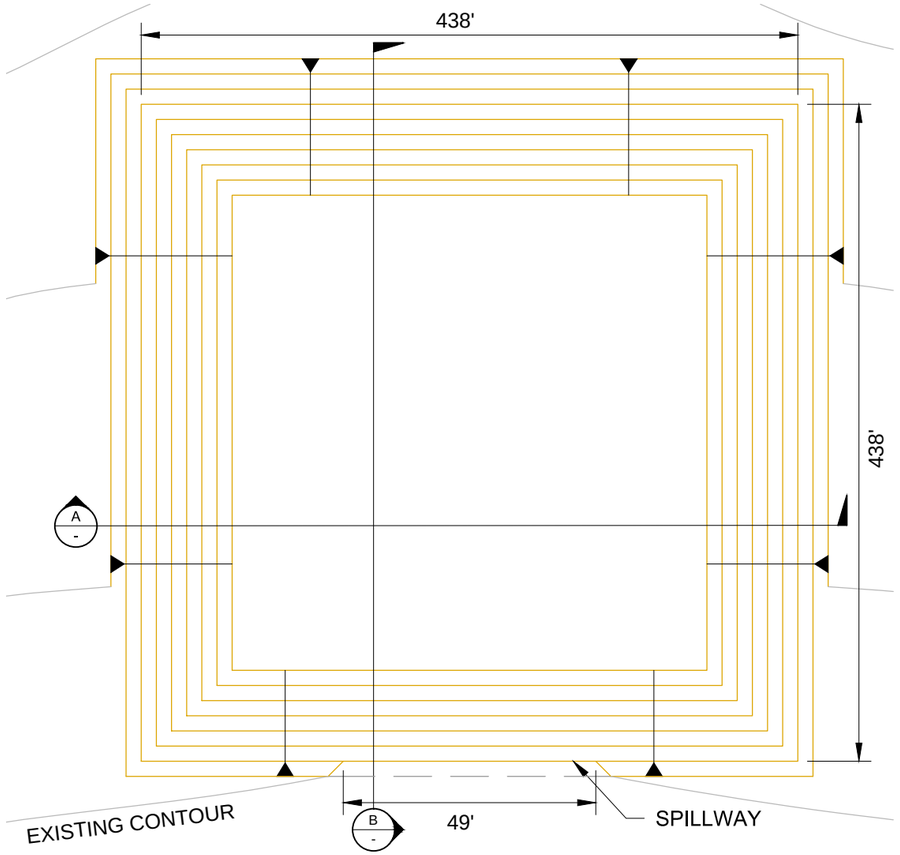
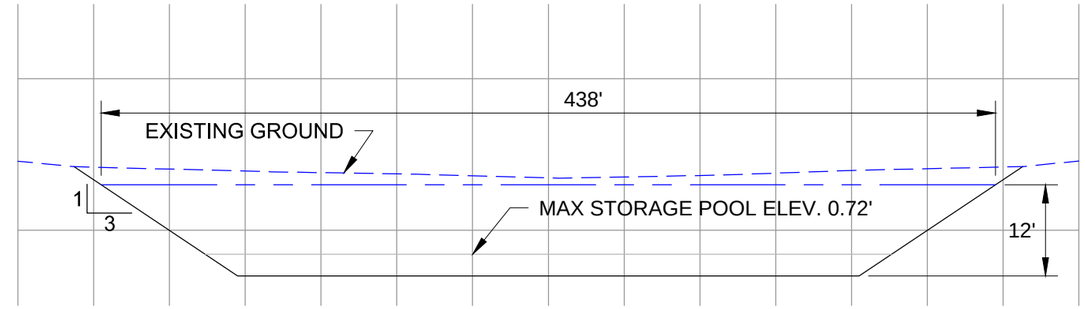


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

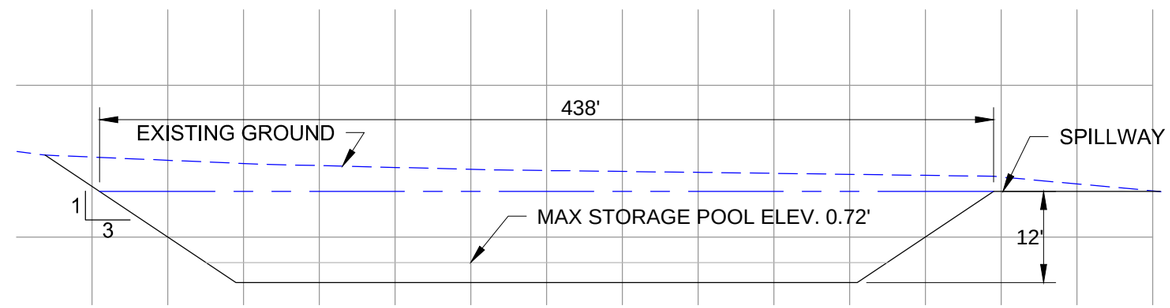
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
7	1060.7	70.0	89.7	0.29	0.046	13.5	881
7U	1032.4	70.0	89.7	0.29	0.046	23.8	854

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	6.4
4.00	13.1
6.00	20.3
8.00	28.0
10.00	36.1
12.00	44.6

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-7	2093.1	35.2	2057.9	152.3	40.93	1.24	44.64

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-7 CONFIGURATION

FIGURE **B-9**

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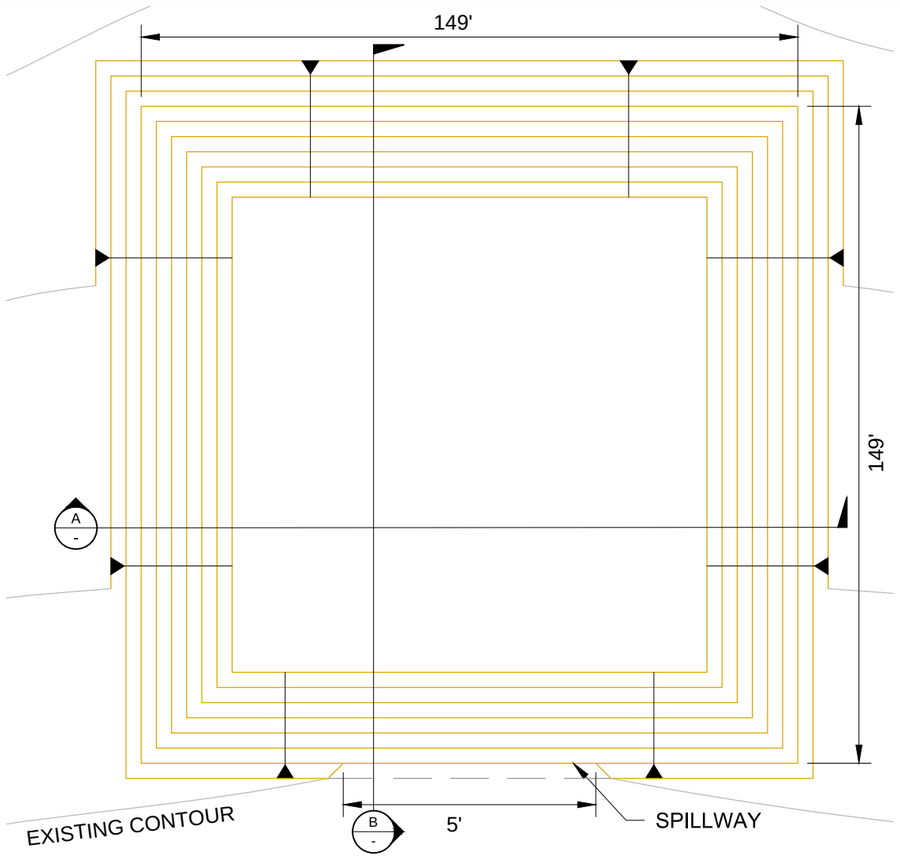
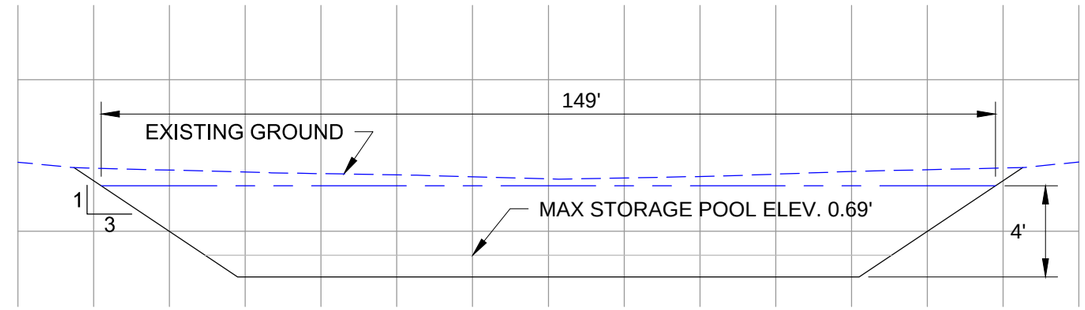


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

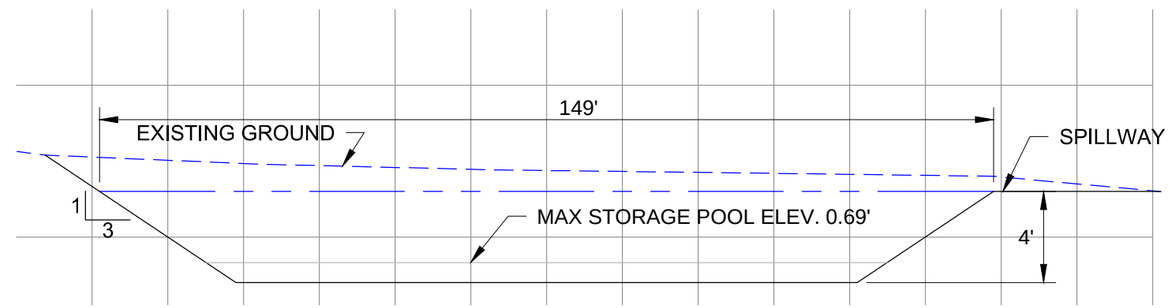
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
8	30.6	62.8	88.1	0.26	0.038	18.0	233

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	0.8
4.00	1.7

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-8	30.6	12.5	18.1	15.5	1.28	0.14	1.70

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-8 CONFIGURATION

FIGURE **B-10**

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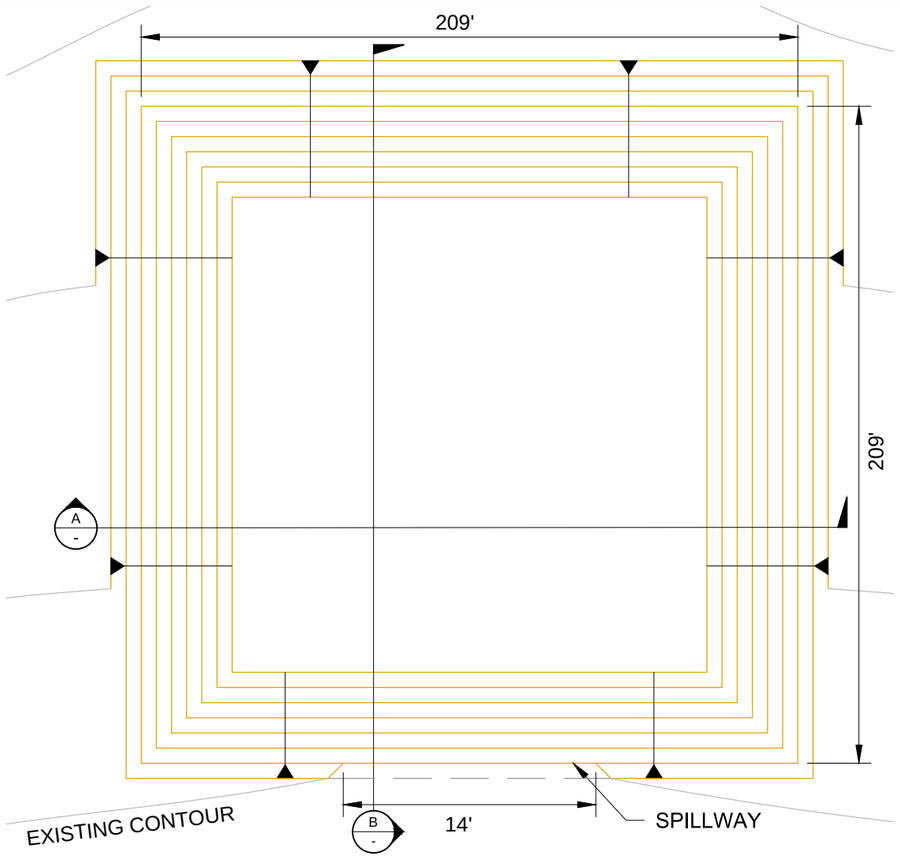
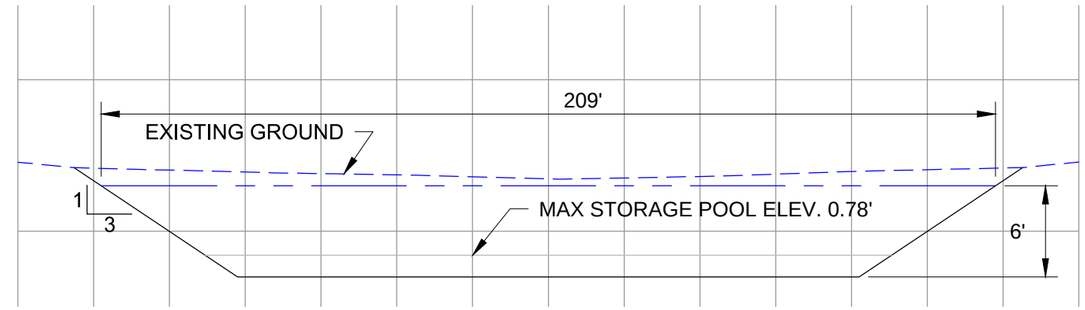
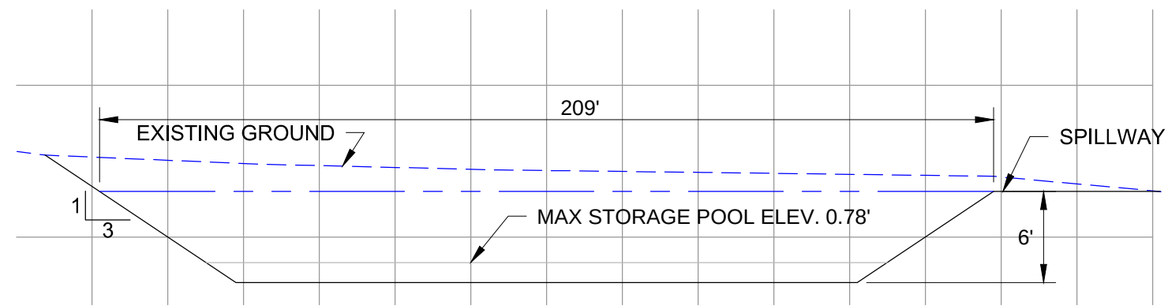


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION
TYPICAL SECTION
NTS



B - SECTION
TYPICAL SECTION
NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
9	40.2	73.5	92.6	0.31	0.038	11.7	300
9A	23.2	73.5	92.6	0.31	0.038	7.3	703

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.5
4.00	3.1
6.00	5.0

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-9	63.5	27.8	12.4	42.0	4.09	0.30	5.01

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-9 CONFIGURATION

FIGURE
B-11

UPDATE TIME: 6:24 PM
GLORENSON\HEL\20140812\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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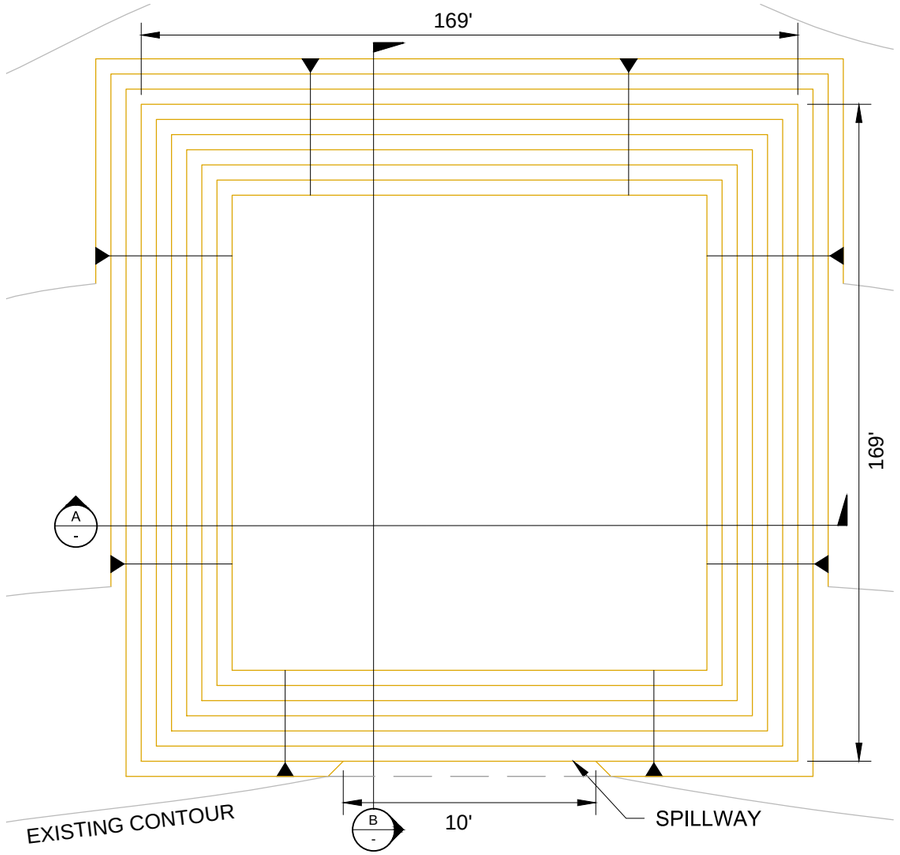
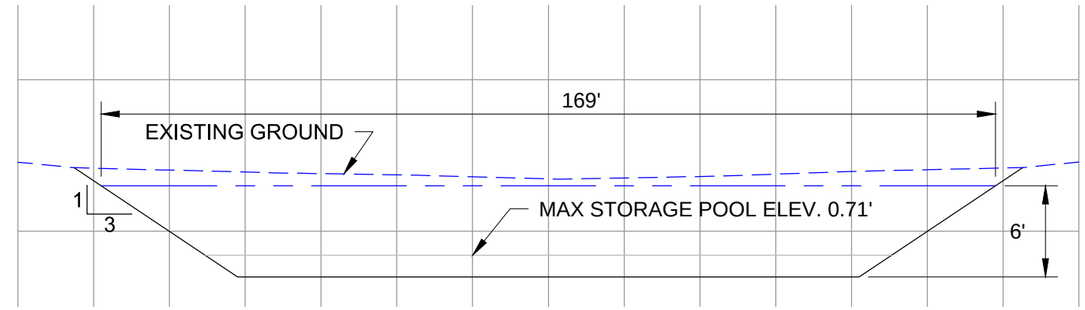
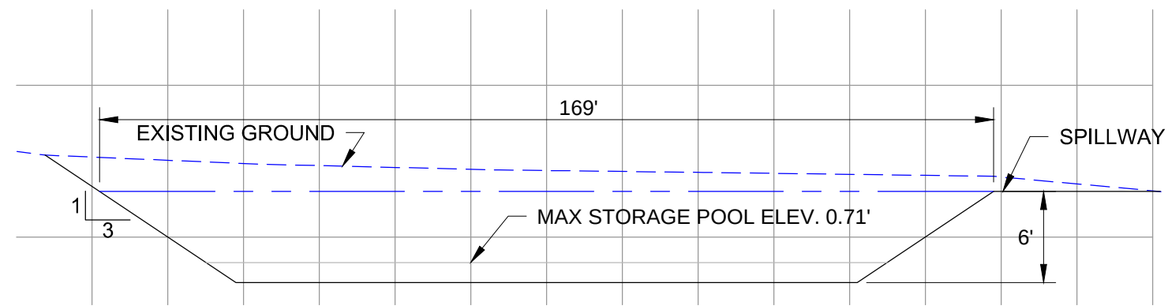


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION
TYPICAL SECTION
NTS



B - SECTION
TYPICAL SECTION
NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
9A	23.2	73.5	92.6	0.31	0.038	7.3	703

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	0.9
4.00	1.9
6.00	3.2

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-9A	23.2	23.2	0.0	31.3	2.65	0.16	3.15

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-9A CONFIGURATION

FIGURE
B-12

UPDATE TIME: 6:24 PM
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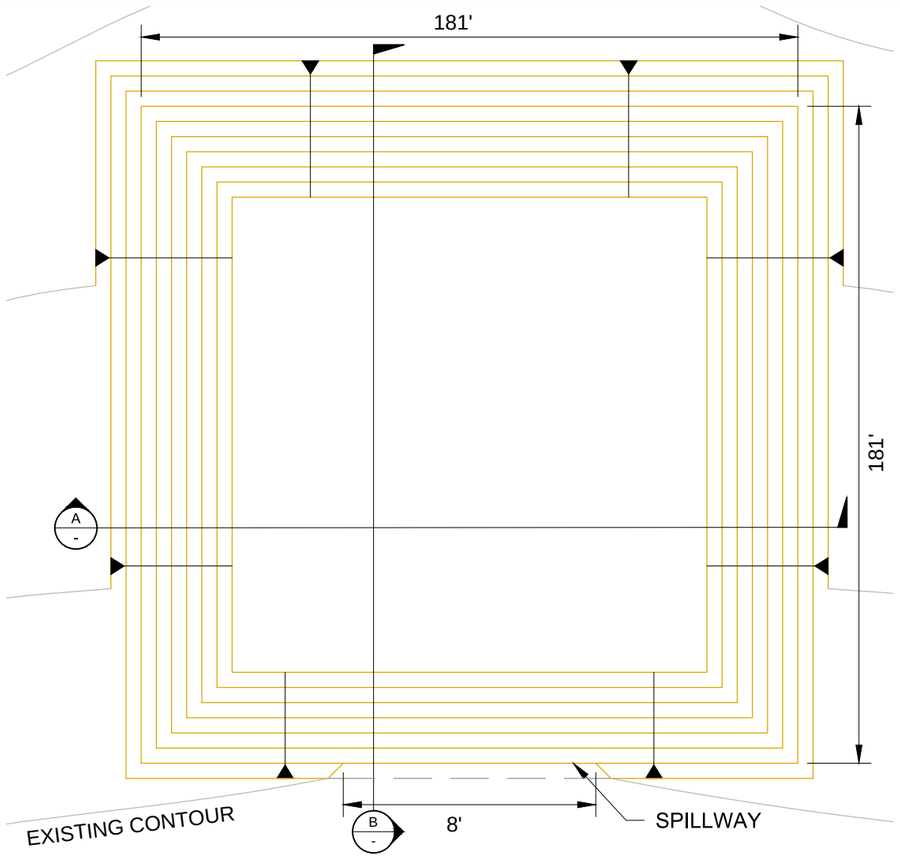
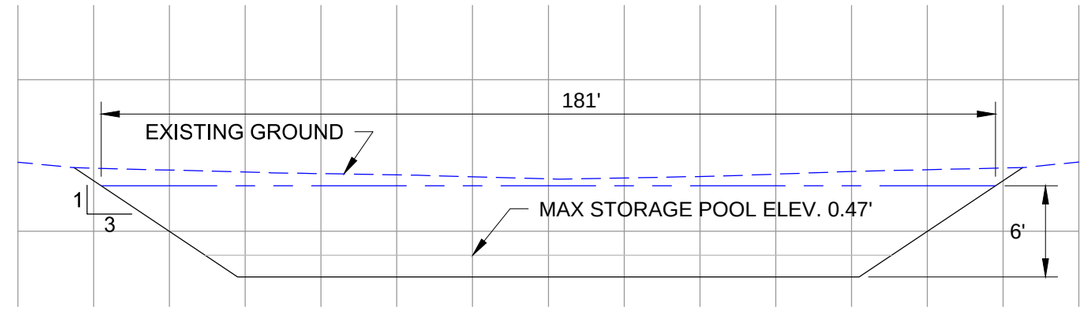


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION

TYPICAL SECTION

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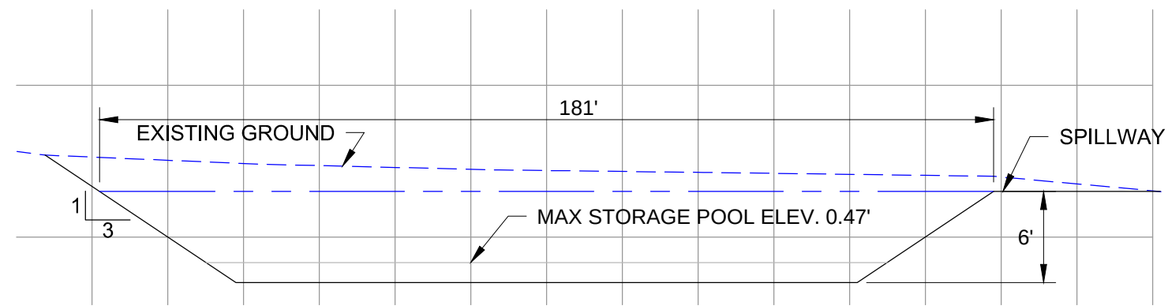

B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
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3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
10	78.5	74.6	92.7	0.26	0.039	8.2	895

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.0
4.00	2.3
6.00	3.7

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-10	78.5	16.8	61.7	25.3	3.26	0.13	3.65

