mcgehee engineering corp

April 29, 2024

Mr. Stephen D. Miles, P.E.
**Alabama Surface Mining Commission**
P. O. Box 2390
Jasper, AL 35502-2390

RE: **Southland Resources, Inc.**
Swann's Crossing Mine, P-3944, R-12

Dear Mr. Miles:

I hereby certify the enclosed detailed modification plans for Phase 2 of Sediment Basin 004 for the above referenced mine are in accordance with the Regulations of the Alabama Surface Mining Commission as adopted by Act 81-435 of December 18, 1981 and as amended to date and that the information used in the enclosed basin design plans is true and correct to the best of my knowledge and belief.

If you have any questions or need additional information, please do not hesitate to contact our office.

Sincerely,

**McGehee Engineering Corp.**

ALABAMA LICENSED No. 17067 PROFESSIONAL ENGINEER C.W. McGEHEE

C. W. McGehee, P.E.
Alabama Reg. No. 17067

Post Office Box 3431 • 450 19th St. West • Jasper, Alabama 35502-3431 • 205-221-0686 • Fax 205-221-7721 • cw@mcgehee.org

## General Notes:

1. Once initial construction begins on the basin it will be constructed and certified to the Regulatory Authority within 90 days unless an extension is approved by the Director.
2. Because of the large disturbed area and drainage area of Sediment Basin 004, Phase 2 of the design plan had to be modified to create additional sediment and detention volume than originally proposed. See the attached Sediment Basin 004 – Phase 2 Modification Plan.
3. Due to the obvious safety concerns of impounding large volumes of water above or adjacent to the existing and proposed underground mines (Kellerman Mine and Kellerman East Mine) at this facility, and because all disturbed drainage is and will be captured in the pit area and pumped up to an existing sediment basin, Southland Resources, Inc. proposes that the reconstruction timetable for Phase 2 of Sediment Basin 004 be extended until 6 months following the completion of mining and closure of the Kellerman UG Mine. A second reason for this request is as follows: Reclamation of the underground mines and current pit area will require a substantial amount of backfilling and regrading in the Sediment Basin 004 design pool area. It will be at that time that SRI will be able to configure and shape the pool area in accordance with the final proposed design requirements.
4. The attached Sediment Basin 004 – Phase 2 Modification Plan was designed in such a manner as to capture and treat the entire disturbed area and drainage area of Sediment Basin 012. During the final grading process, all disturbed area and drainage area which previous drained in Sediment Basin 012 will be routed into Sediment Basin 004.
5. Any reconstructed portion of the pool area located in spoil material will be lined with a clay liner up to the emergency spillway to ensure that the impoundment retains water. See attached Typical Clay Liner drawing.

# SEDIMENT BASIN CONSTRUCTION SPECIFICATIONS

Sediment basins (temporary or permanent) will be designed and constructed using the following as minimum specifications:

## 1. EMBANKMENT REQUIREMENTS

A) The minimum width of the top of the embankment will under no circumstance be less than twelve (12) feet.

B) The embankment will have a minimum front and back slope no steeper than the slopes listed on the detailed design sheet.

C) The foundation area of the embankment will be cleared and grubbed of all organic matter with no surface slope steeper than 1 horizontal to 1 vertical. The entire wet area, as measured from the upstream toe of the embankment to the normal pool level, will be cleared of trees and large brush.

D) A core will be constructed in a cutoff trench along the centerline of the embankment. The cutoff trench will be of suitable depth and width to attain relatively impervious material.

E) The embankment construction material will be free of sod, roots, stumps, rocks, etc., which exceed six (6") inches in diameter. The embankment material will be placed in layers of twelve (12") inches or less and compacted to ninety five (95%) percent of the standard proctor density, as set forth in ASTM.

F) The embankment, foundation and abutments will be designed and constructed to be stable under normal construction and operating conditions, with a minimum static safety factor of 1.3 at normal pool level with steady seepage saturation conditions.

G) The actual constructed height of the embankment will be a minimum of five (5%) percent higher than the design height to allow for settling over the life of the embankment.

H) The design embankment height for temporary impoundments will be a minimum of one (1) foot above the maximum water level anticipated from a 10 Year - 24 Hour or a 25 Year - 6 Hour precipitation event (whichever is greater). The design embankment height for permanent impoundments will be a minimum of one (1) foot above the maximum water level anticipated from a 10 Year - 24 Hour or a 25 Year - 6 Hour precipitation event (whichever is greater).

I) For embankments constructed as point source discharges, the embankment will be constructed and abutments keyed into undisturbed, virgin, ground if at all possible. In the event that this can not be achieved, additional design and construction specifications will be submitted in the detailed design plans.

J) The embankment and all areas disturbed in the construction of the embankment will be seeded with a mixture of perennial and annual grasses, fertilized and mulched to prevent erosion and ensure restabilization. Hay dams, silt fences, rock check dams, etc. will be installed, where deemed necessary, as additional erosion prevention methods.

## 2. DISCHARGE STRUCTURE REQUIREMENTS

A) The primary spillway will be designed to adequately carry the anticipated peak runoff from a 10 Year - 24 Hour precipitation event. The combination primary and secondary (emergency) spillway system will be designed to safely carry the anticipated peak runoff from a 25 Year - 6 Hour precipitation event. When sediment basins are proposed in the drainage course of a public water supply, the spillway system will be designed and constructed to adequately carry the runoff from a 50 Year - 24 Hour precipitation event.

B) Channel linings, for secondary (emergency) spillways will be a trapezoidal open channel constructed in natural ground and planted with a mixture of both annual and perennial grasses being predominantly fescue and bermuda. In the event that the spillway can not be constructed in natural ground the spillway will be lined with riprap, concrete, asphalt or durable rock (See Detailed Design Plans for Spillway Lining).

C) When consisting of pipe, the primary spillway will be installed according to Class "C" pipe installation for embankment bedding.

D) Sediment basins with a single spillway system, such as a skimmer board, will be a trapezoidal open channel constructed in consolidated, nonerodible material and lined with rip-rap, concrete, asphalt or durable rock (See Detailed Design Plans for Spillway Lining).

E) The primary spillway will be designed and constructed with device to eliminate floating solids from leaving the impoundment. This device will consist of a turned down elbow when using pipe or a skimmer system when using an open channel spillway.

F) When necessary, to prevent erosion of the embankment or discharge area, a splash pad of rip-rap, durable rock, sacrete, etc. will be installed at the discharge end of the primary spillway.

G) The combined spillway systems, for sediment basins constructed in series, will be designed to adequately accommodate the entire drainage area.

## 3. INSPECTION, MAINTENANCE AND CERTIFICATION REQUIREMENTS

A) Inspections will be conducted regularly during construction of the sediment basin by a qualified registered professional engineer or other qualified person under the direction of a professional engineer. Upon completion of construction, the sediment basin will be certified, by a qualified registered professional engineer, to the Regulatory Authority as having been constructed in accordance with the approved detailed design plans.

B) Sediment basins will be inspected semi-monthly for erosion, instability, etc., with maintenance performed as necessary, until the removal of the structure or until a Phase III Bond Release is granted.

C) Sediment basins will be examined quarterly for structural weakness, instability, erosion, slope failure, or other hazardous conditions with maintenance performed as necessary.

D) Formal inspections will be made annually, by a qualified registered professional engineer or other qualified person under the direction of a professional engineer, including any reports or modifications, in accordance with 880-X- 10C- .20[1(j)] of the Alabama Surface Mining Regulations.

E) Retained sediment will be removed from each sediment basin when the accumulated sediment reaches the maximum allowable sediment volume as set forth in the detailed design plans.

