



October 24, 2023

Mr. Zach Trujillo  
Environmental Protection Specialist  
Colorado Division of Reclamation, Mining & Safety  
Department of Natural Resources  
1313 Sherman Street, Room 215  
Denver, CO 80203

**RE: Colowyo Coal Company L.P.**  
**Permit No. C-1981-019**  
**Technical Revision 161 (TR-161)**  
**Mine Plan and PMT Revision**

Dear Mr. Trujillo,

Tri-State Generation and Transmission Association Inc. (Tri-State), is the parent company to Axial Basin Coal Company, which is the general partner to Colowyo Coal Company L.P. (Colowyo). Therefore, Tri-State on behalf of Colowyo is submitting technical revision 161 (TR-161) to Permit No. C-1981-019.

TR-161 proposes revisions to the Collom Mine Plan by reducing the areas to be mined and revises the overall mining timing. TR-161 also proposes a revised post mine topography (PMT) for the Collom and South Taylor Pits. Surface mining reserves have been exhausted in the South Taylor Pit and the revised PMT reflects the final pit configuration in relation to the backfill necessary to backfill the South Taylor Pit while keeping the same geomorphic reclamation surface that was previously permitted for the South Taylor Pit. The Collom PMT revision expresses the reduced mine plan proposed to achieve final backfill of the Collom Pit.

Included in this technical revision is a change of index sheet to ease incorporation of this revision into the permit document and a public notice for the Division's review. If you should have any questions or concerns, please feel free to contact Tony Tennyson at (970) 824-1232 or at [ttennyson@tristategt.org](mailto:ttennyson@tristategt.org).

Sincerely,

DocuSigned by:  
A handwritten signature in blue ink that reads "Chris Gilbreath".  
D250C711D0BF450...

Chris Gilbreath  
Senior Manager  
Remediation and Reclamation

CG:TT:der

Enclosure



**TRI-STATE**

October 24, 2023

Page 2

cc: Foster Beckett (BLM-LSFO)  
Tony Tennyson (via email)  
File: C. F. 1.1.2.144 - G471-11.3(21)d

## CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: Colowyo Coal Company L.P.

Permit Number: **C-1981-019**

Date: **October 23, 2023**

Revision Description: **TR-161 Mine Plan and PMT Revision**

| Volume Number | Page, Map or other Permit Entry to be REMOVED                               | Page, Map or other Permit Entry to be ADDED                                 | Description of Change                                  |
|---------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------|
| 1             |                                                                             |                                                                             | No Change                                              |
| 2A            |                                                                             |                                                                             | No Change                                              |
| 2B            |                                                                             |                                                                             | No Change                                              |
| 2C            |                                                                             |                                                                             | No Change                                              |
| 2D            |                                                                             |                                                                             | No Change                                              |
| 2E            |                                                                             |                                                                             | No Change                                              |
| 3             |                                                                             |                                                                             | No Change                                              |
| 4             |                                                                             |                                                                             | No Change                                              |
| 5A            |                                                                             |                                                                             | No Change                                              |
| 5B            |                                                                             |                                                                             | No Change                                              |
| 6             |                                                                             |                                                                             | No Change                                              |
| 7             | Map 12                                                                      | Map 12                                                                      | Map 12 has been updated.                               |
| 7             | Map 19                                                                      | Map 19                                                                      | Map 19 has been updated.                               |
| 8             | Map 23                                                                      | Map 23                                                                      | Map 23 has been updated.                               |
| 8             | Map 29                                                                      | Map 29                                                                      | Map 29 has been updated.                               |
| 9             |                                                                             |                                                                             | No Change                                              |
| 10            |                                                                             |                                                                             | No Change                                              |
| 12            |                                                                             |                                                                             | No Change                                              |
| 13            | Exhibit 7 Item 20 Part B, Pages Exh. 7-20B-1 through Exh. 7-20B-4 (4 pages) | Exhibit 7 Item 20 Part B, Pages Exh. 7-20B-1 through Exh. 7-20B-4 (4 pages) | Exhibit 7 Item 20 Part B has been updated.             |
| 13            | West Taylor Pond 10 Yr-24 Hr SEDCAD Outputs (41 pages)                      | West Taylor Pond 10 Yr-24 Hr SEDCAD Outputs (41 pages)                      | West Taylor Pond 10 Yr 24 Hr SEDCAD has been updated.  |
| 13            | West Taylor Pond 25 Yr-24 Hr SEDCAD Outputs (31 pages)                      | West Taylor Pond 25 Yr-24 Hr SEDCAD Outputs (32 pages)                      | West Taylor Pond 25 Yr 24 Hr SEDCAD has been updated.  |
| 13            | West Taylor Pond 100 Yr-24 Hr SEDCAD Outputs (31 pages)                     | West Taylor Pond 100 Yr-24 Hr SEDCAD Outputs (32 pages)                     | West Taylor Pond 100 Yr 24 Hr SEDCAD has been updated. |
| 13            | Figure 7-20B-2                                                              | Figure 7-20B-2                                                              | Figure 7-20B-2 has been updated.                       |

## CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: Colowyo Coal Company L.P.

Permit Number: **C-1981-019**

Date: **October 23, 2023**

Revision Description: **TR-161 Mine Plan and PMT Revision**

| Volume Number | Page, Map or other Permit Entry to be REMOVED                              | Page, Map or other Permit Entry to be ADDED                                | Description of Change                                 |
|---------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------|
| 14            | Map 33B                                                                    | Map 33B                                                                    | Map 33B has been updated.                             |
| 15            |                                                                            |                                                                            | No Change                                             |
| 16            |                                                                            |                                                                            | No Change                                             |
| 17            |                                                                            |                                                                            | No Change                                             |
| 18A           |                                                                            |                                                                            | No Change                                             |
| 18B           | Exhibit 7 Item 23 Part I Pages Exh. 7-23I-1 through Exh. 7-23I-5 (5 pages) | Exhibit 7 Item 23 Part I Pages Exh. 7-23I-1 through Exh. 7-23I-4 (4 pages) | Exhibit 7 Item 23 Part I has been updated.            |
| 18B           | Section 25 Pond 10 Yr-24 Hr SEDCAD Outputs (49 pages)                      | Section 25 Pond 10 Yr-24 Hr SEDCAD Outputs (46 pages)                      | Section 25 Pond 10 Yr 24 Hr SEDCAD has been updated.  |
| 18B           | Section 25 Pond 25 Yr-24 Hr SEDCAD Outputs (37 pages)                      | Section 25 Pond 25 Yr-24 Hr SEDCAD Outputs (35 pages)                      | Section 25 Pond 25 Yr 24 Hr SEDCAD has been updated.  |
| 18B           | Section 25 Pond 100 Yr-24 Hr SEDCAD Outputs (35 pages)                     | Section 25 Pond 100 Yr-24 Hr SEDCAD Outputs (31 pages)                     | Section 25 Pond 100 Yr 24 Hr SEDCAD has been updated. |
| 18B           | Figures 7-23I-4 and 5                                                      | Figures 7-23I-4 and 5                                                      | Figure 7-23I-4 and 5 have been updated.               |
| 18C           | Exhibit 7 Item 23 Part J Pages Exh. 7-23J-1 through Exh. 7-23J-3 (3 pages) | Exhibit 7 Item 23 Part J Pages Exh. 7-23J-1 through Exh. 7-23J-3 (3 pages) | Exhibit 7 Item 23 Part J has been updated.            |
| 18C           | Section 26 Pond 10 Yr-24 Hr SEDCAD Outputs (24 pages)                      | Section 26 Pond 10 Yr-24 Hr SEDCAD Outputs (22 pages)                      | Section 26 Pond 10 Yr 24 Hr SEDCAD has been updated.  |
| 18C           | Section 26 Pond 25 Yr-24 Hr SEDCAD Outputs (19 pages)                      | Section 26 Pond 25 Yr-24 Hr SEDCAD Outputs (17 pages)                      | Section 26 Pond 25 Yr 24 Hr SEDCAD has been updated.  |
| 18C           | Section 26 Pond 100 Yr-24 Hr SEDCAD Outputs (18 pages)                     | Section 26 Pond 100 Yr-24 Hr SEDCAD Outputs (19 pages)                     | Section 26 Pond 100 Yr 24 Hr SEDCAD has been updated. |
| 18C           | Figures 7-23J-3 and 4                                                      | Figures 7-23J-3 and 4                                                      | Figures 7-23J-3 and 4 have been updated.              |
| 18C           | Figure 7-23N-1                                                             | Figure 7-23N-1                                                             | Figure 7-23N-1 has been updated.                      |
| 18D           |                                                                            |                                                                            | No Change                                             |
| 19            |                                                                            |                                                                            | No Change                                             |
| 20            |                                                                            |                                                                            | No Change                                             |
| 21            |                                                                            |                                                                            | No Change                                             |



## CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: Colowyo Coal Company L.P.

Permit Number: **C-1981-019**

Date: **October 23, 2023**

Revision Description: **TR-161 Mine Plan and PMT Revision**

| Volume<br>Number | Page, Map or other Permit |                      | Description of Change     |
|------------------|---------------------------|----------------------|---------------------------|
|                  | Entry to be<br>REMOVED    | Entry to be<br>ADDED |                           |
| 22               | Map 19C                   | Map 19C              | Map 19C has been updated. |

## **Exhibit 7, Item 20, Part B**

### **West Taylor Pond and Channels**

The location of the West Taylor Pond is presented on Map 12. The profiles of the associated permanent channels associated with the West Taylor Pond watershed are presented on Map 33B. These channels consist of the West Fork Taylor Ditch, East Fork Taylor Ditch, Trib 1 through Trib 7 ditches and the terrace ditches that will be constructed across the West Taylor Fill. The permanent channel design information for all channels is presented in this exhibit. The as-built configuration for the West Taylor Pond is presented on Figure Exh. 7-20B-1, and Figure Exh. 720B-2 provides the breakdown of drainage areas and hydrologic conditions for this sediment pond in the post mining condition.

Exhibit 7, Item 14 in Volume 2D describes the hydrologic methodology used in sediment pond and post mine channel assumptions. Runoff curve numbers assigned to the undisturbed and reclaimed lands in various stages of reclamation have been selected in accordance with Table 1 in the Introductory Text for Exhibit 7 in Volume 2D. For channels protected by a riprap liner, selection of minimum riprap size is done using the Simons/OSM method in SEDCAD<sup>TM</sup>. For channels to be protected by a vegetative liner, the permissible velocities are also determined using SEDCAD<sup>TM</sup> routines.

#### **West Taylor Pond**

The following pages present the results of the SEDCAD<sup>TM</sup> models for the post mining condition. At this stage the oldest reclamation is on the eastern and southern extent of the reclaimed South Taylor Pit, and the younger (topsoil and seeded) reclamation is the northern reaches of the West Taylor Pond watershed very near the West Taylor Pond.

The SEDCAD<sup>TM</sup> model herein provides the results of the 10-year 24-hour design storm and demonstrates the West Taylor Pond will meet the applicable settleable solids standard under this modeled storm event. The second SEDCAD<sup>TM</sup> model demonstrates that the West Taylor Pond emergency spillway elevation is capable of containing the 25-year 24-hour storm.

The final post mining topographic surface and the final locations of the permanent drainage channels as presented on Map 12 were used to model the watershed for the post-mining condition. Four in-stream stock ponds (WFSP-1, WFSP-2, EFSP-1, and, EFSP-2) are included in the permanent channels to decrease peak flows from the modeled storm events, and to provide a water source to support the post-mining land use. A typical design for of each stock pond in the West Taylor Pond watershed are provided on Figure 2.05-6 in Volume 1. However, depending on the ground conditions encountered during reclamation, these stock ponds may be constructed similar to ETD-1 (please see Figure Exh. 7-20ET-3) in the East Taylor watershed.

In summary, the post mining case at the West Taylor Pond, the 10-year 24-hour storm produces 8.8 acre feet of runoff, and the settleable solids discharge is 0.18 ml/l. The 25-year 24-hour storm event peaks at the 7,473.78' elevation, which is well below the emergency spill way elevation of 7,475.0'.

## **Permanent Post Mine Channels**

The West Taylor watershed is comprised of two primary post-mining channels and six tributaries channels. Both of the primary channels convey the post mining surface water flows to the West Taylor Pond, while the six tributaries channels route water to both primary post mining channels. The locations of both the primary and tributary channels are presented on Map 12 and Figure Exh. 7-20B-2. The channel profiles are presented on Map 33B.

The assumed hydrologic condition for all three channels is the post mine condition when the entire West Taylor watershed is reclaimed and reporting to the West Taylor Pond.

### **West and East Fork Taylor Ditch**

The area contributory to each permanent primary channel is less than one square mile, making the appropriate storm event the 10-year, 24-hour event as specified in Rule 4.05.3. However, portions of these channels pass over permanent fills, so the correct storm event required by Rule 4.09.2 becomes the 100-year, 24-hour event. For simplicity, both primary channels are modeled to this larger event.

The upper segments of the primary channels are flat enough that a vegetative liner will provide sufficient erosion protection, even for the 100-year flow. However, both channels below the lower stock ponds require riprap lining to ensure long-term stability.

A SEDCAD<sup>TM</sup> model has been included below which evaluates the peak flow and total runoff volume for each of the channel segments for the 100-year, 24-hour storm event. The channel configurations for the 100-year, 24-hour storm event for both primary channels are described on the tables below.

#### **East Fork Taylor Ditch**

| <u>Station</u>           | <u>Peak Flow<br/>(CFS)</u> | <u>Average<br/>Slope (%)</u> | <u>Channel<br/>Type</u>   | <u>Side<br/>Slopes</u> | <u>Minimum<br/>Depth<br/>(Feet)</u> | <u>Erosion<br/>Protection</u> |
|--------------------------|----------------------------|------------------------------|---------------------------|------------------------|-------------------------------------|-------------------------------|
| Station 0+00 to EFSP-1   | 25.00                      | 25                           | Trapezoidal<br>12' bottom | 3H:1V                  | 4.0                                 | Riprap,<br>D50 = 9"           |
| EFSP-1 to EFSP-2         | 54.25                      | 2.1                          | Trapezoidal<br>12' bottom | 3H:1V                  | 4.0                                 | Vegetation                    |
| EFSP-2 to Station 116+97 | 26.15                      | 5.4                          | Trapezoidal<br>12' bottom | 3H:1V                  | 4.0                                 | Vegetation                    |

### **West Fork Taylor Ditch**

| <u>Station</u>          | <u>Peak Flow<br/>(CFS)</u> | <u>Average<br/>Slope (%)</u> | <u>Channel<br/>Type</u>   | <u>Side<br/>Slopes</u> | <u>Minimum<br/>Depth<br/>(Feet)</u> | <u>Erosion<br/>Protection</u> |
|-------------------------|----------------------------|------------------------------|---------------------------|------------------------|-------------------------------------|-------------------------------|
| Station 0+00 to WFSP-1  | 46.17                      | 26                           | Trapezoidal<br>12' bottom | 3H:1V                  | 4.0                                 | Riprap,<br>D50 = 15"          |
| WFSP-1 to WFSP-2        | 71.02                      | 1.3                          | Trapezoidal<br>12' bottom | 3H:1V                  | 4.0                                 | Vegetation                    |
| WFSP-2 to Station 85+00 | 68.97                      | 10.2                         | Trapezoidal<br>12' bottom | 3H:1V                  | 4.0                                 | Vegetation                    |

### **Tributary Ditches**

The six post mine tributaries channels (Trib's 1 through 6) will be constructed to break up long continuous slopes and minimize erosion in the South Taylor reclamation areas. They will also convey flow to the two primary channels. These six tributaries were modeled in accordance with Rule 4.05.3(3) for the 10-year 24-hour event.

A very small portion of Trib 1 flows over a permanent fill, which in accordance with Rule 4.09.2(7) makes the appropriate storm event for this small portion of channel the 100-year, 24 hour storm event. Since it is minor portion of the channel flows over permanent fill, Trib 1 is modeled to the 10-year, 24-hour storm event.

A summary of the configurations for each tributary channel is provided on the table below.

| <b><u>Post Mine Tributary Channels</u></b> |                                |                              |                          |                        |                                     |                               |
|--------------------------------------------|--------------------------------|------------------------------|--------------------------|------------------------|-------------------------------------|-------------------------------|
| <u>Tributary Name</u>                      | <u>Peak<br/>Flow<br/>(CFS)</u> | <u>Average<br/>Slope (%)</u> | <u>Channel<br/>Type</u>  | <u>Side<br/>Slopes</u> | <u>Minimum<br/>Depth<br/>(Feet)</u> | <u>Erosion<br/>Protection</u> |
| Trib 1                                     | 12.49                          | 5.0                          | Trapezoidal<br>6' bottom | 3H:1V                  | 3.0                                 | Vegetation                    |
| Trib 2                                     | 5.57                           | 11.0                         | Trapezoidal<br>6' bottom | 3H:1V                  | 3.0                                 | Vegetation                    |
| Trib 3                                     | 5.51                           | 11.0                         | Trapezoidal<br>6' bottom | 3H:1V                  | 3.0                                 | Vegetation                    |
| Trib 4                                     | 0.11                           | 16.0                         | Trapezoidal<br>6' bottom | 3H:1V                  | 3.0                                 | Vegetation                    |
| Trib 5                                     | 0.11                           | 4.0                          | Trapezoidal<br>6' bottom | 3H:1V                  | 3.0                                 | Vegetation                    |
| Trib 6                                     | 0.05                           | 6.0                          | Trapezoidal<br>6' bottom | 3H:1V                  | 3.0                                 | Vegetation                    |
| Trib 7                                     | 0.12                           | 7.0                          | Trapezoidal<br>6' bottom | 3H:1V                  | 3.0                                 | Vegetation                    |

## **Terrace Ditches**

A series of terrace ditches will be constructed across the face of the West Taylor Fill which reports surface water runoff to the West Taylor Pond. The locations of terrace ditches are shown on Map 12. The terrace ditches on the West Taylor Fill will originate near the even 100-foot post mining contours of 7600', 7700', and 7800' elevations on the fill face. Actual on the ground topography will dictate the final placement and profile of the terrace ditches to ensure proper water flow.

The function of the terrace ditches is collect surface flows and direct the flow to the permanent post mine channels (East and West Fork Taylor Ditches) on the outer edges of the West Taylor Fill. The design basis for these terrace ditches is the 100-year, 24-hours event as they will be permanent in the post mine topography, and the 100-year 24-hour storm provides a conservative design.

A summary of the configurations for each terrace ditch is provided on the table below.

| <b><u>Terrace Ditch</u></b>   |                                |                                  |                         |                                   |                                     |                               |
|-------------------------------|--------------------------------|----------------------------------|-------------------------|-----------------------------------|-------------------------------------|-------------------------------|
| <u>Terrace<br/>Ditch Name</u> | <u>Peak<br/>Flow<br/>(CFS)</u> | <u>Average<br/>Slope<br/>(%)</u> | <u>Channel<br/>Type</u> | <u>Side Slopes</u>                | <u>Minimum<br/>Depth<br/>(Feet)</u> | <u>Erosion<br/>Protection</u> |
| 7600'                         | 1.41                           | 1.5                              | Triangular              | Left - 1.5H:1V<br>Right - 3.0H:1V | 3.0                                 | Vegetation                    |
| 7700'                         | 2.58                           | 1.5                              | Triangular              | Left - 1.5H:1V<br>Right - 3.0H:1V | 3.0                                 | Vegetation                    |
| West 7800'                    | 7.49                           | 1.5                              | Triangular              | Left - 1.5H:1V<br>Right - 3.0H:1V | 3.0                                 | Vegetation                    |
| East 7800'                    | 12.51                          | 1.5                              | Triangular              | Left - 1.5H:1V<br>Right - 3.0H:1V | 3.0                                 | Vegetation                    |

# **West Taylor Pond** **10 Yr - 24 Hr Storm Event**

*Effluent Demonstration*  
*Post Mining*

Tony Tennyson

## ***General Information***

### ***Storm Information:***

|                 |               |
|-----------------|---------------|
| Storm Type:     | NRCS Type II  |
| Design Storm:   | 10 yr - 24 hr |
| Rainfall Depth: | 1.800 inches  |

### ***Particle Size Distribution:***

| Size (mm) | Colowyo Particle<br>Size |
|-----------|--------------------------|
| 4.7500    | 100.000%                 |
| 0.0750    | 73.000%                  |
| 0.0400    | 33.000%                  |
| 0.0010    | 20.000%                  |

### Structure Networking:

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description                              |
|---------|--------|--------------|--------|---------------|---------|------------------------------------------|
| Null    | #1     | ==>          | End    | 0.000         | 0.000   | Null Below West Taylor Pond              |
| Pond    | #2     | ==>          | #1     | 0.000         | 0.000   | West Taylor Pond                         |
| Null    | #3     | ==>          | #2     | 0.000         | 0.000   | Null Above West Taylor Pond              |
| Channel | #4     | ==>          | #3     | 0.000         | 0.000   | 0+00 to WFSP-1 West Fork Taylor Ditch    |
| Pond    | #5     | ==>          | #4     | 0.000         | 0.000   | WFSP-1 Stock Pond                        |
| Channel | #6     | ==>          | #5     | 0.000         | 0.000   | Channel WFSP-1 to WFSP-2                 |
| Pond    | #7     | ==>          | #6     | 0.000         | 0.000   | WFSP-2 Stockpond                         |
| Channel | #8     | ==>          | #7     | 0.000         | 0.000   | WFSP-2 to Station 85+00                  |
| Null    | #9     | ==>          | #6     | 0.000         | 0.000   | Null Confluence Trib 1                   |
| Channel | #10    | ==>          | #9     | 0.000         | 0.000   | Trib 1                                   |
| Null    | #13    | ==>          | #4     | 0.000         | 0.000   | Null Confluence West 7800' Terrace Ditch |
| Channel | #14    | ==>          | #13    | 0.000         | 0.000   | West 7800' Terrace Ditch                 |
| Null    | #15    | ==>          | #4     | 0.000         | 0.000   | Null 7700' Terrace Ditch                 |
| Channel | #16    | ==>          | #15    | 0.000         | 0.000   | 7700' Terrace Ditch                      |
| Channel | #17    | ==>          | #3     | 0.000         | 0.000   | East Fork Taylor Ditch 0+00 to EFSP-1    |
| Null    | #18    | ==>          | #17    | 0.000         | 0.000   | Null 7600' Terrace Ditch                 |
| Channel | #19    | ==>          | #18    | 0.000         | 0.000   | 7600' Terrace Ditch                      |
| Null    | #20    | ==>          | #17    | 0.000         | 0.000   | Null 7800' Terrace Ditch                 |
| Channel | #21    | ==>          | #20    | 0.000         | 0.000   | East 7800' Terrace Ditch                 |
| Pond    | #22    | ==>          | #17    | 0.000         | 0.000   | EFSP-1 Stock Pond                        |
| Channel | #23    | ==>          | #22    | 0.000         | 0.000   | EFSP-1 to EFSP-2 Veg Channel             |
| Pond    | #24    | ==>          | #23    | 0.000         | 0.000   | EFSP-2 Stockpond                         |
| Channel | #25    | ==>          | #24    | 0.000         | 0.000   | EFSP-2 to Station 116+97                 |
| Null    | #26    | ==>          | #8     | 0.000         | 0.000   | Null Confluence Trib 2                   |
| Channel | #27    | ==>          | #26    | 0.000         | 0.000   | Trib 2                                   |
| Null    | #28    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 3                   |
| Channel | #29    | ==>          | #28    | 0.000         | 0.000   | Trib 3                                   |
| Null    | #30    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 5                   |
| Channel | #31    | ==>          | #30    | 0.000         | 0.000   | Trib 5                                   |
| Null    | #32    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 4                   |
| Channel | #33    | ==>          | #32    | 0.000         | 0.000   | Trib 4                                   |
| Null    | #34    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 6                   |
| Channel | #35    | ==>          | #34    | 0.000         | 0.000   | Trib 6                                   |
| Null    | #36    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 7                   |
| Channel | #37    | ==>          | #36    | 0.000         | 0.000   | Trib 7                                   |

#37  
Chan'l



|  |                                                                                     |               |
|--|-------------------------------------------------------------------------------------|---------------|
|  |  | #36<br>Null   |
|  |  | #35<br>Chan'l |
|  |  | #34<br>Null   |
|  |  | #33<br>Chan'l |
|  |  | #32<br>Null   |
|  |  | #31<br>Chan'l |
|  |  | #30<br>Null   |
|  |  | #29<br>Chan'l |
|  |  | #28<br>Null   |
|  |    | #25<br>Chan'l |
|  |    | #24<br>Pond   |
|  |  | #23<br>Chan'l |
|  |  | #22<br>Pond   |
|  |  | #21<br>Chan'l |
|  |  | #20<br>Null   |
|  |  | #19<br>Chan'l |
|  |  | #18<br>Null   |
|  |  | #17<br>Chan'l |
|  |  | #16<br>Chan'l |
|  |  | #15<br>Null   |
|  |  | #14<br>Chan'l |
|  |  | #13<br>Null   |

|                                                                                   |                                                                                     |                                                                                                   |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
|                                                                                   |    | #10<br>Chan'l                                                                                     |
|                                                                                   |    | #9<br>Null                                                                                        |
|                                                                                   |                                                                                     |  #27<br>Chan'l |
|                                                                                   |  | #26<br>Null                                                                                       |
|                                                                                   |    | #8<br>Chan'l                                                                                      |
|                                                                                   |    | #7<br>Pond                                                                                        |
|                                                                                   |    | #6<br>Chan'l                                                                                      |
|                                                                                   |    | #5<br>Pond                                                                                        |
|                                                                                   |    | #4<br>Chan'l                                                                                      |
|                                                                                   |    | #3<br>Null                                                                                        |
|  | #2<br>Pond                                                                          |                                                                                                   |
| #1<br>Null                                                                        |                                                                                     |                                                                                                   |

### ***Structure Summary:***

|     | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) | Sediment<br>(tons) | Peak<br>Sediment<br>Conc.<br>(mg/l) | Peak<br>Settleable<br>Conc.<br>(ml/l) | 24VW<br>(ml/l) |
|-----|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|--------------------|-------------------------------------|---------------------------------------|----------------|
| #37 | 25.600                                    | 25.600                                | 0.12                       | 0.08                                 | 0.0                | 266                                 | 0.13                                  | 0.11           |
| #36 | 0.000                                     | 25.600                                | 0.12                       | 0.08                                 | 0.0                | 266                                 | 0.13                                  | 0.11           |
| #35 | 6.600                                     | 6.600                                 | 0.05                       | 0.03                                 | 0.0                | 397                                 | 0.23                                  | 0.17           |
| #34 | 0.000                                     | 6.600                                 | 0.05                       | 0.03                                 | 0.0                | 397                                 | 0.23                                  | 0.17           |
| #33 | 14.000                                    | 14.000                                | 0.11                       | 0.06                                 | 0.0                | 388                                 | 0.22                                  | 0.17           |
| #32 | 0.000                                     | 14.000                                | 0.11                       | 0.06                                 | 0.0                | 388                                 | 0.22                                  | 0.17           |
| #31 | 23.800                                    | 23.800                                | 0.11                       | 0.08                                 | 0.0                | 142                                 | 0.07                                  | 0.06           |
| #30 | 0.000                                     | 23.800                                | 0.11                       | 0.08                                 | 0.0                | 142                                 | 0.07                                  | 0.06           |
| #29 | 25.600                                    | 25.600                                | 5.51                       | 0.46                                 | 37.0               | 140,348                             | 79.99                                 | 32.70          |
| #28 | 0.000                                     | 25.600                                | 5.51                       | 0.46                                 | 37.0               | 140,348                             | 79.99                                 | 32.70          |
| #25 | 144.700                                   | 240.300                               | 5.51                       | 1.18                                 | 37.1               | 140,348                             | 79.97                                 | 12.77          |
| #24 | In<br>Out                                 | 0.000                                 | 240.300                    | 5.51                                 | 1.18               | 37.1                                | 140,348                               | 79.97          |
|     |                                           |                                       |                            | 0.00                                 | 0.00               | 37.1                                | 0                                     | 0.00           |
| #23 |                                           | 79.900                                | 320.200                    | 21.53                                | 2.49               | 158.8                               | 68,139                                | 38.40          |
| #22 | In<br>Out                                 | 0.000                                 | 320.200                    | 21.53                                | 2.49               | 158.8                               | 68,139                                | 38.40          |
|     |                                           |                                       |                            | 1.74                                 | 1.31               | 0.0                                 | 4                                     | 0.00           |
| #21 |                                           | 12.400                                | 12.400                     | 4.84                                 | 0.36               | 67.9                                | 276,566                               | 157.63         |
| #20 |                                           | 0.000                                 | 12.400                     | 4.84                                 | 0.36               | 67.9                                | 276,566                               | 157.63         |
| #19 |                                           | 4.000                                 | 4.000                      | 0.03                                 | 0.02               | 0.0                                 | 484                                   | 0.28           |
| #18 |                                           | 0.000                                 | 4.000                      | 0.03                                 | 0.02               | 0.0                                 | 484                                   | 0.28           |
| #17 |                                           | 24.700                                | 361.300                    | 5.41                                 | 1.72               | 71.8                                | 263,295                               | 150.07         |
| #16 |                                           | 7.300                                 | 7.300                      | 0.06                                 | 0.03               | 0.0                                 | 519                                   | 0.30           |
| #15 |                                           | 0.000                                 | 7.300                      | 0.06                                 | 0.03               | 0.0                                 | 519                                   | 0.30           |
| #14 |                                           | 7.500                                 | 7.500                      | 2.89                                 | 0.21               | 33.0                                | 230,293                               | 131.26         |
| #13 |                                           | 0.000                                 | 7.500                      | 2.89                                 | 0.21               | 33.0                                | 230,293                               | 131.26         |
| #10 |                                           | 133.700                               | 133.700                    | 12.49                                | 1.26               | 57.0                                | 64,553                                | 33.20          |
| #9  |                                           | 0.000                                 | 133.700                    | 12.49                                | 1.26               | 57.0                                | 64,553                                | 33.20          |
| #27 |                                           | 90.300                                | 90.300                     | 5.57                                 | 0.75               | 38.3                                | 111,513                               | 59.66          |
| #26 |                                           | 0.000                                 | 90.300                     | 5.57                                 | 0.75               | 38.3                                | 111,513                               | 59.66          |
| #8  |                                           | 110.600                               | 200.900                    | 24.31                                | 2.72               | 145.7                               | 89,360                                | 46.77          |
| #7  | In<br>Out                                 | 0.000                                 | 200.900                    | 24.31                                | 2.72               | 145.7                               | 89,360                                | 46.77          |
|     |                                           |                                       |                            | 1.83                                 | 1.46               | 0.0                                 | 4                                     | 0.00           |
| #6  |                                           | 86.100                                | 420.700                    | 28.46                                | 4.14               | 126.7                               | 68,754                                | 36.15          |
| #5  | In<br>Out                                 | 0.000                                 | 420.700                    | 28.46                                | 4.14               | 126.7                               | 68,754                                | 36.15          |
|     |                                           |                                       |                            | 3.14                                 | 2.87               | 0.0                                 | 7                                     | 0.00           |
| #4  |                                           | 29.000                                | 464.500                    | 3.40                                 | 3.15               | 38.6                                | 228,372                               | 130.16         |
| #3  |                                           | 0.000                                 | 825.800                    | 8.81                                 | 4.87               | 110.4                               | 249,944                               | 142.46         |
| #2  | In<br>Out                                 | 27.600                                | 853.400                    | 8.81                                 | 4.87               | 110.4                               | 249,944                               | 142.46         |
|     |                                           |                                       |                            | 4.87                                 | 4.68               | 26.1                                | 6,418                                 | 0.26           |

# SEDCAD 4 for Windows

Copyright 1998 - 2010 Pamela L. Schwab

7

|    | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) | Sediment<br>(tons) | Peak<br>Sediment<br>Conc.<br>(mg/l) | Peak<br>Settleable<br>Conc.<br>(ml/l) | 24VW<br>(ml/l) |
|----|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|--------------------|-------------------------------------|---------------------------------------|----------------|
| #1 | 0.000                                     | 853.400                               | 4.87                       | 4.68                                 | 26.1               | 6,415                               | 0.26                                  | 0.18           |

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

### ***Structure #37 (Trib 7):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 94.402%  |
| 0.0400    | 42.675%  |
| 0.0010    | 25.864%  |

### ***Structure #36 (Null Confluence Trib 7):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 94.402%  |
| 0.0400    | 42.675%  |
| 0.0010    | 25.864%  |

### ***Structure #35 (Trib 6):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

### ***Structure #34 (Null Confluence Trib 6):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

### ***Structure #33 (Trib 4):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #32 (Null Confluence Trib 4):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #31 (Trib 5):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 94.729%  |
| 0.0400    | 42.823%  |
| 0.0010    | 25.953%  |

***Structure #30 (Null Confluence Trib 5):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 94.729%  |
| 0.0400    | 42.823%  |
| 0.0010    | 25.953%  |

***Structure #29 (Trib 3):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #28 (Null Confluence Trib 3):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |

| Size (mm) | In/Out  |
|-----------|---------|
| 0.0750    | 73.000% |
| 0.0400    | 33.000% |
| 0.0010    | 20.000% |

***Structure #25 (EFSP-2 to Station 116+97):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.060%  |
| 0.0400    | 33.028%  |
| 0.0010    | 20.017%  |

***Structure #24 (EFSP-2 Stockpond):***

| Size (mm) | In       | Out    |
|-----------|----------|--------|
| 4.7500    | 100.000% | 0.000% |
| 0.0750    | 73.060%  | 0.000% |
| 0.0400    | 33.028%  | 0.000% |
| 0.0010    | 20.017%  | 0.000% |

***Structure #23 (EFSP-1 to EFSP-2 Veg Channel):***

| Size (mm) | In/Out  |
|-----------|---------|
| 4.7500    | 76.629% |
| 0.0750    | 75.036% |
| 0.0400    | 33.920% |
| 0.0010    | 20.558% |

***Structure #22 (EFSP-1 Stock Pond):***

| Size (mm) | In      | Out      |
|-----------|---------|----------|
| 4.7500    | 76.629% | 100.000% |
| 0.0750    | 75.036% | 100.000% |
| 0.0400    | 33.920% | 100.000% |
| 0.0010    | 20.558% | 100.000% |

***Structure #21 (East 7800' Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |

| Size (mm) | In/Out  |
|-----------|---------|
| 0.0400    | 33.000% |
| 0.0010    | 20.000% |

***Structure #20 (Null 7800' Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #19 (7600' Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #18 (Null 7600' Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #17 (East Fork Taylor Ditch 0+00 to EFSP-1):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #16 (7700' Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |



| Size (mm) | In/Out  |
|-----------|---------|
| 0.0010    | 20.000% |

***Structure #15 (Null 7700' Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #14 (West 7800' Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #13 (Null Confluence West 7800' Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #10 (Trib 1):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 90.689%  |
| 0.0400    | 40.996%  |
| 0.0010    | 24.846%  |

***Structure #9 (Null Confluence Trib 1):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 90.689%  |
| 0.0400    | 40.996%  |
| 0.0010    | 24.846%  |

**Structure #27 (Trib 2):**

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 84.101%  |
| 0.0400    | 38.018%  |
| 0.0010    | 23.041%  |

**Structure #26 (Null Confluence Trib 2):**

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 84.101%  |
| 0.0400    | 38.018%  |
| 0.0010    | 23.041%  |

**Structure #8 (WFSP-2 to Station 85+00):**

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 87.813%  |
| 0.0400    | 39.696%  |
| 0.0010    | 24.058%  |

**Structure #7 (WFSP-2 Stockpond):**

| Size (mm) | In       | Out      |
|-----------|----------|----------|
| 4.7500    | 100.000% | 100.000% |
| 0.0750    | 87.813%  | 100.000% |
| 0.0400    | 39.696%  | 100.000% |
| 0.0010    | 24.058%  | 100.000% |

**Structure #6 (Channel WFSP-1 to WFSP-2):**

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 87.049%  |
| 0.0400    | 39.351%  |
| 0.0010    | 23.849%  |

**Structure #5 (WFSP-1 Stock Pond):**

| Size (mm) | In       | Out      |
|-----------|----------|----------|
| 4.7500    | 100.000% | 100.000% |
| 0.0750    | 87.049%  | 100.000% |
| 0.0400    | 39.351%  | 100.000% |
| 0.0010    | 23.849%  | 100.000% |

***Structure #4 (0+00 to WFSP-1 West Fork Taylor Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.001%  |
| 0.0400    | 33.002%  |
| 0.0010    | 20.002%  |

***Structure #3 (Null Above West Taylor Pond):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.001%  |
| 0.0010    | 20.001%  |

***Structure #2 (West Taylor Pond):***

| Size (mm) | In       | Out      |
|-----------|----------|----------|
| 4.7500    | 100.000% | 100.000% |
| 0.0750    | 73.000%  | 100.000% |
| 0.0400    | 33.001%  | 100.000% |
| 0.0010    | 20.001%  | 84.690%  |

***Structure #1:***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 100.000% |
| 0.0400    | 100.000% |
| 0.0010    | 84.690%  |

## Structure Detail:

### Structure #37 (Vegetated Channel)

#### *Trib 7*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 7.0       | D, B               | 2.81                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 0.12 cfs                        |                                | 0.12 cfs                       |                               |
| Depth:                 | 0.06 ft                         | 2.87 ft                        | 0.19 ft                        | 3.00 ft                       |
| Top Width:             | 6.38 ft                         | 23.24 ft                       | 7.16 ft                        | 24.02 ft                      |
| Velocity:              | 0.31 fps                        |                                | 0.10 fps                       |                               |
| X-Section Area:        | 0.40 sq ft                      |                                | 1.28 sq ft                     |                               |
| Hydraulic Radius:      | 0.062 ft                        |                                | 0.177 ft                       |                               |
| Froude Number:         | 0.22                            |                                | 0.04                           |                               |
| Roughness Coefficient: | 0.1953                          |                                | 1.2929                         |                               |

### Structure #36 (Null)

#### *Null Confluence Trib 7*

### Structure #35 (Vegetated Channel)

#### *Trib 6*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 6.0       | D, B               | 1.84                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 0.05 cfs                              |                                      | 0.05 cfs                             |                                     |
| Depth:                    | 0.05 ft                               | 1.89 ft                              | 0.16 ft                              | 2.00 ft                             |
| Top Width:                | 6.28 ft                               | 17.32 ft                             | 6.94 ft                              | 17.98 ft                            |
| Velocity:                 | 0.18 fps                              |                                      | 0.05 fps                             |                                     |
| X-Section Area:           | 0.28 sq ft                            |                                      | 1.02 sq ft                           |                                     |
| Hydraulic Radius:         | 0.045 ft                              |                                      | 0.145 ft                             |                                     |
| Froude Number:            | 0.15                                  |                                      | 0.02                                 |                                     |
| Roughness<br>Coefficient: | 0.2554                                |                                      | 2.0366                               |                                     |

Structure #34 (Null)

*Null Confluence Trib 6*

Structure #33 (Vegetated Channel)

*Trib 4*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 6.00                 | 3.0:1                      | 3.0:1                       | 16.0      | D, B                  | 2.86                    |                         |                               | 5.0                           |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 0.11 cfs                              |                                      | 0.11 cfs                             |                                     |
| Depth:                    | 0.05 ft                               | 2.91 ft                              | 0.14 ft                              | 3.00 ft                             |
| Top Width:                | 6.28 ft                               | 23.44 ft                             | 6.86 ft                              | 24.02 ft                            |
| Velocity:                 | 0.37 fps                              |                                      | 0.11 fps                             |                                     |
| X-Section Area:           | 0.29 sq ft                            |                                      | 0.93 sq ft                           |                                     |
| Hydraulic Radius:         | 0.046 ft                              |                                      | 0.134 ft                             |                                     |
| Froude Number:            | 0.30                                  |                                      | 0.05                                 |                                     |
| Roughness<br>Coefficient: | 0.2030                                |                                      | 1.3625                               |                                     |

Structure #32 (Null)

*Null Confluence Trib 4*

Structure #31 (Vegetated Channel)

*Trib 5*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 4.0       | D, B               | 2.77                 |                      |                         | 7.0                     |

Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 0.11 cfs                        |                                | 0.11 cfs                       |                               |
| Depth:                 | 0.07 ft                         | 2.84 ft                        | 0.23 ft                        | 3.00 ft                       |
| Top Width:             | 6.44 ft                         | 23.06 ft                       | 7.36 ft                        | 23.98 ft                      |
| Velocity:              | 0.25 fps                        |                                | 0.07 fps                       |                               |
| X-Section Area:        | 0.45 sq ft                      |                                | 1.51 sq ft                     |                               |
| Hydraulic Radius:      | 0.070 ft                        |                                | 0.203 ft                       |                               |
| Froude Number:         | 0.17                            |                                | 0.03                           |                               |
| Roughness Coefficient: | 0.2006                          |                                | 1.3676                         |                               |

Structure #30 (Null)

*Null Confluence Trib 5*

Structure #29 (Vegetated Channel)

*Trib 3*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 11.0      | D, B               | 2.48                 |                      |                         | 5.0                     |

Vegetated Channel Results:

|                   | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|-------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge: | 5.51 cfs                        |                                | 5.51 cfs                       |                               |
| Depth:            | 0.27 ft                         | 2.75 ft                        | 0.52 ft                        | 3.00 ft                       |
| Top Width:        | 7.64 ft                         | 22.52 ft                       | 9.13 ft                        | 24.01 ft                      |

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Velocity:                 | 2.95 fps                              |                                      | 1.40 fps                             |                                     |
| X-Section Area:           | 1.87 sq ft                            |                                      | 3.94 sq ft                           |                                     |
| Hydraulic Radius:         | 0.242 ft                              |                                      | 0.424 ft                             |                                     |
| Froude Number:            | 1.05                                  |                                      | 0.38                                 |                                     |
| Roughness<br>Coefficient: | 0.0647                                |                                      | 0.1990                               |                                     |

Structure #28 (Null)

*Null Confluence Trib 3*

Structure #25 (Vegetated Channel)

*EFSP-2 to Station 116+97*

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 5.4       | D, B                  | 3.49                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 5.51 cfs                              |                                      | 5.51 cfs                             |                                     |
| Depth:                    | 0.25 ft                               | 3.74 ft                              | 0.51 ft                              | 4.00 ft                             |
| Top Width:                | 13.51 ft                              | 34.45 ft                             | 15.08 ft                             | 36.02 ft                            |
| Velocity:                 | 1.72 fps                              |                                      | 0.79 fps                             |                                     |
| X-Section Area:           | 3.21 sq ft                            |                                      | 6.95 sq ft                           |                                     |
| Hydraulic Radius:         | 0.236 ft                              |                                      | 0.456 ft                             |                                     |
| Froude Number:            | 0.62                                  |                                      | 0.21                                 |                                     |
| Roughness<br>Coefficient: | 0.0768                                |                                      | 0.2582                               |                                     |

Structure #24 (Pond)

*EFSP-2 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 92.00 ft   |
| Initial Pool:      | 0.15 ac-ft |

|                    |            |
|--------------------|------------|
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

## Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.50             | 0.0150      | 98.00              | 0.50                      | 0.00                 |

## Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

## Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 97.97 ft  |
| H'graph Detention Time: | 0.00 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 0.00 days |
| Trap Efficiency:        | 0.00 %    |

*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)  |
|-----------|-----------|------------------|-----------------|---------------------|
| 90.00     | 0.050     | 0.000            | 0.000           | Top of Sed. Storage |
| 91.00     | 0.072     | 0.061            | 0.000           |                     |
| 92.00     | 0.098     | 0.145            | 0.000           |                     |
| 93.00     | 0.128     | 0.258            | 0.000           |                     |
| 94.00     | 0.162     | 0.403            | 0.000           |                     |
| 95.00     | 0.200     | 0.583            | 0.000           |                     |
| 96.00     | 0.231     | 0.799            | 0.000           |                     |
| 97.00     | 0.265     | 1.046            | 0.000           |                     |
| 97.97     | 0.300     | 1.321            | 0.000           | 0.00 Peak Stage     |
| 98.00     | 0.301     | 1.329            | 0.000           | Spillway #1         |
| 99.00     | 0.339     | 1.649            | 2.094           |                     |
| 100.00    | 0.380     | 2.008            | 4.263           | Spillway #2         |
| 101.00    | 0.554     | 2.473            | 30.516          |                     |
| 102.00    | 0.761     | 3.127            | 98.736          |                     |
| 103.00    | 1.000     | 4.005            | 207.246         |                     |



Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 90.00             | 0.000                  | 0.000                       | 0.000                                   |
| 91.00             | 0.000                  | 0.000                       | 0.000                                   |
| 92.00             | 0.000                  | 0.000                       | 0.000                                   |
| 93.00             | 0.000                  | 0.000                       | 0.000                                   |
| 94.00             | 0.000                  | 0.000                       | 0.000                                   |
| 95.00             | 0.000                  | 0.000                       | 0.000                                   |
| 96.00             | 0.000                  | 0.000                       | 0.000                                   |
| 97.00             | 0.000                  | 0.000                       | 0.000                                   |
| 98.00             | 0.000                  | 0.000                       | 0.000                                   |
| 99.00             | (3)>2.094              | 0.000                       | 2.094                                   |
| 100.00            | (5)>4.263              | 0.000                       | 4.263                                   |
| 101.00            | (6)>5.033              | 25.483                      | 30.516                                  |
| 102.00            | (6)>5.701              | 93.036                      | 98.736                                  |
| 103.00            | (6)>6.275              | 200.972                     | 207.246                                 |

Structure #23 (Vegetated Channel)

*EFSP-1 to EFSP-2 Veg Channel*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 2.1       | D, B                  | 2.97                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 21.53 cfs                             |                                      | 21.53 cfs                            |                                     |
| Depth:                    | 0.59 ft                               | 3.56 ft                              | 1.03 ft                              | 4.00 ft                             |
| Top Width:                | 15.56 ft                              | 33.38 ft                             | 18.21 ft                             | 36.03 ft                            |
| Velocity:                 | 2.63 fps                              |                                      | 1.38 fps                             |                                     |
| X-Section Area:           | 8.19 sq ft                            |                                      | 15.63 sq ft                          |                                     |
| Hydraulic Radius:         | 0.520 ft                              |                                      | 0.843 ft                             |                                     |
| Froude Number:            | 0.64                                  |                                      | 0.26                                 |                                     |
| Roughness<br>Coefficient: | 0.0530                                |                                      | 0.1398                               |                                     |

Structure #22 (Pond)

*EFSP-1 Stock Pond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 92.00 ft   |
| Initial Pool:      | 0.15 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

Straight Pipe

| Barrel Diameter<br>(in) | Barrel Length<br>(ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|-------------------------|-----------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                   | 100.00                | 1.50             | 0.0150      | 98.00              | 0.50                      | 0.00                 |

Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 98.83 ft  |
| H'graph Detention Time: | 4.17 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 0.76 days |
| Trap Efficiency:        | 100.00 %  |

*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)  |
|-----------|-----------|------------------|-----------------|---------------------|
| 90.00     | 0.050     | 0.000            | 0.000           | Top of Sed. Storage |
| 91.00     | 0.072     | 0.061            | 0.000           |                     |
| 92.00     | 0.098     | 0.145            | 0.000           |                     |
| 93.00     | 0.128     | 0.258            | 0.000           |                     |
| 94.00     | 0.162     | 0.403            | 0.000           |                     |
| 95.00     | 0.200     | 0.583            | 0.000           |                     |
| 96.00     | 0.231     | 0.799            | 0.000           |                     |
| 97.00     | 0.265     | 1.046            | 0.000           |                     |
| 98.00     | 0.301     | 1.329            | 0.000           | Spillway #1         |

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |             |
|-----------|--------------|---------------------|--------------------|--------------------------|-------------|
| 98.83     | 0.333        | 1.595               | 1.743              | 18.25                    | Peak Stage  |
| 99.00     | 0.339        | 1.649               | 2.094              |                          |             |
| 100.00    | 0.380        | 2.008               | 4.263              |                          | Spillway #2 |
| 101.00    | 0.554        | 2.473               | 30.516             |                          |             |
| 102.00    | 0.761        | 3.127               | 98.736             |                          |             |
| 103.00    | 1.000        | 4.005               | 207.246            |                          |             |

## Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 90.00             | 0.000                  | 0.000                       | 0.000                                   |
| 91.00             | 0.000                  | 0.000                       | 0.000                                   |
| 92.00             | 0.000                  | 0.000                       | 0.000                                   |
| 93.00             | 0.000                  | 0.000                       | 0.000                                   |
| 94.00             | 0.000                  | 0.000                       | 0.000                                   |
| 95.00             | 0.000                  | 0.000                       | 0.000                                   |
| 96.00             | 0.000                  | 0.000                       | 0.000                                   |
| 97.00             | 0.000                  | 0.000                       | 0.000                                   |
| 98.00             | 0.000                  | 0.000                       | 0.000                                   |
| 99.00             | (3)>2.094              | 0.000                       | 2.094                                   |
| 100.00            | (5)>4.263              | 0.000                       | 4.263                                   |
| 101.00            | (6)>5.033              | 25.483                      | 30.516                                  |
| 102.00            | (6)>5.701              | 93.036                      | 98.736                                  |
| 103.00            | (6)>6.275              | 200.972                     | 207.246                                 |

## Structure #21 (Vegetated Channel)

### *East 7800' Terrace Ditch*

Triangular Vegetated Channel Inputs:

### Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  |                         |                         |                               | 7.0                           |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 4.84 cfs                              |                                      | 4.84 cfs                             |                                     |
| Depth:                    | 1.07 ft                               |                                      | 1.68 ft                              |                                     |
| Top Width:                | 4.80 ft                               |                                      | 7.56 ft                              |                                     |
| Velocity:                 | 1.89 fps                              |                                      | 0.76 fps                             |                                     |
| X-Section Area:           | 2.56 sq ft                            |                                      | 6.35 sq ft                           |                                     |
| Hydraulic Radius:         | 0.488 ft                              |                                      | 0.768 ft                             |                                     |
| Froude Number:            | 0.46                                  |                                      | 0.15                                 |                                     |
| Roughness<br>Coefficient: | 0.0598                                |                                      | 0.2004                               |                                     |

Structure #20 (Null)

*Null 7800' Terrace Ditch*

Structure #19 (Vegetated Channel)

*7600' Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  | 2.45                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 0.03 cfs                              |                                      | 0.03 cfs                             |                                     |
| Depth:                    | 0.24 ft                               | 2.69 ft                              | 0.55 ft                              | 3.00 ft                             |
| Top Width:                | 1.08 ft                               | 12.11 ft                             | 2.46 ft                              | 13.49 ft                            |
| Velocity:                 | 0.23 fps                              |                                      | 0.04 fps                             |                                     |
| X-Section Area:           | 0.13 sq ft                            |                                      | 0.67 sq ft                           |                                     |
| Hydraulic Radius:         | 0.110 ft                              |                                      | 0.250 ft                             |                                     |
| Froude Number:            | 0.12                                  |                                      | 0.02                                 |                                     |
| Roughness<br>Coefficient: | 0.1786                                |                                      | 1.6044                               |                                     |

Structure #18 (Null)

*Null 7600' Terrace Ditch*

Structure #17 (Riprap Channel)

*East Fork Taylor Ditch 0+00 to EFSP-1*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 3.0:1                | 3.0:1                 | 25.0      | 3.97                 |                      |                         |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 5.41 cfs      |              |
| Depth:            | 0.03 ft       | 4.00 ft      |
| Top Width:        | 12.20 ft      | 36.02 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.40 sq ft    |              |
| Hydraulic Radius: | 0.033 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #16 (Vegetated Channel)

*7700' Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Smooth brome

| Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 1.5:1                | 3.0:1                 | 1.5       | D, B               | 2.38                 |                      |                         | 7.0                     |

Vegetated Channel Results:

|                   | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|-------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge: | 0.06 cfs                        |                                | 0.06 cfs                       |                               |
| Depth:            | 0.29 ft                         | 2.67 ft                        | 0.62 ft                        | 3.00 ft                       |
| Top Width:        | 1.29 ft                         | 12.00 ft                       | 2.81 ft                        | 13.52 ft                      |

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Velocity:                 | 0.30 fps                              |                                      | 0.06 fps                             |                                     |
| X-Section Area:           | 0.19 sq ft                            |                                      | 0.88 sq ft                           |                                     |
| Hydraulic Radius:         | 0.131 ft                              |                                      | 0.285 ft                             |                                     |
| Froude Number:            | 0.14                                  |                                      | 0.02                                 |                                     |
| Roughness<br>Coefficient: | 0.1569                                |                                      | 1.2529                               |                                     |

Structure #15 (Null)

*Null 7700' Terrace Ditch*

Structure #14 (Vegetated Channel)

*West 7800' Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  | 2.54                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 2.89 cfs                              |                                      | 2.89 cfs                             |                                     |
| Depth:                    | 0.92 ft                               | 3.46 ft                              | 1.50 ft                              | 4.04 ft                             |
| Top Width:                | 4.13 ft                               | 15.56 ft                             | 6.74 ft                              | 18.17 ft                            |
| Velocity:                 | 1.53 fps                              |                                      | 0.57 fps                             |                                     |
| X-Section Area:           | 1.89 sq ft                            |                                      | 5.05 sq ft                           |                                     |
| Hydraulic Radius:         | 0.419 ft                              |                                      | 0.684 ft                             |                                     |
| Froude Number:            | 0.40                                  |                                      | 0.12                                 |                                     |
| Roughness<br>Coefficient: | 0.0669                                |                                      | 0.2477                               |                                     |

Structure #13 (Null)

*Null Confluence West 7800' Terrace Ditch*

Structure #10 (Vegetated Channel)

*Trib 1*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 5.0       | D, B               | 2.15                 |                      |                         | 7.0                     |

Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 12.49 cfs                       |                                | 12.49 cfs                      |                               |
| Depth:                 | 0.49 ft                         | 2.64 ft                        | 0.85 ft                        | 3.00 ft                       |
| Top Width:             | 8.93 ft                         | 21.83 ft                       | 11.11 ft                       | 24.01 ft                      |
| Velocity:              | 3.42 fps                        |                                | 1.72 fps                       |                               |
| X-Section Area:        | 3.65 sq ft                      |                                | 7.28 sq ft                     |                               |
| Hydraulic Radius:      | 0.402 ft                        |                                | 0.639 ft                       |                               |
| Froude Number:         | 0.94                            |                                | 0.37                           |                               |
| Roughness Coefficient: | 0.0529                          |                                | 0.1440                         |                               |

Structure #9 (Null)

*Null Confluence Trib 1*

Structure #27 (Vegetated Channel)

*Trib 2*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 11.0      | D, B               | 2.48                 |                      |                         | 5.0                     |

Vegetated Channel Results:

|                   | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|-------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge: | 5.57 cfs                        |                                | 5.57 cfs                       |                               |
| Depth:            | 0.28 ft                         | 2.76 ft                        | 0.52 ft                        | 3.00 ft                       |
| Top Width:        | 7.65 ft                         | 22.53 ft                       | 9.13 ft                        | 24.01 ft                      |
| Velocity:         | 2.97 fps                        |                                | 1.41 fps                       |                               |
| X-Section Area:   | 1.88 sq ft                      |                                | 3.95 sq ft                     |                               |

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Hydraulic Radius:         | 0.243 ft                              |                                      | 0.425 ft                             |                                     |
| Froude Number:            | 1.06                                  |                                      | 0.38                                 |                                     |
| Roughness<br>Coefficient: | 0.0645                                |                                      | 0.1981                               |                                     |

Structure #26 (Null)

*Null Confluence Trib 2*

Structure #8 (Vegetated Channel)

*WFSP-2 to Station 85+00*

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 10.2      | D, B                  | 3.35                    |                         |                               | 6.0                           |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 24.31 cfs                             |                                      | 24.31 cfs                            |                                     |
| Depth:                    | 0.39 ft                               | 3.74 ft                              | 0.65 ft                              | 4.00 ft                             |
| Top Width:                | 14.32 ft                              | 34.42 ft                             | 15.92 ft                             | 36.02 ft                            |
| Velocity:                 | 4.77 fps                              |                                      | 2.67 fps                             |                                     |
| X-Section Area:           | 5.09 sq ft                            |                                      | 9.12 sq ft                           |                                     |
| Hydraulic Radius:         | 0.353 ft                              |                                      | 0.565 ft                             |                                     |
| Froude Number:            | 1.41                                  |                                      | 0.62                                 |                                     |
| Roughness<br>Coefficient: | 0.0497                                |                                      | 0.1218                               |                                     |

Structure #7 (Pond)

*WFSP-2 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 91.00 ft   |
| Initial Pool:      | 0.06 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |



*\*No sediment capacity defined*

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 5.00              |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.00             | 0.0150      | 98.00              | 0.90                      | 0.00                 |

### Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 98.87 ft  |
| H'graph Detention Time: | 4.34 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 0.73 days |
| Trap Efficiency:        | 100.00 %  |

*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)  |
|-----------|-----------|------------------|-----------------|---------------------|
| 90.00     | 0.050     | 0.000            | 0.000           | Top of Sed. Storage |
| 91.00     | 0.072     | 0.061            | 0.000           |                     |
| 92.00     | 0.098     | 0.145            | 0.000           |                     |
| 93.00     | 0.128     | 0.258            | 0.000           |                     |
| 94.00     | 0.162     | 0.403            | 0.000           |                     |
| 95.00     | 0.200     | 0.583            | 0.000           | Spillway #2         |
| 96.00     | 0.231     | 0.799            | 0.000           |                     |
| 97.00     | 0.265     | 1.046            | 0.000           |                     |
| 98.00     | 0.301     | 1.329            | 0.000           |                     |
| 98.87     | 0.334     | 1.609            | 1.831           | 17.55 Peak Stage    |
| 99.00     | 0.339     | 1.649            | 2.094           | Spillway #1         |
| 100.00    | 0.380     | 2.008            | 3.745           |                     |
| 101.00    | 0.554     | 2.473            | 18.584          |                     |
| 102.00    | 0.761     | 3.127            | 61.251          |                     |
| 103.00    | 1.000     | 4.005            | 135.506         |                     |

### Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 90.00             | 0.000                       | 0.000                  | 0.000                                   |
| 91.00             | 0.000                       | 0.000                  | 0.000                                   |
| 92.00             | 0.000                       | 0.000                  | 0.000                                   |
| 93.00             | 0.000                       | 0.000                  | 0.000                                   |
| 94.00             | 0.000                       | 0.000                  | 0.000                                   |
| 95.00             | 0.000                       | 0.000                  | 0.000                                   |
| 96.00             | 0.000                       | 0.000                  | 0.000                                   |
| 97.00             | 0.000                       | 0.000                  | 0.000                                   |
| 98.00             | 0.000                       | 0.000                  | 0.000                                   |
| 99.00             | 0.000                       | (3)>2.094              | 2.094                                   |
| 100.00            | 0.000                       | (6)>3.745              | 3.745                                   |
| 101.00            | 14.046                      | (6)>4.538              | 18.584                                  |
| 102.00            | 56.062                      | (6)>5.189              | 61.251                                  |
| 103.00            | 129.713                     | (6)>5.793              | 135.506                                 |

Structure #6 (Vegetated Channel)

*Channel WFSP-1 to WFSP-2*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 1.3       | D, B                  | 2.69                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                           | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|---------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:         | 28.46 cfs                             |                                      | 28.46 cfs                            |                                     |
| Depth:                    | 0.77 ft                               | 3.46 ft                              | 1.31 ft                              | 4.00 ft                             |
| Top Width:                | 16.63 ft                              | 32.77 ft                             | 19.85 ft                             | 35.99 ft                            |
| Velocity:                 | 2.58 fps                              |                                      | 1.37 fps                             |                                     |
| X-Section Area:           | 11.05 sq ft                           |                                      | 20.83 sq ft                          |                                     |
| Hydraulic Radius:         | 0.655 ft                              |                                      | 1.027 ft                             |                                     |
| Froude Number:            | 0.56                                  |                                      | 0.24                                 |                                     |
| Roughness<br>Coefficient: | 0.0497                                |                                      | 0.1265                               |                                     |

Structure #5 (Pond)

### WFSP-1 Stock Pond

#### Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 91.00 ft   |
| Initial Pool:      | 0.06 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

#### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.50             | 0.0150      | 98.00              | 0.90                      | 0.00                 |

#### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

#### Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 99.51 ft  |
| H'graph Detention Time: | 3.76 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 0.87 days |
| Trap Efficiency:        | 100.00 %  |

*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)  |
|-----------|-----------|------------------|-----------------|---------------------|
| 90.00     | 0.050     | 0.000            | 0.000           | Top of Sed. Storage |
| 91.00     | 0.072     | 0.061            | 0.000           |                     |
| 92.00     | 0.098     | 0.145            | 0.000           |                     |
| 93.00     | 0.128     | 0.258            | 0.000           |                     |
| 94.00     | 0.162     | 0.403            | 0.000           |                     |
| 95.00     | 0.200     | 0.583            | 0.000           |                     |
| 96.00     | 0.231     | 0.799            | 0.000           |                     |
| 97.00     | 0.265     | 1.046            | 0.000           |                     |
| 98.00     | 0.301     | 1.329            | 0.000           | Spillway #1         |
| 99.00     | 0.339     | 1.649            | 2.094           | 14.10               |

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |             |
|-----------|--------------|---------------------|--------------------|--------------------------|-------------|
| 99.51     | 0.361        | 1.831               | 3.143              | 6.70                     | Peak Stage  |
| 100.00    | 0.380        | 2.008               | 4.162              |                          | Spillway #2 |
| 101.00    | 0.554        | 2.473               | 30.351             |                          |             |
| 102.00    | 0.761        | 3.127               | 98.545             |                          |             |
| 103.00    | 1.000        | 4.005               | 207.032            |                          |             |

### Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 90.00             | 0.000                  | 0.000                       | 0.000                                   |
| 91.00             | 0.000                  | 0.000                       | 0.000                                   |
| 92.00             | 0.000                  | 0.000                       | 0.000                                   |
| 93.00             | 0.000                  | 0.000                       | 0.000                                   |
| 94.00             | 0.000                  | 0.000                       | 0.000                                   |
| 95.00             | 0.000                  | 0.000                       | 0.000                                   |
| 96.00             | 0.000                  | 0.000                       | 0.000                                   |
| 97.00             | 0.000                  | 0.000                       | 0.000                                   |
| 98.00             | 0.000                  | 0.000                       | 0.000                                   |
| 99.00             | (3)>2.094              | 0.000                       | 2.094                                   |
| 100.00            | (6)>4.162              | 0.000                       | 4.162                                   |
| 101.00            | (6)>4.868              | 25.483                      | 30.351                                  |
| 102.00            | (6)>5.509              | 93.036                      | 98.545                                  |
| 103.00            | (6)>6.061              | 200.972                     | 207.032                                 |

### Structure #4 (Riprap Channel)

*0+00 to WFSP-1 West Fork Taylor Ditch*

Trapezoidal Riprap Channel Inputs:

### Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 26.0      | 3.98                    |                         |                               |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

| w/o Freeboard     | w/ Freeboard |
|-------------------|--------------|
| Design Discharge: | 3.40 cfs     |

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Depth:            | 0.02 ft       | 4.00 ft      |
| Top Width:        | 12.11 ft      | 35.99 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.22 sq ft    |              |
| Hydraulic Radius: | 0.018 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #3 (Null)

*Null Above West Taylor Pond*

## Structure #2 (Pond)

*West Taylor Pond*

Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,468.00 ft |
| Initial Pool:      | 1.77 ac-ft  |
| *Sediment Storage: | 0.00 ac-ft  |
| Dead Space:        | 20.00 %     |

*\*No sediment capacity defined*

## Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 10.50             | 18.00                | 150.00             | 2.00             | 0.0150      | 7,471.00           | 2                        |

## Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 7,475.00      | 30.00             | 2.00:1         | 2.00:1          | 30.00             |

Pond Results:

|                         |             |
|-------------------------|-------------|
| Peak Elevation:         | 7,471.53 ft |
| H'graph Detention Time: | 5.46 hrs    |
| Pond Model:             | CSTRS       |
| Dewater Time:           | 1.46 days   |
| Trap Efficiency:        | 76.38 %     |

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

**Elevation-Capacity-Discharge Table**

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 7,455.00  | 0.022        | 0.000               | 0.000              | Top of Sed. Storage      |
| 7,456.00  | 0.032        | 0.027               | 0.000              |                          |
| 7,457.00  | 0.043        | 0.064               | 0.000              |                          |
| 7,458.00  | 0.054        | 0.113               | 0.000              |                          |
| 7,459.00  | 0.066        | 0.173               | 0.000              |                          |
| 7,460.00  | 0.079        | 0.245               | 0.000              |                          |
| 7,461.00  | 0.103        | 0.336               | 0.000              |                          |
| 7,462.00  | 0.139        | 0.456               | 0.000              |                          |
| 7,463.00  | 0.162        | 0.607               | 0.000              |                          |
| 7,464.00  | 0.188        | 0.781               | 0.000              |                          |
| 7,465.00  | 0.213        | 0.981               | 0.000              |                          |
| 7,466.00  | 0.244        | 1.209               | 0.000              |                          |
| 7,467.00  | 0.279        | 1.470               | 0.000              |                          |
| 7,468.00  | 0.312        | 1.766               | 0.000              | Low hole SPW #1          |
| 7,469.00  | 0.360        | 2.102               | 0.473              | 8.60*                    |
| 7,470.00  | 0.389        | 2.476               | 0.669              | 8.10                     |
| 7,471.00  | 0.430        | 2.886               | 0.819              | 8.25 Spillway #1         |
| 7,471.53  | 0.445        | 3.121               | 4.868              | 10.15 Peak Stage         |
| 7,472.00  | 0.463        | 3.332               | 8.509              |                          |
| 7,473.00  | 0.503        | 3.814               | 12.033             |                          |
| 7,474.00  | 0.541        | 4.336               | 14.738             |                          |
| 7,475.00  | 0.580        | 4.897               | 17.018             | Spillway #2              |
| 7,476.00  | 0.581        | 5.477               | 83.791             |                          |
| 7,477.00  | 0.582        | 6.058               | 246.034            |                          |
| 7,478.00  | 0.583        | 6.641               | 483.806            |                          |
| 7,479.00  | 0.584        | 7.224               | 794.453            |                          |
| 7,480.00  | 0.585        | 7.809               | 1,172.300          |                          |

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

**Detailed Discharge Table**

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,455.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,456.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,457.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,458.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,459.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,460.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,461.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,462.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,463.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,464.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,465.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,466.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,467.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,468.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 7,469.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,470.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,471.00          | 0.819             | 0.000                       | 0.819                                   |
| 7,472.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,473.00          | 12.033            | 0.000                       | 12.033                                  |
| 7,474.00          | 14.738            | 0.000                       | 14.738                                  |
| 7,475.00          | 17.018            | 0.000                       | 17.018                                  |
| 7,476.00          | 19.026            | 64.765                      | 83.791                                  |
| 7,477.00          | 20.842            | 225.191                     | 246.034                                 |
| 7,478.00          | 22.512            | 461.294                     | 483.806                                 |
| 7,479.00          | 24.066            | 770.387                     | 794.453                                 |
| 7,480.00          | 25.526            | 1,146.774                   | 1,172.300                               |

Structure #1 (Null)

*Null Below West Taylor Pond*

### 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) |
|--------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #37    | 1        | 25.600         | 0.224              | 0.000        | 0.000  | 62.000       | M   | 0.12                 | 0.084                 |
|        | $\Sigma$ | <b>25.600</b>  |                    |              |        |              |     | <b>0.12</b>          | <b>0.084</b>          |
| #36    | $\Sigma$ | <b>25.600</b>  |                    |              |        |              |     | <b>0.12</b>          | <b>0.084</b>          |
| #35    | 1        | 6.600          | 0.042              | 0.000        | 0.000  | 62.000       | M   | 0.05                 | 0.027                 |
|        | $\Sigma$ | <b>6.600</b>   |                    |              |        |              |     | <b>0.05</b>          | <b>0.027</b>          |
| #34    | $\Sigma$ | <b>6.600</b>   |                    |              |        |              |     | <b>0.05</b>          | <b>0.027</b>          |
| #33    | 1        | 14.000         | 0.059              | 0.000        | 0.000  | 62.000       | M   | 0.11                 | 0.057                 |
|        | $\Sigma$ | <b>14.000</b>  |                    |              |        |              |     | <b>0.11</b>          | <b>0.057</b>          |
| #32    | $\Sigma$ | <b>14.000</b>  |                    |              |        |              |     | <b>0.11</b>          | <b>0.057</b>          |
| #31    | 1        | 23.800         | 0.253              | 0.000        | 0.000  | 62.000       | M   | 0.11                 | 0.078                 |
|        | $\Sigma$ | <b>23.800</b>  |                    |              |        |              |     | <b>0.11</b>          | <b>0.078</b>          |
| #30    | $\Sigma$ | <b>23.800</b>  |                    |              |        |              |     | <b>0.11</b>          | <b>0.078</b>          |
| #29    | 1        | 10.700         | 0.050              | 0.000        | 0.000  | 80.000       | F   | 5.51                 | 0.396                 |
|        | 2        | 14.900         | 0.094              | 0.000        | 0.000  | 62.000       | M   | 0.11                 | 0.061                 |
|        | $\Sigma$ | <b>25.600</b>  |                    |              |        |              |     | <b>5.51</b>          | <b>0.457</b>          |
| #28    | $\Sigma$ | <b>25.600</b>  |                    |              |        |              |     | <b>5.51</b>          | <b>0.457</b>          |
| #25    | 1        | 144.700        | 0.644              | 0.000        | 0.000  | 62.000       | M   | 0.62                 | 0.473                 |
|        | $\Sigma$ | <b>240.300</b> |                    |              |        |              |     | <b>5.51</b>          | <b>1.176</b>          |
| #24    | $\Sigma$ | <b>240.300</b> |                    |              |        |              |     | <b>5.51</b>          | <b>1.176</b>          |
| #23    | 1        | 70.600         | 0.365              | 0.000        | 0.000  | 80.000       | F   | 21.53                | 2.464                 |
|        | 2        | 2.500          | 0.021              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 3        | 6.800          | 0.053              | 0.000        | 0.000  | 62.000       | M   | 0.05                 | 0.028                 |
|        | $\Sigma$ | <b>320.200</b> |                    |              |        |              |     | <b>21.53</b>         | <b>2.491</b>          |
| #22    | $\Sigma$ | <b>320.200</b> |                    |              |        |              |     | <b>21.53</b>         | <b>2.491</b>          |
| #21    | 1        | 3.000          | 0.006              | 0.000        | 0.000  | 62.000       | M   | 0.02                 | 0.011                 |
|        | 2        | 9.400          | 0.036              | 0.000        | 0.000  | 80.000       | F   | 4.84                 | 0.348                 |
|        | $\Sigma$ | <b>12.400</b>  |                    |              |        |              |     | <b>4.84</b>          | <b>0.358</b>          |
| #20    | $\Sigma$ | <b>12.400</b>  |                    |              |        |              |     | <b>4.84</b>          | <b>0.358</b>          |
| #19    | 1        | 4.000          | 0.016              | 0.000        | 0.000  | 62.000       | M   | 0.03                 | 0.016                 |
|        | $\Sigma$ | <b>4.000</b>   |                    |              |        |              |     | <b>0.03</b>          | <b>0.016</b>          |



| Stru #     | SWS #    | SWS Area (ac)  | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|------------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| <b>#18</b> | <b>Σ</b> | <b>4.000</b>   |                    |              |        |              |     | <b>0.03</b>          | <b>0.016</b>          |
| #17        | 1        | 1.100          | 0.011              | 0.000        | 0.000  | 80.000       | M   | 0.57                 | 0.041                 |
|            | 2        | 21.500         | 0.090              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | 3        | 0.600          | 0.012              | 0.000        | 0.000  | 62.000       | M   | 0.00                 | 0.000                 |
|            | 4        | 0.600          | 0.010              | 0.000        | 0.000  | 62.000       | M   | 0.00                 | 0.000                 |
|            | 5        | 0.900          | 0.013              | 0.000        | 0.000  | 62.000       | M   | 0.00                 | 0.000                 |
|            | <b>Σ</b> | <b>361.300</b> |                    |              |        |              |     | <b>5.41</b>          | <b>1.722</b>          |
| #16        | 1        | 7.300          | 0.015              | 0.000        | 0.000  | 62.000       | M   | 0.06                 | 0.030                 |
|            | <b>Σ</b> | <b>7.300</b>   |                    |              |        |              |     | <b>0.06</b>          | <b>0.030</b>          |
| <b>#15</b> | <b>Σ</b> | <b>7.300</b>   |                    |              |        |              |     | <b>0.06</b>          | <b>0.030</b>          |
| #14        | 1        | 1.900          | 0.008              | 0.000        | 0.000  | 62.000       | M   | 0.01                 | 0.002                 |
|            | 2        | 5.600          | 0.043              | 0.000        | 0.000  | 80.000       | F   | 2.89                 | 0.207                 |
|            | <b>Σ</b> | <b>7.500</b>   |                    |              |        |              |     | <b>2.89</b>          | <b>0.209</b>          |
| <b>#13</b> | <b>Σ</b> | <b>7.500</b>   |                    |              |        |              |     | <b>2.89</b>          | <b>0.209</b>          |
| #10        | 1        | 35.700         | 0.252              | 0.000        | 0.000  | 80.000       | F   | 12.49                | 1.260                 |
|            | 2        | 98.000         | 0.045              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | <b>Σ</b> | <b>133.700</b> |                    |              |        |              |     | <b>12.49</b>         | <b>1.260</b>          |
| <b>#9</b>  | <b>Σ</b> | <b>133.700</b> |                    |              |        |              |     | <b>12.49</b>         | <b>1.260</b>          |
| #27        | 1        | 76.400         | 0.290              | 0.000        | 0.000  | 62.000       | M   | 0.36                 | 0.250                 |
|            | 2        | 13.900         | 0.136              | 0.000        | 0.000  | 80.000       | F   | 5.57                 | 0.496                 |
|            | <b>Σ</b> | <b>90.300</b>  |                    |              |        |              |     | <b>5.57</b>          | <b>0.746</b>          |
| <b>#26</b> | <b>Σ</b> | <b>90.300</b>  |                    |              |        |              |     | <b>5.57</b>          | <b>0.746</b>          |
| #8         | 1        | 52.200         | 0.229              | 0.000        | 0.000  | 80.000       | F   | 18.79                | 1.839                 |
|            | 2        | 30.900         | 0.122              | 0.000        | 0.000  | 62.000       | M   | 0.23                 | 0.126                 |
|            | 3        | 23.500         | 0.089              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | 4        | 4.000          | 0.218              | 0.000        | 0.000  | 62.000       | M   | 0.02                 | 0.013                 |
|            | <b>Σ</b> | <b>200.900</b> |                    |              |        |              |     | <b>24.31</b>         | <b>2.725</b>          |
| <b>#7</b>  | <b>Σ</b> | <b>200.900</b> |                    |              |        |              |     | <b>24.31</b>         | <b>2.725</b>          |
| #6         | 1        | 43.000         | 0.095              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | 2        | 39.900         | 0.161              | 0.000        | 0.000  | 80.000       | F   | 15.98                | 1.425                 |
|            | 3        | 0.400          | 0.015              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | 4        | 1.600          | 0.020              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | 5        | 1.200          | 0.021              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | <b>Σ</b> | <b>420.700</b> |                    |              |        |              |     | <b>28.46</b>         | <b>4.140</b>          |
| <b>#5</b>  | <b>Σ</b> | <b>420.700</b> |                    |              |        |              |     | <b>28.46</b>         | <b>4.140</b>          |
| #4         | 1        | 1.000          | 0.007              | 0.000        | 0.000  | 80.000       | M   | 0.52                 | 0.037                 |

| 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        | 2.800          | 0.019              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|           | 3        | 0.900          | 0.010              | 0.000        | 0.000  | 62.000       | M   | 0.00                 | 0.000                 |
|           | 4        | 23.300         | 0.094              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|           | 5        | 1.000          | 0.020              | 0.000        | 0.000  | 62.000       | M   | 0.00                 | 0.000                 |
|           | <b>Σ</b> | <b>464.500</b> |                    |              |        |              |     | <b>3.40</b>          | <b>3.146</b>          |
| <b>#3</b> | <b>Σ</b> | <b>825.800</b> |                    |              |        |              |     | <b>8.81</b>          | <b>4.869</b>          |
| #2        | 1        | 10.500         | 0.051              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|           | 2        | 17.100         | 0.058              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|           | <b>Σ</b> | <b>853.400</b> |                    |              |        |              |     | <b>8.81</b>          | <b>4.869</b>          |
| <b>#1</b> | <b>Σ</b> | <b>853.400</b> |                    |              |        |              |     | <b>4.87</b>          | <b>4.684</b>          |

## 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)  |
|------------|----------|--------|--------|-------|--------|--------|------|-----------------|----------------------------|-----------------------------|--------------|
| #37        | 1        | 0.300  | 400.00 | 10.00 | 0.0100 | 0.3800 | 1    | 0.0             | 266                        | 0.13                        | 0.11         |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>0.0</b>      | <b>266</b>                 | <b>0.13</b>                 | <b>0.11</b>  |
| <b>#36</b> | <b>Σ</b> |        |        |       |        |        |      | <b>0.0</b>      | <b>266</b>                 | <b>0.13</b>                 | <b>0.11</b>  |
| #35        | 1        | 0.300  | 150.00 | 19.00 | 0.0100 | 0.3800 | 1    | 0.0             | 397                        | 0.23                        | 0.17         |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>0.0</b>      | <b>397</b>                 | <b>0.23</b>                 | <b>0.17</b>  |
| <b>#34</b> | <b>Σ</b> |        |        |       |        |        |      | <b>0.0</b>      | <b>397</b>                 | <b>0.23</b>                 | <b>0.17</b>  |
| #33        | 1        | 0.300  | 200.00 | 15.00 | 0.0100 | 0.3800 | 1    | 0.0             | 388                        | 0.22                        | 0.17         |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>0.0</b>      | <b>388</b>                 | <b>0.22</b>                 | <b>0.17</b>  |
| <b>#32</b> | <b>Σ</b> |        |        |       |        |        |      | <b>0.0</b>      | <b>388</b>                 | <b>0.22</b>                 | <b>0.17</b>  |
| #31        | 1        | 0.300  | 400.00 | 6.00  | 0.0100 | 0.3800 | 1    | 0.0             | 142                        | 0.07                        | 0.06         |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>0.0</b>      | <b>142</b>                 | <b>0.07</b>                 | <b>0.06</b>  |
| <b>#30</b> | <b>Σ</b> |        |        |       |        |        |      | <b>0.0</b>      | <b>142</b>                 | <b>0.07</b>                 | <b>0.06</b>  |
| #29        | 1        | 0.300  | 200.00 | 12.00 | 0.8000 | 0.3800 | 1    | 37.0            | 140,348                    | 79.99                       | 37.67        |
|            | 2        | 0.300  | 200.00 | 11.00 | 0.0100 | 0.3800 | 1    | 0.0             | 260                        | 0.15                        | 0.11         |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>37.0</b>     | <b>140,348</b>             | <b>79.99</b>                | <b>32.70</b> |
| <b>#28</b> | <b>Σ</b> |        |        |       |        |        |      | <b>37.0</b>     | <b>140,348</b>             | <b>79.99</b>                | <b>32.70</b> |
| #25        | 1        | 0.300  | 400.00 | 4.00  | 0.0100 | 0.3800 | 1    | 0.1             | 93                         | 0.04                        | 0.04         |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>37.1</b>     | <b>140,348</b>             | <b>79.97</b>                | <b>12.77</b> |

| 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) |
|--------|-------|--------|--------|-------|--------|--------|------|-----------------|----------------------------|-----------------------------|-------------|
| #24    | Σ     |        |        |       |        |        |      | 37.1            | 140,348                    | 79.97                       | 12.77       |
| #23    | 1     | 0.300  | 400.00 | 6.00  | 0.8000 | 0.3800 | 1    | 121.7           | 68,139                     | 33.50                       | 17.52       |
|        | 2     | 0.300  | 75.00  | 19.00 | 0.0800 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | 3     | 0.300  | 100.00 | 19.00 | 0.0100 | 0.3800 | 1    | 0.0             | 312                        | 0.18                        | 0.13        |
|        | Σ     |        |        |       |        |        |      | 158.8           | 68,139                     | 38.40                       | 19.86       |
| #22    | Σ     |        |        |       |        |        |      | 158.8           | 68,139                     | 38.40                       | 19.86       |
| #21    | 1     | 0.300  | 50.00  | 26.00 | 0.0100 | 0.3800 | 1    | 0.0             | 300                        | 0.17                        | 0.14        |
|        | 2     | 0.300  | 300.00 | 18.00 | 0.8000 | 0.3800 | 1    | 67.9            | 276,566                    | 157.63                      | 75.75       |
|        | Σ     |        |        |       |        |        |      | 67.9            | 276,566                    | 157.63                      | 73.55       |
| #20    | Σ     |        |        |       |        |        |      | 67.9            | 276,566                    | 157.63                      | 73.55       |
| #19    | 1     | 0.300  | 100.00 | 30.00 | 0.0100 | 0.3800 | 1    | 0.0             | 484                        | 0.28                        | 0.21        |
|        | Σ     |        |        |       |        |        |      | 0.0             | 484                        | 0.28                        | 0.21        |
| #18    | Σ     |        |        |       |        |        |      | 0.0             | 484                        | 0.28                        | 0.21        |
| #17    | 1     | 0.300  | 75.00  | 25.00 | 0.8000 | 0.3800 | 1    | 3.9             | 143,079                    | 81.55                       | 38.42       |
|        | 2     | 0.300  | 400.00 | 22.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | 3     | 0.300  | 50.00  | 27.00 | 0.0100 | 0.3800 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | 4     | 0.300  | 50.00  | 30.00 | 0.0100 | 0.3800 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | 5     | 0.300  | 75.00  | 33.00 | 0.0100 | 0.3800 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | Σ     |        |        |       |        |        |      | 71.8            | 263,295                    | 150.07                      | 17.86       |
| #16    | 1     | 0.300  | 100.00 | 30.00 | 0.0100 | 0.3800 | 1    | 0.0             | 519                        | 0.30                        | 0.22        |
|        | Σ     |        |        |       |        |        |      | 0.0             | 519                        | 0.30                        | 0.22        |
| #15    | Σ     |        |        |       |        |        |      | 0.0             | 519                        | 0.30                        | 0.22        |
| #14    | 1     | 0.300  | 75.00  | 30.00 | 0.0100 | 0.3800 | 1    | 0.0             | 1,577                      | 0.90                        | 0.84        |
|        | 2     | 0.300  | 300.00 | 16.00 | 0.8000 | 0.3800 | 1    | 33.0            | 230,293                    | 131.26                      | 62.64       |
|        | Σ     |        |        |       |        |        |      | 33.0            | 230,293                    | 131.26                      | 62.18       |
| #13    | Σ     |        |        |       |        |        |      | 33.0            | 230,293                    | 131.26                      | 62.18       |
| #10    | 1     | 0.300  | 200.00 | 8.00  | 0.8000 | 0.3800 | 1    | 57.0            | 64,553                     | 33.20                       | 16.82       |
|        | 2     | 0.300  | 200.00 | 36.00 | 0.0800 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | Σ     |        |        |       |        |        |      | 57.0            | 64,553                     | 33.20                       | 16.82       |
| #9     | Σ     |        |        |       |        |        |      | 57.0            | 64,553                     | 33.20                       | 16.82       |
| #27    | 1     | 0.300  | 200.00 | 14.00 | 0.0100 | 0.3800 | 1    | 0.1             | 372                        | 0.19                        | 0.16        |
|        | 2     | 0.300  | 200.00 | 11.00 | 0.8000 | 0.3800 | 1    | 38.2            | 111,513                    | 59.67                       | 29.38       |
|        | Σ     |        |        |       |        |        |      | 38.3            | 111,513                    | 59.66                       | 19.62       |
| #26    | Σ     |        |        |       |        |        |      | 38.3            | 111,513                    | 59.66                       | 19.62       |

| 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)  |
|--------|----------|--------|--------|-------|--------|--------|------|-----------------|----------------------------|-----------------------------|--------------|
| #8     | 1        | 0.300  | 200.00 | 9.00  | 0.8000 | 0.3800 | 1    | 106.7           | 82,797                     | 42.96                       | 21.64        |
|        | 2        | 0.300  | 200.00 | 18.00 | 0.1000 | 0.3800 | 1    | 0.7             | 5,309                      | 3.03                        | 2.29         |
|        | 3        | 0.300  | 200.00 | 24.00 | 0.0800 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | 4        | 0.300  | 200.00 | 1.00  | 0.0100 | 0.3800 | 1    | 0.0             | 14                         | 0.01                        | 0.01         |
|        | <b>Σ</b> |        |        |       |        |        |      | <b>145.7</b>    | <b>89,360</b>              | <b>46.77</b>                | <b>20.10</b> |
| #7     | <b>Σ</b> |        |        |       |        |        |      | <b>145.7</b>    | <b>89,360</b>              | <b>46.77</b>                | <b>20.10</b> |
| #6     | 1        | 0.300  | 200.00 | 20.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | 2        | 0.300  | 200.00 | 8.00  | 0.8000 | 0.3800 | 1    | 69.7            | 72,027                     | 38.54                       | 18.87        |
|        | 3        | 0.300  | 50.00  | 15.00 | 0.0800 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | 4        | 0.300  | 50.00  | 12.00 | 0.0800 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | 5        | 0.300  | 50.00  | 12.00 | 0.0800 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | <b>Σ</b> |        |        |       |        |        |      | <b>126.7</b>    | <b>68,754</b>              | <b>36.15</b>                | <b>12.00</b> |
| #5     | <b>Σ</b> |        |        |       |        |        |      | <b>126.7</b>    | <b>68,754</b>              | <b>36.15</b>                | <b>12.00</b> |
| #4     | 1        | 0.300  | 100.00 | 33.00 | 0.8000 | 0.3800 | 1    | 5.5             | 217,554                    | 124.00                      | 59.06        |
|        | 2        | 0.300  | 100.00 | 20.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | 3        | 0.300  | 100.00 | 20.00 | 0.0100 | 0.3800 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | 4        | 0.300  | 400.00 | 37.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | 5        | 0.300  | 100.00 | 31.00 | 0.0100 | 0.3800 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | <b>Σ</b> |        |        |       |        |        |      | <b>38.6</b>     | <b>228,372</b>             | <b>130.16</b>               | <b>5.83</b>  |
| #3     | <b>Σ</b> |        |        |       |        |        |      | <b>110.4</b>    | <b>249,944</b>             | <b>142.46</b>               | <b>10.35</b> |
| #2     | 1        | 0.300  | 400.00 | 45.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | 2        | 0.300  | 400.00 | 40.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|        | <b>Σ</b> |        |        |       |        |        |      | <b>110.4</b>    | <b>249,944</b>             | <b>142.46</b>               | <b>10.35</b> |
| #1     | <b>Σ</b> |        |        |       |        |        |      | <b>26.1</b>     | <b>6,415</b>               | <b>0.26</b>                 | <b>0.18</b>  |

### ***Subwatershed Time of Concentration Details:***

| Stru # | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|--------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #2     | 1        | 3. Short grass pasture                                | 45.00     | 443.25           | 985.00            | 5.360          | 0.051        |
| #2     | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.051</b> |
| #2     | 2        | 3. Short grass pasture                                | 40.00     | 425.60           | 1,064.00          | 5.050          | 0.058        |
| #2     | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.058</b> |
| #4     | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 16.00     | 100.80           | 630.00            | 4.000          | 0.043        |
| #4     | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.007</b> |
| #4     | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 33.00     | 50.16            | 152.00            | 5.740          | 0.007        |
| #4     | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.019</b> |

| Stru # | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|--------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #4     | 3        | 3. Short grass pasture                                | 20.00     | 50.00            | 250.00            | 3.570          | 0.019        |
| #4     | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.010</b> |
| #4     | 4        | 3. Short grass pasture                                | 19.00     | 24.70            | 130.00            | 3.480          | 0.010        |
| #4     | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.094</b> |
| #4     | 5        | 3. Short grass pasture                                | 31.00     | 101.37           | 327.00            | 4.450          | 0.020        |
| #4     | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.020</b> |
| #6     | 1        | 3. Short grass pasture                                | 14.60     | 75.01            | 513.76            | 3.050          | 0.046        |
|        |          | 8. Large gullies, diversions, and low flowing streams | 1.50      | 5.67             | 378.00            | 3.670          | 0.028        |
| #6     | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.095</b> |
| #6     | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 8.00      | 131.03           | 1,638.00          | 2.820          | 0.161        |
| #6     | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.161</b> |
| #6     | 3        | 3. Short grass pasture                                | 15.00     | 25.35            | 169.00            | 3.090          | 0.015        |
| #6     | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.015</b> |
| #6     | 4        | 3. Short grass pasture                                | 12.00     | 24.24            | 202.00            | 2.770          | 0.020        |
| #6     | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.020</b> |
| #6     | 5        | 3. Short grass pasture                                | 12.00     | 25.20            | 210.00            | 2.770          | 0.021        |
| #6     | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #8     | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 9.00      | 222.84           | 2,476.00          | 3.000          | 0.229        |
| #8     | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.229</b> |
| #8     | 2        | 3. Short grass pasture                                | 18.00     | 269.82           | 1,499.00          | 3.390          | 0.122        |
| #8     | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.122</b> |
| #8     | 3        | 3. Short grass pasture                                | 24.00     | 303.35           | 1,264.00          | 3.910          | 0.089        |
| #8     | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.089</b> |
| #8     | 4        | 3. Short grass pasture                                | 1.00      | 6.30             | 630.00            | 0.800          | 0.218        |
| #8     | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.218</b> |
| #10    | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 8.00      | 204.96           | 2,562.00          | 2.820          | 0.252        |
| #10    | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.252</b> |
| #10    | 2        | 3. Short grass pasture                                | 35.00     | 272.29           | 778.00            | 4.730          | 0.045        |
| #10    | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.045</b> |
| #14    | 1        | 3. Short grass pasture                                | 30.00     | 40.80            | 135.99            | 4.380          | 0.008        |
| #14    | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.008</b> |
| #14    | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 16.00     | 100.80           | 630.00            | 4.000          | 0.043        |
| #14    | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.043</b> |
| #16    | 1        | 3. Short grass pasture                                | 30.00     | 73.50            | 244.99            | 4.380          | 0.015        |
| #16    | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.015</b> |
| #17    | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 25.00     | 50.25            | 201.00            | 5.000          | 0.011        |
| #17    | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.011</b> |
| #17    | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 24.80     | 49.60            | 200.00            | 4.970          | 0.011        |
| #17    | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.090</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #17        | 3        | 3. Short grass pasture                                | 27.00     | 49.41            | 183.00            | 4.150          | 0.012        |
| <b>#17</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.012</b> |
| #17        | 4        | 3. Short grass pasture                                | 30.00     | 50.40            | 168.00            | 4.380          | 0.010        |
| <b>#17</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.010</b> |
| #17        | 5        | 3. Short grass pasture                                | 33.00     | 74.25            | 225.00            | 4.590          | 0.013        |
| <b>#17</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.013</b> |
| #19        | 1        | 3. Short grass pasture                                | 30.00     | 78.00            | 260.00            | 4.380          | 0.016        |
| <b>#19</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.016</b> |
| #21        | 1        | 3. Short grass pasture                                | 26.00     | 24.70            | 95.00             | 4.070          | 0.006        |
| <b>#21</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.006</b> |
| #21        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 18.00     | 101.34           | 563.00            | 4.240          | 0.036        |
| <b>#21</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.036</b> |
| #23        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 6.00      | 192.78           | 3,213.00          | 2.440          | 0.365        |
| <b>#23</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.365</b> |
| #23        | 2        | 3. Short grass pasture                                | 19.00     | 50.35            | 265.00            | 3.480          | 0.021        |
| <b>#23</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #23        | 3        | 3. Short grass pasture                                | 19.00     | 127.68           | 672.00            | 3.480          | 0.053        |
| <b>#23</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.053</b> |
| #25        | 1        | 3. Short grass pasture                                | 4.00      | 148.44           | 3,711.00          | 1.600          | 0.644        |
| <b>#25</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.644</b> |
| #27        | 1        | 3. Short grass pasture                                | 14.00     | 438.34           | 3,131.00          | 2.990          | 0.290        |
| <b>#27</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.290</b> |
| #27        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 11.00     | 179.52           | 1,632.00          | 3.310          | 0.136        |
| <b>#27</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.136</b> |
| #29        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 12.00     | 74.87            | 624.00            | 3.460          | 0.050        |
| <b>#29</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.050</b> |
| #29        | 2        | 3. Short grass pasture                                | 11.00     | 98.78            | 898.00            | 2.650          | 0.094        |
| <b>#29</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.094</b> |
| #31        | 1        | 3. Short grass pasture                                | 6.00      | 106.98           | 1,783.00          | 1.950          | 0.253        |
| <b>#31</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.253</b> |
| #33        | 1        | 3. Short grass pasture                                | 15.00     | 98.85            | 659.00            | 3.090          | 0.059        |
| <b>#33</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.059</b> |
| #35        | 1        | 3. Short grass pasture                                | 19.00     | 100.32           | 528.00            | 3.480          | 0.042        |
| <b>#35</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.042</b> |
| #37        | 1        | 3. Short grass pasture                                | 10.00     | 203.40           | 2,034.00          | 2.520          | 0.224        |
| <b>#37</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.224</b> |

# **West Taylor Pond** **25 Yr - 24 Hr Storm Event**

***Emergency Spillway Demonstration***  
***Post Mining***

Tony Tennyson

## ***General Information***

### ***Storm Information:***

|                 |               |
|-----------------|---------------|
| Storm Type:     | NRCS Type II  |
| Design Storm:   | 25 yr - 24 hr |
| Rainfall Depth: | 2.300 inches  |

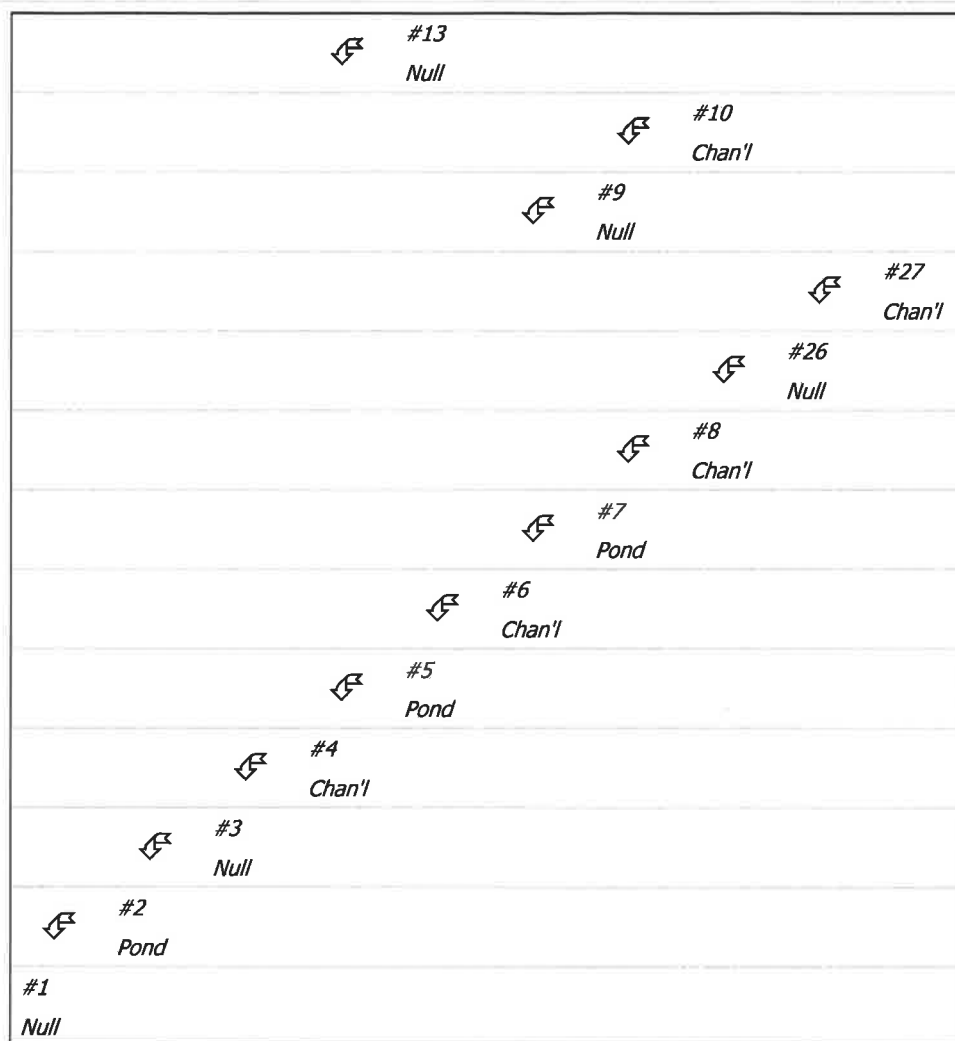


### ***Structure Networking:***

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description                              |
|---------|--------|--------------|--------|---------------|---------|------------------------------------------|
| Null    | #1     | ==>          | End    | 0.000         | 0.000   | Null Below West Taylor Pond              |
| Pond    | #2     | ==>          | #1     | 0.000         | 0.000   | West Taylor Pond                         |
| Null    | #3     | ==>          | #2     | 0.000         | 0.000   | Null Above West Taylor Pond              |
| Channel | #4     | ==>          | #3     | 0.000         | 0.000   | 0+00 to WFSP-1 West Fork Taylor Ditch    |
| Pond    | #5     | ==>          | #4     | 0.000         | 0.000   | WFSP-1 Stock Pond                        |
| Channel | #6     | ==>          | #5     | 0.000         | 0.000   | Channel WFSP-1 to WFSP-2                 |
| Pond    | #7     | ==>          | #6     | 0.000         | 0.000   | WFSP-2 Stockpond                         |
| Channel | #8     | ==>          | #7     | 0.000         | 0.000   | WFSP-2 to Station 85+00                  |
| Null    | #9     | ==>          | #6     | 0.000         | 0.000   | Null Confluence Trib 1                   |
| Channel | #10    | ==>          | #9     | 0.000         | 0.000   | Trib 1                                   |
| Null    | #13    | ==>          | #4     | 0.000         | 0.000   | Null Confluence West 7800' Terrace Ditch |
| Channel | #14    | ==>          | #13    | 0.000         | 0.000   | West 7800' Terrace Ditch                 |
| Null    | #15    | ==>          | #4     | 0.000         | 0.000   | Null 7700' Terrace Ditch                 |
| Channel | #16    | ==>          | #15    | 0.000         | 0.000   | 7700' Terrace Ditch                      |
| Channel | #17    | ==>          | #3     | 0.000         | 0.000   | East Fork Taylor Ditch 0+00 to EFSP-1    |
| Null    | #18    | ==>          | #17    | 0.000         | 0.000   | Null 7600' Terrace Ditch                 |
| Channel | #19    | ==>          | #18    | 0.000         | 0.000   | 7600' Terrace Ditch                      |
| Null    | #20    | ==>          | #17    | 0.000         | 0.000   | Null 7800' Terrace Ditch                 |
| Channel | #21    | ==>          | #20    | 0.000         | 0.000   | East 7800' Terrace Ditch                 |
| Pond    | #22    | ==>          | #17    | 0.000         | 0.000   | EFSP-1 Stock Pond                        |
| Channel | #23    | ==>          | #22    | 0.000         | 0.000   | EFSP-1 to EFSP-2 Veg Channel             |
| Pond    | #24    | ==>          | #23    | 0.000         | 0.000   | EFSP-2 Stockpond                         |
| Channel | #25    | ==>          | #24    | 0.000         | 0.000   | EFSP-2 to Station 116+97                 |
| Null    | #26    | ==>          | #8     | 0.000         | 0.000   | Null Confluence Trib 2                   |
| Channel | #27    | ==>          | #26    | 0.000         | 0.000   | Trib 2                                   |
| Null    | #28    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 3                   |
| Channel | #29    | ==>          | #28    | 0.000         | 0.000   | Trib 3                                   |
| Null    | #30    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 5                   |
| Channel | #31    | ==>          | #30    | 0.000         | 0.000   | Trib 5                                   |
| Null    | #32    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 4                   |
| Channel | #33    | ==>          | #32    | 0.000         | 0.000   | Trib 4                                   |
| Null    | #34    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 6                   |
| Channel | #35    | ==>          | #34    | 0.000         | 0.000   | Trib 6                                   |
| Null    | #36    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 7                   |
| Channel | #37    | ==>          | #36    | 0.000         | 0.000   | Trib 7                                   |

Copyright 1998-2010 Pamela I. Schwan

|  |  |               |               |               |               |
|--|--|---------------|---------------|---------------|---------------|
|  |  |               |               |               | #37<br>Chan'I |
|  |  |               |               | #36<br>Null   |               |
|  |  |               |               | #35<br>Chan'I |               |
|  |  |               | #34<br>Null   |               |               |
|  |  |               | #33<br>Chan'I |               |               |
|  |  | #32<br>Null   |               |               |               |
|  |  | #31<br>Chan'I |               |               |               |
|  |  | #30<br>Null   |               |               |               |
|  |  | #29<br>Chan'I |               |               |               |
|  |  | #28<br>Null   |               |               |               |
|  |  | #25<br>Chan'I |               |               |               |
|  |  | #24<br>Pond   |               |               |               |
|  |  | #23<br>Chan'I |               |               |               |
|  |  | #22<br>Pond   |               |               |               |
|  |  | #21<br>Chan'I |               |               |               |
|  |  | #20<br>Null   |               |               |               |
|  |  | #19<br>Chan'I |               |               |               |
|  |  | #18<br>Null   |               |               |               |
|  |  | #17<br>Chan'I |               |               |               |
|  |  | #16<br>Chan'I |               |               |               |
|  |  | #15<br>Null   |               |               |               |
|  |  | #14<br>Chan'I |               |               |               |



## Structure Summary:

|     |     | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|-----|-----|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #37 |     | 25.600                                    | 25.600                                | 1.16                       | 0.27                                 |
| #36 |     | 0.000                                     | 25.600                                | 1.16                       | 0.27                                 |
| #35 |     | 6.600                                     | 6.600                                 | 0.91                       | 0.09                                 |
| #34 |     | 0.000                                     | 6.600                                 | 0.91                       | 0.09                                 |
| #33 |     | 14.000                                    | 14.000                                | 1.93                       | 0.19                                 |
| #32 |     | 0.000                                     | 14.000                                | 1.93                       | 0.19                                 |
| #31 |     | 23.800                                    | 23.800                                | 1.01                       | 0.25                                 |
| #30 |     | 0.000                                     | 23.800                                | 1.01                       | 0.25                                 |
| #29 |     | 25.600                                    | 25.600                                | 11.18                      | 0.87                                 |
| #28 |     | 0.000                                     | 25.600                                | 11.18                      | 0.87                                 |
| #25 |     | 144.700                                   | 240.300                               | 14.36                      | 3.21                                 |
| #24 | In  | 0.000                                     | 240.300                               | 14.36                      | 3.21                                 |
|     | Out |                                           |                                       | 2.53                       | 2.03                                 |
| #23 |     | 79.900                                    | 320.200                               | 38.90                      | 6.29                                 |
| #22 | In  | 0.000                                     | 320.200                               | 38.90                      | 6.29                                 |
|     | Out |                                           |                                       | 8.16                       | 5.11                                 |
| #21 |     | 12.400                                    | 12.400                                | 8.43                       | 0.63                                 |
| #20 |     | 0.000                                     | 12.400                                | 8.43                       | 0.63                                 |
| #19 |     | 4.000                                     | 4.000                                 | 0.55                       | 0.05                                 |
| #18 |     | 0.000                                     | 4.000                                 | 0.55                       | 0.05                                 |
| #17 |     | 24.700                                    | 361.300                               | 10.21                      | 5.87                                 |
| #16 |     | 7.300                                     | 7.300                                 | 1.01                       | 0.10                                 |
| #15 |     | 0.000                                     | 7.300                                 | 1.01                       | 0.10                                 |
| #14 |     | 7.500                                     | 7.500                                 | 5.04                       | 0.38                                 |
| #13 |     | 0.000                                     | 7.500                                 | 5.04                       | 0.38                                 |
| #10 |     | 133.700                                   | 133.700                               | 22.27                      | 2.14                                 |
| #9  |     | 0.000                                     | 133.700                               | 22.27                      | 2.14                                 |
| #27 |     | 90.300                                    | 90.300                                | 11.57                      | 1.66                                 |
| #26 |     | 0.000                                     | 90.300                                | 11.57                      | 1.66                                 |
| #8  |     | 110.600                                   | 200.900                               | 46.06                      | 5.23                                 |
| #7  | In  | 0.000                                     | 200.900                               | 46.06                      | 5.23                                 |
|     | Out |                                           |                                       | 8.50                       | 3.96                                 |
| #6  |     | 86.100                                    | 420.700                               | 49.87                      | 8.51                                 |
| #5  | In  | 0.000                                     | 420.700                               | 49.87                      | 8.51                                 |
|     | Out |                                           |                                       | 15.43                      | 7.24                                 |
| #4  |     | 29.000                                    | 464.500                               | 16.31                      | 7.79                                 |
| #3  |     | 0.000                                     | 825.800                               | 25.66                      | 13.66                                |

# SEDCAD 4 for Windows

Copyright 1998-2010 Pamela L. Schwab

|    |     | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|----|-----|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #2 | In  | 27.600                                    | 853.400                               | 25.66                      | 13.66                                |
|    | Out |                                           |                                       | 14.13                      | 13.42                                |
| #1 |     | 0.000                                     | 853.400                               | 14.13                      | 13.42                                |

## Structure Detail:

### Structure #37 (Vegetated Channel)

#### *Trib 7*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 7.0       | D, B               | 2.81                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 1.16 cfs                              |                                      | 1.16 cfs                             |                                     |
| Depth:                 | 0.16 ft                               | 2.97 ft                              | 0.38 ft                              | 3.19 ft                             |
| Top Width:             | 6.98 ft                               | 23.84 ft                             | 8.26 ft                              | 25.12 ft                            |
| Velocity:              | 1.09 fps                              |                                      | 0.43 fps                             |                                     |
| X-Section Area:        | 1.06 sq ft                            |                                      | 2.69 sq ft                           |                                     |
| Hydraulic Radius:      | 0.150 ft                              |                                      | 0.321 ft                             |                                     |
| Froude Number:         | 0.50                                  |                                      | 0.13                                 |                                     |
| Roughness Coefficient: | 0.1012                                |                                      | 0.4285                               |                                     |

### Structure #36 (Null)

#### *Null Confluence Trib 7*

### Structure #35 (Vegetated Channel)

#### *Trib 6*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 6.0       | D, B               | 1.84                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 0.91 cfs                              |                                      | 0.91 cfs                             |                                     |
| Depth:                 | 0.15 ft                               | 1.99 ft                              | 0.37 ft                              | 2.21 ft                             |
| Top Width:             | 6.92 ft                               | 17.96 ft                             | 8.21 ft                              | 19.25 ft                            |
| Velocity:              | 0.92 fps                              |                                      | 0.35 fps                             |                                     |
| X-Section Area:        | 1.00 sq ft                            |                                      | 2.62 sq ft                           |                                     |
| Hydraulic Radius:      | 0.143 ft                              |                                      | 0.315 ft                             |                                     |
| Froude Number:         | 0.43                                  |                                      | 0.11                                 |                                     |
| Roughness Coefficient: | 0.1086                                |                                      | 0.4845                               |                                     |

## Structure #34 (Null)

### *Null Confluence Trib 6*

## Structure #33 (Vegetated Channel)

### *Trib 4*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 6.00                 | 3.0:1                      | 3.0:1                       | 16.0      | D, B                  | 2.86                    |                         |                               | 5.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 1.93 cfs                              |                                      | 1.93 cfs                             |                                     |
| Depth:                 | 0.16 ft                               | 3.02 ft                              | 0.34 ft                              | 3.20 ft                             |
| Top Width:             | 6.94 ft                               | 24.10 ft                             | 8.03 ft                              | 25.19 ft                            |
| Velocity:              | 1.90 fps                              |                                      | 0.81 fps                             |                                     |
| X-Section Area:        | 1.02 sq ft                            |                                      | 2.38 sq ft                           |                                     |
| Hydraulic Radius:      | 0.145 ft                              |                                      | 0.292 ft                             |                                     |
| Froude Number:         | 0.88                                  |                                      | 0.26                                 |                                     |
| Roughness Coefficient: | 0.0863                                |                                      | 0.3222                               |                                     |

## Structure #32 (Null)

### *Null Confluence Trib 4*

Structure #31 (Vegetated Channel)

*Trib 5*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 4.0       | D, B               | 2.77                 |                      |                         | 7.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 1.01 cfs                              |                                      | 1.01 cfs                             |                                     |
| Depth:                 | 0.18 ft                               | 2.95 ft                              | 0.43 ft                              | 3.20 ft                             |
| Top Width:             | 7.09 ft                               | 23.71 ft                             | 8.59 ft                              | 25.21 ft                            |
| Velocity:              | 0.84 fps                              |                                      | 0.32 fps                             |                                     |
| X-Section Area:        | 1.19 sq ft                            |                                      | 3.14 sq ft                           |                                     |
| Hydraulic Radius:      | 0.167 ft                              |                                      | 0.360 ft                             |                                     |
| Froude Number:         | 0.36                                  |                                      | 0.09                                 |                                     |
| Roughness Coefficient: | 0.1061                                |                                      | 0.4713                               |                                     |

Structure #30 (Null)

*Null Confluence Trib 5*

Structure #29 (Vegetated Channel)

*Trib 3*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 11.0      | D, B               | 2.48                 |                      |                         | 5.0                     |

Vegetated Channel Results:



|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 11.18 cfs                             |                                      | 11.18 cfs                            |                                     |
| Depth:                 | 0.37 ft                               | 2.85 ft                              | 0.64 ft                              | 3.12 ft                             |
| Top Width:             | 8.21 ft                               | 23.09 ft                             | 9.86 ft                              | 24.74 ft                            |
| Velocity:              | 4.28 fps                              |                                      | 2.19 fps                             |                                     |
| X-Section Area:        | 2.61 sq ft                            |                                      | 5.10 sq ft                           |                                     |
| Hydraulic Radius:      | 0.314 ft                              |                                      | 0.506 ft                             |                                     |
| Froude Number:         | 1.34                                  |                                      | 0.54                                 |                                     |
| Roughness Coefficient: | 0.0533                                |                                      | 0.1430                               |                                     |

## Structure #28 (Null)

*Null Confluence Trib 3*

## Structure #25 (Vegetated Channel)

*EFSP-2 to Station 116+97*

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 5.4       | D, B                  | 3.49                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 14.36 cfs                             |                                      | 14.36 cfs                            |                                     |
| Depth:                 | 0.38 ft                               | 3.87 ft                              | 0.68 ft                              | 4.17 ft                             |
| Top Width:             | 14.26 ft                              | 35.20 ft                             | 16.09 ft                             | 37.03 ft                            |
| Velocity:              | 2.91 fps                              |                                      | 1.50 fps                             |                                     |
| X-Section Area:        | 4.94 sq ft                            |                                      | 9.58 sq ft                           |                                     |
| Hydraulic Radius:      | 0.343 ft                              |                                      | 0.587 ft                             |                                     |
| Froude Number:         | 0.87                                  |                                      | 0.34                                 |                                     |
| Roughness Coefficient: | 0.0583                                |                                      | 0.1617                               |                                     |

## Structure #24 (Pond)

*EFSP-2 Stockpond*

## Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 92.00 ft   |
| Initial Pool:      | 0.15 ac-ft |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.50             | 0.0150      | 98.00              | 0.50                      | 0.00                 |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 99.20 ft  |
| Dewater Time:   | 0.75 days |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 90.00     | 0.050     | 0.000            | 0.000           |                    |
| 91.00     | 0.072     | 0.061            | 0.000           |                    |
| 92.00     | 0.098     | 0.145            | 0.000           |                    |
| 93.00     | 0.128     | 0.258            | 0.000           |                    |
| 94.00     | 0.162     | 0.403            | 0.000           |                    |
| 95.00     | 0.200     | 0.583            | 0.000           |                    |
| 96.00     | 0.231     | 0.799            | 0.000           |                    |
| 97.00     | 0.265     | 1.046            | 0.000           |                    |
| 98.00     | 0.301     | 1.329            | 0.000           | Spillway #1        |
| 99.00     | 0.339     | 1.649            | 2.094           | 15.05              |
| 99.20     | 0.348     | 1.721            | 2.529           | 3.05 Peak Stage    |
| 100.00    | 0.380     | 2.008            | 4.263           | Spillway #2        |
| 101.00    | 0.554     | 2.473            | 30.516          |                    |
| 102.00    | 0.761     | 3.127            | 98.736          |                    |
| 103.00    | 1.000     | 4.005            | 207.246         |                    |

Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 90.00             | 0.000                  | 0.000                       | 0.000                                   |
| 91.00             | 0.000                  | 0.000                       | 0.000                                   |
| 92.00             | 0.000                  | 0.000                       | 0.000                                   |
| 93.00             | 0.000                  | 0.000                       | 0.000                                   |
| 94.00             | 0.000                  | 0.000                       | 0.000                                   |
| 95.00             | 0.000                  | 0.000                       | 0.000                                   |
| 96.00             | 0.000                  | 0.000                       | 0.000                                   |
| 97.00             | 0.000                  | 0.000                       | 0.000                                   |
| 98.00             | 0.000                  | 0.000                       | 0.000                                   |
| 99.00             | (3)>2.094              | 0.000                       | 2.094                                   |
| 100.00            | (5)>4.263              | 0.000                       | 4.263                                   |
| 101.00            | (6)>5.033              | 25.483                      | 30.516                                  |
| 102.00            | (6)>5.701              | 93.036                      | 98.736                                  |
| 103.00            | (6)>6.275              | 200.972                     | 207.246                                 |

Structure #23 (Vegetated Channel)

*EFSP-1 to EFSP-2 Veg Channel*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 2.1       | D, B                  | 2.97                    |                         |                               | 7.0                           |

**Vegetated Channel Results:**

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 38.90 cfs                             |                                      | 38.90 cfs                            |                                     |
| Depth:                 | 0.76 ft                               | 3.73 ft                              | 1.23 ft                              | 4.20 ft                             |
| Top Width:             | 16.57 ft                              | 34.39 ft                             | 19.40 ft                             | 37.22 ft                            |
| Velocity:              | 3.57 fps                              |                                      | 2.01 fps                             |                                     |
| X-Section Area:        | 10.89 sq ft                           |                                      | 19.38 sq ft                          |                                     |
| Hydraulic Radius:      | 0.647 ft                              |                                      | 0.978 ft                             |                                     |
| Froude Number:         | 0.78                                  |                                      | 0.35                                 |                                     |
| Roughness Coefficient: | 0.0451                                |                                      | 0.1060                               |                                     |

## Structure #22 (Pond)

### *EFSP-1 Stock Pond*

#### Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 92.00 ft   |
| Initial Pool:      | 0.15 ac-ft |

#### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.50             | 0.0150      | 98.00              | 0.50                      | 0.00                 |

#### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

#### Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 100.15 ft |
| Dewater Time:   | 1.11 days |

*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) |             |
|-----------|-----------|------------------|-----------------|--------------------|-------------|
| 90.00     | 0.050     | 0.000            | 0.000           |                    |             |
| 91.00     | 0.072     | 0.061            | 0.000           |                    |             |
| 92.00     | 0.098     | 0.145            | 0.000           |                    |             |
| 93.00     | 0.128     | 0.258            | 0.000           |                    |             |
| 94.00     | 0.162     | 0.403            | 0.000           |                    |             |
| 95.00     | 0.200     | 0.583            | 0.000           |                    |             |
| 96.00     | 0.231     | 0.799            | 0.000           |                    |             |
| 97.00     | 0.265     | 1.046            | 0.000           |                    |             |
| 98.00     | 0.301     | 1.329            | 0.000           |                    | Spillway #1 |
| 99.00     | 0.339     | 1.649            | 2.094           | 13.70              |             |
| 100.00    | 0.380     | 2.008            | 4.263           | 7.50               | Spillway #2 |
| 100.15    | 0.462     | 2.077            | 8.165           | 5.35               | Peak Stage  |
| 101.00    | 0.554     | 2.473            | 30.516          |                    |             |

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 102.00    | 0.761        | 3.127               | 98.736             |                          |
| 103.00    | 1.000        | 4.005               | 207.246            |                          |

## Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 90.00             | 0.000                  | 0.000                       | 0.000                                   |
| 91.00             | 0.000                  | 0.000                       | 0.000                                   |
| 92.00             | 0.000                  | 0.000                       | 0.000                                   |
| 93.00             | 0.000                  | 0.000                       | 0.000                                   |
| 94.00             | 0.000                  | 0.000                       | 0.000                                   |
| 95.00             | 0.000                  | 0.000                       | 0.000                                   |
| 96.00             | 0.000                  | 0.000                       | 0.000                                   |
| 97.00             | 0.000                  | 0.000                       | 0.000                                   |
| 98.00             | 0.000                  | 0.000                       | 0.000                                   |
| 99.00             | (3)>2.094              | 0.000                       | 2.094                                   |
| 100.00            | (5)>4.263              | 0.000                       | 4.263                                   |
| 101.00            | (6)>5.033              | 25.483                      | 30.516                                  |
| 102.00            | (6)>5.701              | 93.036                      | 98.736                                  |
| 103.00            | (6)>6.275              | 200.972                     | 207.246                                 |

### Structure #21 (Vegetated Channel)

#### East 7800' Terrace Ditch

Triangular Vegetated Channel Inputs:

#### Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  |                         |                         |                               | 7.0                           |

### Vegetated Channel Results:

|                   | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|-------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge: | 8.43 cfs                              |                                      | 8.43 cfs                             |                                     |
| Depth:            | 1.26 ft                               |                                      | 1.90 ft                              |                                     |
| Top Width:        | 5.65 ft                               |                                      | 8.55 ft                              |                                     |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Velocity:              | 2.38 fps                              |                                      | 1.04 fps                             |                                     |
| X-Section Area:        | 3.55 sq ft                            |                                      | 8.11 sq ft                           |                                     |
| Hydraulic Radius:      | 0.574 ft                              |                                      | 0.868 ft                             |                                     |
| Froude Number:         | 0.53                                  |                                      | 0.19                                 |                                     |
| Roughness Coefficient: | 0.0530                                |                                      | 0.1596                               |                                     |

## Structure #20 (Null)

*Null 7800' Terrace Ditch*

## Structure #19 (Vegetated Channel)

*7600' Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  | 2.45                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 0.55 cfs                              |                                      | 0.55 cfs                             |                                     |
| Depth:                 | 0.56 ft                               | 3.01 ft                              | 1.04 ft                              | 3.49 ft                             |
| Top Width:             | 2.54 ft                               | 13.56 ft                             | 4.68 ft                              | 15.70 ft                            |
| Velocity:              | 0.77 fps                              |                                      | 0.23 fps                             |                                     |
| X-Section Area:        | 0.72 sq ft                            |                                      | 2.43 sq ft                           |                                     |
| Hydraulic Radius:      | 0.258 ft                              |                                      | 0.475 ft                             |                                     |
| Froude Number:         | 0.26                                  |                                      | 0.06                                 |                                     |
| Roughness Coefficient: | 0.0955                                |                                      | 0.4878                               |                                     |

## Structure #18 (Null)

*Null 7600' Terrace Ditch*

## Structure #17 (Riprap Channel)

*East Fork Taylor Ditch 0+00 to EFSP-1*

**Trapezoidal Riprap Channel Inputs:**

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 3.0:1                | 3.0:1                 | 25.0      | 3.97                 |                      |                         |

**Riprap Channel Results:**

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 10.21 cfs     |              |
| Depth:            | 0.06 ft       | 4.03 ft      |
| Top Width:        | 12.35 ft      | 36.17 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.70 sq ft    |              |
| Hydraulic Radius: | 0.057 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #16 (Vegetated Channel)

**7700' Terrace Ditch**

**Triangular Vegetated Channel Inputs:**

Material: Smooth brome

| Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 1.5:1                | 3.0:1                 | 1.5       | D, B               | 2.38                 |                      |                         | 7.0                     |

**Vegetated Channel Results:**

|                   | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|-------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge: | 1.01 cfs                        |                                | 1.01 cfs                       |                               |
| Depth:            | 0.67 ft                         | 3.05 ft                        | 1.19 ft                        | 3.57 ft                       |
| Top Width:        | 3.03 ft                         | 13.74 ft                       | 5.34 ft                        | 16.05 ft                      |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Velocity:              | 0.99 fps                              |                                      | 0.32 fps                             |                                     |
| X-Section Area:        | 1.02 sq ft                            |                                      | 3.17 sq ft                           |                                     |
| Hydraulic Radius:      | 0.307 ft                              |                                      | 0.542 ft                             |                                     |
| Froude Number:         | 0.30                                  |                                      | 0.07                                 |                                     |
| Roughness Coefficient: | 0.0839                                |                                      | 0.3812                               |                                     |

Structure #15 (Null)

Null 7700' Terrace Ditch

Structure #14 (Vegetated Channel)

West 7800' Terrace Ditch

Triangular Vegetated Channel Inputs:

Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  | 2.54                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 5.04 cfs                              |                                      | 5.04 cfs                             |                                     |
| Depth:                 | 1.08 ft                               | 3.62 ft                              | 1.69 ft                              | 4.23 ft                             |
| Top Width:             | 4.86 ft                               | 16.29 ft                             | 7.62 ft                              | 19.05 ft                            |
| Velocity:              | 1.92 fps                              |                                      | 0.78 fps                             |                                     |
| X-Section Area:        | 2.62 sq ft                            |                                      | 6.46 sq ft                           |                                     |
| Hydraulic Radius:      | 0.493 ft                              |                                      | 0.774 ft                             |                                     |
| Froude Number:         | 0.46                                  |                                      | 0.15                                 |                                     |
| Roughness Coefficient: | 0.0593                                |                                      | 0.1971                               |                                     |

Structure #13 (Null)

Null Confluence West 7800' Terrace Ditch

Structure #10 (Vegetated Channel)

Trib 1



Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 5.0       | D, B               | 2.15                 |                      |                         | 7.0                     |

Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 22.27 cfs                       |                                | 22.27 cfs                      |                               |
| Depth:                 | 0.62 ft                         | 2.77 ft                        | 1.01 ft                        | 3.16 ft                       |
| Top Width:             | 9.73 ft                         | 22.63 ft                       | 12.05 ft                       | 24.95 ft                      |
| Velocity:              | 4.55 fps                        |                                | 2.44 fps                       |                               |
| X-Section Area:        | 4.89 sq ft                      |                                | 9.11 sq ft                     |                               |
| Hydraulic Radius:      | 0.493 ft                        |                                | 0.736 ft                       |                               |
| Froude Number:         | 1.13                            |                                | 0.50                           |                               |
| Roughness Coefficient: | 0.0456                          |                                | 0.1110                         |                               |

Structure #9 (Null)

*Null Confluence Trib 1*

Structure #27 (Vegetated Channel)

*Trib 2*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 11.0      | D, B               | 2.48                 |                      |                         | 5.0                     |

Vegetated Channel Results:

|                   | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|-------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge: | 11.57 cfs                       |                                | 11.57 cfs                      |                               |
| Depth:            | 0.37 ft                         | 2.85 ft                        | 0.65 ft                        | 3.13 ft                       |
| Top Width:        | 8.24 ft                         | 23.12 ft                       | 9.90 ft                        | 24.78 ft                      |
| Velocity:         | 4.36 fps                        |                                | 2.24 fps                       |                               |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| X-Section Area:        | 2.66 sq ft                            |                                      | 5.17 sq ft                           |                                     |
| Hydraulic Radius:      | 0.318 ft                              |                                      | 0.511 ft                             |                                     |
| Froude Number:         | 1.35                                  |                                      | 0.55                                 |                                     |
| Roughness Coefficient: | 0.0528                                |                                      | 0.1408                               |                                     |

Structure #26 (Null)

*Null Confluence Trib 2*

Structure #8 (Vegetated Channel)

*WFSP-2 to Station 85+00*

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 10.2      | D, B                  | 3.35                    |                         |                               | 6.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 46.06 cfs                             |                                      | 46.06 cfs                            |                                     |
| Depth:                 | 0.51 ft                               | 3.86 ft                              | 0.79 ft                              | 4.14 ft                             |
| Top Width:             | 15.04 ft                              | 35.14 ft                             | 16.74 ft                             | 36.84 ft                            |
| Velocity:              | 6.72 fps                              |                                      | 4.06 fps                             |                                     |
| X-Section Area:        | 6.86 sq ft                            |                                      | 11.35 sq ft                          |                                     |
| Hydraulic Radius:      | 0.451 ft                              |                                      | 0.668 ft                             |                                     |
| Froude Number:         | 1.75                                  |                                      | 0.87                                 |                                     |
| Roughness Coefficient: | 0.0416                                |                                      | 0.0895                               |                                     |

Structure #7 (Pond)

*WFSP-2 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 91.00 ft   |
| Initial Pool:      | 0.06 ac-ft |

Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 5.00              |

## Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.00             | 0.0150      | 98.00              | 0.90                      | 0.00                 |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 100.32 ft |
| Dewater Time:   | 0.92 days |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 90.00     | 0.050     | 0.000            | 0.000           |                    |
| 91.00     | 0.072     | 0.061            | 0.000           |                    |
| 92.00     | 0.098     | 0.145            | 0.000           |                    |
| 93.00     | 0.128     | 0.258            | 0.000           |                    |
| 94.00     | 0.162     | 0.403            | 0.000           |                    |
| 95.00     | 0.200     | 0.583            | 0.000           |                    |
| 96.00     | 0.231     | 0.799            | 0.000           |                    |
| 97.00     | 0.265     | 1.046            | 0.000           |                    |
| 98.00     | 0.301     | 1.329            | 0.000           | Spillway #2        |
| 99.00     | 0.339     | 1.649            | 2.094           | 11.85              |
| 100.00    | 0.380     | 2.008            | 3.745           | 7.60 Spillway #1   |
| 100.32    | 0.481     | 2.157            | 8.502           | 2.75 Peak Stage    |
| 101.00    | 0.554     | 2.473            | 18.584          |                    |
| 102.00    | 0.761     | 3.127            | 61.251          |                    |
| 103.00    | 1.000     | 4.005            | 135.506         |                    |

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 90.00             | 0.000                       | 0.000                  | 0.000                                   |
| 91.00             | 0.000                       | 0.000                  | 0.000                                   |
| 92.00             | 0.000                       | 0.000                  | 0.000                                   |
| 93.00             | 0.000                       | 0.000                  | 0.000                                   |
| 94.00             | 0.000                       | 0.000                  | 0.000                                   |
| 95.00             | 0.000                       | 0.000                  | 0.000                                   |
| 96.00             | 0.000                       | 0.000                  | 0.000                                   |
| 97.00             | 0.000                       | 0.000                  | 0.000                                   |
| 98.00             | 0.000                       | 0.000                  | 0.000                                   |
| 99.00             | 0.000                       | (3)>2.094              | 2.094                                   |
| 100.00            | 0.000                       | (6)>3.745              | 3.745                                   |
| 101.00            | 14.046                      | (6)>4.538              | 18.584                                  |
| 102.00            | 56.062                      | (6)>5.189              | 61.251                                  |
| 103.00            | 129.713                     | (6)>5.793              | 135.506                                 |

## Structure #6 (Vegetated Channel)

### Channel WFSP-1 to WFSP-2

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 1.3       | D, B                  | 2.69                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 49.87 cfs                             |                                      | 49.87 cfs                            |                                     |
| Depth:                 | 0.98 ft                               | 3.67 ft                              | 1.55 ft                              | 4.24 ft                             |
| Top Width:             | 17.86 ft                              | 34.00 ft                             | 21.27 ft                             | 37.41 ft                            |
| Velocity:              | 3.42 fps                              |                                      | 1.94 fps                             |                                     |
| X-Section Area:        | 14.59 sq ft                           |                                      | 25.70 sq ft                          |                                     |
| Hydraulic Radius:      | 0.802 ft                              |                                      | 1.181 ft                             |                                     |
| Froude Number:         | 0.67                                  |                                      | 0.31                                 |                                     |
| Roughness Coefficient: | 0.0428                                |                                      | 0.0977                               |                                     |

## Structure #5 (Pond)

## WFSP-1 Stock Pond

### Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 91.00 ft   |
| Initial Pool:      | 0.06 ac-ft |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.50             | 0.0150      | 98.00              | 0.90                      | 0.00                 |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

### Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 100.43 ft |
| Dewater Time:   | 1.11 days |

*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) |             |
|-----------|-----------|------------------|-----------------|--------------------|-------------|
| 90.00     | 0.050     | 0.000            | 0.000           |                    |             |
| 91.00     | 0.072     | 0.061            | 0.000           |                    |             |
| 92.00     | 0.098     | 0.145            | 0.000           |                    |             |
| 93.00     | 0.128     | 0.258            | 0.000           |                    |             |
| 94.00     | 0.162     | 0.403            | 0.000           |                    |             |
| 95.00     | 0.200     | 0.583            | 0.000           |                    |             |
| 96.00     | 0.231     | 0.799            | 0.000           |                    |             |
| 97.00     | 0.265     | 1.046            | 0.000           |                    |             |
| 98.00     | 0.301     | 1.329            | 0.000           |                    | Spillway #1 |
| 99.00     | 0.339     | 1.649            | 2.094           | 13.45              |             |
| 100.00    | 0.380     | 2.008            | 4.162           | 5.90               | Spillway #2 |
| 100.43    | 0.493     | 2.208            | 15.430          | 7.20               | Peak Stage  |
| 101.00    | 0.554     | 2.473            | 30.351          |                    |             |
| 102.00    | 0.761     | 3.127            | 98.545          |                    |             |
| 103.00    | 1.000     | 4.005            | 207.032         |                    |             |

Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 90.00             | 0.000                  | 0.000                       | 0.000                                   |
| 91.00             | 0.000                  | 0.000                       | 0.000                                   |
| 92.00             | 0.000                  | 0.000                       | 0.000                                   |
| 93.00             | 0.000                  | 0.000                       | 0.000                                   |
| 94.00             | 0.000                  | 0.000                       | 0.000                                   |
| 95.00             | 0.000                  | 0.000                       | 0.000                                   |
| 96.00             | 0.000                  | 0.000                       | 0.000                                   |
| 97.00             | 0.000                  | 0.000                       | 0.000                                   |
| 98.00             | 0.000                  | 0.000                       | 0.000                                   |
| 99.00             | (3)>2.094              | 0.000                       | 2.094                                   |
| 100.00            | (6)>4.162              | 0.000                       | 4.162                                   |
| 101.00            | (6)>4.868              | 25.483                      | 30.351                                  |
| 102.00            | (6)>5.509              | 93.036                      | 98.545                                  |
| 103.00            | (6)>6.061              | 200.972                     | 207.032                                 |

Structure #4 (Riprap Channel)

*0+00 to WFSP-1 West Fork Taylor Ditch*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 26.0      | 3.98                    |                         |                               |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 16.31 cfs     |              |
| Depth:            | 0.08 ft       | 4.06 ft      |
| Top Width:        | 12.48 ft      | 36.36 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.99 sq ft    |              |
| Hydraulic Radius: | 0.079 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |

|       | w/o Freeboard | w/ Freeboard |
|-------|---------------|--------------|
| D50:  | 9.00 in       |              |
| Dmax: | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #3 (Null)

*Null Above West Taylor Pond*

## Structure #2 (Pond)

*West Taylor Pond*

Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,468.00 ft |
| Initial Pool:      | 1.77 ac-ft  |

### Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 10.50             | 18.00                | 150.00             | 2.00             | 0.0150      | 7,471.00           | 2                        |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 7,475.00      | 30.00             | 2.00:1         | 2.00:1          | 30.00             |

Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 7,473.78 ft |
| Dewater Time:   | 1.70 days   |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 7,455.00  | 0.022     | 0.000            | 0.000           |                    |
| 7,456.00  | 0.032     | 0.027            | 0.000           |                    |
| 7,457.00  | 0.043     | 0.064            | 0.000           |                    |
| 7,458.00  | 0.054     | 0.113            | 0.000           |                    |
| 7,459.00  | 0.066     | 0.173            | 0.000           |                    |

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 7,460.00  | 0.079        | 0.245               | 0.000              |                          |
| 7,461.00  | 0.103        | 0.336               | 0.000              |                          |
| 7,462.00  | 0.139        | 0.456               | 0.000              |                          |
| 7,463.00  | 0.162        | 0.607               | 0.000              |                          |
| 7,464.00  | 0.188        | 0.781               | 0.000              |                          |
| 7,465.00  | 0.213        | 0.981               | 0.000              |                          |
| 7,466.00  | 0.244        | 1.209               | 0.000              |                          |
| 7,467.00  | 0.279        | 1.470               | 0.000              |                          |
| 7,468.00  | 0.312        | 1.766               | 0.000              | Low hole SPW #1          |
| 7,469.00  | 0.360        | 2.102               | 0.473              | 8.60*                    |
| 7,470.00  | 0.389        | 2.476               | 0.669              | 8.10                     |
| 7,471.00  | 0.430        | 2.886               | 0.819              | 8.20 Spillway #1         |
| 7,472.00  | 0.463        | 3.332               | 8.509              | 8.45                     |
| 7,473.00  | 0.503        | 3.814               | 12.033             | 4.15                     |
| 7,473.78  | 0.532        | 4.220               | 14.133             | 3.30 Peak Stage          |
| 7,474.00  | 0.541        | 4.336               | 14.738             |                          |
| 7,475.00  | 0.580        | 4.897               | 17.018             | Spillway #2              |
| 7,476.00  | 0.581        | 5.477               | 83.791             |                          |
| 7,477.00  | 0.582        | 6.058               | 246.034            |                          |
| 7,478.00  | 0.583        | 6.641               | 483.806            |                          |
| 7,479.00  | 0.584        | 7.224               | 794.453            |                          |
| 7,480.00  | 0.585        | 7.809               | 1,172.300          |                          |

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

## Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,455.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,456.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,457.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,458.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,459.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,460.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,461.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,462.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,463.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,464.00          | 0.000             | 0.000                       | 0.000                                   |



| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,465.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,466.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,467.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,468.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 7,469.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,470.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,471.00          | 0.819             | 0.000                       | 0.819                                   |
| 7,472.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,473.00          | 12.033            | 0.000                       | 12.033                                  |
| 7,474.00          | 14.738            | 0.000                       | 14.738                                  |
| 7,475.00          | 17.018            | 0.000                       | 17.018                                  |
| 7,476.00          | 19.026            | 64.765                      | 83.791                                  |
| 7,477.00          | 20.842            | 225.191                     | 246.034                                 |
| 7,478.00          | 22.512            | 461.294                     | 483.806                                 |
| 7,479.00          | 24.066            | 770.387                     | 794.453                                 |
| 7,480.00          | 25.526            | 1,146.774                   | 1,172.300                               |

Structure #1 (Null)

*Null Below West Taylor Pond*

### ***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) |
|------------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #37        | 1        | 25.600         | 0.224              | 0.000        | 0.000  | 62.000       | M   | 1.16                 | 0.275                 |
|            | <b>Σ</b> | <b>25.600</b>  |                    |              |        |              |     | <b>1.16</b>          | <b>0.275</b>          |
| <b>#36</b> | <b>Σ</b> | <b>25.600</b>  |                    |              |        |              |     | <b>1.16</b>          | <b>0.275</b>          |
| #35        | 1        | 6.600          | 0.042              | 0.000        | 0.000  | 62.000       | M   | 0.91                 | 0.088                 |
|            | <b>Σ</b> | <b>6.600</b>   |                    |              |        |              |     | <b>0.91</b>          | <b>0.088</b>          |
| <b>#34</b> | <b>Σ</b> | <b>6.600</b>   |                    |              |        |              |     | <b>0.91</b>          | <b>0.088</b>          |
| #33        | 1        | 14.000         | 0.059              | 0.000        | 0.000  | 62.000       | M   | 1.93                 | 0.186                 |
|            | <b>Σ</b> | <b>14.000</b>  |                    |              |        |              |     | <b>1.93</b>          | <b>0.186</b>          |
| <b>#32</b> | <b>Σ</b> | <b>14.000</b>  |                    |              |        |              |     | <b>1.93</b>          | <b>0.186</b>          |
| #31        | 1        | 23.800         | 0.253              | 0.000        | 0.000  | 62.000       | M   | 1.01                 | 0.255                 |
|            | <b>Σ</b> | <b>23.800</b>  |                    |              |        |              |     | <b>1.01</b>          | <b>0.255</b>          |
| <b>#30</b> | <b>Σ</b> | <b>23.800</b>  |                    |              |        |              |     | <b>1.01</b>          | <b>0.255</b>          |
| #29        | 1        | 10.700         | 0.050              | 0.000        | 0.000  | 80.000       | F   | 9.13                 | 0.671                 |
|            | 2        | 14.900         | 0.094              | 0.000        | 0.000  | 62.000       | M   | 2.06                 | 0.198                 |
|            | <b>Σ</b> | <b>25.600</b>  |                    |              |        |              |     | <b>11.18</b>         | <b>0.869</b>          |
| <b>#28</b> | <b>Σ</b> | <b>25.600</b>  |                    |              |        |              |     | <b>11.18</b>         | <b>0.869</b>          |
| #25        | 1        | 144.700        | 0.644              | 0.000        | 0.000  | 62.000       | M   | 4.06                 | 1.539                 |
|            | <b>Σ</b> | <b>240.300</b> |                    |              |        |              |     | <b>14.36</b>         | <b>3.213</b>          |
| <b>#24</b> | <b>Σ</b> | <b>240.300</b> |                    |              |        |              |     | <b>14.36</b>         | <b>3.213</b>          |
| #23        | 1        | 70.600         | 0.365              | 0.000        | 0.000  | 80.000       | F   | 38.67                | 4.174                 |
|            | 2        | 2.500          | 0.021              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | 3        | 6.800          | 0.053              | 0.000        | 0.000  | 62.000       | M   | 0.94                 | 0.091                 |
|            | <b>Σ</b> | <b>320.200</b> |                    |              |        |              |     | <b>38.90</b>         | <b>6.293</b>          |
| <b>#22</b> | <b>Σ</b> | <b>320.200</b> |                    |              |        |              |     | <b>38.90</b>         | <b>6.293</b>          |
| #21        | 1        | 3.000          | 0.006              | 0.000        | 0.000  | 62.000       | M   | 0.41                 | 0.040                 |
|            | 2        | 9.400          | 0.036              | 0.000        | 0.000  | 80.000       | F   | 8.02                 | 0.589                 |
|            | <b>Σ</b> | <b>12.400</b>  |                    |              |        |              |     | <b>8.43</b>          | <b>0.629</b>          |
| <b>#20</b> | <b>Σ</b> | <b>12.400</b>  |                    |              |        |              |     | <b>8.43</b>          | <b>0.629</b>          |
| #19        | 1        | 4.000          | 0.016              | 0.000        | 0.000  | 62.000       | M   | 0.55                 | 0.053                 |

| Stru # | SWS #    | SWS Area (ac) | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|--------|----------|---------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
|        | $\Sigma$ | 4.000         |                    |              |        |              |     | 0.55                 | 0.053                 |
| #18    | $\Sigma$ | 4.000         |                    |              |        |              |     | 0.55                 | 0.053                 |
| #17    | 1        | 1.100         | 0.011              | 0.000        | 0.000  | 80.000       | M   | 0.94                 | 0.069                 |
|        | 2        | 21.500        | 0.090              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 3        | 0.600         | 0.012              | 0.000        | 0.000  | 62.000       | M   | 0.08                 | 0.003                 |
|        | 4        | 0.600         | 0.010              | 0.000        | 0.000  | 62.000       | M   | 0.08                 | 0.003                 |
|        | 5        | 0.900         | 0.013              | 0.000        | 0.000  | 62.000       | M   | 0.12                 | 0.008                 |
|        | $\Sigma$ | 361.300       |                    |              |        |              |     | 10.21                | 5.874                 |
| #16    | 1        | 7.300         | 0.015              | 0.000        | 0.000  | 62.000       | M   | 1.01                 | 0.097                 |
|        | $\Sigma$ | 7.300         |                    |              |        |              |     | 1.01                 | 0.097                 |
| #15    | $\Sigma$ | 7.300         |                    |              |        |              |     | 1.01                 | 0.097                 |
| #14    | 1        | 1.900         | 0.008              | 0.000        | 0.000  | 62.000       | M   | 0.26                 | 0.025                 |
|        | 2        | 5.600         | 0.043              | 0.000        | 0.000  | 80.000       | F   | 4.78                 | 0.351                 |
|        | $\Sigma$ | 7.500         |                    |              |        |              |     | 5.04                 | 0.376                 |
| #13    | $\Sigma$ | 7.500         |                    |              |        |              |     | 5.04                 | 0.376                 |
| #10    | 1        | 35.700        | 0.252              | 0.000        | 0.000  | 80.000       | F   | 22.27                | 2.135                 |
|        | 2        | 98.000        | 0.045              | 0.000        | 0.000  | 47.000       | S   | 0.02                 | 0.001                 |
|        | $\Sigma$ | 133.700       |                    |              |        |              |     | 22.27                | 2.136                 |
| #9     | $\Sigma$ | 133.700       |                    |              |        |              |     | 22.27                | 2.136                 |
| #27    | 1        | 76.400        | 0.290              | 0.000        | 0.000  | 62.000       | M   | 2.97                 | 0.815                 |
|        | 2        | 13.900        | 0.136              | 0.000        | 0.000  | 80.000       | F   | 9.62                 | 0.841                 |
|        | $\Sigma$ | 90.300        |                    |              |        |              |     | 11.57                | 1.655                 |
| #26    | $\Sigma$ | 90.300        |                    |              |        |              |     | 11.57                | 1.655                 |
| #8     | 1        | 52.200        | 0.229              | 0.000        | 0.000  | 80.000       | F   | 33.37                | 3.116                 |
|        | 2        | 30.900        | 0.122              | 0.000        | 0.000  | 62.000       | M   | 4.27                 | 0.412                 |
|        | 3        | 23.500        | 0.089              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 4        | 4.000         | 0.218              | 0.000        | 0.000  | 62.000       | M   | 0.18                 | 0.043                 |
|        | $\Sigma$ | 200.900       |                    |              |        |              |     | 46.06                | 5.225                 |
| #7     | $\Sigma$ | 200.900       |                    |              |        |              |     | 46.06                | 5.225                 |
| #6     | 1        | 43.000        | 0.095              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 2        | 39.900        | 0.161              | 0.000        | 0.000  | 80.000       | F   | 27.61                | 2.414                 |
|        | 3        | 0.400         | 0.015              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 4        | 1.600         | 0.020              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 5        | 1.200         | 0.021              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |

| Stru #    | SWS #    | SWS Area (ac)  | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|-----------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
|           | <b>Σ</b> | <b>420.700</b> |                    |              |        |              |     | <b>49.87</b>         | <b>8.506</b>          |
| <b>#5</b> | <b>Σ</b> | <b>420.700</b> |                    |              |        |              |     | <b>49.87</b>         | <b>8.506</b>          |
| #4        | 1        | 1.000          | 0.007              | 0.000        | 0.000  | 80.000       | M   | 0.85                 | 0.063                 |
|           | 2        | 2.800          | 0.019              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|           | 3        | 0.900          | 0.010              | 0.000        | 0.000  | 62.000       | M   | 0.12                 | 0.008                 |
|           | 4        | 23.300         | 0.094              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|           | 5        | 1.000          | 0.020              | 0.000        | 0.000  | 62.000       | M   | 0.14                 | 0.009                 |
|           | <b>Σ</b> | <b>464.500</b> |                    |              |        |              |     | <b>16.31</b>         | <b>7.789</b>          |
| <b>#3</b> | <b>Σ</b> | <b>825.800</b> |                    |              |        |              |     | <b>25.66</b>         | <b>13.663</b>         |
| #2        | 1        | 10.500         | 0.051              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|           | 2        | 17.100         | 0.058              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|           | <b>Σ</b> | <b>853.400</b> |                    |              |        |              |     | <b>25.66</b>         | <b>13.663</b>         |
| <b>#1</b> | <b>Σ</b> | <b>853.400</b> |                    |              |        |              |     | <b>14.13</b>         | <b>13.417</b>         |

## Subwatershed Time of Concentration Details:

| Stru #    | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|-----------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #2        | 1        | 3. Short grass pasture                                | 45.00     | 443.25           | 985.00            | 5.360          | 0.051        |
| <b>#2</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.051</b> |
| #2        | 2        | 3. Short grass pasture                                | 40.00     | 425.60           | 1,064.00          | 5.050          | 0.058        |
| <b>#2</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.058</b> |
| #4        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 16.00     | 100.80           | 630.00            | 4.000          | 0.043        |
| <b>#4</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.007</b> |
| #4        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 33.00     | 50.16            | 152.00            | 5.740          | 0.007        |
| <b>#4</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.019</b> |
| #4        | 3        | 3. Short grass pasture                                | 20.00     | 50.00            | 250.00            | 3.570          | 0.019        |
| <b>#4</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.010</b> |
| #4        | 4        | 3. Short grass pasture                                | 19.00     | 24.70            | 130.00            | 3.480          | 0.010        |
| <b>#4</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.094</b> |
| #4        | 5        | 3. Short grass pasture                                | 31.00     | 101.37           | 327.00            | 4.450          | 0.020        |
| <b>#4</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.020</b> |
| #6        | 1        | 3. Short grass pasture                                | 14.60     | 75.01            | 513.76            | 3.050          | 0.046        |
|           |          | 8. Large gullies, diversions, and low flowing streams | 1.50      | 5.67             | 378.00            | 3.670          | 0.028        |
| <b>#6</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.095</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #6         | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 8.00      | 131.03           | 1,638.00          | 2.820          | 0.161        |
| <b>#6</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.161</b> |
| #6         | 3        | 3. Short grass pasture                                | 15.00     | 25.35            | 169.00            | 3.090          | 0.015        |
| <b>#6</b>  | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.015</b> |
| #6         | 4        | 3. Short grass pasture                                | 12.00     | 24.24            | 202.00            | 2.770          | 0.020        |
| <b>#6</b>  | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.020</b> |
| #6         | 5        | 3. Short grass pasture                                | 12.00     | 25.20            | 210.00            | 2.770          | 0.021        |
| <b>#6</b>  | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #8         | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 9.00      | 222.84           | 2,476.00          | 3.000          | 0.229        |
| <b>#8</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.229</b> |
| #8         | 2        | 3. Short grass pasture                                | 18.00     | 269.82           | 1,499.00          | 3.390          | 0.122        |
| <b>#8</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.122</b> |
| #8         | 3        | 3. Short grass pasture                                | 24.00     | 303.35           | 1,264.00          | 3.910          | 0.089        |
| <b>#8</b>  | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.089</b> |
| #8         | 4        | 3. Short grass pasture                                | 1.00      | 6.30             | 630.00            | 0.800          | 0.218        |
| <b>#8</b>  | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.218</b> |
| #10        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 8.00      | 204.96           | 2,562.00          | 2.820          | 0.252        |
| <b>#10</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.252</b> |
| #10        | 2        | 3. Short grass pasture                                | 35.00     | 272.29           | 778.00            | 4.730          | 0.045        |
| <b>#10</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.045</b> |
| #14        | 1        | 3. Short grass pasture                                | 30.00     | 40.80            | 135.99            | 4.380          | 0.008        |
| <b>#14</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.008</b> |
| #14        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 16.00     | 100.80           | 630.00            | 4.000          | 0.043        |
| <b>#14</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.043</b> |
| #16        | 1        | 3. Short grass pasture                                | 30.00     | 73.50            | 244.99            | 4.380          | 0.015        |
| <b>#16</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.015</b> |
| #17        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 25.00     | 50.25            | 201.00            | 5.000          | 0.011        |
| <b>#17</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.011</b> |
| #17        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 24.80     | 49.60            | 200.00            | 4.970          | 0.011        |
| <b>#17</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.090</b> |
| #17        | 3        | 3. Short grass pasture                                | 27.00     | 49.41            | 183.00            | 4.150          | 0.012        |
| <b>#17</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.012</b> |
| #17        | 4        | 3. Short grass pasture                                | 30.00     | 50.40            | 168.00            | 4.380          | 0.010        |
| <b>#17</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.010</b> |
| #17        | 5        | 3. Short grass pasture                                | 33.00     | 74.25            | 225.00            | 4.590          | 0.013        |
| <b>#17</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.013</b> |
| #19        | 1        | 3. Short grass pasture                                | 30.00     | 78.00            | 260.00            | 4.380          | 0.016        |
| <b>#19</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.016</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #21        | 1        | 3. Short grass pasture                                | 26.00     | 24.70            | 95.00             | 4.070          | 0.006        |
| <b>#21</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.006</b> |
| #21        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 18.00     | 101.34           | 563.00            | 4.240          | 0.036        |
| <b>#21</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.036</b> |
| #23        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 6.00      | 192.78           | 3,213.00          | 2.440          | 0.365        |
| <b>#23</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.365</b> |
| #23        | 2        | 3. Short grass pasture                                | 19.00     | 50.35            | 265.00            | 3.480          | 0.021        |
| <b>#23</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #23        | 3        | 3. Short grass pasture                                | 19.00     | 127.68           | 672.00            | 3.480          | 0.053        |
| <b>#23</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.053</b> |
| #25        | 1        | 3. Short grass pasture                                | 4.00      | 148.44           | 3,711.00          | 1.600          | 0.644        |
| <b>#25</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.644</b> |
| #27        | 1        | 3. Short grass pasture                                | 14.00     | 438.34           | 3,131.00          | 2.990          | 0.290        |
| <b>#27</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.290</b> |
| #27        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 11.00     | 179.52           | 1,632.00          | 3.310          | 0.136        |
| <b>#27</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.136</b> |
| #29        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 12.00     | 74.87            | 624.00            | 3.460          | 0.050        |
| <b>#29</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.050</b> |
| #29        | 2        | 3. Short grass pasture                                | 11.00     | 98.78            | 898.00            | 2.650          | 0.094        |
| <b>#29</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.094</b> |
| #31        | 1        | 3. Short grass pasture                                | 6.00      | 106.98           | 1,783.00          | 1.950          | 0.253        |
| <b>#31</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.253</b> |
| #33        | 1        | 3. Short grass pasture                                | 15.00     | 98.85            | 659.00            | 3.090          | 0.059        |
| <b>#33</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.059</b> |
| #35        | 1        | 3. Short grass pasture                                | 19.00     | 100.32           | 528.00            | 3.480          | 0.042        |
| <b>#35</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.042</b> |
| #37        | 1        | 3. Short grass pasture                                | 10.00     | 203.40           | 2,034.00          | 2.520          | 0.224        |
| <b>#37</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.224</b> |

# **West Taylor Pond** **100 Yr - 24 Hr Storm Event**

***Post Mine Channel Demonstration***  
***Post Mining***

Tony Tennyson

## ***General Information***

### ***Storm Information:***

|                 |                |
|-----------------|----------------|
| Storm Type:     | NRCS Type II   |
| Design Storm:   | 100 yr - 24 hr |
| Rainfall Depth: | 2.700 inches   |



## Structure Networking:

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description                              |
|---------|--------|--------------|--------|---------------|---------|------------------------------------------|
| Null    | #1     | ==>          | End    | 0.000         | 0.000   | Null Below West Taylor Pond              |
| Pond    | #2     | ==>          | #1     | 0.000         | 0.000   | West Taylor Pond                         |
| Null    | #3     | ==>          | #2     | 0.000         | 0.000   | Null Above West Taylor Pond              |
| Channel | #4     | ==>          | #3     | 0.000         | 0.000   | 0+00 to WFSP-1 West Fork Taylor Ditch    |
| Pond    | #5     | ==>          | #4     | 0.000         | 0.000   | WFSP-1 Stock Pond                        |
| Channel | #6     | ==>          | #5     | 0.000         | 0.000   | Channel WFSP-1 to WFSP-2                 |
| Pond    | #7     | ==>          | #6     | 0.000         | 0.000   | WFSP-2 Stockpond                         |
| Channel | #8     | ==>          | #7     | 0.000         | 0.000   | WFSP-2 to Station 85+00                  |
| Null    | #9     | ==>          | #6     | 0.000         | 0.000   | Null Confluence Trib 1                   |
| Channel | #10    | ==>          | #9     | 0.000         | 0.000   | Trib 1                                   |
| Null    | #13    | ==>          | #4     | 0.000         | 0.000   | Null Confluence West 7800' Terrace Ditch |
| Channel | #14    | ==>          | #13    | 0.000         | 0.000   | West 7800' Terrace Ditch                 |
| Null    | #15    | ==>          | #4     | 0.000         | 0.000   | Null 7700' Terrace Ditch                 |
| Channel | #16    | ==>          | #15    | 0.000         | 0.000   | 7700' Terrace Ditch                      |
| Channel | #17    | ==>          | #3     | 0.000         | 0.000   | East Fork Taylor Ditch 0+00 to EFSP-1    |
| Null    | #18    | ==>          | #17    | 0.000         | 0.000   | Null 7600' Terrace Ditch                 |
| Channel | #19    | ==>          | #18    | 0.000         | 0.000   | 7600' Terrace Ditch                      |
| Null    | #20    | ==>          | #17    | 0.000         | 0.000   | Null 7800' Terrace Ditch                 |
| Channel | #21    | ==>          | #20    | 0.000         | 0.000   | East 7800' Terrace Ditch                 |
| Pond    | #22    | ==>          | #17    | 0.000         | 0.000   | EFSP-1 Stock Pond                        |
| Channel | #23    | ==>          | #22    | 0.000         | 0.000   | EFSP-1 to EFSP-2 Veg Channel             |
| Pond    | #24    | ==>          | #23    | 0.000         | 0.000   | EFSP-2 Stockpond                         |
| Channel | #25    | ==>          | #24    | 0.000         | 0.000   | EFSP-2 to Station 116+97                 |
| Null    | #26    | ==>          | #8     | 0.000         | 0.000   | Null Confluence Trib 2                   |
| Channel | #27    | ==>          | #26    | 0.000         | 0.000   | Trib 2                                   |
| Null    | #28    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 3                   |
| Channel | #29    | ==>          | #28    | 0.000         | 0.000   | Trib 3                                   |
| Null    | #30    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 5                   |
| Channel | #31    | ==>          | #30    | 0.000         | 0.000   | Trib 5                                   |
| Null    | #32    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 4                   |
| Channel | #33    | ==>          | #32    | 0.000         | 0.000   | Trib 4                                   |
| Null    | #34    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 6                   |
| Channel | #35    | ==>          | #34    | 0.000         | 0.000   | Trib 6                                   |
| Null    | #36    | ==>          | #25    | 0.000         | 0.000   | Null Confluence Trib 7                   |
| Channel | #37    | ==>          | #36    | 0.000         | 0.000   | Trib 7                                   |

|  |                                                                                     |               |
|--|-------------------------------------------------------------------------------------|---------------|
|  |  | #37<br>Chan'l |
|  |  | #36<br>Null   |
|  |  | #35<br>Chan'l |
|  |  | #34<br>Null   |
|  |  | #33<br>Chan'l |
|  |  | #32<br>Null   |
|  |  | #31<br>Chan'l |
|  |  | #30<br>Null   |
|  |  | #29<br>Chan'l |
|  |  | #28<br>Null   |
|  |    | #25<br>Chan'l |
|  |  | #24<br>Pond   |
|  |  | #23<br>Chan'l |
|  |  | #22<br>Pond   |
|  |  | #21<br>Chan'l |
|  |  | #20<br>Null   |
|  |  | #19<br>Chan'l |
|  |  | #18<br>Null   |
|  |  | #17<br>Chan'l |
|  |  | #16<br>Chan'l |
|  |  | #15<br>Null   |
|  |  | #14<br>Chan'l |

|  |                                                                                   |             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|-----------------------------------------------------------------------------------|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  | #13<br>Null |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|-----------------------------------------------------------------------------------|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

## Structure Summary:

|         | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|---------|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #37     | 25.600                                    | 25.600                                | 3.19                       | 0.49                                 |
| #36     | 0.000                                     | 25.600                                | 3.19                       | 0.49                                 |
| #35     | 6.600                                     | 6.600                                 | 2.03                       | 0.16                                 |
| #34     | 0.000                                     | 6.600                                 | 2.03                       | 0.16                                 |
| #33     | 14.000                                    | 14.000                                | 4.30                       | 0.33                                 |
| #32     | 0.000                                     | 14.000                                | 4.30                       | 0.33                                 |
| #31     | 23.800                                    | 23.800                                | 2.81                       | 0.45                                 |
| #30     | 0.000                                     | 23.800                                | 2.81                       | 0.45                                 |
| #29     | 25.600                                    | 25.600                                | 16.81                      | 1.27                                 |
| #28     | 0.000                                     | 25.600                                | 16.81                      | 1.27                                 |
| #25     | 144.700                                   | 240.300                               | 26.15                      | 5.45                                 |
| #24 In  | 0.000                                     | 240.300                               | 26.15                      | 5.45                                 |
| #24 Out |                                           |                                       | 7.89                       | 4.27                                 |
| #23     | 79.900                                    | 320.200                               | 54.25                      | 10.13                                |
| #22 In  | 0.000                                     | 320.200                               | 54.25                      | 10.13                                |
| #22 Out |                                           |                                       | 21.87                      | 8.95                                 |
| #21     | 12.400                                    | 12.400                                | 11.67                      | 0.88                                 |
| #20     | 0.000                                     | 12.400                                | 11.67                      | 0.88                                 |
| #19     | 4.000                                     | 4.000                                 | 1.23                       | 0.10                                 |
| #18     | 0.000                                     | 4.000                                 | 1.23                       | 0.10                                 |
| #17     | 24.700                                    | 361.300                               | 25.00                      | 10.09                                |
| #16     | 7.300                                     | 7.300                                 | 2.24                       | 0.17                                 |
| #15     | 0.000                                     | 7.300                                 | 2.24                       | 0.17                                 |
| #14     | 7.500                                     | 7.500                                 | 6.99                       | 0.53                                 |
| #13     | 0.000                                     | 7.500                                 | 6.99                       | 0.53                                 |
| #10     | 133.700                                   | 133.700                               | 30.87                      | 3.05                                 |
| #9      | 0.000                                     | 133.700                               | 30.87                      | 3.05                                 |
| #27     | 90.300                                    | 90.300                                | 20.26                      | 2.60                                 |
| #26     | 0.000                                     | 90.300                                | 20.26                      | 2.60                                 |
| #8      | 110.600                                   | 200.900                               | 68.97                      | 7.70                                 |
| #7 In   | 0.000                                     | 200.900                               | 68.97                      | 7.70                                 |
| #7 Out  |                                           |                                       | 24.95                      | 6.44                                 |
| #6      | 86.100                                    | 420.700                               | 71.02                      | 12.85                                |
| #5 In   | 0.000                                     | 420.700                               | 71.02                      | 12.85                                |
| #5 Out  |                                           |                                       | 43.71                      | 11.58                                |
| #4      | 29.000                                    | 464.500                               | 46.17                      | 12.44                                |
| #3      | 0.000                                     | 825.800                               | 71.16                      | 22.52                                |

|    |     | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|----|-----|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #2 | In  | 27.600                                    | 853.400                               | 71.16                      | 22.56                                |
|    | Out |                                           |                                       | 49.99                      | 22.29                                |
| #1 |     | 0.000                                     | 853.400                               | 49.99                      | 22.29                                |

## Structure Detail:

### Structure #37 (Vegetated Channel)

*Trib 7*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 7.0       | D, B               | 2.81                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 3.19 cfs                              |                                      | 3.19 cfs                             |                                     |
| Depth:                 | 0.25 ft                               | 3.06 ft                              | 0.51 ft                              | 3.32 ft                             |
| Top Width:             | 7.49 ft                               | 24.35 ft                             | 9.06 ft                              | 25.92 ft                            |
| Velocity:              | 1.90 fps                              |                                      | 0.83 fps                             |                                     |
| X-Section Area:        | 1.68 sq ft                            |                                      | 3.84 sq ft                           |                                     |
| Hydraulic Radius:      | 0.222 ft                              |                                      | 0.416 ft                             |                                     |
| Froude Number:         | 0.71                                  |                                      | 0.22                                 |                                     |
| Roughness Coefficient: | 0.0759                                |                                      | 0.2645                               |                                     |

### Structure #36 (Null)

*Null Confluence Trib 7*

### Structure #35 (Vegetated Channel)

*Trib 6*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 6.0       | D, B               | 1.84                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 2.03 cfs                              |                                      | 2.03 cfs                             |                                     |
| Depth:                 | 0.22 ft                               | 2.06 ft                              | 0.47 ft                              | 2.31 ft                             |
| Top Width:             | 7.30 ft                               | 18.34 ft                             | 8.81 ft                              | 19.85 ft                            |
| Velocity:              | 1.41 fps                              |                                      | 0.58 fps                             |                                     |
| X-Section Area:        | 1.44 sq ft                            |                                      | 3.47 sq ft                           |                                     |
| Hydraulic Radius:      | 0.195 ft                              |                                      | 0.387 ft                             |                                     |
| Froude Number:         | 0.56                                  |                                      | 0.16                                 |                                     |
| Roughness Coefficient: | 0.0865                                |                                      | 0.3305                               |                                     |

## Structure #34 (Null)

### *Null Confluence Trib 6*

## Structure #33 (Vegetated Channel)

### *Trib 4*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 16.0      | D, B               | 2.86                 |                      |                         | 5.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 4.30 cfs                              |                                      | 4.30 cfs                             |                                     |
| Depth:                 | 0.22 ft                               | 3.08 ft                              | 0.43 ft                              | 3.29 ft                             |
| Top Width:             | 7.32 ft                               | 24.48 ft                             | 8.58 ft                              | 25.74 ft                            |
| Velocity:              | 2.93 fps                              |                                      | 1.37 fps                             |                                     |
| X-Section Area:        | 1.47 sq ft                            |                                      | 3.13 sq ft                           |                                     |
| Hydraulic Radius:      | 0.198 ft                              |                                      | 0.360 ft                             |                                     |
| Froude Number:         | 1.16                                  |                                      | 0.40                                 |                                     |
| Roughness Coefficient: | 0.0688                                |                                      | 0.2194                               |                                     |

## Structure #32 (Null)

### *Null Confluence Trib 4*

## Structure #31 (Vegetated Channel)

### *Trib 5*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 4.0       | D, B               | 2.77                 |                      |                         | 7.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 2.81 cfs                              |                                      | 2.81 cfs                             |                                     |
| Depth:                 | 0.28 ft                               | 3.05 ft                              | 0.59 ft                              | 3.36 ft                             |
| Top Width:             | 7.68 ft                               | 24.30 ft                             | 9.52 ft                              | 26.14 ft                            |
| Velocity:              | 1.47 fps                              |                                      | 0.62 fps                             |                                     |
| X-Section Area:        | 1.92 sq ft                            |                                      | 4.55 sq ft                           |                                     |
| Hydraulic Radius:      | 0.246 ft                              |                                      | 0.468 ft                             |                                     |
| Froude Number:         | 0.52                                  |                                      | 0.16                                 |                                     |
| Roughness Coefficient: | 0.0796                                |                                      | 0.2905                               |                                     |

## Structure #30 (Null)

### *Null Confluence Trib 5*

## Structure #29 (Vegetated Channel)

### *Trib 3*

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 11.0      | D, B               | 2.48                 |                      |                         | 5.0                     |

Vegetated Channel Results:



|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 16.81 cfs                             |                                      | 16.81 cfs                            |                                     |
| Depth:                 | 0.44 ft                               | 2.92 ft                              | 0.73 ft                              | 3.21 ft                             |
| Top Width:             | 8.62 ft                               | 23.50 ft                             | 10.36 ft                             | 25.24 ft                            |
| Velocity:              | 5.26 fps                              |                                      | 2.83 fps                             |                                     |
| X-Section Area:        | 3.19 sq ft                            |                                      | 5.94 sq ft                           |                                     |
| Hydraulic Radius:      | 0.365 ft                              |                                      | 0.561 ft                             |                                     |
| Froude Number:         | 1.52                                  |                                      | 0.66                                 |                                     |
| Roughness Coefficient: | 0.0478                                |                                      | 0.1186                               |                                     |

## Structure #28 (Null)

*Null Confluence Trib 3*

## Structure #25 (Vegetated Channel)

*EFSP-2 to Station 116+97*

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 5.4       | D, B                  | 3.49                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 26.15 cfs                             |                                      | 26.15 cfs                            |                                     |
| Depth:                 | 0.48 ft                               | 3.97 ft                              | 0.81 ft                              | 4.30 ft                             |
| Top Width:             | 14.90 ft                              | 35.84 ft                             | 16.89 ft                             | 37.83 ft                            |
| Velocity:              | 4.02 fps                              |                                      | 2.22 fps                             |                                     |
| X-Section Area:        | 6.51 sq ft                            |                                      | 11.77 sq ft                          |                                     |
| Hydraulic Radius:      | 0.432 ft                              |                                      | 0.686 ft                             |                                     |
| Froude Number:         | 1.07                                  |                                      | 0.47                                 |                                     |
| Roughness Coefficient: | 0.0493                                |                                      | 0.1211                               |                                     |

## Structure #24 (Pond)

*EFSP-2 Stockpond*

## Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 92.00 ft   |
| Initial Pool:      | 0.15 ac-ft |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.50             | 0.0150      | 98.00              | 0.50                      | 0.00                 |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 100.14 ft |
| Dewater Time:   | 0.93 days |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 90.00     | 0.050     | 0.000            | 0.000           |                    |
| 91.00     | 0.072     | 0.061            | 0.000           |                    |
| 92.00     | 0.098     | 0.145            | 0.000           |                    |
| 93.00     | 0.128     | 0.258            | 0.000           |                    |
| 94.00     | 0.162     | 0.403            | 0.000           |                    |
| 95.00     | 0.200     | 0.583            | 0.000           |                    |
| 96.00     | 0.231     | 0.799            | 0.000           |                    |
| 97.00     | 0.265     | 1.046            | 0.000           |                    |
| 98.00     | 0.301     | 1.329            | 0.000           | Spillway #1        |
| 99.00     | 0.339     | 1.649            | 2.094           | 11.30              |
| 100.00    | 0.380     | 2.008            | 4.263           | 8.25 Spillway #2   |
| 100.14    | 0.461     | 2.072            | 7.885           | 2.70 Peak Stage    |
| 101.00    | 0.554     | 2.473            | 30.516          |                    |
| 102.00    | 0.761     | 3.127            | 98.736          |                    |
| 103.00    | 1.000     | 4.005            | 207.246         |                    |

## Detailed Discharge Table

| Elevation (ft) | Straight Pipe (cfs) | Emergency Spillway (cfs) | Combined Total Discharge (cfs) |
|----------------|---------------------|--------------------------|--------------------------------|
| 90.00          | 0.000               | 0.000                    | 0.000                          |
| 91.00          | 0.000               | 0.000                    | 0.000                          |
| 92.00          | 0.000               | 0.000                    | 0.000                          |
| 93.00          | 0.000               | 0.000                    | 0.000                          |
| 94.00          | 0.000               | 0.000                    | 0.000                          |
| 95.00          | 0.000               | 0.000                    | 0.000                          |
| 96.00          | 0.000               | 0.000                    | 0.000                          |
| 97.00          | 0.000               | 0.000                    | 0.000                          |
| 98.00          | 0.000               | 0.000                    | 0.000                          |
| 99.00          | (3)>2.094           | 0.000                    | 2.094                          |
| 100.00         | (5)>4.263           | 0.000                    | 4.263                          |
| 101.00         | (6)>5.033           | 25.483                   | 30.516                         |
| 102.00         | (6)>5.701           | 93.036                   | 98.736                         |
| 103.00         | (6)>6.275           | 200.972                  | 207.246                        |

## Structure #23 (Vegetated Channel)

### EFSP-1 to EFSP-2 Veg Channel

Trapezoidal Vegetated Channel Inputs:

### Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 12.00             | 3.0:1                | 3.0:1                 | 2.1       | D, B               | 2.97                 |                      |                         | 7.0                     |

## Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 54.25 cfs                       |                                | 54.25 cfs                      |                               |
| Depth:                 | 0.88 ft                         | 3.85 ft                        | 1.36 ft                        | 4.33 ft                       |
| Top Width:             | 17.26 ft                        | 35.08 ft                       | 20.18 ft                       | 38.00 ft                      |
| Velocity:              | 4.23 fps                        |                                | 2.47 fps                       |                               |
| X-Section Area:        | 12.81 sq ft                     |                                | 21.93 sq ft                    |                               |
| Hydraulic Radius:      | 0.731 ft                        |                                | 1.063 ft                       |                               |
| Froude Number:         | 0.87                            |                                | 0.42                           |                               |
| Roughness Coefficient: | 0.0413                          |                                | 0.0909                         |                               |

## Structure #22 (Pond)

### *EFSP-1 Stock Pond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 92.00 ft   |
| Initial Pool:      | 0.15 ac-ft |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.50             | 0.0150      | 98.00              | 0.50                      | 0.00                 |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 100.67 ft |
| Dewater Time:   | 1.16 days |

*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) |             |
|-----------|-----------|------------------|-----------------|--------------------|-------------|
| 90.00     | 0.050     | 0.000            | 0.000           |                    |             |
| 91.00     | 0.072     | 0.061            | 0.000           |                    |             |
| 92.00     | 0.098     | 0.145            | 0.000           |                    |             |
| 93.00     | 0.128     | 0.258            | 0.000           |                    |             |
| 94.00     | 0.162     | 0.403            | 0.000           |                    |             |
| 95.00     | 0.200     | 0.583            | 0.000           |                    |             |
| 96.00     | 0.231     | 0.799            | 0.000           |                    |             |
| 97.00     | 0.265     | 1.046            | 0.000           |                    |             |
| 98.00     | 0.301     | 1.329            | 0.000           |                    | Spillway #1 |
| 99.00     | 0.339     | 1.649            | 2.094           | 13.45              |             |
| 100.00    | 0.380     | 2.008            | 4.263           | 4.20               | Spillway #2 |
| 100.67    | 0.519     | 2.320            | 21.867          | 10.10              | Peak Stage  |
| 101.00    | 0.554     | 2.473            | 30.516          |                    |             |

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 102.00    | 0.761        | 3.127               | 98.736             |                          |
| 103.00    | 1.000        | 4.005               | 207.246            |                          |

## Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 90.00             | 0.000                  | 0.000                       | 0.000                                   |
| 91.00             | 0.000                  | 0.000                       | 0.000                                   |
| 92.00             | 0.000                  | 0.000                       | 0.000                                   |
| 93.00             | 0.000                  | 0.000                       | 0.000                                   |
| 94.00             | 0.000                  | 0.000                       | 0.000                                   |
| 95.00             | 0.000                  | 0.000                       | 0.000                                   |
| 96.00             | 0.000                  | 0.000                       | 0.000                                   |
| 97.00             | 0.000                  | 0.000                       | 0.000                                   |
| 98.00             | 0.000                  | 0.000                       | 0.000                                   |
| 99.00             | (3)>2.094              | 0.000                       | 2.094                                   |
| 100.00            | (5)>4.263              | 0.000                       | 4.263                                   |
| 101.00            | (6)>5.033              | 25.483                      | 30.516                                  |
| 102.00            | (6)>5.701              | 93.036                      | 98.736                                  |
| 103.00            | (6)>6.275              | 200.972                     | 207.246                                 |

## Structure #21 (Vegetated Channel)

### East 7800' Terrace Ditch

Triangular Vegetated Channel Inputs:

### Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  | 0.93                    |                         |                               | 7.0                           |

## Vegetated Channel Results:

|                   | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|-------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge: | 11.67 cfs                             |                                      | 11.67 cfs                            |                                     |
| Depth:            | 1.38 ft                               | 2.31 ft                              | 2.04 ft                              | 2.97 ft                             |
| Top Width:        | 6.22 ft                               | 10.40 ft                             | 9.18 ft                              | 13.37 ft                            |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Velocity:              | 2.72 fps                              |                                      | 1.25 fps                             |                                     |
| X-Section Area:        | 4.30 sq ft                            |                                      | 9.36 sq ft                           |                                     |
| Hydraulic Radius:      | 0.631 ft                              |                                      | 0.932 ft                             |                                     |
| Froude Number:         | 0.58                                  |                                      | 0.22                                 |                                     |
| Roughness Coefficient: | 0.0495                                |                                      | 0.1397                               |                                     |

## Structure #20 (Null)

*Null 7800' Terrace Ditch*

## Structure #19 (Vegetated Channel)

*7600' Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  | 1.72                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 1.23 cfs                              |                                      | 1.23 cfs                             |                                     |
| Depth:                 | 0.71 ft                               | 2.43 ft                              | 1.24 ft                              | 2.96 ft                             |
| Top Width:             | 3.21 ft                               | 10.95 ft                             | 5.58 ft                              | 13.32 ft                            |
| Velocity:              | 1.07 fps                              |                                      | 0.36 fps                             |                                     |
| X-Section Area:        | 1.14 sq ft                            |                                      | 3.46 sq ft                           |                                     |
| Hydraulic Radius:      | 0.326 ft                              |                                      | 0.567 ft                             |                                     |
| Froude Number:         | 0.32                                  |                                      | 0.08                                 |                                     |
| Roughness Coefficient: | 0.0804                                |                                      | 0.3516                               |                                     |

## Structure #18 (Null)

*Null 7600' Terrace Ditch*

## Structure #17 (Riprap Channel)

*East Fork Taylor Ditch 0+00 to EFSP-1*

**Trapezoidal Riprap Channel Inputs:**

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 3.0:1                | 3.0:1                 | 25.0      | 3.97                 |                      |                         |

**Riprap Channel Results:**

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 25.00 cfs     |              |
| Depth:            | 0.13 ft       | 4.10 ft      |
| Top Width:        | 12.76 ft      | 36.58 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 1.57 sq ft    |              |
| Hydraulic Radius: | 0.123 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

**Structure #16 (Vegetated Channel)**

**7700' Terrace Ditch**

**Triangular Vegetated Channel Inputs:**

Material: Smooth brome

| Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 1.5:1                | 3.0:1                 | 1.5       | D, B               | 1.54                 |                      |                         | 7.0                     |

**Vegetated Channel Results:**

|                   | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|-------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge: | 2.24 cfs                        |                                | 2.24 cfs                       |                               |
| Depth:            | 0.85 ft                         | 2.39 ft                        | 1.42 ft                        | 2.96 ft                       |
| Top Width:        | 3.83 ft                         | 10.76 ft                       | 6.37 ft                        | 13.30 ft                      |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Velocity:              | 1.38 fps                              |                                      | 0.50 fps                             |                                     |
| X-Section Area:        | 1.63 sq ft                            |                                      | 4.51 sq ft                           |                                     |
| Hydraulic Radius:      | 0.389 ft                              |                                      | 0.647 ft                             |                                     |
| Froude Number:         | 0.37                                  |                                      | 0.10                                 |                                     |
| Roughness Coefficient: | 0.0706                                |                                      | 0.2747                               |                                     |

Structure #15 (Null)

Null 7700' Terrace Ditch

Structure #14 (Vegetated Channel)

West 7800' Terrace Ditch

Triangular Vegetated Channel Inputs:

Material: Smooth brome

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 1.5       | D, B                  | 1.15                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 6.99 cfs                              |                                      | 6.99 cfs                             |                                     |
| Depth:                 | 1.19 ft                               | 2.34 ft                              | 1.82 ft                              | 2.97 ft                             |
| Top Width:             | 5.35 ft                               | 10.53 ft                             | 8.19 ft                              | 13.37 ft                            |
| Velocity:              | 2.20 fps                              |                                      | 0.94 fps                             |                                     |
| X-Section Area:        | 3.18 sq ft                            |                                      | 7.46 sq ft                           |                                     |
| Hydraulic Radius:      | 0.543 ft                              |                                      | 0.832 ft                             |                                     |
| Froude Number:         | 0.50                                  |                                      | 0.17                                 |                                     |
| Roughness Coefficient: | 0.0552                                |                                      | 0.1724                               |                                     |

Structure #13 (Null)

Null Confluence West 7800' Terrace Ditch

Structure #10 (Vegetated Channel)

Trib 1



**Trapezoidal Vegetated Channel Inputs:**

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 5.0       | D, B               | 2.15                 |                      |                         | 7.0                     |

**Vegetated Channel Results:**

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 30.87 cfs                             |                                      | 30.87 cfs                            |                                     |
| Depth:                 | 0.71 ft                               | 2.86 ft                              | 1.11 ft                              | 3.26 ft                             |
| Top Width:             | 10.27 ft                              | 23.17 ft                             | 12.67 ft                             | 25.57 ft                            |
| Velocity:              | 5.33 fps                              |                                      | 2.98 fps                             |                                     |
| X-Section Area:        | 5.79 sq ft                            |                                      | 10.37 sq ft                          |                                     |
| Hydraulic Radius:      | 0.552 ft                              |                                      | 0.796 ft                             |                                     |
| Froude Number:         | 1.25                                  |                                      | 0.58                                 |                                     |
| Roughness Coefficient: | 0.0419                                |                                      | 0.0960                               |                                     |

Structure #9 (Null)

*Null Confluence Trib 1*

Structure #27 (Vegetated Channel)

*Trib 2*

**Trapezoidal Vegetated Channel Inputs:**

Material: Smooth brome

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 6.00              | 3.0:1                | 3.0:1                 | 11.0      | D, B               | 2.48                 |                      |                         | 5.0                     |

**Vegetated Channel Results:**

|                   | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|-------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge: | 20.26 cfs                             |                                      | 20.26 cfs                            |                                     |
| Depth:            | 0.47 ft                               | 2.95 ft                              | 0.77 ft                              | 3.25 ft                             |
| Top Width:        | 8.83 ft                               | 23.71 ft                             | 10.61 ft                             | 25.49 ft                            |
| Velocity:         | 5.79 fps                              |                                      | 3.18 fps                             |                                     |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| X-Section Area:        | 3.50 sq ft                            |                                      | 6.38 sq ft                           |                                     |
| Hydraulic Radius:      | 0.390 ft                              |                                      | 0.587 ft                             |                                     |
| Froude Number:         | 1.62                                  |                                      | 0.72                                 |                                     |
| Roughness Coefficient: | 0.0455                                |                                      | 0.1089                               |                                     |

Structure #26 (Null)

Null Confluence Trib 2

Structure #8 (Vegetated Channel)

WFSP-2 to Station 85+00

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 10.2      | D, B                  | 3.35                    |                         |                               | 6.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 68.97 cfs                             |                                      | 68.97 cfs                            |                                     |
| Depth:                 | 0.60 ft                               | 3.95 ft                              | 0.89 ft                              | 4.24 ft                             |
| Top Width:             | 15.61 ft                              | 35.71 ft                             | 17.35 ft                             | 37.45 ft                            |
| Velocity:              | 8.31 fps                              |                                      | 5.28 fps                             |                                     |
| X-Section Area:        | 8.30 sq ft                            |                                      | 13.07 sq ft                          |                                     |
| Hydraulic Radius:      | 0.525 ft                              |                                      | 0.741 ft                             |                                     |
| Froude Number:         | 2.01                                  |                                      | 1.07                                 |                                     |
| Roughness Coefficient: | 0.0372                                |                                      | 0.0738                               |                                     |

Structure #7 (Pond)

WFSP-2 Stockpond

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 91.00 ft   |
| Initial Pool:      | 0.06 ac-ft |

Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 5.00              |

## Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.00             | 0.0150      | 98.00              | 0.90                      | 0.00                 |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 101.15 ft |
| Dewater Time:   | 0.98 days |

*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) |             |
|-----------|-----------|------------------|-----------------|--------------------|-------------|
| 90.00     | 0.050     | 0.000            | 0.000           |                    |             |
| 91.00     | 0.072     | 0.061            | 0.000           |                    |             |
| 92.00     | 0.098     | 0.145            | 0.000           |                    |             |
| 93.00     | 0.128     | 0.258            | 0.000           |                    |             |
| 94.00     | 0.162     | 0.403            | 0.000           |                    |             |
| 95.00     | 0.200     | 0.583            | 0.000           |                    |             |
| 96.00     | 0.231     | 0.799            | 0.000           |                    |             |
| 97.00     | 0.265     | 1.046            | 0.000           |                    |             |
| 98.00     | 0.301     | 1.329            | 0.000           |                    | Spillway #2 |
| 99.00     | 0.339     | 1.649            | 2.094           | 11.15              |             |
| 100.00    | 0.380     | 2.008            | 3.745           | 6.75               | Spillway #1 |
| 101.00    | 0.554     | 2.473            | 18.584          | 5.35               |             |
| 101.15    | 0.599     | 2.570            | 24.954          | 0.35               | Peak Stage  |
| 102.00    | 0.761     | 3.127            | 61.251          |                    |             |
| 103.00    | 1.000     | 4.005            | 135.506         |                    |             |

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 90.00             | 0.000                       | 0.000                  | 0.000                                   |
| 91.00             | 0.000                       | 0.000                  | 0.000                                   |
| 92.00             | 0.000                       | 0.000                  | 0.000                                   |
| 93.00             | 0.000                       | 0.000                  | 0.000                                   |
| 94.00             | 0.000                       | 0.000                  | 0.000                                   |
| 95.00             | 0.000                       | 0.000                  | 0.000                                   |
| 96.00             | 0.000                       | 0.000                  | 0.000                                   |
| 97.00             | 0.000                       | 0.000                  | 0.000                                   |
| 98.00             | 0.000                       | 0.000                  | 0.000                                   |
| 99.00             | 0.000                       | (3)>2.094              | 2.094                                   |
| 100.00            | 0.000                       | (6)>3.745              | 3.745                                   |
| 101.00            | 14.046                      | (6)>4.538              | 18.584                                  |
| 102.00            | 56.062                      | (6)>5.189              | 61.251                                  |
| 103.00            | 129.713                     | (6)>5.793              | 135.506                                 |

## Structure #6 (Vegetated Channel)

### Channel WFSP-1 to WFSP-2

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 1.3       | D, B                  | 2.69                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 71.02 cfs                             |                                      | 71.02 cfs                            |                                     |
| Depth:                 | 1.13 ft                               | 3.82 ft                              | 1.72 ft                              | 4.41 ft                             |
| Top Width:             | 18.79 ft                              | 34.93 ft                             | 22.30 ft                             | 38.44 ft                            |
| Velocity:              | 4.08 fps                              |                                      | 2.41 fps                             |                                     |
| X-Section Area:        | 17.41 sq ft                           |                                      | 29.43 sq ft                          |                                     |
| Hydraulic Radius:      | 0.909 ft                              |                                      | 1.288 ft                             |                                     |
| Froude Number:         | 0.75                                  |                                      | 0.37                                 |                                     |
| Roughness Coefficient: | 0.0391                                |                                      | 0.0832                               |                                     |

## Structure #5 (Pond)

## WFSP-1 Stock Pond

### Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 91.00 ft   |
| Initial Pool:      | 0.06 ac-ft |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 1.50             | 0.0150      | 98.00              | 0.90                      | 0.00                 |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 100.00        | 20.00             | 2.00:1         | 2.00:1          | 10.00             |

### Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 101.20 ft |
| Dewater Time:   | 1.16 days |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 90.00     | 0.050     | 0.000            | 0.000           |                    |
| 91.00     | 0.072     | 0.061            | 0.000           |                    |
| 92.00     | 0.098     | 0.145            | 0.000           |                    |
| 93.00     | 0.128     | 0.258            | 0.000           |                    |
| 94.00     | 0.162     | 0.403            | 0.000           |                    |
| 95.00     | 0.200     | 0.583            | 0.000           |                    |
| 96.00     | 0.231     | 0.799            | 0.000           |                    |
| 97.00     | 0.265     | 1.046            | 0.000           |                    |
| 98.00     | 0.301     | 1.329            | 0.000           | Spillway #1        |
| 99.00     | 0.339     | 1.649            | 2.094           | 13.40              |
| 100.00    | 0.380     | 2.008            | 4.162           | 2.75 Spillway #2   |
| 101.00    | 0.554     | 2.473            | 30.351          | 11.35              |
| 101.20    | 0.608     | 2.601            | 43.706          | 0.40 Peak Stage    |
| 102.00    | 0.761     | 3.127            | 98.545          |                    |
| 103.00    | 1.000     | 4.005            | 207.032         |                    |

### Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 90.00             | 0.000                  | 0.000                       | 0.000                                   |
| 91.00             | 0.000                  | 0.000                       | 0.000                                   |
| 92.00             | 0.000                  | 0.000                       | 0.000                                   |
| 93.00             | 0.000                  | 0.000                       | 0.000                                   |
| 94.00             | 0.000                  | 0.000                       | 0.000                                   |
| 95.00             | 0.000                  | 0.000                       | 0.000                                   |
| 96.00             | 0.000                  | 0.000                       | 0.000                                   |
| 97.00             | 0.000                  | 0.000                       | 0.000                                   |
| 98.00             | 0.000                  | 0.000                       | 0.000                                   |
| 99.00             | (3)>2.094              | 0.000                       | 2.094                                   |
| 100.00            | (6)>4.162              | 0.000                       | 4.162                                   |
| 101.00            | (6)>4.868              | 25.483                      | 30.351                                  |
| 102.00            | (6)>5.509              | 93.036                      | 98.545                                  |
| 103.00            | (6)>6.061              | 200.972                     | 207.032                                 |

### Structure #4 (Riprap Channel)

*0+00 to WFSP-1 West Fork Taylor Ditch*

Trapezoidal Riprap Channel Inputs:

### Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 12.00                | 3.0:1                      | 3.0:1                       | 26.0      | 3.98                    |                         |                               |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 46.17 cfs     |              |
| Depth:            | 0.20 ft       | 4.18 ft      |
| Top Width:        | 13.21 ft      | 37.09 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 2.55 sq ft    |              |
| Hydraulic Radius: | 0.192 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 4.00 in       |              |

|       | w/o Freeboard | w/ Freeboard |
|-------|---------------|--------------|
| D50:  | 12.00 in      |              |
| Dmax: | 15.00 in      |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #3 (Null)

*Null Above West Taylor Pond*

## Structure #2 (Pond)

*West Taylor Pond*

Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,468.00 ft |
| Initial Pool:      | 1.77 ac-ft  |

### Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 10.50             | 18.00                | 150.00             | 2.00             | 0.0150      | 7,471.00           | 2                        |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 7,475.00      | 30.00             | 2.00:1         | 2.00:1          | 30.00             |

Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 7,475.49 ft |
| Dewater Time:   | 1.82 days   |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 7,455.00  | 0.022     | 0.000            | 0.000           |                    |
| 7,456.00  | 0.032     | 0.027            | 0.000           |                    |
| 7,457.00  | 0.043     | 0.064            | 0.000           |                    |
| 7,458.00  | 0.054     | 0.113            | 0.000           |                    |
| 7,459.00  | 0.066     | 0.173            | 0.000           |                    |

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 7,460.00  | 0.079        | 0.245               | 0.000              |                          |
| 7,461.00  | 0.103        | 0.336               | 0.000              |                          |
| 7,462.00  | 0.139        | 0.456               | 0.000              |                          |
| 7,463.00  | 0.162        | 0.607               | 0.000              |                          |
| 7,464.00  | 0.188        | 0.781               | 0.000              |                          |
| 7,465.00  | 0.213        | 0.981               | 0.000              |                          |
| 7,466.00  | 0.244        | 1.209               | 0.000              |                          |
| 7,467.00  | 0.279        | 1.470               | 0.000              |                          |
| 7,468.00  | 0.312        | 1.766               | 0.000              | Low hole SPW #1          |
| 7,469.00  | 0.360        | 2.102               | 0.473              | 8.60*                    |
| 7,470.00  | 0.389        | 2.476               | 0.669              | 8.05                     |
| 7,471.00  | 0.430        | 2.886               | 0.819              | 8.20 Spillway #1         |
| 7,472.00  | 0.463        | 3.332               | 8.509              | 6.15                     |
| 7,473.00  | 0.503        | 3.814               | 12.033             | 3.40                     |
| 7,474.00  | 0.541        | 4.336               | 14.738             | 2.40                     |
| 7,475.00  | 0.580        | 4.897               | 17.018             | 3.25 Spillway #2         |
| 7,475.49  | 0.571        | 5.183               | 49.990             | 3.65 Peak Stage          |
| 7,476.00  | 0.581        | 5.477               | 83.791             |                          |
| 7,477.00  | 0.582        | 6.058               | 246.034            |                          |
| 7,478.00  | 0.583        | 6.641               | 483.806            |                          |
| 7,479.00  | 0.584        | 7.224               | 794.453            |                          |
| 7,480.00  | 0.585        | 7.809               | 1,172.300          |                          |