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-10 CONFIGURATION

FIGURE **B-13**

UPDATE TIME: 6:35 PM
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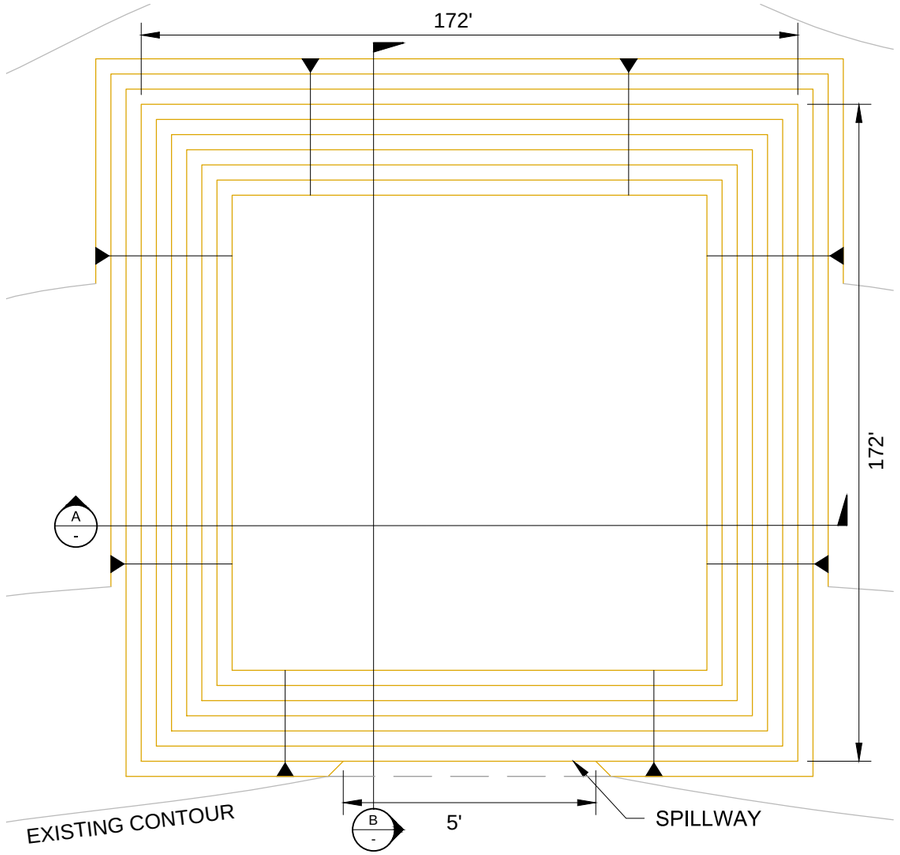
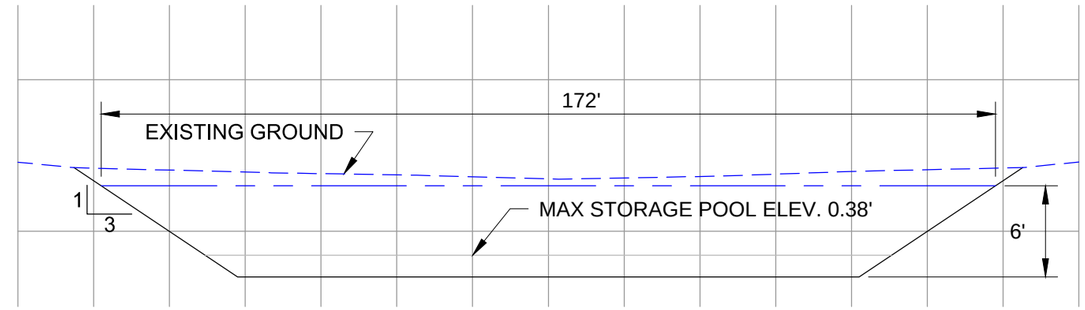


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

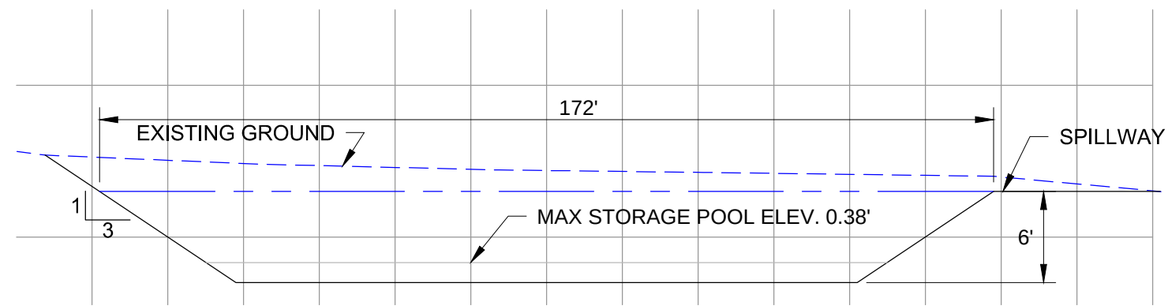
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
11	106.3	69.8	91.0	0.26	0.039	7.4	864

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	0.9
4.00	2.0
6.00	3.3

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-11	106.3	16.3	90.0	15.4	2.99	0.09	3.27

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-11 CONFIGURATION

FIGURE **B-14**

UPDATE TIME: 6:38 PM
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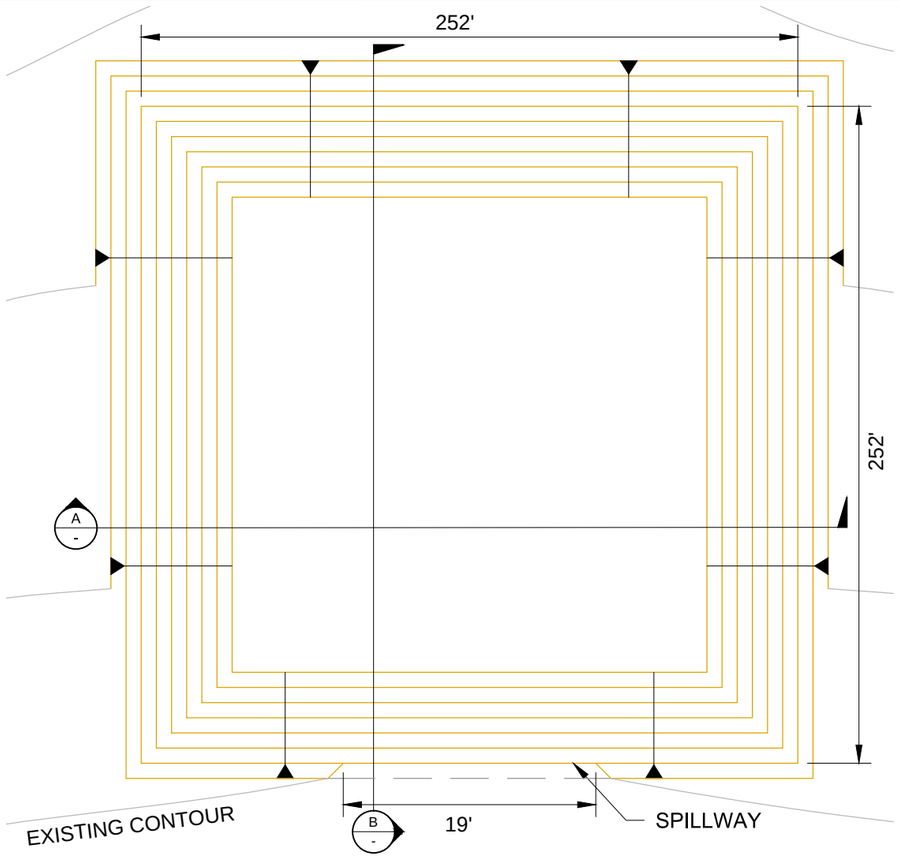
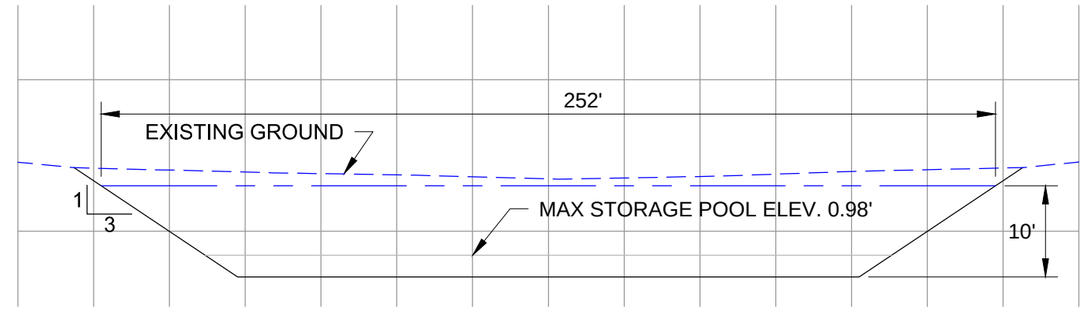
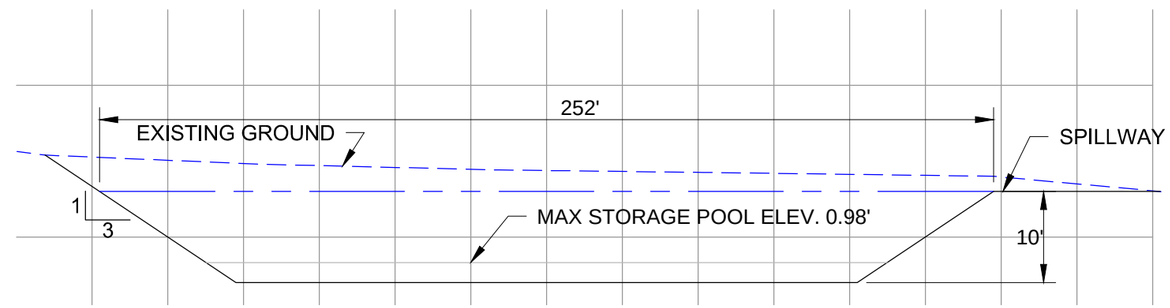


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION
TYPICAL SECTION
NTS



B - SECTION
TYPICAL SECTION
NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
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Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
12	285.6	73.2	92.4	0.28	0.039	9.9	984

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.8
4.00	3.8
6.00	6.1
8.00	8.6
10.00	11.4

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-12	285.6	43.4	242.2	58.2	9.90	0.48	11.33

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-12 CONFIGURATION

FIGURE
B-15

UPDATE TIME: 6:41 PM
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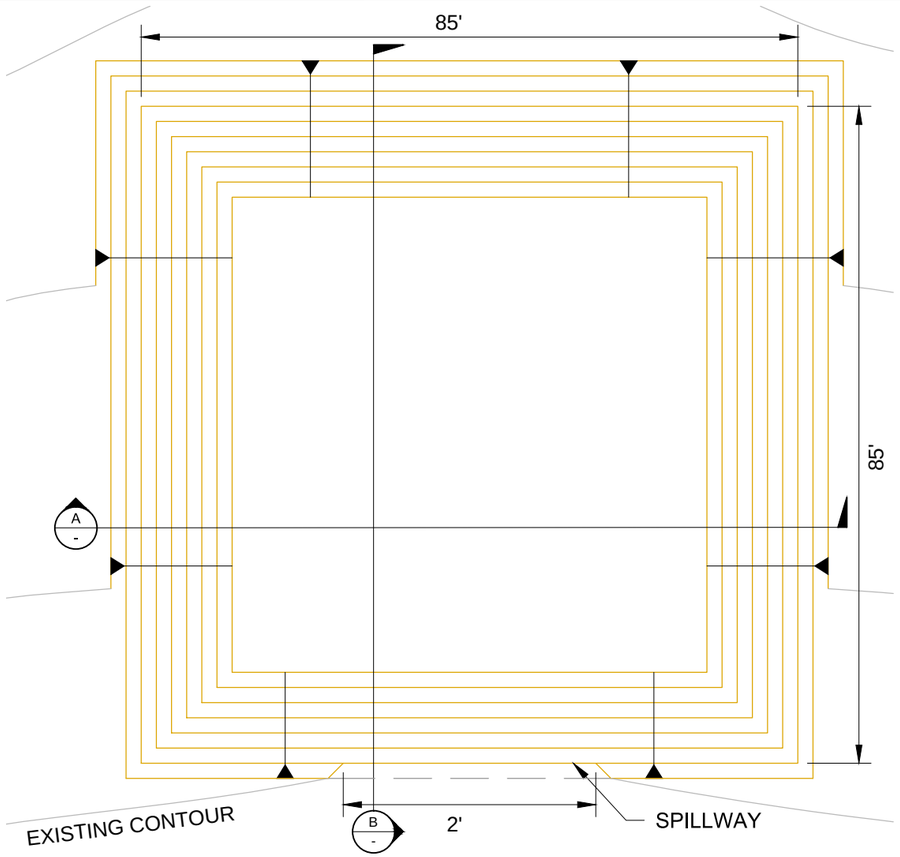
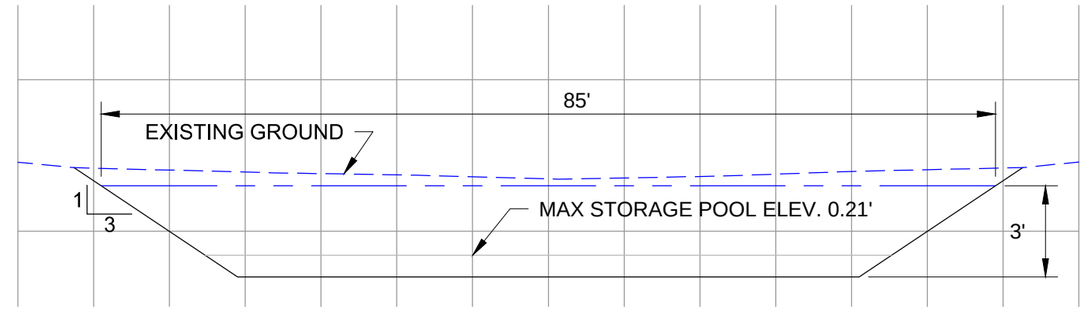


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

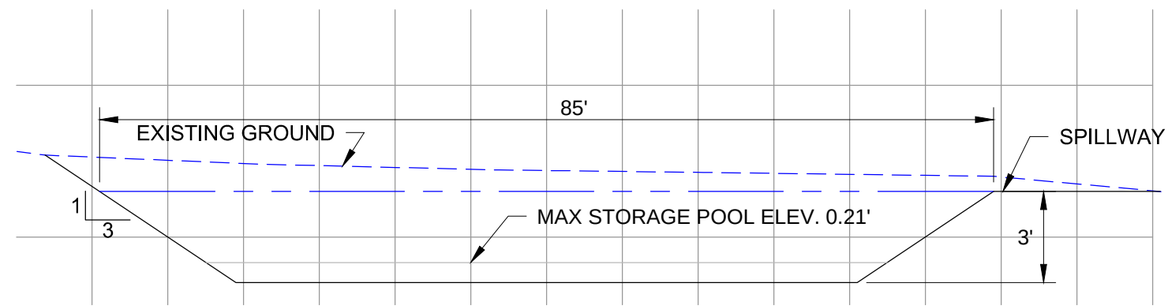
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
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5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
13	4.7	56.0	----	0.24	0.038	6.4	350

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
1.00	0.1
2.00	0.2
3.00	0.4

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-13	4.7	4.7	0.0	4.7	0.36	0.01	0.40

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-13 CONFIGURATION

FIGURE **B-16**

UPDATE TIME: 6:46 PM
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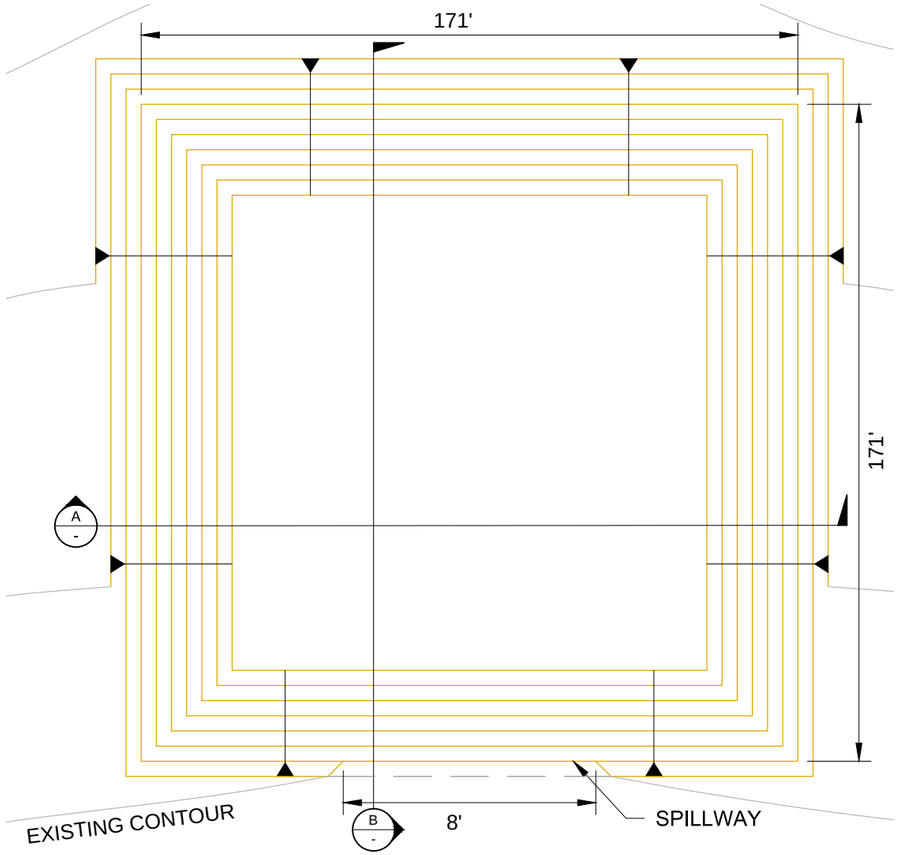
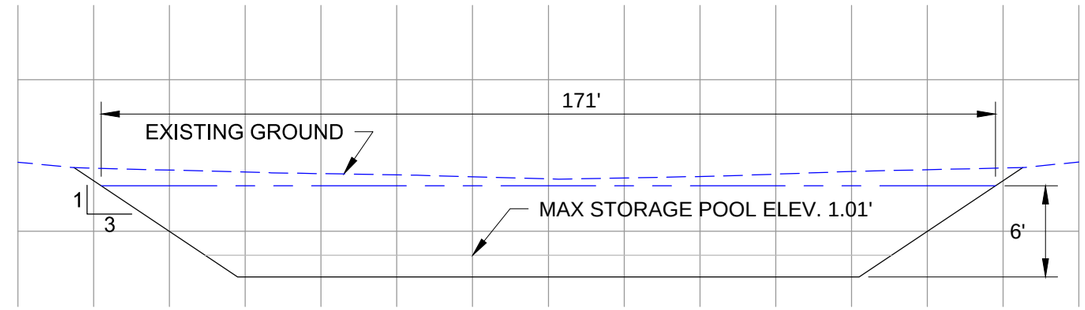


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

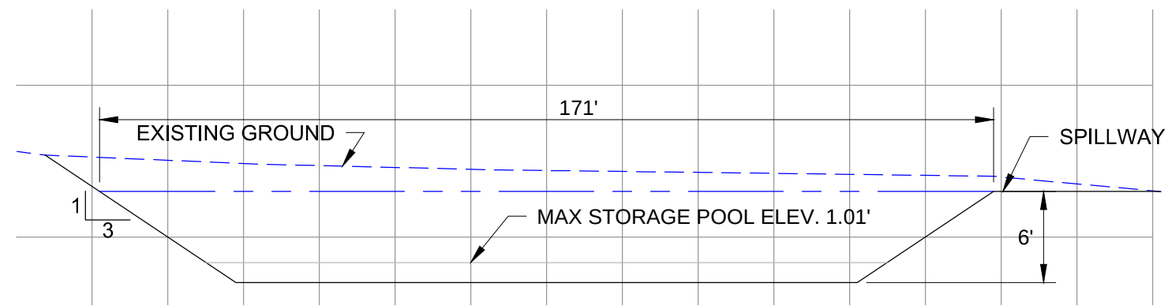
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

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3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
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Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
14	35.1	66.4	89.7	0.23	0.038	9.5	777

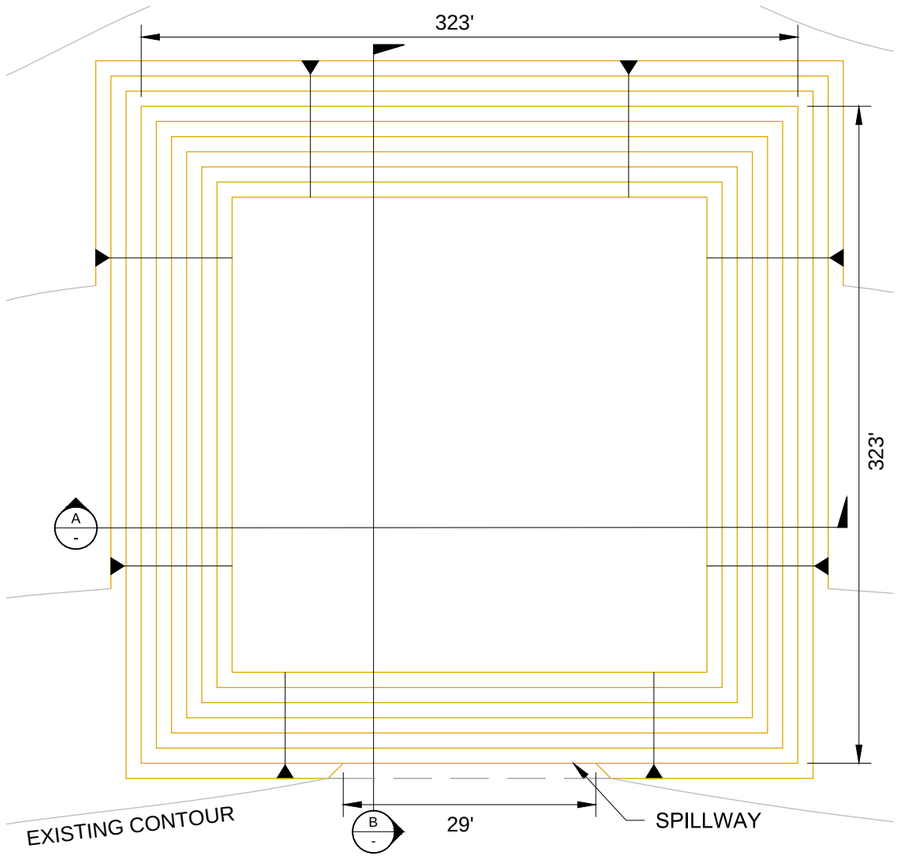
POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	0.9
4.00	2.0
6.00	3.2

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-14	35.1	31.6	3.5	25.5	2.50	0.24	3.24

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

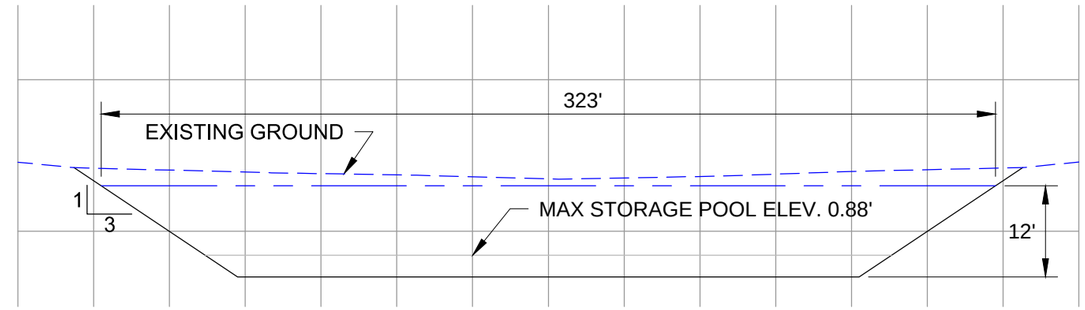
FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-14 CONFIGURATION

FIGURE **B-17**



TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

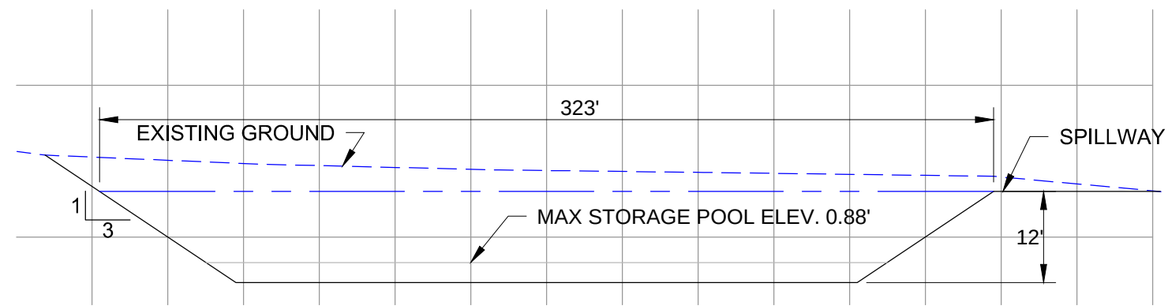
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
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Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
15	651.6	74.7	92.3	0.27	0.040	16.4	808

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	3.0
4.00	6.4
6.00	10.0
8.00	13.9
10.00	18.2
12.00	22.8

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-15	651.6	39.5	612.1	88.6	20.64	0.72	22.81