## 4. BASIN REMOVAL REQUIREMENTS

A) Upon completion of mining, reclamation, restabilization and effluent standards being met, each sediment basin not proposed as a permanent water impoundment will be dewatered in a controlled manner by either pumping or siphoning. Upon successful dewatering, a determination will be made as to the retained sediment level in the basin. After determining the retained sediment level, a channel will be cut into the embankment down to the retained sediment level on the side of the embankment deemed most suitable to reach natural ground without encountering prohibiting rock. The embankment material removed from this newly constructed channel will be spread and compacted over the previous impoundment (wet area) area to prevent erosion and ensure restabilization. The newly constructed channel will be of adequate width (minimum 30 feet) and sloped to a grade (approximately 1% to 3%) which will cause all surface drainage to travel across this area in sheet flow, minimizing the possibility of erosion. Also, where necessary, hay dams will be installed in strategic locations across the width of the channel to retain sediment and slow the water velocity to a favorable rate. Upon removal of the embankment section, all disturbed areas will be graded in such a manner to ensure slope stability, successful restabilization and to minimize erosion. All disturbed areas will be seeded with a mixture of annual and perennial grasses, fertilized and mulched. No slope, existing or created in the removal of the sediment basin, will be left on a grade that will slip or slough.

## 5. PERMANENT WATER IMPOUNDMENT REQUIREMENTS

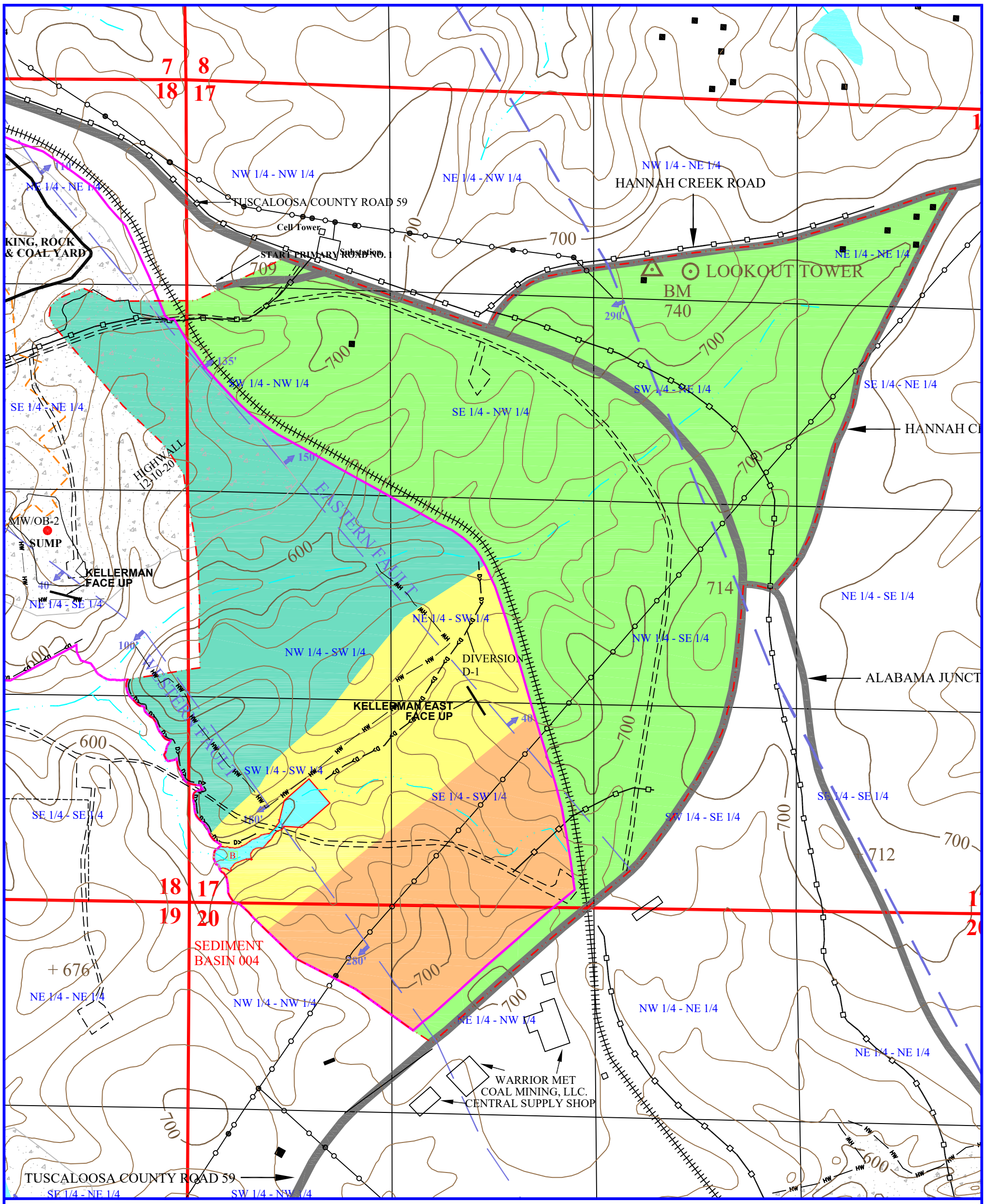
A) Prior to a request for a Phase II Bond Release, all sediment basins being left as permanent water impoundments will have supplemental data submitted to the Regulatory Authority concerning water quality, water quantity, size, depth, configuration, postmining land use, etc.

B) Final grading slopes of the entire permanent water impoundment area will not exceed a slope of 2 Horizontal to 1 Vertical to provide for safety and access for future water users.

**Southland Resources, Inc.**
**Swann's Crossing Mine, P-3944, R-12**

# DETAILED MODIFICATION PLANS
# SEDIMENT BASIN 004
# PHASE 2

Post Office Box 3431 • 450 19th St. West • Jasper, Alabama 35502-3431 • 205-221-0686 • Fax 205-221-7721 • cw@mcgehee.org

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**mcgehee engineering corp**
post office box 3431 - 450 19th street
jasper, alabama 35502-3431
telephone: (205) 221-0686 fax: 221-7721
email: staff@mcgehee.org

# SOUTHLAND RESOURCES, INC.
## SWANN'S CROSSING MINE, P-3944, R-12
### SEDIMENT BASIN 004 MODIFICATION
### WATERSHED MAP
SCALE: 1" = 600'

CONTOUR INTERVAL 20'

## MAP LEGEND

- PERMIT BOUNDARY
- DRAINAGE DIVIDE
- DIVERSION
- DRAIN/STREAM
- B — SEDIMENT BASIN, CN 100
- FOREST, CN 55
- GRADED & BARE, CN 81
- REVEG. 0-2 MONTHS, CN 79
- REVEG. 2-12 MONTHS, CN 74