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

## Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,455.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,456.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,457.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,458.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,459.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,460.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,461.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,462.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,463.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,464.00          | 0.000             | 0.000                       | 0.000                                   |



| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,465.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,466.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,467.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,468.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 7,469.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,470.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,471.00          | 0.819             | 0.000                       | 0.819                                   |
| 7,472.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,473.00          | 12.033            | 0.000                       | 12.033                                  |
| 7,474.00          | 14.738            | 0.000                       | 14.738                                  |
| 7,475.00          | 17.018            | 0.000                       | 17.018                                  |
| 7,476.00          | 19.026            | 64.765                      | 83.791                                  |
| 7,477.00          | 20.842            | 225.191                     | 246.034                                 |
| 7,478.00          | 22.512            | 461.294                     | 483.806                                 |
| 7,479.00          | 24.066            | 770.387                     | 794.453                                 |
| 7,480.00          | 25.526            | 1,146.774                   | 1,172.300                               |

Structure #1 (Null)

*Null Below West Taylor Pond*

### 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) |
|--------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #37    | 1        | 25.600         | 0.224              | 0.000        | 0.000  | 62.000       | M   | 3.19                 | 0.490                 |
|        | $\Sigma$ | <b>25.600</b>  |                    |              |        |              |     | <b>3.19</b>          | <b>0.490</b>          |
| #36    | $\Sigma$ | <b>25.600</b>  |                    |              |        |              |     | <b>3.19</b>          | <b>0.490</b>          |
| #35    | 1        | 6.600          | 0.042              | 0.000        | 0.000  | 62.000       | M   | 2.03                 | 0.157                 |
|        | $\Sigma$ | <b>6.600</b>   |                    |              |        |              |     | <b>2.03</b>          | <b>0.157</b>          |
| #34    | $\Sigma$ | <b>6.600</b>   |                    |              |        |              |     | <b>2.03</b>          | <b>0.157</b>          |
| #33    | 1        | 14.000         | 0.059              | 0.000        | 0.000  | 62.000       | M   | 4.30                 | 0.333                 |
|        | $\Sigma$ | <b>14.000</b>  |                    |              |        |              |     | <b>4.30</b>          | <b>0.333</b>          |
| #32    | $\Sigma$ | <b>14.000</b>  |                    |              |        |              |     | <b>4.30</b>          | <b>0.333</b>          |
| #31    | 1        | 23.800         | 0.253              | 0.000        | 0.000  | 62.000       | M   | 2.81                 | 0.455                 |
|        | $\Sigma$ | <b>23.800</b>  |                    |              |        |              |     | <b>2.81</b>          | <b>0.455</b>          |
| #30    | $\Sigma$ | <b>23.800</b>  |                    |              |        |              |     | <b>2.81</b>          | <b>0.455</b>          |
| #29    | 1        | 10.700         | 0.050              | 0.000        | 0.000  | 80.000       | F   | 12.23                | 0.917                 |
|        | 2        | 14.900         | 0.094              | 0.000        | 0.000  | 62.000       | M   | 4.57                 | 0.354                 |
|        | $\Sigma$ | <b>25.600</b>  |                    |              |        |              |     | <b>16.81</b>         | <b>1.271</b>          |
| #28    | $\Sigma$ | <b>25.600</b>  |                    |              |        |              |     | <b>16.81</b>         | <b>1.271</b>          |
| #25    | 1        | 144.700        | 0.644              | 0.000        | 0.000  | 62.000       | M   | 10.10                | 2.747                 |
|        | $\Sigma$ | <b>240.300</b> |                    |              |        |              |     | <b>26.15</b>         | <b>5.453</b>          |
| #24    | $\Sigma$ | <b>240.300</b> |                    |              |        |              |     | <b>26.15</b>         | <b>5.453</b>          |
| #23    | 1        | 70.600         | 0.365              | 0.000        | 0.000  | 80.000       | F   | 53.79                | 5.705                 |
|        | 2        | 2.500          | 0.021              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 3        | 6.800          | 0.053              | 0.000        | 0.000  | 62.000       | M   | 2.09                 | 0.162                 |
|        | $\Sigma$ | <b>320.200</b> |                    |              |        |              |     | <b>54.25</b>         | <b>10.134</b>         |
| #22    | $\Sigma$ | <b>320.200</b> |                    |              |        |              |     | <b>54.25</b>         | <b>10.134</b>         |
| #21    | 1        | 3.000          | 0.006              | 0.000        | 0.000  | 62.000       | M   | 0.92                 | 0.071                 |
|        | 2        | 9.400          | 0.036              | 0.000        | 0.000  | 80.000       | F   | 10.75                | 0.806                 |
|        | $\Sigma$ | <b>12.400</b>  |                    |              |        |              |     | <b>11.67</b>         | <b>0.877</b>          |
| #20    | $\Sigma$ | <b>12.400</b>  |                    |              |        |              |     | <b>11.67</b>         | <b>0.877</b>          |
| #19    | 1        | 4.000          | 0.016              | 0.000        | 0.000  | 62.000       | M   | 1.23                 | 0.095                 |

| Stru # | SWS #    | SWS Area (ac) | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|--------|----------|---------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
|        | $\Sigma$ | 4.000         |                    |              |        |              |     | 1.23                 | 0.095                 |
| #18    | $\Sigma$ | 4.000         |                    |              |        |              |     | 1.23                 | 0.095                 |
| #17    | 1        | 1.100         | 0.011              | 0.000        | 0.000  | 80.000       | M   | 1.26                 | 0.094                 |
|        | 2        | 21.500        | 0.090              | 0.000        | 0.000  | 47.000       | S   | 0.05                 | 0.030                 |
|        | 3        | 0.600         | 0.012              | 0.000        | 0.000  | 62.000       | M   | 0.18                 | 0.010                 |
|        | 4        | 0.600         | 0.010              | 0.000        | 0.000  | 62.000       | M   | 0.18                 | 0.010                 |
|        | 5        | 0.900         | 0.013              | 0.000        | 0.000  | 62.000       | M   | 0.28                 | 0.020                 |
|        | $\Sigma$ | 361.300       |                    |              |        |              |     | 25.00                | 10.086                |
| #16    | 1        | 7.300         | 0.015              | 0.000        | 0.000  | 62.000       | M   | 2.24                 | 0.174                 |
|        | $\Sigma$ | 7.300         |                    |              |        |              |     | 2.24                 | 0.174                 |
| #15    | $\Sigma$ | 7.300         |                    |              |        |              |     | 2.24                 | 0.174                 |
| #14    | 1        | 1.900         | 0.008              | 0.000        | 0.000  | 62.000       | M   | 0.58                 | 0.045                 |
|        | 2        | 5.600         | 0.043              | 0.000        | 0.000  | 80.000       | F   | 6.40                 | 0.480                 |
|        | $\Sigma$ | 7.500         |                    |              |        |              |     | 6.99                 | 0.525                 |
| #13    | $\Sigma$ | 7.500         |                    |              |        |              |     | 6.99                 | 0.525                 |
| #10    | 1        | 35.700        | 0.252              | 0.000        | 0.000  | 80.000       | F   | 30.87                | 2.917                 |
|        | 2        | 98.000        | 0.045              | 0.000        | 0.000  | 47.000       | S   | 0.24                 | 0.137                 |
|        | $\Sigma$ | 133.700       |                    |              |        |              |     | 30.87                | 3.054                 |
| #9     | $\Sigma$ | 133.700       |                    |              |        |              |     | 30.87                | 3.054                 |
| #27    | 1        | 76.400        | 0.290              | 0.000        | 0.000  | 62.000       | M   | 8.40                 | 1.453                 |
|        | 2        | 13.900        | 0.136              | 0.000        | 0.000  | 80.000       | F   | 13.15                | 1.149                 |
|        | $\Sigma$ | 90.300        |                    |              |        |              |     | 20.26                | 2.603                 |
| #26    | $\Sigma$ | 90.300        |                    |              |        |              |     | 20.26                | 2.603                 |
| #8     | 1        | 52.200        | 0.229              | 0.000        | 0.000  | 80.000       | F   | 46.24                | 4.258                 |
|        | 2        | 30.900        | 0.122              | 0.000        | 0.000  | 62.000       | M   | 9.49                 | 0.735                 |
|        | 3        | 23.500        | 0.089              | 0.000        | 0.000  | 47.000       | S   | 0.06                 | 0.033                 |
|        | 4        | 4.000         | 0.218              | 0.000        | 0.000  | 62.000       | M   | 0.50                 | 0.076                 |
|        | $\Sigma$ | 200.900       |                    |              |        |              |     | 68.97                | 7.704                 |
| #7     | $\Sigma$ | 200.900       |                    |              |        |              |     | 68.97                | 7.704                 |
| #6     | 1        | 43.000        | 0.095              | 0.000        | 0.000  | 47.000       | S   | 0.10                 | 0.060                 |
|        | 2        | 39.900        | 0.161              | 0.000        | 0.000  | 80.000       | F   | 37.75                | 3.299                 |
|        | 3        | 0.400         | 0.015              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 4        | 1.600         | 0.020              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 5        | 1.200         | 0.021              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |

| Stru # | SWS #    | SWS Area (ac) | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|--------|----------|---------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
|        | $\Sigma$ | 420.700       |                    |              |        |              |     | 71.02                | 12.848                |
| #5     | $\Sigma$ | 420.700       |                    |              |        |              |     | 71.02                | 12.848                |
| #4     | 1        | 1.000         | 0.007              | 0.000        | 0.000  | 80.000       | M   | 1.14                 | 0.086                 |
|        | 2        | 2.800         | 0.019              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 3        | 0.900         | 0.010              | 0.000        | 0.000  | 62.000       | M   | 0.28                 | 0.020                 |
|        | 4        | 23.300        | 0.094              | 0.000        | 0.000  | 47.000       | S   | 0.06                 | 0.032                 |
|        | 5        | 1.000         | 0.020              | 0.000        | 0.000  | 62.000       | M   | 0.31                 | 0.024                 |
|        | $\Sigma$ | 464.500       |                    |              |        |              |     | 46.17                | 12.438                |
| #3     | $\Sigma$ | 825.800       |                    |              |        |              |     | 71.16                | 22.524                |
| #2     | 1        | 10.500        | 0.051              | 0.000        | 0.000  | 47.000       | S   | 0.03                 | 0.014                 |
|        | 2        | 17.100        | 0.058              | 0.000        | 0.000  | 47.000       | S   | 0.04                 | 0.024                 |
|        | $\Sigma$ | 853.400       |                    |              |        |              |     | 71.16                | 22.562                |
| #1     | $\Sigma$ | 853.400       |                    |              |        |              |     | 49.99                | 22.291                |

## Subwatershed Time of Concentration Details:

| Stru # | SWS # | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|--------|-------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #2     | 1     | 3. Short grass pasture                                | 45.00     | 443.25           | 985.00            | 5.360          | 0.051        |
| #2     | 1     | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.051</b> |
| #2     | 2     | 3. Short grass pasture                                | 40.00     | 425.60           | 1,064.00          | 5.050          | 0.058        |
| #2     | 2     | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.058</b> |
| #4     | 1     | 5. Nearly bare and untilled, and alluvial valley fans | 16.00     | 100.80           | 630.00            | 4.000          | 0.043        |
| #4     | 1     | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.007</b> |
| #4     | 2     | 5. Nearly bare and untilled, and alluvial valley fans | 33.00     | 50.16            | 152.00            | 5.740          | 0.007        |
| #4     | 2     | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.019</b> |
| #4     | 3     | 3. Short grass pasture                                | 20.00     | 50.00            | 250.00            | 3.570          | 0.019        |
| #4     | 3     | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.010</b> |
| #4     | 4     | 3. Short grass pasture                                | 19.00     | 24.70            | 130.00            | 3.480          | 0.010        |
| #4     | 4     | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.094</b> |
| #4     | 5     | 3. Short grass pasture                                | 31.00     | 101.37           | 327.00            | 4.450          | 0.020        |
| #4     | 5     | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.020</b> |
| #6     | 1     | 3. Short grass pasture                                | 14.60     | 75.01            | 513.76            | 3.050          | 0.046        |
|        |       | 8. Large gullies, diversions, and low flowing streams | 1.50      | 5.67             | 378.00            | 3.670          | 0.028        |
| #6     | 1     | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.095</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #6         | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 8.00      | 131.03           | 1,638.00          | 2.820          | 0.161        |
| <b>#6</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.161</b> |
| #6         | 3        | 3. Short grass pasture                                | 15.00     | 25.35            | 169.00            | 3.090          | 0.015        |
| <b>#6</b>  | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.015</b> |
| #6         | 4        | 3. Short grass pasture                                | 12.00     | 24.24            | 202.00            | 2.770          | 0.020        |
| <b>#6</b>  | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.020</b> |
| #6         | 5        | 3. Short grass pasture                                | 12.00     | 25.20            | 210.00            | 2.770          | 0.021        |
| <b>#6</b>  | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #8         | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 9.00      | 222.84           | 2,476.00          | 3.000          | 0.229        |
| <b>#8</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.229</b> |
| #8         | 2        | 3. Short grass pasture                                | 18.00     | 269.82           | 1,499.00          | 3.390          | 0.122        |
| <b>#8</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.122</b> |
| #8         | 3        | 3. Short grass pasture                                | 24.00     | 303.35           | 1,264.00          | 3.910          | 0.089        |
| <b>#8</b>  | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.089</b> |
| #8         | 4        | 3. Short grass pasture                                | 1.00      | 6.30             | 630.00            | 0.800          | 0.218        |
| <b>#8</b>  | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.218</b> |
| #10        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 8.00      | 204.96           | 2,562.00          | 2.820          | 0.252        |
| <b>#10</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.252</b> |
| #10        | 2        | 3. Short grass pasture                                | 35.00     | 272.29           | 778.00            | 4.730          | 0.045        |
| <b>#10</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.045</b> |
| #14        | 1        | 3. Short grass pasture                                | 30.00     | 40.80            | 135.99            | 4.380          | 0.008        |
| <b>#14</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.008</b> |
| #14        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 16.00     | 100.80           | 630.00            | 4.000          | 0.043        |
| <b>#14</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.043</b> |
| #16        | 1        | 3. Short grass pasture                                | 30.00     | 73.50            | 244.99            | 4.380          | 0.015        |
| <b>#16</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.015</b> |
| #17        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 25.00     | 50.25            | 201.00            | 5.000          | 0.011        |
| <b>#17</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.011</b> |
| #17        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 24.80     | 49.60            | 200.00            | 4.970          | 0.011        |
| <b>#17</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.090</b> |
| #17        | 3        | 3. Short grass pasture                                | 27.00     | 49.41            | 183.00            | 4.150          | 0.012        |
| <b>#17</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.012</b> |
| #17        | 4        | 3. Short grass pasture                                | 30.00     | 50.40            | 168.00            | 4.380          | 0.010        |
| <b>#17</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.010</b> |
| #17        | 5        | 3. Short grass pasture                                | 33.00     | 74.25            | 225.00            | 4.590          | 0.013        |
| <b>#17</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.013</b> |
| #19        | 1        | 3. Short grass pasture                                | 30.00     | 78.00            | 260.00            | 4.380          | 0.016        |
| <b>#19</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.016</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #21        | 1        | 3. Short grass pasture                                | 26.00     | 24.70            | 95.00             | 4.070          | 0.006        |
| <b>#21</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.006</b> |
| #21        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 18.00     | 101.34           | 563.00            | 4.240          | 0.036        |
| <b>#21</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.036</b> |
| #23        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 6.00      | 192.78           | 3,213.00          | 2.440          | 0.365        |
| <b>#23</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.365</b> |
| #23        | 2        | 3. Short grass pasture                                | 19.00     | 50.35            | 265.00            | 3.480          | 0.021        |
| <b>#23</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #23        | 3        | 3. Short grass pasture                                | 19.00     | 127.68           | 672.00            | 3.480          | 0.053        |
| <b>#23</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.053</b> |
| #25        | 1        | 3. Short grass pasture                                | 4.00      | 148.44           | 3,711.00          | 1.600          | 0.644        |
| <b>#25</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.644</b> |
| #27        | 1        | 3. Short grass pasture                                | 14.00     | 438.34           | 3,131.00          | 2.990          | 0.290        |
| <b>#27</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.290</b> |
| #27        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 11.00     | 179.52           | 1,632.00          | 3.310          | 0.136        |
| <b>#27</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.136</b> |
| #29        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 12.00     | 74.87            | 624.00            | 3.460          | 0.050        |
| <b>#29</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.050</b> |
| #29        | 2        | 3. Short grass pasture                                | 11.00     | 98.78            | 898.00            | 2.650          | 0.094        |
| <b>#29</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.094</b> |
| #31        | 1        | 3. Short grass pasture                                | 6.00      | 106.98           | 1,783.00          | 1.950          | 0.253        |
| <b>#31</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.253</b> |
| #33        | 1        | 3. Short grass pasture                                | 15.00     | 98.85            | 659.00            | 3.090          | 0.059        |
| <b>#33</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.059</b> |
| #35        | 1        | 3. Short grass pasture                                | 19.00     | 100.32           | 528.00            | 3.480          | 0.042        |
| <b>#35</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.042</b> |
| #37        | 1        | 3. Short grass pasture                                | 10.00     | 203.40           | 2,034.00          | 2.520          | 0.224        |
| <b>#37</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.224</b> |

## **EXHIBIT 7, ITEM 23, PART I**

### **Section 25 Pond Sediment Control Post Mining**

#### **Introduction**

Exhibit 7, Item 14 in Volume 2D describes the hydrologic methodology used in sediment pond, permanent post-mine channels, and temporary conveyance channel demonstrations. Runoff curve numbers assigned to the undisturbed and/or reclaimed lands in various stages of reclamation have been selected in accordance with Table 1 in the Introductory Text for Exhibit 7 in Volume 2D and are directly tied to Colowyo's reclamation procedures and timing presented on Map 29B as required by Rule 4.05.6(3)(a). For channels protected by a riprap liner, selection of minimum riprap size is done using the Simons/OSM method in SEDCAD<sup>TM</sup>. For channels to be protected by a vegetative liner, the permissible velocities are also determined using SEDCAD<sup>TM</sup> routines.

SEDCAD<sup>TM</sup> demonstrations with two distinct time frames have been evaluated in detail for the Section 25 Pond. Exhibit 7, Item 23, Parts B addresses sediment control for the Section 25 Pond during the mining timeframe. Exhibit 7, Item 23, Part B also contain the design criteria for all temporary channels used to route surface runoff to the sediment pond, except for the temporary D-5 and D-7 Ditches which will be constructed during reclamation activities. The design criteria for the D-5 and D-7 Ditches are contained below.

This exhibit (Exhibit 7, Item 23, Part I) address sediment control during the post mining timeframe for the Section 25 Pond and provides the design criteria for the post mine channel configurations, the temporary ditch, and terrace ditches. The temporary conveyance channel will be retained until Phase II bond release has been achieved in the entire watershed reporting to particular pond the temporary channel is supporting.

Colowyo has several types of mining disturbances shown in this demonstration and in the larger mining permit. The disturbance limit shown on maps and figures (a greenish colored boundary on maps) is the permitted disturbance limit. This is the disturbance limit that could potentially be disturbed but may not depending on mine plans and a reclamation bond has not been posted to date to disturb to this limit. Volume 20, Exhibit 13C provides the cumulative bond schedule disturbance limits. These disturbance limits are areas that Colowyo has permitted for disturbance and posted a reclamation bond to disturbed. However, given Colowyo's current mine plans it may not have disturbed the entire area shown in Exhibit 13C. The disturbance or reclaimed areas shown in this hydrology demonstration for the Section 25 Pond are actual disturbance to date with planned future disturbances. Current mining plans do not anticipate any further ground disturbances beyond these areas, especially north of the temporary out of pit spoil pile (Map 29C), and on the west and end sides of the Collom Pit. Should mine plan changes occur, and additional disturbance is necessary, it will be permitted and bonded for accordingly, and this hydrology demonstration for the Section 25 Pond will be reevaluated prior to implementation of ground disturbance activities in the Section 25 Pond watershed.

#### **Section 25 Pond – Post Mining**

The location of the Section 25 Pond and its watershed is presented on Map 41B. The profiles of the associated permanent channels associated with the Section 25 Pond watershed are presented

on Map 33C. The temporary channels that route water to the Section 25 Pond are presented on 41B. Eight post mine channels will be constructed in the Section 25 watershed. In the 10-Year 24-Hour and 25-Year 24-Hour modeled events, Lower and Middle Bobcat Draw are not included as they will be reconstructed within the footprints of the Middle and Section 36 Ponds respectively when both are reclaimed. A separate hydrology model demonstration is included for the post mine channel design and is discussion later in this exhibit.

The as-built configuration for the Middle Pond is presented on Figure 7-23I-1, the as-built configuration for the Section 36 Pond is presented on Figure 7-23I-2, the as-built configuration for the Section 25 Pond is presented on Figure 7-23I-3, and the as-built configuration for the Coal Stockpile Pond is presented in Exhibit 7, Item 23 Part M, Figure 7-26M-1. Figure 7-23I-4 provides the breakdown of drainage areas and hydrologic conditions for all areas in the watershed reporting to these four sediment ponds. The Middle and Section 36 Ponds are part of the Section 25 Pond sediment control system and are utilized to reduced peak flows and provide additional sediment storage if need. All discharges from the Middle and Section 36 Ponds flow directly to the Section 25 Pond through a natural channel, and the Section 25 Pond is the final discharge location.

The following pages present the results of the SEDCAD<sup>TM</sup> models for the post mining condition. At this stage all areas that have been disturbed by mining activities in the Section 25 watershed has been reclaimed with the newest or younger (topsoil and seeded) reclamation near the northern eastern reaches of the Upper Bobcat Draw. The northern portion of the watershed is relatively undisturbed.

The SEDCAD<sup>TM</sup> model herein provides the results of the 10-year 24-hour design storm and demonstrates the Section 25 Pond will meet the applicable settleable solids standard under this modeled storm event. The second SEDCAD<sup>TM</sup> model demonstrates that the Section 25 Pond emergency spillway elevation is capable of containing the 25-year 24-hour storm.

In summary, for the post mining case at the Section 25 Pond, the 10-year 24-hour storm produces 9.5 acre feet of runoff, and the peak settleable solids concentration is 0.00 ml/l. The 25-year 24-hour storm event peaks at the 6,875.07 elevation, which is right at the emergency spillway elevation of 6,875.0'

### **Permanent Post Mine Channels**

The Section 25 Pond watershed is comprised of eight post-mining channels which are Little Collom Gulch, Sage Draw, Dusky Draw, Grouse Draw, Sharpie Draw, Lower, Middle, and Upper Bobcat Draws respectively. The locations of these post mine channels are presented on Map 41B and Figure 7-23I-5, and the channel profiles are presented on Map 33C.

#### **Little Collom Gulch**

The area contributory to Little Collom Gulch is greater than one square mile, and the lower portion of the channel passes over a permanent valley fill; therefore, the modeled storm event required by rule is the 100-year 24-hour event. The entire length of Little Collom Gulch will be riprap lined. Four stock ponds LCG-1, LGC-2, LCG-3, and LCG-4 will be constructed inline in the channel to



reduce peak flows from larger storm events and provide a water source to support the post mine land use.

A SEDCAD™ model (100 Year 24 Hour Channel Demonstration) has been included which evaluates the peak flow for each of the channel. The minimum channel configurations for Little Collom Gulch are summarized below.

#### **Little Collom Gulch**

| <u>Station</u>                        | <u>Peak Flow<br/>(CFS)</u> | <u>Average<br/>Slope (%)</u> | <u>Channel<br/>Type</u>   | <u>Side<br/>Slopes</u> | <u>Minimum<br/>Depth<br/>(Feet)</u> | <u>Erosion<br/>Protection</u> |
|---------------------------------------|----------------------------|------------------------------|---------------------------|------------------------|-------------------------------------|-------------------------------|
| Station 0+00<br>to 10+00<br>(LCG-1)   | 41.51                      | 16.6                         | Trapezoidal<br>15' bottom | 3H:1V                  | 4.0                                 | Riprap,<br>D50 = 9"           |
| Station 10+00<br>to 25+00<br>(LCG-2)  | 55.67                      | 4.9                          | Trapezoidal<br>10' bottom | 3H:1V                  | 4.0                                 | Riprap,<br>D50 = 9"           |
| Station 25+00<br>to 55+00<br>(LCG-3)  | 81.69                      | 4.7                          | Trapezoidal<br>12' bottom | 3H:1V                  | 4.0                                 | Riprap,<br>D50 = 9"           |
| Station 55+00<br>to 85+00<br>(LCG-4)  | 37.30                      | 7.8                          | Trapezoidal<br>10' bottom | 3H:1V                  | 4.0                                 | Riprap,<br>D50 = 6"           |
| Station 85+00<br>(LCG-4) to<br>100+00 | 40.52                      | 7.4                          | Trapezoidal<br>10' bottom | 3H:1V                  | 4.0                                 | Riprap,<br>D50 = 6"           |

#### Sage Draw, Grouse Draw, Sharpie Draw, Lower, Middle, and Upper Bobcat Draws

Sage Draw, Grouse Draw, Dusky Draw, Sharpie Draw are tributary drainages to the reconstructed portion of Little Collom Gulch, while Lower, Middle, and Upper Bobcat Draws are tributary to natural tributary of Little Collom Gulch. Contributory areas to these ditches are less than one square mile which would make the required modeled storm event the 10-year 24-hour storm event. For ease and conservatism, all seven channels have been modeled against the 100-year 24-hour storm event.

Lower and Middle Bobcat Draw will be constructed inside the reclaimed footprint of the Section 36 and Middle Ponds. Therefore, in the 100-Year 24-Hour model, it is assumed the entire watersheds reporting to both ponds have been approved for Phase II bond release and both ponds are no longer necessary for sediment control. In lieu of the two sediments ponds post mine channel configurations have been added to the model.

A SEDCAD™ model (100 Year 24 Hour Channel Demonstration model) has been included which evaluates the peak flow for each of the channel. The minimum channel configurations for Little Collom Gulch are summarized below

| <u>Name</u>        | <u>Peak Flow (CFS)</u> | <u>Average Slope (%)</u> | <u>Channel Type</u>       | <u>Side Slopes</u> | <u>Minimum Depth (Feet)</u> | <u>Erosion Protection</u> |
|--------------------|------------------------|--------------------------|---------------------------|--------------------|-----------------------------|---------------------------|
| Sage Draw          | 25.46                  | 2.1                      | Trapezoidal<br>5' bottom  | 3H:1V              | 4.0                         | Riprap,<br>D50 = 9"       |
| Grouse Draw        | 3.73                   | 16.8                     | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                         | Riprap,<br>D50 = 6"       |
| Sharpie Draw       | 5.84                   | 22.0                     | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                         | Riprap,<br>D50 = 6"       |
| Dusky Draw         | 39.64                  |                          | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                         | Riprap,<br>D50 = 6"       |
| Lower Bobcat Draw  | 94.76                  | 6.4                      | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                         | Riprap,<br>D50 = 9"       |
| Middle Bobcat Draw | 94.76                  | 5.0                      | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                         | Riprap,<br>D50 = 9"       |
| Upper Bobcat Draw  | 91.42                  | 8.3                      | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                         | Riprap,<br>D50 = 9"       |

### **Terrace Ditches**

Two terrace ditches will be constructed across the face of the Little Collom Valley Fill to route surface water runoff to the reconstructed Little Collom Gulch. The locations of both terrace ditches are shown on Map 41B and Figure 7-23I-5. The terrace ditches on the Little Collom Valley Fill will originate near the post mining contours of 7200' and 7300' elevations on the fill face. Actual on the ground topography will dictate the final placement and profile of the terrace ditches to ensure proper water flow.

The function of the terrace ditches is to collect surface flows and direct the flows to Little Collom Gulch. The design basis for these terrace ditches is the 100-year, 24-hours event as they will be permanent in the post mine topography, and the 100-year 24-hour storm provides a conservative approach.

A SEDCAD<sup>TM</sup> model (100 Year 24 Hour Channel Demonstration model) has been included which evaluates the peak flow for each terrace ditch. The minimum ditch configurations are summarized below

| <b><u>Terrace Ditch</u></b> |                        |                          |                     |                                   |                             |                           |
|-----------------------------|------------------------|--------------------------|---------------------|-----------------------------------|-----------------------------|---------------------------|
| <u>Terrace Ditch Name</u>   | <u>Peak Flow (CFS)</u> | <u>Average Slope (%)</u> | <u>Channel Type</u> | <u>Side Slopes</u>                | <u>Minimum Depth (Feet)</u> | <u>Erosion Protection</u> |
| 7200' (Lower Terrace Ditch) | 10.55                  | 2.0                      | Triangular          | Left - 1.5H:1V<br>Right - 3.0H:1V | 3.0                         | Vegetation                |
| 7300' (Upper Terrace Ditch) | 17.19                  | 2.0                      | Triangular          | Left - 1.5H:1V<br>Right - 3.0H:1V | 3.0                         | Vegetation                |

# **Section 25 Pond** **Effluent Demonstration**

***10-Year 24-Hour Storm Event***  
***Post-Mining Condition***

Tony Tennyson

## ***General Information***

### ***Storm Information:***

|                 |               |
|-----------------|---------------|
| Storm Type:     | NRCS Type II  |
| Design Storm:   | 10 yr - 24 hr |
| Rainfall Depth: | 1.800 inches  |

### ***Particle Size Distribution:***

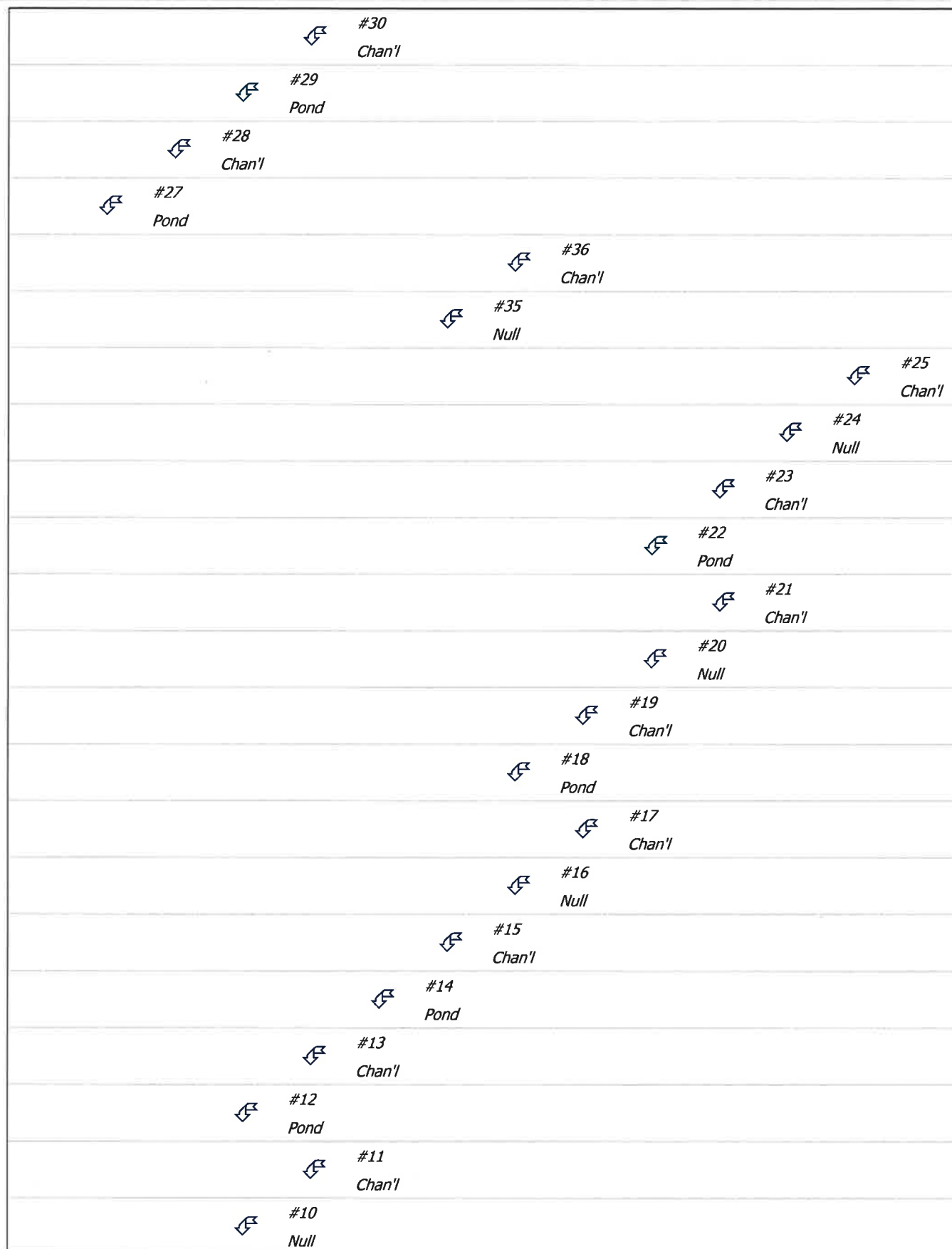
| Size (mm) | Colowyo Particle Size |
|-----------|-----------------------|
| 4.7500    | 100.000%              |
| 0.0750    | 73.000%               |
| 0.0400    | 33.000%               |
| 0.0010    | 20.000%               |

## Structure Networking:

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description                                          |
|---------|--------|--------------|--------|---------------|---------|------------------------------------------------------|
| Null    | #1     | ==>          | End    | 0.000         | 0.000   | Null Below Section 25 Pond                           |
| Pond    | #2     | ==>          | #1     | 0.000         | 0.000   | Section 25 Pond                                      |
| Channel | #3     | ==>          | #2     | 0.000         | 0.000   | Little Collom Gulch Natural Channel                  |
| Null    | #4     | ==>          | #3     | 0.000         | 0.000   | Null at Confluence with D-3 Ditch                    |
| Channel | #5     | ==>          | #4     | 0.000         | 0.000   | D-3 Ditch                                            |
| Channel | #6     | ==>          | #3     | 0.000         | 0.000   | Little Collom Gulch 0+00 to LCG-1                    |
| Null    | #7     | ==>          | #6     | 0.000         | 0.000   | Null at Confluence Lower Terrace Ditch               |
| Channel | #8     | ==>          | #7     | 0.000         | 0.000   | Lower Terrace Ditch                                  |
| Null    | #10    | ==>          | #6     | 0.000         | 0.000   | Null at Confluence Upper Terrace Ditch               |
| Channel | #11    | ==>          | #10    | 0.000         | 0.000   | Upper Terrace Ditch                                  |
| Pond    | #12    | ==>          | #6     | 0.000         | 0.000   | LCG-1 Stockpond                                      |
| Channel | #13    | ==>          | #12    | 0.000         | 0.000   | Little Collom Gulch LCG-1 to LCG-2                   |
| Pond    | #14    | ==>          | #13    | 0.000         | 0.000   | LCG-2 Stockpond                                      |
| Channel | #15    | ==>          | #14    | 0.000         | 0.000   | Little Collom Gulch LCG-2 to LCG-3                   |
| Null    | #16    | ==>          | #15    | 0.000         | 0.000   | Null at Confluence with Sage Draw                    |
| Channel | #17    | ==>          | #16    | 0.000         | 0.000   | Sage Draw                                            |
| Pond    | #18    | ==>          | #15    | 0.000         | 0.000   | LCG-3 Stockpond                                      |
| Channel | #19    | ==>          | #18    | 0.000         | 0.000   | Little Collom Gulch LCG-3 to LCG-4                   |
| Null    | #20    | ==>          | #19    | 0.000         | 0.000   | Null at Confluence with Grouse Draw                  |
| Channel | #21    | ==>          | #20    | 0.000         | 0.000   | Grouse Draw                                          |
| Pond    | #22    | ==>          | #19    | 0.000         | 0.000   | LCG-4 Stockpond                                      |
| Channel | #23    | ==>          | #22    | 0.000         | 0.000   | Little Collom Gulch LCG-4 to 100+00                  |
| Null    | #24    | ==>          | #23    | 0.000         | 0.000   | Null at Confluence with Sharpie Draw                 |
| Channel | #25    | ==>          | #24    | 0.000         | 0.000   | Sharpie Draw                                         |
| Pond    | #27    | ==>          | #2     | 0.000         | 0.000   | Middle Pond                                          |
| Channel | #28    | ==>          | #27    | 0.000         | 0.000   | Natural Channel Middle Pond to Section 36 Pond       |
| Pond    | #29    | ==>          | #28    | 0.000         | 0.000   | Section 36 Pond                                      |
| Channel | #30    | ==>          | #29    | 0.000         | 0.000   | Natural Channel Section 36 Pond to Upper Bobcat Draw |
| Channel | #31    | ==>          | #30    | 0.000         | 0.000   | Upper Bobcat Draw 0+00 to 27+81                      |
| Null    | #35    | ==>          | #14    | 0.000         | 0.000   | Null at Confluence Dusky Draw and LCG-2              |
| Channel | #36    | ==>          | #35    | 0.000         | 0.000   | Dusky Draw                                           |



#31  
Chan'l



|            |                                                                                   |              |
|------------|-----------------------------------------------------------------------------------|--------------|
|            |  | #8<br>Chan'l |
|            |  | #7<br>Null   |
|            |  | #6<br>Chan'l |
|            |  | #5<br>Chan'l |
|            |  | #4<br>Null   |
|            |  | #3<br>Chan'l |
|            |  | #2<br>Pond   |
| #1<br>Null |                                                                                   |              |

## Structure Summary:

|        | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) | Sediment<br>(tons) | Peak<br>Sediment<br>Conc.<br>(mg/l) | Peak<br>Settleable<br>Conc.<br>(ml/l) | 24VW<br>(ml/l) |
|--------|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|--------------------|-------------------------------------|---------------------------------------|----------------|
| #31    | 164.300                                   | 164.300                               | 36.45                      | 3.51                                 | 340.2              | 149,055                             | 79.77                                 | 36.70          |
| #30    | 24.700                                    | 189.000                               | 36.70                      | 3.60                                 | 341.3              | 148,165                             | 79.31                                 | 35.95          |
| #29 In | 0.000                                     | 189.000                               | 36.70                      | 3.60                                 | 341.3              | 148,165                             | 79.31                                 | 35.95          |
| Out    |                                           |                                       | 11.42                      | 3.59                                 | 92.6               | 22,625                              | 0.90                                  | 0.76           |
| #28    | 19.600                                    | 208.600                               | 11.42                      | 3.59                                 | 92.6               | 22,617                              | 0.90                                  | 0.76           |
| #27 In | 0.000                                     | 208.600                               | 11.42                      | 3.59                                 | 92.6               | 22,617                              | 0.90                                  | 0.76           |
| Out    |                                           |                                       | 6.98                       | 3.57                                 | 75.6               | 18,021                              | 0.00                                  | 0.00           |
| #36    | 117.900                                   | 117.900                               | 11.99                      | 1.41                                 | 14.1               | 15,302                              | 7.51                                  | 3.58           |
| #35    | 0.000                                     | 117.900                               | 11.99                      | 1.41                                 | 14.1               | 15,302                              | 7.51                                  | 3.58           |
| #25    | 22.800                                    | 22.800                                | 2.09                       | 0.15                                 | 2.5                | 29,693                              | 16.92                                 | 6.96           |
| #24    | 0.000                                     | 22.800                                | 2.09                       | 0.15                                 | 2.5                | 29,693                              | 16.92                                 | 6.96           |
| #23    | 204.600                                   | 227.400                               | 11.06                      | 1.03                                 | 19.2               | 39,294                              | 22.31                                 | 7.72           |
| #22 In | 0.000                                     | 227.400                               | 11.06                      | 1.03                                 | 19.2               | 39,294                              | 22.31                                 | 7.72           |
| Out    |                                           |                                       | 0.00                       | 0.00                                 | 19.2               | 0                                   | 0.00                                  | 0.00           |
| #21    | 49.670                                    | 49.670                                | 1.34                       | 0.10                                 | 0.8                | 15,618                              | 8.90                                  | 3.65           |
| #20    | 0.000                                     | 49.670                                | 1.34                       | 0.10                                 | 0.8                | 15,618                              | 8.90                                  | 3.65           |
| #19    | 130.200                                   | 407.270                               | 7.86                       | 1.26                                 | 29.0               | 13,399                              | 9.29                                  | 3.96           |
| #18 In | 0.000                                     | 407.270                               | 7.86                       | 1.26                                 | 29.0               | 13,399                              | 9.29                                  | 3.96           |
| Out    |                                           |                                       | 0.00                       | 0.00                                 | 29.0               | 0                                   | 0.00                                  | 0.00           |
| #17    | 163.300                                   | 163.300                               | 7.95                       | 1.03                                 | 7.8                | 23,679                              | 13.47                                 | 3.15           |
| #16    | 0.000                                     | 163.300                               | 7.95                       | 1.03                                 | 7.8                | 23,679                              | 13.47                                 | 3.15           |
| #15    | 127.800                                   | 698.370                               | 20.24                      | 3.25                                 | 70.8               | 23,666                              | 14.88                                 | 5.92           |
| #14 In | 0.000                                     | 816.270                               | 32.23                      | 4.66                                 | 84.9               | 20,562                              | 12.46                                 | 5.31           |
| Out    |                                           |                                       | 2.71                       | 2.58                                 | 0.0                | 0                                   | 0.00                                  | 0.00           |
| #13    | 67.100                                    | 883.370                               | 18.32                      | 3.94                                 | 19.0               | 25,318                              | 14.43                                 | 2.43           |
| #12 In | 0.000                                     | 883.370                               | 18.32                      | 3.94                                 | 19.0               | 25,318                              | 14.43                                 | 2.43           |
| Out    |                                           |                                       | 1.88                       | 1.84                                 | 0.0                | 0                                   | 0.00                                  | 0.00           |
| #11    | 37.000                                    | 37.000                                | 4.57                       | 0.53                                 | 2.3                | 7,933                               | 4.10                                  | 1.65           |
| #10    | 0.000                                     | 37.000                                | 4.57                       | 0.53                                 | 2.3                | 7,933                               | 4.10                                  | 1.65           |
| #8     | 14.600                                    | 14.600                                | 3.44                       | 0.26                                 | 2.5                | 18,002                              | 10.26                                 | 4.02           |
| #7     | 0.000                                     | 14.600                                | 3.44                       | 0.26                                 | 2.5                | 18,002                              | 10.26                                 | 4.02           |
| #6     | 16.500                                    | 951.470                               | 11.58                      | 2.99                                 | 12.1               | 22,522                              | 12.61                                 | 2.99           |
| #5     | 14.900                                    | 14.900                                | 0.02                       | 0.01                                 | 0.1                | 4,145                               | 2.36                                  | 1.57           |
| #4     | 0.000                                     | 14.900                                | 0.02                       | 0.01                                 | 0.1                | 4,145                               | 2.36                                  | 1.57           |
| #3     | 234.900                                   | 1,201.270                             | 25.26                      | 4.34                                 | 27.1               | 28,746                              | 15.99                                 | 3.65           |
| #2 In  | 128.200                                   | 1,538.070                             | 44.44                      | 9.50                                 | 207.7              | 65,337                              | 23.22                                 | 5.80           |
| Out    |                                           |                                       | 5.00                       | 7.00                                 | 53.2               | 6,225                               | 0.00                                  | 0.00           |



# SEDCAD 4 for Windows

Copyright 1998-2010 Pamela L. Schwab

7

|    | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) | Sediment<br>(tons) | Peak<br>Sediment<br>Conc.<br>(mg/l) | Peak<br>Settleable<br>Conc.<br>(ml/l) | 24VW<br>(ml/l) |
|----|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|--------------------|-------------------------------------|---------------------------------------|----------------|
| #1 | 0.000                                     | 1,538.070                             | 5.00                       | 7.00                                 | 53.2               | 6,223                               | 0.00                                  | 0.00           |

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

### ***Structure #31 (Upper Bobcat Draw 0+00 to 27+81):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 84.049%  |
| 0.0400    | 37.995%  |
| 0.0010    | 23.027%  |

### ***Structure #30 (Natural Channel Section 36 Pond to Upper Bobcat Draw):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 84.016%  |
| 0.0400    | 37.980%  |
| 0.0010    | 23.018%  |

### ***Structure #29 (Section 36 Pond):***

| Size (mm) | In       | Out      |
|-----------|----------|----------|
| 4.7500    | 100.000% | 100.000% |
| 0.0750    | 84.016%  | 100.000% |
| 0.0400    | 37.980%  | 100.000% |
| 0.0010    | 23.018%  | 84.856%  |

### ***Structure #28 (Natural Channel Middle Pond to Section 36 Pond):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 100.000% |
| 0.0400    | 100.000% |
| 0.0010    | 84.856%  |

***Structure #27 (Middle Pond):***

| Size (mm) | In       | Out      |
|-----------|----------|----------|
| 4.7500    | 100.000% | 100.000% |
| 0.0750    | 100.000% | 100.000% |
| 0.0400    | 100.000% | 100.000% |
| 0.0010    | 84.856%  | 100.000% |

***Structure #36 (Dusky Draw):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 98.171%  |
| 0.0400    | 44.378%  |
| 0.0010    | 26.896%  |

***Structure #35 (Null at Confluence Dusky Draw and LCG-2):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 98.171%  |
| 0.0400    | 44.378%  |
| 0.0010    | 26.896%  |

***Structure #25 (Sharpie Draw):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #24 (Null at Confluence with Sharpie Draw):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #23 (Little Collom Gulch LCG-4 to 100+00):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.693%  |
| 0.0400    | 33.313%  |
| 0.0010    | 20.190%  |

***Structure #22 (LCG-4 Stockpond):***

| Size (mm) | In       | Out    |
|-----------|----------|--------|
| 4.7500    | 100.000% | 0.000% |
| 0.0750    | 73.693%  | 0.000% |
| 0.0400    | 33.313%  | 0.000% |
| 0.0010    | 20.190%  | 0.000% |

***Structure #21 (Grouse Draw):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #20 (Null at Confluence with Grouse Draw):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #19 (Little Collom Gulch LCG-3 to LCG-4):***

| Size (mm) | In/Out  |
|-----------|---------|
| 4.7500    | 33.809% |
| 0.0750    | 32.843% |
| 0.0400    | 15.286% |
| 0.0010    | 9.264%  |

***Structure #18 (LCG-3 Stockpond):***

| Size (mm) | In      | Out    |
|-----------|---------|--------|
| 4.7500    | 33.809% | 0.000% |
| 0.0750    | 32.843% | 0.000% |
| 0.0400    | 15.286% | 0.000% |
| 0.0010    | 9.264%  | 0.000% |

***Structure #17 (Sage Draw):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.359%  |
| 0.0400    | 33.162%  |
| 0.0010    | 20.098%  |

***Structure #16 (Null at Confluence with Sage Draw):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.359%  |
| 0.0400    | 33.162%  |
| 0.0010    | 20.098%  |

***Structure #15 (Little Collom Gulch LCG-2 to LCG-3):***

| Size (mm) | In/Out  |
|-----------|---------|
| 4.7500    | 59.043% |
| 0.0750    | 54.387% |
| 0.0400    | 24.586% |
| 0.0010    | 14.901% |

***Structure #14 (LCG-2 Stockpond):***

| Size (mm) | In      | Out      |
|-----------|---------|----------|
| 4.7500    | 65.830% | 100.000% |
| 0.0750    | 61.642% | 100.000% |
| 0.0400    | 27.866% | 100.000% |
| 0.0010    | 16.888% | 100.000% |

***Structure #13 (Little Collom Gulch LCG-1 to LCG-2):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #12 (LCG-1 Stockpond):***

| Size (mm) | In       | Out      |
|-----------|----------|----------|
| 4.7500    | 100.000% | 100.000% |
| 0.0750    | 73.000%  | 100.000% |
| 0.0400    | 33.000%  | 100.000% |
| 0.0010    | 20.000%  | 100.000% |

***Structure #11 (Upper Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 89.909%  |
| 0.0400    | 40.644%  |
| 0.0010    | 24.632%  |

***Structure #10 (Null at Confluence Upper Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 89.909%  |
| 0.0400    | 40.644%  |
| 0.0010    | 24.632%  |

***Structure #8 (Lower Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #7 (Null at Confluence Lower Terrace Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #6 (Little Collom Gulch 0+00 to LCG-1):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 76.213%  |
| 0.0400    | 34.453%  |
| 0.0010    | 20.880%  |

***Structure #5 (D-3 Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #4 (Null at Confluence with D-3 Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #3 (Little Collom Gulch Natural Channel):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 77.410%  |
| 0.0400    | 34.994%  |
| 0.0010    | 21.208%  |

***Structure #2 (Section 25 Pond):***

| Size (mm) | In       | Out      |
|-----------|----------|----------|
| 4.7500    | 100.000% | 100.000% |
| 0.0750    | 85.081%  | 100.000% |
| 0.0400    | 58.398%  | 100.000% |
| 0.0010    | 49.726%  | 100.000% |

***Structure #1:***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 100.000% |
| 0.0400    | 100.000% |
| 0.0010    | 100.000% |



## Structure Detail:

### Structure #31 (Riprap Channel)

*Upper Bobcat Draw 0+00 to 27+81*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 8.3       | 3.76                 |                      |                         |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 36.45 cfs     |              |
| Depth:            | 0.34 ft       | 4.10 ft      |
| Top Width:        | 12.07 ft      | 34.63 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 3.80 sq ft    |              |
| Hydraulic Radius: | 0.312 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #30 (Vegetated Channel)

*Natural Channel Section 36 Pond to Upper Bobcat Draw*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 12.9      | D, B               |                      |                      |                         | 5.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 36.70 cfs                             |                                      | 36.70 cfs                            |                                     |
| Depth:                 | 0.63 ft                               |                                      | 0.93 ft                              |                                     |
| Top Width:             | 7.52 ft                               |                                      | 8.71 ft                              |                                     |
| Velocity:              | 9.31 fps                              |                                      | 5.77 fps                             |                                     |
| X-Section Area:        | 3.94 sq ft                            |                                      | 6.36 sq ft                           |                                     |
| Hydraulic Radius:      | 0.504 ft                              |                                      | 0.695 ft                             |                                     |
| Froude Number:         | 2.26                                  |                                      | 1.19                                 |                                     |
| Roughness Coefficient: | 0.0364                                |                                      | 0.0728                               |                                     |

## Structure #29 (Pond)

### *Section 36 Pond*

#### Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,116.00 ft |
| Initial Pool:      | 0.97 ac-ft  |
| *Sediment Storage: | 0.00 ac-ft  |
| Dead Space:        | 0.00 %      |

*\*No sediment capacity defined*

### Perforated Riser

| Riser<br>Diameter<br>(in) | Riser Height<br>(ft) | Barrel<br>Diameter<br>(in) | Barrel<br>Length (ft) | Barrel Slope<br>(%) | Manning's n | Spillway Elev<br>(ft) | Number of<br>Holes per<br>Elev |
|---------------------------|----------------------|----------------------------|-----------------------|---------------------|-------------|-----------------------|--------------------------------|
| 18.00                     | 11.00                | 18.00                      | 170.00                | 3.00                | 0.0150      | 7,118.00              | 2                              |

### Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 7,125.00      | 46.00                | 3.00:1            | 3.00:1             | 30.00                |

#### Pond Results:

|                         |             |
|-------------------------|-------------|
| Peak Elevation:         | 7,119.83 ft |
| H'graph Detention Time: | 2.76 hrs    |
| Pond Model:             | CSTRS       |
| Dewater Time:           | 0.96 days   |
| Trap Efficiency:        | 72.87 %     |

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

Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |                     |
|-----------|--------------|---------------------|--------------------|--------------------------|---------------------|
| 7,105.00  | 0.000        | 0.000               | 0.000              |                          | Top of Sed. Storage |
| 7,106.00  | 0.010        | 0.003               | 0.000              |                          |                     |
| 7,107.00  | 0.025        | 0.020               | 0.000              |                          |                     |
| 7,108.00  | 0.038        | 0.052               | 0.000              |                          |                     |
| 7,109.00  | 0.053        | 0.097               | 0.000              |                          |                     |
| 7,110.00  | 0.075        | 0.161               | 0.000              |                          |                     |
| 7,111.00  | 0.093        | 0.244               | 0.000              |                          |                     |
| 7,112.00  | 0.112        | 0.347               | 0.000              |                          |                     |
| 7,113.00  | 0.132        | 0.469               | 0.000              |                          |                     |
| 7,114.00  | 0.154        | 0.611               | 0.000              |                          |                     |
| 7,115.00  | 0.178        | 0.777               | 0.000              |                          |                     |
| 7,116.00  | 0.205        | 0.969               | 0.000              |                          | Low hole SPW #1     |
| 7,117.00  | 0.235        | 1.188               | 0.473              | 5.63*                    |                     |
| 7,118.00  | 0.267        | 1.439               | 0.669              | 5.35                     | Spillway #1         |
| 7,119.00  | 0.301        | 1.723               | 8.509              | 11.10                    |                     |
| 7,119.83  | 0.334        | 1.987               | 11.418             | 0.90                     | Peak Stage          |
| 7,120.00  | 0.340        | 2.043               | 12.033             |                          |                     |
| 7,121.00  | 0.387        | 2.407               | 14.738             |                          |                     |
| 7,122.00  | 0.433        | 2.816               | 17.018             |                          |                     |
| 7,123.00  | 0.485        | 3.275               | 19.026             |                          |                     |
| 7,124.00  | 0.538        | 3.786               | 20.842             |                          |                     |
| 7,125.00  | 0.599        | 4.355               | 22.512             |                          | Spillway #2         |
| 7,126.00  | 0.664        | 4.986               | 82.907             |                          |                     |
| 7,127.00  | 0.732        | 5.684               | 248.131            |                          |                     |
| 7,128.00  | 0.813        | 6.456               | 490.139            |                          |                     |
| 7,129.00  | 0.915        | 7.319               | 829.643            |                          |                     |
| 7,130.00  | 1.043        | 8.298               | 1,243.042          |                          |                     |

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,105.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,106.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,107.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,108.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,109.00          | 0.000             | 0.000                       | 0.000                                   |

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,110.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,111.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,112.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,113.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,114.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,115.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,116.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 7,117.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,118.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,119.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,120.00          | 12.033            | 0.000                       | 12.033                                  |
| 7,121.00          | 14.738            | 0.000                       | 14.738                                  |
| 7,122.00          | 17.018            | 0.000                       | 17.018                                  |
| 7,123.00          | 19.026            | 0.000                       | 19.026                                  |
| 7,124.00          | 20.842            | 0.000                       | 20.842                                  |
| 7,125.00          | 22.512            | 0.000                       | 22.512                                  |
| 7,126.00          | 24.066            | 58.841                      | 82.907                                  |
| 7,127.00          | 25.526            | 222.604                     | 248.131                                 |
| 7,128.00          | 26.907            | 463.232                     | 490.139                                 |
| 7,129.00          | 28.220            | 801.423                     | 829.643                                 |
| 7,130.00          | 29.205            | 1,213.837                   | 1,243.042                               |

## Structure #28 (Vegetated Channel)

### *Natural Channel Middle Pond to Section 36 Pond*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 5.00                 | 2.0:1                      | 2.0:1                       | 6.4       | D, B                  |                         |                         |                               | 6.0                           |

### Vegetated Channel Results:

|                   | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|-------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge: | 11.42 cfs                             |                                      | 11.42 cfs                            |                                     |
| Depth:            | 0.48 ft                               |                                      | 0.82 ft                              |                                     |
| Top Width:        | 6.90 ft                               |                                      | 8.26 ft                              |                                     |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Velocity:              | 4.03 fps                              |                                      | 2.11 fps                             |                                     |
| X-Section Area:        | 2.83 sq ft                            |                                      | 5.41 sq ft                           |                                     |
| Hydraulic Radius:      | 0.397 ft                              |                                      | 0.626 ft                             |                                     |
| Froude Number:         | 1.11                                  |                                      | 0.46                                 |                                     |
| Roughness Coefficient: | 0.0505                                |                                      | 0.1306                               |                                     |

## Structure #27 (Pond)

### *Middle Pond*

#### Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,057.00 ft |
| Initial Pool:      | 0.53 ac-ft  |
| *Sediment Storage: | 0.00 ac-ft  |
| Dead Space:        | 0.00 %      |

*\*No sediment capacity defined*

### Perforated Riser

| Riser<br>Diameter<br>(in) | Riser Height<br>(ft) | Barrel<br>Diameter<br>(in) | Barrel<br>Length (ft) | Barrel Slope<br>(%) | Manning's n | Spillway Elev<br>(ft) | Number of<br>Holes per<br>Elev |
|---------------------------|----------------------|----------------------------|-----------------------|---------------------|-------------|-----------------------|--------------------------------|
| 18.00                     | 10.00                | 18.00                      | 198.00                | 5.00                | 0.0150      | 7,061.00              | 2                              |

### Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 7,066.00      | 38.00                | 3.00:1            | 3.00:1             | 24.00                |

#### Pond Results:

|                         |             |
|-------------------------|-------------|
| Peak Elevation:         | 7,061.80 ft |
| H'graph Detention Time: | 4.79 hrs    |
| Pond Model:             | CSTRS       |
| Dewater Time:           | 1.29 days   |
| Trap Efficiency:        | 18.38 %     |

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

### Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |                     |
|-----------|--------------|---------------------|--------------------|--------------------------|---------------------|
| 7,048.00  | 0.000        | 0.000               | 0.000              |                          | Top of Sed. Storage |
| 7,049.00  | 0.009        | 0.003               | 0.000              |                          |                     |
| 7,050.00  | 0.021        | 0.018               | 0.000              |                          |                     |
| 7,051.00  | 0.035        | 0.045               | 0.000              |                          |                     |
| 7,052.00  | 0.050        | 0.088               | 0.000              |                          |                     |
| 7,053.00  | 0.063        | 0.144               | 0.000              |                          |                     |
| 7,054.00  | 0.078        | 0.214               | 0.000              |                          |                     |
| 7,055.00  | 0.095        | 0.301               | 0.000              |                          |                     |
| 7,056.00  | 0.113        | 0.405               | 0.000              |                          |                     |
| 7,057.00  | 0.132        | 0.527               | 0.000              |                          | Low hole SPW #1     |
| 7,058.00  | 0.158        | 0.672               | 0.473              | 3.71*                    |                     |
| 7,059.00  | 0.183        | 0.842               | 0.669              | 4.40                     |                     |
| 7,060.00  | 0.210        | 1.038               | 0.819              | 4.55                     |                     |
| 7,061.00  | 0.248        | 1.267               | 0.945              | 7.40                     | Spillway #1         |
| 7,061.80  | 0.277        | 1.479               | 6.982              | 10.95                    | Peak Stage          |
| 7,062.00  | 0.284        | 1.533               | 8.509              |                          |                     |
| 7,063.00  | 0.327        | 1.838               | 12.033             |                          |                     |
| 7,064.00  | 0.371        | 2.187               | 14.738             |                          |                     |
| 7,065.00  | 0.417        | 2.581               | 17.018             |                          |                     |
| 7,066.00  | 0.465        | 3.022               | 19.026             |                          | Spillway #2         |
| 7,067.00  | 0.522        | 3.515               | 71.605             |                          |                     |
| 7,068.00  | 0.576        | 4.064               | 211.288            |                          |                     |
| 7,069.00  | 0.628        | 4.665               | 418.987            |                          |                     |
| 7,070.00  | 0.685        | 5.322               | 716.430            |                          |                     |
| 7,071.00  | 0.760        | 6.044               | 1,074.454          |                          |                     |

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,048.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,049.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,050.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,051.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,052.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,053.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,054.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,055.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,056.00          | 0.000             | 0.000                       | 0.000                                   |

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,057.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 7,058.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,059.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,060.00          | 0.819             | 0.000                       | 0.819                                   |
| 7,061.00          | 0.945             | 0.000                       | 0.945                                   |
| 7,062.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,063.00          | 12.033            | 0.000                       | 12.033                                  |
| 7,064.00          | 14.738            | 0.000                       | 14.738                                  |
| 7,065.00          | 17.018            | 0.000                       | 17.018                                  |
| 7,066.00          | 19.026            | 0.000                       | 19.026                                  |
| 7,067.00          | 20.842            | 50.763                      | 71.605                                  |
| 7,068.00          | 22.512            | 188.776                     | 211.288                                 |
| 7,069.00          | 24.066            | 394.921                     | 418.987                                 |
| 7,070.00          | 25.526            | 690.903                     | 716.430                                 |
| 7,071.00          | 26.907            | 1,047.547                   | 1,074.454                               |

Structure #36 (Riprap Channel)

*Dusky Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 12.00                | 2.0:1                      | 2.0:1                       | 7.7       | 2.86                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 11.99 cfs     |              |
| Depth:            | 0.14 ft       | 3.00 ft      |
| Top Width:        | 12.56 ft      | 24.00 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 1.71 sq ft    |              |
| Hydraulic Radius: | 0.136 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 1.00 in       |              |

|       | w/o Freeboard | w/ Freeboard |
|-------|---------------|--------------|
| D50:  | 3.00 in       |              |
| Dmax: | 3.75 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #35 (Null)

*Null at Confluence Dusky Draw and LCG-2*

Structure #25 (Riprap Channel)

*Sharpie Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 22.0      | 2.95                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 2.09 cfs      |              |
| Depth:            | 0.03 ft       | 2.98 ft      |
| Top Width:        | 10.16 ft      | 27.86 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.26 sq ft    |              |
| Hydraulic Radius: | 0.026 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #24 (Null)

*Null at Confluence with Sharpie Draw*

Structure #23 (Riprap Channel)

*Little Collom Gulch LCG-4 to 100+00*



## Trapezoidal Riprap Channel Inputs:

### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.4       | 3.80                 |                      |                         |

## Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 11.06 cfs     |              |
| Depth:            | 0.14 ft       | 3.94 ft      |
| Top Width:        | 10.83 ft      | 33.63 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 1.44 sq ft    |              |
| Hydraulic Radius: | 0.132 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 1.00 in       |              |
| D50:              | 3.00 in       |              |
| Dmax:             | 3.75 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #22 (Pond)

### LCG-4 Stockpond

## Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

### Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 12.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

## Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 103.62 ft |
| H'graph Detention Time: | 0.00 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 0.00 days |
| Trap Efficiency:        | 0.00 %    |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |                     |
|-----------|--------------|---------------------|--------------------|--------------------------|---------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          | Top of Sed. Storage |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |                     |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |                     |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |                     |
| 103.62    | 0.698        | 1.366               | 0.000              | 0.00                     | Peak Stage          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |                     |
| 105.00    | 0.843        | 2.416               | 0.000              |                          | Spillway #2         |
| 106.00    | 0.872        | 3.273               | 2.094              |                          |                     |
| 107.00    | 0.872        | 4.145               | 4.414              |                          | Spillway #1         |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |                     |

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>2.094              | 2.094                                   |

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 107.00            | 0.000                       | (5)>4.414              | 4.414                                   |
| 108.00            | 36.939                      | (6)>5.182              | 42.121                                  |

Structure #21 (Riprap Channel)

*Grouse Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 10.00                | 3.0:1                      | 3.0:1                       | 16.8      | 3.90                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 1.34 cfs      |              |
| Depth:            | 0.04 ft       | 3.94 ft      |
| Top Width:        | 10.22 ft      | 33.62 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.37 sq ft    |              |
| Hydraulic Radius: | 0.036 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #20 (Null)

*Null at Confluence with Grouse Draw*

Structure #19 (Riprap Channel)

*Little Collom Gulch LCG-3 to LCG-4*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.8       | 3.76                 |                      |                         |

## Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 7.86 cfs      |              |
| Depth:            | 0.11 ft       | 3.87 ft      |
| Top Width:        | 10.66 ft      | 33.22 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 1.14 sq ft    |              |
| Hydraulic Radius: | 0.107 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 1.00 in       |              |
| D50:              | 3.00 in       |              |
| Dmax:             | 3.75 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #18 (Pond)

### LCG-3 Stockpond

#### Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

### Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 12.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

## Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 103.96 ft |
| H'graph Detention Time: | 0.00 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 0.00 days |
| Trap Efficiency:        | 0.00 %    |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |                     |
|-----------|--------------|---------------------|--------------------|--------------------------|---------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          | Top of Sed. Storage |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |                     |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |                     |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |                     |
| 103.96    | 0.731        | 1.597               | 0.000              | 0.00                     | Peak Stage          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |                     |
| 105.00    | 0.843        | 2.416               | 0.000              |                          | Spillway #2         |
| 106.00    | 0.872        | 3.273               | 2.094              |                          |                     |
| 107.00    | 0.872        | 4.145               | 4.414              |                          | Spillway #1         |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |                     |

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>2.094              | 2.094                                   |

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 107.00            | 0.000                       | (5)>4.414              | 4.414                                   |
| 108.00            | 36.939                      | (6)>5.182              | 42.121                                  |

Structure #17 (Riprap Channel)

*Sage Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 5.00                 | 3.0:1                      | 3.0:1                       | 2.1       | 2.89                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 7.95 cfs      |              |
| Depth:            | 0.21 ft       | 3.10 ft      |
| Top Width:        | 6.29 ft       | 23.63 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 1.21 sq ft    |              |
| Hydraulic Radius: | 0.191 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #16 (Null)

*Null at Confluence with Sage Draw*

Structure #15 (Riprap Channel)

*Little Collom Gulch LCG-2 to LCG-3*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 4.7       | 3.77                 |                      |                         |

## Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 20.24 cfs     |              |
| Depth:            | 0.22 ft       | 3.99 ft      |
| Top Width:        | 11.31 ft      | 33.93 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 2.32 sq ft    |              |
| Hydraulic Radius: | 0.204 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #14 (Pond)

### LCG-2 Stockpond

#### Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 30.00             | 2.00:1         | 2.00:1          | 20.00             |

### Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 18.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

## Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 105.86 ft |
| H'graph Detention Time: | 5.79 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 1.09 days |
| Trap Efficiency:        | 100.00 %  |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |                     |
|-----------|--------------|---------------------|--------------------|--------------------------|---------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          | Top of Sed. Storage |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |                     |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |                     |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |                     |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |                     |
| 105.00    | 0.843        | 2.416               | 0.000              |                          | Spillway #2         |
| 105.86    | 0.863        | 3.157               | 2.715              | 26.20                    | Peak Stage          |
| 106.00    | 0.872        | 3.273               | 3.142              |                          |                     |
| 107.00    | 0.872        | 4.145               | 8.425              |                          | Spillway #1         |
| 108.00    | 0.872        | 5.017               | 56.073             |                          |                     |

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>3.142              | 3.142                                   |



| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 107.00            | 0.000                       | (5)>8.425              | 8.425                                   |
| 108.00            | 43.900                      | (5)>12.173             | 56.073                                  |

Structure #13 (Riprap Channel)

*Little Collom Gulch LCG-1 to LCG-2*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 10.00                | 3.0:1                      | 3.0:1                       | 4.9       | 3.72                    |                         |                               |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 18.32 cfs     |              |
| Depth:            | 0.20 ft       | 3.92 ft      |
| Top Width:        | 11.20 ft      | 33.52 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 2.13 sq ft    |              |
| Hydraulic Radius: | 0.189 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 1.00 in       |              |
| D50:              | 3.00 in       |              |
| Dmax:             | 3.75 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #12 (Pond)

*LCG-1 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 30.00             | 2.00:1         | 2.00:1          | 20.00             |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 2.00             | 0.0150      | 105.00             | 0.90                      | 0.00                 |

### Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 105.90 ft |
| H'graph Detention Time: | 9.17 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 1.25 days |
| Trap Efficiency:        | 100.00 %  |

*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)  |
|-----------|-----------|------------------|-----------------|---------------------|
| 100.00    | 0.016     | 0.000            | 0.000           | Top of Sed. Storage |
| 101.00    | 0.096     | 0.050            | 0.000           |                     |
| 102.00    | 0.539     | 0.338            | 0.000           |                     |
| 103.00    | 0.654     | 0.933            | 0.000           |                     |
| 104.00    | 0.735     | 1.628            | 0.000           |                     |
| 105.00    | 0.843     | 2.416            | 0.000           | Spillway #2         |
| 105.90    | 0.865     | 3.187            | 1.884           | 25.05 Peak Stage    |
| 106.00    | 0.872     | 3.273            | 2.094           |                     |
| 107.00    | 0.872     | 4.145            | 4.414           | Spillway #1         |
| 108.00    | 0.872     | 5.017            | 49.083          |                     |

### Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>2.094              | 2.094                                   |
| 107.00            | 0.000                       | (5)>4.414              | 4.414                                   |
| 108.00            | 43.900                      | (6)>5.182              | 49.083                                  |

Structure #11 (Vegetated Channel)

*Upper Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Tall fescue

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 2.0       | D, B                  | 1.55                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 4.57 cfs                              |                                      | 4.57 cfs                             |                                     |
| Depth:                 | 0.99 ft                               | 2.54 ft                              | 1.55 ft                              | 3.10 ft                             |
| Top Width:             | 4.44 ft                               | 11.42 ft                             | 6.98 ft                              | 13.95 ft                            |
| Velocity:              | 2.08 fps                              |                                      | 0.84 fps                             |                                     |
| X-Section Area:        | 2.19 sq ft                            |                                      | 5.41 sq ft                           |                                     |
| Hydraulic Radius:      | 0.451 ft                              |                                      | 0.708 ft                             |                                     |
| Froude Number:         | 0.52                                  |                                      | 0.17                                 |                                     |
| Roughness Coefficient: | 0.0594                                |                                      | 0.1981                               |                                     |

Structure #10 (Null)

*Null at Confluence Upper Terrace Ditch*

Structure #8 (Vegetated Channel)

*Lower Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Tall fescue

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 2.0       | D, B                  |                         |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 3.44 cfs                              |                                      | 3.44 cfs                             |                                     |
| Depth:                 | 0.91 ft                               |                                      | 1.46 ft                              |                                     |
| Top Width:             | 4.09 ft                               |                                      | 6.55 ft                              |                                     |
| Velocity:              | 1.85 fps                              |                                      | 0.72 fps                             |                                     |
| X-Section Area:        | 1.86 sq ft                            |                                      | 4.77 sq ft                           |                                     |
| Hydraulic Radius:      | 0.415 ft                              |                                      | 0.665 ft                             |                                     |
| Froude Number:         | 0.48                                  |                                      | 0.15                                 |                                     |
| Roughness Coefficient: | 0.0632                                |                                      | 0.2226                               |                                     |

Structure #7 (Null)

*Null at Confluence Lower Terrace Ditch*

Structure #6 (Riprap Channel)

*Little Collom Gulch 0+00 to LCG-1*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 15.00                | 3.0:1                      | 3.0:1                       | 16.6      | 3.94                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 11.58 cfs     |              |
| Depth:            | 0.06 ft       | 4.00 ft      |
| Top Width:        | 15.36 ft      | 39.00 ft     |
| Velocity*:        |               |              |

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| X-Section Area:   | 0.91 sq ft    |              |
| Hydraulic Radius: | 0.059 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #5 (Riprap Channel)

#### *D-3 Ditch*

Trapezoidal Riprap Channel Inputs:

#### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 16.1      | 2.98                 |                      |                         |

Riprap Channel Results:

#### Simons/OSM Method - Mild Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 0.02 cfs      |              |
| Depth:            | 0.02 ft       | 3.00 ft      |
| Top Width:        | 12.07 ft      | 23.99 ft     |
| Velocity:         | 0.11 fps      |              |
| X-Section Area:   | 0.21 sq ft    |              |
| Hydraulic Radius: | 0.017 ft      |              |
| Froude Number:    | 0.15          |              |
| Manning's n:      | 0.0322        |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 9.00 in       |              |

### Structure #4 (Null)

*Null at Confluence with D-3 Ditch*

### Structure #3 (Vegetated Channel)

*Little Collom Gulch Natural Channel*

### Trapezoidal Vegetated Channel Inputs:

#### Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 5.7       | D, B               |                      |                      |                         | 6.0                     |

### Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 25.26 cfs                             |                                      | 25.26 cfs                            |                                     |
| Depth:                 | 0.69 ft                               |                                      | 1.07 ft                              |                                     |
| Top Width:             | 7.76 ft                               |                                      | 9.30 ft                              |                                     |
| Velocity:              | 5.75 fps                              |                                      | 3.29 fps                             |                                     |
| X-Section Area:        | 4.39 sq ft                            |                                      | 7.69 sq ft                           |                                     |
| Hydraulic Radius:      | 0.544 ft                              |                                      | 0.784 ft                             |                                     |
| Froude Number:         | 1.35                                  |                                      | 0.64                                 |                                     |
| Roughness Coefficient: | 0.0412                                |                                      | 0.0919                               |                                     |

### Structure #2 (Pond)

#### *Section 25 Pond*

### Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 6,868.00 ft |
| Initial Pool:      | 4.36 ac-ft  |
| *Sediment Storage: | 0.00 ac-ft  |
| Dead Space:        | 0.00 %      |

*\*No sediment capacity defined*

### Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 16.00             | 18.00                | 182.00             | 5.00             | 0.0150      | 6,872.00           | 2                        |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 6,875.00      | 45.00             | 2.00:1         | 2.00:1          | 20.00             |

## Pond Results:

|                         |             |
|-------------------------|-------------|
| Peak Elevation:         | 6,872.54 ft |
| H'graph Detention Time: | 5.84 hrs    |
| Pond Model:             | CSTRS       |
| Dewater Time:           | 3.10 days   |
| Trap Efficiency:        | 74.37 %     |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |                     |
|-----------|--------------|---------------------|--------------------|--------------------------|---------------------|
| 6,855.00  | 0.047        | 0.000               | 0.000              |                          | Top of Sed. Storage |
| 6,856.00  | 0.102        | 0.073               | 0.000              |                          |                     |
| 6,857.00  | 0.156        | 0.201               | 0.000              |                          |                     |
| 6,858.00  | 0.191        | 0.374               | 0.000              |                          |                     |
| 6,859.00  | 0.228        | 0.583               | 0.000              |                          |                     |
| 6,860.00  | 0.266        | 0.830               | 0.000              |                          |                     |
| 6,861.00  | 0.306        | 1.116               | 0.000              |                          |                     |
| 6,862.00  | 0.348        | 1.443               | 0.000              |                          |                     |
| 6,863.00  | 0.391        | 1.812               | 0.000              |                          |                     |
| 6,864.00  | 0.436        | 2.225               | 0.000              |                          |                     |
| 6,865.00  | 0.483        | 2.684               | 0.000              |                          |                     |
| 6,866.00  | 0.532        | 3.192               | 0.000              |                          |                     |
| 6,867.00  | 0.582        | 3.749               | 0.000              |                          |                     |
| 6,868.00  | 0.635        | 4.357               | 0.000              |                          | Low hole SPW #1     |
| 6,869.00  | 0.689        | 5.019               | 0.473              | 16.94*                   |                     |
| 6,870.00  | 0.746        | 5.736               | 0.669              | 12.98*                   |                     |
| 6,871.00  | 0.804        | 6.511               | 0.819              | 11.45*                   |                     |
| 6,872.00  | 0.864        | 7.345               | 0.945              | 10.67*                   | Spillway #1         |
| 6,872.54  | 0.898        | 7.824               | 4.995              | 22.35                    | Peak Stage          |
| 6,873.00  | 0.927        | 8.240               | 8.509              |                          |                     |
| 6,874.00  | 0.991        | 9.199               | 12.033             |                          |                     |
| 6,875.00  | 1.060        | 10.224              | 14.738             |                          | Spillway #2         |
| 6,876.00  | 1.125        | 11.316              | 56.584             |                          |                     |
| 6,877.00  | 1.187        | 12.472              | 168.142            |                          |                     |
| 6,878.00  | 1.250        | 13.691              | 330.639            |                          |                     |
| 6,879.00  | 1.318        | 14.974              | 558.801            |                          |                     |
| 6,880.00  | 1.386        | 16.326              | 834.822            |                          |                     |

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

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 6,855.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,856.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,857.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,858.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,859.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,860.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,861.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,862.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,863.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,864.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,865.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,866.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,867.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,868.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 6,869.00          | 0.473             | 0.000                       | 0.473                                   |
| 6,870.00          | 0.669             | 0.000                       | 0.669                                   |
| 6,871.00          | 0.819             | 0.000                       | 0.819                                   |
| 6,872.00          | 0.945             | 0.000                       | 0.945                                   |
| 6,873.00          | 8.509             | 0.000                       | 8.509                                   |
| 6,874.00          | 12.033            | 0.000                       | 12.033                                  |
| 6,875.00          | 14.738            | 0.000                       | 14.738                                  |
| 6,876.00          | 17.018            | 39.567                      | 56.584                                  |
| 6,877.00          | 19.026            | 149.116                     | 168.142                                 |
| 6,878.00          | 20.842            | 309.797                     | 330.639                                 |
| 6,879.00          | 22.512            | 536.289                     | 558.801                                 |
| 6,880.00          | 24.066            | 810.756                     | 834.822                                 |

Structure #1 (Null)

*Null Below Section 25 Pond*



### 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) |
|--------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #31    | 1        | 1.000          | 0.012              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 2        | 12.600         | 0.048              | 0.000        | 0.000  | 74.000       | F   | 3.76                 | 0.274                 |
|        | 3        | 88.700         | 0.161              | 0.000        | 0.000  | 80.000       | F   | 35.52                | 3.167                 |
|        | 4        | 2.400          | 0.058              | 0.000        | 0.000  | 74.000       | F   | 0.72                 | 0.052                 |
|        | 5        | 2.200          | 0.032              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 6        | 36.800         | 0.280              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 7        | 4.000          | 0.054              | 0.000        | 0.000  | 62.000       | M   | 0.03                 | 0.016                 |
|        | 8        | 16.600         | 0.112              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>164.300</b> |                    |              |        |              |     | <b>36.45</b>         | <b>3.509</b>          |
| #30    | 1        | 20.700         | 0.117              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 2        | 4.000          | 0.102              | 0.000        | 0.000  | 74.000       | F   | 1.20                 | 0.087                 |
|        | <b>Σ</b> | <b>189.000</b> |                    |              |        |              |     | <b>36.70</b>         | <b>3.596</b>          |
| #29    | <b>Σ</b> | <b>189.000</b> |                    |              |        |              |     | <b>36.70</b>         | <b>3.596</b>          |
| #28    | 1        | 19.600         | 0.129              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>208.600</b> |                    |              |        |              |     | <b>11.42</b>         | <b>3.590</b>          |
| #27    | <b>Σ</b> | <b>208.600</b> |                    |              |        |              |     | <b>11.42</b>         | <b>3.590</b>          |
| #36    | 1        | 68.100         | 0.249              | 0.000        | 0.000  | 74.000       | F   | 11.99                | 1.412                 |
|        | 2        | 49.800         | 0.199              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>117.900</b> |                    |              |        |              |     | <b>11.99</b>         | <b>1.412</b>          |
| #35    | <b>Σ</b> | <b>117.900</b> |                    |              |        |              |     | <b>11.99</b>         | <b>1.412</b>          |
| #25    | 1        | 7.000          | 0.051              | 0.000        | 0.000  | 74.000       | F   | 2.09                 | 0.152                 |
|        | 2        | 15.800         | 0.108              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>22.800</b>  |                    |              |        |              |     | <b>2.09</b>          | <b>0.152</b>          |
| #24    | <b>Σ</b> | <b>22.800</b>  |                    |              |        |              |     | <b>2.09</b>          | <b>0.152</b>          |
| #23    | 1        | 30.700         | 0.036              | 0.000        | 0.000  | 62.000       | M   | 0.23                 | 0.125                 |
|        | 2        | 30.000         | 0.058              | 0.000        | 0.000  | 74.000       | F   | 8.96                 | 0.652                 |
|        | 3        | 138.500        | 0.339              | 0.000        | 0.000  | 57.000       | M   | 0.17                 | 0.100                 |
|        | 4        | 5.400          | 0.060              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>227.400</b> |                    |              |        |              |     | <b>11.06</b>         | <b>1.029</b>          |
| #22    | <b>Σ</b> | <b>227.400</b> |                    |              |        |              |     | <b>11.06</b>         | <b>1.029</b>          |
| #21    | 1        | 4.470          | 0.021              | 0.000        | 0.000  | 74.000       | F   | 1.34                 | 0.097                 |
|        | 2        | 45.200         | 0.150              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |

# SEDCAD 4 for Windows

Copyright 1998-2010 Pamela L. Schwab

40

| Stru #     | SWS #    | SWS Area (ac)  | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|------------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
|            | $\Sigma$ | <b>49.670</b>  |                    |              |        |              |     | <b>1.34</b>          | <b>0.097</b>          |
| <b>#20</b> | $\Sigma$ | <b>49.670</b>  |                    |              |        |              |     | <b>1.34</b>          | <b>0.097</b>          |
| #19        | 1        | 14.800         | 0.097              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | 2        | 46.700         | 0.304              | 0.000        | 0.000  | 74.000       | F   | 7.52                 | 0.957                 |
|            | 3        | 50.400         | 0.037              | 0.000        | 0.000  | 62.000       | M   | 0.38                 | 0.206                 |
|            | 4        | 18.300         | 0.129              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | $\Sigma$ | <b>407.270</b> |                    |              |        |              |     | <b>7.86</b>          | <b>1.259</b>          |
| <b>#18</b> | $\Sigma$ | <b>407.270</b> |                    |              |        |              |     | <b>7.86</b>          | <b>1.259</b>          |
| #17        | 1        | 22.600         | 0.084              | 0.000        | 0.000  | 74.000       | F   | 6.75                 | 0.491                 |
|            | 2        | 130.800        | 0.473              | 0.000        | 0.000  | 62.000       | M   | 0.58                 | 0.428                 |
|            | 3        | 4.000          | 0.040              | 0.000        | 0.000  | 74.000       | F   | 1.20                 | 0.087                 |
|            | 4        | 5.900          | 0.040              | 0.000        | 0.000  | 62.000       | M   | 0.04                 | 0.024                 |
|            | $\Sigma$ | <b>163.300</b> |                    |              |        |              |     | <b>7.95</b>          | <b>1.030</b>          |
| <b>#16</b> | $\Sigma$ | <b>163.300</b> |                    |              |        |              |     | <b>7.95</b>          | <b>1.030</b>          |
| #15        | 1        | 102.200        | 0.230              | 0.000        | 0.000  | 74.000       | F   | 18.56                | 2.115                 |
|            | 2        | 25.600         | 0.098              | 0.000        | 0.000  | 62.000       | M   | 0.19                 | 0.105                 |
|            | $\Sigma$ | <b>698.370</b> |                    |              |        |              |     | <b>20.24</b>         | <b>3.249</b>          |
| <b>#14</b> | $\Sigma$ | <b>816.270</b> |                    |              |        |              |     | <b>32.23</b>         | <b>4.661</b>          |
| #13        | 1        | 61.300         | 0.124              | 0.000        | 0.000  | 74.000       | F   | 18.32                | 1.332                 |
|            | 2        | 5.800          | 0.019              | 0.000        | 0.000  | 62.000       | M   | 0.04                 | 0.024                 |
|            | $\Sigma$ | <b>883.370</b> |                    |              |        |              |     | <b>18.32</b>         | <b>3.936</b>          |
| <b>#12</b> | $\Sigma$ | <b>883.370</b> |                    |              |        |              |     | <b>18.32</b>         | <b>3.936</b>          |
| #11        | 1        | 22.200         | 0.148              | 0.000        | 0.000  | 74.000       | F   | 4.57                 | 0.465                 |
|            | 2        | 14.800         | 0.110              | 0.000        | 0.000  | 62.000       | M   | 0.11                 | 0.060                 |
|            | $\Sigma$ | <b>37.000</b>  |                    |              |        |              |     | <b>4.57</b>          | <b>0.526</b>          |
| <b>#10</b> | $\Sigma$ | <b>37.000</b>  |                    |              |        |              |     | <b>4.57</b>          | <b>0.526</b>          |
| #8         | 1        | 11.500         | 0.053              | 0.000        | 0.000  | 74.000       | F   | 3.44                 | 0.250                 |
|            | 2        | 3.100          | 0.037              | 0.000        | 0.000  | 62.000       | M   | 0.02                 | 0.012                 |
|            | $\Sigma$ | <b>14.600</b>  |                    |              |        |              |     | <b>3.44</b>          | <b>0.262</b>          |
| <b>#7</b>  | $\Sigma$ | <b>14.600</b>  |                    |              |        |              |     | <b>3.44</b>          | <b>0.262</b>          |
| #6         | 1        | 16.500         | 0.091              | 0.000        | 0.000  | 74.000       | F   | 4.93                 | 0.358                 |
|            | $\Sigma$ | <b>951.470</b> |                    |              |        |              |     | <b>11.58</b>         | <b>2.988</b>          |
| #5         | 1        | 14.900         | 0.083              | 0.000        | 0.000  | 57.000       | F   | 0.02                 | 0.013                 |

| Stru # | SWS #    | SWS Area (ac) | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS  | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|--------|----------|---------------|--------------------|--------------|--------|--------------|------|----------------------|-----------------------|
|        | $\Sigma$ | 14.900        |                    |              |        |              |      | 0.02                 | 0.013                 |
| #4     | $\Sigma$ | 14.900        |                    |              |        |              |      | 0.02                 | 0.013                 |
| #3     | 1        | 170.900       | 0.627              | 0.000        | 0.000  | 47.000       | S    | 0.00                 | 0.000                 |
|        | 2        | 23.800        | 0.069              | 0.000        | 0.000  | 74.000       | F    | 7.11                 | 0.517                 |
|        | 3        | 4.400         | 0.078              | 0.000        | 0.000  | 62.000       | M    | 0.03                 | 0.018                 |
|        | 4        | 31.600        | 0.199              | 0.000        | 0.000  | 74.000       | F    | 6.05                 | 0.651                 |
|        | 5        | 4.200         | 0.039              | 0.000        | 0.000  | 80.000       | F    | 2.16                 | 0.155                 |
|        | $\Sigma$ | 1,201.270     |                    |              |        |              |      | 25.26                | 4.343                 |
| #2     | 1        | 75.000        | 0.368              | 0.000        | 0.000  | 47.000       | S    | 0.00                 | 0.000                 |
|        | 2        | 3.600         | 0.038              | 0.000        | 0.000  | 74.000       | F    | 1.08                 | 0.078                 |
|        | 3        | 10.600        | 0.073              | 0.000        | 0.000  | 80.000       | F    | 5.46                 | 0.392                 |
|        | 4        | 20.200        | 0.157              | 0.000        | 0.000  | 74.000       | F    | 4.15                 | 0.424                 |
|        | 5        | 18.800        | 0.104              | 0.000        | 0.000  | 80.000       | 9.69 | 0.696                |                       |
|        | $\Sigma$ | 1,538.070     |                    |              |        |              |      | 44.44                | 9.503                 |
| #1     | $\Sigma$ | 1,538.070     |                    |              |        |              |      | 5.00                 | 7.000                 |

## 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) |
|--------|----------|--------|--------|-------|--------|--------|------|-----------------|----------------------------|-----------------------------|-------------|
| #31    | 1        | 0.300  | 10.00  | 2.00  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | 2        | 0.300  | 50.00  | 7.00  | 0.0700 | 0.3800 | 1    | 0.5             | 3,047                      | 1.74                        | 0.71        |
|        | 3        | 0.300  | 400.00 | 10.00 | 0.8000 | 0.3800 | 1    | 339.6           | 152,687                    | 81.71                       | 40.46       |
|        | 4        | 0.300  | 100.00 | 10.00 | 0.0700 | 0.3800 | 1    | 0.2             | 5,649                      | 3.22                        | 1.32        |
|        | 5        | 0.300  | 50.00  | 9.00  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | 6        | 0.300  | 400.00 | 7.00  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | 7        | 0.300  | 100.00 | 10.00 | 0.0100 | 0.3800 | 1    | 0.0             | 124                        | 0.07                        | 0.05        |
|        | 8        | 0.300  | 400.00 | 10.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | $\Sigma$ |        |        |       |        |        |      | 340.2           | 149,055                    | 79.77                       | 36.70       |
| #30    | 1        | 0.300  | 300.00 | 8.00  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | 2        | 0.300  | 50.00  | 2.00  | 0.7000 | 0.9000 | 1    | 1.0             | 21,047                     | 12.00                       | 4.92        |
|        | $\Sigma$ |        |        |       |        |        |      | 341.3           | 148,165                    | 79.31                       | 35.95       |
| #29    | $\Sigma$ |        |        |       |        |        |      | 341.3           | 148,165                    | 79.31                       | 35.95       |
| #28    | 1        | 0.300  | 400.00 | 10.80 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|        | $\Sigma$ |        |        |       |        |        |      | 92.6            | 22,617                     | 0.90                        | 0.76        |

# SEDCAD 4 for Windows

Copyright 1998-2010 Pamela L. Schwab

42

| 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) |
|------------|----------|--------|--------|-------|--------|--------|------|-----------------|----------------------------|-----------------------------|-------------|
| <b>#27</b> | <b>Σ</b> |        |        |       |        |        |      | <b>92.6</b>     | <b>22,617</b>              | <b>0.90</b>                 | <b>0.76</b> |
| #36        | 1        | 0.300  | 400.00 | 11.00 | 0.0700 | 0.3800 | 1    | 14.1            | 15,302                     | 7.51                        | 3.58        |
|            | 2        | 0.300  | 400.00 | 8.00  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>14.1</b>     | <b>15,302</b>              | <b>7.51</b>                 | <b>3.58</b> |
| <b>#35</b> | <b>Σ</b> |        |        |       |        |        |      | <b>14.1</b>     | <b>15,302</b>              | <b>7.51</b>                 | <b>3.58</b> |
| #25        | 1        | 0.300  | 200.00 | 24.00 | 0.0700 | 0.3800 | 1    | 2.5             | 29,693                     | 16.92                       | 6.96        |
|            | 2        | 0.300  | 400.00 | 13.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>2.5</b>      | <b>29,693</b>              | <b>16.92</b>                | <b>6.96</b> |
| <b>#24</b> | <b>Σ</b> |        |        |       |        |        |      | <b>2.5</b>      | <b>29,693</b>              | <b>16.92</b>                | <b>6.96</b> |
| #23        | 1        | 0.300  | 200.00 | 33.00 | 0.0100 | 0.3800 | 1    | 0.1             | 1,030                      | 0.59                        | 0.44        |
|            | 2        | 0.300  | 200.00 | 28.00 | 0.0700 | 0.3800 | 1    | 15.3            | 41,524                     | 23.67                       | 9.75        |
|            | 3        | 0.300  | 400.00 | 14.00 | 0.0800 | 0.9000 | 1    | 1.2             | 10,193                     | 5.46                        | 4.79        |
|            | 4        | 0.300  | 200.00 | 15.00 | 0.0370 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>19.2</b>     | <b>39,294</b>              | <b>22.31</b>                | <b>7.72</b> |
| <b>#22</b> | <b>Σ</b> |        |        |       |        |        |      | <b>19.2</b>     | <b>39,294</b>              | <b>22.31</b>                | <b>7.72</b> |
| #21        | 1        | 0.300  | 50.00  | 30.00 | 0.0700 | 0.3800 | 1    | 0.8             | 15,618                     | 8.90                        | 3.65        |
|            | 2        | 0.300  | 400.00 | 17.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>0.8</b>      | <b>15,618</b>              | <b>8.90</b>                 | <b>3.65</b> |
| <b>#20</b> | <b>Σ</b> |        |        |       |        |        |      | <b>0.8</b>      | <b>15,618</b>              | <b>8.90</b>                 | <b>3.65</b> |
| #19        | 1        | 0.300  | 400.00 | 16.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|            | 2        | 0.300  | 400.00 | 11.00 | 0.0700 | 0.3800 | 1    | 8.8             | 13,729                     | 6.52                        | 3.19        |
|            | 3        | 0.300  | 150.00 | 32.00 | 0.0100 | 0.3800 | 1    | 0.2             | 892                        | 0.51                        | 0.39        |
|            | 4        | 0.300  | 400.00 | 14.00 | 0.0800 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>29.0</b>     | <b>13,399</b>              | <b>9.29</b>                 | <b>3.96</b> |
| <b>#18</b> | <b>Σ</b> |        |        |       |        |        |      | <b>29.0</b>     | <b>13,399</b>              | <b>9.29</b>                 | <b>3.96</b> |
| #17        | 1        | 0.300  | 300.00 | 16.00 | 0.0700 | 0.3800 | 1    | 7.5             | 27,300                     | 15.56                       | 6.39        |
|            | 2        | 0.300  | 400.00 | 8.00  | 0.0100 | 0.3800 | 1    | 0.1             | 215                        | 0.11                        | 0.09        |
|            | 3        | 0.300  | 50.00  | 8.00  | 0.0700 | 0.3800 | 1    | 0.1             | 3,018                      | 1.72                        | 0.70        |
|            | 4        | 0.300  | 50.00  | 8.00  | 0.0100 | 0.3800 | 1    | 0.0             | 65                         | 0.04                        | 0.03        |
|            | <b>Σ</b> |        |        |       |        |        |      | <b>7.8</b>      | <b>23,679</b>              | <b>13.47</b>                | <b>3.15</b> |
| <b>#16</b> | <b>Σ</b> |        |        |       |        |        |      | <b>7.8</b>      | <b>23,679</b>              | <b>13.47</b>                | <b>3.15</b> |
| #15        | 1        | 0.300  | 400.00 | 15.00 | 0.0700 | 0.3800 | 1    | 33.9            | 24,814                     | 12.31                       | 5.82        |
|            | 2        | 0.300  | 400.00 | 21.00 | 0.0100 | 0.3800 | 1    | 0.1             | 942                        | 0.54                        | 0.41        |

# SEDCAD 4 for Windows

Copyright 1998-2010 Pamela L. Schwab

43

| 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) |
|------------|----------|--------|--------|-------|--------|--------|------|-----------------|----------------------------|-----------------------------|-------------|
| $\Sigma$   |          |        |        |       |        |        |      | <b>70.8</b>     | <b>23,666</b>              | <b>14.88</b>                | <b>5.92</b> |
| <b>#14</b> | $\Sigma$ |        |        |       |        |        |      | <b>84.9</b>     | <b>20,562</b>              | <b>12.46</b>                | <b>5.31</b> |
| #13        | 1        | 0.300  | 400.00 | 12.00 | 0.0700 | 0.3800 | 1    | 18.9            | 25,318                     | 14.43                       | 5.93        |
|            | 2        | 0.300  | 50.00  | 13.00 | 0.0100 | 0.3800 | 1    | 0.0             | 127                        | 0.07                        | 0.05        |
| $\Sigma$   |          |        |        |       |        |        |      | <b>19.0</b>     | <b>25,318</b>              | <b>14.43</b>                | <b>2.43</b> |
| <b>#12</b> | $\Sigma$ |        |        |       |        |        |      | <b>19.0</b>     | <b>25,318</b>              | <b>14.43</b>                | <b>2.43</b> |
| #11        | 1        | 0.300  | 400.00 | 8.00  | 0.0700 | 0.3800 | 1    | 2.3             | 7,933                      | 4.10                        | 1.86        |
|            | 2        | 0.300  | 200.00 | 8.00  | 0.0100 | 0.3800 | 1    | 0.0             | 145                        | 0.08                        | 0.06        |
| $\Sigma$   |          |        |        |       |        |        |      | <b>2.3</b>      | <b>7,933</b>               | <b>4.10</b>                 | <b>1.65</b> |
| <b>#10</b> | $\Sigma$ |        |        |       |        |        |      | <b>2.3</b>      | <b>7,933</b>               | <b>4.10</b>                 | <b>1.65</b> |
| #8         | 1        | 0.300  | 100.00 | 21.00 | 0.0700 | 0.3800 | 1    | 2.5             | 18,002                     | 10.26                       | 4.21        |
|            | 2        | 0.300  | 50.00  | 8.00  | 0.0100 | 0.3800 | 1    | 0.0             | 64                         | 0.04                        | 0.03        |
| $\Sigma$   |          |        |        |       |        |        |      | <b>2.5</b>      | <b>18,002</b>              | <b>10.26</b>                | <b>4.02</b> |
| <b>#7</b>  | $\Sigma$ |        |        |       |        |        |      | <b>2.5</b>      | <b>18,002</b>              | <b>10.26</b>                | <b>4.02</b> |
| #6         | 1        | 0.300  | 400.00 | 18.00 | 0.0700 | 0.3800 | 1    | 7.3             | 35,868                     | 20.44                       | 8.41        |
| $\Sigma$   |          |        |        |       |        |        |      | <b>12.1</b>     | <b>22,522</b>              | <b>12.61</b>                | <b>2.99</b> |
| #5         | 1        | 0.300  | 400.00 | 19.00 | 0.0310 | 0.9000 | 1    | 0.1             | 4,145                      | 2.36                        | 1.57        |
| $\Sigma$   |          |        |        |       |        |        |      | <b>0.1</b>      | <b>4,145</b>               | <b>2.36</b>                 | <b>1.57</b> |
| <b>#4</b>  | $\Sigma$ |        |        |       |        |        |      | <b>0.1</b>      | <b>4,145</b>               | <b>2.36</b>                 | <b>1.57</b> |
| #3         | 1        | 0.300  | 400.00 | 7.00  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|            | 2        | 0.300  | 150.00 | 18.00 | 0.0700 | 0.3800 | 1    | 6.1             | 20,934                     | 11.93                       | 4.90        |
|            | 3        | 0.300  | 100.00 | 5.00  | 0.0100 | 0.3800 | 1    | 0.0             | 57                         | 0.03                        | 0.02        |
|            | 4        | 0.300  | 400.00 | 9.00  | 0.0700 | 0.3800 | 1    | 3.9             | 9,555                      | 4.83                        | 2.23        |
|            | 5        | 0.300  | 50.00  | 11.00 | 0.8000 | 0.3800 | 1    | 5.0             | 50,314                     | 28.68                       | 13.33       |
| $\Sigma$   |          |        |        |       |        |        |      | <b>27.1</b>     | <b>28,746</b>              | <b>15.99</b>                | <b>3.65</b> |
| #2         | 1        | 0.300  | 400.00 | 10.00 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00        |
|            | 2        | 0.300  | 50.00  | 8.00  | 0.0700 | 0.3800 | 1    | 0.1             | 2,980                      | 1.70                        | 0.70        |
|            | 3        | 0.300  | 100.00 | 9.00  | 0.8000 | 0.3800 | 1    | 15.5            | 61,242                     | 34.91                       | 16.25       |
|            | 4        | 0.300  | 400.00 | 8.00  | 0.7000 | 0.3800 | 1    | 20.6            | 76,285                     | 39.41                       | 18.09       |
|            | 5        | 0.300  | 400.00 | 10.00 | 0.8000 | 0.3800 | 1    | 68.8            | 148,168                    | 84.45                       | 39.81       |
| $\Sigma$   |          |        |        |       |        |        |      | <b>207.7</b>    | <b>65,337</b>              | <b>23.22</b>                | <b>5.80</b> |
| <b>#1</b>  | $\Sigma$ |        |        |       |        |        |      | <b>53.2</b>     | <b>6,223</b>               | <b>0.00</b>                 | <b>0.00</b> |

### ***Subwatershed Time of Concentration Details:***

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #2         | 1        | 3. Short grass pasture                                | 10.00     | 334.30           | 3,343.00          | 2.520          | 0.368        |
| <b>#2</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.368</b> |
| #2         | 2        | 3. Short grass pasture                                | 8.00      | 25.04            | 313.00            | 2.260          | 0.038        |
| <b>#2</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.038</b> |
| #2         | 3        | 5. Nearly bare and untilled, and alluvial valley fans | 9.00      | 71.91            | 799.00            | 3.000          | 0.073        |
| <b>#2</b>  | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.073</b> |
| #2         | 4        | 3. Short grass pasture                                | 8.00      | 102.80           | 1,285.00          | 2.260          | 0.157        |
| <b>#2</b>  | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.157</b> |
| #2         | 5        | 5. Nearly bare and untilled, and alluvial valley fans | 10.00     | 118.80           | 1,188.00          | 3.160          | 0.104        |
| <b>#2</b>  | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.104</b> |
| #3         | 1        | 3. Short grass pasture                                | 7.00      | 333.69           | 4,767.00          | 2.110          | 0.627        |
| <b>#3</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.627</b> |
| #3         | 2        | 3. Short grass pasture                                | 18.00     | 153.54           | 853.00            | 3.390          | 0.069        |
| <b>#3</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.069</b> |
| #3         | 3        | 3. Short grass pasture                                | 5.00      | 25.30            | 506.00            | 1.780          | 0.078        |
| <b>#3</b>  | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.078</b> |
| #3         | 4        | 3. Short grass pasture                                | 9.00      | 155.16           | 1,724.00          | 2.400          | 0.199        |
| <b>#3</b>  | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.199</b> |
| #3         | 5        | 5. Nearly bare and untilled, and alluvial valley fans | 11.00     | 51.37            | 467.00            | 3.310          | 0.039        |
| <b>#3</b>  | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.039</b> |
| #5         | 1        | 3. Short grass pasture                                | 19.00     | 199.94           | 1,052.31          | 3.480          | 0.083        |
| <b>#5</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.083</b> |
| #6         | 1        | 3. Short grass pasture                                | 18.00     | 201.06           | 1,117.00          | 3.390          | 0.091        |
| <b>#6</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.091</b> |
| #8         | 1        | 3. Short grass pasture                                | 21.00     | 149.09           | 710.00            | 3.660          | 0.053        |
| <b>#8</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.053</b> |
| #8         | 2        | 3. Short grass pasture                                | 8.00      | 24.56            | 307.00            | 2.260          | 0.037        |
| <b>#8</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.037</b> |
| #11        | 1        | 3. Short grass pasture                                | 8.00      | 96.48            | 1,206.00          | 2.260          | 0.148        |
| <b>#11</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.148</b> |
| #11        | 2        | 3. Short grass pasture                                | 8.00      | 72.08            | 901.00            | 2.260          | 0.110        |
| <b>#11</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.110</b> |
| #13        | 1        | 3. Short grass pasture                                | 12.00     | 148.44           | 1,237.00          | 2.770          | 0.124        |
| <b>#13</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.124</b> |
| #13        | 2        | 3. Short grass pasture                                | 13.00     | 25.74            | 198.00            | 2.880          | 0.019        |
| <b>#13</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.019</b> |
| #15        | 1        | 3. Short grass pasture                                | 15.00     | 384.90           | 2,566.00          | 3.090          | 0.230        |
| <b>#15</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.230</b> |

| Stru #     | SWS #    | Land Flow Condition           | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #15        | 2        | 3. Short grass pasture        | 21.00     | 272.37           | 1,297.00          | 3.660          | 0.098        |
| <b>#15</b> | <b>2</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.098</b> |
| #17        | 1        | 3. Short grass pasture        | 16.00     | 155.20           | 970.00            | 3.200          | 0.084        |
| <b>#17</b> | <b>1</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.084</b> |
| #17        | 3        | 3. Short grass pasture        | 8.00      | 26.56            | 332.00            | 2.260          | 0.040        |
| <b>#17</b> | <b>3</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.040</b> |
| #17        | 4        | 3. Short grass pasture        | 8.00      | 26.16            | 327.00            | 2.260          | 0.040        |
| <b>#17</b> | <b>4</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.040</b> |
| #19        | 1        | 3. Short grass pasture        | 16.00     | 180.15           | 1,126.00          | 3.200          | 0.097        |
| <b>#19</b> | <b>1</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.097</b> |
| #19        | 2        | 3. Short grass pasture        | 11.00     | 319.44           | 2,904.00          | 2.650          | 0.304        |
| <b>#19</b> | <b>2</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.304</b> |
| #19        | 3        | 3. Short grass pasture        | 32.00     | 196.15           | 613.00            | 4.520          | 0.037        |
| <b>#19</b> | <b>3</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.037</b> |
| #19        | 4        | 3. Short grass pasture        | 14.00     | 195.58           | 1,397.00          | 2.990          | 0.129        |
| <b>#19</b> | <b>4</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.129</b> |
| #21        | 1        | 3. Short grass pasture        | 30.00     | 101.40           | 338.00            | 4.380          | 0.021        |
| <b>#21</b> | <b>1</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.021</b> |
| #21        | 2        | 3. Short grass pasture        | 17.00     | 302.94           | 1,782.00          | 3.290          | 0.150        |
| <b>#21</b> | <b>2</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.150</b> |
| #23        | 1        | 3. Short grass pasture        | 33.00     | 200.31           | 607.00            | 4.590          | 0.036        |
| <b>#23</b> | <b>1</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.036</b> |
| #23        | 2        | 3. Short grass pasture        | 28.00     | 249.20           | 890.00            | 4.230          | 0.058        |
| <b>#23</b> | <b>2</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.058</b> |
| #23        | 3        | 3. Short grass pasture        | 14.00     | 511.28           | 3,652.00          | 2.990          | 0.339        |
| <b>#23</b> | <b>3</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.339</b> |
| #23        | 4        | 3. Short grass pasture        | 15.00     | 101.25           | 675.00            | 3.090          | 0.060        |
| <b>#23</b> | <b>4</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.060</b> |
| #25        | 1        | 3. Short grass pasture        | 24.00     | 173.04           | 721.00            | 3.910          | 0.051        |
| <b>#25</b> | <b>1</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.051</b> |
| #25        | 2        | 3. Short grass pasture        | 13.00     | 146.75           | 1,128.84          | 2.880          | 0.108        |
| <b>#25</b> | <b>2</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.108</b> |
| #28        | 1        | 3. Short grass pasture        | 9.00      | 100.98           | 1,122.00          | 2.400          | 0.129        |
| <b>#28</b> | <b>1</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.129</b> |
| #30        | 1        | 3. Short grass pasture        | 8.00      | 76.47            | 956.00            | 2.260          | 0.117        |
| <b>#30</b> | <b>1</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.117</b> |
| #30        | 2        | 3. Short grass pasture        | 2.00      | 8.32             | 416.00            | 1.130          | 0.102        |
| <b>#30</b> | <b>2</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.102</b> |
| #31        | 1        | 3. Short grass pasture        | 2.00      | 1.00             | 50.00             | 1.130          | 0.012        |
| <b>#31</b> | <b>1</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.012</b> |
| #31        | 2        | 3. Short grass pasture        | 7.00      | 25.90            | 370.00            | 2.110          | 0.048        |
| <b>#31</b> | <b>2</b> | <b>Time of Concentration:</b> |           |                  |                   |                | <b>0.048</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #31        | 3        | 5. Nearly bare and untilled, and alluvial valley fans | 10.00     | 183.30           | 1,833.00          | 3.160          | 0.161        |
| <b>#31</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.161</b> |
| #31        | 4        | 3. Short grass pasture                                | 10.00     | 52.90            | 529.00            | 2.520          | 0.058        |
| <b>#31</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.058</b> |
| #31        | 5        | 3. Short grass pasture                                | 9.00      | 25.29            | 281.00            | 2.400          | 0.032        |
| <b>#31</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.032</b> |
| #31        | 6        | 3. Short grass pasture                                | 7.00      | 149.10           | 2,130.00          | 2.110          | 0.280        |
| <b>#31</b> | <b>6</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.280</b> |
| #31        | 7        | 3. Short grass pasture                                | 10.00     | 49.60            | 496.00            | 2.520          | 0.054        |
| <b>#31</b> | <b>7</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.054</b> |
| #31        | 8        | 3. Short grass pasture                                | 10.00     | 101.90           | 1,019.00          | 2.520          | 0.112        |
| <b>#31</b> | <b>8</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.112</b> |
| #36        | 1        | 3. Short grass pasture                                | 11.00     | 261.79           | 2,380.00          | 2.650          | 0.249        |
| <b>#36</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.249</b> |
| #36        | 2        | 3. Short grass pasture                                | 8.00      | 130.00           | 1,625.00          | 2.260          | 0.199        |
| <b>#36</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.199</b> |



# **Section 25 Pond** **Emergency Spillway Demonstration**

***25-Year 24-Hour Storm Event***  
***Post-Mining Condition***

Tony Tennyson

## ***General Information***

### ***Storm Information:***

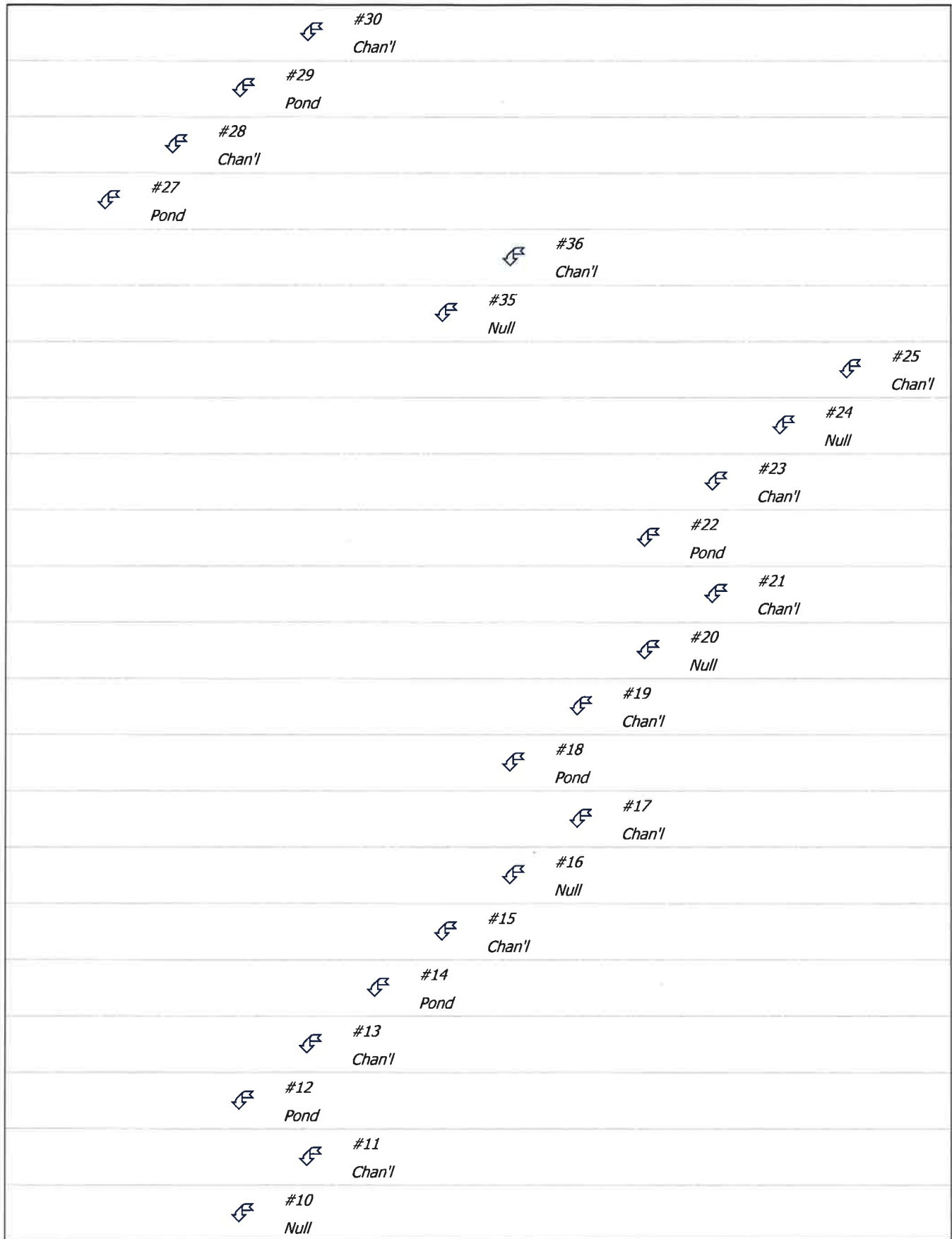
|                 |               |
|-----------------|---------------|
| • Storm Type:   | NRCS Type II  |
| Design Storm:   | 25 yr - 24 hr |
| Rainfall Depth: | 2.300 inches  |

## Structure Networking:

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description                                          |
|---------|--------|--------------|--------|---------------|---------|------------------------------------------------------|
| Null    | #1     | ==>          | End    | 0.000         | 0.000   | Null Below Section 25 Pond                           |
| Pond    | #2     | ==>          | #1     | 0.000         | 0.000   | Section 25 Pond                                      |
| Channel | #3     | ==>          | #2     | 0.000         | 0.000   | Little Collom Gulch Natural Channel                  |
| Null    | #4     | ==>          | #3     | 0.000         | 0.000   | Null at Confluence with D-3 Ditch                    |
| Channel | #5     | ==>          | #4     | 0.000         | 0.000   | D-3 Ditch                                            |
| Channel | #6     | ==>          | #3     | 0.000         | 0.000   | Little Collom Gulch 0+00 to LCG-1                    |
| Null    | #7     | ==>          | #6     | 0.000         | 0.000   | Null at Confluence Lower Terrace Ditch               |
| Channel | #8     | ==>          | #7     | 0.000         | 0.000   | Lower Terrace Ditch                                  |
| Null    | #10    | ==>          | #6     | 0.000         | 0.000   | Null at Confluence Upper Terrace Ditch               |
| Channel | #11    | ==>          | #10    | 0.000         | 0.000   | Upper Terrace Ditch                                  |
| Pond    | #12    | ==>          | #6     | 0.000         | 0.000   | LCG-1 Stockpond                                      |
| Channel | #13    | ==>          | #12    | 0.000         | 0.000   | Little Collom Gulch LCG-1 to LCG-2                   |
| Pond    | #14    | ==>          | #13    | 0.000         | 0.000   | LCG-2 Stockpond                                      |
| Channel | #15    | ==>          | #14    | 0.000         | 0.000   | Little Collom Gulch LCG-2 to LCG-3                   |
| Null    | #16    | ==>          | #15    | 0.000         | 0.000   | Null at Confluence with Sage Draw                    |
| Channel | #17    | ==>          | #16    | 0.000         | 0.000   | Sage Draw                                            |
| Pond    | #18    | ==>          | #15    | 0.000         | 0.000   | LCG-3 Stockpond                                      |
| Channel | #19    | ==>          | #18    | 0.000         | 0.000   | Little Collom Gulch LCG-3 to LCG-4                   |
| Null    | #20    | ==>          | #19    | 0.000         | 0.000   | Null at Confluence with Grouse Draw                  |
| Channel | #21    | ==>          | #20    | 0.000         | 0.000   | Grouse Draw                                          |
| Pond    | #22    | ==>          | #19    | 0.000         | 0.000   | LCG-4 Stockpond                                      |
| Channel | #23    | ==>          | #22    | 0.000         | 0.000   | Little Collom Gulch LCG-4 to 100+00                  |
| Null    | #24    | ==>          | #23    | 0.000         | 0.000   | Null at Confluence with Sharpie Draw                 |
| Channel | #25    | ==>          | #24    | 0.000         | 0.000   | Sharpie Draw                                         |
| Pond    | #27    | ==>          | #2     | 0.000         | 0.000   | Middle Pond                                          |
| Channel | #28    | ==>          | #27    | 0.000         | 0.000   | Natural Channel Middle Pond to Section 36 Pond       |
| Pond    | #29    | ==>          | #28    | 0.000         | 0.000   | Section 36 Pond                                      |
| Channel | #30    | ==>          | #29    | 0.000         | 0.000   | Natural Channel Section 36 Pond to Upper Bobcat Draw |
| Channel | #31    | ==>          | #30    | 0.000         | 0.000   | Upper Bobcat Draw 0+00 to 27+81                      |
| Null    | #35    | ==>          | #14    | 0.000         | 0.000   | Null at Confluence Dusky Draw and LCG-2              |
| Channel | #36    | ==>          | #35    | 0.000         | 0.000   | Dusky Draw                                           |



#31  
Chan'l



|                                                                                   |                                                                                   |              |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------|
|                                                                                   |  | #8<br>Chan'l |
|                                                                                   |  | #7<br>Null   |
|                                                                                   |  | #6<br>Chan'l |
|                                                                                   |  | #5<br>Chan'l |
|                                                                                   |  | #4<br>Null   |
|                                                                                   |  | #3<br>Chan'l |
|  | #2<br>Pond                                                                        |              |
| #1<br>Null                                                                        |                                                                                   |              |

## Structure Summary:

|         | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|---------|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #31     | 164.300                                   | 164.300                               | 64.63                      | 6.04                                 |
| #30     | 24.700                                    | 189.000                               | 66.96                      | 6.21                                 |
| #29 In  | 0.000                                     | 189.000                               | 66.96                      | 6.21                                 |
| #29 Out |                                           |                                       | 17.75                      | 6.20                                 |
| #28     | 19.600                                    | 208.600                               | 17.75                      | 6.20                                 |
| #27 In  | 0.000                                     | 208.600                               | 17.75                      | 6.20                                 |
| #27 Out |                                           |                                       | 12.76                      | 6.18                                 |
| #36     | 117.900                                   | 117.900                               | 26.09                      | 2.70                                 |
| #35     | 0.000                                     | 117.900                               | 26.09                      | 2.70                                 |
| #25     | 22.800                                    | 22.800                                | 4.07                       | 0.29                                 |
| #24     | 0.000                                     | 22.800                                | 4.07                       | 0.29                                 |
| #23     | 204.600                                   | 227.400                               | 25.74                      | 2.64                                 |
| #22 In  | 0.000                                     | 227.400                               | 25.74                      | 2.64                                 |
| #22 Out |                                           |                                       | 0.83                       | 0.56                                 |
| #21     | 49.670                                    | 49.670                                | 2.60                       | 0.19                                 |
| #20     | 0.000                                     | 49.670                                | 2.60                       | 0.19                                 |
| #19     | 130.200                                   | 407.270                               | 20.10                      | 3.24                                 |
| #18 In  | 0.000                                     | 407.270                               | 20.10                      | 3.24                                 |
| #18 Out |                                           |                                       | 1.16                       | 1.15                                 |
| #17     | 163.300                                   | 163.300                               | 16.41                      | 2.58                                 |
| #16     | 0.000                                     | 163.300                               | 16.41                      | 2.58                                 |
| #15     | 127.800                                   | 698.370                               | 49.54                      | 8.11                                 |
| #14 In  | 0.000                                     | 816.270                               | 72.12                      | 10.81                                |
| #14 Out |                                           |                                       | 13.15                      | 8.71                                 |
| #13     | 67.100                                    | 883.370                               | 36.42                      | 11.34                                |
| #12 In  | 0.000                                     | 883.370                               | 36.42                      | 11.34                                |
| #12 Out |                                           |                                       | 9.53                       | 9.17                                 |
| #11     | 37.000                                    | 37.000                                | 10.27                      | 1.09                                 |
| #10     | 0.000                                     | 37.000                                | 10.27                      | 1.09                                 |
| #8      | 14.600                                    | 14.600                                | 7.11                       | 0.52                                 |
| #7      | 0.000                                     | 14.600                                | 7.11                       | 0.52                                 |
| #6      | 16.500                                    | 951.470                               | 26.78                      | 11.46                                |
| #5      | 14.900                                    | 14.900                                | 0.22                       | 0.09                                 |
| #4      | 0.000                                     | 14.900                                | 0.22                       | 0.09                                 |
| #3      | 234.900                                   | 1,201.270                             | 55.81                      | 14.11                                |
| #2 In   | 128.200                                   | 1,538.070                             | 90.67                      | 23.09                                |
| #2 Out  |                                           |                                       | 17.52                      | 19.15                                |

|    | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|----|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #1 | 0.000                                     | 1,538.070                             | 17.52                      | 19.15                                |

## Structure Detail:

### Structure #31 (Riprap Channel)

*Upper Bobcat Draw 0+00 to 27+81*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 8.3       | 3.76                 |                      |                         |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 64.63 cfs     |              |
| Depth:            | 0.54 ft       | 4.30 ft      |
| Top Width:        | 13.22 ft      | 35.78 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 6.22 sq ft    |              |
| Hydraulic Radius: | 0.465 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #30 (Vegetated Channel)

*Natural Channel Section 36 Pond to Upper Bobcat Draw*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 12.9      | D, B               |                      |                      |                         | 5.0                     |



## Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 66.96 cfs                             |                                      | 66.96 cfs                            |                                     |
| Depth:                 | 0.81 ft                               |                                      | 1.11 ft                              |                                     |
| Top Width:             | 8.24 ft                               |                                      | 9.45 ft                              |                                     |
| Velocity:              | 12.49 fps                             |                                      | 8.33 fps                             |                                     |
| X-Section Area:        | 5.36 sq ft                            |                                      | 8.03 sq ft                           |                                     |
| Hydraulic Radius:      | 0.622 ft                              |                                      | 0.805 ft                             |                                     |
| Froude Number:         | 2.73                                  |                                      | 1.59                                 |                                     |
| Roughness Coefficient: | 0.0312                                |                                      | 0.0555                               |                                     |

## Structure #29 (Pond)

### Section 36 Pond

#### Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,116.00 ft |
| Initial Pool:      | 0.97 ac-ft  |

#### Perforated Riser

| Riser<br>Diameter<br>(in) | Riser Height<br>(ft) | Barrel<br>Diameter<br>(in) | Barrel<br>Length (ft) | Barrel Slope<br>(%) | Manning's n | Spillway Elev<br>(ft) | Number of<br>Holes per<br>Elev |
|---------------------------|----------------------|----------------------------|-----------------------|---------------------|-------------|-----------------------|--------------------------------|
| 18.00                     | 11.00                | 18.00                      | 170.00                | 3.00                | 0.0150      | 7,118.00              | 2                              |

#### Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 7,125.00      | 46.00                | 3.00:1            | 3.00:1             | 30.00                |

#### Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 7,122.37 ft |
| Dewater Time:   | 0.96 days   |

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

#### Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 7,105.00  | 0.000        | 0.000               | 0.000              |                          |
| 7,106.00  | 0.010        | 0.003               | 0.000              |                          |
| 7,107.00  | 0.025        | 0.020               | 0.000              |                          |
| 7,108.00  | 0.038        | 0.052               | 0.000              |                          |
| 7,109.00  | 0.053        | 0.097               | 0.000              |                          |
| 7,110.00  | 0.075        | 0.161               | 0.000              |                          |
| 7,111.00  | 0.093        | 0.244               | 0.000              |                          |
| 7,112.00  | 0.112        | 0.347               | 0.000              |                          |
| 7,113.00  | 0.132        | 0.469               | 0.000              |                          |
| 7,114.00  | 0.154        | 0.611               | 0.000              |                          |
| 7,115.00  | 0.178        | 0.777               | 0.000              |                          |
| 7,116.00  | 0.205        | 0.969               | 0.000              | Low hole SPW #1          |
| 7,117.00  | 0.235        | 1.188               | 0.473              | 5.63*                    |
| 7,118.00  | 0.267        | 1.439               | 0.669              | 5.40 Spillway #1         |
| 7,119.00  | 0.301        | 1.723               | 8.509              | 9.70                     |
| 7,120.00  | 0.340        | 2.043               | 12.033             | 0.75                     |
| 7,121.00  | 0.387        | 2.407               | 14.738             | 0.60                     |
| 7,122.00  | 0.433        | 2.816               | 17.018             | 0.65                     |
| 7,122.37  | 0.454        | 2.985               | 17.754             | 0.40 Peak Stage          |
| 7,123.00  | 0.485        | 3.275               | 19.026             |                          |
| 7,124.00  | 0.538        | 3.786               | 20.842             |                          |
| 7,125.00  | 0.599        | 4.355               | 22.512             | Spillway #2              |
| 7,126.00  | 0.664        | 4.986               | 82.907             |                          |
| 7,127.00  | 0.732        | 5.684               | 248.131            |                          |
| 7,128.00  | 0.813        | 6.456               | 490.139            |                          |
| 7,129.00  | 0.915        | 7.319               | 829.643            |                          |
| 7,130.00  | 1.043        | 8.298               | 1,243.042          |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,105.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,106.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,107.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,108.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,109.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,110.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,111.00          | 0.000             | 0.000                       | 0.000                                   |

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,112.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,113.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,114.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,115.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,116.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 7,117.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,118.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,119.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,120.00          | 12.033            | 0.000                       | 12.033                                  |
| 7,121.00          | 14.738            | 0.000                       | 14.738                                  |
| 7,122.00          | 17.018            | 0.000                       | 17.018                                  |
| 7,123.00          | 19.026            | 0.000                       | 19.026                                  |
| 7,124.00          | 20.842            | 0.000                       | 20.842                                  |
| 7,125.00          | 22.512            | 0.000                       | 22.512                                  |
| 7,126.00          | 24.066            | 58.841                      | 82.907                                  |
| 7,127.00          | 25.526            | 222.604                     | 248.131                                 |
| 7,128.00          | 26.907            | 463.232                     | 490.139                                 |
| 7,129.00          | 28.220            | 801.423                     | 829.643                                 |
| 7,130.00          | 29.205            | 1,213.837                   | 1,243.042                               |

## Structure #28 (Vegetated Channel)

### *Natural Channel Middle Pond to Section 36 Pond*

Trapezoidal Vegetated Channel Inputs:

### Material: Tall fescue

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 5.00                 | 2.0:1                      | 2.0:1                       | 6.4       | D, B                  |                         |                         |                               | 6.0                           |