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-15 CONFIGURATION

FIGURE **B-18**

UPDATE TIME: 6:52 PM
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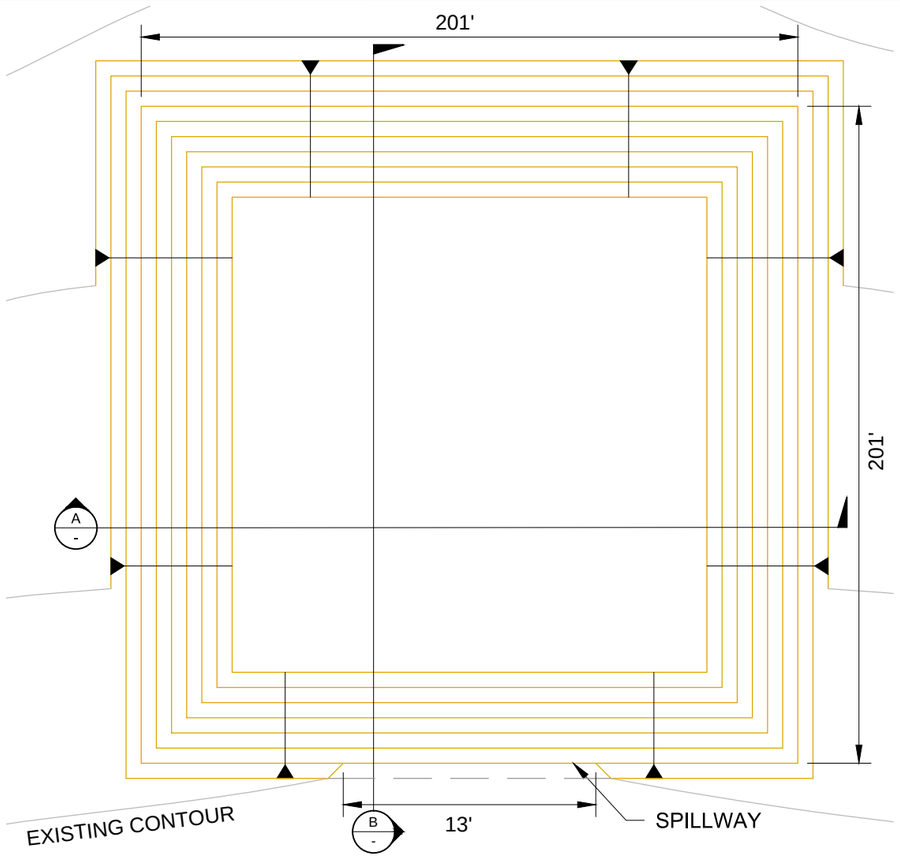
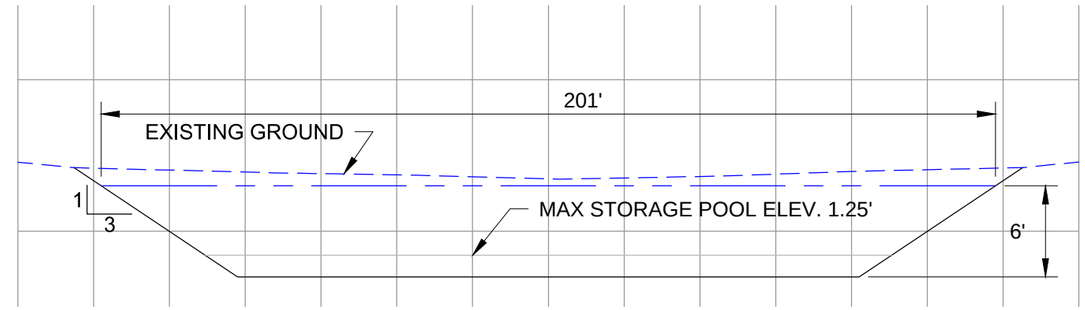


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

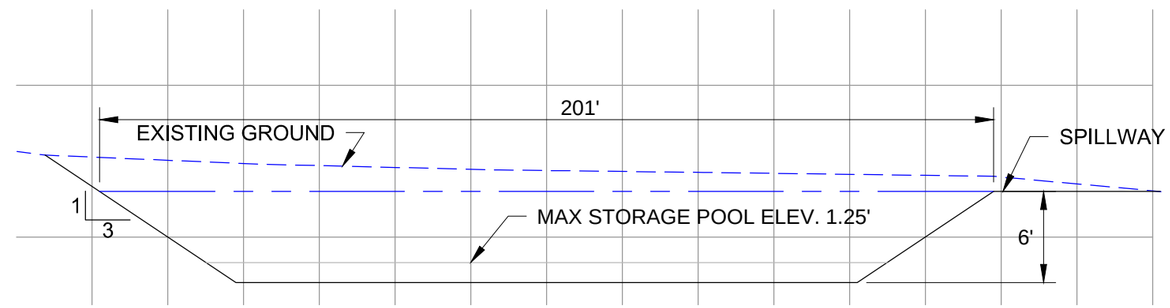
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
R1	30.9	74.1	91.2	0.29	0.050	12.0	624

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.3
4.00	2.9
6.00	4.6

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-R1	30.9	30.9	0.0	39.5	3.26	0.46	4.62

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-R1 CONFIGURATION	FIGURE B-19

UPDATE TIME: 8:13 AM
GLORENSON\HEL\20140813\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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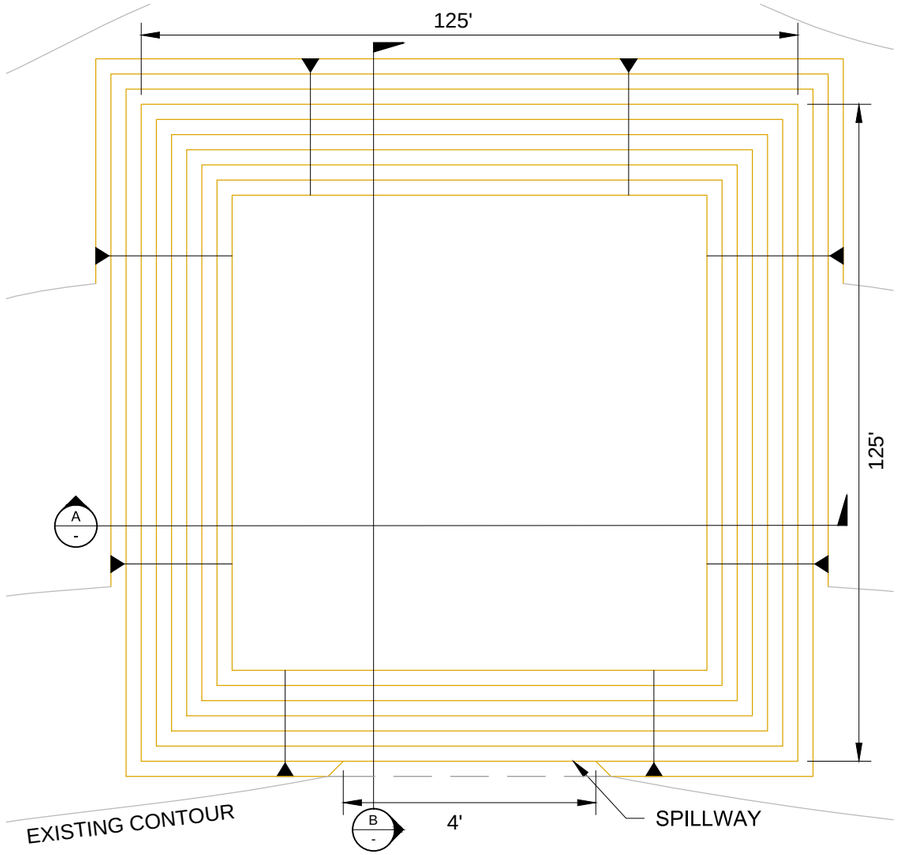
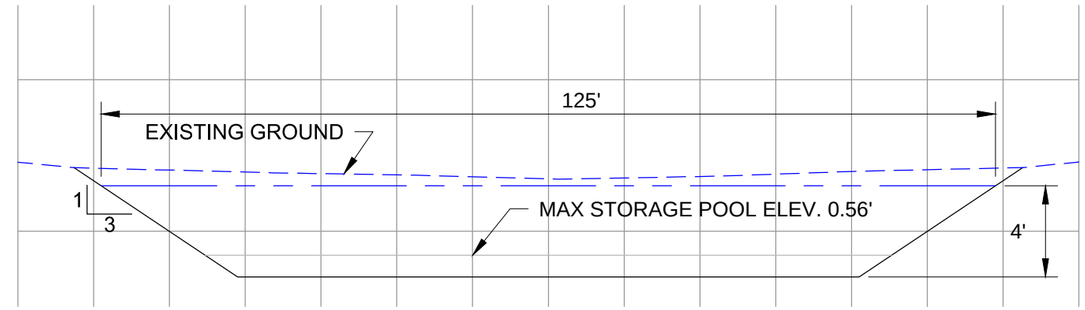


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

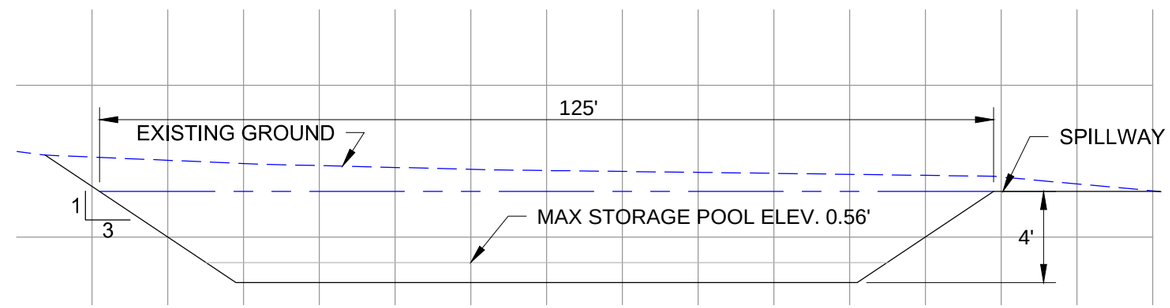
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	0.5
4.00	1.2

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
R2	9.0	74.1	91.2	0.29	0.050	11.3	354

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-R2	9.0	9.0	0.0	11.5	0.95	0.07	1.17

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-R2 CONFIGURATION

FIGURE **B-20**

UPDATE TIME: 8:18 AM
GLORENSON\HEL\20140813\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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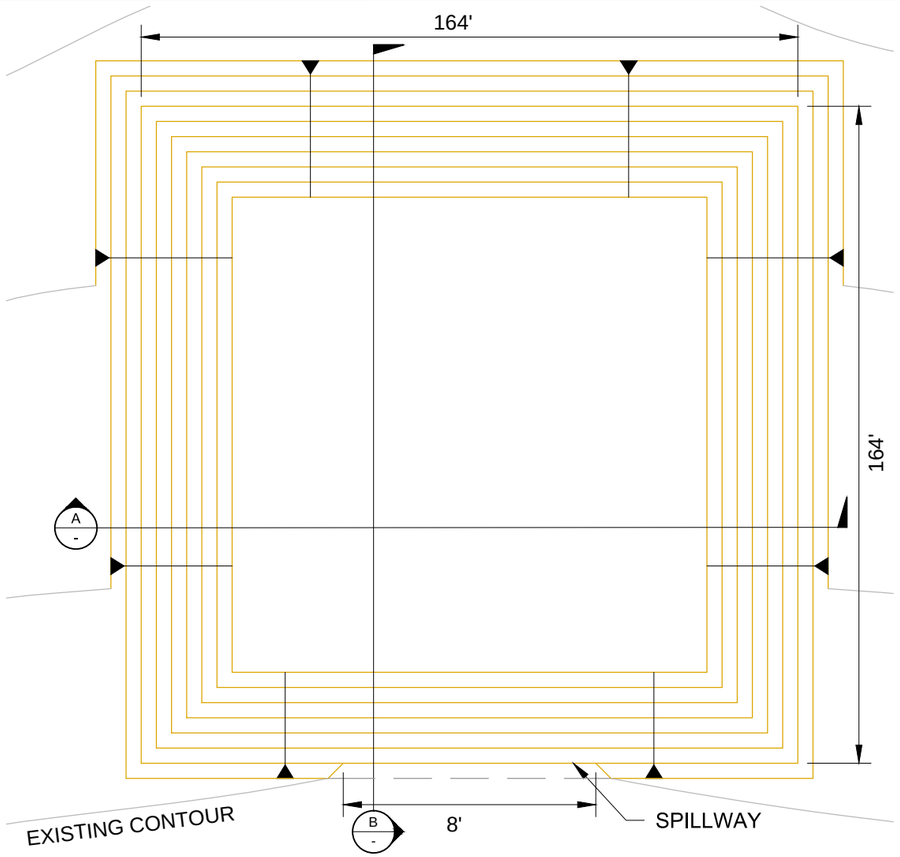
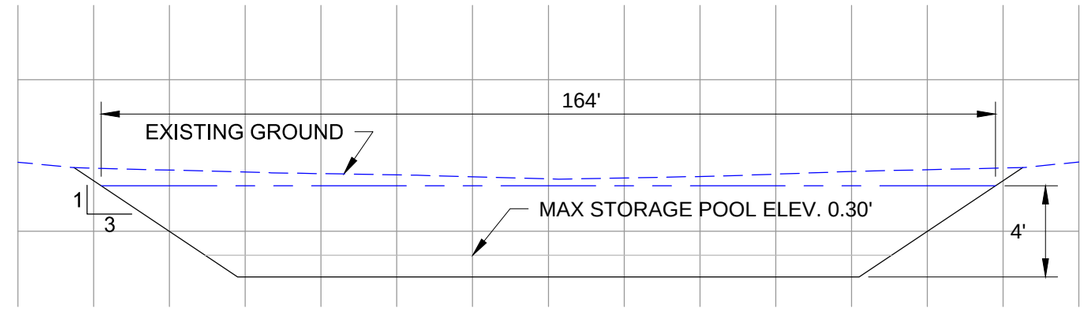


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

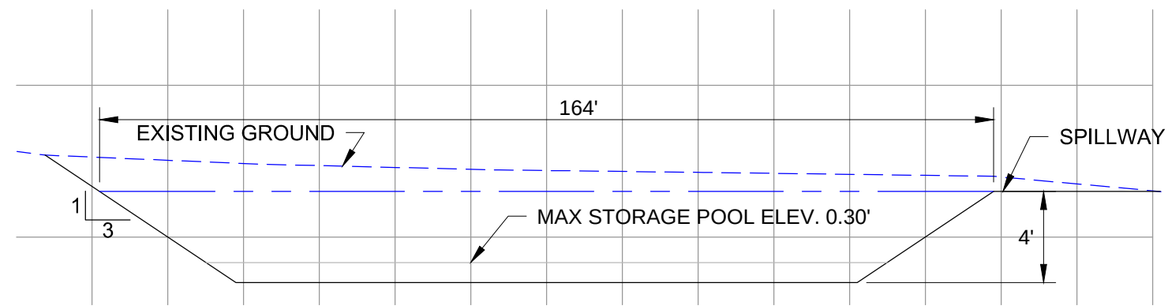
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
R3	26.7	74.1	91.2	0.29	0.050	9.8	266

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.0
4.00	2.1

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-R3	26.7	13.9	12.8	23.7	1.89	0.08	2.12

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-R3 CONFIGURATION

FIGURE **B-21**

UPDATE TIME: 8:18 AM
GLORENSON\HEL\20140813\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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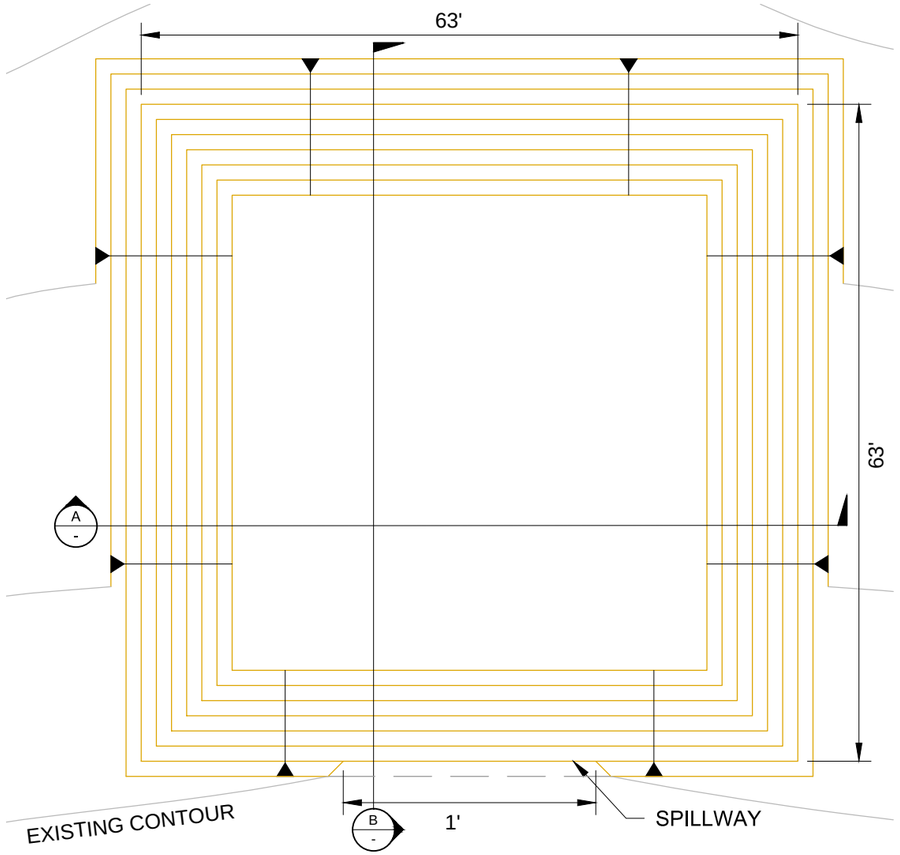
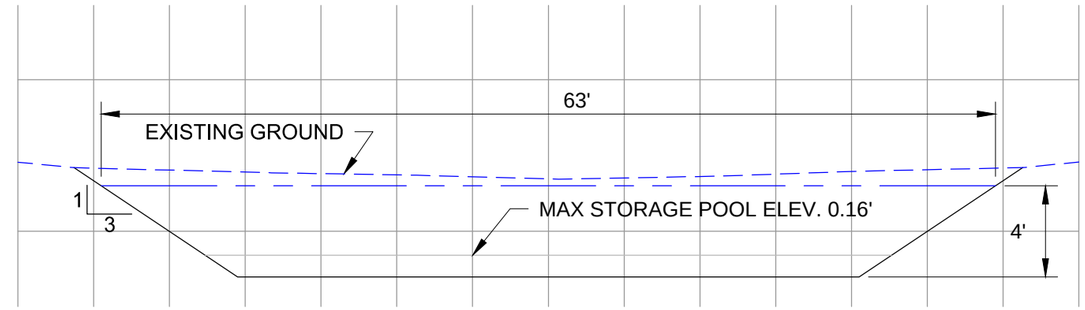
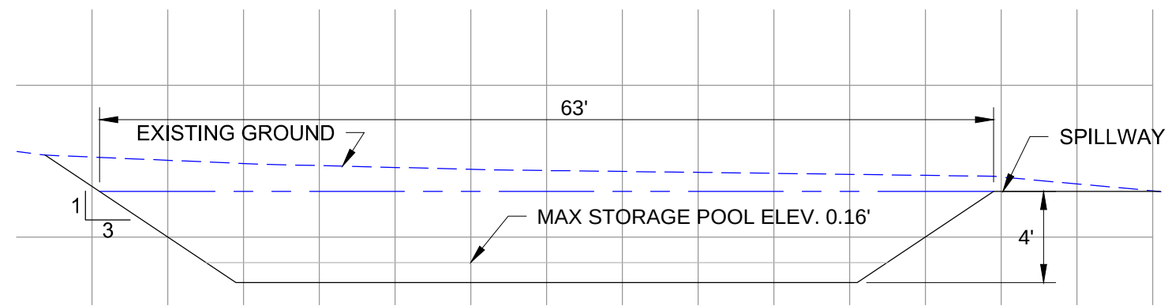


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION
TYPICAL SECTION
NTS



B - SECTION
TYPICAL SECTION
NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
R4	2.2	74.1	91.2	0.29	0.050	11.7	281

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	0.1
4.00	0.2

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-R4	2.2	2.2	0.0	2.8	0.23	0.00	0.24

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-R4 CONFIGURATION

FIGURE
B-22

UPDATE TIME: 8:22 AM
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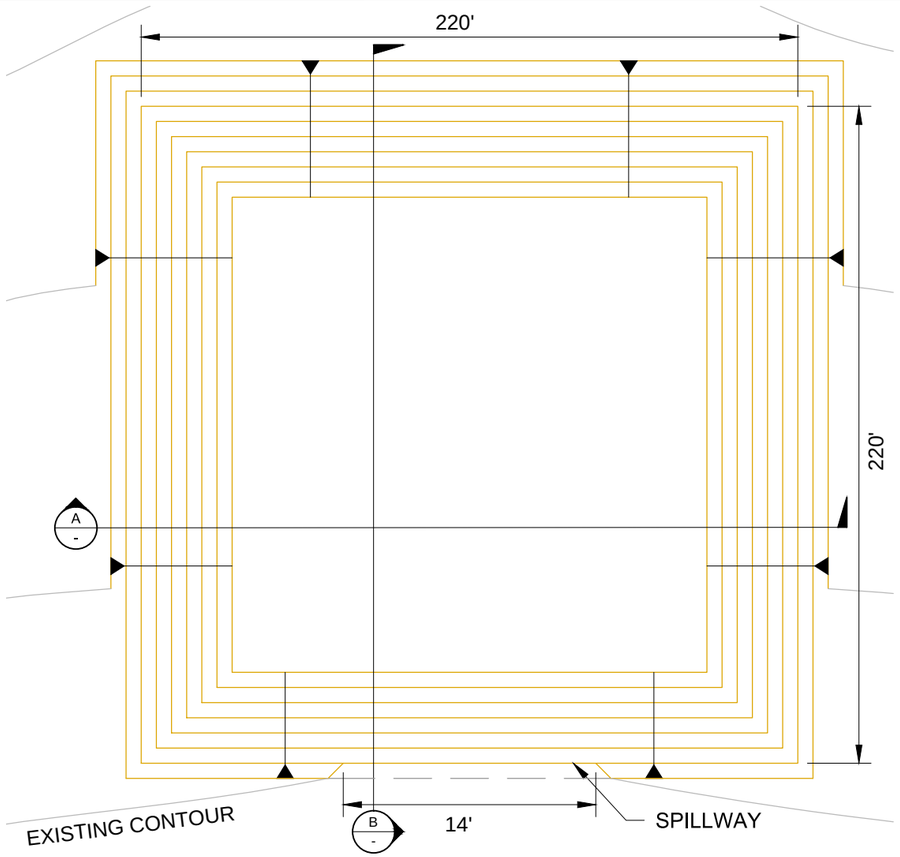
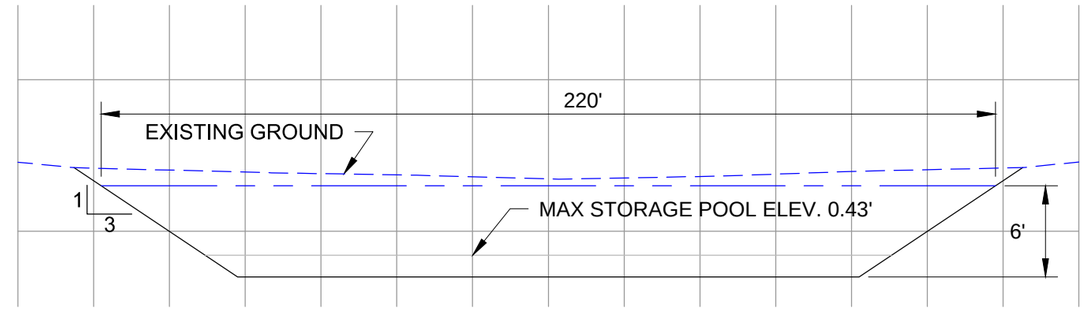


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

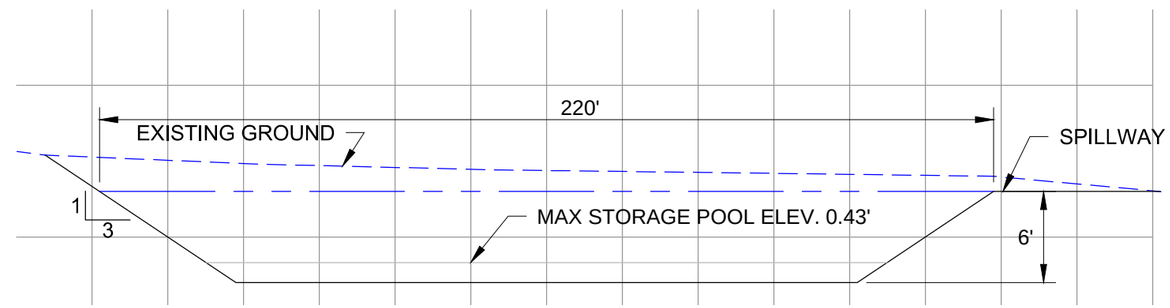
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Weighted K Factor	Weighted C Factor	Slope (%)	Length (Ft)
R5	117.6	74.1	91.2	0.29	0.050	6.6	906

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
2.00	1.7
4.00	3.5
6.00	5.6

Pond	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Required Pond Volume (acre-feet)
EP-R5	117.6	32.9	84.7	43.8	5.04	0.19	5.60

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

FIRST PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-R5 CONFIGURATION

FIGURE **B-23**

UPDATE TIME: 8:30 AM
GLORENSON\HEL\20140813\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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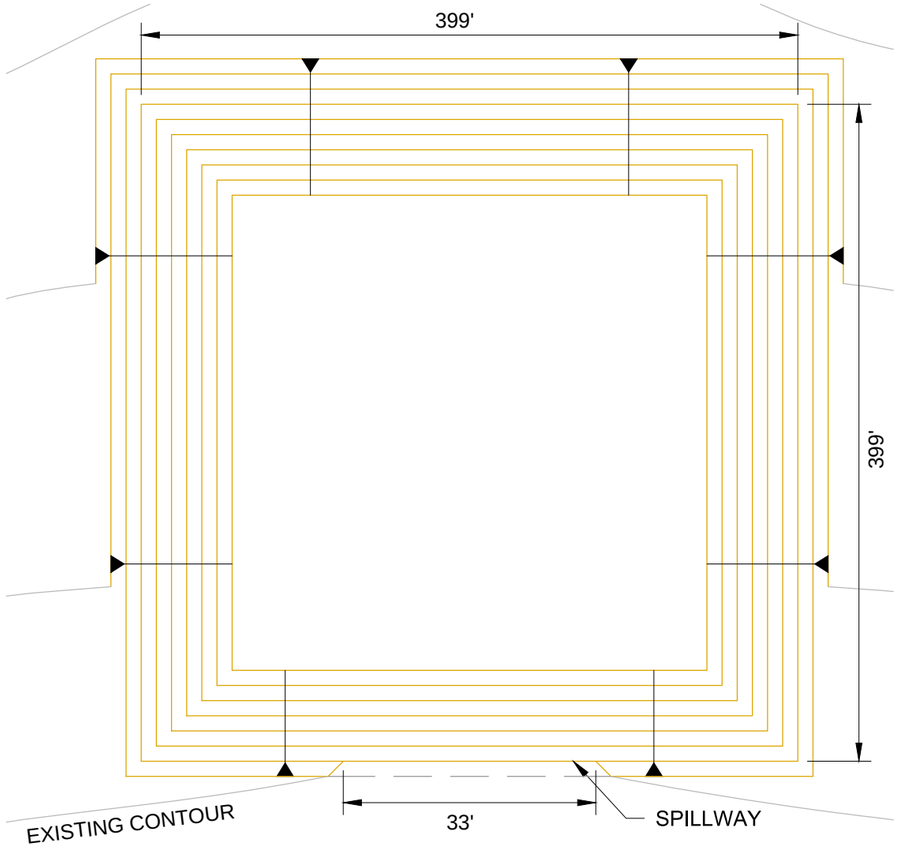
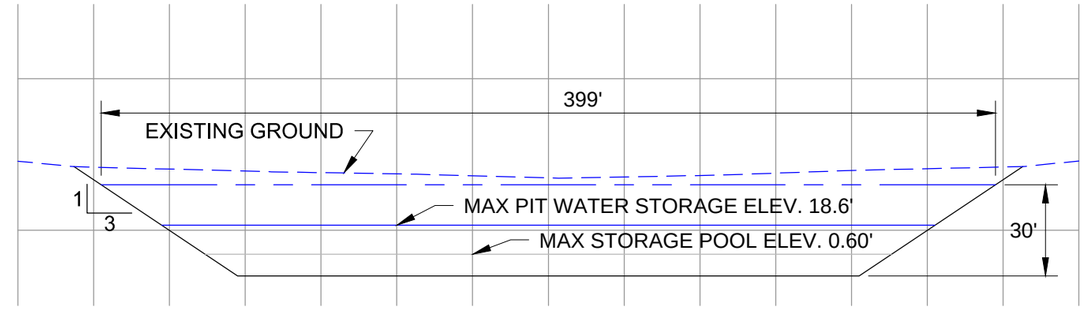
Consulting Scientists and Engineers



TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

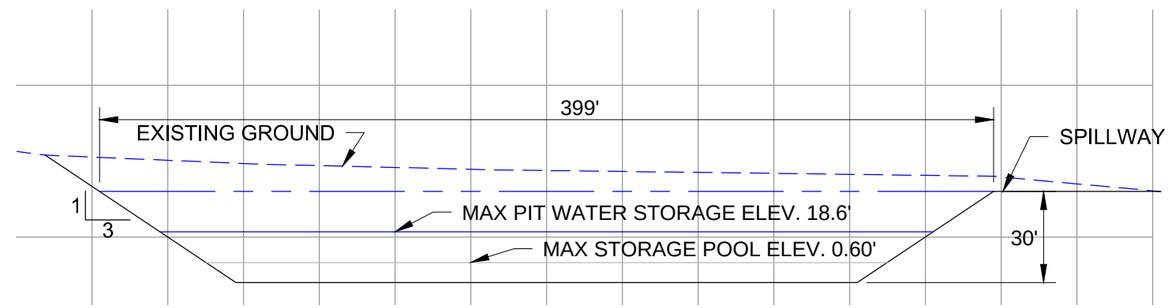
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Fair Weighted CN	K Factor	Weighted C Factor	Bare C Factor	Fair C Factor	Slope (%)	Length (Ft)
1A	324.3	74.1	91.2	78.7	0.32	--	0.45	0.042	7.2	907

Pond	Worst-Case Year	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Reclaimed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-1A	16	324.3	63.4	--	260.9	242.5	34.10	0.37	32	67.2

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
5.00	6.3
10.00	14.3
15.00	24.2
20.00	36.3
25.00	50.7
30.00	67.6

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-1A CONFIGURATION

FIGURE **B-24**

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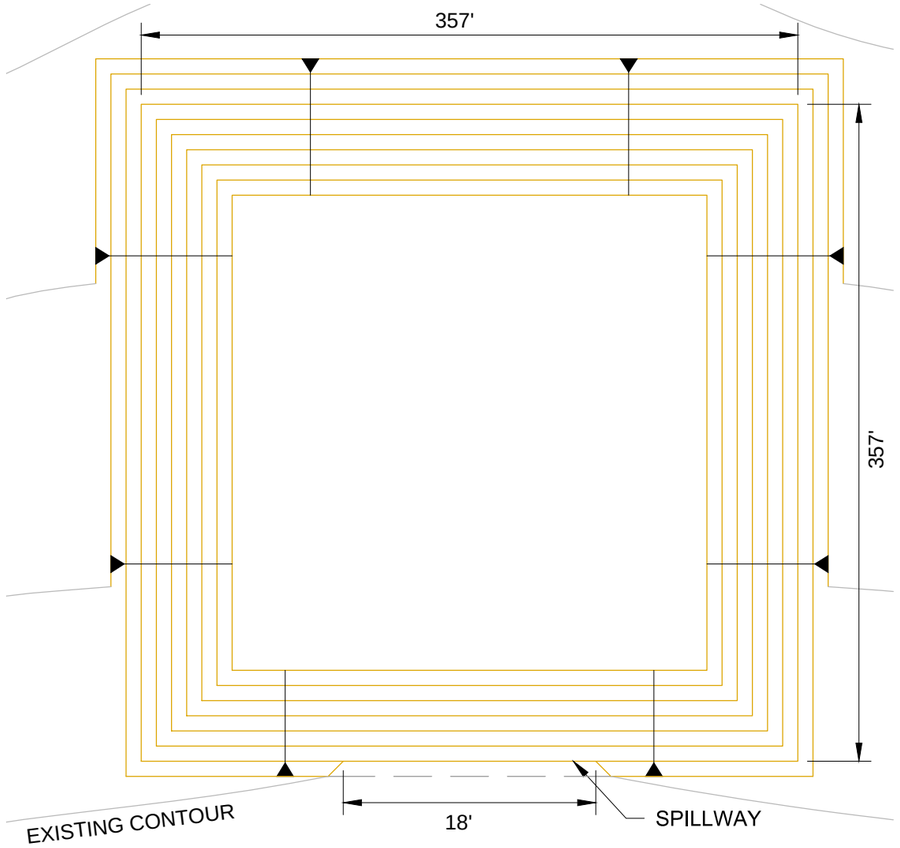
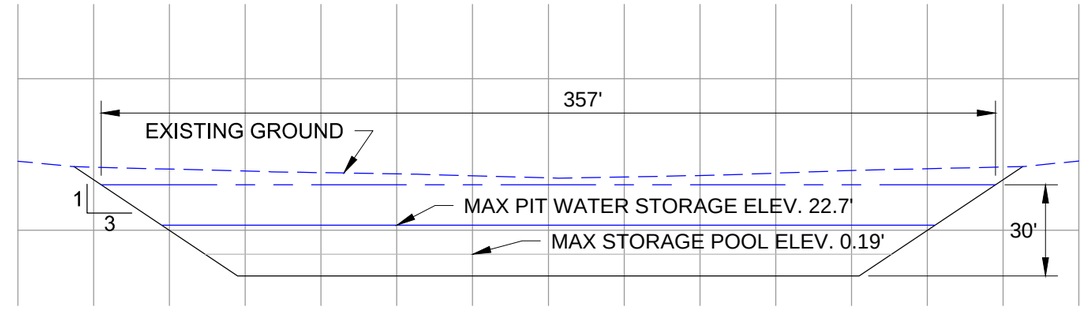


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

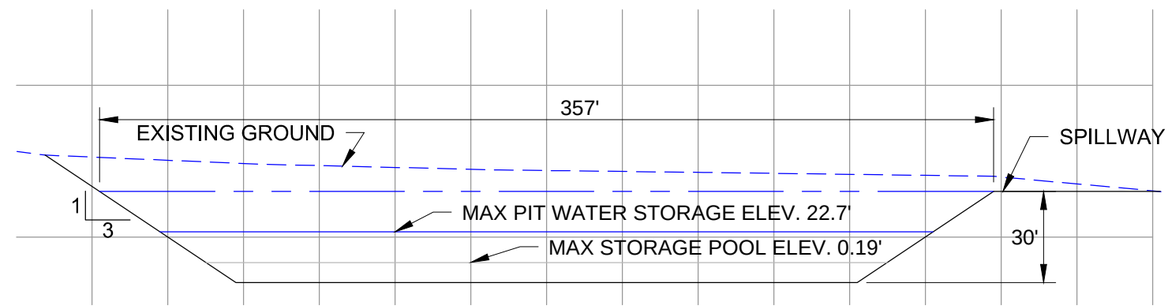
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Fair Weighted CN	K Factor	Weighted C Factor	Bare C Factor	Fair C Factor	Slope (%)	Length (Ft)
2A	183.1	72.1	91.6	79.5	0.32	--	0.45	0.042	7.1	973

Pond	Worst-Case Year	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Reclaimed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-2A	14	183.1	13.5	--	169.6	152.8	18.45	0.08	32	50.7

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
5.00	4.2
10.00	9.9
15.00	17.2
20.00	26.3
25.00	37.5
30.00	51.0

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-2A CONFIGURATION

FIGURE **B-25**

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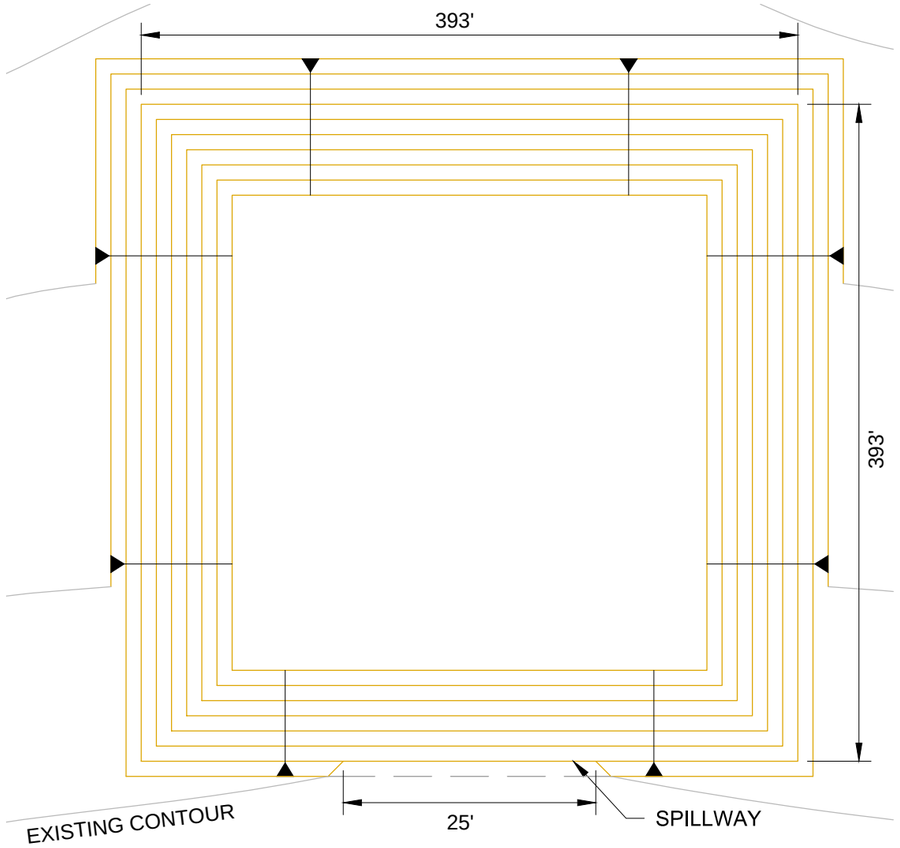
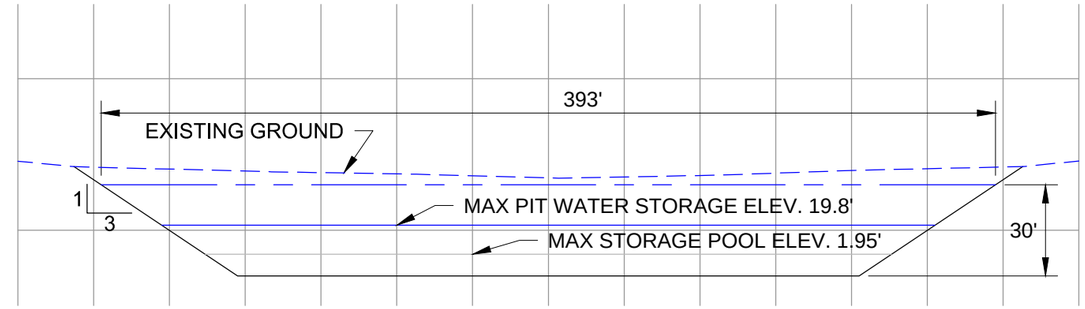


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

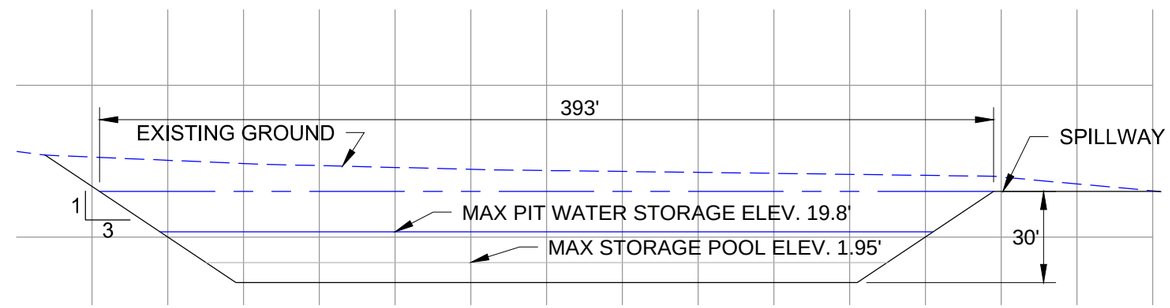
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Fair Weighted CN	K Factor	Weighted C Factor	Bare C Factor	Fair C Factor	Slope (%)	Length (Ft)
3A/4A	342.9	63.3	88.5	73.8	0.32	0.039	0.45	0.042	11.1	991

Pond	Worst-Case Year	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Reclaimed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-3A	13	342.9	94.6	63.5	184.8	198.2	29.23	1.19	32	64.8

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
5.00	6.0
10.00	13.6
15.00	23.2
20.00	34.8
25.00	48.7
30.00	65.1

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
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3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-3A CONFIGURATION

FIGURE **B-26**

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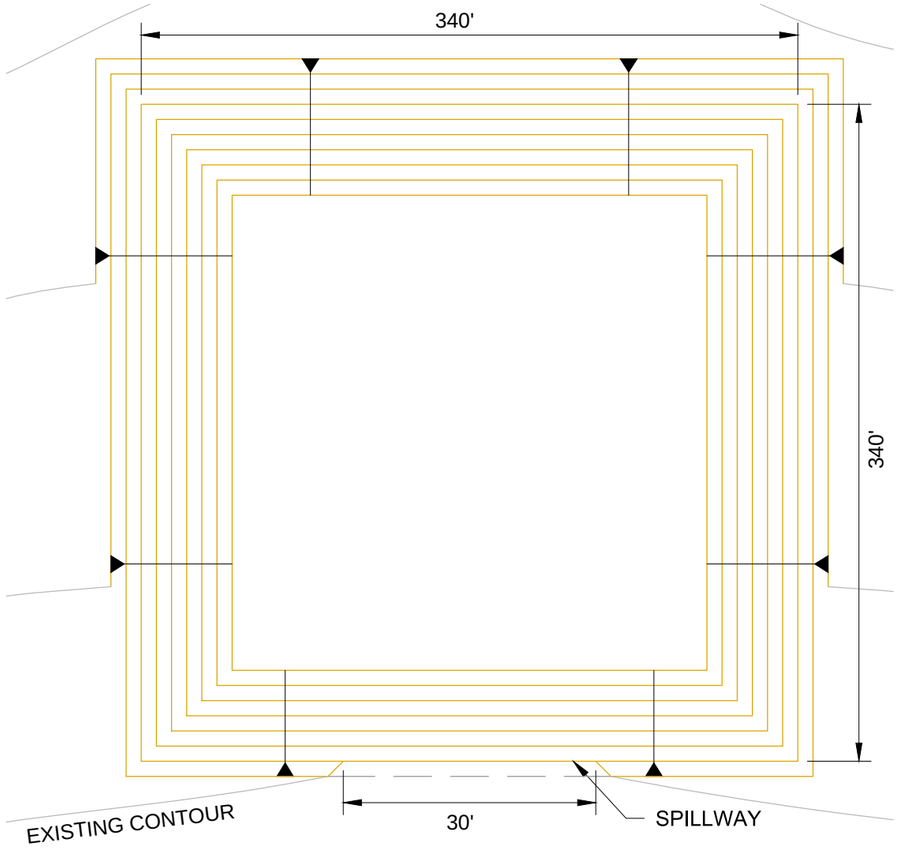
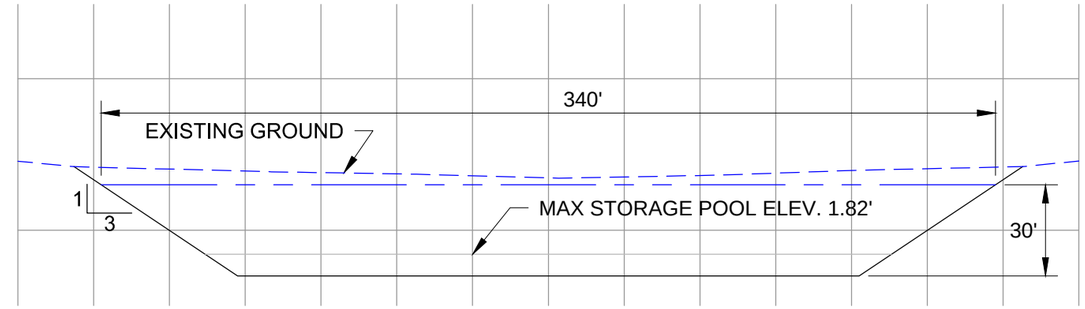


TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

NTS



A - SECTION

TYPICAL SECTION

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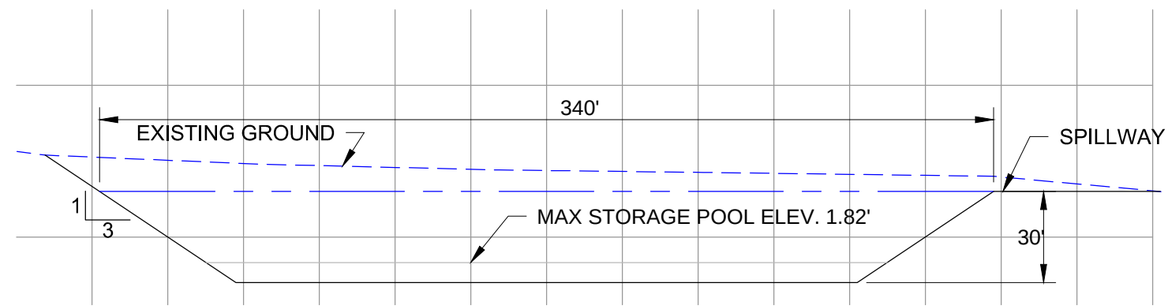

B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Fair Weighted CN	K Factor	Weighted C Factor	Bare C Factor	Fair C Factor	Slope (%)	Length (Ft)
5	493.3	67.5	89.6	75.8	0.32	0.039	0.45	0.042	9.7	819

Pond	Worst-Case Year	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Reclaimed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-5	18	493.3	89.6	95.8	307.9	242.9	42.85	0.64	-	44.8

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
5.00	3.5
10.00	8.4
15.00	14.7
20.00	22.8
25.00	32.8
30.00	44.9

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-5 CONFIGURATION

FIGURE **B-27**

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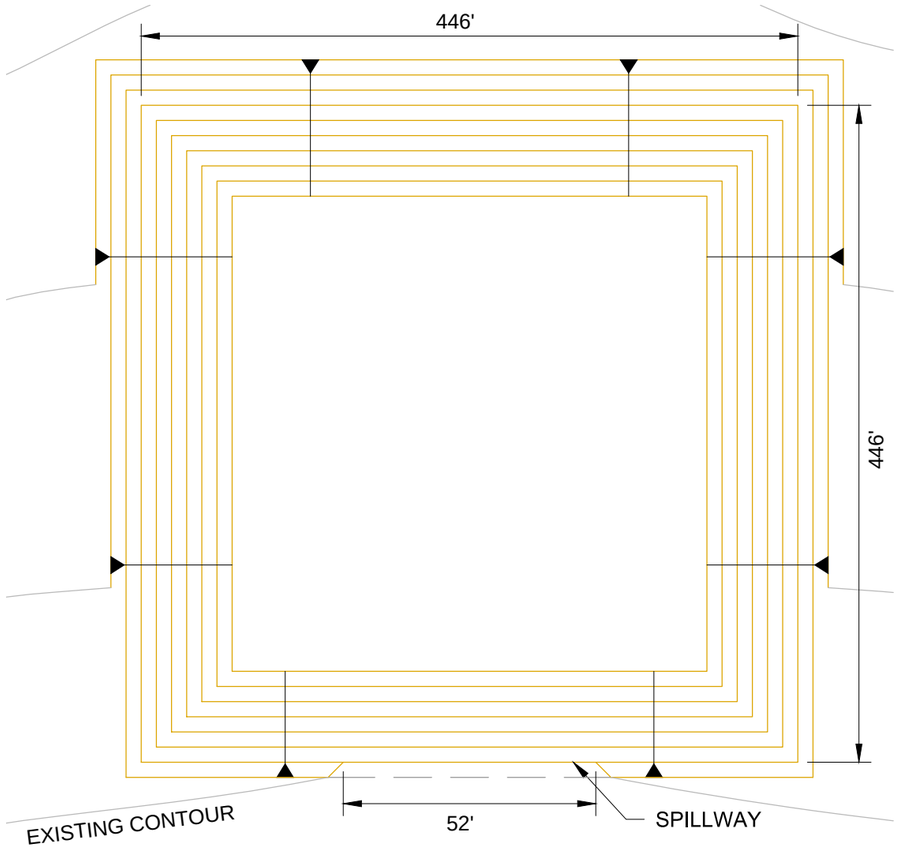

TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

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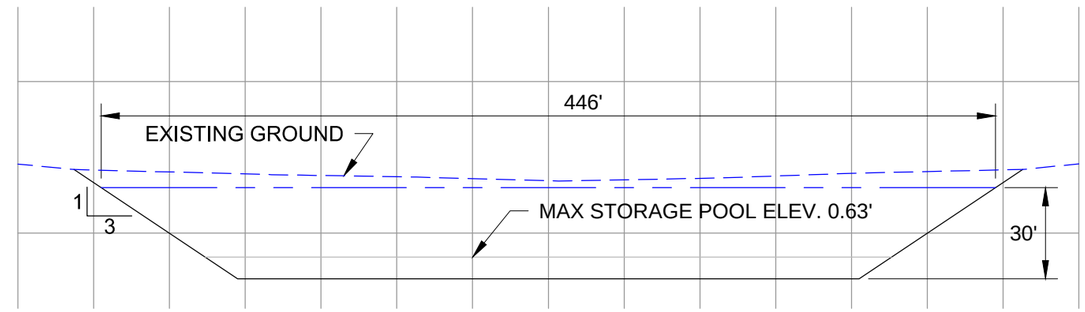

A - SECTION

TYPICAL SECTION

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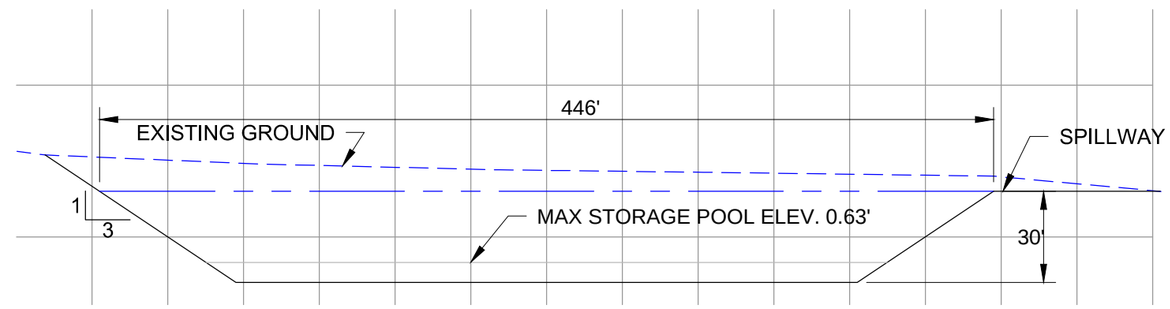

B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Fair Weighted CN	K Factor	Weighted C Factor	Bare C Factor	Fair C Factor	Slope (%)	Length (Ft)
6/7	460.7	67.6	89.7	76.3	0.32	--	0.45	0.042	3.1	976
7U	651.2	70.0	--	--	0.32	0.046	--	--	23.8	854

Pond	Worst-Case Year	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Reclaimed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-6	20	1111.9	159.7	301	651.2	501.7	86.95	0.58	-	88.7

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
5.00	9.1
10.00	20.2
15.00	33.5
20.00	49.3
25.00	67.8
30.00	89.1

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-6 CONFIGURATION	FIGURE B-28

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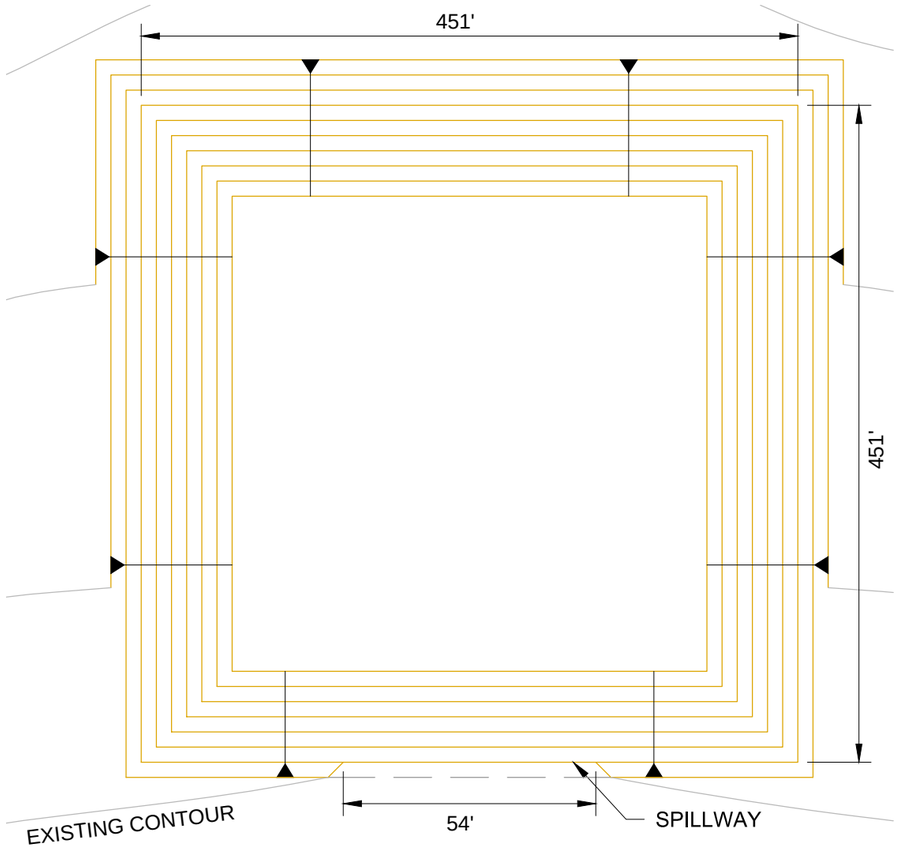

TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

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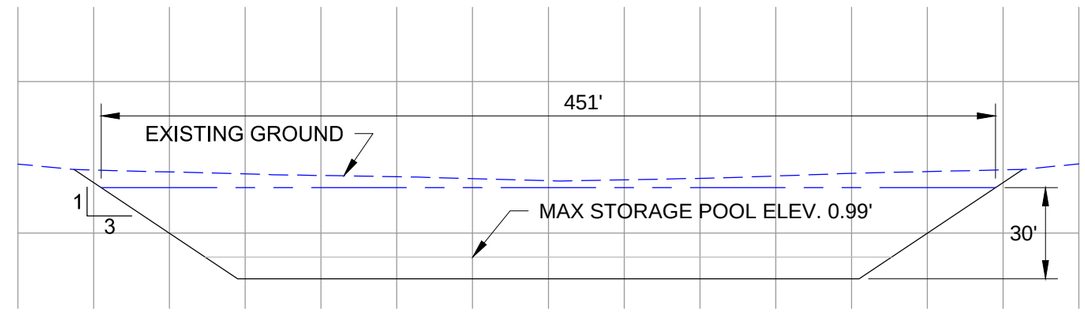

A - SECTION

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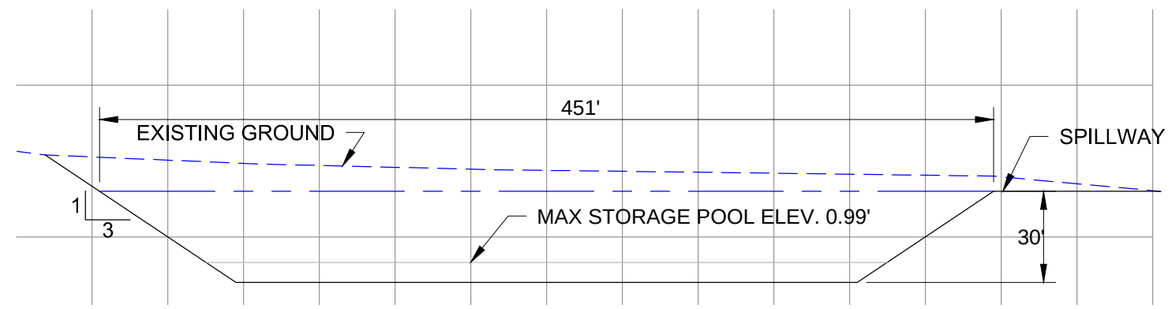

B - SECTION

TYPICAL SECTION

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Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Fair Weighted CN	K Factor	Weighted C Factor	Bare C Factor	Fair C Factor	Slope (%)	Length (Ft)
7	705.5	70.0	89.7	76.4	0.32	--	0.45	0.042	8.5	867
7U	381.1	70.0	--	--	0.29	0.046	--	--	23.8	854

Pond	Worst-Case Year	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Reclaimed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-7	20	1086.6	118.9	381.1	586.6	501.7	88.68	0.95	-	91.5

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
5.00	9.4
10.00	20.9
15.00	34.6
20.00	50.9
25.00	69.8
30.00	91.6

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-7 CONFIGURATION

FIGURE **B-29**

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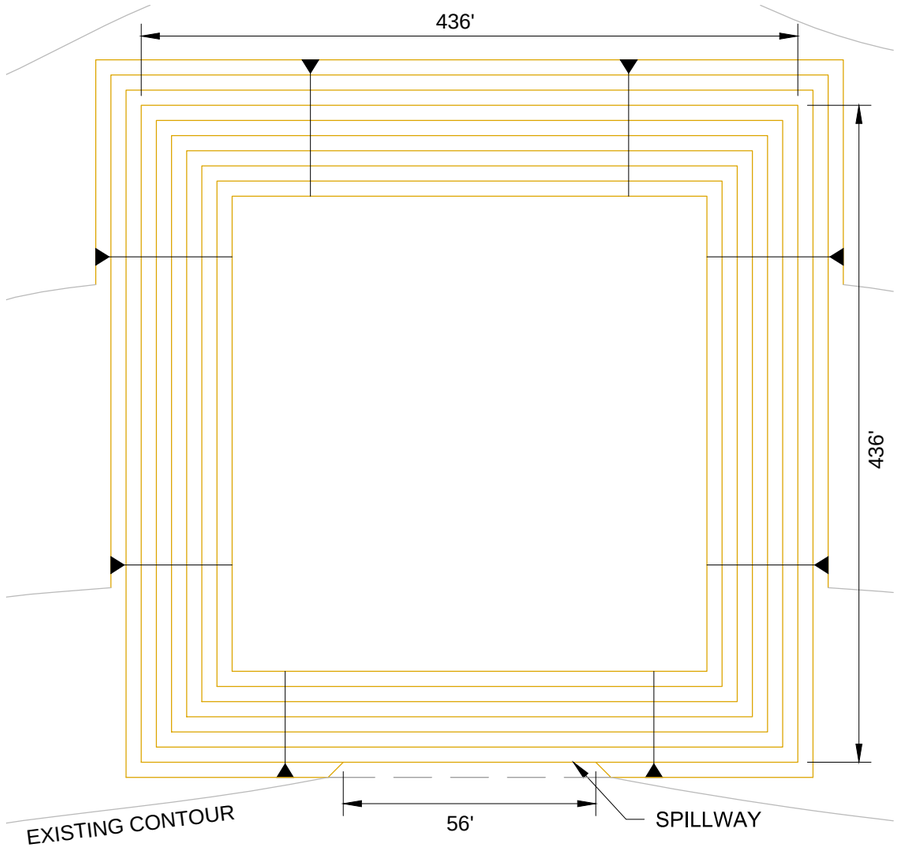

TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

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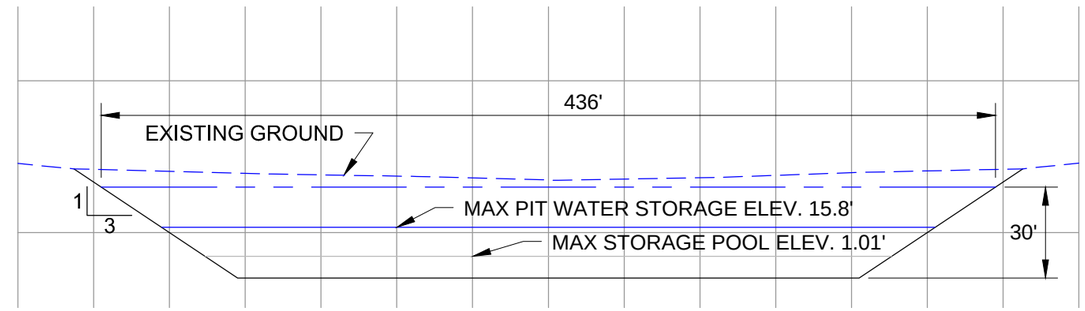

A - SECTION

TYPICAL SECTION

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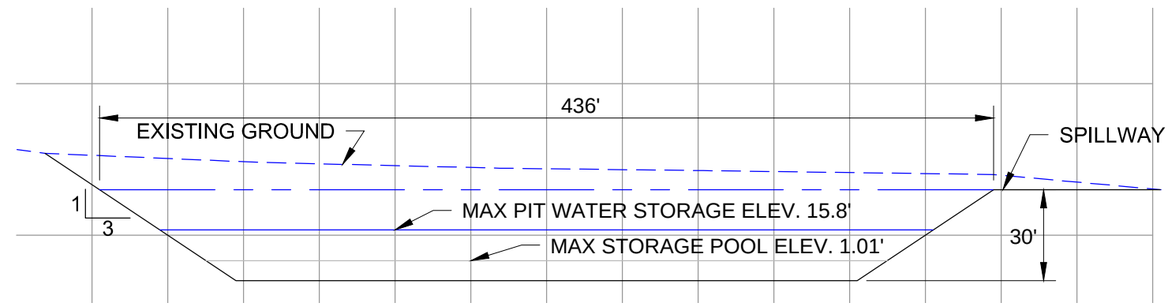

B - SECTION

TYPICAL SECTION

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Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Fair Weighted CN	K Factor	Weighted C Factor	Bare C Factor	Fair C Factor	Slope (%)	Length (Ft)
10	147.8	74.6	92.7	81.6	0.32	--	0.45	0.042	7.2	925
11	101.6	69.8	91.0	78.4	0.32	--	0.45	0.042	5.0	952
12	138.3	73.2	92.4	81.0	0.32	--	0.45	0.042	6.0	851
14	7.9	66.4	89.7	75.9	0.32	--	0.45	0.042	7.0	589

Pond	Worst-Case Year	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Reclaimed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-10	16	395.6	150.9	--	244.7	372.6	49.47	0.86	32	84.1

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
5.00	8.4
10.00	18.8
15.00	31.4
20.00	46.4
25.00	64.0
30.00	84.3

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-10 CONFIGURATION

FIGURE **B-30**

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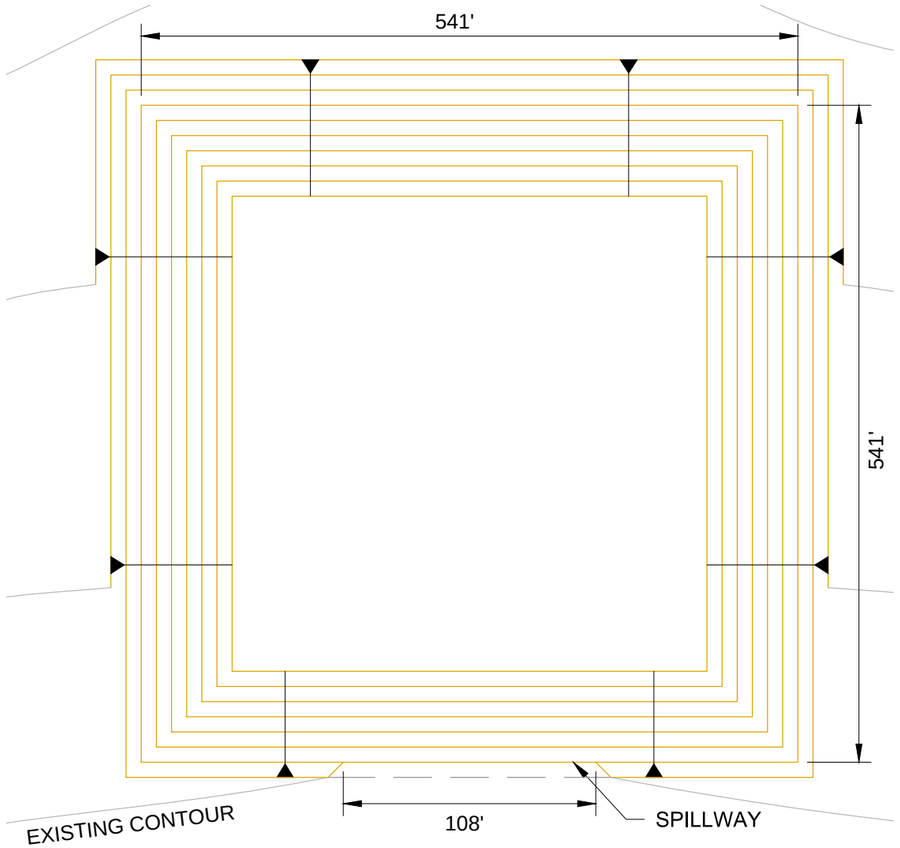

TYPICAL EXCAVATED SEDIMENT POND - PLAN VIEW

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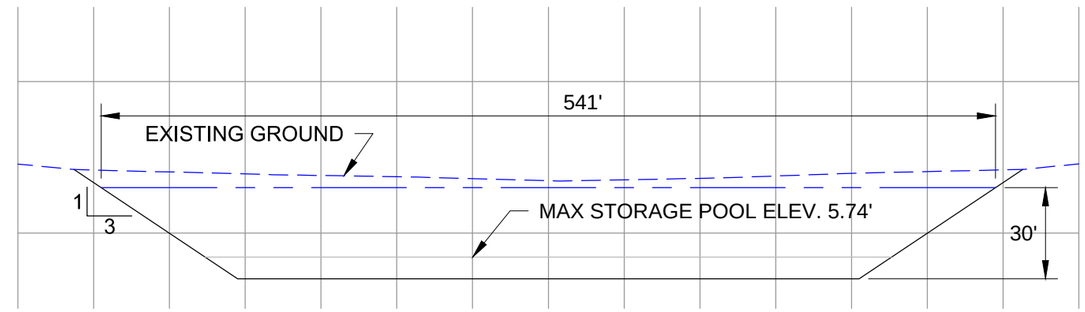

A - SECTION

TYPICAL SECTION

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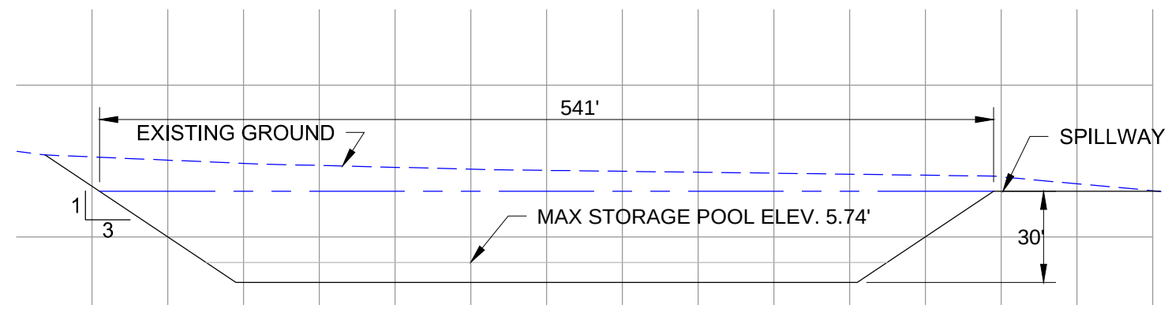

B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT SEDIMENT PONDS WITH 3(H):1(V) SIDE SLOPES. EXTEND 3:1 SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. SEDIMENT POND SHOWN WITH SQUARE GEOMETRY. RECTANGULAR TRAPS MAY BE USED AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. WHEN POND REACHES MAX STORAGE POOL ELEVATION, EQUAL TO 60% OF THE DESIGN SEDIMENT STORAGE CAPACITY, THE POND MUST BE CLEANED OUT.
5. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT TO MEET THE REQUIREMENTS OF ARM 17.24.640(28)(b) AND 17.24.639(1)(d).

Watershed	Drainage Area (acres)	Undisturbed Weighted CN	Bare Weighted CN	Fair Weighted CN	K Factor	Weighted C Factor	Bare C Factor	Fair C Factor	Slope (%)	Length (Ft)
14	31.0	--	89.7	75.9	0.32	--	0.45	0.042	7.0	589
15	715.6	74.7	92.3	80.9	0.32	0.040	0.45	0.042	15.6	936

Pond	Worst-Case Year	Total Area (acres)	Disturbed Area (acres)	Undisturbed Area (acres)	Reclaimed Area (acres)	Peak Flow (cfs)	Runoff Volume (acre-feet)	Average Annual Sediment Yield (acre-feet)	Pit Water Storage (acre-feet)	Required Pond Volume (acre-feet)
EP-6	21	746.6	589.3	116.0	41.3	633.6	110.13	15.73	--	141.6

POND DEPTH (FT)	VOLUME (ACRE-FT)
0.00	0.0
5.00	16.2
10.00	35.2
15.00	57.0
20.00	81.9
25.00	110.2
30.00	141.9

OTTER CREEK MINE - EXHIBIT 315A
DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT

SECOND PHASE OPERATIONAL DRAINAGE CONTROL SEDIMENT POND EP-15 CONFIGURATION

FIGURE **B-31**

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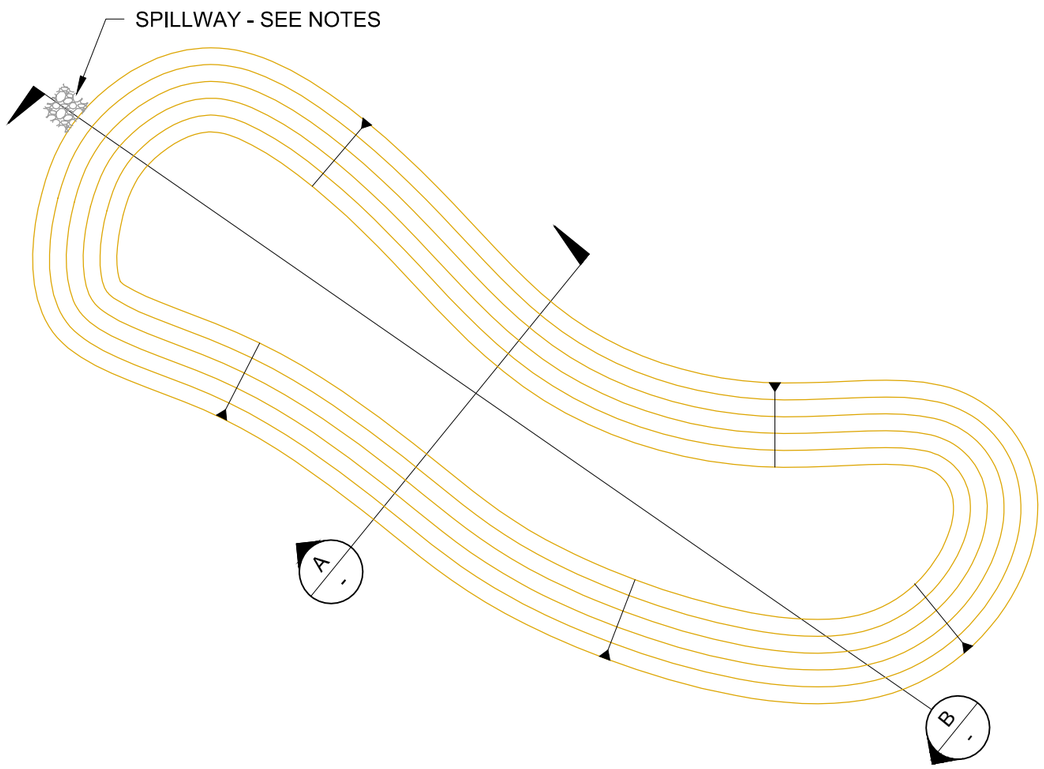
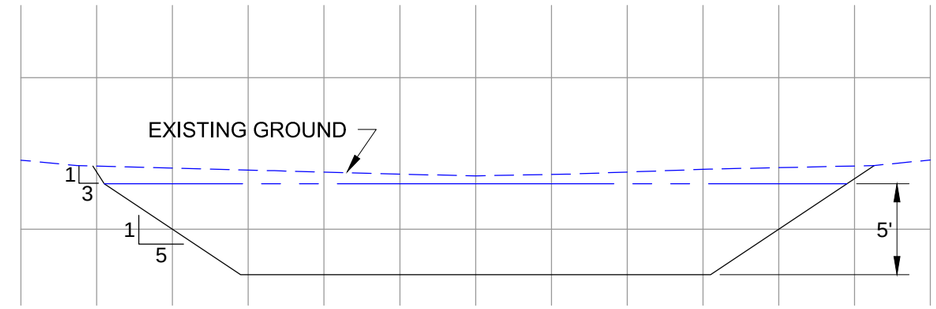
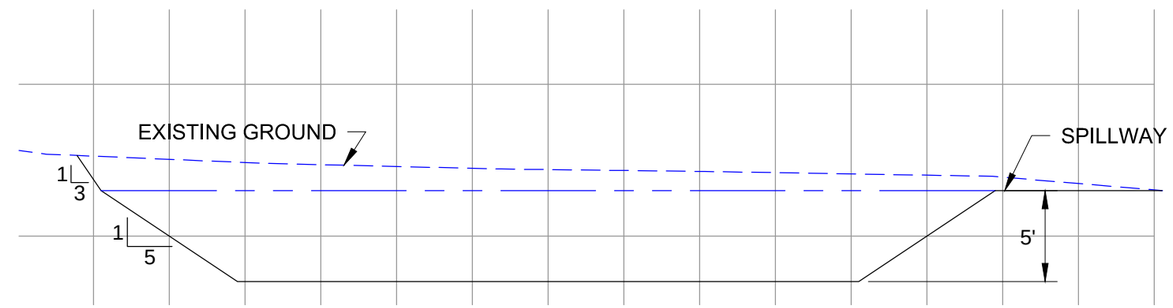


PERMANENT POND - PLAN VIEW
NTS



A - SECTION
TYPICAL SECTION
NTS



B - SECTION
TYPICAL SECTION
NTS

NOTES:

1. CONSTRUCT PERMANENT PONDS WITH 5(H):1(V) SIDE SLOPES BELOW SPILLWAY ELEVATION. USE 3:1 OR SHALLOWER SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. ACTUAL POND GEOMETRY MAY VARY AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT.
5. MINIMUM SPILLWAY WIDTH IS 11'. SPILLWAY OUTLET PROTECTION SHALL CONSIST OF 12" OF RIPRAP (D50 = 9") PLACED ON A 6 OZ GEOTEXTILE. RIPRAP SHALL EXTEND AT LEAST 10 FEET DOWNSTREAM OF POND OUTLET.

Pond	Drainage Area (acres)	Final Grading AASY (acre-feet)	Fully Reclaimed AASY (acre-feet)	Fully Reclaimed 2-yr, 24-hr Runoff (acre-feet)	Required Storage Volume (acre-feet)
EP-1P	335.6	0.21	0.02	1.73	2.16

POND DEPTH (FT)	AREA (ACRES)	VOLUME (ACRE-FT)
0.0	0.25	0.0
2.0	0.40	0.7
4.0	0.56	1.6
5.0	0.65	2.2

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	PERMANENT POND EP-1P CONFIGURATION	FIGURE B-32

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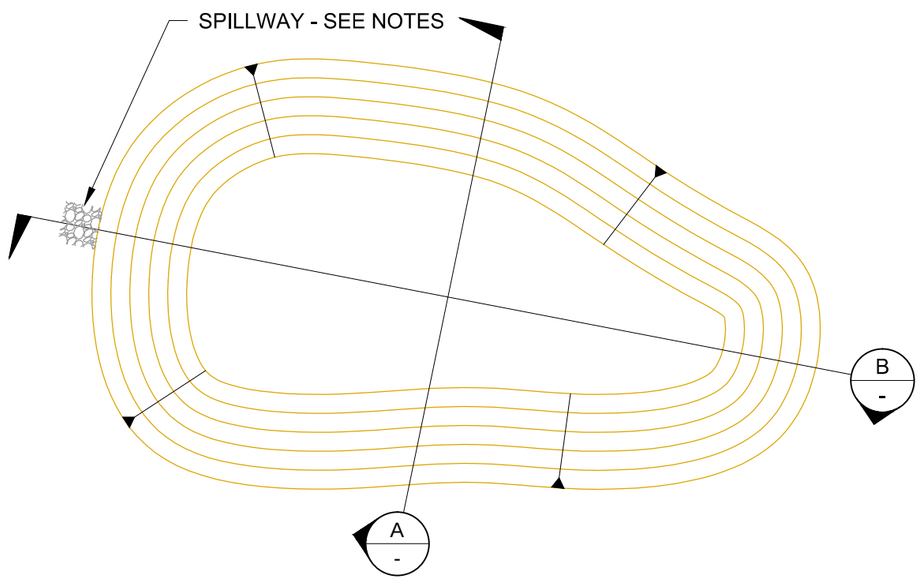
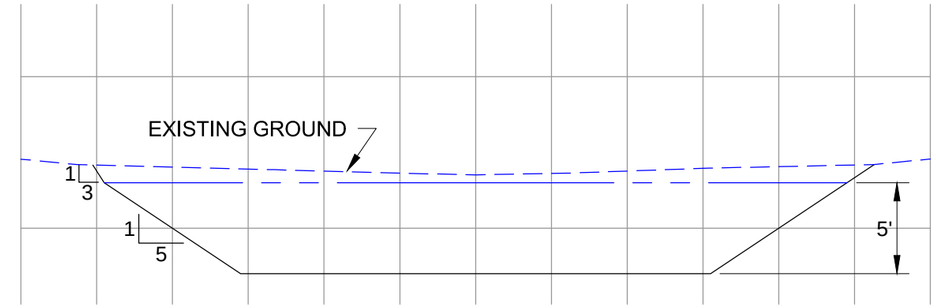
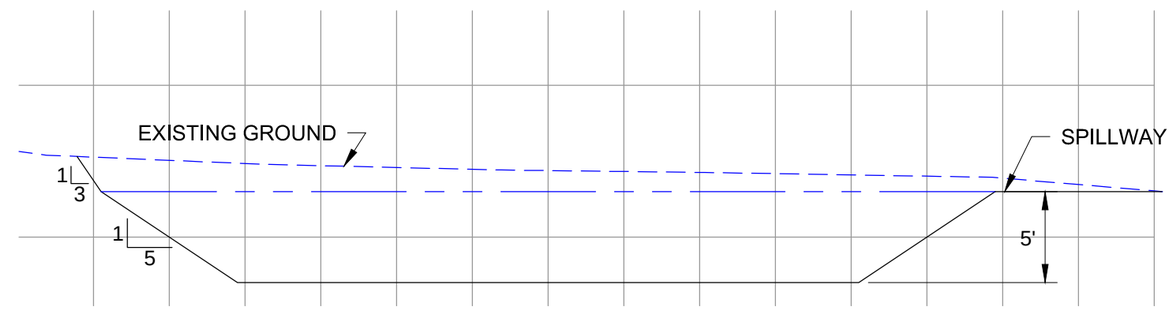


PERMANENT POND - PLAN VIEW
NTS



A - SECTION
TYPICAL SECTION
NTS



B - SECTION
TYPICAL SECTION
NTS

NOTES:

1. CONSTRUCT PERMANENT PONDS WITH 5(H):1(V) SIDE SLOPES BELOW SPILLWAY ELEVATION. USE 3:1 OR SHALLOWER SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. ACTUAL POND GEOMETRY MAY VARY AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT.
5. MINIMUM SPILLWAY WIDTH IS 7'. SPILLWAY OUTLET PROTECTION SHALL CONSIST OF 12" OF RIPRAP (D50 = 9") PLACED ON A 6 OZ GEOTEXTILE. RIPRAP SHALL EXTEND AT LEAST 10 FEET DOWNSTREAM OF POND OUTLET.