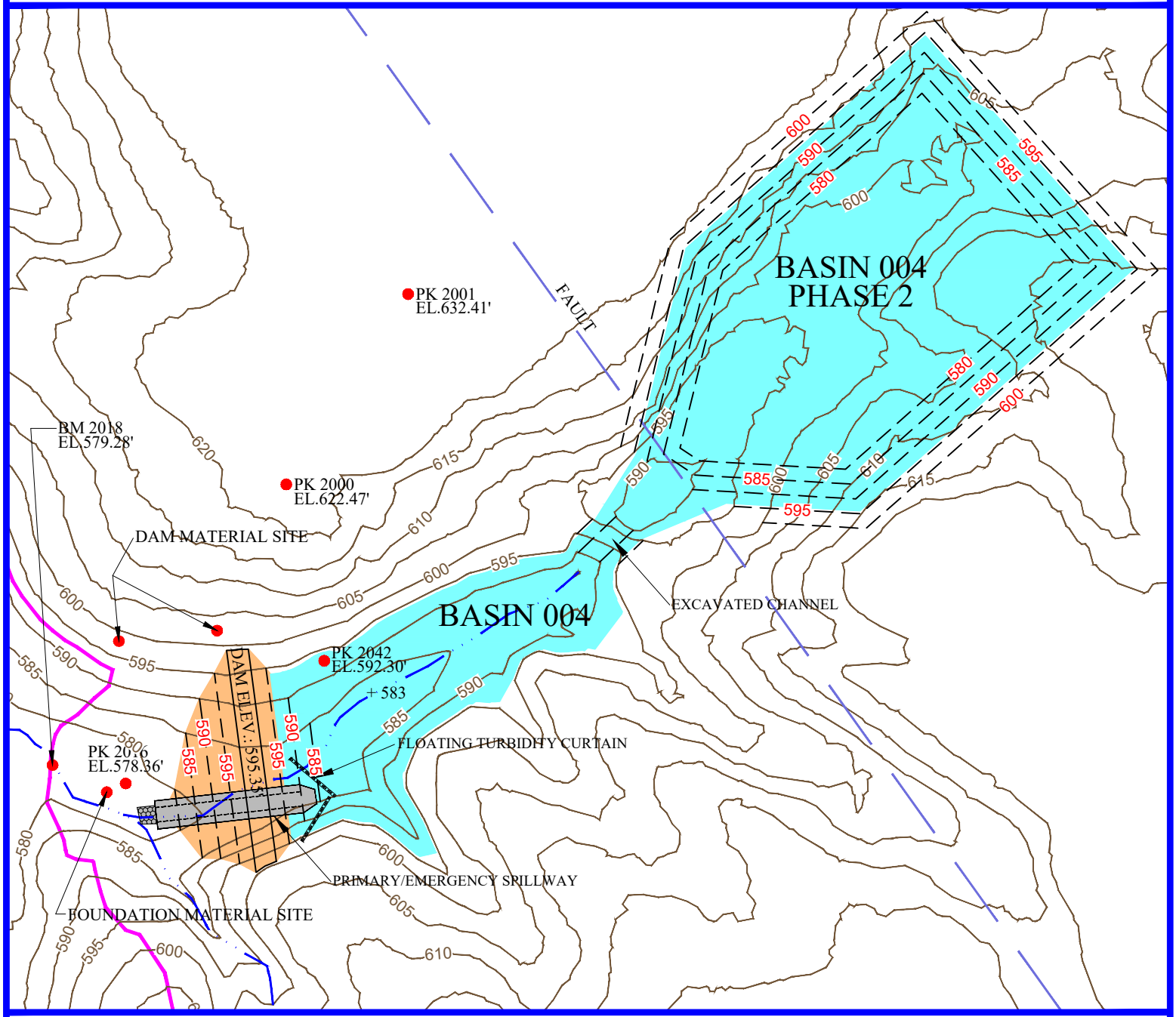
SEDIMENT BASIN 004

INCISED TOE ELEV.: 577.0'
UPSTREAM TOE ELEV.: 580.0'
SEDIMENT REMOVAL ELEV.: 589.0'
PRIMARY SPILLWAY ELEV.: 591.0'
EMERGENCY SPILLWAY ELEV.: 591.0'
**MAXIMUM WATER ELEV.: 594.18'
TOP OF DAM ELEV.: 595.35'

EMERGENCY SPILLWAY: 10' WIDE TRAPEZOIDAL
CONCRETE LINED

# SOUTHLAND RESOURCES, INC.
# SWANN'S CROSSING MINE, P-3944, R-12

## SEDIMENT BASIN 004 MODIFICATION
## PLAN VIEW DRAWING
## SCALE: 1" = 100'




PERMIT BOUNDARY
590 CONTOUR EXISTING
590 CONTOUR PROPOSED
EMBANKMENT
NORMAL POOL AREA
EXISTING DRAINAGE COURSE

ENERGY DISSIPATER (CLASS II SANDSTONE RIPRAP 12' x 12' x 1.5')
** 25 YEAR - 6 HOUR PRECIPITATION EVENT.

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mcgehee engineering corp
post office box 3431
jasper, alabama 35502-3431
telephone: (205) 221-0686 fax: 221-7721

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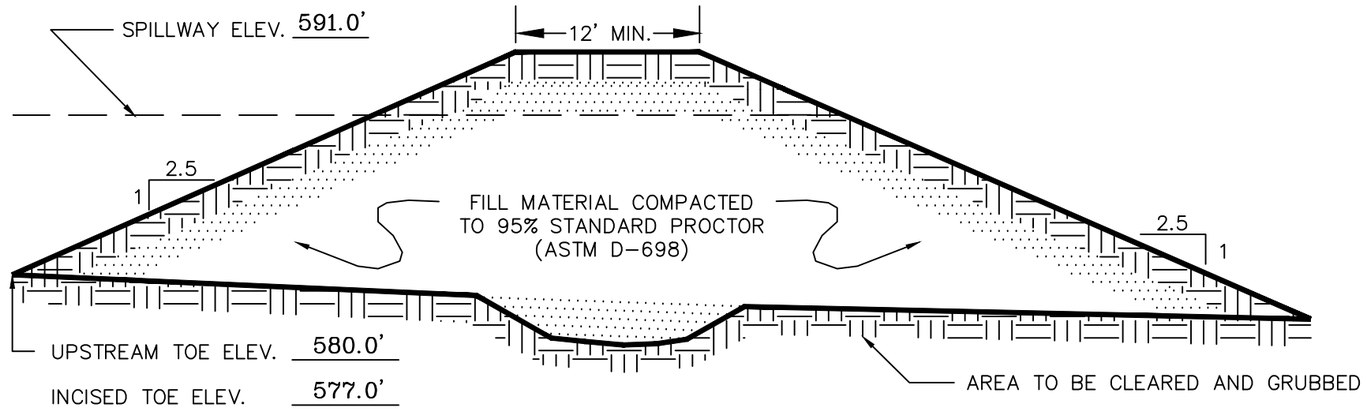
# Sediment Basin 004 Modification

## Elevation-Area-Capacity Table

| Elevation (ft) | Area (ac) | Capacity (ac-ft) |
|---|---|---|
| 577.00 | 0.897 | 0.000 |
| 577.50 | 0.915 | 0.453 |
| 578.00 | 0.934 | 0.915 |
| 578.50 | 0.952 | 1.387 |
| 579.00 | 0.971 | 1.868 |
| 579.50 | 0.994 | 2.359 |
| 580.00 | 1.017 | 2.862 |
| 580.50 | 1.041 | 3.376 |
| 581.00 | 1.065 | 3.903 |
| 581.50 | 1.108 | 4.446 |
| 582.00 | 1.152 | 5.011 |
| 582.50 | 1.191 | 5.597 |
| 583.00 | 1.230 | 6.202 |
| 583.50 | 1.274 | 6.828 |
| 584.00 | 1.319 | 7.476 |
| 584.50 | 1.365 | 8.147 |
| 585.00 | 1.411 | 8.841 |
| 585.50 | 1.483 | 9.564 |
| 586.00 | 1.556 | 10.324 |
| 586.50 | 1.632 | 11.121 |
| 587.00 | 1.709 | 11.956 |
| 587.50 | 1.758 | 12.823 |
| 588.00 | 1.808 | 13.714 |
| 588.50 | 1.858 | 14.630 |
| 589.00 | 1.909 | 15.572 |
| 589.50 | 1.961 | 16.540 |
| 590.00 | 2.013 | 17.533 |
| 590.50 | 2.066 | 18.553 |
| 591.00 | 2.120 | 19.599 |
| 591.50 | 2.177 | 20.674 |
| 592.00 | 2.235 | 21.777 |
| 592.50 | 2.294 | 22.909 |
| 593.00 | 2.353 | 24.070 |
| 593.50 | 2.416 | 25.262 |
| 594.00 | 2.479 | 26.486 |
| 594.50 | 2.544 | 27.742 |
| 595.00 | 2.609 | 29.030 |