### Vegetated Channel Results:

|                   | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|-------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge: | 17.75 cfs                             |                                      | 17.75 cfs                            |                                     |
| Depth:            | 0.57 ft                               |                                      | 0.93 ft                              |                                     |
| Top Width:        | 7.30 ft                               |                                      | 8.73 ft                              |                                     |
| Velocity:         | 5.03 fps                              |                                      | 2.78 fps                             |                                     |
| X-Section Area:   | 3.53 sq ft                            |                                      | 6.40 sq ft                           |                                     |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Hydraulic Radius:      | 0.466 ft                              |                                      | 0.698 ft                             |                                     |
| Froude Number:         | 1.27                                  |                                      | 0.57                                 |                                     |
| Roughness Coefficient: | 0.0449                                |                                      | 0.1068                               |                                     |

## Structure #27 (Pond)

### *Middle Pond*

Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,057.00 ft |
| Initial Pool:      | 0.53 ac-ft  |

### Perforated Riser

| Riser<br>Diameter<br>(in) | Riser Height<br>(ft) | Barrel<br>Diameter<br>(in) | Barrel<br>Length (ft) | Barrel Slope<br>(%) | Manning's n | Spillway Elev<br>(ft) | Number of<br>Holes per<br>Elev |
|---------------------------|----------------------|----------------------------|-----------------------|---------------------|-------------|-----------------------|--------------------------------|
| 18.00                     | 10.00                | 18.00                      | 198.00                | 5.00                | 0.0150      | 7,061.00              | 2                              |

### Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 7,066.00      | 38.00                | 3.00:1            | 3.00:1             | 24.00                |

Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 7,063.27 ft |
| Dewater Time:   | 1.29 days   |

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

### Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 7,048.00  | 0.000        | 0.000               | 0.000              |                          |
| 7,049.00  | 0.009        | 0.003               | 0.000              |                          |
| 7,050.00  | 0.021        | 0.018               | 0.000              |                          |
| 7,051.00  | 0.035        | 0.045               | 0.000              |                          |
| 7,052.00  | 0.050        | 0.088               | 0.000              |                          |
| 7,053.00  | 0.063        | 0.144               | 0.000              |                          |
| 7,054.00  | 0.078        | 0.214               | 0.000              |                          |

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 7,055.00  | 0.095        | 0.301               | 0.000              |                          |
| 7,056.00  | 0.113        | 0.405               | 0.000              |                          |
| 7,057.00  | 0.132        | 0.527               | 0.000              | Low hole SPW #1          |
| 7,058.00  | 0.158        | 0.672               | 0.473              | 3.71*                    |
| 7,059.00  | 0.183        | 0.842               | 0.669              | 4.40                     |
| 7,060.00  | 0.210        | 1.038               | 0.819              | 4.50                     |
| 7,061.00  | 0.248        | 1.267               | 0.945              | 7.30 Spillway #1         |
| 7,062.00  | 0.284        | 1.533               | 8.509              | 9.25                     |
| 7,063.00  | 0.327        | 1.838               | 12.033             | 1.00                     |
| 7,063.27  | 0.339        | 1.932               | 12.758             | 0.70 Peak Stage          |
| 7,064.00  | 0.371        | 2.187               | 14.738             |                          |
| 7,065.00  | 0.417        | 2.581               | 17.018             |                          |
| 7,066.00  | 0.465        | 3.022               | 19.026             | Spillway #2              |
| 7,067.00  | 0.522        | 3.515               | 71.605             |                          |
| 7,068.00  | 0.576        | 4.064               | 211.288            |                          |
| 7,069.00  | 0.628        | 4.665               | 418.987            |                          |
| 7,070.00  | 0.685        | 5.322               | 716.430            |                          |
| 7,071.00  | 0.760        | 6.044               | 1,074.454          |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,048.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,049.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,050.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,051.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,052.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,053.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,054.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,055.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,056.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,057.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 7,058.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,059.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,060.00          | 0.819             | 0.000                       | 0.819                                   |
| 7,061.00          | 0.945             | 0.000                       | 0.945                                   |
| 7,062.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,063.00          | 12.033            | 0.000                       | 12.033                                  |

| Elevation (ft) | Perf. Riser (cfs) | Emergency Spillway (cfs) | Combined Total Discharge (cfs) |
|----------------|-------------------|--------------------------|--------------------------------|
| 7,064.00       | 14.738            | 0.000                    | 14.738                         |
| 7,065.00       | 17.018            | 0.000                    | 17.018                         |
| 7,066.00       | 19.026            | 0.000                    | 19.026                         |
| 7,067.00       | 20.842            | 50.763                   | 71.605                         |
| 7,068.00       | 22.512            | 188.776                  | 211.288                        |
| 7,069.00       | 24.066            | 394.921                  | 418.987                        |
| 7,070.00       | 25.526            | 690.903                  | 716.430                        |
| 7,071.00       | 26.907            | 1,047.547                | 1,074.454                      |

## Structure #36 (Riprap Channel)

### *Dusky Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 7.7       | 2.86                 |                      |                         |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 26.09 cfs     |              |
| Depth:            | 0.25 ft       | 3.11 ft      |
| Top Width:        | 13.01 ft      | 24.45 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 3.15 sq ft    |              |
| Hydraulic Radius: | 0.240 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #35 (Null)

### *Null at Confluence Dusky Draw and LCG-2*

Structure #25 (Riprap Channel)

*Sharpie Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 22.0      | 2.95                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 4.07 cfs      |              |
| Depth:            | 0.04 ft       | 2.99 ft      |
| Top Width:        | 10.24 ft      | 27.94 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.41 sq ft    |              |
| Hydraulic Radius: | 0.040 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #24 (Null)

*Null at Confluence with Sharpie Draw*

Structure #23 (Riprap Channel)

*Little Collom Gulch LCG-4 to 100+00*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.4       | 3.80                 |                      |                         |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 25.74 cfs     |              |
| Depth:            | 0.26 ft       | 4.06 ft      |
| Top Width:        | 11.58 ft      | 34.38 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 2.84 sq ft    |              |
| Hydraulic Radius: | 0.243 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #22 (Pond)

#### LCG-4 Stockpond

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

#### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

#### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 2.00             | 0.0150      | 105.00             | 0.90                      | 0.00                 |

Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 105.39 ft |
| Dewater Time:   | 1.06 days |

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

#### Elevation-Capacity-Discharge Table



| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |
| 105.00    | 0.843        | 2.416               | 0.000              | Spillway #2              |
| 105.39    | 0.831        | 2.754               | 0.826              | 25.55 Peak Stage         |
| 106.00    | 0.872        | 3.273               | 2.094              |                          |
| 107.00    | 0.872        | 4.145               | 4.414              | Spillway #1              |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>2.094              | 2.094                                   |
| 107.00            | 0.000                       | (5)>4.414              | 4.414                                   |
| 108.00            | 36.939                      | (6)>5.182              | 42.121                                  |

Structure #21 (Riprap Channel)

*Grouse Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 10.00                | 3.0:1                      | 3.0:1                       | 16.8      | 3.90                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 2.60 cfs      |              |
| Depth:            | 0.05 ft       | 3.95 ft      |
| Top Width:        | 10.28 ft      | 33.68 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.47 sq ft    |              |
| Hydraulic Radius: | 0.046 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #20 (Null)

*Null at Confluence with Grouse Draw*

Structure #19 (Riprap Channel)

*Little Collom Gulch LCG-3 to LCG-4*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.8       | 3.76                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 20.10 cfs     |              |
| Depth:            | 0.22 ft       | 3.98 ft      |
| Top Width:        | 11.30 ft      | 33.86 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 2.30 sq ft    |              |
| Hydraulic Radius: | 0.203 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #18 (Pond)

### *LCG-3 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 2.00             | 0.0150      | 105.00             | 0.90                      | 0.00                 |

Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 105.56 ft |
| Dewater Time:   | 1.28 days |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 100.00    | 0.016     | 0.000            | 0.000           |                    |
| 101.00    | 0.096     | 0.050            | 0.000           |                    |
| 102.00    | 0.539     | 0.338            | 0.000           |                    |
| 103.00    | 0.654     | 0.933            | 0.000           |                    |
| 104.00    | 0.735     | 1.628            | 0.000           |                    |
| 105.00    | 0.843     | 2.416            | 0.000           | Spillway #2        |
| 105.56    | 0.842     | 2.893            | 1.164           | 25.65 Peak Stage   |
| 106.00    | 0.872     | 3.273            | 2.094           |                    |
| 107.00    | 0.872     | 4.145            | 4.414           | Spillway #1        |
| 108.00    | 0.872     | 5.017            | 42.121          |                    |

Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>2.094              | 2.094                                   |
| 107.00            | 0.000                       | (5)>4.414              | 4.414                                   |
| 108.00            | 36.939                      | (6)>5.182              | 42.121                                  |

Structure #17 (Riprap Channel)

*Sage Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 5.00                 | 3.0:1                      | 3.0:1                       | 2.1       | 2.89                    |                         |                               |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 16.41 cfs     |              |
| Depth:            | 0.33 ft       | 3.22 ft      |
| Top Width:        | 6.98 ft       | 24.32 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 1.98 sq ft    |              |
| Hydraulic Radius: | 0.279 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #16 (Null)

*Null at Confluence with Sage Draw*

Structure #15 (Riprap Channel)

*Little Collom Gulch LCG-2 to LCG-3*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 4.7       | 3.77                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 49.54 cfs     |              |
| Depth:            | 0.45 ft       | 4.22 ft      |
| Top Width:        | 12.71 ft      | 35.33 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 5.13 sq ft    |              |
| Hydraulic Radius: | 0.399 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #14 (Pond)

*LCG-2 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 30.00             | 2.00:1         | 2.00:1          | 20.00             |

## Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 18.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 107.10 ft |
| Dewater Time:   | 0.64 days |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |             |
|-----------|--------------|---------------------|--------------------|--------------------------|-------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |             |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |             |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |             |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |             |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |             |
| 105.00    | 0.843        | 2.416               | 0.000              |                          | Spillway #2 |
| 106.00    | 0.872        | 3.273               | 3.142              | 3.30*                    |             |
| 107.00    | 0.872        | 4.145               | 8.425              | 10.30                    | Spillway #1 |
| 107.10    | 0.872        | 4.232               | 13.148             | 1.70                     | Peak Stage  |
| 108.00    | 0.872        | 5.017               | 56.073             |                          |             |

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>3.142              | 3.142                                   |
| 107.00            | 0.000                       | (5)>8.425              | 8.425                                   |
| 108.00            | 43.900                      | (5)>12.173             | 56.073                                  |

Structure #13 (Riprap Channel)

*Little Collom Gulch LCG-1 to LCG-2*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 4.9       | 3.72                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 36.42 cfs     |              |
| Depth:            | 0.35 ft       | 4.07 ft      |
| Top Width:        | 12.12 ft      | 34.44 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 3.90 sq ft    |              |
| Hydraulic Radius: | 0.319 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #12 (Pond)

*LCG-1 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 30.00             | 2.00:1         | 2.00:1          | 20.00             |

Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 12.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 107.11 ft |
| Dewater Time:   | 0.89 days |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |
| 105.00    | 0.843        | 2.416               | 0.000              | Spillway #2              |
| 106.00    | 0.872        | 3.273               | 2.094              | 4.95*                    |
| 107.00    | 0.872        | 4.145               | 4.414              | 7.95 Spillway #1         |
| 107.11    | 0.872        | 4.245               | 9.534              | 8.40 Peak Stage          |
| 108.00    | 0.872        | 5.017               | 49.083             |                          |

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>2.094              | 2.094                                   |
| 107.00            | 0.000                       | (5)>4.414              | 4.414                                   |
| 108.00            | 43.900                      | (6)>5.182              | 49.083                                  |

## *Structure #11 (Vegetated Channel)*



*Upper Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Tall fescue

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 2.0       | D, B                  | 1.55                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 10.27 cfs                             |                                      | 10.27 cfs                            |                                     |
| Depth:                 | 1.25 ft                               | 2.80 ft                              | 1.86 ft                              | 3.41 ft                             |
| Top Width:             | 5.64 ft                               | 12.61 ft                             | 8.35 ft                              | 15.32 ft                            |
| Velocity:              | 2.91 fps                              |                                      | 1.33 fps                             |                                     |
| X-Section Area:        | 3.53 sq ft                            |                                      | 7.74 sq ft                           |                                     |
| Hydraulic Radius:      | 0.573 ft                              |                                      | 0.848 ft                             |                                     |
| Froude Number:         | 0.65                                  |                                      | 0.24                                 |                                     |
| Roughness Coefficient: | 0.0499                                |                                      | 0.1421                               |                                     |

Structure #10 (Null)

*Null at Confluence Upper Terrace Ditch*

Structure #8 (Vegetated Channel)

*Lower Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Tall fescue

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 2.0       | D, B                  |                         |                         |                               | 7.0                           |

Vegetated Channel Results:

|                   | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|-------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge: | 7.11 cfs                              |                                      | 7.11 cfs                             |                                     |
| Depth:            | 1.12 ft                               |                                      | 1.71 ft                              |                                     |

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Top Width:             | 5.06 ft                               |                                      | 7.70 ft                              |                                     |
| Velocity:              | 2.50 fps                              |                                      | 1.08 fps                             |                                     |
| X-Section Area:        | 2.84 sq ft                            |                                      | 6.58 sq ft                           |                                     |
| Hydraulic Radius:      | 0.514 ft                              |                                      | 0.781 ft                             |                                     |
| Froude Number:         | 0.59                                  |                                      | 0.21                                 |                                     |
| Roughness Coefficient: | 0.0540                                |                                      | 0.1653                               |                                     |

Structure #7 (Null)

*Null at Confluence Lower Terrace Ditch*

Structure #6 (Riprap Channel)

*Little Collom Gulch 0+00 to LCG-1*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 15.00                | 3.0:1                      | 3.0:1                       | 16.6      | 3.94                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 26.78 cfs     |              |
| Depth:            | 0.14 ft       | 4.08 ft      |
| Top Width:        | 15.85 ft      | 39.49 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 2.19 sq ft    |              |
| Hydraulic Radius: | 0.138 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #5 (Riprap Channel)

### *D-3 Ditch*

Trapezoidal Riprap Channel Inputs:

#### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 16.1      | 2.98                 |                      |                         |

Riprap Channel Results:

#### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 0.22 cfs      |              |
| Depth:            | 0.02 ft       | 3.00 ft      |
| Top Width:        | 12.07 ft      | 23.99 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.22 sq ft    |              |
| Hydraulic Radius: | 0.019 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #4 (Null)

*Null at Confluence with D-3 Ditch*

### Structure #3 (Vegetated Channel)

*Little Collom Gulch Natural Channel*

Trapezoidal Vegetated Channel Inputs:

#### Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 5.7       | D, B               |                      |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 55.81 cfs                             |                                      | 55.81 cfs                            |                                     |
| Depth:                 | 0.96 ft                               |                                      | 1.36 ft                              |                                     |
| Top Width:             | 8.83 ft                               |                                      | 10.44 ft                             |                                     |
| Velocity:              | 8.42 fps                              |                                      | 5.31 fps                             |                                     |
| X-Section Area:        | 6.63 sq ft                            |                                      | 10.51 sq ft                          |                                     |
| Hydraulic Radius:      | 0.714 ft                              |                                      | 0.948 ft                             |                                     |
| Froude Number:         | 1.71                                  |                                      | 0.93                                 |                                     |
| Roughness Coefficient: | 0.0337                                |                                      | 0.0646                               |                                     |

## Structure #2 (Pond)

### *Section 25 Pond*

Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 6,866.00 ft |
| Initial Pool:      | 3.19 ac-ft  |

### Perforated Riser

| Riser<br>Diameter<br>(in) | Riser Height<br>(ft) | Barrel<br>Diameter<br>(in) | Barrel<br>Length (ft) | Barrel Slope<br>(%) | Manning's n | Spillway Elev<br>(ft) | Number of<br>Holes per<br>Elev |
|---------------------------|----------------------|----------------------------|-----------------------|---------------------|-------------|-----------------------|--------------------------------|
| 18.00                     | 16.00                | 18.00                      | 182.00                | 5.00                | 0.0150      | 6,872.00              | 2                              |

### Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 6,875.00      | 45.00                | 2.00:1            | 2.00:1             | 20.00                |

Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 6,875.07 ft |
| Dewater Time:   | 3.30 days   |

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

### Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 6,855.00  | 0.047        | 0.000               | 0.000              |                          |
| 6,856.00  | 0.102        | 0.073               | 0.000              |                          |
| 6,857.00  | 0.156        | 0.201               | 0.000              |                          |
| 6,858.00  | 0.191        | 0.374               | 0.000              |                          |
| 6,859.00  | 0.228        | 0.583               | 0.000              |                          |
| 6,860.00  | 0.266        | 0.830               | 0.000              |                          |
| 6,861.00  | 0.306        | 1.116               | 0.000              |                          |
| 6,862.00  | 0.348        | 1.443               | 0.000              |                          |
| 6,863.00  | 0.391        | 1.812               | 0.000              |                          |
| 6,864.00  | 0.436        | 2.225               | 0.000              |                          |
| 6,865.00  | 0.483        | 2.684               | 0.000              |                          |
| 6,866.00  | 0.532        | 3.192               | 0.000              |                          |
| 6,867.00  | 0.582        | 3.749               | 0.000              |                          |
| 6,868.00  | 0.635        | 4.357               | 0.000              | Low hole SPW #1          |
| 6,869.00  | 0.689        | 5.019               | 0.473              | 16.94*                   |
| 6,870.00  | 0.746        | 5.736               | 0.669              | 12.98*                   |
| 6,871.00  | 0.804        | 6.511               | 0.819              | 11.45*                   |
| 6,872.00  | 0.864        | 7.345               | 0.945              | 10.67* Spillway #1       |
| 6,873.00  | 0.927        | 8.240               | 8.509              | 17.65                    |
| 6,874.00  | 0.991        | 9.199               | 12.033             | 2.55                     |
| 6,875.00  | 1.060        | 10.224              | 14.738             | 5.55 Spillway #2         |
| 6,875.07  | 1.062        | 10.297              | 17.518             | 1.40 Peak Stage          |
| 6,876.00  | 1.125        | 11.316              | 56.584             |                          |
| 6,877.00  | 1.187        | 12.472              | 168.142            |                          |
| 6,878.00  | 1.250        | 13.691              | 330.639            |                          |
| 6,879.00  | 1.318        | 14.974              | 558.801            |                          |
| 6,880.00  | 1.386        | 16.326              | 834.822            |                          |

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

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 6,855.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,856.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,857.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,858.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,859.00          | 0.000             | 0.000                       | 0.000                                   |

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 6,860.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,861.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,862.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,863.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,864.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,865.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,866.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,867.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,868.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 6,869.00          | 0.473             | 0.000                       | 0.473                                   |
| 6,870.00          | 0.669             | 0.000                       | 0.669                                   |
| 6,871.00          | 0.819             | 0.000                       | 0.819                                   |
| 6,872.00          | 0.945             | 0.000                       | 0.945                                   |
| 6,873.00          | 8.509             | 0.000                       | 8.509                                   |
| 6,874.00          | 12.033            | 0.000                       | 12.033                                  |
| 6,875.00          | 14.738            | 0.000                       | 14.738                                  |
| 6,876.00          | 17.018            | 39.567                      | 56.584                                  |
| 6,877.00          | 19.026            | 149.116                     | 168.142                                 |
| 6,878.00          | 20.842            | 309.797                     | 330.639                                 |
| 6,879.00          | 22.512            | 536.289                     | 558.801                                 |
| 6,880.00          | 24.066            | 810.756                     | 834.822                                 |

Structure #1 (Null)

*Null Below Section 25 Pond*

### 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) |
|--------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #31    | 1        | 1.000          | 0.012              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 2        | 12.600         | 0.048              | 0.000        | 0.000  | 74.000       | F   | 7.32                 | 0.523                 |
|        | 3        | 88.700         | 0.161              | 0.000        | 0.000  | 80.000       | F   | 61.37                | 5.366                 |
|        | 4        | 2.400          | 0.058              | 0.000        | 0.000  | 74.000       | F   | 1.39                 | 0.100                 |
|        | 5        | 2.200          | 0.032              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 6        | 36.800         | 0.280              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 7        | 4.000          | 0.054              | 0.000        | 0.000  | 62.000       | M   | 0.55                 | 0.053                 |
|        | 8        | 16.600         | 0.112              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>164.300</b> |                    |              |        |              |     | <b>64.63</b>         | <b>6.043</b>          |
| #30    | 1        | 20.700         | 0.117              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 2        | 4.000          | 0.102              | 0.000        | 0.000  | 74.000       | F   | 2.32                 | 0.166                 |
|        | <b>Σ</b> | <b>189.000</b> |                    |              |        |              |     | <b>66.96</b>         | <b>6.209</b>          |
| #29    | <b>Σ</b> | <b>189.000</b> |                    |              |        |              |     | <b>66.96</b>         | <b>6.209</b>          |
| #28    | 1        | 19.600         | 0.129              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>208.600</b> |                    |              |        |              |     | <b>17.75</b>         | <b>6.202</b>          |
| #27    | <b>Σ</b> | <b>208.600</b> |                    |              |        |              |     | <b>17.75</b>         | <b>6.202</b>          |
| #36    | 1        | 68.100         | 0.249              | 0.000        | 0.000  | 74.000       | F   | 26.09                | 2.699                 |
|        | 2        | 49.800         | 0.199              | 0.000        | 0.000  | 47.000       | S   | 0.01                 | 0.000                 |
|        | <b>Σ</b> | <b>117.900</b> |                    |              |        |              |     | <b>26.09</b>         | <b>2.699</b>          |
| #35    | <b>Σ</b> | <b>117.900</b> |                    |              |        |              |     | <b>26.09</b>         | <b>2.699</b>          |
| #25    | 1        | 7.000          | 0.051              | 0.000        | 0.000  | 74.000       | F   | 4.07                 | 0.291                 |
|        | 2        | 15.800         | 0.108              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>22.800</b>  |                    |              |        |              |     | <b>4.07</b>          | <b>0.291</b>          |
| #24    | <b>Σ</b> | <b>22.800</b>  |                    |              |        |              |     | <b>4.07</b>          | <b>0.291</b>          |
| #23    | 1        | 30.700         | 0.036              | 0.000        | 0.000  | 62.000       | M   | 4.24                 | 0.409                 |
|        | 2        | 30.000         | 0.058              | 0.000        | 0.000  | 74.000       | F   | 17.43                | 1.246                 |
|        | 3        | 138.500        | 0.339              | 0.000        | 0.000  | 57.000       | M   | 1.08                 | 0.694                 |
|        | 4        | 5.400          | 0.060              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>227.400</b> |                    |              |        |              |     | <b>25.74</b>         | <b>2.640</b>          |
| #22    | <b>Σ</b> | <b>227.400</b> |                    |              |        |              |     | <b>25.74</b>         | <b>2.640</b>          |
| #21    | 1        | 4.470          | 0.021              | 0.000        | 0.000  | 74.000       | F   | 2.60                 | 0.186                 |
|        | 2        | 45.200         | 0.150              | 0.000        | 0.000  | 47.000       | S   | 0.01                 | 0.000                 |

| Stru #     | SWS #    | SWS Area (ac)  | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|------------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
|            | $\Sigma$ | <b>49.670</b>  |                    |              |        |              |     | <b>2.60</b>          | <b>0.186</b>          |
| <b>#20</b> | $\Sigma$ | <b>49.670</b>  |                    |              |        |              |     | <b>2.60</b>          | <b>0.186</b>          |
| #19        | 1        | 14.800         | 0.097              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | 2        | 46.700         | 0.304              | 0.000        | 0.000  | 74.000       | F   | 16.53                | 1.829                 |
|            | 3        | 50.400         | 0.037              | 0.000        | 0.000  | 62.000       | M   | 6.96                 | 0.671                 |
|            | 4        | 18.300         | 0.129              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|            | $\Sigma$ | <b>407.270</b> |                    |              |        |              |     | <b>20.10</b>         | <b>3.244</b>          |
| <b>#18</b> | $\Sigma$ | <b>407.270</b> |                    |              |        |              |     | <b>20.10</b>         | <b>3.244</b>          |
| #17        | 1        | 22.600         | 0.084              | 0.000        | 0.000  | 74.000       | F   | 13.13                | 0.939                 |
|            | 2        | 130.800        | 0.473              | 0.000        | 0.000  | 62.000       | M   | 3.96                 | 1.393                 |
|            | 3        | 4.000          | 0.040              | 0.000        | 0.000  | 74.000       | F   | 2.32                 | 0.166                 |
|            | 4        | 5.900          | 0.040              | 0.000        | 0.000  | 62.000       | M   | 0.81                 | 0.079                 |
|            | $\Sigma$ | <b>163.300</b> |                    |              |        |              |     | <b>16.41</b>         | <b>2.577</b>          |
| <b>#16</b> | $\Sigma$ | <b>163.300</b> |                    |              |        |              |     | <b>16.41</b>         | <b>2.577</b>          |
| #15        | 1        | 102.200        | 0.230              | 0.000        | 0.000  | 74.000       | F   | 40.27                | 4.042                 |
|            | 2        | 25.600         | 0.098              | 0.000        | 0.000  | 62.000       | M   | 3.53                 | 0.341                 |
|            | $\Sigma$ | <b>698.370</b> |                    |              |        |              |     | <b>49.54</b>         | <b>8.112</b>          |
| <b>#14</b> | $\Sigma$ | <b>816.270</b> |                    |              |        |              |     | <b>72.12</b>         | <b>10.811</b>         |
| #13        | 1        | 61.300         | 0.124              | 0.000        | 0.000  | 74.000       | F   | 35.62                | 2.546                 |
|            | 2        | 5.800          | 0.019              | 0.000        | 0.000  | 62.000       | M   | 0.80                 | 0.077                 |
|            | $\Sigma$ | <b>883.370</b> |                    |              |        |              |     | <b>36.42</b>         | <b>11.337</b>         |
| <b>#12</b> | $\Sigma$ | <b>883.370</b> |                    |              |        |              |     | <b>36.42</b>         | <b>11.337</b>         |
| #11        | 1        | 22.200         | 0.148              | 0.000        | 0.000  | 74.000       | F   | 9.79                 | 0.890                 |
|            | 2        | 14.800         | 0.110              | 0.000        | 0.000  | 62.000       | M   | 2.04                 | 0.197                 |
|            | $\Sigma$ | <b>37.000</b>  |                    |              |        |              |     | <b>10.27</b>         | <b>1.087</b>          |
| <b>#10</b> | $\Sigma$ | <b>37.000</b>  |                    |              |        |              |     | <b>10.27</b>         | <b>1.087</b>          |
| #8         | 1        | 11.500         | 0.053              | 0.000        | 0.000  | 74.000       | F   | 6.68                 | 0.478                 |
|            | 2        | 3.100          | 0.037              | 0.000        | 0.000  | 62.000       | M   | 0.43                 | 0.041                 |
|            | $\Sigma$ | <b>14.600</b>  |                    |              |        |              |     | <b>7.11</b>          | <b>0.519</b>          |
| <b>#7</b>  | $\Sigma$ | <b>14.600</b>  |                    |              |        |              |     | <b>7.11</b>          | <b>0.519</b>          |
| #6         | 1        | 16.500         | 0.091              | 0.000        | 0.000  | 74.000       | F   | 9.59                 | 0.685                 |
|            | $\Sigma$ | <b>951.470</b> |                    |              |        |              |     | <b>26.78</b>         | <b>11.456</b>         |
| #5         | 1        | 14.900         | 0.083              | 0.000        | 0.000  | 57.000       | F   | 0.22                 | 0.093                 |



| Stru #    | SWS #    | SWS Area (ac)    | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS   | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|-----------|----------|------------------|--------------------|--------------|--------|--------------|-------|----------------------|-----------------------|
| <b>Σ</b>  |          | <b>14.900</b>    |                    |              |        |              |       | <b>0.22</b>          | <b>0.093</b>          |
| <b>#4</b> | <b>Σ</b> | <b>14.900</b>    |                    |              |        |              |       | <b>0.22</b>          | <b>0.093</b>          |
| #3        | 1        | 170.900          | 0.627              | 0.000        | 0.000  | 47.000       | S     | 0.01                 | 0.001                 |
|           | 2        | 23.800           | 0.069              | 0.000        | 0.000  | 74.000       | F     | 13.83                | 0.989                 |
|           | 3        | 4.400            | 0.078              | 0.000        | 0.000  | 62.000       | M     | 0.61                 | 0.059                 |
|           | 4        | 31.600           | 0.199              | 0.000        | 0.000  | 74.000       | F     | 13.06                | 1.245                 |
|           | 5        | 4.200            | 0.039              | 0.000        | 0.000  | 80.000       | F     | 3.58                 | 0.263                 |
| <b>Σ</b>  |          | <b>1,201.270</b> |                    |              |        |              |       | <b>55.81</b>         | <b>14.106</b>         |
| #2        | 1        | 75.000           | 0.368              | 0.000        | 0.000  | 47.000       | S     | 0.01                 | 0.000                 |
|           | 2        | 3.600            | 0.038              | 0.000        | 0.000  | 74.000       | F     | 2.09                 | 0.150                 |
|           | 3        | 10.600           | 0.073              | 0.000        | 0.000  | 80.000       | F     | 9.04                 | 0.665                 |
|           | 4        | 20.200           | 0.157              | 0.000        | 0.000  | 74.000       | F     | 8.91                 | 0.810                 |
|           | 5        | 18.800           | 0.104              | 0.000        | 0.000  | 80.000       | 16.04 | 1.179                |                       |
| <b>Σ</b>  |          | <b>1,538.070</b> |                    |              |        |              |       | <b>90.67</b>         | <b>23.092</b>         |
| <b>#1</b> | <b>Σ</b> | <b>1,538.070</b> |                    |              |        |              |       | <b>17.52</b>         | <b>19.150</b>         |

## Subwatershed Time of Concentration Details:

| Stru #    | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|-----------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #2        | 1        | 3. Short grass pasture                                | 10.00     | 334.30           | 3,343.00          | 2.520          | 0.368        |
| <b>#2</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.368</b> |
| #2        | 2        | 3. Short grass pasture                                | 8.00      | 25.04            | 313.00            | 2.260          | 0.038        |
| <b>#2</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.038</b> |
| #2        | 3        | 5. Nearly bare and untilled, and alluvial valley fans | 9.00      | 71.91            | 799.00            | 3.000          | 0.073        |
| <b>#2</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.073</b> |
| #2        | 4        | 3. Short grass pasture                                | 8.00      | 102.80           | 1,285.00          | 2.260          | 0.157        |
| <b>#2</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.157</b> |
| #2        | 5        | 5. Nearly bare and untilled, and alluvial valley fans | 10.00     | 118.80           | 1,188.00          | 3.160          | 0.104        |
| <b>#2</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.104</b> |
| #3        | 1        | 3. Short grass pasture                                | 7.00      | 333.69           | 4,767.00          | 2.110          | 0.627        |
| <b>#3</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.627</b> |
| #3        | 2        | 3. Short grass pasture                                | 18.00     | 153.54           | 853.00            | 3.390          | 0.069        |
| <b>#3</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.069</b> |
| #3        | 3        | 3. Short grass pasture                                | 5.00      | 25.30            | 506.00            | 1.780          | 0.078        |
| <b>#3</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.078</b> |
| #3        | 4        | 3. Short grass pasture                                | 9.00      | 155.16           | 1,724.00          | 2.400          | 0.199        |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| <b>#3</b>  | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.199</b> |
| #3         | 5        | 5. Nearly bare and untilled, and alluvial valley fans | 11.00     | 51.37            | 467.00            | 3.310          | 0.039        |
| <b>#3</b>  | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.039</b> |
| #5         | 1        | 3. Short grass pasture                                | 19.00     | 199.94           | 1,052.31          | 3.480          | 0.083        |
| <b>#5</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.083</b> |
| #6         | 1        | 3. Short grass pasture                                | 18.00     | 201.06           | 1,117.00          | 3.390          | 0.091        |
| <b>#6</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.091</b> |
| #8         | 1        | 3. Short grass pasture                                | 21.00     | 149.09           | 710.00            | 3.660          | 0.053        |
| <b>#8</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.053</b> |
| #8         | 2        | 3. Short grass pasture                                | 8.00      | 24.56            | 307.00            | 2.260          | 0.037        |
| <b>#8</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.037</b> |
| #11        | 1        | 3. Short grass pasture                                | 8.00      | 96.48            | 1,206.00          | 2.260          | 0.148        |
| <b>#11</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.148</b> |
| #11        | 2        | 3. Short grass pasture                                | 8.00      | 72.08            | 901.00            | 2.260          | 0.110        |
| <b>#11</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.110</b> |
| #13        | 1        | 3. Short grass pasture                                | 12.00     | 148.44           | 1,237.00          | 2.770          | 0.124        |
| <b>#13</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.124</b> |
| #13        | 2        | 3. Short grass pasture                                | 13.00     | 25.74            | 198.00            | 2.880          | 0.019        |
| <b>#13</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.019</b> |
| #15        | 1        | 3. Short grass pasture                                | 15.00     | 384.90           | 2,566.00          | 3.090          | 0.230        |
| <b>#15</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.230</b> |
| #15        | 2        | 3. Short grass pasture                                | 21.00     | 272.37           | 1,297.00          | 3.660          | 0.098        |
| <b>#15</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.098</b> |
| #17        | 1        | 3. Short grass pasture                                | 16.00     | 155.20           | 970.00            | 3.200          | 0.084        |
| <b>#17</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.084</b> |
| #17        | 3        | 3. Short grass pasture                                | 8.00      | 26.56            | 332.00            | 2.260          | 0.040        |
| <b>#17</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.040</b> |
| #17        | 4        | 3. Short grass pasture                                | 8.00      | 26.16            | 327.00            | 2.260          | 0.040        |
| <b>#17</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.040</b> |
| #19        | 1        | 3. Short grass pasture                                | 16.00     | 180.15           | 1,126.00          | 3.200          | 0.097        |
| <b>#19</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.097</b> |
| #19        | 2        | 3. Short grass pasture                                | 11.00     | 319.44           | 2,904.00          | 2.650          | 0.304        |
| <b>#19</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.304</b> |
| #19        | 3        | 3. Short grass pasture                                | 32.00     | 196.15           | 613.00            | 4.520          | 0.037        |
| <b>#19</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.037</b> |
| #19        | 4        | 3. Short grass pasture                                | 14.00     | 195.58           | 1,397.00          | 2.990          | 0.129        |
| <b>#19</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.129</b> |
| #21        | 1        | 3. Short grass pasture                                | 30.00     | 101.40           | 338.00            | 4.380          | 0.021        |
| <b>#21</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #21        | 2        | 3. Short grass pasture                                | 17.00     | 302.94           | 1,782.00          | 3.290          | 0.150        |
| <b>#21</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.150</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #23        | 1        | 3. Short grass pasture                                | 33.00     | 200.31           | 607.00            | 4.590          | 0.036        |
| <b>#23</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.036</b> |
| #23        | 2        | 3. Short grass pasture                                | 28.00     | 249.20           | 890.00            | 4.230          | 0.058        |
| <b>#23</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.058</b> |
| #23        | 3        | 3. Short grass pasture                                | 14.00     | 511.28           | 3,652.00          | 2.990          | 0.339        |
| <b>#23</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.339</b> |
| #23        | 4        | 3. Short grass pasture                                | 15.00     | 101.25           | 675.00            | 3.090          | 0.060        |
| <b>#23</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.060</b> |
| #25        | 1        | 3. Short grass pasture                                | 24.00     | 173.04           | 721.00            | 3.910          | 0.051        |
| <b>#25</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.051</b> |
| #25        | 2        | 3. Short grass pasture                                | 13.00     | 146.75           | 1,128.84          | 2.880          | 0.108        |
| <b>#25</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.108</b> |
| #28        | 1        | 3. Short grass pasture                                | 9.00      | 100.98           | 1,122.00          | 2.400          | 0.129        |
| <b>#28</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.129</b> |
| #30        | 1        | 3. Short grass pasture                                | 8.00      | 76.47            | 956.00            | 2.260          | 0.117        |
| <b>#30</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.117</b> |
| #30        | 2        | 3. Short grass pasture                                | 2.00      | 8.32             | 416.00            | 1.130          | 0.102        |
| <b>#30</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.102</b> |
| #31        | 1        | 3. Short grass pasture                                | 2.00      | 1.00             | 50.00             | 1.130          | 0.012        |
| <b>#31</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.012</b> |
| #31        | 2        | 3. Short grass pasture                                | 7.00      | 25.90            | 370.00            | 2.110          | 0.048        |
| <b>#31</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.048</b> |
| #31        | 3        | 5. Nearly bare and untilled, and alluvial valley fans | 10.00     | 183.30           | 1,833.00          | 3.160          | 0.161        |
| <b>#31</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.161</b> |
| #31        | 4        | 3. Short grass pasture                                | 10.00     | 52.90            | 529.00            | 2.520          | 0.058        |
| <b>#31</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.058</b> |
| #31        | 5        | 3. Short grass pasture                                | 9.00      | 25.29            | 281.00            | 2.400          | 0.032        |
| <b>#31</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.032</b> |
| #31        | 6        | 3. Short grass pasture                                | 7.00      | 149.10           | 2,130.00          | 2.110          | 0.280        |
| <b>#31</b> | <b>6</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.280</b> |
| #31        | 7        | 3. Short grass pasture                                | 10.00     | 49.60            | 496.00            | 2.520          | 0.054        |
| <b>#31</b> | <b>7</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.054</b> |
| #31        | 8        | 3. Short grass pasture                                | 10.00     | 101.90           | 1,019.00          | 2.520          | 0.112        |
| <b>#31</b> | <b>8</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.112</b> |
| #36        | 1        | 3. Short grass pasture                                | 11.00     | 261.79           | 2,380.00          | 2.650          | 0.249        |
| <b>#36</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.249</b> |
| #36        | 2        | 3. Short grass pasture                                | 8.00      | 130.00           | 1,625.00          | 2.260          | 0.199        |
| <b>#36</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.199</b> |

# **Section 25 Pond**

## **Post Mine Channel Demonstration**

***100-Year 24-Hour Storm Event***  
***Post-Mining Condition***

Tony Tennyson

## ***General Information***

### ***Storm Information:***

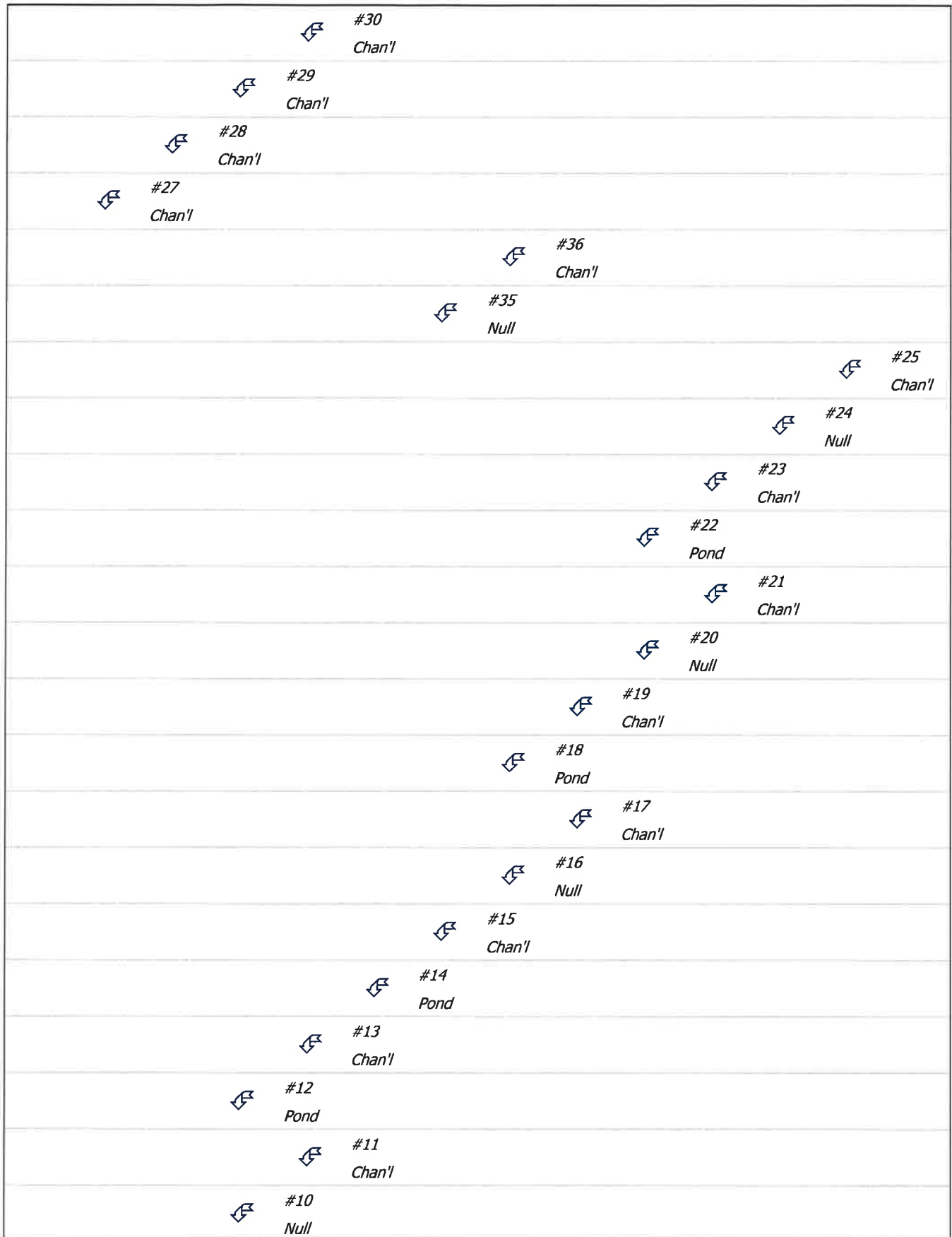
|                 |                |
|-----------------|----------------|
| Storm Type:     | NRCS Type II   |
| Design Storm:   | 100 yr - 24 hr |
| Rainfall Depth: | 2.700 inches   |

## Structure Networking:

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description                                          |
|---------|--------|--------------|--------|---------------|---------|------------------------------------------------------|
| Null    | #1     | ==>          | End    | 0.000         | 0.000   | Null Below Section 25 Pond                           |
| Pond    | #2     | ==>          | #1     | 0.000         | 0.000   | Section 25 Pond                                      |
| Channel | #3     | ==>          | #2     | 0.000         | 0.000   | Little Collom Gulch Natural Channel                  |
| Null    | #4     | ==>          | #3     | 0.000         | 0.000   | Null at Confluence with D-3 Ditch                    |
| Channel | #5     | ==>          | #4     | 0.000         | 0.000   | D-3 Ditch                                            |
| Channel | #6     | ==>          | #3     | 0.000         | 0.000   | Little Collom Gulch 0+00 to LCG-1                    |
| Null    | #7     | ==>          | #6     | 0.000         | 0.000   | Null at Confluence Lower Terrace Ditch               |
| Channel | #8     | ==>          | #7     | 0.000         | 0.000   | Lower Terrace Ditch                                  |
| Null    | #10    | ==>          | #6     | 0.000         | 0.000   | Null at Confluence Upper Terrace Ditch               |
| Channel | #11    | ==>          | #10    | 0.000         | 0.000   | Upper Terrace Ditch                                  |
| Pond    | #12    | ==>          | #6     | 0.000         | 0.000   | LCG-1 Stockpond                                      |
| Channel | #13    | ==>          | #12    | 0.000         | 0.000   | Little Collom Gulch LCG-1 to LCG-2                   |
| Pond    | #14    | ==>          | #13    | 0.000         | 0.000   | LCG-2 Stockpond                                      |
| Channel | #15    | ==>          | #14    | 0.000         | 0.000   | Little Collom Gulch LCG-2 to LCG-3                   |
| Null    | #16    | ==>          | #15    | 0.000         | 0.000   | Null at Confluence with Sage Draw                    |
| Channel | #17    | ==>          | #16    | 0.000         | 0.000   | Sage Draw                                            |
| Pond    | #18    | ==>          | #15    | 0.000         | 0.000   | LCG-3 Stockpond                                      |
| Channel | #19    | ==>          | #18    | 0.000         | 0.000   | Little Collom Gulch LCG-3 to LCG-4                   |
| Null    | #20    | ==>          | #19    | 0.000         | 0.000   | Null at Confluence with Grouse Draw                  |
| Channel | #21    | ==>          | #20    | 0.000         | 0.000   | Grouse Draw                                          |
| Pond    | #22    | ==>          | #19    | 0.000         | 0.000   | LCG-4 Stockpond                                      |
| Channel | #23    | ==>          | #22    | 0.000         | 0.000   | Little Collom Gulch LCG-4 to 100+00                  |
| Null    | #24    | ==>          | #23    | 0.000         | 0.000   | Null at Confluence with Sharpie Draw                 |
| Channel | #25    | ==>          | #24    | 0.000         | 0.000   | Sharpie Draw                                         |
| Channel | #27    | ==>          | #2     | 0.000         | 0.000   | Lower Bobcat Draw                                    |
| Channel | #28    | ==>          | #27    | 0.000         | 0.000   | Natural Channel Middle Pond to Section 36 Pond       |
| Channel | #29    | ==>          | #28    | 0.000         | 0.000   | Middle Bobcat Draw                                   |
| Channel | #30    | ==>          | #29    | 0.000         | 0.000   | Natural Channel Section 36 Pond to Upper Bobcat Draw |
| Channel | #31    | ==>          | #30    | 0.000         | 0.000   | Upper Bobcat Draw 0+00 to 27+81                      |
| Null    | #35    | ==>          | #14    | 0.000         | 0.000   | Null at Confluence Dusky Draw and LCG-2              |
| Channel | #36    | ==>          | #35    | 0.000         | 0.000   | Dusky Draw                                           |



#31  
Chan'l



|                                                                                   |                                                                                   |              |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------|
|                                                                                   |  | #8<br>Chan'l |
|                                                                                   |  | #7<br>Null   |
|                                                                                   |  | #6<br>Chan'l |
|                                                                                   |  | #5<br>Chan'l |
|                                                                                   |  | #4<br>Null   |
|                                                                                   |  | #3<br>Chan'l |
|  | #2<br>Pond                                                                        |              |
| #1<br>Null                                                                        |                                                                                   |              |



### ***Structure Summary:***

|        | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|--------|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #31    | 164.300                                   | 164.300                               | 91.42                      | 8.39                                 |
| #30    | 24.700                                    | 189.000                               | 94.76                      | 8.66                                 |
| #29    | 0.000                                     | 189.000                               | 94.76                      | 8.66                                 |
| #28    | 19.600                                    | 208.600                               | 94.76                      | 8.68                                 |
| #27    | 0.000                                     | 208.600                               | 94.76                      | 8.68                                 |
| #36    | 117.900                                   | 117.900                               | 39.64                      | 3.96                                 |
| #35    | 0.000                                     | 117.900                               | 39.64                      | 3.96                                 |
| #25    | 22.800                                    | 22.800                                | 5.84                       | 0.44                                 |
| #24    | 0.000                                     | 22.800                                | 5.84                       | 0.44                                 |
| #23    | 204.600                                   | 227.400                               | 40.52                      | 4.49                                 |
| #22 In |                                           |                                       | 40.52                      | 4.49                                 |
| Out    | 0.000                                     | 227.400                               | 2.16                       | 2.40                                 |
| #21    | 49.670                                    | 49.670                                | 3.73                       | 0.31                                 |
| #20    | 0.000                                     | 49.670                                | 3.73                       | 0.31                                 |
| #19    | 130.200                                   | 407.270                               | 37.30                      | 6.60                                 |
| #18 In |                                           |                                       | 37.30                      | 6.60                                 |
| Out    | 0.000                                     | 407.270                               | 3.50                       | 4.49                                 |
| #17    | 163.300                                   | 163.300                               | 25.46                      | 4.23                                 |
| #16    | 0.000                                     | 163.300                               | 25.46                      | 4.23                                 |
| #15    | 127.800                                   | 698.370                               | 81.69                      | 15.19                                |
| #14 In |                                           |                                       | 113.72                     | 19.15                                |
| Out    | 0.000                                     | 816.270                               | 45.11                      | 17.02                                |
| #13    | 67.100                                    | 883.370                               | 55.67                      | 20.85                                |
| #12 In |                                           |                                       | 55.67                      | 20.85                                |
| Out    | 0.000                                     | 883.370                               | 30.03                      | 18.58                                |
| #11    | 37.000                                    | 37.000                                | 17.19                      | 1.64                                 |
| #10    | 0.000                                     | 37.000                                | 17.19                      | 1.64                                 |
| #8     | 14.600                                    | 14.600                                | 10.55                      | 0.77                                 |
| #7     | 0.000                                     | 14.600                                | 10.55                      | 0.77                                 |
| #6     | 16.500                                    | 951.470                               | 41.51                      | 21.98                                |
| #5     | 14.900                                    | 14.900                                | 1.80                       | 0.20                                 |
| #4     | 0.000                                     | 14.900                                | 1.80                       | 0.20                                 |
| #3     | 234.900                                   | 1,201.270                             | 86.63                      | 26.04                                |
| #2 In  |                                           |                                       | 229.51                     | 38.70                                |
| Out    | 128.200                                   | 1,538.070                             | 51.61                      | 34.64                                |
| #1     | 0.000                                     | 1,538.070                             | 51.61                      | 34.64                                |

## Structure Detail:

### Structure #31 (Riprap Channel)

*Upper Bobcat Draw 0+00 to 27+81*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 8.3       | 3.76                 |                      |                         |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 91.42 cfs     |              |
| Depth:            | 0.69 ft       | 4.45 ft      |
| Top Width:        | 14.14 ft      | 36.70 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 8.32 sq ft    |              |
| Hydraulic Radius: | 0.580 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #30 (Vegetated Channel)

*Natural Channel Section 36 Pond to Upper Bobcat Draw*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 12.9      | D, B               |                      |                      |                         | 5.0                     |

## Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 94.76 cfs                             |                                      | 94.76 cfs                            |                                     |
| Depth:                 | 0.93 ft                               |                                      | 1.23 ft                              |                                     |
| Top Width:             | 8.74 ft                               |                                      | 9.93 ft                              |                                     |
| Velocity:              | 14.75 fps                             |                                      | 10.29 fps                            |                                     |
| X-Section Area:        | 6.42 sq ft                            |                                      | 9.21 sq ft                           |                                     |
| Hydraulic Radius:      | 0.700 ft                              |                                      | 0.876 ft                             |                                     |
| Froude Number:         | 3.03                                  |                                      | 1.88                                 |                                     |
| Roughness Coefficient: | 0.0286                                |                                      | 0.0475                               |                                     |

## Structure #29 (Riprap Channel)

### Middle Bobcat Draw

## Trapezoidal Riprap Channel Inputs:

### Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 10.00                | 3.0:1                      | 3.0:1                       | 5.0       | 3.26                    |                         |                               |

## Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 94.76 cfs     |              |
| Depth:            | 0.74 ft       | 4.00 ft      |
| Top Width:        | 14.41 ft      | 33.97 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 8.98 sq ft    |              |
| Hydraulic Radius: | 0.613 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #28 (Vegetated Channel)

*Natural Channel Middle Pond to Section 36 Pond*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 6.4       | D, B               |                      |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 94.76 cfs                             |                                      | 94.76 cfs                            |                                     |
| Depth:                 | 1.15 ft                               |                                      | 1.53 ft                              |                                     |
| Top Width:             | 9.60 ft                               |                                      | 11.14 ft                             |                                     |
| Velocity:              | 11.27 fps                             |                                      | 7.66 fps                             |                                     |
| X-Section Area:        | 8.40 sq ft                            |                                      | 12.38 sq ft                          |                                     |
| Hydraulic Radius:      | 0.828 ft                              |                                      | 1.044 ft                             |                                     |
| Froude Number:         | 2.12                                  |                                      | 1.28                                 |                                     |
| Roughness Coefficient: | 0.0295                                |                                      | 0.0506                               |                                     |

Structure #27 (Riprap Channel)

*Lower Bobcat Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 6.4       | 3.28                 |                      |                         |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 94.76 cfs     |              |
| Depth:            | 0.72 ft       | 4.00 ft      |
| Top Width:        | 14.34 ft      | 34.02 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 8.81 sq ft    |              |
| Hydraulic Radius: | 0.604 ft      |              |

|                 | w/o Freeboard | w/ Freeboard |
|-----------------|---------------|--------------|
| Froude Number*: |               |              |
| Manning's n*:   |               |              |
| Dmin:           | 3.00 in       |              |
| D50:            | 9.00 in       |              |
| Dmax:           | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #36 (Riprap Channel)

#### *Dusky Draw*

Trapezoidal Riprap Channel Inputs:

#### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.7       | 3.63                 |                      |                         |

Riprap Channel Results:

#### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 39.64 cfs     |              |
| Depth:            | 0.37 ft       | 4.00 ft      |
| Top Width:        | 12.22 ft      | 34.00 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 4.11 sq ft    |              |
| Hydraulic Radius: | 0.333 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #35 (Null)

*Null at Confluence Dusky Draw and LCG-2*

### Structure #25 (Riprap Channel)

*Sharpie Draw*

**Trapezoidal Riprap Channel Inputs:**

**Material: Riprap**

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 22.0      | 2.95                 |                      |                         |

**Riprap Channel Results:**

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 5.84 cfs      |              |
| Depth:            | 0.05 ft       | 3.00 ft      |
| Top Width:        | 10.32 ft      | 28.02 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.53 sq ft    |              |
| Hydraulic Radius: | 0.052 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

**Structure #24 (Null)**

*Null at Confluence with Sharpie Draw*

**Structure #23 (Riprap Channel)**

*Little Collom Gulch LCG-4 to 100+00*

**Trapezoidal Riprap Channel Inputs:**

**Material: Riprap**

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.4       | 3.80                 |                      |                         |

**Riprap Channel Results:**

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 40.52 cfs     |              |
| Depth:            | 0.38 ft       | 4.18 ft      |
| Top Width:        | 12.26 ft      | 35.06 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 4.20 sq ft    |              |
| Hydraulic Radius: | 0.339 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #22 (Pond)

### *LCG-4 Stockpond*

#### Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 2.00             | 0.0150      | 105.00             | 0.90                      | 0.00                 |

#### Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 106.03 ft |
| Dewater Time:   | 0.28 days |

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

### Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |
| 105.00    | 0.843        | 2.416               | 0.000              | Spillway #2              |
| 106.00    | 0.872        | 3.273               | 2.094              | 4.95*                    |
| 106.03    | 0.858        | 3.299               | 2.163              | 1.75 Peak Stage          |
| 107.00    | 0.872        | 4.145               | 4.414              | Spillway #1              |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |

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

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>2.094              | 2.094                                   |
| 107.00            | 0.000                       | (5)>4.414              | 4.414                                   |
| 108.00            | 36.939                      | (6)>5.182              | 42.121                                  |

## Structure #21 (Riprap Channel)

### Grouse Draw

Trapezoidal Riprap Channel Inputs:

### Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 10.00                | 3.0:1                      | 3.0:1                       | 16.8      | 3.90                    |                         |                               |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design



|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 3.73 cfs      |              |
| Depth:            | 0.06 ft       | 3.96 ft      |
| Top Width:        | 10.33 ft      | 33.73 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.57 sq ft    |              |
| Hydraulic Radius: | 0.055 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #20 (Null)

*Null at Confluence with Grouse Draw*

## Structure #19 (Riprap Channel)

*Little Collom Gulch LCG-3 to LCG-4*

Trapezoidal Riprap Channel Inputs:

### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.8       | 3.76                 |                      |                         |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 37.30 cfs     |              |
| Depth:            | 0.35 ft       | 4.11 ft      |
| Top Width:        | 12.11 ft      | 34.67 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 3.89 sq ft    |              |
| Hydraulic Radius: | 0.318 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #18 (Pond)

### *LCG-3 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 2.00             | 0.0150      | 105.00             | 0.90                      | 0.00                 |

Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 106.61 ft |
| Dewater Time:   | 0.40 days |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 100.00    | 0.016     | 0.000            | 0.000           |                    |
| 101.00    | 0.096     | 0.050            | 0.000           |                    |
| 102.00    | 0.539     | 0.338            | 0.000           |                    |
| 103.00    | 0.654     | 0.933            | 0.000           |                    |
| 104.00    | 0.735     | 1.628            | 0.000           |                    |
| 105.00    | 0.843     | 2.416            | 0.000           | Spillway #2        |
| 106.00    | 0.872     | 3.273            | 2.094           | 4.95*              |
| 106.61    | 0.866     | 3.802            | 3.501           | 4.70 Peak Stage    |
| 107.00    | 0.872     | 4.145            | 4.414           | Spillway #1        |
| 108.00    | 0.872     | 5.017            | 42.121          |                    |

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

Detailed Discharge Table

| Elevation (ft) | Emergency Spillway (cfs) | Straight Pipe (cfs) | Combined Total Discharge (cfs) |
|----------------|--------------------------|---------------------|--------------------------------|
| 100.00         | 0.000                    | 0.000               | 0.000                          |
| 101.00         | 0.000                    | 0.000               | 0.000                          |
| 102.00         | 0.000                    | 0.000               | 0.000                          |
| 103.00         | 0.000                    | 0.000               | 0.000                          |
| 104.00         | 0.000                    | 0.000               | 0.000                          |
| 105.00         | 0.000                    | 0.000               | 0.000                          |
| 106.00         | 0.000                    | (3)>2.094           | 2.094                          |
| 107.00         | 0.000                    | (5)>4.414           | 4.414                          |
| 108.00         | 36.939                   | (6)>5.182           | 42.121                         |

Structure #17 (Riprap Channel)

*Sage Draw*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 5.00              | 3.0:1                | 3.0:1                 | 2.1       | 2.89                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 25.46 cfs     |              |
| Depth:            | 0.44 ft       | 3.33 ft      |
| Top Width:        | 7.65 ft       | 24.99 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 2.80 sq ft    |              |
| Hydraulic Radius: | 0.359 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #16 (Null)

*Null at Confluence with Sage Draw*

Structure #15 (Riprap Channel)

*Little Collom Gulch LCG-2 to LCG-3*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 4.7       | 3.77                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 81.69 cfs     |              |
| Depth:            | 0.66 ft       | 4.43 ft      |
| Top Width:        | 13.97 ft      | 36.59 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 7.94 sq ft    |              |
| Hydraulic Radius: | 0.559 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #14 (Pond)

*LCG-2 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 30.00             | 2.00:1         | 2.00:1          | 20.00             |

## Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 18.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 107.77 ft |
| Dewater Time:   | 0.81 days |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |             |
|-----------|--------------|---------------------|--------------------|--------------------------|-------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |             |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |             |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |             |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |             |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |             |
| 105.00    | 0.843        | 2.416               | 0.000              |                          | Spillway #2 |
| 106.00    | 0.872        | 3.273               | 3.142              | 3.30*                    |             |
| 107.00    | 0.872        | 4.145               | 8.425              | 4.70                     | Spillway #1 |
| 107.77    | 0.872        | 4.817               | 45.109             | 11.50                    | Peak Stage  |
| 108.00    | 0.872        | 5.017               | 56.073             |                          |             |

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

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>3.142              | 3.142                                   |

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 107.00            | 0.000                       | (5)>8.425              | 8.425                                   |
| 108.00            | 43.900                      | (5)>12.173             | 56.073                                  |

Structure #13 (Riprap Channel)

*Little Collom Gulch LCG-1 to LCG-2*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 10.00                | 3.0:1                      | 3.0:1                       | 4.9       | 3.72                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 55.67 cfs     |              |
| Depth:            | 0.50 ft       | 4.22 ft      |
| Top Width:        | 12.97 ft      | 35.29 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 5.69 sq ft    |              |
| Hydraulic Radius: | 0.433 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #12 (Pond)

*LCG-1 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 107.00        | 30.00                | 2.00:1            | 2.00:1             | 20.00                |

## Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 12.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 107.57 ft |
| Dewater Time:   | 1.21 days |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |             |
|-----------|--------------|---------------------|--------------------|--------------------------|-------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |             |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |             |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |             |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |             |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |             |
| 105.00    | 0.843        | 2.416               | 0.000              |                          | Spillway #2 |
| 106.00    | 0.872        | 3.273               | 2.094              | 4.95*                    |             |
| 107.00    | 0.872        | 4.145               | 4.414              | 10.10                    | Spillway #1 |
| 107.57    | 0.872        | 4.645               | 30.029             | 13.90                    | Peak Stage  |
| 108.00    | 0.872        | 5.017               | 49.083             |                          |             |

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

## Detailed Discharge Table

| Elevation<br>(ft) | Emergency<br>Spillway (cfs) | Straight Pipe<br>(cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-----------------------------|------------------------|-----------------------------------------|
| 100.00            | 0.000                       | 0.000                  | 0.000                                   |
| 101.00            | 0.000                       | 0.000                  | 0.000                                   |
| 102.00            | 0.000                       | 0.000                  | 0.000                                   |
| 103.00            | 0.000                       | 0.000                  | 0.000                                   |
| 104.00            | 0.000                       | 0.000                  | 0.000                                   |
| 105.00            | 0.000                       | 0.000                  | 0.000                                   |
| 106.00            | 0.000                       | (3)>2.094              | 2.094                                   |
| 107.00            | 0.000                       | (5)>4.414              | 4.414                                   |
| 108.00            | 43.900                      | (6)>5.182              | 49.083                                  |

Structure #11 (Vegetated Channel)

*Upper Terrace Ditch*

Triangular Vegetated Channel Inputs:

Material: Tall fescue

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 2.0       | D, B                  | 0.92                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 17.19 cfs                             |                                      | 17.19 cfs                            |                                     |
| Depth:                 | 1.46 ft                               | 2.38 ft                              | 2.08 ft                              | 3.00 ft                             |
| Top Width:             | 6.56 ft                               | 10.70 ft                             | 9.36 ft                              | 13.50 ft                            |
| Velocity:              | 3.59 fps                              |                                      | 1.77 fps                             |                                     |
| X-Section Area:        | 4.78 sq ft                            |                                      | 9.73 sq ft                           |                                     |
| Hydraulic Radius:      | 0.666 ft                              |                                      | 0.950 ft                             |                                     |
| Froude Number:         | 0.74                                  |                                      | 0.31                                 |                                     |
| Roughness Coefficient: | 0.0447                                |                                      | 0.1151                               |                                     |

Structure #10 (Null)

*Null at Confluence Upper Terrace Ditch*

Structure #8 (Vegetated Channel)

*Lower Terrace Ditch*



Triangular Vegetated Channel Inputs:

Material: Tall fescue

| Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 1.5:1                      | 3.0:1                       | 2.0       | D, B                  | 1.13                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 10.55 cfs                             |                                      | 10.55 cfs                            |                                     |
| Depth:                 | 1.26 ft                               | 2.39 ft                              | 1.87 ft                              | 3.00 ft                             |
| Top Width:             | 5.68 ft                               | 10.77 ft                             | 8.40 ft                              | 13.48 ft                            |
| Velocity:              | 2.94 fps                              |                                      | 1.35 fps                             |                                     |
| X-Section Area:        | 3.59 sq ft                            |                                      | 7.83 sq ft                           |                                     |
| Hydraulic Radius:      | 0.577 ft                              |                                      | 0.853 ft                             |                                     |
| Froude Number:         | 0.65                                  |                                      | 0.25                                 |                                     |
| Roughness Coefficient: | 0.0496                                |                                      | 0.1406                               |                                     |