Pond	Drainage Area (acres)	Final Grading AASY (acre-feet)	Fully Reclaimed AASY (acre-feet)	Fully Reclaimed 2-yr, 24-hr Runoff (acre-feet)	Required Storage Volume (acre-feet)
EP-5P	349.9	0.25	0.02	0.80	1.25

POND DEPTH (FT)	AREA (ACRES)	VOLUME (ACRE-FT)
0.0	0.16	0.0
2.0	0.25	0.4
4.0	0.35	1.0
5.0	0.40	1.4

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	PERMANENT POND EP-5P CONFIGURATION	FIGURE B-33

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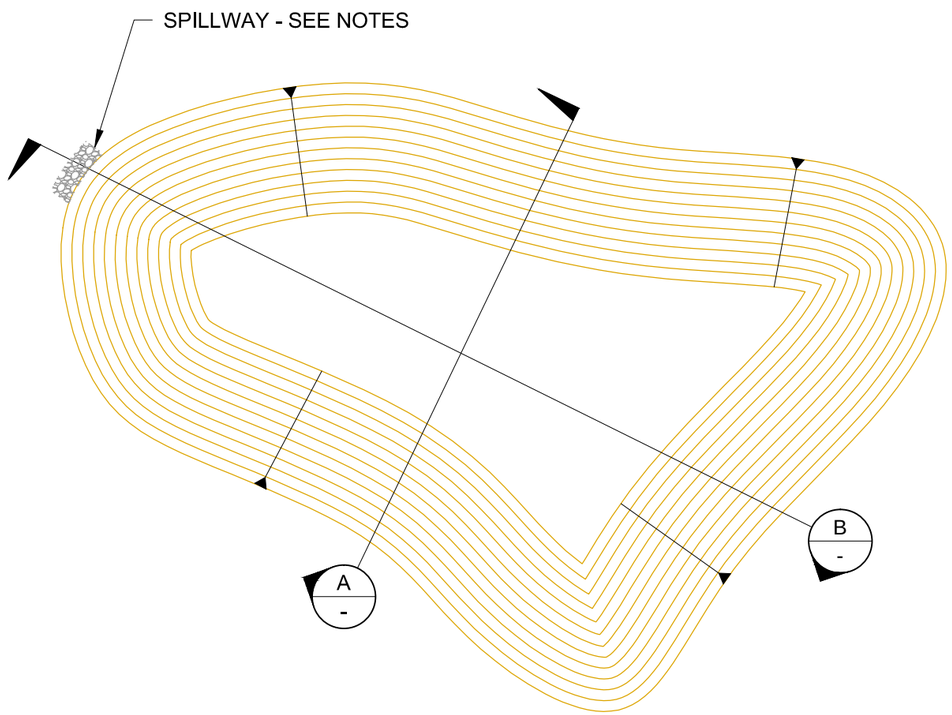
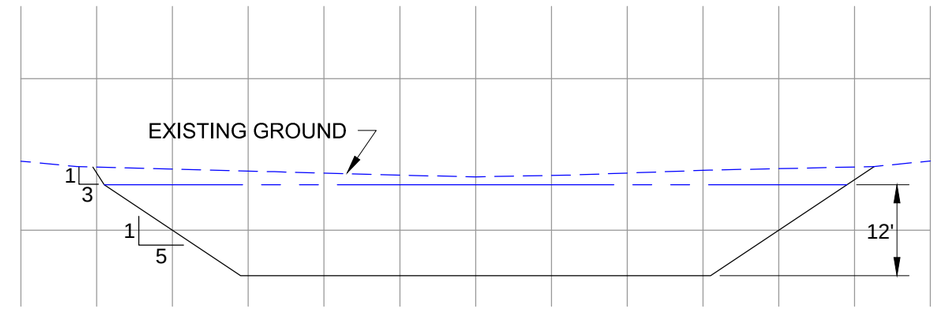


PERMANENT POND - PLAN VIEW

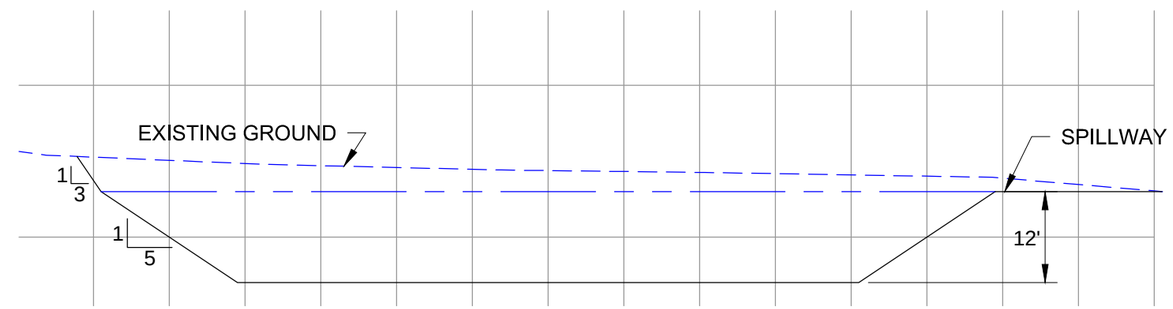
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT PERMANENT PONDS WITH 5(H):1(V) SIDE SLOPES BELOW SPILLWAY ELEVATION. USE 3:1 OR SHALLOWER SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. ACTUAL POND GEOMETRY MAY VARY AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT.
5. MINIMUM SPILLWAY WIDTH IS 28'. SPILLWAY OUTLET PROTECTION SHALL CONSIST OF 12" OF RIPRAP (D50 = 9") PLACED ON A 6 OZ GEOTEXTILE. RIPRAP SHALL EXTEND AT LEAST 10 FEET DOWNSTREAM OF POND OUTLET.

Pond	Drainage Area (acres)	Final Grading AASY (acre-feet)	Fully Reclaimed AASY (acre-feet)	Fully Reclaimed 2-yr, 24-hr Runoff (acre-feet)	Required Storage Volume (acre-feet)
EP-7P	1371.2	2.32	0.66	3.90	12.85

POND DEPTH (FT)	AREA (ACRES)	VOLUME (ACRE-FT)
0.0	0.50	0.0
4.0	0.86	2.7
8.0	1.27	6.9
12.0	1.74	12.9

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	PERMANENT POND EP-7P CONFIGURATION	FIGURE B-34

UPDATE TIME: 3:58 PM
GMETZGER\HEL\20141006\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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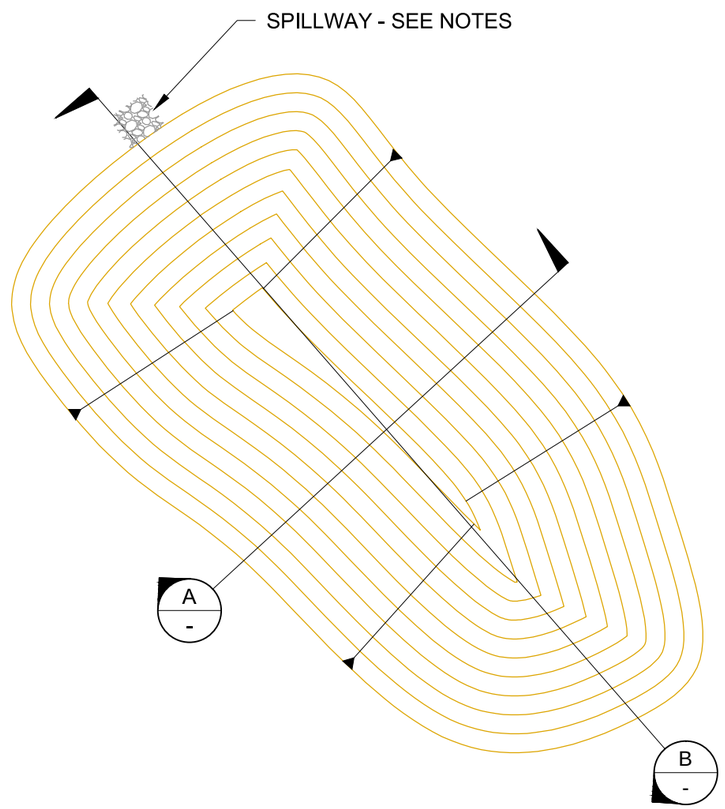
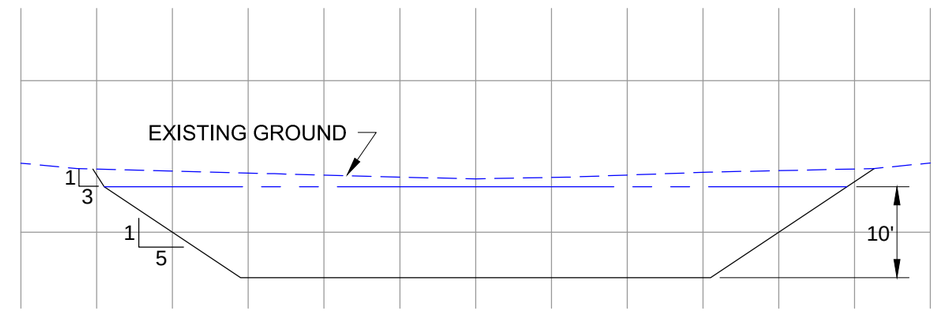


PERMANENT POND - PLAN VIEW

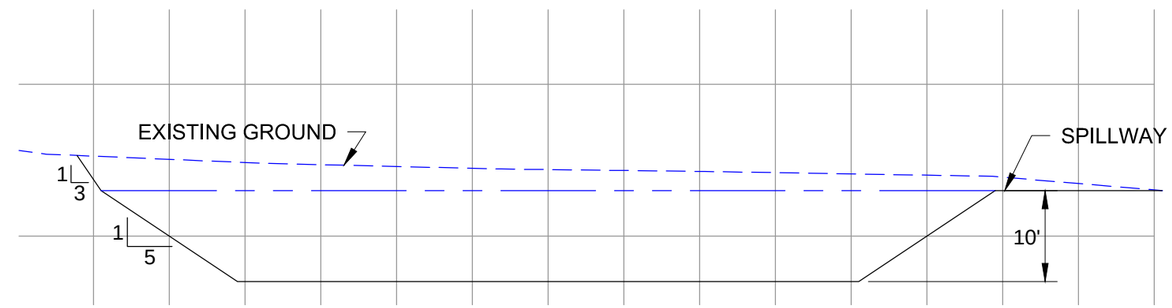
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT PERMANENT PONDS WITH 5(H):1(V) SIDE SLOPES BELOW SPILLWAY ELEVATION. USE 3:1 OR SHALLOWER SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. ACTUAL POND GEOMETRY MAY VARY AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT.
5. MINIMUM SPILLWAY WIDTH IS 9'. SPILLWAY OUTLET PROTECTION SHALL CONSIST OF 12" OF RIPRAP (D50 = 9") PLACED ON A 6 OZ GEOTEXTILE. RIPRAP SHALL EXTEND AT LEAST 10 FEET DOWNSTREAM OF POND OUTLET.

Pond	Drainage Area (acres)	Final Grading AASY (acre-feet)	Fully Reclaimed AASY (acre-feet)	Fully Reclaimed 2-yr, 24-hr Runoff (acre-feet)	Required Storage Volume (acre-feet)
EP-12P	166.0	0.23	0.02	1.48	1.91

POND DEPTH (FT)	AREA (ACRES)	VOLUME (ACRE-FT)
0.0	0.01	0.0
4.0	0.14	0.3
8.0	0.33	1.2
10.0	0.44	1.94

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	PERMANENT POND EP-12P CONFIGURATION	FIGURE B-35

UPDATE TIME: 3:58 PM
GMETZGER\HEL\20141006\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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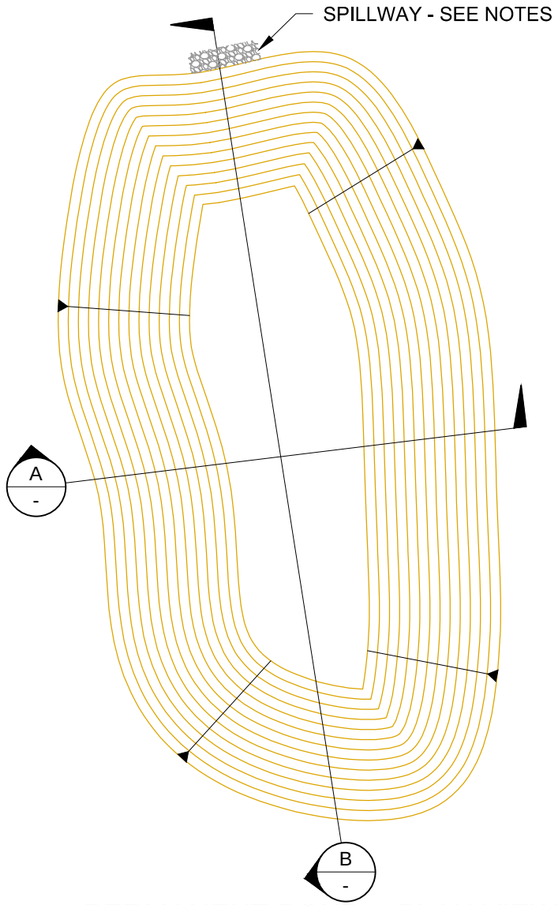
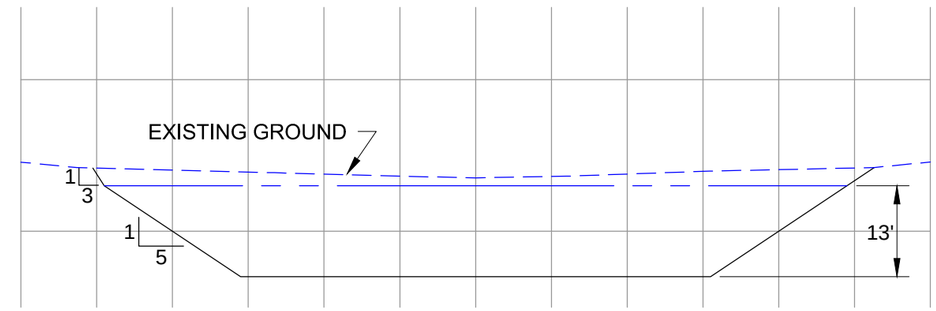


PERMANENT POND - PLAN VIEW

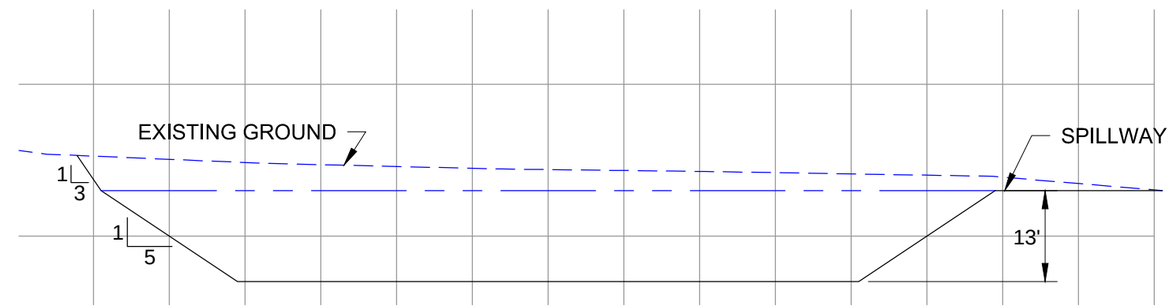
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT PERMANENT PONDS WITH 5(H):1(V) SIDE SLOPES BELOW SPILLWAY ELEVATION. USE 3:1 OR SHALLOWER SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. ACTUAL POND GEOMETRY MAY VARY AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT.
5. MINIMUM SPILLWAY WIDTH IS 36'. SPILLWAY OUTLET PROTECTION SHALL CONSIST OF 12" OF RIPRAP (D50 = 9") PLACED ON A 6 OZ GEOTEXTILE. RIPRAP SHALL EXTEND AT LEAST 10 FEET DOWNSTREAM OF POND OUTLET.

Pond	Drainage Area (acres)	Final Grading AASY (acre-feet)	Fully Reclaimed AASY (acre-feet)	Fully Reclaimed 2-yr, 24-hr Runoff (acre-feet)	Required Storage Volume (acre-feet)
EP-15P1	715.6	8.48	0.09	2.43	11.84

POND DEPTH (FT)	AREA (ACRES)	VOLUME (ACRE-FT)
0.0	0.37	0.0
4.0	0.67	1.9
8.0	1.03	5.4
13.0	1.56	11.9

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	PERMANENT POND EP-15P1 CONFIGURATION	FIGURE B-36

UPDATE TIME: 3:58 PM
GMETZGER\HEL\20141006\I:\LAND PROJECTS\OTRCR\DWG\315A\315A ATTACHMENT C.DWG

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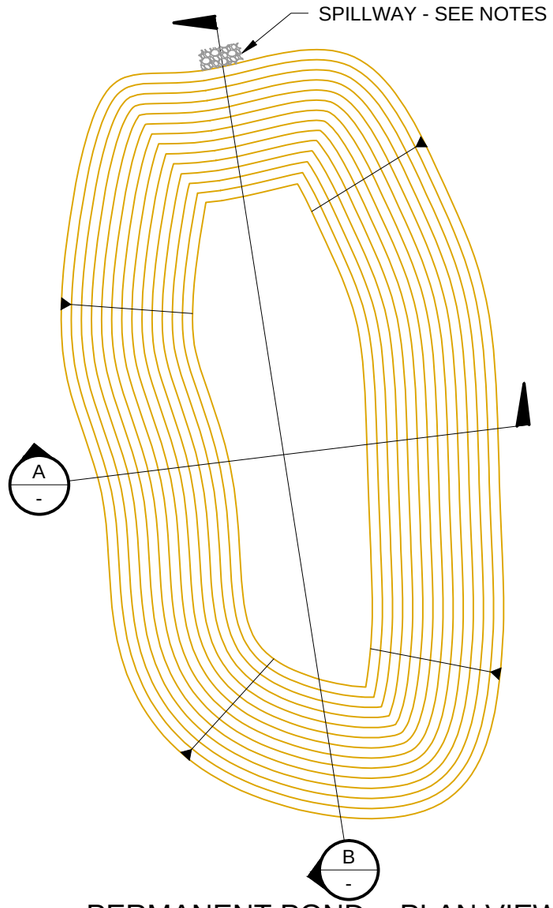
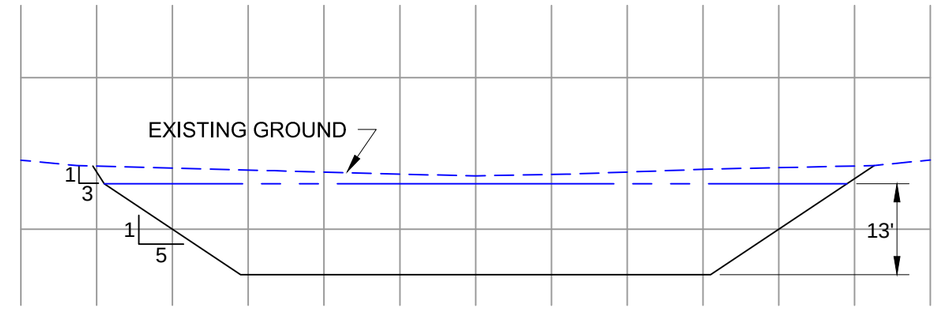


PERMANENT POND - PLAN VIEW

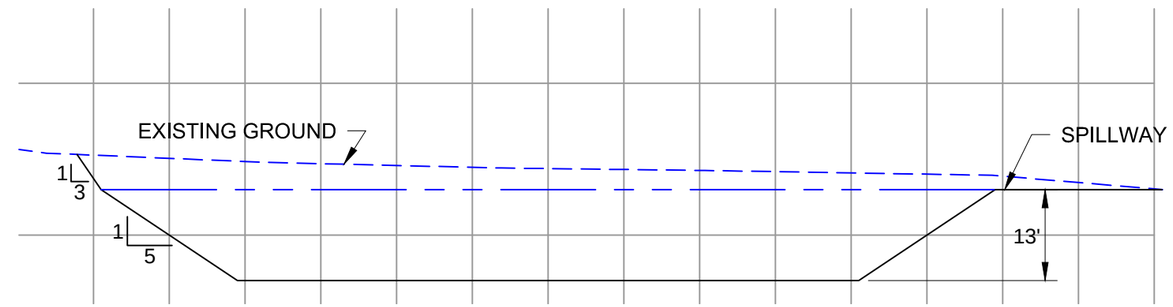
NTS



A - SECTION

TYPICAL SECTION

NTS



B - SECTION

TYPICAL SECTION

NTS

NOTES:

1. CONSTRUCT PERMANENT PONDS WITH 5(H):1(V) SIDE SLOPES BELOW SPILLWAY ELEVATION. USE 3:1 OR SHALLOWER SLOPE TO DAYLIGHT WITH EXISTING GROUND.
2. CONSTRUCT SPILLWAY ON LEVEL TO DAYLIGHT WITH EXISTING GROUND.
3. ACTUAL POND GEOMETRY MAY VARY AS LONG AS STORAGE VOLUME REQUIREMENT IS MET.
4. ONCE CONSTRUCTED THIS DESIGN SHEET CAN BE UPDATED AND CERTIFIED AS AN AS-BUILT.
5. MINIMUM SPILLWAY WIDTH IS 21'. SPILLWAY OUTLET PROTECTION SHALL CONSIST OF 12" OF RIPRAP (D50 = 9") PLACED ON A 6 OZ GEOTEXTILE. RIPRAP SHALL EXTEND AT LEAST 10 FEET DOWNSTREAM OF POND OUTLET.

Pond	Drainage Area (acres)	Final Grading AASY (acre-feet)	Fully Reclaimed AASY (acre-feet)	Fully Reclaimed 2-yr, 24-hr Runoff (acre-feet)	Required Storage Volume (acre-feet)
EP-15P2	406.5	7.06	0.15	3.16	11.70

POND DEPTH (FT)	AREA (ACRES)	VOLUME (ACRE-FT)
0.0	0.37	0.0
4.0	0.67	1.9
8.0	1.03	5.4
13.0	1.56	11.9

OTTER CREEK MINE - EXHIBIT 315A DRAINAGE CONTROL HYDROLOGY AND SEDIMENTOLOGY REPORT	PERMANENT POND EP-15P2 CONFIGURATION	FIGURE B-37

UPDATE TIME: 4:24 PM
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APPENDIX C