## EMBANKMENT CROSS-SECTION



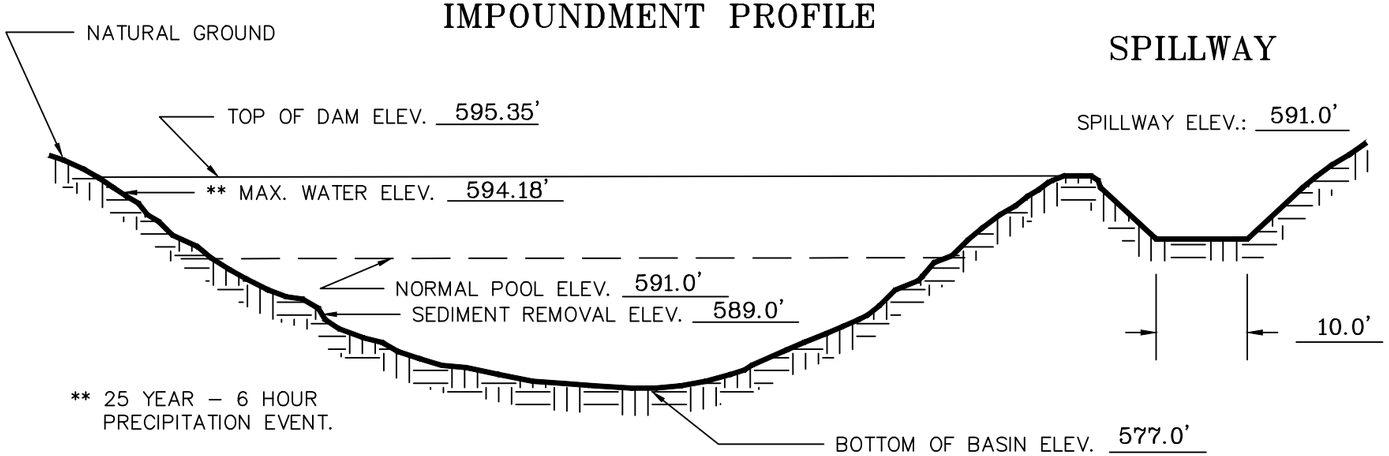

COMPANY: SOUTHLAND RESOURCES, INC.

MINE NAME: SWANNS CROSSING MINE

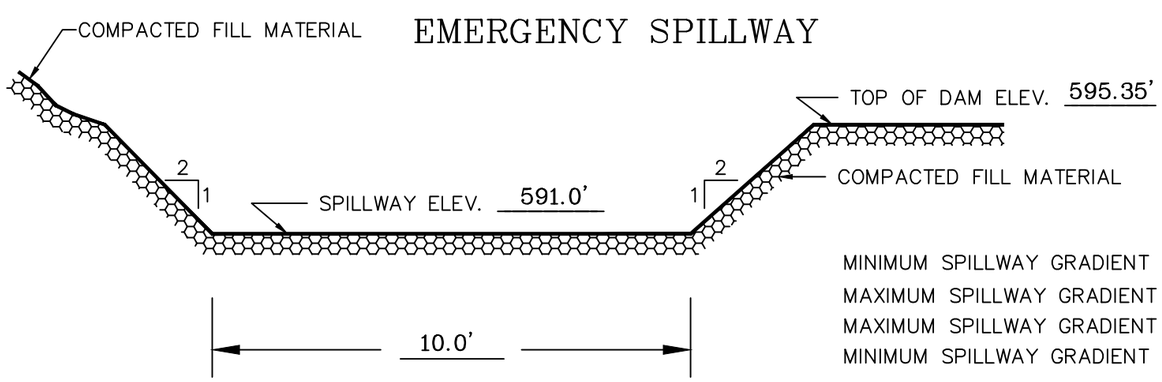
PERMIT #: P-3944, R-12

BASIN I.D. #: SEDIMENT BASIN 004 MODIFICATION

## IMPOUNDMENT PROFILE




## EMERGENCY SPILLWAY




MINIMUM SPILLWAY GRADIENT 0.5 % (CONTROL SECTION)

MAXIMUM SPILLWAY GRADIENT 2.0 % (CONTROL SECTION)

MAXIMUM SPILLWAY GRADIENT 40.0 % (TAIL DITCH SECTION)

MINIMUM SPILLWAY GRADIENT 25.0 % (TAIL DITCH SECTION)

## KEY BASIN PARAMETERS

| | | |
|---|---|---|
| DRAINAGE AREA | 393.5 | ACRES |
| DISTURBED AREA | 172.0 | ACRES |
| SEDIMENT STORAGE | 15.57 | AC.FT. |
| DETENTION STORAGE | 4.03 | AC.FT. |
| PERMANENT POOL CAPACITY | 19.60 | AC.FT. |
| * TOTAL BASIN STORAGE CAPACITY | 25.81 | AC.FT. |
| ** PEAK INFLOW | 318.35 | C.F.S. |
| ** PEAK OUTFLOW | 225.43 | C.F.S. |

NOTE: ALL ELEVATIONS ASSUMED.

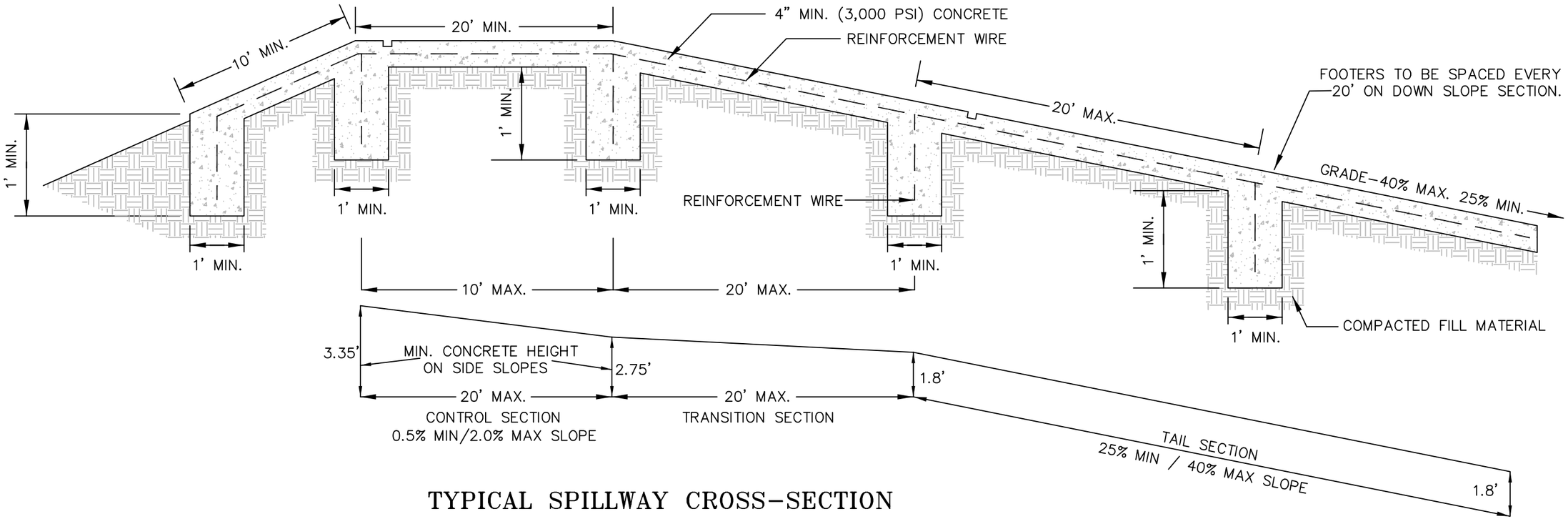
* 10 YEAR - 24 HOUR PRECIPITATION EVENT.

