TRI-STATE

December 15, 2022

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 158 (TR-158)
Final East Pit Ditch Watershed 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 158 (TR-158) to Permit No. C-1981-019.

TR-158 is being submitted as a requirement to abate Notice of Violation No. CV-2022-001 (NOV). Colowyo under abatement step two in the NOV, is required to submit a complete technical revision to provide a new design for the Final East Pit Ditch that will safely pass the peak runoff from a 10-year, 24-hour precipitation event by January 10, 2022. This technical revision provides a revised sediment control plan for the Final East Pit Ditch watershed as required to abate the NOV. It is requested that the Division note that this submittal satisfies step two requirements to abate the NOV.

In summary, TR-158 proposes additional sediment control structure within the Final East Pit Ditch watershed, and an additional sediment pond (Section 15 Pond) to reduce the overall acres reporting to the Final East Pit Ditch and in the end Prospect Pond also. TR-158 also proposes to increase the capacities of the EP1 and EP2 stock ponds, proposes an additional stock pond (EP3), and proposes to make Reach 1 of the Final East Pit Ditch a nonerosive structure (concrete riprap lined ditch). Finally, Colowyo has identified an area where a post-mine channel in the South Taylor reclamation where it will be beneficial to direct surface water runoff to assist in mitigating erosion, and that channel is also being proposed under TR-158.

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. Finally, it is requested that the Division calculate the revised reclamation liability proposed under this technical revision. If you should have any additional questions or concerns, please feel free to contact Tony Tennyson at (970) 824-1232 or at ttennyson@tristategt.org.

P.O. BOX 33695
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303-452-6111
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Sincerely,

DocuSigned by:
Chris Gilbreath
D250C711D0BF450...

Chris Gilbreath
Senior Manager
Remediation and Reclamation

CG:TT:der

Enclosure

cc: Foster Beckett (BLM-LSFO)
Tony Tennyson (via email)
File: C. F. 1.1.2.143 - 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: **December 13, 2022**
Revision Description: **TR-158 Prospect Pond Watershed 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	Page Exh. 7-14TOC-2 (1 page)		Page Exh. 7-14TOC-2 (1 page)		Exhibit 7 Table of Contents has been updated.
2C	Page Exh. 7-14TOC-2 (1 page)		Page Exh. 7-14TOC-2 (1 page)		Exhibit 7 Table of Contents has been updated.
2C	Page 7-15-6 (1 page)		Page 7-15-6 (1 page)		Exhibit 7 Item 14 Table 1 has been updated.
2C	Exhibit 7 Item 14B Pages Exh. 7-14B-1 through Exh. 7-14B-5 (5 pages)				Exhibit 7 Item 14B information has been moved to appliable pond appendices that the temporary channels are contained in the reporting watershed.
2D	Page Exh. 7-14TOC-2 (1 page)		Page Exh. 7-14TOC-2 (1 page)		Exhibit 7 Table of Contents has been updated.
2D	Appendix Exh. 7-14SP, Pages Exh. 7-14SP-2 and 3 (2 pages)		Appendix Exh. 7-14SP, Pages Exh. 7-14SP-2 and 3 (2 pages)		Appendix Exh. 7-14SP has been updated with information from Exhibit 7 Item 14B.
2D	Appendix Exh. 7-14S3, Pages Exh. 7-14S-2 and 3 (2 pages)		Appendix Exh. 7-14S3, Pages Exh. 7-14S-2 and 3 (2 pages)		Appendix Exh. 7-14S3 has been updated with information from Exhibit 7 Item 14B.
2E	Page Exh. 7-14TOC-2 (1 page)		Page Exh. 7-14TOC-2 (1 page)		Exhibit 7 Table of Contents has been updated.
2E	Exhibit 7 Item 14 Part PP All Pages (90 pages)		Appendix Exh. 7-14PP Pages Exh. 7-14PP-1 through 4 (4 pages), SEDCAD Outputs (87 pages), Figures Exh. 7-14PP1, 7-14PP-2, and 7-14PP-3 (3 pages)		Appendix Exh. 7-14PP for Prospect Pond and Prospect Pond watershed has been updated.
2E			Appendix Exh. 7-14S15 Pages Exh. 7-14S15-1 and 2 (2 pages), SEDCAD Outputs (8 pages), Figures Exh. 7-14S15-1 and 2 (2 pages)		Appendix Exh. 7-14S15 has been inserted into the permit.
2E	Appendix Exh. 7-14S Pages Exh. 7-14S-2 and 3 (2 pages), Figure Exh. 7-14S-2 (1 page), and Section 16 Fill Ditch SEDCAD Output (7 pages)		Appendix Exh. 7-14S, Pages Exh. 7-14S-2 and 3 (2 pages), Figure Exh. 7-14S-2 (1 page)		Appendix Exh. 7-14S has been updated.
3					No Change
4					No Change
5A					No Change
5B					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: **December 13, 2022**
Revision Description: **TR-158 Prospect Pond Watershed Revision**

Volume Number	Page, Map or other Permit Entry to be REMOVED		Page, Map or other Permit Entry to be ADDED		Description of Change
6	Map 10C		Map 10C		Map 10C has been updated.
7	Map 12		Map 12		Map 12 has been updated.
8	Map 29		Map 29		Map 29 has been updated.
9	Map 33		Map 33		Map 33 has been updated.
10					No Change
12					No Change
13					No Change
14	Map 22A		Map 22A		Map 22A has been updated.
14	Map 33B		Map 33B		Map 33B has been updated.
14	Map 44		Map 44		Map 44 has been updated.
15					No Change
16					No Change
17					No Change
18A					No Change
18B					No Change
18C					No Change
18D					No Change
19					No Change
20					No Change
20					No Change
21					No Change
22					No Change

19) Point of Compliance Well Investigation Report – Colowyo Mine, AECOM 2021

20) Topsoil Pile 15G Grass Filter Demonstration

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Taylor Pump Pond

(Note: For hydrology information in the South Taylor Area, See Volume 13, Exhibit 7 Item 20 and for the Collom Area, See Volumes 18B through 18D.)