OTTER CREEK TRIBUTARY MONITORING DATA

OTTER CREEK MINE BASELINE REPORT 304E
OTTER CREEK TRIBUTARIES SURFACE WATER
(SW-13, SW-14, SW-17, SW-18, SW-19, SW-20
AND SW-21) RESULTS AND STATISTICAL
SUMMARY THROUGH JUNE 2014

		sys_loc_code	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13	SW-14	SW-14	SW-14
		sample_date	6/14/2011	6/14/2011	10/21/2011	12/8/2011	3/14/2012	8/28/2012	2/7/2013	4/25/2013	6/20/2013	6/14/2011	10/25/2011	3/22/2012
		sys_sample_code	OTRCR-1106-102	OTRCR-1106-103	OTRCR-1110-716	OTRCR-1112-103	OCC-1203-107	OCC-1208-203	OCC-1302-701	OCC-1304-209	OCC-1306-112	OTRCR-1106-107	OTRCR-1110-757	OCC-1203-117
		lab_sample_id	H11060328-002	H11060328-003	H11100333-012	H11120137-002	H12030214-008	H12080485-004	H13020128-002	H13040428-010	H13060353-003	H11060328-007	H11100409-004	H12030308-002
chemical_name	**result_unit**	**fraction**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**
ALUMINUM (AL)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	0.3	< 0.1	0.1	< 0.1	< 0.1	
ALUMINUM (AL)	mg/L	TRC	13.3	0.1	1.6	59.6	2.3	8.6	0.2	0.7	50.6	5.7	1.4	2.7
ARSENIC (AS)	mg/L	DIS	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	
ARSENIC (AS)	mg/L	TRC	0.009	< 0.003	< 0.003	0.033	< 0.003	0.006	< 0.003	< 0.003	0.026	< 0.003	< 0.003	< 0.003
BARIUM (BA)	mg/L	DIS	0.078	0.057	0.054	0.073	0.028	0.091	0.07	0.074	0.184	0.082	0.086	
BARIUM (BA)	mg/L	TRC	0.257	0.06	0.057	0.932	0.057	0.202	0.074	0.081	0.639	0.165	0.116	0.132
BERYLLIUM (BE)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
BERYLLIUM (BE)	mg/L	TRC	0.001	< 0.001	< 0.001	0.004	< 0.001	< 0.001	< 0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001
BICARBONATE ALKALINITY AS HCO3	mg/L	NO MEAS	520	590	590	270	120	260	150	390	320	180	210	
BORON (B)	mg/L	DIS	0.68	1.23	0.97	0.15	0.05	0.13	0.11	0.33	0.19	0.03	0.09	
BORON (B)	mg/L	TRC	0.65	1.22	1	0.16	0.05	0.16	0.11	0.34	0.52	0.03	0.06	0.05
CADMIUM (CD)	mg/L	DIS	< 0.00008	< 0.00008	< 0.00008	0.00125	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	
CADMIUM (CD)	mg/L	TRC	0.00035	< 0.00008	< 0.00008	0.00139	0.00009	0.0002	< 0.0001	< 0.00008	0.0011	0.00014	< 0.00008	0.00021
CALCIUM (CA)	mg/L	DIS	273	334	278	67	18	100	42	142	91	55	243	
CALCIUM (CA)	mg/L	TRC	278	341	278	155	22	111	41	141	219	65	143	81
CARBONATE AS CO3	mg/L	NO MEAS	< 4	23	< 4	< 1	< 1	< 1	< 1	63	< 1	< 4	< 4	
CHLORIDE (CL)	mg/L	NO MEAS	15	25	21	27	3	10	4	14	8	1	18	
CHROMIUM (CR)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
CHROMIUM (CR)	mg/L	TRC	0.022	< 0.001	0.002	0.075	0.003	0.012	< 0.001	0.001	0.064	0.009	0.003	0.003
COPPER (CU)	mg/L	DIS	0.002	0.005	0.007	0.009	0.004	0.006	0.007	0.005	0.004	0.002	0.006	
COPPER (CU)	mg/L	TRC	0.023	0.006	0.009	0.102	0.007	0.019	0.007	0.006	0.074	0.013	0.006	0.02
FLUORIDE (F)	mg/L	NO MEAS	0.4	0.6	0.5	0.3	0.1	0.2	0.2	0.4	0.3	0.3	0.9	
IRON (FE)	mg/L	DIS	0.06	0.08	< 0.05	0.12	0.34	0.14	0.26	< 0.05	< 0.05	0.25	< 0.05	
IRON (FE)	mg/L	TRC	20.3	0.2	1.75	83.7	3.1	10.5	0.25	0.84	53.2	7.42	2.33	2.8
LEAD (PB)	mg/L	DIS	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	
LEAD (PB)	mg/L	TRC	0.0191	< 0.0005	0.0016	0.0696	0.0024	0.0081	< 0.0005	0.0007	0.0539	0.0073	0.0018	0.0063
MAGNESIUM (MG)	mg/L	DIS	396	600	546	72	17	100	39	232	71	28	244	
MAGNESIUM (MG)	mg/L	TRC	400	606	535	104	19	110	40	253	264	31	82	45
MANGANESE (MN)	mg/L	DIS	0.122	0.02	0.017	0.041	0.076	0.019	0.032	0.012	0.299	0.214	0.01	
MANGANESE (MN)	mg/L	TRC	0.535	0.017	0.053	2.19	0.134	0.481	0.033	0.028	1.54	0.28	0.041	0.165
MERCURY (HG)	mg/L	DIS	< 0.0001	0.0002	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.0001	< 0.00005	
MERCURY (HG)	mg/L	TOT	< 0.0001	< 0.0001	< 0.00005	0.0002	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.00015	< 0.0001	< 0.00005	0.00005
MOLYBDENUM (MO)	mg/L	DIS	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
MOLYBDENUM (MO)	mg/L	TRC	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005
NICKEL (NI)	mg/L	DIS	0.01	0.02	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
NICKEL (NI)	mg/L	TRC	0.04	0.02	0.01	0.12	< 0.01	0.02	< 0.01	< 0.01	0.09	0.01	< 0.01	0.01
NITRATE + NITRITE AS N	mg/L	NO MEAS	1.39	4.55	2.32	0.35	0.05	0.74	0.44	< 0.01	0.1	0.14	1.29	
pH - LAB	s.u.	NO MEAS	8.1	8.4	8.1	7.5	7.5	7.9	7.7	8.9	7.6	8	8	
PHOSPHORUS (P)	mg/L	TOT	4.58	0.016	0.1							0.211	0.074	
POTASSIUM (K)	mg/L	DIS	14	14	15	24	7	19	8	17	11	6	16	
POTASSIUM (K)	mg/L	TRC	16	13	15	29	8	21	9	17	22	7	9	13
SC (UMHOS/CM AT 25 C)	umhos/cm	NO MEAS	9340	11000	7500	2020	690	3510	1880	8710	4650	796	3640	
SELENIUM (SE)	mg/L	DIS	0.004	0.007	0.006	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	
SELENIUM (SE)	mg/L	TRC	0.005	0.008	0.005	0.003	< 0.001	< 0.001	< 0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001
SODIUM (NA)	mg/L	DIS	1440	1650	1580	350	93	563	315	1790	384	72	437	
SODIUM (NA)	mg/L	TRC	1440	1640	1580	294	96	580	335	1810	1210	74	144	78
SODIUM ADSORPTION RATIO	unitless	NO MEAS	13	12.5	12.7	7.06	3.73	9.35	8.43	21.5	7.31	1.98	4.74	1.72
SULFATE (SO4)	mg/L	NO MEAS	4800	6300	5700	950	220	1600	790	4800	2500	290	2400	
TDS - CALCULATED	mg/L	NO MEAS												
TDS (MEASURED AT 180 C)	mg/L	NO MEAS	7930	10000	9080	1880	414	2700	1360	6780	3690	582	3910	
TOTAL ALKALINITY AS CACO3	mg/L	NO MEAS	420	520	480	220	99	210	120	430	260	140	170	
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	NO MEAS	0.12	< 0.05	< 0.1							0.23	< 0.05	
TOTAL SUSPENDED SOLIDS	mg/L	NO MEAS	2670	45	830	1110	118	912	62	110	1050	122	374	
TURBIDITY (NTU) - LAB	NTU	NO MEAS	87.5	4.4	100000	4770	79.9	274	42.2	8	503	14.2	100000	
VANADIUM (V)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
VANADIUM (V)	mg/L	TRC	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
ZINC (ZN)	mg/L	DIS	0.04	0.01	0.03	0.02	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.02	< 0.01	
ZINC (ZN)	mg/L	TRC	0.2	< 0.01	0.05	0.48	0.02	0.15	< 0.01	< 0.01	0.27	0.07	0.04	0.04

OTTER CREEK MINE BASELINE REPORT 304E
OTTER CREEK TRIBUTARIES SURFACE WATER
(SW-13, SW-14, SW-17, SW-18, SW-19, SW-20
AND SW-21) RESULTS AND STATISTICAL
SUMMARY THROUGH JUNE 2014

		sys_loc_code	SW-14	SW-14	SW-17	SW-17	SW-17	SW-17	SW-18	SW-18	SW-18	SW-18	SW-18	SW-19
		sample_date	8/27/2012	4/26/2013	6/14/2011	10/25/2011	3/15/2012	6/13/2013	6/15/2011	3/22/2012	2/7/2013	4/26/2013	6/20/2013	8/27/2012
		sys_sample_code	OCC-1208-200	OCC-1304-210	OTRCR-1106-108	OTRCR-1110-758	OCC-1203-110	OCC-1306-102	OTRCR-1106-112	OCC-1203-116	OCC-1302-700	OCC-1304-211	OCC-1306-114	OCC-1208-201
		lab_sample_id	H12080485-001	H13040428-011	H11060328-008	H11100409-005	H12030214-011	H13060240-003	H11060332-004	H12030308-001	H13020128-001	H13040428-012	H13060353-005	H12080485-002
chemical_name	result_unit	fraction	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text
ALUMINUM (AL)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	2.4	< 0.1	0.2	< 0.1
ALUMINUM (AL)	mg/L	TRC	2.7	1	5.5	0.6	3.2	0.6	3.1	0.1	7.2	1.4	33.7	
ARSENIC (AS)	mg/L	DIS	< 0.003	< 0.003	< 0.003	< 0.003		< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
ARSENIC (AS)	mg/L	TRC	< 0.003	< 0.003	0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.005	< 0.003	0.023	
BARIUM (BA)	mg/L	DIS	0.14	0.071	0.084	0.064		0.068	0.07	0.066	0.064	0.06	0.069	0.166
BARIUM (BA)	mg/L	TRC	0.165	0.098	0.136	0.052	0.076	0.074	0.109	0.041	0.114	0.073	0.398	
BERYLLIUM (BE)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
BERYLLIUM (BE)	mg/L	TRC	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.003	
BICARBONATE ALKALINITY AS HCO3	mg/L	NO MEAS	150	110	210	520		110	120	210	88	97	130	170
BORON (B)	mg/L	DIS	0.04	0.03	0.18	0.24		0.19	0.04	0.07	0.03	0.03	0.03	0.05
BORON (B)	mg/L	TRC	0.07	0.04	0.17	0.18	0.1	0.19	0.05	0.04	0.04	0.04	0.07	
CADMIUM (CD)	mg/L	DIS	< 0.00008	< 0.00008	< 0.00008	< 0.00008		< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
CADMIUM (CD)	mg/L	TRC	< 0.00008	< 0.00008	0.00016	< 0.00008	0.00016	< 0.00008	0.00014	< 0.00008	0.0002	< 0.00008	0.00085	
CALCIUM (CA)	mg/L	DIS	33	20	181	246		430	28	39	20	17	27	70
CALCIUM (CA)	mg/L	TRC	36	25	179	212	193	431	33	22	20	21	53	
CARBONATE AS CO3	mg/L	NO MEAS	< 1	< 1	< 4	4		< 1	< 4	< 1	< 1	< 1	< 1	< 1
CHLORIDE (CL)	mg/L	NO MEAS	2	3	6	< 50		7	1	15	3	2	1	4
CHROMIUM (CR)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001
CHROMIUM (CR)	mg/L	TRC	0.004	0.002	0.009	0.001	0.006	0.001	0.008	< 0.001	0.011	0.002	0.073	
COPPER (CU)	mg/L	DIS	0.003	0.004	< 0.001	0.003		0.006	0.002	0.007	0.007	0.003	0.002	0.003
COPPER (CU)	mg/L	TRC	0.008	0.008	0.013	0.005	0.024	0.007	0.009	0.005	0.018	0.007	0.084	
FLUORIDE (F)	mg/L	NO MEAS	0.1	< 0.1	0.9	1.2		0.5	2	0.4	< 0.1	< 0.1	< 0.1	0.2
IRON (FE)	mg/L	DIS	0.59	0.38	0.1	0.07		< 0.05	0.05	0.35	1.81	0.77	0.3	0.41
IRON (FE)	mg/L	TRC	3.22	2.12	9.32	0.88	6.32	0.63	5.12	0.35	10.7	3.25	73	
LEAD (PB)	mg/L	DIS	< 0.0005	< 0.0005	< 0.0005	< 0.0005		< 0.0005	< 0.0005	0.0007	0.0013	< 0.0005	< 0.0005	< 0.0005
LEAD (PB)	mg/L	TRC	0.0026	0.0018	0.01	0.0009	0.0064	0.0008	0.0046	0.0008	0.0082	0.0019	0.0578	
MAGNESIUM (MG)	mg/L	DIS	7	7	172	245		146	16	21	7	5	9	28
MAGNESIUM (MG)	mg/L	TRC	10	10	173	149	106	140	19	11	10	8	31	
MANGANESE (MN)	mg/L	DIS	0.012	0.102	0.166	0.025		0.016	< 0.005	0.1	0.043	0.189	0.141	0.039
MANGANESE (MN)	mg/L	TRC	0.098	0.202	0.248	0.038	0.815	0.026	0.109	0.064	0.21	0.258	1.49	
MERCURY (HG)	mg/L	DIS	< 0.00005	< 0.00005	< 0.0001	< 0.00005		< 0.00005	< 0.0001	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
MERCURY (HG)	mg/L	TOT	< 0.00005	< 0.00005	< 0.0001	< 0.00005	< 0.00005	< 0.00005	< 0.0001	< 0.00005	0.00007	< 0.00005	0.0001	
MOLYBDENUM (MO)	mg/L	DIS	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MOLYBDENUM (MO)	mg/L	TRC	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
NICKEL (NI)	mg/L	DIS	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
NICKEL (NI)	mg/L	TRC	< 0.01	0.01	0.02	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.07	
NITRATE + NITRITE AS N	mg/L	NO MEAS	2.59	0.27	0.05	0.54		0.05	< 0.01	0.02	0.18	0.02	0.4	
pH - LAB	s.u.	NO MEAS	7.7	7.1	8	8.3		8.2	7.9	6.7	6.9	7	7.8	7.6
PHOSPHORUS (P)	mg/L	TOT			0.11	0.012			0.179					
POTASSIUM (K)	mg/L	DIS	12	12	14	16		20	7	65	15	9	7	19
POTASSIUM (K)	mg/L	TRC	10	14	15	12	37	20	8	42	12	10	16	
SC (UMHOS/CM AT 25 C)	umhos/cm	NO MEAS	287	205	1760	4740		3750	536	517	173	182	338	1310
SELENIUM (SE)	mg/L	DIS	< 0.001	< 0.001	0.005	0.003		0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
SELENIUM (SE)	mg/L	TRC	< 0.001	< 0.001	0.004	0.003	0.001	0.003	< 0.001	< 0.001	< 0.001	< 0.001	0.002	
SODIUM (NA)	mg/L	DIS	4	8	517	808		331	44	13	8	6	21	161
SODIUM (NA)	mg/L	TRC	3	6	575	415	252	322	50	8	7	7	24	
SODIUM ADSORPTION RATIO	unitless	NO MEAS	0.16	0.38	6.6	4.48	3.61	3.52	1.65	0.42	0.29	0.3	0.89	
SULFATE (SO4)	mg/L	NO MEAS	9	8	800	2100		2400	160	42	22	9	60	530
TDS - CALCULATED	mg/L	NO MEAS							325					
TDS (MEASURED AT 180 C)	mg/L	NO MEAS	180	163	1360	4850		3360		470	169	190	200	856
TOTAL ALKALINITY AS CACO3	mg/L	NO MEAS	120	89	170	430		93	100	170	72	80	110	140
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	NO MEAS			0.45	< 0.05			0.31					
TOTAL SUSPENDED SOLIDS	mg/L	NO MEAS	92	117	18100	1230		40		8700	232	307	1610	26
TURBIDITY (NTU) - LAB	NTU	NO MEAS	331	52.7	100000	100000		13.5			219	216	3500	26.4
VANADIUM (V)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
VANADIUM (V)	mg/L	TRC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	
ZINC (ZN)	mg/L	DIS	< 0.01	0.01	< 0.01	0.01		< 0.01	0.16	0.04	0.02	< 0.01	< 0.01	< 0.01
ZINC (ZN)	mg/L	TRC	0.02	0.02	0.06	0.06	0.09	< 0.01	0.32	0.04	0.06	0.02	0.3	

OTTER CREEK MINE BASELINE REPORT 304E
OTTER CREEK TRIBUTARIES SURFACE WATER
(SW-13, SW-14, SW-17, SW-18, SW-19, SW-20
AND SW-21) RESULTS AND STATISTICAL
SUMMARY THROUGH JUNE 2014

		sys_loc_code	SW-19	SW-20	SW-20	SW-20	SW-20
		sample_date	5/21/2014	6/15/2011	10/25/2011	4/26/2013	6/20/2013
		sys_sample_code	OCC-1405-158	OTRCR-1106-111	OTRCR-1110-754	OCC-1304-212	OCC-1306-113
		lab_sample_id	H14050407-009	H11060332-003	H11100409-001	H13040428-013	H13060353-004
chemical_name	result_unit	fraction	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text
ALUMINUM (AL)	mg/L	DIS	0.017	< 0.1	0.6	1.5	0.1
ALUMINUM (AL)	mg/L	TRC		< 0.1	0.4	15.5	71.7
ARSENIC (AS)	mg/L	DIS	< 0.001	< 0.003	< 0.003	0.003	< 0.003
ARSENIC (AS)	mg/L	TRC		< 0.003	< 0.003	0.015	0.062
BARIUM (BA)	mg/L	DIS	0.06	0.048	0.117	0.128	0.071
BARIUM (BA)	mg/L	TRC		< 0.005	0.112	0.332	0.862
BERYLLIUM (BE)	mg/L	DIS	< 0.0008	< 0.001	< 0.001	< 0.001	< 0.001
BERYLLIUM (BE)	mg/L	TRC		< 0.001	< 0.001	0.002	0.006
BICARBONATE ALKALINITY AS HCO3	mg/L	NO MEAS	160	81	160	100	130
BORON (B)	mg/L	DIS	0.02	0.04	0.05	0.06	0.04
BORON (B)	mg/L	TRC		< 0.01	0.05	0.08	0.13
CADMIUM (CD)	mg/L	DIS	< 0.00003	< 0.00008	< 0.00008	0.00009	< 0.00008
CADMIUM (CD)	mg/L	TRC		< 0.00008	< 0.00008	0.00064	0.0016
CALCIUM (CA)	mg/L	DIS	37	25	72	40	30
CALCIUM (CA)	mg/L	TRC		2	66	96	175
CARBONATE AS CO3	mg/L	NO MEAS	< 1	< 4	< 4	< 1	< 1
CHLORIDE (CL)	mg/L	NO MEAS	3	1	5	3	1
CHROMIUM (CR)	mg/L	DIS	< 0.001	< 0.001	< 0.001	0.002	< 0.001
CHROMIUM (CR)	mg/L	TRC		< 0.001	< 0.001	0.028	0.13
COPPER (CU)	mg/L	DIS	0.001	0.001	0.003	0.006	0.001
COPPER (CU)	mg/L	TRC		< 0.001	0.003	0.039	0.105
FLUORIDE (F)	mg/L	NO MEAS	0.1	0.7	0.5	< 0.1	< 0.1
IRON (FE)	mg/L	DIS	0.03	0.13	0.67	3.49	0.36
IRON (FE)	mg/L	TRC		< 0.05	0.88	33.6	148
LEAD (PB)	mg/L	DIS	< 0.0003	< 0.0005	0.0011	0.0026	< 0.0005
LEAD (PB)	mg/L	TRC		< 0.0005	0.0006	0.0329	0.114
MAGNESIUM (MG)	mg/L	DIS	15	10	19	11	5
MAGNESIUM (MG)	mg/L	TRC		< 1	18	34	84
MANGANESE (MN)	mg/L	DIS	< 0.005	0.012	0.045	0.571	0.468
MANGANESE (MN)	mg/L	TRC		0.011	0.058	1.09	3.39
MERCURY (HG)	mg/L	DIS	< 0.000005	< 0.0001	< 0.00005	< 0.00005	< 0.00005
MERCURY (HG)	mg/L	TOT		< 0.0001	< 0.00005	0.00013	0.00019
MOLYBDENUM (MO)	mg/L	DIS	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MOLYBDENUM (MO)	mg/L	TRC		< 0.005	< 0.005	< 0.005	< 0.005
NICKEL (NI)	mg/L	DIS	< 0.002	< 0.01	< 0.01	< 0.01	< 0.01
NICKEL (NI)	mg/L	TRC		< 0.01	< 0.01	0.04	0.12
NITRATE + NITRITE AS N	mg/L	NO MEAS		0.08	1.32	0.03	0.39
pH - LAB	s.u.	NO MEAS	7.9	8	8.1	7.1	7.4
PHOSPHORUS (P)	mg/L	TOT		0.403	0.018		
POTASSIUM (K)	mg/L	DIS	9	5	16	18	8
POTASSIUM (K)	mg/L	TRC		< 1	15	22	28
SC (UMHOS/CM AT 25 C)	umhos/cm	NO MEAS	396	318	560	201	226
SELENIUM (SE)	mg/L	DIS	< 0.001	0.002	0.001	0.001	< 0.001
SELENIUM (SE)	mg/L	TRC		< 0.001	< 0.001	0.002	0.004
SODIUM (NA)	mg/L	DIS	18	19	23	2	2
SODIUM (NA)	mg/L	TRC		< 1	21	3	8
SODIUM ADSORPTION RATIO	unitless	NO MEAS	0.62	0.8	0.62	0.09	0.11
SULFATE (SO4)	mg/L	NO MEAS	67	82	150	11	9
TDS - CALCULATED	mg/L	NO MEAS		190			
TDS (MEASURED AT 180 C)	mg/L	NO MEAS	253		385	201	171
TOTAL ALKALINITY AS CACO3	mg/L	NO MEAS	130	67	130	84	110
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	NO MEAS		1.44	< 0.05		
TOTAL SUSPENDED SOLIDS	mg/L	NO MEAS	509		286	26	26
TURBIDITY (NTU) - LAB	NTU	NO MEAS	576		486	22.4	86.4
VANADIUM (V)	mg/L	DIS	< 0.01	< 0.1	< 0.1	< 0.1	< 0.1
VANADIUM (V)	mg/L	TRC		< 0.1	< 0.1	< 0.1	0.2
ZINC (ZN)	mg/L	DIS	< 0.008	0.08	0.01	0.04	< 0.01
ZINC (ZN)	mg/L	TRC		0.2	< 0.01	0.24	0.67

APPENDIX D

THREEMILE CREEK TRIBUTARY MONITORING DATA

OTTER CREEK MINE BASELINE REPORT 304E
THREEMILE CREEK TRIBUTARIES SURFACE WATER
(SW-4, SW-6, SW-7, SW-8, AND SW-9) RESULTS
AND STATISTICAL ANALYSIS THROUGH MAY 2014

		sys_loc_code	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-6	SW-6	SW-6
		sample_date	6/14/2011	10/21/2011	12/8/2011	3/22/2012	8/28/2012	4/25/2013	6/14/2013	5/22/2014	6/14/2011	10/21/2011	3/14/2012
		sys_sample_code	OTRCR-1106-104	OTRCR-1110-714	OTRCR-1112-102	OCC-1203-119	OCC-1208-204	OCC-1304-202	OCC-1306-104	OCC-1405-167	OTRCR-1106-105	OTRCR-1110-712	OCC-1203-105
		lab_sample_id	H11060328-004	H11100333-010	H11120137-001	H12030308-004	H12080485-005	H13040428-003	H13060240-005	H14050407-018	H11060328-005	H11100333-008	H12030214-006
chemical_name	**result_unit**	**fraction**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**
ALUMINUM (AL)	mg/L	DIS	< 0.1	< 0.1	0.9	< 0.1	< 0.1	< 0.1	< 0.1	0.023	< 0.1	< 0.1	0.8
ALUMINUM (AL)	mg/L	TRC	8.2	0.7	20.8	0.3	14.7	0.4	51.7	31.9	1.9	1.1	0.5
ARSENIC (AS)	mg/L	DIS	< 0.003	< 0.003	< 0.003	< 0.003	0.007	< 0.003	< 0.003	< 0.001	< 0.003	< 0.003	< 0.003
ARSENIC (AS)	mg/L	TRC	0.004	< 0.003	0.01	< 0.003	0.014	< 0.003	0.025	0.018	< 0.003	< 0.003	< 0.003
BARIUM (BA)	mg/L	DIS	0.084	0.064	0.073	0.106	0.308	0.089	0.099	0.089	0.093	0.084	0.146
BARIUM (BA)	mg/L	TRC	0.174	0.07	0.31	0.121	0.527	0.108	0.82	0.658	0.115	0.091	0.13
BERYLLIUM (BE)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0008	< 0.001	< 0.001	< 0.001
BERYLLIUM (BE)	mg/L	TRC	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	0.003	0.0029	< 0.001	< 0.001	< 0.001
BICARBONATE ALKALINITY AS HCO3	mg/L	NO MEAS	160	170	120	110	230	120	150	210	77	110	180
BORON (B)	mg/L	DIS	0.04	0.03	0.03	0.04	0.04	0.02	0.03	0.02	0.02	0.02	0.03
BORON (B)	mg/L	TRC	0.03	0.03	0.03	0.04	0.06	0.02	0.1	0.04	0.02	0.02	0.02
CADMIUM (CD)	mg/L	DIS	< 0.00008	< 0.00008	0.00096	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00003	< 0.00008	< 0.00008	0.0001
CADMIUM (CD)	mg/L	TRC	0.00018	< 0.00008	0.00048	0.00009	0.00042	< 0.00008	0.0011	0.0018	< 0.00008	< 0.00008	< 0.00008
CALCIUM (CA)	mg/L	DIS	40	23	22	43	40	25	34	32	31	38	60
CALCIUM (CA)	mg/L	TRC	45	23	39	44	62	34	99	81	32	37	53
CARBONATE AS CO3	mg/L	NO MEAS	< 4	< 4	< 1	< 1	< 1	< 1	< 1	< 1	< 4	< 4	< 1
CHLORIDE (CL)	mg/L	NO MEAS	2	5	10	3	8	3	< 1	3	2	2	17
CHROMIUM (CR)	mg/L	DIS	< 0.001	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002
CHROMIUM (CR)	mg/L	TRC	0.028	0.001	0.04	0.001	0.026	< 0.001	0.109	0.072	0.006	0.004	0.001
COPPER (CU)	mg/L	DIS	0.003	0.002	0.008	0.006	0.001	0.004	0.002	0.002	< 0.001	0.001	0.01
COPPER (CU)	mg/L	TRC	0.016	0.003	0.048	0.008	0.034	0.005	0.099	0.073	0.003	0.003	0.006
FLUORIDE (F)	mg/L	NO MEAS	2	0.4	0.1	0.2	0.2	0.1	0.2	0.3	< 0.1	0.4	< 0.1
IRON (FE)	mg/L	DIS	< 0.05	0.22	1.38	0.18	9.14	0.1	0.42	0.07	2.02	0.11	1.34
IRON (FE)	mg/L	TRC	13.7	1.1	38	0.61	30.2	0.89	87.6	59.9	4.3	1.72	1.31
LEAD (PB)	mg/L	DIS	< 0.0005	< 0.0005	0.0013	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0003	< 0.0005	< 0.0005	0.0008
LEAD (PB)	mg/L	TRC	0.0091	0.0009	0.0238	0.001	0.0179	0.0005	0.059	0.0399	0.0032	0.0011	0.0006
MAGNESIUM (MG)	mg/L	DIS	11	5	7	18	11	6	6	7	11	14	21
MAGNESIUM (MG)	mg/L	TRC	15	4	19	17	19	8	40	32	11	13	18
MANGANESE (MN)	mg/L	DIS	0.011	0.023	0.026	0.204	1.71	0.104	0.114	0.038	0.276	0.019	0.141
MANGANESE (MN)	mg/L	TRC	0.238	0.03	0.761	0.217	2.1	0.016	1.74	1.35	0.315	0.028	0.137
MERCURY (HG)	mg/L	DIS	< 0.0001	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.000006	< 0.0001	< 0.00005	< 0.00005
MERCURY (HG)	mg/L	TOT	< 0.0001	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.00007	0.00011	< 0.0001	< 0.00005	< 0.00005
MOLYBDENUM (MO)	mg/L	DIS	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MOLYBDENUM (MO)	mg/L	TRC	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
NICKEL (NI)	mg/L	DIS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.003	< 0.01	< 0.01	< 0.01
NICKEL (NI)	mg/L	TRC	0.02	< 0.01	0.04	< 0.01	0.04	< 0.01	0.1	0.066	< 0.01	< 0.01	< 0.01
NITRATE + NITRITE AS N	mg/L	NO MEAS	0.73	0.03	0.2	0.38	< 0.02	2.26	1.84	0.22	0.03	0.98	0.06
pH - LAB	s.u.	NO MEAS	8	7.7	6.5	6.8	7	7.5	7.3	7.5	7.6	7.7	7.2
PHOSPHORUS (P)	mg/L	TOT	0.223	0.259							0.813	0.03	
POTASSIUM (K)	mg/L	DIS	5	16	14	17	21	9	5	6	5	10	28
POTASSIUM (K)	mg/L	TRC	7	16	17	17	24	9	18	16	6	10	25
SC (UMHOS/CM AT 25 C)	umhos/cm	NO MEAS	380	778	226	241	361	257	245	273	438	423	591
SELENIUM (SE)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
SELENIUM (SE)	mg/L	TRC	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.002	< 0.001	< 0.001	< 0.001
SODIUM (NA)	mg/L	DIS	21	4	8	18	16	3	6	8	23	32	13
SODIUM (NA)	mg/L	TRC	22	3	11	18	8	3	29	9	21	30	11
SODIUM ADSORPTION RATIO	unitless	NO MEAS	0.74	0.2	0.37	0.59	0.58	0.12	0.25	0.33	0.92	1.11	0.4
SULFATE (SO4)	mg/L	NO MEAS	55	330	8	13	2	13	7	11	150	120	110
TDS - CALCULATED	mg/L	NO MEAS	216										
TDS (MEASURED AT 180 C)	mg/L	NO MEAS		608	318	190	200	154	152	176	324	340	500
TOTAL ALKALINITY AS CACO3	mg/L	NO MEAS	130	140	95	93	190	96	130	170	63	93	150
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	NO MEAS	0.33	0.41							2.4	< 0.05	
TOTAL SUSPENDED SOLIDS	mg/L	NO MEAS		350	278	46	1230	312	294	61	54	11000	200
TURBIDITY (NTU) - LAB	NTU	NO MEAS		262	8440	26.3	533	26.3	300	33.4	11.4	100000	111
VANADIUM (V)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1
VANADIUM (V)	mg/L	TRC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.09	< 0.1	< 0.1	< 0.1
ZINC (ZN)	mg/L	DIS	0.02	0.01	0.02	0.03	0.03	0.01	< 0.01	< 0.008	0.01	0.01	0.05
ZINC (ZN)	mg/L	TRC	0.15	0.01	0.19	0.03	0.23	< 0.01	0.4	0.4	0.22	0.04	0.04