** 25 YEAR - 6 HOUR PRECIPITATION EVENT.

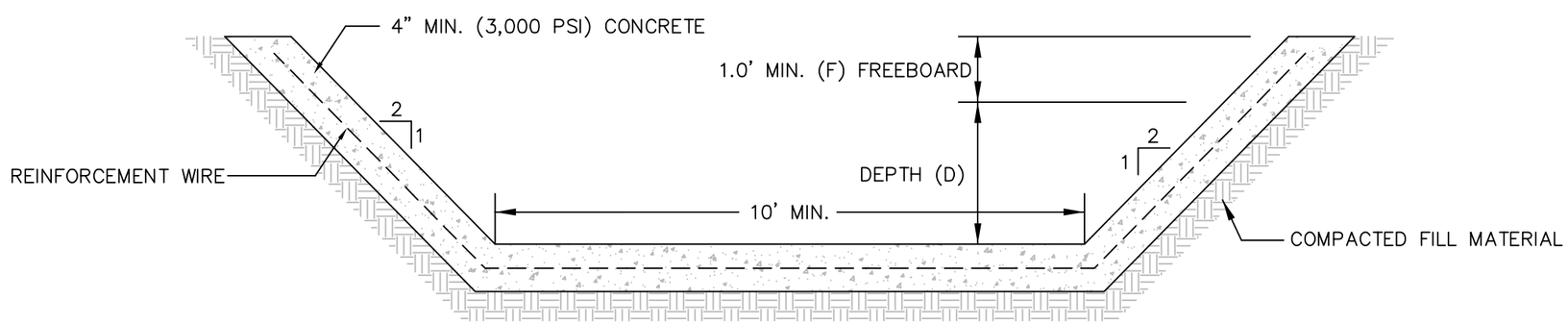
SEE SPILLWAY CONTROL SECTION AND TAIL DITCH DESIGN FOR CHANNEL LINING REQUIREMENTS.


mcgehee engineering corp
post office box 3431
jasper, alabama 35502-3431
telephone: (205) 221-0686 fax: 221-7721
email: cw@mcgehee.org

# SEDIMENT BASIN 004 MODIFICATION PHASE 2 – SPILLWAY PROFILE




## TYPICAL SPILLWAY CROSS–SECTION




| | BEGINNING OF CONTROL SECTION | END OF CONTROL SECTION | END OF TRANSITION SECTION | ENTIRE TAIL SECTION |
|---|---|---|---|---|
| MAXIMUM FLOW DEPTH "D" | 2.35' | 1.75' | 0.8' | 0.8' |
| FREEBOARD "F" | 1.0' | 1.0' | 1.0' | 1.0' |
| MINIMUM CONCRETE HEIGHT ON SIDE SLOPES | 3.35' | 2.75' | 1.8' | 1.8' |


mcgehee engineering corp
post office box 3431
jasper, alabama 35502-3431
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## SPILLWAY CHANNEL SPECIFICATIONS
## SEDIMENT BASIN 004

The entire control section and tail ditch section of the emergency spillway will be cut into the compacted fill of the embankment and lined with a minimum of 4 inches of reinforced concrete. All concrete will be reinforced with 10 gauge, 6" x 6" welded wire mesh. Fibermesh may be added to the concrete for additional strength, however, the addition of fibermesh shall not be used in place of the required 6" x 6" welded wire.

The gradient of the control section of the emergency spillway will not exceed two (2%) percent. The gradient of the tail ditch section of the emergency spillway will not exceed forty (40%) percent.

The control section and tail ditch section of the emergency spillway will extend from the inner face of the embankment, past the centerline of the embankment and be carried out beyond the downstream slope of the embankment.

The concrete liner at the beginning of the control section of the emergency spillway will be a minimum of 3.35 feet as measured vertically, allowing 2.35 feet for the maximum anticipated flow and 1.0 feet of dry freeboard. The concrete liner at the end of the control section of the emergency spillway will be a minimum of 2.75 feet as measured vertically, allowing 1.75 feet for the maximum anticipated flow and 1.0 feet of dry freeboard. The concrete liner of the tail ditch section of the emergency spillway will be a minimum of 1.8 feet as measured vertically, allowing 0.8 feet for the maximum anticipated flow and 1.0 foot of dry freeboard. There will be a transition zone of at least 20 feet in length between the control section and the tail section. The minimum depth at the beginning of the transition will be 2.75 feet and 1.8 feet at the end of the transition. The flow line of the spillway will be smoothed at the transition to avoid abrupt changes in the flow line slope.

See enclosed SEDCAD 4.0 spillway tail ditch section design and attached Plan Sheet cross-section for the minimum and maximum emergency spillway construction requirements.

A floating silt fence (lightweight turbidity curtain) will be installed near the entrance to the spillway to accomplish sub-surface withdrawal. The floating silt fence (lightweight turbidity curtain) will be set at normal pool and will be anchored at the 10 Year – 24 Hour Event peak stage with steel fence posts.

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# Basin 004 Spillway Control Section

Material: Concrete, Rubble

*Trapezoidal Channel*

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Manning's n | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|---|---|---|---|---|---|---|---|
| 10.00 | 2.0:1 | 2.0:1 | 0.5 | 0.0220 | 1.00 | | |

| | w/o Freeboard | w/ Freeboard |
|---|---|---|
| Design Discharge: | 235.00 cfs | |
| Depth: | 2.35 ft | 3.35 ft |
| Top Width: | 19.42 ft | 23.42 ft |
| Velocity: | 6.79 fps | |
| X-Section Area: | 34.63 sq ft | |
| Hydraulic Radius: | 1.687 ft | |
| Froude Number: | 0.90 | |

# Basin 004 Spillway Control Section

Material: Concrete, Rubble

*Trapezoidal Channel*

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Manning's n | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|---|---|---|---|---|---|---|---|
| 10.00 | 2.0:1 | 2.0:1 | 2.0 | 0.0220 | 1.00 | | |

| | w/o Freeboard | w/ Freeboard |
|---|---|---|
| Design Discharge: | 235.00 cfs | |
| Depth: | 1.61 ft | 2.61 ft |
| Top Width: | 16.44 ft | 20.44 ft |
| Velocity: | 11.04 fps | |
| X-Section Area: | 21.29 sq ft | |
| Hydraulic Radius: | 1.238 ft | |
| Froude Number: | 1.71 | |

# Basin 004 Spillway Tail Ditch Section

Material: Concrete, Rubble

*Trapezoidal Channel*

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Manning's n | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|---|---|---|---|---|---|---|---|
| 10.00 | 2.0:1 | 2.0:1 | 25.0 | 0.0220 | 1.00 | | |

| | w/o Freeboard | w/ Freeboard |
|---|---|---|
| Design Discharge: | 235.00 cfs | |
| Depth: | 0.78 ft | 1.78 ft |
| Top Width: | 13.13 ft | 17.13 ft |
| Velocity: | 25.95 fps | |
| X-Section Area: | 9.06 sq ft | |
| Hydraulic Radius: | 0.671 ft | |
| Froude Number: | 5.51 | |