Structure #7 (Null)

*Null at Confluence Lower Terrace Ditch*

Structure #6 (Riprap Channel)

*Little Collom Gulch 0+00 to LCG-1*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 15.00                | 3.0:1                      | 3.0:1                       | 16.6      | 3.94                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 41.51 cfs     |              |
| Depth:            | 0.22 ft       | 4.16 ft      |
| Top Width:        | 16.30 ft      | 39.94 ft     |
| Velocity*:        |               |              |

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| X-Section Area:   | 3.38 sq ft    |              |
| Hydraulic Radius: | 0.207 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 3.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 11.25 in      |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #5 (Riprap Channel)

#### *D-3 Ditch*

Trapezoidal Riprap Channel Inputs:

#### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 16.1      | 2.98                 |                      |                         |

Riprap Channel Results:

#### **Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 1.80 cfs      |              |
| Depth:            | 0.03 ft       | 3.01 ft      |
| Top Width:        | 12.12 ft      | 24.04 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.36 sq ft    |              |
| Hydraulic Radius: | 0.029 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #4 (Null)

*Null at Confluence with D-3 Ditch*

### Structure #3 (Vegetated Channel)

*Little Collom Gulch Natural Channel*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 5.7       | D, B               |                      |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 86.63 cfs                             |                                      | 86.63 cfs                            |                                     |
| Depth:                 | 1.15 ft                               |                                      | 1.55 ft                              |                                     |
| Top Width:             | 9.59 ft                               |                                      | 11.20 ft                             |                                     |
| Velocity:              | 10.34 fps                             |                                      | 6.91 fps                             |                                     |
| X-Section Area:        | 8.38 sq ft                            |                                      | 12.54 sq ft                          |                                     |
| Hydraulic Radius:      | 0.827 ft                              |                                      | 1.052 ft                             |                                     |
| Froude Number:         | 1.95                                  |                                      | 1.15                                 |                                     |
| Roughness Coefficient: | 0.0303                                |                                      | 0.0533                               |                                     |

Structure #2 (Pond)

*Section 25 Pond*

Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 6,866.00 ft |
| Initial Pool:      | 3.19 ac-ft  |

Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 16.00             | 18.00                | 182.00             | 5.00             | 0.0150      | 6,872.00           | 2                        |

Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 6,875.00      | 45.00             | 2.00:1         | 2.00:1          | 20.00             |

Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 6,875.88 ft |
| Dewater Time:   | 3.53 days   |

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

Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 6,855.00  | 0.047        | 0.000               | 0.000              |                          |
| 6,856.00  | 0.102        | 0.073               | 0.000              |                          |
| 6,857.00  | 0.156        | 0.201               | 0.000              |                          |
| 6,858.00  | 0.191        | 0.374               | 0.000              |                          |
| 6,859.00  | 0.228        | 0.583               | 0.000              |                          |
| 6,860.00  | 0.266        | 0.830               | 0.000              |                          |
| 6,861.00  | 0.306        | 1.116               | 0.000              |                          |
| 6,862.00  | 0.348        | 1.443               | 0.000              |                          |
| 6,863.00  | 0.391        | 1.812               | 0.000              |                          |
| 6,864.00  | 0.436        | 2.225               | 0.000              |                          |
| 6,865.00  | 0.483        | 2.684               | 0.000              |                          |
| 6,866.00  | 0.532        | 3.192               | 0.000              |                          |
| 6,867.00  | 0.582        | 3.749               | 0.000              |                          |
| 6,868.00  | 0.635        | 4.357               | 0.000              | Low hole SPW #1          |
| 6,869.00  | 0.689        | 5.019               | 0.473              | 16.94*                   |
| 6,870.00  | 0.746        | 5.736               | 0.669              | 12.98*                   |
| 6,871.00  | 0.804        | 6.511               | 0.819              | 11.45*                   |
| 6,872.00  | 0.864        | 7.345               | 0.945              | 10.67* Spillway #1       |
| 6,873.00  | 0.927        | 8.240               | 8.509              | 17.90                    |
| 6,874.00  | 0.991        | 9.199               | 12.033             | 2.10                     |
| 6,875.00  | 1.060        | 10.224              | 14.738             | 2.05 Spillway #2         |
| 6,875.88  | 1.117        | 11.187              | 51.612             | 10.65 Peak Stage         |
| 6,876.00  | 1.125        | 11.316              | 56.584             |                          |
| 6,877.00  | 1.187        | 12.472              | 168.142            |                          |
| 6,878.00  | 1.250        | 13.691              | 330.639            |                          |
| 6,879.00  | 1.318        | 14.974              | 558.801            |                          |
| 6,880.00  | 1.386        | 16.326              | 834.822            |                          |

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

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 6,855.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,856.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,857.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,858.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,859.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,860.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,861.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,862.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,863.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,864.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,865.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,866.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,867.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,868.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 6,869.00          | 0.473             | 0.000                       | 0.473                                   |
| 6,870.00          | 0.669             | 0.000                       | 0.669                                   |
| 6,871.00          | 0.819             | 0.000                       | 0.819                                   |
| 6,872.00          | 0.945             | 0.000                       | 0.945                                   |
| 6,873.00          | 8.509             | 0.000                       | 8.509                                   |
| 6,874.00          | 12.033            | 0.000                       | 12.033                                  |
| 6,875.00          | 14.738            | 0.000                       | 14.738                                  |
| 6,876.00          | 17.018            | 39.567                      | 56.584                                  |
| 6,877.00          | 19.026            | 149.116                     | 168.142                                 |
| 6,878.00          | 20.842            | 309.797                     | 330.639                                 |
| 6,879.00          | 22.512            | 536.289                     | 558.801                                 |
| 6,880.00          | 24.066            | 810.756                     | 834.822                                 |

Structure #1 (Null)

*Null Below Section 25 Pond*

### 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) |
|--------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #31    | 1        | 1.000          | 0.012              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 2        | 12.600         | 0.048              | 0.000        | 0.000  | 74.000       | F   | 10.52                | 0.759                 |
|        | 3        | 88.700         | 0.161              | 0.000        | 0.000  | 80.000       | F   | 83.91                | 7.334                 |
|        | 4        | 2.400          | 0.058              | 0.000        | 0.000  | 74.000       | F   | 2.00                 | 0.145                 |
|        | 5        | 2.200          | 0.032              | 0.000        | 0.000  | 47.000       | S   | 0.00                 | 0.000                 |
|        | 6        | 36.800         | 0.280              | 0.000        | 0.000  | 47.000       | S   | 0.06                 | 0.034                 |
|        | 7        | 4.000          | 0.054              | 0.000        | 0.000  | 62.000       | M   | 1.23                 | 0.095                 |
|        | 8        | 16.600         | 0.112              | 0.000        | 0.000  | 47.000       | S   | 0.04                 | 0.023                 |
|        | <b>Σ</b> | <b>164.300</b> |                    |              |        |              |     | <b>91.42</b>         | <b>8.390</b>          |
| #30    | 1        | 20.700         | 0.117              | 0.000        | 0.000  | 47.000       | S   | 0.05                 | 0.029                 |
|        | 2        | 4.000          | 0.102              | 0.000        | 0.000  | 74.000       | F   | 3.34                 | 0.241                 |
|        | <b>Σ</b> | <b>189.000</b> |                    |              |        |              |     | <b>94.76</b>         | <b>8.660</b>          |
| #29    | <b>Σ</b> | <b>189.000</b> |                    |              |        |              |     | <b>94.76</b>         | <b>8.660</b>          |
| #28    | 1        | 19.600         | 0.129              | 0.000        | 0.000  | 47.000       | S   | 0.03                 | 0.018                 |
|        | <b>Σ</b> | <b>208.600</b> |                    |              |        |              |     | <b>94.76</b>         | <b>8.678</b>          |
| #27    | <b>Σ</b> | <b>208.600</b> |                    |              |        |              |     | <b>94.76</b>         | <b>8.678</b>          |
| #36    | 1        | 68.100         | 0.249              | 0.000        | 0.000  | 74.000       | F   | 39.64                | 3.913                 |
|        | 2        | 49.800         | 0.199              | 0.000        | 0.000  | 47.000       | S   | 0.08                 | 0.047                 |
|        | <b>Σ</b> | <b>117.900</b> |                    |              |        |              |     | <b>39.64</b>         | <b>3.960</b>          |
| #35    | <b>Σ</b> | <b>117.900</b> |                    |              |        |              |     | <b>39.64</b>         | <b>3.960</b>          |
| #25    | 1        | 7.000          | 0.051              | 0.000        | 0.000  | 74.000       | F   | 5.84                 | 0.422                 |
|        | 2        | 15.800         | 0.108              | 0.000        | 0.000  | 47.000       | S   | 0.04                 | 0.022                 |
|        | <b>Σ</b> | <b>22.800</b>  |                    |              |        |              |     | <b>5.84</b>          | <b>0.444</b>          |
| #24    | <b>Σ</b> | <b>22.800</b>  |                    |              |        |              |     | <b>5.84</b>          | <b>0.444</b>          |
| #23    | 1        | 30.700         | 0.036              | 0.000        | 0.000  | 62.000       | M   | 9.43                 | 0.730                 |
|        | 2        | 30.000         | 0.058              | 0.000        | 0.000  | 74.000       | F   | 25.04                | 1.807                 |
|        | 3        | 138.500        | 0.339              | 0.000        | 0.000  | 57.000       | M   | 3.93                 | 1.500                 |
|        | 4        | 5.400          | 0.060              | 0.000        | 0.000  | 47.000       | S   | 0.01                 | 0.005                 |
|        | <b>Σ</b> | <b>227.400</b> |                    |              |        |              |     | <b>40.52</b>         | <b>4.486</b>          |
| #22    | <b>Σ</b> | <b>227.400</b> |                    |              |        |              |     | <b>40.52</b>         | <b>4.486</b>          |
| #21    | 1        | 4.470          | 0.021              | 0.000        | 0.000  | 74.000       | F   | 3.73                 | 0.269                 |
|        | 2        | 45.200         | 0.150              | 0.000        | 0.000  | 47.000       | S   | 0.07                 | 0.043                 |

| Stru #     | SWS #    | SWS Area (ac)  | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|------------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
|            | <b>Σ</b> | <b>49.670</b>  |                    |              |        |              |     | <b>3.73</b>          | <b>0.312</b>          |
| <b>#20</b> | <b>Σ</b> | <b>49.670</b>  |                    |              |        |              |     | <b>3.73</b>          | <b>0.312</b>          |
| #19        | 1        | 14.800         | 0.097              | 0.000        | 0.000  | 47.000       | S   | 0.04                 | 0.020                 |
|            | 2        | 46.700         | 0.304              | 0.000        | 0.000  | 74.000       | F   | 25.37                | 2.651                 |
|            | 3        | 50.400         | 0.037              | 0.000        | 0.000  | 62.000       | M   | 15.48                | 1.198                 |
|            | 4        | 18.300         | 0.129              | 0.000        | 0.000  | 47.000       | S   | 0.03                 | 0.017                 |
|            | <b>Σ</b> | <b>407.270</b> |                    |              |        |              |     | <b>37.30</b>         | <b>6.601</b>          |
| <b>#18</b> | <b>Σ</b> | <b>407.270</b> |                    |              |        |              |     | <b>37.30</b>         | <b>6.601</b>          |
| #17        | 1        | 22.600         | 0.084              | 0.000        | 0.000  | 74.000       | F   | 18.86                | 1.362                 |
|            | 2        | 130.800        | 0.473              | 0.000        | 0.000  | 62.000       | M   | 10.97                | 2.486                 |
|            | 3        | 4.000          | 0.040              | 0.000        | 0.000  | 74.000       | F   | 3.34                 | 0.241                 |
|            | 4        | 5.900          | 0.040              | 0.000        | 0.000  | 62.000       | M   | 1.81                 | 0.140                 |
|            | <b>Σ</b> | <b>163.300</b> |                    |              |        |              |     | <b>25.46</b>         | <b>4.228</b>          |
| <b>#16</b> | <b>Σ</b> | <b>163.300</b> |                    |              |        |              |     | <b>25.46</b>         | <b>4.228</b>          |
| #15        | 1        | 102.200        | 0.230              | 0.000        | 0.000  | 74.000       | F   | 60.76                | 5.862                 |
|            | 2        | 25.600         | 0.098              | 0.000        | 0.000  | 62.000       | M   | 7.86                 | 0.609                 |
|            | <b>Σ</b> | <b>698.370</b> |                    |              |        |              |     | <b>81.69</b>         | <b>15.189</b>         |
| <b>#14</b> | <b>Σ</b> | <b>816.270</b> |                    |              |        |              |     | <b>113.72</b>        | <b>19.149</b>         |
| #13        | 1        | 61.300         | 0.124              | 0.000        | 0.000  | 74.000       | F   | 51.16                | 3.693                 |
|            | 2        | 5.800          | 0.019              | 0.000        | 0.000  | 62.000       | M   | 1.78                 | 0.138                 |
|            | <b>Σ</b> | <b>883.370</b> |                    |              |        |              |     | <b>55.67</b>         | <b>20.855</b>         |
| <b>#12</b> | <b>Σ</b> | <b>883.370</b> |                    |              |        |              |     | <b>55.67</b>         | <b>20.855</b>         |
| #11        | 1        | 22.200         | 0.148              | 0.000        | 0.000  | 74.000       | F   | 14.59                | 1.290                 |
|            | 2        | 14.800         | 0.110              | 0.000        | 0.000  | 62.000       | M   | 4.54                 | 0.352                 |
|            | <b>Σ</b> | <b>37.000</b>  |                    |              |        |              |     | <b>17.19</b>         | <b>1.642</b>          |
| <b>#10</b> | <b>Σ</b> | <b>37.000</b>  |                    |              |        |              |     | <b>17.19</b>         | <b>1.642</b>          |
| #8         | 1        | 11.500         | 0.053              | 0.000        | 0.000  | 74.000       | F   | 9.60                 | 0.693                 |
|            | 2        | 3.100          | 0.037              | 0.000        | 0.000  | 62.000       | M   | 0.95                 | 0.074                 |
|            | <b>Σ</b> | <b>14.600</b>  |                    |              |        |              |     | <b>10.55</b>         | <b>0.766</b>          |
| <b>#7</b>  | <b>Σ</b> | <b>14.600</b>  |                    |              |        |              |     | <b>10.55</b>         | <b>0.766</b>          |
| #6         | 1        | 16.500         | 0.091              | 0.000        | 0.000  | 74.000       | F   | 13.77                | 0.994                 |
|            | <b>Σ</b> | <b>951.470</b> |                    |              |        |              |     | <b>41.51</b>         | <b>21.978</b>         |
| #5         | 1        | 14.900         | 0.083              | 0.000        | 0.000  | 57.000       | F   | 1.80                 | 0.201                 |

| Stru #    | SWS #    | SWS Area (ac)    | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS   | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|-----------|----------|------------------|--------------------|--------------|--------|--------------|-------|----------------------|-----------------------|
|           | <b>Σ</b> | <b>14.900</b>    |                    |              |        |              |       | <b>1.80</b>          | <b>0.201</b>          |
| <b>#4</b> | <b>Σ</b> | <b>14.900</b>    |                    |              |        |              |       | <b>1.80</b>          | <b>0.201</b>          |
| #3        | 1        | 170.900          | 0.627              | 0.000        | 0.000  | 47.000       | S     | 0.26                 | 0.160                 |
|           | 2        | 23.800           | 0.069              | 0.000        | 0.000  | 74.000       | F     | 19.86                | 1.434                 |
|           | 3        | 4.400            | 0.078              | 0.000        | 0.000  | 62.000       | M     | 1.35                 | 0.105                 |
|           | 4        | 31.600           | 0.199              | 0.000        | 0.000  | 74.000       | F     | 19.56                | 1.805                 |
|           | 5        | 4.200            | 0.039              | 0.000        | 0.000  | 80.000       | F     | 4.80                 | 0.360                 |
|           | <b>Σ</b> | <b>1,201.270</b> |                    |              |        |              |       | <b>86.63</b>         | <b>26.043</b>         |
| #2        | 1        | 75.000           | 0.368              | 0.000        | 0.000  | 47.000       | S     | 0.12                 | 0.070                 |
|           | 2        | 3.600            | 0.038              | 0.000        | 0.000  | 74.000       | F     | 3.00                 | 0.217                 |
|           | 3        | 10.600           | 0.073              | 0.000        | 0.000  | 80.000       | F     | 12.12                | 0.909                 |
|           | 4        | 20.200           | 0.157              | 0.000        | 0.000  | 74.000       | F     | 13.28                | 1.174                 |
|           | 5        | 18.800           | 0.104              | 0.000        | 0.000  | 80.000       | 21.49 | 1.611                |                       |
|           | <b>Σ</b> | <b>1,538.070</b> |                    |              |        |              |       | <b>229.51</b>        | <b>38.702</b>         |
| <b>#1</b> | <b>Σ</b> | <b>1,538.070</b> |                    |              |        |              |       | <b>51.61</b>         | <b>34.642</b>         |

## Subwatershed Time of Concentration Details:

| Stru #    | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|-----------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #2        | 1        | 3. Short grass pasture                                | 10.00     | 334.30           | 3,343.00          | 2.520          | 0.368        |
| <b>#2</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.368</b> |
| #2        | 2        | 3. Short grass pasture                                | 8.00      | 25.04            | 313.00            | 2.260          | 0.038        |
| <b>#2</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.038</b> |
| #2        | 3        | 5. Nearly bare and untilled, and alluvial valley fans | 9.00      | 71.91            | 799.00            | 3.000          | 0.073        |
| <b>#2</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.073</b> |
| #2        | 4        | 3. Short grass pasture                                | 8.00      | 102.80           | 1,285.00          | 2.260          | 0.157        |
| <b>#2</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.157</b> |
| #2        | 5        | 5. Nearly bare and untilled, and alluvial valley fans | 10.00     | 118.80           | 1,188.00          | 3.160          | 0.104        |
| <b>#2</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.104</b> |
| #3        | 1        | 3. Short grass pasture                                | 7.00      | 333.69           | 4,767.00          | 2.110          | 0.627        |
| <b>#3</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.627</b> |
| #3        | 2        | 3. Short grass pasture                                | 18.00     | 153.54           | 853.00            | 3.390          | 0.069        |
| <b>#3</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.069</b> |
| #3        | 3        | 3. Short grass pasture                                | 5.00      | 25.30            | 506.00            | 1.780          | 0.078        |
| <b>#3</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.078</b> |
| #3        | 4        | 3. Short grass pasture                                | 9.00      | 155.16           | 1,724.00          | 2.400          | 0.199        |



| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| <b>#3</b>  | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.199</b> |
| #3         | 5        | 5. Nearly bare and untilled, and alluvial valley fans | 11.00     | 51.37            | 467.00            | 3.310          | 0.039        |
| <b>#3</b>  | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.039</b> |
| #5         | 1        | 3. Short grass pasture                                | 19.00     | 199.94           | 1,052.31          | 3.480          | 0.083        |
| <b>#5</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.083</b> |
| #6         | 1        | 3. Short grass pasture                                | 18.00     | 201.06           | 1,117.00          | 3.390          | 0.091        |
| <b>#6</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.091</b> |
| #8         | 1        | 3. Short grass pasture                                | 21.00     | 149.09           | 710.00            | 3.660          | 0.053        |
| <b>#8</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.053</b> |
| #8         | 2        | 3. Short grass pasture                                | 8.00      | 24.56            | 307.00            | 2.260          | 0.037        |
| <b>#8</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.037</b> |
| #11        | 1        | 3. Short grass pasture                                | 8.00      | 96.48            | 1,206.00          | 2.260          | 0.148        |
| <b>#11</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.148</b> |
| #11        | 2        | 3. Short grass pasture                                | 8.00      | 72.08            | 901.00            | 2.260          | 0.110        |
| <b>#11</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.110</b> |
| #13        | 1        | 3. Short grass pasture                                | 12.00     | 148.44           | 1,237.00          | 2.770          | 0.124        |
| <b>#13</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.124</b> |
| #13        | 2        | 3. Short grass pasture                                | 13.00     | 25.74            | 198.00            | 2.880          | 0.019        |
| <b>#13</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.019</b> |
| #15        | 1        | 3. Short grass pasture                                | 15.00     | 384.90           | 2,566.00          | 3.090          | 0.230        |
| <b>#15</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.230</b> |
| #15        | 2        | 3. Short grass pasture                                | 21.00     | 272.37           | 1,297.00          | 3.660          | 0.098        |
| <b>#15</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.098</b> |
| #17        | 1        | 3. Short grass pasture                                | 16.00     | 155.20           | 970.00            | 3.200          | 0.084        |
| <b>#17</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.084</b> |
| #17        | 3        | 3. Short grass pasture                                | 8.00      | 26.56            | 332.00            | 2.260          | 0.040        |
| <b>#17</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.040</b> |
| #17        | 4        | 3. Short grass pasture                                | 8.00      | 26.16            | 327.00            | 2.260          | 0.040        |
| <b>#17</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.040</b> |
| #19        | 1        | 3. Short grass pasture                                | 16.00     | 180.15           | 1,126.00          | 3.200          | 0.097        |
| <b>#19</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.097</b> |
| #19        | 2        | 3. Short grass pasture                                | 11.00     | 319.44           | 2,904.00          | 2.650          | 0.304        |
| <b>#19</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.304</b> |
| #19        | 3        | 3. Short grass pasture                                | 32.00     | 196.15           | 613.00            | 4.520          | 0.037        |
| <b>#19</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.037</b> |
| #19        | 4        | 3. Short grass pasture                                | 14.00     | 195.58           | 1,397.00          | 2.990          | 0.129        |
| <b>#19</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.129</b> |
| #21        | 1        | 3. Short grass pasture                                | 30.00     | 101.40           | 338.00            | 4.380          | 0.021        |
| <b>#21</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #21        | 2        | 3. Short grass pasture                                | 17.00     | 302.94           | 1,782.00          | 3.290          | 0.150        |
| <b>#21</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.150</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #23        | 1        | 3. Short grass pasture                                | 33.00     | 200.31           | 607.00            | 4.590          | 0.036        |
| <b>#23</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.036</b> |
| #23        | 2        | 3. Short grass pasture                                | 28.00     | 249.20           | 890.00            | 4.230          | 0.058        |
| <b>#23</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.058</b> |
| #23        | 3        | 3. Short grass pasture                                | 14.00     | 511.28           | 3,652.00          | 2.990          | 0.339        |
| <b>#23</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.339</b> |
| #23        | 4        | 3. Short grass pasture                                | 15.00     | 101.25           | 675.00            | 3.090          | 0.060        |
| <b>#23</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.060</b> |
| #25        | 1        | 3. Short grass pasture                                | 24.00     | 173.04           | 721.00            | 3.910          | 0.051        |
| <b>#25</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.051</b> |
| #25        | 2        | 3. Short grass pasture                                | 13.00     | 146.75           | 1,128.84          | 2.880          | 0.108        |
| <b>#25</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.108</b> |
| #28        | 1        | 3. Short grass pasture                                | 9.00      | 100.98           | 1,122.00          | 2.400          | 0.129        |
| <b>#28</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.129</b> |
| #30        | 1        | 3. Short grass pasture                                | 8.00      | 76.47            | 956.00            | 2.260          | 0.117        |
| <b>#30</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.117</b> |
| #30        | 2        | 3. Short grass pasture                                | 2.00      | 8.32             | 416.00            | 1.130          | 0.102        |
| <b>#30</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.102</b> |
| #31        | 1        | 3. Short grass pasture                                | 2.00      | 1.00             | 50.00             | 1.130          | 0.012        |
| <b>#31</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.012</b> |
| #31        | 2        | 3. Short grass pasture                                | 7.00      | 25.90            | 370.00            | 2.110          | 0.048        |
| <b>#31</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.048</b> |
| #31        | 3        | 5. Nearly bare and untilled, and alluvial valley fans | 10.00     | 183.30           | 1,833.00          | 3.160          | 0.161        |
| <b>#31</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.161</b> |
| #31        | 4        | 3. Short grass pasture                                | 10.00     | 52.90            | 529.00            | 2.520          | 0.058        |
| <b>#31</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.058</b> |
| #31        | 5        | 3. Short grass pasture                                | 9.00      | 25.29            | 281.00            | 2.400          | 0.032        |
| <b>#31</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.032</b> |
| #31        | 6        | 3. Short grass pasture                                | 7.00      | 149.10           | 2,130.00          | 2.110          | 0.280        |
| <b>#31</b> | <b>6</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.280</b> |
| #31        | 7        | 3. Short grass pasture                                | 10.00     | 49.60            | 496.00            | 2.520          | 0.054        |
| <b>#31</b> | <b>7</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.054</b> |
| #31        | 8        | 3. Short grass pasture                                | 10.00     | 101.90           | 1,019.00          | 2.520          | 0.112        |
| <b>#31</b> | <b>8</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.112</b> |
| #36        | 1        | 3. Short grass pasture                                | 11.00     | 261.79           | 2,380.00          | 2.650          | 0.249        |
| <b>#36</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.249</b> |
| #36        | 2        | 3. Short grass pasture                                | 8.00      | 130.00           | 1,625.00          | 2.260          | 0.199        |
| <b>#36</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.199</b> |

## **EXHIBIT 7, ITEM 23, PART J**

### **Section 26 Pond Sediment Control Post Mining**

#### **Introduction**

Exhibit 7, Item 14 in Volume 2D describes the hydrologic methodology used in sediment pond, permanent post-mine channels, and temporary conveyance channel demonstrations. Runoff curve numbers assigned to the undisturbed and/or reclaimed lands in various stages of reclamation have been selected in accordance with Table 1 in the Introductory Text for Exhibit 7 in Volume 2D and are directly tied to Colowyo's reclamation procedures and timing presented on Map 29B as required by Rule 4.05.6(3)(a). For channels protected by a riprap liner, selection of minimum riprap size is done using the Simons/OSM method in SEDCAD<sup>TM</sup>. For channels to be protected by a vegetative liner, the permissible velocities are also determined using SEDCAD<sup>TM</sup> routines.

SEDCAD<sup>TM</sup> demonstrations with two distinct time frames have been evaluated in detail for the Section 26 Pond. Exhibit 7, Item 23, Parts C addresses sediment control for the Section 26 Pond during the mining timeframe. This exhibit also contains the design criteria for all temporary channels used to route surface runoff to the sediment pond. This exhibit (Exhibit 7, Item 23, Part J) addresses sediment control during the post mining timeframe for the Section 26 Pond and provides a demonstration for the post mine channel configurations.

Colowyo has several types of mining disturbances shown in this demonstration and in the larger mining permit. The disturbance limit shown on maps and figures (a greenish colored boundary on maps) is the permitted disturbance limit. This is the disturbance limit that could potentially be disturbed but may not depending on mine plans and a reclamation bond has not been posted to date to disturb to this limit. Volume 20, Exhibit 13C provides the cumulative bond schedule disturbance limits. These disturbance limits are areas that Colowyo has permitted for disturbance and posted a reclamation bond to disturb. However, given Colowyo's current mine plans it may not have disturbed the entire area shown in Exhibit 13C. The disturbance or reclaimed areas shown in this hydrology demonstration for the Section 26 Pond are actual disturbance to date combined with planned future disturbances. Current mining plans do not anticipate any further ground disturbances beyond these areas, especially north of the temporary out of pit spoil pile (Map 29C), and on the west and end sides of the Collom Pit. Should mine plan changes occur, and additional disturbance is necessary, it will be permitted and bonded for accordingly, and this hydrology demonstration for the Section 26 Pond will be reevaluated prior to implementation of additional ground disturbance activities not currently modeled in the Section 26 Pond watershed.

#### **Section 26 Pond – Post Mining**

The location of the Section 26 Pond and its watershed is presented on Map 41B. The profiles of the associated permanent channels associated with the Section 26 Pond watershed are presented on Map 33C. The temporary channels that route water to the Section 26 Pond are presented on 41B. Two post mine channels will be constructed in the Section 26 watershed including Lower and Upper Bear Draw respectively. In the 10-Year 24-Hour and 25-Year 24-Hour modeled events, Lower Bear Draw is not included as it will be reconstructed within the footprint of the Section 26 Pond. A separate hydrology model demonstration is included for the post mine channel design and is discussed later in this exhibit.

The as-built configuration for the Section 26 Pond is presented on Figure 7-23J-1, and the as-built configuration for the Sidehill Pond is presented on Figure 7-23J-2. Figure 7-23J-3 provides the breakdown of drainage areas and hydrologic conditions for all areas in the watershed reporting to these two sediment ponds. The Sidehill Pond as part of the Section 26 Pond sediment control system is utilized to reduced peak flows and provide additional sediment storage if need. All discharges from the Sidehill Pond flow directly to the Section 26 Pond through the D-1 Ditch, and the Section 26 Pond is the final discharge location.

The following pages present the results of the SEDCAD<sup>TM</sup> models for the post mining condition. At this stage all areas that have been disturbed by mining activities in the Section 26 watershed has been reclaimed with the reclamation areas having three plus years growth in the majority of the Section 26 Pond watershed. The farthest northern portion of the watershed is relatively undisturbed.

The SEDCAD<sup>TM</sup> model herein provides the results of the 10-year 24-hour design storm and demonstrates the Section 26 Pond will meet the applicable settleable solids standard under this modeled storm event. The second SEDCAD<sup>TM</sup> model demonstrates that the Section 26 Pond emergency spillway elevation is capable of containing the 25-year 24-hour storm.

In summary, for the post mining case at the Section 26 Pond, the 10-year 24-hour storm produces 0.3 acre feet of runoff, and the peak settleable solids concentration is 0.00 ml/l. The 25-year 24-hour storm event peaks at the 6,983.1 elevation, which below the emergency spillway elevation of 6,986.0’

### **Section 26 Pond Permanent Post Mine Channels**

The Section 26 Pond watershed is comprised of two post-mining channels which include Bear Draw and Lower Bear Draw. The locations of these post mine channels are presented on Map 41B and Figure 7-23J-4, and the channel profiles are presented on Map 33C.

The area contributory to Bear Draw and Little Bear Draw are less than one square mile; therefore, the modeled storm event required by rule is the 10-year 24-hour event. However, for built in conservatism, both channels will are modeled against the 25-year 24-hour storm event.

The upper reaches of Bear Draw will be a vegetative lined while the lowest most portion will be riprap lined. Lower Bear Draw will be protected with riprap over the entire length of the channel. Two stock ponds, BD-1 and BD-2 will be constructed inline in the Bear Draw to reduce peak flows from larger storm events and provide a water source to support the post mine land use.

Lower Bear Draw will be constructed inside the reclaimed footprint of the Section 26 Pond. Therefore, in the 25-Year 24-Hour model, it is assumed the entire watersheds reporting to both the Sidehill and Section 26 Ponds has been approved for Phase II bond release and both ponds are no longer necessary for sediment control.

A SEDCAD™ model (25 Year 24 Hour Channel Demonstration model) has been included which evaluates the peak flow for each of the channel. The minimum channel configurations are summarized below

| <u>Name</u>                 | <u>Peak<br/>Flow<br/>(CFS)</u> | <u>Average<br/>Slope<br/>(%)</u> | <u>Channel<br/>Type</u>   | <u>Side Slopes</u> | <u>Minimum<br/>Depth<br/>(Feet)</u> | <u>Erosion<br/>Protection</u> |
|-----------------------------|--------------------------------|----------------------------------|---------------------------|--------------------|-------------------------------------|-------------------------------|
| Lower Bear Draw             | 7.96                           | 9.5                              | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                                 | Riprap,<br>D50 = 3"           |
| Bear Draw<br>0+00 to 15+00  | 30.03                          | 10.8                             | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                                 | Riprap,<br>D50 = 6"           |
| Bear Draw<br>15+00 to 34+00 | 5.7                            | 2.8                              | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                                 | Vegetation                    |
| Bear Draw<br>34+00 to 81+10 | 2.1                            | 7.1                              | Trapezoidal<br>10' bottom | 3H:1V              | 4.0                                 | Vegetation                    |

# **Section 26 Pond** **Effluent Demonstration**

***10- Year 24-Hour Storm Event***  
***Post Mining***

Tony Tennyson

## ***General Information***

### ***Storm Information:***

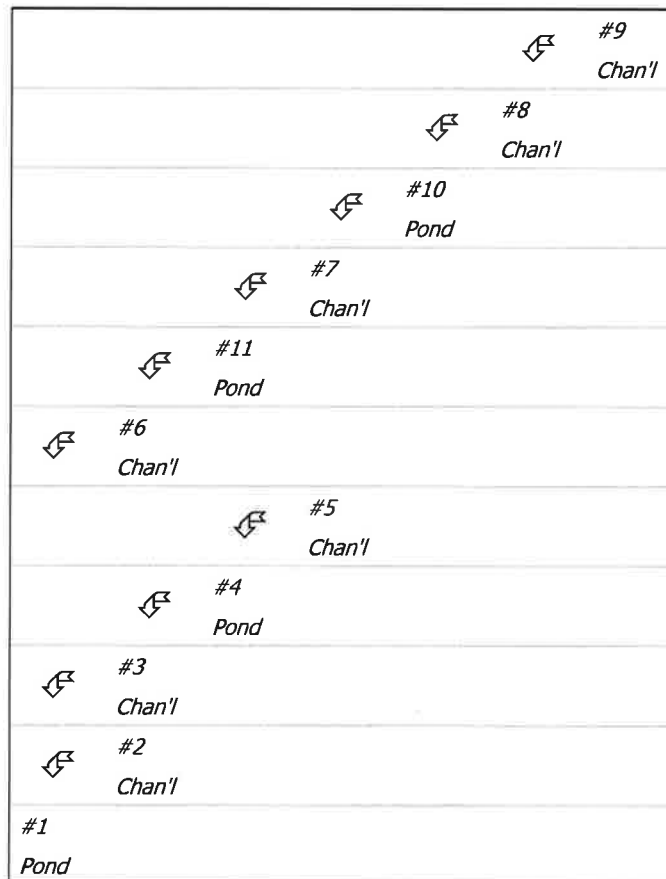
|                 |               |
|-----------------|---------------|
| Storm Type:     | NRCS Type II  |
| Design Storm:   | 10 yr - 24 hr |
| Rainfall Depth: | 1.800 inches  |

### ***Particle Size Distribution:***

| Size (mm) | Colowyo Particle Size |
|-----------|-----------------------|
| 4.7500    | 100.000%              |
| 0.0750    | 73.000%               |
| 0.0400    | 33.000%               |
| 0.0010    | 20.000%               |

## Structure Networking:

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description              |
|---------|--------|--------------|--------|---------------|---------|--------------------------|
| Pond    | #1     | ==>          | End    | 0.000         | 0.000   | Section 26 Pond          |
| Channel | #2     | ==>          | #1     | 0.000         | 0.000   | D-2 Ditch                |
| Channel | #3     | ==>          | #1     | 0.000         | 0.000   | D-1 Ditch                |
| Pond    | #4     | ==>          | #3     | 0.000         | 0.000   | Sidehill Pond            |
| Channel | #5     | ==>          | #4     | 0.000         | 0.000   | D-4 Ditch                |
| Channel | #6     | ==>          | #1     | 0.000         | 0.000   | Natural Channel          |
| Channel | #7     | ==>          | #11    | 0.000         | 0.000   | Bear Draw 0+00 to 15+00  |
| Channel | #8     | ==>          | #10    | 0.000         | 0.000   | Bear Draw 15+00 to 34+00 |
| Channel | #9     | ==>          | #8     | 0.000         | 0.000   | Bear Draw 34+00 to 78+51 |
| Pond    | #10    | ==>          | #7     | 0.000         | 0.000   | BD-2 Stockpond           |
| Pond    | #11    | ==>          | #6     | 0.000         | 0.000   | BD-1 Stockpond           |





## Structure Summary:

|     | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) | Sediment<br>(tons) | Peak<br>Sediment<br>Conc.<br>(mg/l) | Peak<br>Settleable<br>Conc.<br>(ml/l) | 24VW<br>(ml/l) |
|-----|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|--------------------|-------------------------------------|---------------------------------------|----------------|
| #9  | 72.500                                    | 72.500                                | 0.31                       | 0.24                                 | 0.5                | 1,653                               | 0.80                                  | 0.70           |
| #8  | 40.700                                    | 113.200                               | 0.55                       | 0.40                                 | 1.1                | 3,206                               | 1.71                                  | 1.04           |
| #10 | In<br>Out                                 | 0.000<br>113.200                      | 0.55                       | 0.40                                 | 1.1                | 3,206                               | 1.71                                  | 1.04           |
|     |                                           |                                       | 0.00                       | 0.00                                 | 1.1                | 0                                   | 0.00                                  | 0.00           |
| #7  | 35.200                                    | 148.400                               | 18.14                      | 1.30                                 | 261.3              | 282,235                             | 161.13                                | 77.50          |
| #11 | In<br>Out                                 | 0.000<br>148.400                      | 18.14                      | 1.30                                 | 261.3              | 282,235                             | 161.13                                | 77.50          |
|     |                                           |                                       | 0.00                       | 0.00                                 | 261.3              | 0                                   | 0.00                                  | 0.00           |
| #6  | 54.500                                    | 202.900                               | 0.78                       | 0.15                                 | 262.1              | 14,266                              | 11.40                                 | 3.18           |
| #5  | 22.500                                    | 22.500                                | 0.11                       | 0.07                                 | 0.1                | 974                                 | 0.49                                  | 0.41           |
| #4  | In<br>Out                                 | 2.900<br>25.400                       | 0.12                       | 0.08                                 | 0.1                | 862                                 | 0.43                                  | 0.37           |
|     |                                           |                                       | 0.00                       | 0.00                                 | 0.1                | 0                                   | 0.00                                  | 0.00           |
| #3  | 1.600                                     | 27.000                                | 0.82                       | 0.06                                 | 8.5                | 207,202                             | 118.57                                | 56.39          |
| #2  | 47.400                                    | 47.400                                | 0.04                       | 0.02                                 | 0.0                | 1,194                               | 0.68                                  | 0.52           |
| #1  | In<br>Out                                 | 5.000<br>282.300                      | 2.58                       | 0.29                                 | 276.1              | 118,111                             | 93.04                                 | 27.95          |
|     |                                           |                                       | 0.20                       | 0.29                                 | 0.0                | 46                                  | 0.00                                  | 0.00           |

***Particle Size Distribution(s) at Each Structure******Structure #9 (Bear Draw 34+00 to 78+51):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 100.000% |
| 0.0400    | 45.242%  |
| 0.0010    | 27.419%  |

***Structure #8 (Bear Draw 15+00 to 34+00):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 84.803%  |
| 0.0400    | 38.351%  |
| 0.0010    | 23.243%  |

***Structure #10 (BD-2 Stockpond):***

| Size (mm) | In       | Out    |
|-----------|----------|--------|
| 4.7500    | 100.000% | 0.000% |
| 0.0750    | 84.803%  | 0.000% |
| 0.0400    | 38.351%  | 0.000% |
| 0.0010    | 23.243%  | 0.000% |

***Structure #7 (Bear Draw 0+00 to 15+00):***

| Size (mm) | In/Out  |
|-----------|---------|
| 4.7500    | 99.592% |
| 0.0750    | 72.702% |
| 0.0400    | 32.865% |
| 0.0010    | 19.918% |

***Structure #11 (BD-1 Stockpond):***

| Size (mm) | In      | Out    |
|-----------|---------|--------|
| 4.7500    | 99.592% | 0.000% |
| 0.0750    | 72.702% | 0.000% |
| 0.0400    | 32.865% | 0.000% |
| 0.0010    | 19.918% | 0.000% |

***Structure #6 (Natural Channel):***

| Size (mm) | In/Out |
|-----------|--------|
| 4.7500    | 0.304% |
| 0.0750    | 0.222% |
| 0.0400    | 0.100% |
| 0.0010    | 0.061% |

***Structure #5 (D-4 Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 95.639%  |
| 0.0400    | 43.234%  |
| 0.0010    | 26.202%  |

***Structure #4 (Sidehill Pond):***

| Size (mm) | In       | Out    |
|-----------|----------|--------|
| 4.7500    | 100.000% | 0.000% |
| 0.0750    | 95.361%  | 0.000% |
| 0.0400    | 43.108%  | 0.000% |
| 0.0010    | 26.126%  | 0.000% |

***Structure #3 (D-1 Ditch):***

| Size (mm) | In/Out  |
|-----------|---------|
| 4.7500    | 99.009% |
| 0.0750    | 72.277% |
| 0.0400    | 32.673% |
| 0.0010    | 19.802% |

***Structure #2 (D-2 Ditch):***

| Size (mm) | In/Out   |
|-----------|----------|
| 4.7500    | 100.000% |
| 0.0750    | 73.000%  |
| 0.0400    | 33.000%  |
| 0.0010    | 20.000%  |

***Structure #1:***

| Size (mm) | In     | Out      |
|-----------|--------|----------|
| 4.7500    | 5.315% | 100.000% |
| 0.0750    | 3.880% | 100.000% |
| 0.0400    | 1.754% | 100.000% |
| 0.0010    | 1.063% | 100.000% |

## ***Structure Detail:***

### *Structure #9 (Vegetated Channel)*

***Bear Draw 34+00 to 78+51***

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.1       | D, B               | 2.78                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 0.31 cfs                              |                                      | 0.31 cfs                             |                                     |
| Depth:                 | 0.07 ft                               | 2.86 ft                              | 0.22 ft                              | 3.00 ft                             |
| Top Width:             | 10.45 ft                              | 27.13 ft                             | 11.30 ft                             | 27.98 ft                            |
| Velocity:              | 0.41 fps                              |                                      | 0.14 fps                             |                                     |
| X-Section Area:        | 0.77 sq ft                            |                                      | 2.30 sq ft                           |                                     |
| Hydraulic Radius:      | 0.073 ft                              |                                      | 0.202 ft                             |                                     |
| Froude Number:         | 0.26                                  |                                      | 0.05                                 |                                     |
| Roughness Coefficient: | 0.1705                                |                                      | 1.0022                               |                                     |

### *Structure #8 (Vegetated Channel)*

***Bear Draw 15+00 to 34+00***

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 2.8       | D, B               | 2.64                 |                      |                         | 7.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 0.55 cfs                              |                                      | 0.55 cfs                             |                                     |
| Depth:                 | 0.13 ft                               | 2.77 ft                              | 0.34 ft                              | 2.98 ft                             |
| Top Width:             | 10.76 ft                              | 26.60 ft                             | 12.04 ft                             | 27.88 ft                            |
| Velocity:              | 0.42 fps                              |                                      | 0.15 fps                             |                                     |
| X-Section Area:        | 1.32 sq ft                            |                                      | 3.75 sq ft                           |                                     |
| Hydraulic Radius:      | 0.122 ft                              |                                      | 0.308 ft                             |                                     |
| Froude Number:         | 0.21                                  |                                      | 0.05                                 |                                     |
| Roughness Coefficient: | 0.1445                                |                                      | 0.7685                               |                                     |

## Structure #10 (Pond)

### *BD-2 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

### Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 12.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

### Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 107.00        | 20.00                | 2.00:1            | 2.00:1             | 15.00                |

Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 102.68 ft |
| H'graph Detention Time: | 0.00 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 0.00 days |
| Trap Efficiency:        | 0.00 %    |

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

Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 100.00    | 0.016        | 0.000               | 0.000              | Top of Sed. Storage      |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |
| 102.68    | 0.564        | 0.741               | 0.000              | 0.00 Peak Stage          |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |
| 105.00    | 0.843        | 2.416               | 0.000              | Spillway #1              |
| 106.00    | 0.872        | 3.273               | 2.094              |                          |
| 107.00    | 0.872        | 4.145               | 4.414              | Spillway #2              |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 100.00            | 0.000                  | 0.000                       | 0.000                                   |
| 101.00            | 0.000                  | 0.000                       | 0.000                                   |
| 102.00            | 0.000                  | 0.000                       | 0.000                                   |
| 103.00            | 0.000                  | 0.000                       | 0.000                                   |
| 104.00            | 0.000                  | 0.000                       | 0.000                                   |
| 105.00            | 0.000                  | 0.000                       | 0.000                                   |
| 106.00            | (3)>2.094              | 0.000                       | 2.094                                   |
| 107.00            | (5)>4.414              | 0.000                       | 4.414                                   |
| 108.00            | (6)>5.182              | 36.939                      | 42.121                                  |

Structure #7 (Riprap Channel)

*Bear Draw 0+00 to 15+00*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 10.00                | 2.0:1                      | 2.0:1                       | 10.8      | 2.80                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 18.14 cfs     |              |
| Depth:            | 0.20 ft       | 3.00 ft      |
| Top Width:        | 10.78 ft      | 21.98 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 2.04 sq ft    |              |
| Hydraulic Radius: | 0.187 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #11 (Pond)

### *BD-1 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |
| *Sediment Storage: | 0.00 ac-ft |
| Dead Space:        | 0.00 %     |

*\*No sediment capacity defined*

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 2.00             | 0.0150      | 105.00             | 0.90                      | 0.00                 |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

Pond Results:

|                         |           |
|-------------------------|-----------|
| Peak Elevation:         | 104.02 ft |
| H'graph Detention Time: | 0.00 hrs  |
| Pond Model:             | CSTRS     |
| Dewater Time:           | 0.00 days |



Trap Efficiency: 0.00 %

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

Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 100.00    | 0.016        | 0.000               | 0.000              | Top of Sed. Storage      |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |
| 104.02    | 0.750        | 1.640               | 0.000              | 0.00 Peak Stage          |
| 105.00    | 0.843        | 2.416               | 0.000              | Spillway #1              |
| 106.00    | 0.872        | 3.273               | 2.094              |                          |
| 107.00    | 0.872        | 4.145               | 4.414              | Spillway #2              |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 100.00            | 0.000                  | 0.000                       | 0.000                                   |
| 101.00            | 0.000                  | 0.000                       | 0.000                                   |
| 102.00            | 0.000                  | 0.000                       | 0.000                                   |
| 103.00            | 0.000                  | 0.000                       | 0.000                                   |
| 104.00            | 0.000                  | 0.000                       | 0.000                                   |
| 105.00            | 0.000                  | 0.000                       | 0.000                                   |
| 106.00            | (3)>2.094              | 0.000                       | 2.094                                   |
| 107.00            | (5)>4.414              | 0.000                       | 4.414                                   |
| 108.00            | (6)>5.182              | 36.939                      | 42.121                                  |

Structure #6 (Vegetated Channel)

*Natural Channel*

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 11.0      | D, B               | 3.00                 |                      |                         | 6.0                     |

## Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 0.78 cfs                        |                                | 0.78 cfs                       |                               |
| Depth:                 | 0.13 ft                         | 3.13 ft                        | 0.31 ft                        | 3.31 ft                       |
| Top Width:             | 5.52 ft                         | 17.52 ft                       | 6.23 ft                        | 18.23 ft                      |
| Velocity:              | 1.14 fps                        |                                | 0.45 fps                       |                               |
| X-Section Area:        | 0.68 sq ft                      |                                | 1.72 sq ft                     |                               |
| Hydraulic Radius:      | 0.123 ft                        |                                | 0.270 ft                       |                               |
| Froude Number:         | 0.57                            |                                | 0.15                           |                               |
| Roughness Coefficient: | 0.1065                          |                                | 0.4576                         |                               |

## Structure #5 (Vegetated Channel)

### D-4 Ditch

## Trapezoidal Vegetated Channel Inputs:

### Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 20.00             | 2.0:1                | 2.0:1                 | 5.9       | D, B               | 3.68                 |                      |                         | 6.0                     |

## Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 0.11 cfs                        |                                | 0.11 cfs                       |                               |
| Depth:                 | 0.04 ft                         | 3.72 ft                        | 0.14 ft                        | 3.82 ft                       |
| Top Width:             | 20.15 ft                        | 34.87 ft                       | 20.54 ft                       | 35.26 ft                      |
| Velocity:              | 0.14 fps                        |                                | 0.04 fps                       |                               |
| X-Section Area:        | 0.76 sq ft                      |                                | 2.74 sq ft                     |                               |
| Hydraulic Radius:      | 0.038 ft                        |                                | 0.133 ft                       |                               |
| Froude Number:         | 0.12                            |                                | 0.02                           |                               |
| Roughness Coefficient: | 0.2904                          |                                | 2.4310                         |                               |

## Structure #4 (Pond)

### Sidehill Pond

#### Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,160.00 ft |
| Initial Pool:      | 0.98 ac-ft  |
| *Sediment Storage: | 0.00 ac-ft  |
| Dead Space:        | 0.00 %      |

*\*No sediment capacity defined*

### Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 13.00             | 18.00                | 125.00             | 4.00             | 0.0240      | 7,170.00           | 2                        |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 7,172.00      | 40.00             | 2.00:1         | 2.00:1          | 12.00             |

#### Pond Results:

|                         |             |
|-------------------------|-------------|
| Peak Elevation:         | 7,160.27 ft |
| H'graph Detention Time: | 0.00 hrs    |
| Pond Model:             | CSTRS       |
| Dewater Time:           | 0.00 days   |
| Trap Efficiency:        | 0.00 %      |

*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)  |
|-----------|-----------|------------------|-----------------|---------------------|
| 7,155.00  | 0.000     | 0.000            | 0.000           | Top of Sed. Storage |
| 7,156.00  | 0.157     | 0.052            | 0.000           |                     |
| 7,157.00  | 0.205     | 0.233            | 0.000           |                     |
| 7,158.00  | 0.234     | 0.452            | 0.000           |                     |
| 7,159.00  | 0.264     | 0.701            | 0.000           |                     |
| 7,160.00  | 0.294     | 0.979            | 0.000           |                     |
| 7,160.27  | 0.304     | 1.062            | 0.000           | 0.00 Peak Stage     |
| 7,161.00  | 0.328     | 1.290            | 0.000           |                     |

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 7,162.00  | 0.362        | 1.635               | 0.000              |                          |
| 7,163.00  | 0.399        | 2.016               | 0.000              |                          |
| 7,164.00  | 0.440        | 2.435               | 0.000              |                          |
| 7,165.00  | 0.480        | 2.895               | 0.000              |                          |
| 7,166.00  | 0.525        | 3.397               | 0.000              |                          |
| 7,167.00  | 0.572        | 3.945               | 0.000              | Low hole SPW #1          |
| 7,168.00  | 0.622        | 4.542               | 0.473              |                          |
| 7,169.00  | 0.672        | 5.189               | 0.669              |                          |
| 7,170.00  | 0.724        | 5.887               | 0.819              | Spillway #1              |
| 7,171.00  | 0.778        | 6.638               | 8.509              |                          |
| 7,172.00  | 0.833        | 7.443               | 12.033             | Spillway #2              |
| 7,173.00  | 0.833        | 8.276               | 40.297             |                          |
| 7,174.00  | 0.833        | 9.108               | 115.083            |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,155.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,156.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,157.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,158.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,159.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,160.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,161.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,162.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,163.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,164.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,165.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,166.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,167.00          | 3.00              | 0.000                       | 0.000                                   |
| 7,168.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,169.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,170.00          | 0.819             | 0.000                       | 0.819                                   |
| 7,171.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,172.00          | 12.033            | 0.000                       | 12.033                                  |
| 7,173.00          | 14.738            | 25.559                      | 40.297                                  |
| 7,174.00          | 17.018            | 98.065                      | 115.083                                 |

*Structure #3 (Riprap Channel)*

*D-1 Ditch*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 21.0      | 3.92                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 0.82 cfs      |              |
| Depth:            | 0.01 ft       | 3.93 ft      |
| Top Width:        | 12.06 ft      | 27.74 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.18 sq ft    |              |
| Hydraulic Radius: | 0.015 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

Structure #2 (Riprap Channel)

*D-2 Ditch*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 4.9       | 3.91                 |                      |                         |

Riprap Channel Results:

**Simons/OSM Method - Mild Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 0.04 cfs      |              |
| Depth:            | 0.01 ft       | 3.92 ft      |

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Top Width:        | 12.04 ft      | 27.68 ft     |
| Velocity:         | 0.41 fps      |              |
| X-Section Area:   | 0.12 sq ft    |              |
| Hydraulic Radius: | 0.010 ft      |              |
| Froude Number:    | 0.72          |              |
| Manning's n:      | 0.0377        |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 9.00 in       |              |
| Dmax:             | 12.00 in      |              |

## Structure #1 (Pond)

### *Section 26 Pond*

#### Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 6,982.00 ft |
| Initial Pool:      | 1.57 ac-ft  |
| *Sediment Storage: | 0.00 ac-ft  |
| Dead Space:        | 20.00 %     |

*\*No sediment capacity defined*

#### Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 14.00             | 18.00                | 200.00             | 4.00             | 0.0150      | 6,984.00           | 2                        |

#### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 6,986.00      | 30.00             | 2.50:1         | 2.50:1          | 24.00             |

#### Pond Results:

|                         |             |
|-------------------------|-------------|
| Peak Elevation:         | 6,982.41 ft |
| H'graph Detention Time: | 7.38 hrs    |
| Pond Model:             | CSTRS       |
| Dewater Time:           | 1.66 days   |
| Trap Efficiency:        | 100.00 %    |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 6,968.00  | 0.000        | 0.000               | 0.000              | Top of Sed. Storage      |
| 6,969.00  | 0.001        | 0.000               | 0.000              |                          |
| 6,970.00  | 0.021        | 0.009               | 0.000              |                          |
| 6,971.00  | 0.030        | 0.035               | 0.000              |                          |
| 6,972.00  | 0.045        | 0.072               | 0.000              |                          |
| 6,973.00  | 0.060        | 0.124               | 0.000              |                          |
| 6,974.00  | 0.078        | 0.193               | 0.000              |                          |
| 6,975.00  | 0.097        | 0.280               | 0.000              |                          |
| 6,976.00  | 0.118        | 0.388               | 0.000              |                          |
| 6,977.00  | 0.141        | 0.517               | 0.000              |                          |
| 6,978.00  | 0.167        | 0.671               | 0.000              |                          |
| 6,979.00  | 0.195        | 0.852               | 0.000              |                          |
| 6,980.00  | 0.224        | 1.061               | 0.000              |                          |
| 6,981.00  | 0.256        | 1.301               | 0.000              |                          |
| 6,982.00  | 0.290        | 1.574               | 0.000              | Low hole SPW #1          |
| 6,982.41  | 0.306        | 1.701               | 0.195              | 31.90 Peak Stage         |
| 6,983.00  | 0.327        | 1.882               | 0.473              |                          |
| 6,984.00  | 0.365        | 2.228               | 0.669              | Spillway #1              |
| 6,985.00  | 0.405        | 2.612               | 8.509              |                          |
| 6,986.00  | 0.448        | 3.039               | 12.033             | Spillway #2              |
| 6,987.00  | 0.473        | 3.499               | 67.527             |                          |
| 6,988.00  | 0.499        | 3.985               | 204.557            |                          |
| 6,989.00  | 0.525        | 4.497               | 411.119            |                          |
| 6,990.00  | 0.551        | 5.035               | 688.306            |                          |
| 6,991.00  | 0.578        | 5.600               | 1,033.669          |                          |

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

## Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 6,968.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,969.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,970.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,971.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,972.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,973.00          | 0.000             | 0.000                       | 0.000                                   |

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 6,974.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,975.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,976.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,977.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,978.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,979.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,980.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,981.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,982.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 6,983.00          | 0.473             | 0.000                       | 0.473                                   |
| 6,984.00          | 0.669             | 0.000                       | 0.669                                   |
| 6,985.00          | 8.509             | 0.000                       | 8.509                                   |
| 6,986.00          | 12.033            | 0.000                       | 12.033                                  |
| 6,987.00          | 14.738            | 52.789                      | 67.527                                  |
| 6,988.00          | 17.018            | 187.539                     | 204.557                                 |
| 6,989.00          | 19.026            | 392.093                     | 411.119                                 |
| 6,990.00          | 20.842            | 667.464                     | 688.306                                 |
| 6,991.00          | 22.512            | 1,011.157                   | 1,033.669                               |



### 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) |
|--------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #9     | 1        | 72.500         | 0.581              | 0.000        | 0.000  | 62.000       | M   | 0.31                 | 0.237                 |
|        | <b>Σ</b> | <b>72.500</b>  |                    |              |        |              |     | <b>0.31</b>          | <b>0.237</b>          |
| #8     | 1        | 40.700         | 0.107              | 0.000        | 0.000  | 62.000       | M   | 0.31                 | 0.166                 |
|        | <b>Σ</b> | <b>113.200</b> |                    |              |        |              |     | <b>0.55</b>          | <b>0.403</b>          |
| #10    | <b>Σ</b> | <b>113.200</b> |                    |              |        |              |     | <b>0.55</b>          | <b>0.403</b>          |
| #7     | 1        | 35.200         | 0.119              | 0.000        | 0.000  | 80.000       | F   | 18.14                | 1.303                 |
|        | <b>Σ</b> | <b>148.400</b> |                    |              |        |              |     | <b>18.14</b>         | <b>1.303</b>          |
| #11    | <b>Σ</b> | <b>148.400</b> |                    |              |        |              |     | <b>18.14</b>         | <b>1.303</b>          |
| #6     | 1        | 19.600         | 0.064              | 0.000        | 0.000  | 62.000       | M   | 0.15                 | 0.080                 |
|        | 2        | 0.300          | 0.017              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | 3        | 19.500         | 0.111              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | 4        | 12.500         | 0.083              | 0.000        | 0.000  | 57.000       | M   | 0.02                 | 0.011                 |
|        | 5        | 2.600          | 0.028              | 0.000        | 0.000  | 74.000       | F   | 0.78                 | 0.056                 |
|        | <b>Σ</b> | <b>202.900</b> |                    |              |        |              |     | <b>0.78</b>          | <b>0.147</b>          |
| #5     | 1        | 22.500         | 0.315              | 0.000        | 0.000  | 62.000       | M   | 0.11                 | 0.074                 |
|        | <b>Σ</b> | <b>22.500</b>  |                    |              |        |              |     | <b>0.11</b>          | <b>0.074</b>          |
| #4     | 1        | 2.900          | 0.037              | 0.000        | 0.000  | 62.000       | M   | 0.02                 | 0.009                 |
|        | <b>Σ</b> | <b>25.400</b>  |                    |              |        |              |     | <b>0.12</b>          | <b>0.083</b>          |
| #3     | 1        | 1.600          | 0.018              | 0.000        | 0.000  | 80.000       | F   | 0.82                 | 0.059                 |
|        | <b>Σ</b> | <b>27.000</b>  |                    |              |        |              |     | <b>0.82</b>          | <b>0.059</b>          |
| #2     | 1        | 12.000         | 0.105              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | 2        | 5.500          | 0.035              | 0.000        | 0.000  | 62.000       | M   | 0.04                 | 0.022                 |
|        | 3        | 29.900         | 0.126              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>47.400</b>  |                    |              |        |              |     | <b>0.04</b>          | <b>0.022</b>          |
| #1     | 1        | 0.300          | 0.021              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | 2        | 0.400          | 0.016              | 0.000        | 0.000  | 80.000       | F   | 0.21                 | 0.011                 |
|        | 3        | 1.900          | 0.014              | 0.000        | 0.000  | 57.000       | M   | 0.00                 | 0.000                 |
|        | 4        | 1.500          | 0.004              | 0.000        | 0.000  | 80.000       | F   | 0.77                 | 0.056                 |
|        | 5        | 0.900          | 0.038              | 0.000        | 0.000  | 57.000       | M   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>282.300</b> |                    |              |        |              |     | <b>2.58</b>          | <b>0.295</b>          |

### ***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)  |
|----------|-------|--------|--------|-------|--------|--------|------|-----------------|----------------------------|-----------------------------|--------------|
| #9       | 1     | 0.300  | 400.00 | 9.00  | 0.0700 | 0.3800 | 1    | 0.5             | 1,653                      | 0.80                        | 0.70         |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>0.5</b>      | <b>1,653</b>               | <b>0.80</b>                 | <b>0.70</b>  |
| #8       | 1     | 0.300  | 400.00 | 12.00 | 0.0700 | 0.3800 | 1    | 0.6             | 3,498                      | 1.99                        | 1.51         |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>1.1</b>      | <b>3,206</b>               | <b>1.71</b>                 | <b>1.04</b>  |
| #10      | Σ     |        |        |       |        |        |      | <b>1.1</b>      | <b>3,206</b>               | <b>1.71</b>                 | <b>1.04</b>  |
| #7       | 1     | 0.300  | 400.00 | 14.00 | 0.8000 | 0.3800 | 1    | 260.3           | 282,235                    | 160.86                      | 77.37        |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>261.3</b>    | <b>282,235</b>             | <b>161.13</b>               | <b>77.50</b> |
| #11      | Σ     |        |        |       |        |        |      | <b>261.3</b>    | <b>282,235</b>             | <b>161.13</b>               | <b>77.50</b> |
| #6       | 1     | 0.300  | 200.00 | 19.00 | 0.0700 | 0.3800 | 1    | 0.3             | 3,752                      | 2.14                        | 1.62         |
|          | 2     | 0.300  | 50.00  | 1.00  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|          | 3     | 0.300  | 400.00 | 8.20  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|          | 4     | 0.300  | 400.00 | 13.90 | 0.0310 | 0.9000 | 1    | 0.0             | 2,828                      | 1.61                        | 1.45         |
|          | 5     | 0.300  | 100.00 | 20.00 | 0.0700 | 0.3800 | 1    | 0.5             | 14,266                     | 8.13                        | 3.33         |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>262.1</b>    | <b>14,266</b>              | <b>11.40</b>                | <b>3.18</b>  |
| #5       | 1     | 0.300  | 400.00 | 6.00  | 0.0700 | 0.3800 | 1    | 0.1             | 974                        | 0.49                        | 0.41         |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>0.1</b>      | <b>974</b>                 | <b>0.49</b>                 | <b>0.41</b>  |
| #4       | 1     | 0.300  | 100.00 | 8.00  | 0.0100 | 0.3800 | 1    | 0.0             | 103                        | 0.06                        | 0.05         |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>0.1</b>      | <b>862</b>                 | <b>0.43</b>                 | <b>0.37</b>  |
| #3       | 1     | 0.300  | 150.00 | 23.60 | 0.8000 | 0.3800 | 1    | 8.4             | 207,202                    | 118.10                      | 56.17        |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>8.5</b>      | <b>207,202</b>             | <b>118.57</b>               | <b>56.39</b> |
| #2       | 1     | 0.300  | 300.00 | 4.10  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|          | 2     | 0.300  | 50.00  | 1.50  | 0.8000 | 0.3800 | 1    | 0.0             | 1,194                      | 0.68                        | 0.52         |
|          | 3     | 0.300  | 400.00 | 9.10  | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>0.0</b>      | <b>1,194</b>               | <b>0.68</b>                 | <b>0.52</b>  |
| #1       | 1     | 0.300  | 100.00 | 11.90 | 0.0310 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|          | 2     | 0.300  | 100.00 | 11.90 | 0.8000 | 0.3800 | 1    | 0.6             | 71,289                     | 40.63                       | 23.63        |
|          | 3     | 0.300  | 100.00 | 23.90 | 0.0850 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
|          | 4     | 0.300  | 50.00  | 27.90 | 0.8000 | 0.3800 | 1    | 4.8             | 131,564                    | 74.99                       | 35.27        |
|          | 5     | 0.300  | 125.00 | 8.00  | 0.0850 | 0.9000 | 1    | 0.0             | 1                          | 0.00                        | 0.00         |
| <b>Σ</b> |       |        |        |       |        |        |      | <b>276.1</b>    | <b>118,111</b>             | <b>93.04</b>                | <b>27.95</b> |