OTTER CREEK MINE BASELINE REPORT 304E
THREEMILE CREEK TRIBUTARIES SURFACE WATER
(SW-4, SW-6, SW-7, SW-8, AND SW-9) RESULTS
AND STATISTICAL ANALYSIS THROUGH MAY 2014

		sys_loc_code	SW-6	SW-6	SW-6	SW-6	SW-7	SW-7	SW-7	SW-7	SW-8	SW-8	SW-8
		sample_date	8/28/2012	4/25/2013	6/14/2013	5/22/2014	6/14/2011	3/14/2012	4/25/2013	5/22/2014	8/25/2011	10/20/2011	3/14/2012
		sys_sample_code	OCC-1208-205	OCC-1304-204	OCC-1306-105	OCC-1405-164	OTRCR-1106-106	OCC-1203-106	OCC-1304-203	OCC-1405-165	OTRCR-1108-902	OTRCR-1110-709	OCC-1203-102
		lab_sample_id	H12080485-006	H13040428-005	H13060240-006	H14050407-015	H11060328-006	H12030214-007	H13040428-004	H14050407-016	H11080473-003	H11100333-005	H12030214-003
chemical_name	**result_unit**	**fraction**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**
ALUMINUM (AL)	mg/L	DIS	< 0.1	< 0.1	0.3	0.019	< 0.1		< 0.1	0.011	< 0.1	< 0.1	< 0.1
ALUMINUM (AL)	mg/L	TRC	3	0.8	13		0.8	0.6	0.3		< 0.1	< 0.1	< 0.1
ARSENIC (AS)	mg/L	DIS	< 0.003	< 0.003	0.004	< 0.001	< 0.003		< 0.003	< 0.001	< 0.003	< 0.003	< 0.003
ARSENIC (AS)	mg/L	TRC	< 0.003	< 0.003	0.01		< 0.003	< 0.003	< 0.003		< 0.003	< 0.003	< 0.003
BARIUM (BA)	mg/L	DIS	0.109	0.134	0.088	0.087	0.354		0.051	0.056	0.09	0.055	0.05
BARIUM (BA)	mg/L	TRC	0.146	0.049	0.238		0.334	0.075	0.053		0.089	0.058	0.054
BERYLLIUM (BE)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.0008	< 0.001		< 0.001	< 0.0008	< 0.001	< 0.001	< 0.001
BERYLLIUM (BE)	mg/L	TRC	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
BICARBONATE ALKALINITY AS HCO3	mg/L	NO MEAS	120	140	140	150	290		87	97	520	540	550
BORON (B)	mg/L	DIS	0.03	0.02	0.04	0.02	0.06		0.02	0.03	0.11	0.09	0.07
BORON (B)	mg/L	TRC	0.04	0.02	0.04		0.07	0.07	0.03		0.11	0.09	0.07
CADMIUM (CD)	mg/L	DIS	< 0.00008	< 0.00008	< 0.00008	< 0.00003	< 0.00008		< 0.00008	< 0.00003	< 0.00008	< 0.00008	< 0.00008
CADMIUM (CD)	mg/L	TRC	0.00009	< 0.00008	0.00037		< 0.00008	0.00013	< 0.00008		< 0.00008	< 0.00008	< 0.00008
CALCIUM (CA)	mg/L	DIS	25	34	20	30	127		17	23	284	258	243
CALCIUM (CA)	mg/L	TRC	27	15	30		129	65	18		296	260	240
CARBONATE AS CO3	mg/L	NO MEAS	< 1	< 1	< 1	< 1	< 4		< 1	< 1	< 4	< 4	< 1
CHLORIDE (CL)	mg/L	NO MEAS	2	2	< 1	2	10		2	1	10	10	11
CHROMIUM (CR)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
CHROMIUM (CR)	mg/L	TRC	0.007	< 0.001	0.031		0.002	0.002	< 0.001		< 0.001	< 0.001	< 0.001
COPPER (CU)	mg/L	DIS	< 0.001	0.006	0.001	0.001	0.001		0.003	0.003	< 0.001	< 0.001	< 0.001
COPPER (CU)	mg/L	TRC	0.005	0.003	0.026		0.003	0.014	0.004		< 0.001	< 0.001	< 0.001
FLUORIDE (F)	mg/L	NO MEAS	0.3	< 0.1	0.2	0.1	0.7		< 0.1	< 0.1	0.3	0.3	0.2
IRON (FE)	mg/L	DIS	2.28	0.12	2.54	0.05	0.14		0.13	0.07	< 0.05	< 0.05	< 0.05
IRON (FE)	mg/L	TRC	7.82	0.34	21.4		1.19	1.02	0.54		< 0.05	< 0.05	0.27
LEAD (PB)	mg/L	DIS	< 0.0005	< 0.0005	0.0006	< 0.0003	< 0.0005		< 0.0005	< 0.0003	< 0.0005	< 0.0005	< 0.0005
LEAD (PB)	mg/L	TRC	0.0031	< 0.0005	0.0151		0.0014	0.0011	0.0005		< 0.0005	< 0.0005	< 0.0005
MAGNESIUM (MG)	mg/L	DIS	5	7	6	9	53		4	4	166	168	153
MAGNESIUM (MG)	mg/L	TRC	6	5	12		53	28	5		167	166	148
MANGANESE (MN)	mg/L	DIS	0.473	0.01	0.542	0.013	0.032		0.019	< 0.005	0.022	< 0.005	3.19
MANGANESE (MN)	mg/L	TRC	0.542	0.041	0.853		0.043	0.158	0.027		0.027	0.016	3.42
MERCURY (HG)	mg/L	DIS	< 0.00005	< 0.00005	< 0.00005	< 0.000005	< 0.0001		< 0.00005	< 0.000005	< 0.00005	< 0.00005	< 0.00005
MERCURY (HG)	mg/L	TOT	< 0.00005	< 0.00005	0.00007		< 0.0001	< 0.00005	< 0.00005		< 0.00005	< 0.00005	< 0.00005
MOLYBDENUM (MO)	mg/L	DIS	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MOLYBDENUM (MO)	mg/L	TRC	< 0.005	< 0.005	< 0.005		< 0.005	0.006	< 0.005		< 0.005	< 0.005	< 0.005
NICKEL (NI)	mg/L	DIS	< 0.01	< 0.01	< 0.01	0.002	< 0.01		< 0.01	0.002	< 0.01	< 0.01	< 0.01
NICKEL (NI)	mg/L	TRC	< 0.01	< 0.01	0.03		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01
NITRATE + NITRITE AS N	mg/L	NO MEAS	0.12	3.72	0.06		0.02		0.09		< 0.01	0.11	0.09
pH - LAB	s.u.	NO MEAS	7.3	6.7	7.1	7.6	8.1		6.8	7.5	8.1	8	7.5
PHOSPHORUS (P)	mg/L	TOT					0.106				0.011	0.008	
POTASSIUM (K)	mg/L	DIS	9	11	10	13	14		12	11	11	10	12
POTASSIUM (K)	mg/L	TRC	9	9	12		14	44	13		11	10	12
SC (UMHOS/CM AT 25 C)	umhos/cm	NO MEAS	213	156	259	295	1290		155	182	2860	2860	3140
SELENIUM (SE)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	0.005		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
SELENIUM (SE)	mg/L	TRC	< 0.001	< 0.001	< 0.001		0.006	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001
SODIUM (NA)	mg/L	DIS	2	2	4	10	87		1	< 1	344	361	312
SODIUM (NA)	mg/L	TRC	1	2	4		87	33	1		348	368	314
SODIUM ADSORPTION RATIO	unitless	NO MEAS	0.06	0.07	0.2	0.41	1.64	0.85	0.07	0.03	4	4.29	3.87
SULFATE (SO4)	mg/L	NO MEAS	< 5	2	16	18	540		3	4	1600	1600	1400
TDS - CALCULATED	mg/L	NO MEAS					969						
TDS (MEASURED AT 180 C)	mg/L	NO MEAS	132	92	142	181			161	117	2940	3100	2500
TOTAL ALKALINITY AS CACO3	mg/L	NO MEAS	100	110	110	120	240		71	80	430	440	450
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	NO MEAS					0.4				< 0.05	< 0.05	
TOTAL SUSPENDED SOLIDS	mg/L	NO MEAS	1970	25	734	95			54	14	6	6	20
TURBIDITY (NTU) - LAB	NTU	NO MEAS	4290	8.7	732	50.7			29	10.7	0.7	1.1	2
VANADIUM (V)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.01	< 0.1		< 0.1	< 0.01	< 0.1	< 0.1	< 0.1
VANADIUM (V)	mg/L	TRC	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1
ZINC (ZN)	mg/L	DIS	< 0.01	< 0.01	0.02	< 0.008	0.09		0.03	< 0.008	< 0.01	< 0.01	< 0.01
ZINC (ZN)	mg/L	TRC	0.02	0.02	0.17		0.11	0.25	0.04		< 0.01	< 0.01	< 0.01

OTTER CREEK MINE BASELINE REPORT 304E
THREEMILE CREEK TRIBUTARIES SURFACE WATER
(SW-4, SW-6, SW-7, SW-8, AND SW-9) RESULTS
AND STATISTICAL ANALYSIS THROUGH MAY 2014

		sys_loc_code	SW-8	SW-8	SW-8	SW-8	SW-8	SW-9	SW-9	SW-9	SW-9	SW-9	SW-9
		sample_date	4/19/2012	6/20/2013	7/30/2013	3/21/2014	5/15/2014	8/25/2011	10/20/2011	12/2/2011	3/14/2012	4/19/2012	5/24/2012
		sys_sample_code	OCC-1204-104	OCC-1306-111	OCC-1307-504	OCC-1403-702	OCC-1405-251	OTRCR-1108-903	OTRCR-1110-706	OTRCR-1112-101	OCC-1203-103	OCC-1204-101	OCC-1205-601
		lab_sample_id	H12040346-005	H13060353-002	H13070565-005	H14030299-024	H14050292-029	H11080473-004	H11100333-002	H11120042-002	H12030214-004	H12040346-002	H12050407-002
chemical_name	**result_unit**	**fraction**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**	**report_result_text**
ALUMINUM (AL)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.009	< 0.009	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1
ALUMINUM (AL)	mg/L	TRC	< 0.1	< 0.1	0.3	0.543	< 0.009	0.1	0.5	0.9	0.1	< 0.1	0.9
ARSENIC (AS)	mg/L	DIS	< 0.003	< 0.003	< 0.003	< 0.001	< 0.001	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
ARSENIC (AS)	mg/L	TRC	< 0.003	< 0.003	< 0.003	< 0.001	< 0.001	< 0.003	< 0.003	< 0.003	< 0.003	0.003	< 0.003
BARIUM (BA)	mg/L	DIS	0.032	0.069	0.044	0.041	0.024	0.05	0.035	0.043	0.052	0.035	0.025
BARIUM (BA)	mg/L	TRC	0.034	0.071	0.049	0.048	0.024	0.054	0.039	0.054	0.052	0.067	0.04
BERYLLIUM (BE)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.0008	< 0.0008	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
BERYLLIUM (BE)	mg/L	TRC	< 0.001	< 0.001	< 0.001	< 0.0008	< 0.0008	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
BICARBONATE ALKALINITY AS HCO3	mg/L	NO MEAS	590	590	530	570	480	280	160	110	470	440	600
BORON (B)	mg/L	DIS	0.09	0.11	0.12	0.08	0.07	0.4	0.11	0.06	0.28	0.15	0.21
BORON (B)	mg/L	TRC	0.08	0.12	0.12	0.08	0.07	0.39	0.1	0.05	0.27	0.18	0.21
CADMIUM (CD)	mg/L	DIS	< 0.00008	< 0.00008	< 0.00008	< 0.00003	< 0.00003	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00019	< 0.00008
CADMIUM (CD)	mg/L	TRC	< 0.00008	< 0.00008	< 0.00008	0.00008	< 0.00003	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00016	0.00012
CALCIUM (CA)	mg/L	DIS	234	244	167	187	100	293	215	94	237	236	356
CALCIUM (CA)	mg/L	TRC	232	248	182	191	96	305	214	98	244	368	326
CARBONATE AS CO3	mg/L	NO MEAS	< 1	< 1	13	< 1	2	< 4	< 4	< 4	< 1	< 1	< 1
CHLORIDE (CL)	mg/L	NO MEAS	11	7	3	8	3	27	27	23	15	18	25
CHROMIUM (CR)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
CHROMIUM (CR)	mg/L	TRC	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	0.005	0.001
COPPER (CU)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	0.003	0.007	0.004	0.003	< 0.001
COPPER (CU)	mg/L	TRC	< 0.001	< 0.001	< 0.001	0.002	< 0.001	0.003	0.006	0.007	0.004	0.014	0.004
FLUORIDE (F)	mg/L	NO MEAS	0.3	0.3	0.3	0.2	0.3	0.3	1.4	0.9	0.3	0.2	0.5
IRON (FE)	mg/L	DIS	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	0.07	0.26	0.11	< 0.05	0.15	< 0.05
IRON (FE)	mg/L	TRC	0.26	0.19	0.48	0.92	0.05	1.33	0.95	0.29	0.27	6.21	1.11
LEAD (PB)	mg/L	DIS	< 0.0005	< 0.0005	< 0.0005	< 0.0003	< 0.0003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
LEAD (PB)	mg/L	TRC	0.0006	< 0.0005	< 0.0005	0.0008	< 0.0003	< 0.0005	0.001	< 0.0005	< 0.0005	0.0057	0.001
MAGNESIUM (MG)	mg/L	DIS	169	133	125	96	68	530	348	66	281	265	451
MAGNESIUM (MG)	mg/L	TRC	169	130	123	93	64	532	342	70	285	450	448
MANGANESE (MN)	mg/L	DIS	0.214	0.312	0.005	0.014	0.011	0.618	0.212	0.059	0.132	< 0.005	0.065
MANGANESE (MN)	mg/L	TRC	0.229	0.32	0.025	0.06	0.01	0.883	0.21	0.065	0.134	2.09	0.084
MERCURY (HG)	mg/L	DIS	< 0.00005	< 0.00005	< 0.00005	< 0.000005	< 0.000005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
MERCURY (HG)	mg/L	TOT	< 0.00005	< 0.00005	< 0.00005	< 0.000005	< 0.000005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
MOLYBDENUM (MO)	mg/L	DIS	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MOLYBDENUM (MO)	mg/L	TRC	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005
NICKEL (NI)	mg/L	DIS	< 0.01	< 0.01	< 0.01	< 0.002	< 0.002	< 0.01	0.01	< 0.01	0.01	< 0.01	< 0.01
NICKEL (NI)	mg/L	TRC	< 0.01	< 0.01	< 0.01	0.003	< 0.002	0.01	0.01	< 0.01	0.01	0.02	< 0.01
NITRATE + NITRITE AS N	mg/L	NO MEAS	< 0.01	< 0.01	< 0.01	0.06	< 0.01	0.02	< 0.02	0.25	0.01	< 0.02	0.28
pH - LAB	s.u.	NO MEAS	7.7	7.9	8.1	8	7.8	8.3	7	7.2	7.9	7.1	7.8
PHOSPHORUS (P)	mg/L	TOT						0.149	0.151				
POTASSIUM (K)	mg/L	DIS	10	11	10	13	6	28	44	32	12	15	17
POTASSIUM (K)	mg/L	TRC	10	12	11	14	6	28	45	32	13	17	18
SC (UMHOS/CM AT 25 C)	umhos/cm	NO MEAS	3310	2850	2670	2230	1610	6570	5150	1410	5410	3600	7470
SELENIUM (SE)	mg/L	DIS	< 0.001	0.001	< 0.001	0.003	< 0.001	0.001	0.002	0.002	< 0.001	0.001	< 0.001
SELENIUM (SE)	mg/L	TRC	< 0.001	< 0.001	< 0.001	0.002	< 0.001	0.001	0.002	< 0.001	< 0.001	0.001	< 0.001
SODIUM (NA)	mg/L	DIS	352	280	294	220	185	1140	840	138	737	696	995
SODIUM (NA)	mg/L	TRC	345	300	290	228	188	1160	840	144	746	963	1040
SODIUM ADSORPTION RATIO	unitless	NO MEAS	4.27	3.58	4.19	3.25	3.48	9.21	8.24	3.21	7.67	7.39	8.26
SULFATE (SO4)	mg/L	NO MEAS	1600	1200	1200	970	560	5000	3600	690	2800	2900	4200
TDS - CALCULATED	mg/L	NO MEAS											
TDS (MEASURED AT 180 C)	mg/L	NO MEAS	2960	2250	2130	1710	1150	7570	6140	1160	4540	4670	6490
TOTAL ALKALINITY AS CACO3	mg/L	NO MEAS	480	480	450	470	400	230	130	87	380	360	490
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	NO MEAS						< 0.05	0.1				
TOTAL SUSPENDED SOLIDS	mg/L	NO MEAS	< 4	16	18	36	< 4	48	592	148	16	70	120
TURBIDITY (NTU) - LAB	NTU	NO MEAS	2.8	2.5	10.3	17	0.7	23.2	323	84.3	2.9	31.8	6.4
VANADIUM (V)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.01	< 0.01	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
VANADIUM (V)	mg/L	TRC	< 0.1	< 0.1	< 0.1	< 0.01	< 0.01	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
ZINC (ZN)	mg/L	DIS	< 0.01	< 0.01	< 0.01	< 0.008	< 0.008	< 0.01	0.19	0.04	0.04	0.04	0.13
ZINC (ZN)	mg/L	TRC	< 0.01	< 0.01	< 0.01	0.009	< 0.008	< 0.01	0.19	0.05	0.06	0.44	0.09

OTTER CREEK MINE BASELINE REPORT 304E
THREEMILE CREEK TRIBUTARIES SURFACE WATER
(SW-4, SW-6, SW-7, SW-8, AND SW-9) RESULTS
AND STATISTICAL ANALYSIS THROUGH MAY 2014

		sys_loc_code	SW-9	SW-9	SW-9	SW-9	SW-9	SW-9
		sample_date	6/7/2012	8/28/2012	4/25/2013	6/14/2013	3/24/2014	5/22/2014
		sys_sample_code	OCC-1206-102	OCC-1208-209	OCC-1304-208	OCC-1306-107	OCC-1403-705	OCC-1405-162
		lab_sample_id	H12060165-003	H12080485-010	H13040428-009	H13060240-008	H14030353-001	H14050407-013
chemical_name	result_unit	fraction	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text	report_result_text
ALUMINUM (AL)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.1	0.019	< 0.009
ALUMINUM (AL)	mg/L	TRC	< 0.1	1	1.2	< 0.1	0.217	0.191
ARSENIC (AS)	mg/L	DIS	< 0.003	0.008	< 0.003	< 0.003	< 0.001	0.001
ARSENIC (AS)	mg/L	TRC	< 0.003	0.009	< 0.003	< 0.003	0.001	0.001
BARIUM (BA)	mg/L	DIS	0.033	0.07	0.085	0.063	0.07	0.042
BARIUM (BA)	mg/L	TRC	0.032	0.078	0.071	0.064	0.076	0.045
BERYLLIUM (BE)	mg/L	DIS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0008	< 0.0008
BERYLLIUM (BE)	mg/L	TRC	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0008	< 0.0008
BICARBONATE ALKALINITY AS HCO3	mg/L	NO MEAS	390	370	120	510	710	710
BORON (B)	mg/L	DIS	0.13	0.16	0.06	0.4	0.18	0.31
BORON (B)	mg/L	TRC	0.17	0.33	0.05	0.38	0.18	0.32
CADMIUM (CD)	mg/L	DIS	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00003	< 0.00003
CADMIUM (CD)	mg/L	TRC	< 0.00008	< 0.0002	< 0.00008	< 0.00008	< 0.00003	< 0.00003
CALCIUM (CA)	mg/L	DIS	290	237	100	314	296	248
CALCIUM (CA)	mg/L	TRC	284	357	74	326	282	239
CARBONATE AS CO3	mg/L	NO MEAS	< 1	< 1	< 1	16	13	< 1
CHLORIDE (CL)	mg/L	NO MEAS	40	51	6	21	19	10
CHROMIUM (CR)	mg/L	DIS	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001
CHROMIUM (CR)	mg/L	TRC	< 0.001	0.004	0.002	< 0.001	< 0.001	< 0.001
COPPER (CU)	mg/L	DIS	0.011	< 0.001	0.004	0.003	0.002	0.002
COPPER (CU)	mg/L	TRC	0.009	0.006	0.01	0.003	0.003	0.003
FLUORIDE (F)	mg/L	NO MEAS	0.2	0.5	0.3	0.4	0.3	0.5
IRON (FE)	mg/L	DIS	0.08	0.06	1.09	< 0.05	0.04	< 0.02
IRON (FE)	mg/L	TRC	0.62	1.51	2.52	0.12	0.34	0.36
LEAD (PB)	mg/L	DIS	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0003	< 0.0003
LEAD (PB)	mg/L	TRC	< 0.0005	0.0012	0.0015	< 0.0005	0.0003	0.0004
MAGNESIUM (MG)	mg/L	DIS	337	391	59	398	364	331
MAGNESIUM (MG)	mg/L	TRC	341	896	44	381	368	329
MANGANESE (MN)	mg/L	DIS	0.282	1.15	0.51	0.041	0.013	0.047
MANGANESE (MN)	mg/L	TRC	1.8	1.15	0.412	0.046	0.021	0.074
MERCURY (HG)	mg/L	DIS	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.000005	< 0.000005
MERCURY (HG)	mg/L	TOT	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.000005	0.000006
MOLYBDENUM (MO)	mg/L	DIS	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MOLYBDENUM (MO)	mg/L	TRC	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
NICKEL (NI)	mg/L	DIS	0.02	0.01	< 0.01	< 0.01	0.003	0.005
NICKEL (NI)	mg/L	TRC	0.02	0.02	< 0.01	< 0.01	0.004	0.006
NITRATE + NITRITE AS N	mg/L	NO MEAS	0.05	< 0.02	0.45	< 0.01	< 0.01	< 0.01
pH - LAB	s.u.	NO MEAS	7.5	7.4	7.1	8.2	8.3	8.1
PHOSPHORUS (P)	mg/L	TOT						
POTASSIUM (K)	mg/L	DIS	33	43	13	18	15	13
POTASSIUM (K)	mg/L	TRC	32	72	16	19	15	13
SC (UMHOS/CM AT 25 C)	umhos/cm	NO MEAS	6370	6900	1220	6790	6380	5640
SELENIUM (SE)	mg/L	DIS	0.001	0.024	< 0.001	0.001	0.003	< 0.001
SELENIUM (SE)	mg/L	TRC	0.001	0.012	< 0.001	0.001	0.003	< 0.001
SODIUM (NA)	mg/L	DIS	806	1010	389	959	914	823
SODIUM (NA)	mg/L	TRC	842	1850	131	971	914	849
SODIUM ADSORPTION RATIO	unitless	NO MEAS	7.63	9.36	7.62	8.48	8.4	8.04
SULFATE (SO4)	mg/L	NO MEAS	3700	4500	480	4400	3600	3100
TDS - CALCULATED	mg/L	NO MEAS						
TDS (MEASURED AT 180 C)	mg/L	NO MEAS	6180	7270	868	6330	6130	5230
TOTAL ALKALINITY AS CACO3	mg/L	NO MEAS	320	300	97	450	600	580
TOTAL AMMONIA (NH3+NH4 AS N)	mg/L	NO MEAS						
TOTAL SUSPENDED SOLIDS	mg/L	NO MEAS	40	540	164	60	16	12
TURBIDITY (NTU) - LAB	NTU	NO MEAS	10.6	273	52.1	2.9	4.9	5.7
VANADIUM (V)	mg/L	DIS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.01	< 0.01
VANADIUM (V)	mg/L	TRC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.01	< 0.01
ZINC (ZN)	mg/L	DIS	0.13	0.01	< 0.01	< 0.01	0.009	< 0.008
ZINC (ZN)	mg/L	TRC	0.1	0.05	0.06	< 0.01	0.015	< 0.008