# Basin 004 Spillway Tail Ditch Section

Material: Concrete, Rubble

*Trapezoidal Channel*

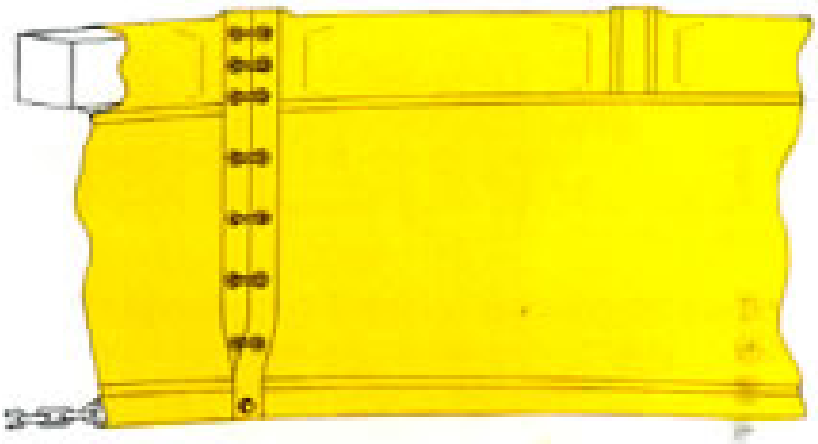
| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Manning's n | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|---|---|---|---|---|---|---|---|
| 10.00 | 2.0:1 | 2.0:1 | 40.0 | 0.0220 | 1.00 | | |

| | w/o Freeboard | w/ Freeboard |
|---|---|---|
| Design Discharge: | 235.00 cfs | |
| Depth: | 0.68 ft | 1.68 ft |
| Top Width: | 12.73 ft | 16.73 ft |
| Velocity: | 30.28 fps | |
| X-Section Area: | 7.76 sq ft | |
| Hydraulic Radius: | 0.594 ft | |
| Froude Number: | 6.84 | |

## SUBSURFACE WITHDRAWAL DEVICE AND FLOATING SILT BOOM

**Lightweight Turbidity Curtain**

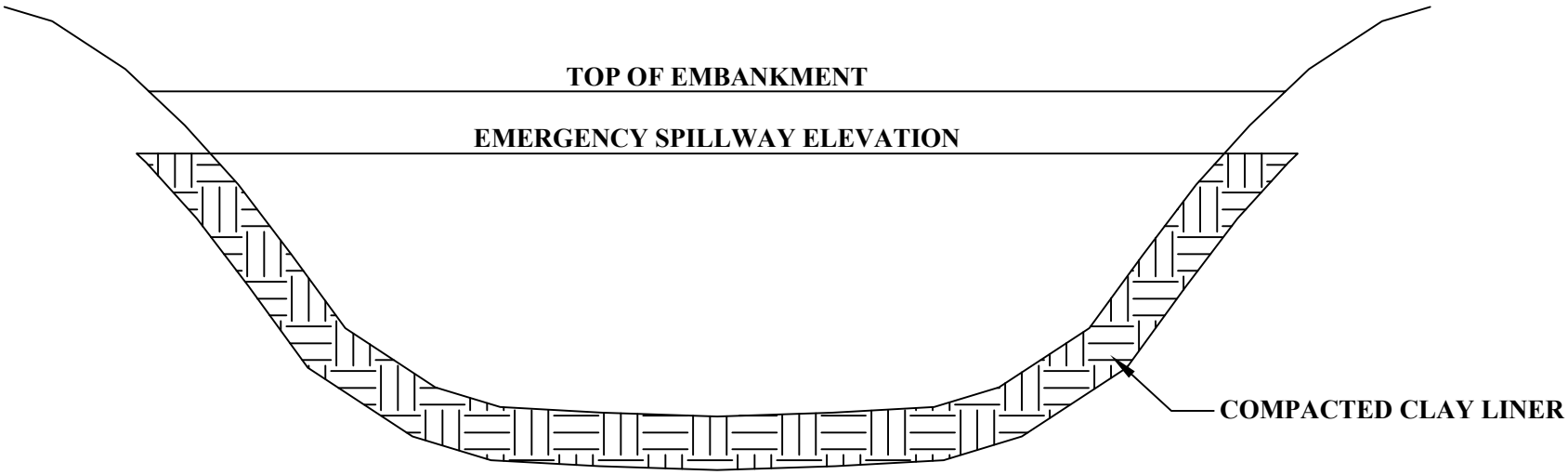
Application: Calm waters with little current, such as lakes, ponds, canals and shoreline areas.



### Specifications

- Curtain to be anchored at the maximum anticipated peak stage elevation (10 Year – 24 Hour Precipitation Event).
- PVC coated floatations - ultraviolet resistant
- Geotextile fabric screens
- Chain ballast with connectors
- Double sewn seams with grommets
- Depths per requirements ' 50' sections = Minimum 24" deep
- Fabric - Polyester reinforced vinyl high visibility yellow
- Connector - Sections are laced together through grommets and load lines are bolted together.
- Flotation - 6" expanded polystyrene over 9 lbs./ft. buoyancy.
- Ballast - 1/4" galvanized chain (.7 lbs/ft).

# TYPICAL IMPOUNDMENT PROFILE
# CLAY LINER CROSS-SECTION




In the event that a sediment basin must be constructed in spoil material, that part of the interior or wet area located in spoil material will be lined with a minimum of one (1') foot of clay material with a permeability no greater than 0.000001 cm./sec. up to the emergency spillway elevation. The clay liner material will be placed in lifts no greater than six (6") inches and compacted to ninety-five (95) percent of the standard proctor density.

mcgehee engineering corp
post office box 3431
jasper, alabama 35502-3431
telephone: (205) 221-0686 fax: 221-7721
email: cw@mcgehee.org

**Southland Resources, Inc.**
**Swann's Crossing Mine, P-3944, R-12**

# HYDROLOGY AND SEDIMENTOLOGY PREDICTION
# 10 YEAR - 24 HOUR PRECIPITATION EVENT
# SEDIMENT BASINS 004 MODIFICATION
# PHASE 2

Post Office Box 3431 • 450 19th St. West • Jasper, Alabama 35502-3431 • 205-221-0686 • Fax 205-221-7721 • cw@mcgehee.org

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# Southland Resources, Inc.
# Swann's Crossing Mine, P-3944, P-12
# Sediment Basin 004 Modification
# Phase II

***10 Year - 24 Hour Precipitation Event***

C.W. McGehee, P.E.