### ***Subwatershed Time of Concentration Details:***

# SEDCAD 4 for Windows

Copyright 1998-2010 Pamela I. Schwab

22

| Stru #    | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|-----------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #1        | 1        | 3. Short grass pasture                                | 11.90     | 24.87            | 209.00            | 2.750          | 0.021        |
| <b>#1</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #1        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 11.90     | 24.87            | 209.00            | 3.440          | 0.016        |
| <b>#1</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.016</b> |
| #1        | 3        | 3. Short grass pasture                                | 23.90     | 49.95            | 209.00            | 3.910          | 0.014        |
| <b>#1</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.014</b> |
| #1        | 4        | 5. Nearly bare and untilled, and alluvial valley fans | 27.90     | 25.10            | 90.00             | 5.280          | 0.004        |
| <b>#1</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.004</b> |
| #1        | 5        | 3. Short grass pasture                                | 8.00      | 24.96            | 312.00            | 2.260          | 0.038        |
| <b>#1</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.038</b> |
| #2        | 1        | 3. Short grass pasture                                | 4.10      | 24.96            | 609.00            | 1.610          | 0.105        |
| <b>#2</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.105</b> |
| #2        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 1.50      | 2.35             | 157.00            | 1.220          | 0.035        |
| <b>#2</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.035</b> |
| #2        | 3        | 3. Short grass pasture                                | 9.10      | 99.64            | 1,095.00          | 2.410          | 0.126        |
| <b>#2</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.126</b> |
| #3        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 23.60     | 75.04            | 318.00            | 4.850          | 0.018        |
| <b>#3</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.018</b> |
| #4        | 1        | 3. Short grass pasture                                | 8.00      | 24.40            | 305.00            | 2.260          | 0.037        |
| <b>#4</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.037</b> |
| #5        | 1        | 3. Short grass pasture                                | 6.00      | 132.89           | 2,214.83          | 1.950          | 0.315        |
| <b>#5</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.315</b> |
| #6        | 1        | 3. Short grass pasture                                | 19.00     | 153.33           | 807.00            | 3.480          | 0.064        |
| <b>#6</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.064</b> |
| #6        | 2        | 3. Short grass pasture                                | 1.00      | 0.50             | 50.00             | 0.800          | 0.017        |
| <b>#6</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.017</b> |
| #6        | 3        | 3. Short grass pasture                                | 3.00      | 24.87            | 829.00            | 1.380          | 0.166        |
| <b>#6</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.111</b> |
| #6        | 4        | 3. Short grass pasture                                | 13.90     | 125.23           | 900.93            | 2.980          | 0.083        |
| <b>#6</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.083</b> |
| #6        | 5        | 3. Short grass pasture                                | 20.00     | 73.60            | 368.00            | 3.570          | 0.028        |
| <b>#6</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.028</b> |
| #7        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 14.00     | 224.84           | 1,606.00          | 3.740          | 0.119        |
| <b>#7</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.119</b> |
| #8        | 1        | 3. Short grass pasture                                | 12.00     | 128.28           | 1,069.00          | 2.770          | 0.107        |
| <b>#8</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.107</b> |
| #9        | 1        | 3. Short grass pasture                                | 9.00      | 452.16           | 5,024.00          | 2.400          | 0.581        |
| <b>#9</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.581</b> |

# **Section 26 Pond** **Emergency Spillway Demonstration**

***25 - Year 24 - Hour Storm Event***  
***Post Mining***

Tony Tennyson

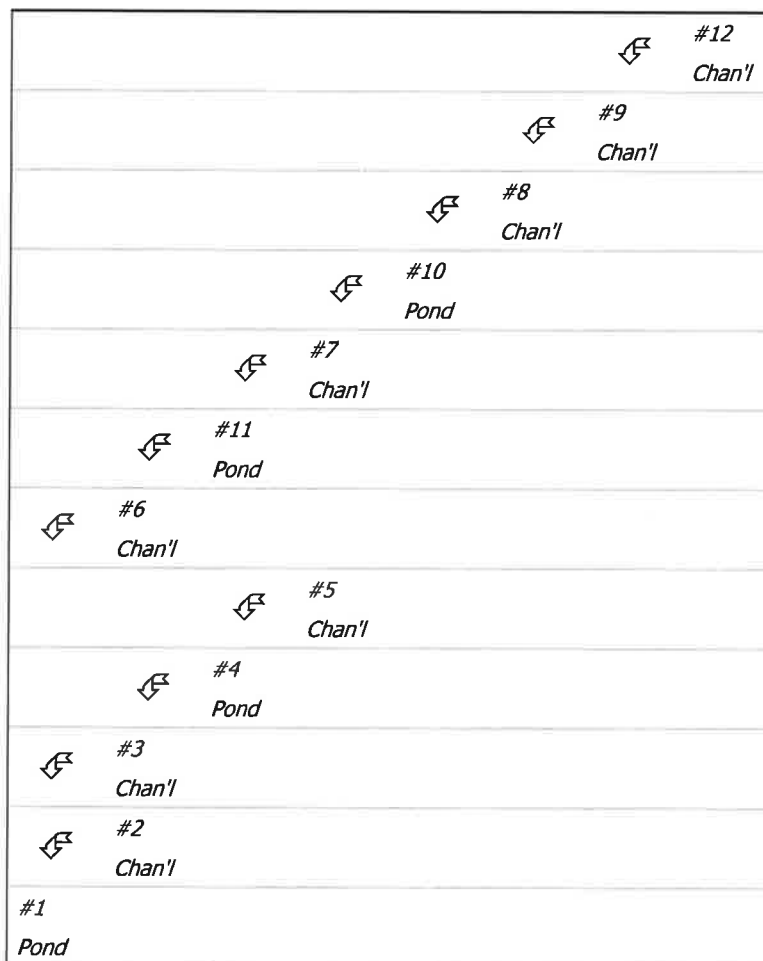
## ***General Information***

### ***Storm Information:***

|                 |               |
|-----------------|---------------|
| Storm Type:     | NRCS Type II  |
| Design Storm:   | 25 yr - 24 hr |
| Rainfall Depth: | 2.300 inches  |

### Structure Networking:

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description              |
|---------|--------|--------------|--------|---------------|---------|--------------------------|
| Pond    | #1     | ==>          | End    | 0.000         | 0.000   | Section 26 Pond          |
| Channel | #2     | ==>          | #1     | 0.000         | 0.000   | D-2 Ditch                |
| Channel | #3     | ==>          | #1     | 0.000         | 0.000   | D-1 Ditch                |
| Pond    | #4     | ==>          | #3     | 0.000         | 0.000   | Sidehill Pond            |
| Channel | #5     | ==>          | #4     | 0.000         | 0.000   | D-4 Ditch                |
| Channel | #6     | ==>          | #1     | 0.000         | 0.000   | Natural Channel          |
| Channel | #7     | ==>          | #11    | 0.000         | 0.000   | Bear Draw 0+00 to 15+00  |
| Channel | #8     | ==>          | #10    | 0.000         | 0.000   | Bear Draw 15+00 to 34+00 |
| Channel | #9     | ==>          | #8     | 0.000         | 0.000   | Bear Draw 34+00 to 81+10 |
| Pond    | #10    | ==>          | #7     | 0.000         | 0.000   | BD-2 Stockpond           |
| Pond    | #11    | ==>          | #6     | 0.000         | 0.000   | BD-1 Stockpond           |
| Channel | #12    | ==>          | #9     | 0.000         | 0.000   | D-6 Ditch                |



## Structure Summary:

|        | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|--------|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #12    | 33.400                                    | 33.400                                | 12.09                      | 1.31                                 |
| #9     | 72.300                                    | 105.700                               | 35.80                      | 4.06                                 |
| #8     | 40.000                                    | 145.700                               | 60.49                      | 6.57                                 |
| #10 In | 0.000                                     | 145.700                               | 60.49                      | 6.57                                 |
| Out    |                                           |                                       | 4.24                       | 4.48                                 |
| #7     | 35.200                                    | 180.900                               | 30.03                      | 6.69                                 |
| #11 In | 0.000                                     | 180.900                               | 30.03                      | 6.69                                 |
| Out    |                                           |                                       | 3.53                       | 4.57                                 |
| #6     | 55.200                                    | 236.100                               | 19.36                      | 6.07                                 |
| #5     | 26.200                                    | 26.200                                | 17.02                      | 1.59                                 |
| #4 In  | 0.000                                     | 26.200                                | 17.02                      | 1.59                                 |
| Out    |                                           |                                       | 0.00                       | 0.00                                 |
| #3     | 1.600                                     | 27.800                                | 1.36                       | 0.10                                 |
| #2     | 47.400                                    | 47.400                                | 4.69                       | 0.34                                 |
| #1 In  | 5.000                                     | 316.300                               | 27.04                      | 6.64                                 |
| Out    |                                           |                                       | 4.15                       | 5.78                                 |

## ***Structure Detail:***

### ***Structure #12 (Vegetated Channel)***

#### ***D-6 Ditch***

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 6.0       | D, B               | 2.15                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 12.09 cfs                             |                                      | 12.09 cfs                            |                                     |
| Depth:                 | 0.50 ft                               | 2.65 ft                              | 0.85 ft                              | 3.00 ft                             |
| Top Width:             | 6.99 ft                               | 15.59 ft                             | 8.39 ft                              | 16.99 ft                            |
| Velocity:              | 4.06 fps                              |                                      | 2.13 fps                             |                                     |
| X-Section Area:        | 2.98 sq ft                            |                                      | 5.68 sq ft                           |                                     |
| Hydraulic Radius:      | 0.412 ft                              |                                      | 0.646 ft                             |                                     |
| Froude Number:         | 1.10                                  |                                      | 0.46                                 |                                     |
| Roughness Coefficient: | 0.0498                                |                                      | 0.1279                               |                                     |

### ***Structure #9 (Vegetated Channel)***

#### ***Bear Draw 34+00 to 81+10***

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.1       | D, B               | 3.35                 |                      |                         | 6.0                     |

Vegetated Channel Results:



|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 35.80 cfs                             |                                      | 35.80 cfs                            |                                     |
| Depth:                 | 0.55 ft                               | 3.90 ft                              | 0.87 ft                              | 4.22 ft                             |
| Top Width:             | 13.30 ft                              | 33.40 ft                             | 15.25 ft                             | 35.35 ft                            |
| Velocity:              | 5.59 fps                              |                                      | 3.24 fps                             |                                     |
| X-Section Area:        | 6.41 sq ft                            |                                      | 11.05 sq ft                          |                                     |
| Hydraulic Radius:      | 0.475 ft                              |                                      | 0.711 ft                             |                                     |
| Froude Number:         | 1.42                                  |                                      | 0.67                                 |                                     |
| Roughness Coefficient: | 0.0433                                |                                      | 0.0974                               |                                     |

### Structure #8 (Vegetated Channel)

*Bear Draw 15+00 to 34+00*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 10.00                | 3.0:1                      | 3.0:1                       | 2.8       | D, B                  | 2.90                    |                         |                               | 7.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 60.49 cfs                             |                                      | 60.49 cfs                            |                                     |
| Depth:                 | 0.91 ft                               | 3.81 ft                              | 1.37 ft                              | 4.27 ft                             |
| Top Width:             | 15.44 ft                              | 32.84 ft                             | 18.21 ft                             | 35.61 ft                            |
| Velocity:              | 5.24 fps                              |                                      | 3.13 fps                             |                                     |
| X-Section Area:        | 11.54 sq ft                           |                                      | 19.31 sq ft                          |                                     |
| Hydraulic Radius:      | 0.733 ft                              |                                      | 1.035 ft                             |                                     |
| Froude Number:         | 1.07                                  |                                      | 0.54                                 |                                     |
| Roughness Coefficient: | 0.0386                                |                                      | 0.0814                               |                                     |

### Structure #10 (Pond)

*BD-2 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

## Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 12.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

## Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 107.00        | 20.00                | 2.00:1            | 2.00:1             | 15.00                |

## Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 106.92 ft |
| Dewater Time:   | 0.61 days |

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

## Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |
| 105.00    | 0.843        | 2.416               | 0.000              | Spillway #1              |
| 106.00    | 0.872        | 3.273               | 2.094              | 4.95*                    |
| 106.92    | 0.871        | 4.078               | 4.235              | 9.65 Peak Stage          |
| 107.00    | 0.872        | 4.145               | 4.414              | Spillway #2              |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |

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

## Detailed Discharge Table

| Elevation (ft) | Straight Pipe (cfs) | Emergency Spillway (cfs) | Combined Total Discharge (cfs) |
|----------------|---------------------|--------------------------|--------------------------------|
| 100.00         | 0.000               | 0.000                    | 0.000                          |
| 101.00         | 0.000               | 0.000                    | 0.000                          |
| 102.00         | 0.000               | 0.000                    | 0.000                          |
| 103.00         | 0.000               | 0.000                    | 0.000                          |
| 104.00         | 0.000               | 0.000                    | 0.000                          |
| 105.00         | 0.000               | 0.000                    | 0.000                          |
| 106.00         | (3)>2.094           | 0.000                    | 2.094                          |
| 107.00         | (5)>4.414           | 0.000                    | 4.414                          |
| 108.00         | (6)>5.182           | 36.939                   | 42.121                         |

## Structure #7 (Riprap Channel)

*Bear Draw 0+00 to 15+00*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 2.0:1                | 2.0:1                 | 10.8      | 3.59                 |                      |                         |

Riprap Channel Results:

## Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 30.03 cfs     |              |
| Depth:            | 0.29 ft       | 3.88 ft      |
| Top Width:        | 11.15 ft      | 25.51 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 3.03 sq ft    |              |
| Hydraulic Radius: | 0.269 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #11 (Pond)

## BD-1 Stockpond

### Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 2.00             | 0.0150      | 105.00             | 0.90                      | 0.00                 |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

### Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 106.62 ft |
| Dewater Time:   | 0.49 days |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 100.00    | 0.016     | 0.000            | 0.000           |                    |
| 101.00    | 0.096     | 0.050            | 0.000           |                    |
| 102.00    | 0.539     | 0.338            | 0.000           |                    |
| 103.00    | 0.654     | 0.933            | 0.000           |                    |
| 104.00    | 0.735     | 1.628            | 0.000           |                    |
| 105.00    | 0.843     | 2.416            | 0.000           | Spillway #1        |
| 106.00    | 0.872     | 3.273            | 2.094           | 4.95*              |
| 106.62    | 0.866     | 3.814            | 3.532           | 6.90 Peak Stage    |
| 107.00    | 0.872     | 4.145            | 4.414           | Spillway #2        |
| 108.00    | 0.872     | 5.017            | 42.121          |                    |

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

### Detailed Discharge Table

| Elevation (ft) | Straight Pipe (cfs) | Emergency Spillway (cfs) | Combined Total Discharge (cfs) |
|----------------|---------------------|--------------------------|--------------------------------|
| 100.00         | 0.000               | 0.000                    | 0.000                          |
| 101.00         | 0.000               | 0.000                    | 0.000                          |
| 102.00         | 0.000               | 0.000                    | 0.000                          |
| 103.00         | 0.000               | 0.000                    | 0.000                          |
| 104.00         | 0.000               | 0.000                    | 0.000                          |
| 105.00         | 0.000               | 0.000                    | 0.000                          |
| 106.00         | (3)>2.094           | 0.000                    | 2.094                          |
| 107.00         | (5)>4.414           | 0.000                    | 4.414                          |
| 108.00         | (6)>5.182           | 36.939                   | 42.121                         |

### Structure #6 (Vegetated Channel)

#### *Natural Channel*

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 5.00              | 2.0:1                | 2.0:1                 | 11.0      | D, B               | 3.00                 |                      |                         | 6.0                     |

#### Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 19.36 cfs                       |                                | 19.36 cfs                      |                               |
| Depth:                 | 0.50 ft                         | 3.50 ft                        | 0.81 ft                        | 3.81 ft                       |
| Top Width:             | 7.02 ft                         | 19.02 ft                       | 8.22 ft                        | 20.22 ft                      |
| Velocity:              | 6.38 fps                        |                                | 3.63 fps                       |                               |
| X-Section Area:        | 3.04 sq ft                      |                                | 5.33 sq ft                     |                               |
| Hydraulic Radius:      | 0.418 ft                        |                                | 0.619 ft                       |                               |
| Froude Number:         | 1.71                            |                                | 0.80                           |                               |
| Roughness Coefficient: | 0.0432                          |                                | 0.0987                         |                               |

### Structure #5 (Vegetated Channel)

#### *D-4 Ditch*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 20.00             | 2.0:1                | 2.0:1                 | 5.9       | D, B               | 3.68                 |                      |                         | 6.0                     |

## Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 17.02 cfs                             |                                      | 17.02 cfs                            |                                     |
| Depth:                 | 0.32 ft                               | 4.00 ft                              | 0.58 ft                              | 4.26 ft                             |
| Top Width:             | 21.26 ft                              | 35.98 ft                             | 22.34 ft                             | 37.06 ft                            |
| Velocity:              | 2.61 fps                              |                                      | 1.38 fps                             |                                     |
| X-Section Area:        | 6.52 sq ft                            |                                      | 12.36 sq ft                          |                                     |
| Hydraulic Radius:      | 0.304 ft                              |                                      | 0.547 ft                             |                                     |
| Froude Number:         | 0.83                                  |                                      | 0.33                                 |                                     |
| Roughness Coefficient: | 0.0625                                |                                      | 0.1756                               |                                     |

## Structure #4 (Pond)

### Sidehill Pond

#### Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,160.00 ft |
| Initial Pool:      | 0.98 ac-ft  |

#### Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 13.00             | 18.00                | 125.00             | 4.00             | 0.0240      | 7,170.00           | 2                        |

#### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 7,172.00      | 40.00             | 2.00:1         | 2.00:1          | 12.00             |

#### Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 7,164.29 ft |
| Dewater Time:   | 0.00 days   |

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

Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 7,155.00  | 0.000        | 0.000               | 0.000              |                          |
| 7,155.01  | 0.002        | 0.000               | 0.000              |                          |
| 7,156.00  | 0.157        | 0.058               | 0.000              |                          |
| 7,157.00  | 0.205        | 0.238               | 0.000              |                          |
| 7,158.00  | 0.234        | 0.457               | 0.000              |                          |
| 7,159.00  | 0.264        | 0.706               | 0.000              |                          |
| 7,160.00  | 0.294        | 0.985               | 0.000              |                          |
| 7,161.00  | 0.328        | 1.295               | 0.000              |                          |
| 7,162.00  | 0.362        | 1.640               | 0.000              |                          |
| 7,163.00  | 0.399        | 2.021               | 0.000              |                          |
| 7,164.00  | 0.440        | 2.440               | 0.000              |                          |
| 7,164.29  | 0.451        | 2.575               | 0.000              | 0.00 Peak Stage          |
| 7,165.00  | 0.480        | 2.900               | 0.000              |                          |
| 7,166.00  | 0.525        | 3.402               | 0.000              |                          |
| 7,167.00  | 0.572        | 3.950               | 0.000              | Low hole SPW #1          |
| 7,168.00  | 0.622        | 4.547               | 0.473              |                          |
| 7,169.00  | 0.672        | 5.194               | 0.669              |                          |
| 7,170.00  | 0.724        | 5.892               | 0.819              | Spillway #1              |
| 7,171.00  | 0.778        | 6.643               | 8.509              |                          |
| 7,172.00  | 0.833        | 7.448               | 12.033             | Spillway #2              |
| 7,173.00  | 0.833        | 8.281               | 40.297             |                          |
| 7,174.00  | 0.833        | 9.114               | 115.083            |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,155.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,155.01          | 0.000             | 0.000                       | 0.000                                   |
| 7,156.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,157.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,158.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,159.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,160.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,161.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,162.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,163.00          | 0.000             | 0.000                       | 0.000                                   |

| Elevation (ft) | Perf. Riser (cfs) | Emergency Spillway (cfs) | Combined Total Discharge (cfs) |
|----------------|-------------------|--------------------------|--------------------------------|
| 7,164.00       | 0.000             | 0.000                    | 0.000                          |
| 7,165.00       | 0.000             | 0.000                    | 0.000                          |
| 7,166.00       | 0.000             | 0.000                    | 0.000                          |
| 7,167.00       | 3.00>0.000        | 0.000                    | 0.000                          |
| 7,168.00       | 0.473             | 0.000                    | 0.473                          |
| 7,169.00       | 0.669             | 0.000                    | 0.669                          |
| 7,170.00       | 0.819             | 0.000                    | 0.819                          |
| 7,171.00       | 8.509             | 0.000                    | 8.509                          |
| 7,172.00       | 12.033            | 0.000                    | 12.033                         |
| 7,173.00       | 14.738            | 25.559                   | 40.297                         |
| 7,174.00       | 17.018            | 98.065                   | 115.083                        |

## Structure #3 (Riprap Channel)

### D-1 Ditch

Trapezoidal Riprap Channel Inputs:

#### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 21.0      | 3.92                 |                      |                         |

Riprap Channel Results:

#### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 1.36 cfs      |              |
| Depth:            | 0.02 ft       | 3.94 ft      |
| Top Width:        | 12.07 ft      | 27.75 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.22 sq ft    |              |
| Hydraulic Radius: | 0.018 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.



### Structure #2 (Riprap Channel)

#### *D-2 Ditch*

Trapezoidal Riprap Channel Inputs:

#### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 4.9       | 3.91                 |                      |                         |

Riprap Channel Results:

#### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 4.69 cfs      |              |
| Depth:            | 0.09 ft       | 4.00 ft      |
| Top Width:        | 12.38 ft      | 28.02 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 1.15 sq ft    |              |
| Hydraulic Radius: | 0.092 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 1.00 in       |              |
| D50:              | 3.00 in       |              |
| Dmax:             | 3.75 in       |              |

Velocity and Manning's n calculations may not apply for this method.

### Structure #1 (Pond)

#### *Section 26 Pond*

Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 6,980.00 ft |
| Initial Pool:      | 1.06 ac-ft  |

#### Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 14.00             | 18.00                | 200.00             | 4.00             | 0.0150      | 6,984.00           | 2                        |

#### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 6,986.00      | 30.00             | 2.50:1         | 2.50:1          | 24.00             |

## Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 6,984.44 ft |
| Dewater Time:   | 1.22 days   |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 6,968.00  | 0.000     | 0.000            | 0.000           |                    |
| 6,969.00  | 0.001     | 0.000            | 0.000           |                    |
| 6,970.00  | 0.021     | 0.009            | 0.000           |                    |
| 6,971.00  | 0.030     | 0.035            | 0.000           |                    |
| 6,972.00  | 0.045     | 0.072            | 0.000           |                    |
| 6,973.00  | 0.060     | 0.124            | 0.000           |                    |
| 6,974.00  | 0.078     | 0.193            | 0.000           |                    |
| 6,975.00  | 0.097     | 0.280            | 0.000           |                    |
| 6,976.00  | 0.118     | 0.388            | 0.000           |                    |
| 6,977.00  | 0.141     | 0.517            | 0.000           |                    |
| 6,978.00  | 0.167     | 0.671            | 0.000           |                    |
| 6,979.00  | 0.195     | 0.852            | 0.000           |                    |
| 6,980.00  | 0.224     | 1.061            | 0.000           |                    |
| 6,981.00  | 0.256     | 1.301            | 0.000           |                    |
| 6,982.00  | 0.290     | 1.574            | 0.000           | Low hole SPW #1    |
| 6,983.00  | 0.327     | 1.882            | 0.473           | 7.89*              |
| 6,984.00  | 0.365     | 2.228            | 0.669           | 6.26* Spillway #1  |
| 6,984.44  | 0.383     | 2.399            | 4.155           | 15.05 Peak Stage   |
| 6,985.00  | 0.405     | 2.612            | 8.509           |                    |
| 6,986.00  | 0.448     | 3.039            | 12.033          | Spillway #2        |
| 6,987.00  | 0.473     | 3.499            | 67.527          |                    |
| 6,988.00  | 0.499     | 3.985            | 204.557         |                    |
| 6,989.00  | 0.525     | 4.497            | 411.119         |                    |
| 6,990.00  | 0.551     | 5.035            | 688.306         |                    |
| 6,991.00  | 0.578     | 5.600            | 1,033.669       |                    |

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

## Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 6,968.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,969.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,970.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,971.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,972.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,973.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,974.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,975.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,976.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,977.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,978.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,979.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,980.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,981.00          | 0.000             | 0.000                       | 0.000                                   |
| 6,982.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 6,983.00          | 0.473             | 0.000                       | 0.473                                   |
| 6,984.00          | 0.669             | 0.000                       | 0.669                                   |
| 6,985.00          | 8.509             | 0.000                       | 8.509                                   |
| 6,986.00          | 12.033            | 0.000                       | 12.033                                  |
| 6,987.00          | 14.738            | 52.789                      | 67.527                                  |
| 6,988.00          | 17.018            | 187.539                     | 204.557                                 |
| 6,989.00          | 19.026            | 392.093                     | 411.119                                 |
| 6,990.00          | 20.842            | 667.464                     | 688.306                                 |
| 6,991.00          | 22.512            | 1,011.157                   | 1,033.669                               |

### 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) |
|--------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #12    | 1        | 33.400         | 0.285              | 0.000        | 0.000  | 74.000       | F   | 12.09                | 1.308                 |
|        | <b>Σ</b> | <b>33.400</b>  |                    |              |        |              |     | <b>12.09</b>         | <b>1.308</b>          |
| #9     | 1        | 32.500         | 0.383              | 0.000        | 0.000  | 74.000       | F   | 10.48                | 1.272                 |
|        | 2        | 18.300         | 0.146              | 0.000        | 0.000  | 62.000       | M   | 0.97                 | 0.199                 |
|        | 3        | 21.500         | 0.268              | 0.000        | 0.000  | 80.000       | F   | 13.14                | 1.281                 |
|        | <b>Σ</b> | <b>105.700</b> |                    |              |        |              |     | <b>35.80</b>         | <b>4.059</b>          |
| #8     | 1        | 40.000         | 0.064              | 0.000        | 0.000  | 80.000       | F   | 34.12                | 2.509                 |
|        | <b>Σ</b> | <b>145.700</b> |                    |              |        |              |     | <b>60.49</b>         | <b>6.568</b>          |
| #10    | <b>Σ</b> | <b>145.700</b> |                    |              |        |              |     | <b>60.49</b>         | <b>6.568</b>          |
| #7     | 1        | 35.200         | 0.119              | 0.000        | 0.000  | 80.000       | F   | 30.03                | 2.208                 |
|        | <b>Σ</b> | <b>180.900</b> |                    |              |        |              |     | <b>30.03</b>         | <b>6.690</b>          |
| #11    | <b>Σ</b> | <b>180.900</b> |                    |              |        |              |     | <b>30.03</b>         | <b>6.690</b>          |
| #6     | 1        | 22.700         | 0.091              | 0.000        | 0.000  | 80.000       | F   | 19.36                | 1.424                 |
|        | 2        | 0.300          | 0.017              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | 3        | 19.700         | 0.111              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | 4        | 12.500         | 0.083              | 0.000        | 0.000  | 57.000       | M   | 0.19                 | 0.078                 |
|        | <b>Σ</b> | <b>236.100</b> |                    |              |        |              |     | <b>19.36</b>         | <b>6.074</b>          |
| #5     | 1        | 23.300         | 0.157              | 0.000        | 0.000  | 80.000       | F   | 16.12                | 1.410                 |
|        | 2        | 2.900          | 0.039              | 0.000        | 0.000  | 80.000       | F   | 2.47                 | 0.182                 |
|        | <b>Σ</b> | <b>26.200</b>  |                    |              |        |              |     | <b>17.02</b>         | <b>1.591</b>          |
| #4     | <b>Σ</b> | <b>26.200</b>  |                    |              |        |              |     | <b>17.02</b>         | <b>1.591</b>          |
| #3     | 1        | 1.600          | 0.018              | 0.000        | 0.000  | 80.000       | F   | 1.36                 | 0.100                 |
|        | <b>Σ</b> | <b>27.800</b>  |                    |              |        |              |     | <b>1.36</b>          | <b>0.100</b>          |
| #2     | 1        | 12.000         | 0.105              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | 2        | 5.500          | 0.035              | 0.000        | 0.000  | 80.000       | F   | 4.69                 | 0.345                 |
|        | 3        | 29.900         | 0.126              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | <b>Σ</b> | <b>47.400</b>  |                    |              |        |              |     | <b>4.69</b>          | <b>0.345</b>          |
| #1     | 1        | 0.300          | 0.021              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|        | 2        | 0.400          | 0.016              | 0.000        | 0.000  | 80.000       | F   | 0.34                 | 0.021                 |
|        | 3        | 1.900          | 0.014              | 0.000        | 0.000  | 57.000       | M   | 0.03                 | 0.008                 |
|        | 4        | 1.500          | 0.004              | 0.000        | 0.000  | 80.000       | F   | 1.28                 | 0.094                 |
|        | 5        | 0.900          | 0.038              | 0.000        | 0.000  | 57.000       | M   | 0.01                 | 0.000                 |

| Stru #   | SWS # | SWS Area (ac) | Time of Conc (hrs) | Musk K (hrs) | Musk X | Curve Number | UHS | Peak Discharge (cfs) | Runoff Volume (ac-ft) |
|----------|-------|---------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| $\Sigma$ |       | 316.300       |                    |              |        |              |     | 27.04                | 6.642                 |

## Subwatershed Time of Concentration Details:

| Stru #    | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|-----------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #1        | 1        | 3. Short grass pasture                                | 11.90     | 24.87            | 209.00            | 2.750          | 0.021        |
| <b>#1</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #1        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 11.90     | 24.87            | 209.00            | 3.440          | 0.016        |
| <b>#1</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.016</b> |
| #1        | 3        | 3. Short grass pasture                                | 23.90     | 49.95            | 209.00            | 3.910          | 0.014        |
| <b>#1</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.014</b> |
| #1        | 4        | 5. Nearly bare and untilled, and alluvial valley fans | 27.90     | 25.10            | 90.00             | 5.280          | 0.004        |
| <b>#1</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.004</b> |
| #1        | 5        | 3. Short grass pasture                                | 8.00      | 24.96            | 312.00            | 2.260          | 0.038        |
| <b>#1</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.038</b> |
| #2        | 1        | 3. Short grass pasture                                | 4.10      | 24.96            | 609.00            | 1.610          | 0.105        |
| <b>#2</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.105</b> |
| #2        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 1.50      | 2.35             | 157.00            | 1.220          | 0.035        |
| <b>#2</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.035</b> |
| #2        | 3        | 3. Short grass pasture                                | 9.10      | 99.64            | 1,095.00          | 2.410          | 0.126        |
| <b>#2</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.126</b> |
| #3        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 23.60     | 75.04            | 318.00            | 4.850          | 0.018        |
| <b>#3</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.018</b> |
| #5        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 6.80      | 100.50           | 1,478.00          | 2.600          | 0.157        |
| <b>#5</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.157</b> |
| #5        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 6.80      | 25.16            | 370.00            | 2.600          | 0.039        |
| <b>#5</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.039</b> |
| #6        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 14.00     | 172.90           | 1,235.00          | 3.740          | 0.091        |
| <b>#6</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.091</b> |
| #6        | 2        | 3. Short grass pasture                                | 1.00      | 0.50             | 50.00             | 0.800          | 0.017        |
| <b>#6</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.017</b> |
| #6        | 3        | 3. Short grass pasture                                | 8.20      | 75.19            | 917.00            | 2.290          | 0.111        |
| <b>#6</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.111</b> |
| #6        | 4        | 3. Short grass pasture                                | 13.90     | 125.23           | 901.00            | 2.980          | 0.083        |
| <b>#6</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.083</b> |

| Stru #     | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|------------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #7         | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 14.00     | 224.84           | 1,606.00          | 3.740          | 0.119        |
| <b>#7</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.119</b> |
| #8         | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 12.30     | 100.36           | 816.00            | 3.500          | 0.064        |
| <b>#8</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.064</b> |
| #9         | 1        | 3. Short grass pasture                                | 8.00      | 249.68           | 3,121.00          | 2.260          | 0.383        |
| <b>#9</b>  | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.383</b> |
| #9         | 2        | 3. Short grass pasture                                | 10.80     | 149.58           | 1,385.00          | 2.620          | 0.146        |
| <b>#9</b>  | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.146</b> |
| #9         | 3        | 5. Nearly bare and untilled, and alluvial valley fans | 3.00      | 50.21            | 1,674.00          | 1.730          | 0.268        |
| <b>#9</b>  | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.268</b> |
| #12        | 1        | 3. Short grass pasture                                | 8.00      | 185.84           | 2,323.00          | 2.260          | 0.285        |
| <b>#12</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.285</b> |

# **Section 26 Pond** **Post Mine Channel Demonstration**

***25- Year 24-Hour Storm Event***  
***Post Mining***

Tony Tennyson

## ***General Information***

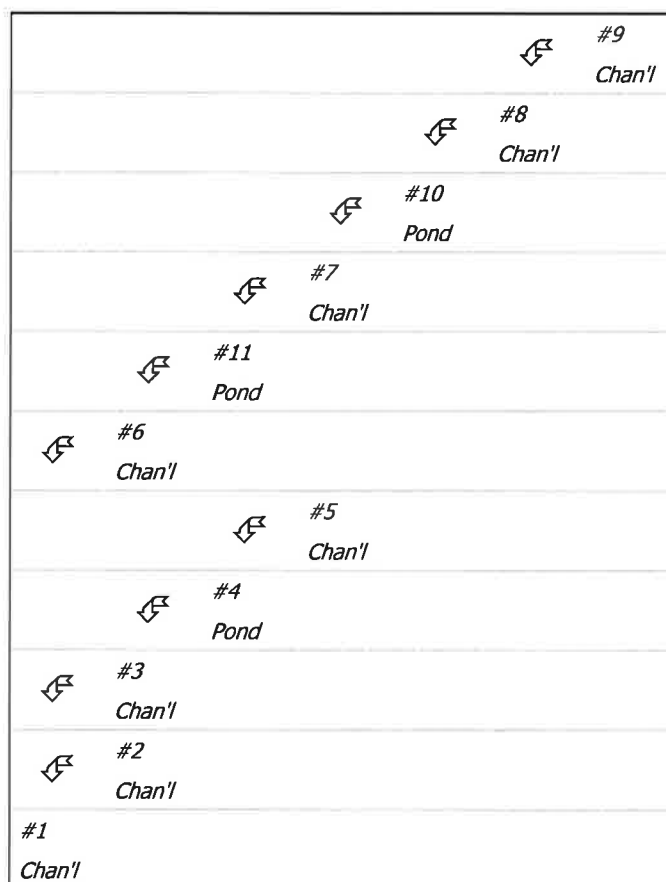
### ***Storm Information:***

|                 |               |
|-----------------|---------------|
| Storm Type:     | NRCS Type II  |
| Design Storm:   | 25 yr - 24 hr |
| Rainfall Depth: | 2.300 inches  |



## Structure Networking:

| Type    | Stru # | (flows into) | Stru # | Musk. K (hrs) | Musk. X | Description              |
|---------|--------|--------------|--------|---------------|---------|--------------------------|
| Channel | #1     | ==>          | End    | 0.000         | 0.000   | Lower Bear Draw          |
| Channel | #2     | ==>          | #1     | 0.000         | 0.000   | D-2 Ditch                |
| Channel | #3     | ==>          | #1     | 0.000         | 0.000   | D-1 Ditch                |
| Pond    | #4     | ==>          | #3     | 0.000         | 0.000   | Sidehill Pond            |
| Channel | #5     | ==>          | #4     | 0.000         | 0.000   | D-4 Ditch                |
| Channel | #6     | ==>          | #1     | 0.000         | 0.000   | Natural Channel          |
| Channel | #7     | ==>          | #11    | 0.000         | 0.000   | Bear Draw 0+00 to 15+00  |
| Channel | #8     | ==>          | #10    | 0.000         | 0.000   | Bear Draw 15+00 to 34+00 |
| Channel | #9     | ==>          | #8     | 0.000         | 0.000   | Bear Draw 34+00 to 78+51 |
| Pond    | #10    | ==>          | #7     | 0.000         | 0.000   | BD-2 Stockpond           |
| Pond    | #11    | ==>          | #6     | 0.000         | 0.000   | BD-1 Stockpond           |



## Structure Summary:

|        | Immediate<br>Contributing<br>Area<br>(ac) | Total<br>Contributing<br>Area<br>(ac) | Peak<br>Discharge<br>(cfs) | Total<br>Runoff<br>Volume<br>(ac-ft) |
|--------|-------------------------------------------|---------------------------------------|----------------------------|--------------------------------------|
| #9     | 72.500                                    | 72.500                                | 2.10                       | 0.77                                 |
| #8     | 40.700                                    | 113.200                               | 5.70                       | 1.31                                 |
| #10 In | 0.000                                     | 113.200                               | 5.70                       | 1.31                                 |
| Out    |                                           |                                       | 0.00                       | 0.00                                 |
| #7     | 35.200                                    | 148.400                               | 30.03                      | 2.21                                 |
| #11 In | 0.000                                     | 148.400                               | 30.03                      | 2.21                                 |
| Out    |                                           |                                       | 0.25                       | 0.13                                 |
| #6     | 54.500                                    | 202.900                               | 4.22                       | 0.57                                 |
| #5     | 22.500                                    | 22.500                                | 0.84                       | 0.24                                 |
| #4 In  | 2.900                                     | 25.400                                | 0.94                       | 0.28                                 |
| Out    |                                           |                                       | 0.00                       | 0.00                                 |
| #3     | 1.600                                     | 27.000                                | 1.36                       | 0.10                                 |
| #2     | 47.400                                    | 47.400                                | 0.76                       | 0.07                                 |
| #1     | 5.000                                     | 282.300                               | 7.96                       | 0.87                                 |

## Structure Detail:

### Structure #9 (Vegetated Channel)

*Bear Draw 34+00 to 78+51*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 7.1       | D, B               | 3.62                 |                      |                         | 6.0                     |

Vegetated Channel Results:

|                        | Stability Class D w/o Freeboard | Stability Class D w/ Freeboard | Capacity Class B w/o Freeboard | Capacity Class B w/ Freeboard |
|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Design Discharge:      | 2.10 cfs                        |                                | 2.10 cfs                       |                               |
| Depth:                 | 0.17 ft                         | 3.79 ft                        | 0.38 ft                        | 4.00 ft                       |
| Top Width:             | 11.00 ft                        | 32.72 ft                       | 12.26 ft                       | 33.98 ft                      |
| Velocity:              | 1.20 fps                        |                                | 0.50 fps                       |                               |
| X-Section Area:        | 1.75 sq ft                      |                                | 4.20 sq ft                     |                               |
| Hydraulic Radius:      | 0.159 ft                        |                                | 0.339 ft                       |                               |
| Froude Number:         | 0.53                            |                                | 0.15                           |                               |
| Roughness Coefficient: | 0.0969                          |                                | 0.3848                         |                               |

### Structure #8 (Vegetated Channel)

*Bear Draw 15+00 to 34+00*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Retardance Classes | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) | Limiting Velocity (fps) |
|-------------------|----------------------|-----------------------|-----------|--------------------|----------------------|----------------------|-------------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 2.8       | D, B               | 3.32                 |                      |                         | 7.0                     |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 5.70 cfs                              |                                      | 5.70 cfs                             |                                     |
| Depth:                 | 0.34 ft                               | 3.66 ft                              | 0.68 ft                              | 4.00 ft                             |
| Top Width:             | 12.02 ft                              | 31.94 ft                             | 14.07 ft                             | 33.99 ft                            |
| Velocity:              | 1.54 fps                              |                                      | 0.70 fps                             |                                     |
| X-Section Area:        | 3.71 sq ft                            |                                      | 8.16 sq ft                           |                                     |
| Hydraulic Radius:      | 0.306 ft                              |                                      | 0.571 ft                             |                                     |
| Froude Number:         | 0.49                                  |                                      | 0.16                                 |                                     |
| Roughness Coefficient: | 0.0734                                |                                      | 0.2452                               |                                     |

## Structure #10 (Pond)

### *BD-2 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

### Straight Pipe

| Barrel<br>Diameter<br>(in) | Barrel<br>Length<br>(ft) | Barrel<br>Slope (%) | Manning's<br>n | Spillway<br>Elev (ft) | Entrance<br>Loss<br>Coefficient | Tailwater<br>Depth<br>(ft) |
|----------------------------|--------------------------|---------------------|----------------|-----------------------|---------------------------------|----------------------------|
| 12.00                      | 100.00                   | 2.00                | 0.0150         | 105.00                | 0.90                            | 0.00                       |

### Emergency Spillway

| Spillway Elev | Crest Length<br>(ft) | Left<br>Sideslope | Right<br>Sideslope | Bottom<br>Width (ft) |
|---------------|----------------------|-------------------|--------------------|----------------------|
| 107.00        | 20.00                | 2.00:1            | 2.00:1             | 15.00                |

Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 104.03 ft |
| Dewater Time:   | 0.00 days |

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

### Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |
| 104.03    | 0.751        | 1.651               | 0.000              | 0.00 Peak Stage          |
| 105.00    | 0.843        | 2.416               | 0.000              | Spillway #1              |
| 106.00    | 0.872        | 3.273               | 2.094              |                          |
| 107.00    | 0.872        | 4.145               | 4.414              | Spillway #2              |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 100.00            | 0.000                  | 0.000                       | 0.000                                   |
| 101.00            | 0.000                  | 0.000                       | 0.000                                   |
| 102.00            | 0.000                  | 0.000                       | 0.000                                   |
| 103.00            | 0.000                  | 0.000                       | 0.000                                   |
| 104.00            | 0.000                  | 0.000                       | 0.000                                   |
| 105.00            | 0.000                  | 0.000                       | 0.000                                   |
| 106.00            | (3)>2.094              | 0.000                       | 2.094                                   |
| 107.00            | (5)>4.414              | 0.000                       | 4.414                                   |
| 108.00            | (6)>5.182              | 36.939                      | 42.121                                  |

Structure #7 (Riprap Channel)

*Bear Draw 0+00 to 15+00*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 10.00                | 2.0:1                      | 2.0:1                       | 10.8      | 3.71                    |                         |                               |

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 30.03 cfs     |              |
| Depth:            | 0.29 ft       | 4.00 ft      |
| Top Width:        | 11.15 ft      | 25.99 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 3.03 sq ft    |              |
| Hydraulic Radius: | 0.269 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #11 (Pond)

### *BD-1 Stockpond*

Pond Inputs:

|                    |            |
|--------------------|------------|
| Initial Pool Elev: | 102.00 ft  |
| Initial Pool:      | 0.34 ac-ft |

### Straight Pipe

| Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Entrance Loss Coefficient | Tailwater Depth (ft) |
|----------------------|--------------------|------------------|-------------|--------------------|---------------------------|----------------------|
| 12.00                | 100.00             | 2.00             | 0.0150      | 105.00             | 0.90                      | 0.00                 |

### Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 107.00        | 20.00             | 2.00:1         | 2.00:1          | 15.00             |

Pond Results:

|                 |           |
|-----------------|-----------|
| Peak Elevation: | 105.12 ft |
| Dewater Time:   | 0.80 days |

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

### Elevation-Capacity-Discharge Table

| Elevation | Area<br>(ac) | Capacity<br>(ac-ft) | Discharge<br>(cfs) | Dewater<br>Time<br>(hrs) |
|-----------|--------------|---------------------|--------------------|--------------------------|
| 100.00    | 0.016        | 0.000               | 0.000              |                          |
| 101.00    | 0.096        | 0.050               | 0.000              |                          |
| 102.00    | 0.539        | 0.338               | 0.000              |                          |
| 103.00    | 0.654        | 0.933               | 0.000              |                          |
| 104.00    | 0.735        | 1.628               | 0.000              |                          |
| 105.00    | 0.843        | 2.416               | 0.000              | Spillway #1              |
| 105.12    | 0.812        | 2.517               | 0.247              | 19.30 Peak Stage         |
| 106.00    | 0.872        | 3.273               | 2.094              |                          |
| 107.00    | 0.872        | 4.145               | 4.414              | Spillway #2              |
| 108.00    | 0.872        | 5.017               | 42.121             |                          |

Detailed Discharge Table

| Elevation<br>(ft) | Straight Pipe<br>(cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|------------------------|-----------------------------|-----------------------------------------|
| 100.00            | 0.000                  | 0.000                       | 0.000                                   |
| 101.00            | 0.000                  | 0.000                       | 0.000                                   |
| 102.00            | 0.000                  | 0.000                       | 0.000                                   |
| 103.00            | 0.000                  | 0.000                       | 0.000                                   |
| 104.00            | 0.000                  | 0.000                       | 0.000                                   |
| 105.00            | 0.000                  | 0.000                       | 0.000                                   |
| 106.00            | (3)>2.094              | 0.000                       | 2.094                                   |
| 107.00            | (5)>4.414              | 0.000                       | 4.414                                   |
| 108.00            | (6)>5.182              | 36.939                      | 42.121                                  |

Structure #6 (Vegetated Channel)

*Natural Channel*

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 5.00                 | 2.0:1                      | 2.0:1                       | 11.0      | D, B                  | 3.00                    |                         |                               | 6.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 4.22 cfs                              |                                      | 4.22 cfs                             |                                     |
| Depth:                 | 0.27 ft                               | 3.27 ft                              | 0.51 ft                              | 3.51 ft                             |
| Top Width:             | 6.06 ft                               | 18.06 ft                             | 7.04 ft                              | 19.04 ft                            |
| Velocity:              | 2.88 fps                              |                                      | 1.38 fps                             |                                     |
| X-Section Area:        | 1.47 sq ft                            |                                      | 3.06 sq ft                           |                                     |
| Hydraulic Radius:      | 0.237 ft                              |                                      | 0.421 ft                             |                                     |
| Froude Number:         | 1.03                                  |                                      | 0.37                                 |                                     |
| Roughness Coefficient: | 0.0655                                |                                      | 0.2015                               |                                     |

## Structure #5 (Vegetated Channel)

### *D-4 Ditch*

Trapezoidal Vegetated Channel Inputs:

Material: Tall fescue

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Retardance<br>Classes | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) | Limiting<br>Velocity<br>(fps) |
|----------------------|----------------------------|-----------------------------|-----------|-----------------------|-------------------------|-------------------------|-------------------------------|-------------------------------|
| 20.00                | 2.0:1                      | 2.0:1                       | 5.9       | D, B                  | 3.68                    |                         |                               | 6.0                           |

Vegetated Channel Results:

|                        | Stability<br>Class D w/o<br>Freeboard | Stability<br>Class D w/<br>Freeboard | Capacity<br>Class B w/o<br>Freeboard | Capacity<br>Class B w/<br>Freeboard |
|------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Design Discharge:      | 0.84 cfs                              |                                      | 0.84 cfs                             |                                     |
| Depth:                 | 0.09 ft                               | 3.77 ft                              | 0.24 ft                              | 3.92 ft                             |
| Top Width:             | 20.36 ft                              | 35.08 ft                             | 20.98 ft                             | 35.70 ft                            |
| Velocity:              | 0.46 fps                              |                                      | 0.17 fps                             |                                     |
| X-Section Area:        | 1.82 sq ft                            |                                      | 5.00 sq ft                           |                                     |
| Hydraulic Radius:      | 0.089 ft                              |                                      | 0.237 ft                             |                                     |
| Froude Number:         | 0.27                                  |                                      | 0.06                                 |                                     |
| Roughness Coefficient: | 0.1547                                |                                      | 0.8265                               |                                     |

## Structure #4 (Pond)

### *Sidehill Pond*

Pond Inputs:

|                    |             |
|--------------------|-------------|
| Initial Pool Elev: | 7,160.00 ft |
| Initial Pool:      | 0.98 ac-ft  |



## Perforated Riser

| Riser Diameter (in) | Riser Height (ft) | Barrel Diameter (in) | Barrel Length (ft) | Barrel Slope (%) | Manning's n | Spillway Elev (ft) | Number of Holes per Elev |
|---------------------|-------------------|----------------------|--------------------|------------------|-------------|--------------------|--------------------------|
| 18.00               | 13.00             | 18.00                | 125.00             | 4.00             | 0.0240      | 7,170.00           | 2                        |

## Emergency Spillway

| Spillway Elev | Crest Length (ft) | Left Sideslope | Right Sideslope | Bottom Width (ft) |
|---------------|-------------------|----------------|-----------------|-------------------|
| 7,172.00      | 40.00             | 2.00:1         | 2.00:1          | 12.00             |

## Pond Results:

|                 |             |
|-----------------|-------------|
| Peak Elevation: | 7,160.90 ft |
| Dewater Time:   | 0.00 days   |

*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) |
|-----------|-----------|------------------|-----------------|--------------------|
| 7,155.00  | 0.000     | 0.000            | 0.000           |                    |
| 7,156.00  | 0.157     | 0.052            | 0.000           |                    |
| 7,157.00  | 0.205     | 0.233            | 0.000           |                    |
| 7,158.00  | 0.234     | 0.452            | 0.000           |                    |
| 7,159.00  | 0.264     | 0.701            | 0.000           |                    |
| 7,160.00  | 0.294     | 0.979            | 0.000           |                    |
| 7,160.90  | 0.324     | 1.258            | 0.000           | 0.00 Peak Stage    |
| 7,161.00  | 0.328     | 1.290            | 0.000           |                    |
| 7,162.00  | 0.362     | 1.635            | 0.000           |                    |
| 7,163.00  | 0.399     | 2.016            | 0.000           |                    |
| 7,164.00  | 0.440     | 2.435            | 0.000           |                    |
| 7,165.00  | 0.480     | 2.895            | 0.000           |                    |
| 7,166.00  | 0.525     | 3.397            | 0.000           |                    |
| 7,167.00  | 0.572     | 3.945            | 0.000           | Low hole SPW #1    |
| 7,168.00  | 0.622     | 4.542            | 0.473           |                    |
| 7,169.00  | 0.672     | 5.189            | 0.669           |                    |
| 7,170.00  | 0.724     | 5.887            | 0.819           | Spillway #1        |
| 7,171.00  | 0.778     | 6.638            | 8.509           |                    |
| 7,172.00  | 0.833     | 7.443            | 12.033          | Spillway #2        |
| 7,173.00  | 0.833     | 8.276            | 40.297          |                    |
| 7,174.00  | 0.833     | 9.108            | 115.083         |                    |

Detailed Discharge Table

| Elevation<br>(ft) | Perf. Riser (cfs) | Emergency<br>Spillway (cfs) | Combined<br>Total<br>Discharge<br>(cfs) |
|-------------------|-------------------|-----------------------------|-----------------------------------------|
| 7,155.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,156.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,157.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,158.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,159.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,160.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,161.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,162.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,163.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,164.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,165.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,166.00          | 0.000             | 0.000                       | 0.000                                   |
| 7,167.00          | 3.00>0.000        | 0.000                       | 0.000                                   |
| 7,168.00          | 0.473             | 0.000                       | 0.473                                   |
| 7,169.00          | 0.669             | 0.000                       | 0.669                                   |
| 7,170.00          | 0.819             | 0.000                       | 0.819                                   |
| 7,171.00          | 8.509             | 0.000                       | 8.509                                   |
| 7,172.00          | 12.033            | 0.000                       | 12.033                                  |
| 7,173.00          | 14.738            | 25.559                      | 40.297                                  |
| 7,174.00          | 17.018            | 98.065                      | 115.083                                 |

Structure #3 (Riprap Channel)

*D-1 Ditch*

Trapezoidal Riprap Channel Inputs:

Material: Riprap

| Bottom<br>Width (ft) | Left<br>Sideslope<br>Ratio | Right<br>Sideslope<br>Ratio | Slope (%) | Freeboard<br>Depth (ft) | Freeboard<br>% of Depth | Freeboard<br>Mult. x<br>(VxD) |
|----------------------|----------------------------|-----------------------------|-----------|-------------------------|-------------------------|-------------------------------|
| 12.00                | 2.0:1                      | 2.0:1                       | 21.0      | 3.92                    |                         |                               |

Riprap Channel Results:

**Simons/OSM Method - Steep Slope Design**

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 1.36 cfs      |              |
| Depth:            | 0.02 ft       | 3.94 ft      |
| Top Width:        | 12.07 ft      | 27.75 ft     |

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Velocity*:        |               |              |
| X-Section Area:   | 0.22 sq ft    |              |
| Hydraulic Radius: | 0.018 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 2.00 in       |              |
| D50:              | 6.00 in       |              |
| Dmax:             | 7.50 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #2 (Riprap Channel)

### *D-2 Ditch*

Trapezoidal Riprap Channel Inputs:

### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 12.00             | 2.0:1                | 2.0:1                 | 4.9       | 3.91                 |                      |                         |

Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 0.76 cfs      |              |
| Depth:            | 0.06 ft       | 3.97 ft      |
| Top Width:        | 12.22 ft      | 27.86 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 0.67 sq ft    |              |
| Hydraulic Radius: | 0.055 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 1.00 in       |              |
| D50:              | 3.00 in       |              |
| Dmax:             | 3.75 in       |              |

Velocity and Manning's n calculations may not apply for this method.

## Structure #1 (Riprap Channel)

### *Lower Bear Draw*

## Trapezoidal Riprap Channel Inputs:

### Material: Riprap

| Bottom Width (ft) | Left Sideslope Ratio | Right Sideslope Ratio | Slope (%) | Freeboard Depth (ft) | Freeboard % of Depth | Freeboard Mult. x (VxD) |
|-------------------|----------------------|-----------------------|-----------|----------------------|----------------------|-------------------------|
| 10.00             | 3.0:1                | 3.0:1                 | 9.5       | 3.89                 |                      |                         |

## Riprap Channel Results:

### Simons/OSM Method - Steep Slope Design

|                   | w/o Freeboard | w/ Freeboard |
|-------------------|---------------|--------------|
| Design Discharge: | 7.96 cfs      |              |
| Depth:            | 0.11 ft       | 4.00 ft      |
| Top Width:        | 10.69 ft      | 34.03 ft     |
| Velocity*:        |               |              |
| X-Section Area:   | 1.19 sq ft    |              |
| Hydraulic Radius: | 0.111 ft      |              |
| Froude Number*:   |               |              |
| Manning's n*:     |               |              |
| Dmin:             | 1.00 in       |              |
| D50:              | 3.00 in       |              |
| Dmax:             | 3.75 in       |              |

Velocity and Manning's n calculations may not apply for this method.

### 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) |
|------------|----------|----------------|--------------------|--------------|--------|--------------|-----|----------------------|-----------------------|
| #9         | 1        | 72.500         | 0.581              | 0.000        | 0.000  | 62.000       | M   | 2.10                 | 0.772                 |
|            | <b>Σ</b> | <b>72.500</b>  |                    |              |        |              |     | <b>2.10</b>          | <b>0.772</b>          |
| #8         | 1        | 40.700         | 0.107              | 0.000        | 0.000  | 62.000       | M   | 5.62                 | 0.542                 |
|            | <b>Σ</b> | <b>113.200</b> |                    |              |        |              |     | <b>5.70</b>          | <b>1.314</b>          |
| <b>#10</b> | <b>Σ</b> | <b>113.200</b> |                    |              |        |              |     | <b>5.70</b>          | <b>1.314</b>          |
| #7         | 1        | 35.200         | 0.119              | 0.000        | 0.000  | 80.000       | F   | 30.03                | 2.208                 |
|            | <b>Σ</b> | <b>148.400</b> |                    |              |        |              |     | <b>30.03</b>         | <b>2.208</b>          |
| <b>#11</b> | <b>Σ</b> | <b>148.400</b> |                    |              |        |              |     | <b>30.03</b>         | <b>2.208</b>          |
| #6         | 1        | 19.600         | 0.064              | 0.000        | 0.000  | 62.000       | M   | 2.71                 | 0.261                 |
|            | 2        | 0.300          | 0.017              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|            | 3        | 19.500         | 0.111              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|            | 4        | 12.500         | 0.083              | 0.000        | 0.000  | 57.000       | M   | 0.19                 | 0.078                 |
|            | 5        | 2.600          | 0.028              | 0.000        | 0.000  | 74.000       | F   | 1.51                 | 0.108                 |
|            | <b>Σ</b> | <b>202.900</b> |                    |              |        |              |     | <b>4.22</b>          | <b>0.575</b>          |
| #5         | 1        | 22.500         | 0.315              | 0.000        | 0.000  | 62.000       | M   | 0.84                 | 0.240                 |
|            | <b>Σ</b> | <b>22.500</b>  |                    |              |        |              |     | <b>0.84</b>          | <b>0.240</b>          |
| #4         | 1        | 2.900          | 0.037              | 0.000        | 0.000  | 62.000       | M   | 0.40                 | 0.039                 |
|            | <b>Σ</b> | <b>25.400</b>  |                    |              |        |              |     | <b>0.94</b>          | <b>0.279</b>          |
| #3         | 1        | 1.600          | 0.018              | 0.000        | 0.000  | 80.000       | F   | 1.36                 | 0.100                 |
|            | <b>Σ</b> | <b>27.000</b>  |                    |              |        |              |     | <b>1.36</b>          | <b>0.100</b>          |
| #2         | 1        | 12.000         | 0.105              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|            | 2        | 5.500          | 0.035              | 0.000        | 0.000  | 62.000       | M   | 0.76                 | 0.073                 |
|            | 3        | 29.900         | 0.126              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|            | <b>Σ</b> | <b>47.400</b>  |                    |              |        |              |     | <b>0.76</b>          | <b>0.073</b>          |
| #1         | 1        | 0.300          | 0.021              | 0.000        | 0.000  | 47.000       | M   | 0.00                 | 0.000                 |
|            | 2        | 0.400          | 0.016              | 0.000        | 0.000  | 80.000       | F   | 0.34                 | 0.021                 |
|            | 3        | 1.900          | 0.014              | 0.000        | 0.000  | 57.000       | M   | 0.03                 | 0.008                 |
|            | 4        | 1.500          | 0.004              | 0.000        | 0.000  | 80.000       | F   | 1.28                 | 0.094                 |
|            | 5        | 0.900          | 0.038              | 0.000        | 0.000  | 57.000       | M   | 0.01                 | 0.000                 |
|            | <b>Σ</b> | <b>282.300</b> |                    |              |        |              |     | <b>7.96</b>          | <b>0.872</b>          |

### ***Subwatershed Time of Concentration Details:***

| Stru #    | SWS #    | Land Flow Condition                                   | Slope (%) | Vert. Dist. (ft) | Horiz. Dist. (ft) | Velocity (fps) | Time (hrs)   |
|-----------|----------|-------------------------------------------------------|-----------|------------------|-------------------|----------------|--------------|
| #1        | 1        | 3. Short grass pasture                                | 11.90     | 24.87            | 209.00            | 2.750          | 0.021        |
| <b>#1</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.021</b> |
| #1        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 11.90     | 24.87            | 209.00            | 3.440          | 0.016        |
| <b>#1</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.016</b> |
| #1        | 3        | 3. Short grass pasture                                | 23.90     | 49.95            | 209.00            | 3.910          | 0.014        |
| <b>#1</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.014</b> |
| #1        | 4        | 5. Nearly bare and untilled, and alluvial valley fans | 27.90     | 25.10            | 90.00             | 5.280          | 0.004        |
| <b>#1</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.004</b> |
| #1        | 5        | 3. Short grass pasture                                | 8.00      | 24.96            | 312.00            | 2.260          | 0.038        |
| <b>#1</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.038</b> |
| #2        | 1        | 3. Short grass pasture                                | 4.10      | 24.96            | 609.00            | 1.610          | 0.105        |
| <b>#2</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.105</b> |
| #2        | 2        | 5. Nearly bare and untilled, and alluvial valley fans | 1.50      | 2.35             | 157.00            | 1.220          | 0.035        |
| <b>#2</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.035</b> |
| #2        | 3        | 3. Short grass pasture                                | 9.10      | 99.64            | 1,095.00          | 2.410          | 0.126        |
| <b>#2</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.126</b> |
| #3        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 23.60     | 75.04            | 318.00            | 4.850          | 0.018        |
| <b>#3</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.018</b> |
| #4        | 1        | 3. Short grass pasture                                | 8.00      | 24.40            | 305.00            | 2.260          | 0.037        |
| <b>#4</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.037</b> |
| #5        | 1        | 3. Short grass pasture                                | 6.00      | 132.89           | 2,214.83          | 1.950          | 0.315        |
| <b>#5</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.315</b> |
| #6        | 1        | 3. Short grass pasture                                | 19.00     | 153.33           | 807.00            | 3.480          | 0.064        |
| <b>#6</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.064</b> |
| #6        | 2        | 3. Short grass pasture                                | 1.00      | 0.50             | 50.00             | 0.800          | 0.017        |
| <b>#6</b> | <b>2</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.017</b> |
| #6        | 3        | 3. Short grass pasture                                | 3.00      | 24.87            | 829.00            | 1.380          | 0.166        |
| <b>#6</b> | <b>3</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.111</b> |
| #6        | 4        | 3. Short grass pasture                                | 13.90     | 125.23           | 900.93            | 2.980          | 0.083        |
| <b>#6</b> | <b>4</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.083</b> |
| #6        | 5        | 3. Short grass pasture                                | 20.00     | 73.60            | 368.00            | 3.570          | 0.028        |
| <b>#6</b> | <b>5</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.028</b> |
| #7        | 1        | 5. Nearly bare and untilled, and alluvial valley fans | 14.00     | 224.84           | 1,606.00          | 3.740          | 0.119        |
| <b>#7</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.119</b> |
| #8        | 1        | 3. Short grass pasture                                | 12.00     | 128.28           | 1,069.00          | 2.770          | 0.107        |
| <b>#8</b> | <b>1</b> | <b>Time of Concentration:</b>                         |           |                  |                   |                | <b>0.107</b> |
| #9        | 1        | 3. Short grass pasture                                | 9.00      | 452.16           | 5,024.00          | 2.400          | 0.581        |

| Stru<br># | SWS<br># | Land Flow Condition    | Slope (%) | Vert. Dist.<br>(ft) | Horiz. Dist.<br>(ft) | Velocity<br>(fps) | Time (hrs) |
|-----------|----------|------------------------|-----------|---------------------|----------------------|-------------------|------------|
| #9        | 1        | Time of Concentration: |           |                     |                      |                   | 0.581      |