# General Information

## Storm Information:

| | |
|---|---|
| Storm Type: | DRN 58 |
| Design Storm: | 10 yr - 24 hr |
| Rainfall Depth: | 6.100 inches |

## Particle Size Distribution:

| Size (mm) | Topsoil | Mine Spoil |
|---|---|---|
| 3.0000 | 100.000% | 100.000% |
| 2.0000 | 98.900% | 94.400% |
| 1.0000 | 95.800% | 82.000% |
| 0.5000 | 94.400% | 67.400% |
| 0.3000 | 92.100% | 53.900% |
| 0.2000 | 88.500% | 44.900% |
| 0.1000 | 77.100% | 35.900% |
| 0.0500 | 57.300% | 29.200% |
| 0.0300 | 45.800% | 24.700% |
| 0.0200 | 38.500% | 20.200% |
| 0.0100 | 29.200% | 15.700% |
| 0.0050 | 21.900% | 11.200% |
| 0.0030 | 15.600% | 7.900% |
| 0.0010 | 6.300% | 2.200% |
| 0.0001 | 0.000% | 0.000% |

# *Structure Networking:*

| Type | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description |
|---|---|---|---|---|---|---|
| Pond | #1 | ==> | End | 0.000 | 0.000 | Sediment Basin 004 |

*#1*
*Pond*

# *Structure Summary:*

| | | Immediate Contributing Area (ac) | Total Contributing Area (ac) | Peak Discharge (cfs) | Total Runoff Volume (ac-ft) | Sediment (tons) | Peak Sediment Conc. (mg/l) | Peak Settleable Conc. (ml/l) | 24VW (ml/l) |
|---|---|---|---|---|---|---|---|---|---|
| #1 | In | 393.500 | 393.500 | 184.25 | 64.45 | 2,111.0 | 58,860 | 38.55 | 16.32 |
| | Out | | | 168.53 | 64.33 | 368.3 | 10,199 | 0.40 | 0.18 |

# *Particle Size Distribution(s) at Each Structure*

## *Structure #1:*

| Size (mm) | In | Out |
|---|---|---|
| 3.0000 | 100.000% | 100.000% |
| 2.0000 | 97.791% | 100.000% |
| 1.0000 | 86.305% | 100.000% |
| 0.5000 | 71.126% | 100.000% |
| 0.3000 | 57.090% | 100.000% |
| 0.2000 | 47.733% | 100.000% |
| 0.1000 | 38.375% | 100.000% |
| 0.0500 | 31.409% | 100.000% |
| 0.0300 | 26.731% | 100.000% |
| 0.0200 | 21.935% | 100.000% |
| 0.0100 | 17.031% | 97.624% |
| 0.0050 | 12.175% | 69.791% |
| 0.0030 | 8.592% | 49.249% |
| 0.0010 | 2.440% | 13.987% |
| 0.0001 | 0.000% | 0.000% |

# *Structure Detail:*

## *Structure #1 (Pond)*

*Sediment Basin 004*

### Pond Inputs:

| | |
|---|---|
| Initial Pool Elev: | 591.00 ft |
| Initial Pool: | 4.03 ac-ft |
| *Sediment Storage: | 15.57 ac-ft |
| Dead Space: | 20.00 % |

**Sediment capacity was entered by user*

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---|---|---|---|---|
| 591.00 | 20.00 | 2.00:1 | 2.00:1 | 10.00 |

### Pond Results:

| | |
|---|---|
| Peak Elevation: | 593.73 ft |
| H'graph Detention Time: | 0.94 hrs |
| Pond Model: | CSTRS |
| Dewater Time: | 1.01 days |
| Trap Efficiency: | 82.55 % |

*Dewatering time is calculated from peak stage to lowest spillway*

### Elevation-Capacity-Discharge Table

| Elevation | Area (ac) | Capacity (ac-ft) | Discharge (cfs) | Dewater Time (hrs) | |
|---|---|---|---|---|---|
| 589.00 | 1.909 | 0.000 | 0.000 | | Top of Sed. Storage |
| 589.00 | 1.909 | 0.000 | 0.000 | | |
| 589.50 | 1.961 | 0.968 | 0.000 | | |
| 590.00 | 2.013 | 1.961 | 0.000 | | |
| 590.50 | 2.066 | 2.981 | 0.000 | | |
| 591.00 | 2.120 | 4.027 | 0.000 | | Spillway #1 |
| 591.50 | 2.177 | 5.102 | 1.830 | 7.10* | |
| 592.00 | 2.235 | 6.205 | 25.483 | 5.45 | |
| 592.50 | 2.294 | 7.337 | 53.905 | 8.25 | |
| 593.00 | 2.353 | 8.498 | 93.036 | 2.55 | |
| 593.50 | 2.416 | 9.690 | 141.972 | 0.55 | |
| 593.73 | 2.445 | 10.241 | 168.529 | 0.25 | Peak Stage |
| 594.00 | 2.479 | 10.914 | 200.972 | | |

| Elevation | Area (ac) | Capacity (ac-ft) | Discharge (cfs) | Dewater Time (hrs) |
|---|---|---|---|---|
| 594.50 | 2.544 | 12.170 | 270.364 | |
| 595.00 | 2.609 | 13.458 | 350.507 | |

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

## Detailed Discharge Table

| Elevation (ft) | Emergency Spillway (cfs) | Combined Total Discharge (cfs) |
|---|---|---|
| 589.00 | 0.000 | 0.000 |
| 589.00 | 0.000 | 0.000 |
| 589.50 | 0.000 | 0.000 |
| 590.00 | 0.000 | 0.000 |
| 590.50 | 0.000 | 0.000 |
| 591.00 | 0.000 | 0.000 |
| 591.50 | 1.830 | 1.830 |
| 592.00 | 25.483 | 25.483 |
| 592.50 | 53.905 | 53.905 |
| 593.00 | 93.036 | 93.036 |
| 593.50 | 141.972 | 141.972 |
| 594.00 | 200.972 | 200.972 |
| 594.50 | 270.364 | 270.364 |
| 595.00 | 350.507 | 350.507 |

# 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 | 219.000 | 1.700 | 0.137 | 0.369 | 55.000 | S | 29.50 | 19.209 |
| | 2 | 45.000 | 0.150 | 0.000 | 0.000 | 81.000 | F | 56.54 | 14.362 |
| | 3 | 2.500 | 0.000 | 0.000 | 0.000 | 100.000 | F | 4.00 | 1.270 |
| | 4 | 45.000 | 0.150 | 0.239 | 0.347 | 79.000 | M | 45.44 | 11.486 |
| | 5 | 82.000 | 0.175 | 0.000 | 0.000 | 74.000 | M | 73.38 | 18.120 |
| | Σ | **393.500** | | | | | | **184.25** | **64.446** |

# 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 | 0.320 | 400.00 | 15.00 | 0.0030 | 1.0000 | 1 | 22.2 | 1,162 | 0.31 | 0.23 |
| | 2 | 0.240 | 200.00 | 10.00 | 0.9000 | 1.0000 | 2 | 1,720.4 | 146,531 | 97.01 | 55.89 |
| | 3 | 0.001 | 400.00 | 0.01 | 0.0010 | 1.0000 | 1 | 0.0 | 0 | 0.00 | 0.00 |
| | 4 | 0.240 | 200.00 | 10.00 | 0.1400 | 1.0000 | 2 | 229.9 | 25,717 | 16.66 | 9.46 |
| | 5 | 0.240 | 200.00 | 10.00 | 0.0500 | 1.0000 | 2 | 138.7 | 9,932 | 6.42 | 3.63 |
| | Σ | | | | | | | **2,111.0** | **58,860** | **38.55** | **16.32** |

# HYDROLOGY AND SEDIMENTOLOGY PREDICTION
# 25 YEAR - 6 HOUR PRECIPITATION EVENT
# SEDIMENT BASINS 004 MODIFICATION
# PHASE 2

Post Office Box 3431 • 450 19th St. West • Jasper, Alabama 35502-3431 • 205-221-0686 • Fax 205-221-7721 • cw@mcgehee.org

Copyright 1998 -2010 Pamela L Schwab


# Southland Resources, Inc.
# Swann's Crossing Mine, P-3944, P-12
# Sediment Basin 004 Modification
# Phase II

***25 Year - 6 Hour Precipitation Event***

C.W. McGehee, P.E.

# General Information

## Storm Information:

| | |
|---|---|
| Storm Type: | SCS 6 HOUR |
| Design Storm: | 25 yr - 6 hr |
| Rainfall Depth: | 5.000 inches |

## Particle Size Distribution:

| Size (mm) | Topsoil | Mine Spoil |
|---|---|---|
| 3.0000 | 100.000% | 100.000% |
| 2.0000 | 98.900% | 94.400% |
| 1.0000 | 95.800% | 82.000% |
| 0.5000 | 94.400% | 67.400% |
| 0.3000 | 92.100% | 53.900% |
| 0.2000 | 88.500% | 44.900% |
| 0.1000 | 77.100% | 35.900% |
| 0.0500 | 57.300% | 29.200% |
| 0.0300 | 45.800% | 24.700% |
| 0.0200 | 38.500% | 20.200% |
| 0.0100 | 29.200% | 15.700% |
| 0.0050 | 21.900% | 11.200% |
| 0.0030 | 15.600% | 7.900% |
| 0.0010 | 6.300% | 2.200% |
| 0.0001 | 0.000% | 0.000% |

# *Structure Networking:*

| Type | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description |
|---|---|---|---|---|---|---|
| Pond | #1 | ==> | End | 0.000 | 0.000 | Sediment Basin 004 |

*#1*
*Pond*

# *Structure Summary:*

| | | Immediate Contributing Area (ac) | Total Contributing Area (ac) | Peak Discharge (cfs) | Total Runoff Volume (ac-ft) | Sediment (tons) | Peak Sediment Conc. (mg/l) | Peak Settleable Conc. (ml/l) | 24VW (ml/l) |
|---|---|---|---|---|---|---|---|---|---|
| #1 | In | 393.500 | 393.500 | 318.35 | 45.41 | 2,669.5 | 98,772 | 64.07 | 27.32 |
| | Out | | | 225.43 | 45.40 | 523.1 | 16,462 | 1.39 | 0.72 |

# *Particle Size Distribution(s) at Each Structure*

## *Structure #1:*

| Size (mm) | In | Out |
|---|---|---|
| 3.0000 | 100.000% | 100.000% |
| 2.0000 | 100.000% | 100.000% |
| 1.0000 | 89.917% | 100.000% |
| 0.5000 | 74.713% | 100.000% |
| 0.3000 | 59.882% | 100.000% |
| 0.2000 | 49.995% | 100.000% |
| 0.1000 | 40.108% | 100.000% |
| 0.0500 | 32.747% | 100.000% |
| 0.0300 | 27.804% | 100.000% |
| 0.0200 | 22.860% | 100.000% |
| 0.0100 | 17.832% | 91.001% |
| 0.0050 | 12.743% | 65.027% |
| 0.0030 | 8.991% | 45.883% |
| 0.0010 | 2.543% | 12.977% |
| 0.0001 | 0.000% | 0.000% |

# *Structure Detail:*

## *Structure #1 (Pond)*

*Sediment Basin 004*

Pond Inputs:

| | |
|---|---|
| Initial Pool Elev: | 591.00 ft |
| Initial Pool: | 4.03 ac-ft |
| *Sediment Storage: | 15.57 ac-ft |
| Dead Space: | 20.00 % |

**Sediment capacity was entered by user*

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---|---|---|---|---|
| 591.00 | 20.00 | 2.00:1 | 2.00:1 | 10.00 |

Pond Results:

| | |
|---|---|
| Peak Elevation: | 594.18 ft |
| H'graph Detention Time: | 0.94 hrs |
| Pond Model: | CSTRS |
| Dewater Time: | 0.77 days |
| Trap Efficiency: | 80.40 % |

*Dewatering time is calculated from peak stage to lowest spillway*

### Elevation-Capacity-Discharge Table

| Elevation | Area (ac) | Capacity (ac-ft) | Discharge (cfs) | Dewater Time (hrs) | |
|---|---|---|---|---|---|
| 589.00 | 1.909 | 0.000 | 0.000 | | Top of Sed. Storage |
| 589.00 | 1.909 | 0.000 | 0.000 | | |
| 589.50 | 1.961 | 0.968 | 0.000 | | |
| 590.00 | 2.013 | 1.961 | 0.000 | | |
| 590.50 | 2.066 | 2.981 | 0.000 | | |
| 591.00 | 2.120 | 4.027 | 0.000 | | Spillway #1 |
| 591.50 | 2.177 | 5.102 | 1.830 | 7.10* | |
| 592.00 | 2.235 | 6.205 | 25.483 | 7.00 | |
| 592.50 | 2.294 | 7.337 | 53.905 | 1.00 | |
| 593.00 | 2.353 | 8.498 | 93.036 | 1.30 | |
| 593.50 | 2.416 | 9.690 | 141.972 | 1.45 | |
| 594.00 | 2.479 | 10.914 | 200.972 | 0.40 | |
| 594.18 | 2.502 | 11.357 | 225.425 | 0.20 | Peak Stage |

| Elevation | Area (ac) | Capacity (ac-ft) | Discharge (cfs) | Dewater Time (hrs) |
|---|---|---|---|---|
| 594.50 | 2.544 | 12.170 | 270.364 | |
| 595.00 | 2.609 | 13.458 | 350.507 | |

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

## Detailed Discharge Table

| Elevation (ft) | Emergency Spillway (cfs) | Combined Total Discharge (cfs) |
|---|---|---|
| 589.00 | 0.000 | 0.000 |
| 589.00 | 0.000 | 0.000 |
| 589.50 | 0.000 | 0.000 |
| 590.00 | 0.000 | 0.000 |
| 590.50 | 0.000 | 0.000 |
| 591.00 | 0.000 | 0.000 |
| 591.50 | 1.830 | 1.830 |
| 592.00 | 25.483 | 25.483 |
| 592.50 | 53.905 | 53.905 |
| 593.00 | 93.036 | 93.036 |
| 593.50 | 141.972 | 141.972 |
| 594.00 | 200.972 | 200.972 |
| 594.50 | 270.364 | 270.364 |
| 595.00 | 350.507 | 350.507 |

# 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 | 219.000 | 1.700 | 0.137 | 0.369 | 55.000 | S | 32.44 | 11.947 |
| | 2 | 45.000 | 0.150 | 0.000 | 0.000 | 81.000 | F | 118.82 | 10.786 |
| | 3 | 2.500 | 0.000 | 0.000 | 0.000 | 100.000 | F | 9.70 | 1.038 |
| | 4 | 45.000 | 0.150 | 0.239 | 0.347 | 79.000 | M | 87.72 | 8.538 |
| | 5 | 82.000 | 0.175 | 0.000 | 0.000 | 74.000 | M | 132.84 | 13.104 |
| | Σ | **393.500** | | | | | | **318.35** | **45.413** |

# 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 | 400.00 | 15.00 | 0.0030 | 1.0000 | 1 | 17.9 | 1,418 | 0.15 | 0.12 |
| | 2 | 0.240 | 200.00 | 10.00 | 0.9000 | 1.0000 | 2 | 2,221.4 | 217,767 | 143.02 | 93.04 |
| | 3 | 0.001 | 400.00 | 0.01 | 0.0010 | 1.0000 | 1 | 0.0 | 0 | 0.00 | 0.00 |
| | 4 | 0.240 | 200.00 | 10.00 | 0.1400 | 1.0000 | 2 | 281.4 | 36,700 | 23.33 | 15.24 |
| | 5 | 0.240 | 200.00 | 10.00 | 0.0500 | 1.0000 | 2 | 161.3 | 13,979 | 8.83 | 5.70 |
| | Σ | | | | | | | **2,669.5** | **98,772** | **64.07** | **27.32** |

# STABILITY ANALYSIS

## STABILITY ANALYSIS PROCEDURE

Due to the fact Sediment Basin 004 is an existing structure and because after numerous inspections and site visits, there are no signs of structural weakness, instability, erosion, slope failure, or other hazardous conditions, no stability analysis is submitted.