Exhibit 7, Item 14, Table 1
Summary of Ditch and Channel Design Parameters

Exh7-14F

West Pit Fill Ditch & East Taylor Pond Ditch	Flow, Q	Slope, %	Bottom Width	Side Slope, H:1V	Rip Rap, D50, in
(All segments ex. Coal Road Ditch designed for 100 yr storm; WP Coal Rd Ditch designed for 10 year storm)					
West Pit Fill Ditch, Sta 0 to 2	169.9	17.0	10.0	3.0	21
West Pit Fill Ditch, Sta 2 to 10	158.2	25.0	10.0	3.0	24
West Pit Fill Ditch, Sta 10 to 31	108.0	10.0	10.0	3.0	12
West Pit Coal Road Ditch, Sta 0 to 21	19.2	10.0	10.0	3.0	Veg.
East Taylor Pond Ditch, Sta 0 to 30	50.2	3.5	0.0	3.0	Veg.

Note: For permanent and temporary channels in the West Pit, East Pit, and South Taylor area please see appliacble appendices in Volumes 2B, 2C, 2D, 2E, and 13.

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(Note: For hydrology information in the South Taylor Area, See Volume 13, Exhibit 7 Item 20 and for the Collom Area, See Volumes 18B through 18D.)

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(Note: For hydrology information in the South Taylor Area, See Volume 13, Exhibit 7 Item 20 and for the Collom Area, See Volumes 18B through 18D.)

Temporary Ditches

The Streeter South Side Ditch routes water from Phase III released areas to the Streeter Pond. The location of the temporary ditch can be found on Map 12 and Figure Exh. 7-14SP-2. Design information for the temporary ditch is as follows:

Streeter South Side Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Total Depth	Erosion Protection
0+00 to 16+50	0.04	3.0	V Ditch 2' Bottom Width	1H:1V Left 7H:1V Right	0.5	Vegetation

Post Mine Channels

The Streeter Pond watershed is comprised of two post-mining channels. The main channel is the Streeter Ditch, which will convey post mining surface water flows to the Streeter Pond. Buckskin Ditch is a tributary to the Streeter Ditch. The locations of both channels are presented on Map 12 and Figure Exh. 7-14SP-2, and the channel profiles are presented on Map 33.

The assumed hydrologic condition for both channels is the post mine condition when the entire Streeter watershed is reclaimed and reporting to the Streeter Pond.

The upper segments of the Streeter Ditch and the entirety of Buckskin Ditch have a contributing area of less than one square mile. They could be designed in accordance with Rule 4.05.3. However, for ease since the lower segments of Streeter Ditch meet the requirements of Rule 4.05.4, both ditches have been designed for the 100-year, 24-hour storm event.

A SEDCAD^{TM} model has been included 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 for the Streeter and Buckskin Ditches are summarized below.

Temporary Ditches

The Stoker Ditch routes water from native and disturbed areas to the Section 3 Ponds. The location of the temporary ditch can be found on Map 12 and Figure Exh. 7-14S3-2. Design information for the temporary ditch is as follows:

Stoker Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Total Depth	Erosion Protection
0+00 to 24+86	19.06	3.0	V Ditch 2' Bottom Width	1H:1V Left 7H:1V Right	0.5	Vegetation

Permanent Post Mine Channels

The Section 3 Pond watershed is comprised of two post-mining channels. The main channel is the Streeter Ditch, which will convey post mining surface water flows to the Upper and Lower Section 3 Ponds. Buckskin Ditch is a tributary to the Streeter Ditch. The locations of both channels are presented on Map 12 and Figure Exh. 7-14S3-2, and the channel profiles are presented on Map 33.

Both channels have been designed in accordance with Rule 4.05.4(2)(b) for the 100-year, 24-hour storm event as the watershed reporting to the Upper and Lower Section 3 Ponds is greater than one square mile.

A SEDCAD™ model has been included 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 Streeter and Buckskin Ditches are summarized below.

Streeter Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
Station 0+00 to SD-1	104.12	4.7	Trapezoidal 15' bottom	3H:1V	Riprap, D50 = 6"
SD-1 to SD-2	109.89	4.4	Trapezoidal 15' bottom	3H:1V	Riprap, D50 = 9"
SD-2 to SD-3	111.97	2.7	Trapezoidal 15' bottom	3H:1V	Vegetation
SD-3 to Confluence with Buckskin Ditch	104.21	2.1	Trapezoidal 15' bottom	3H:1V	Vegetation
Confluence of Buckskin Ditch to Station 101+46	81.98	2.6	Trapezoidal 15' bottom	3H:1V	Vegetation

Buckskin Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
Station 0+00 to 35+00	37.48	4.0	Trapezoidal 12’ bottom	3H:1V	Vegetation

Streeter Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
Station 0+00 to 10+00	7.93	28.3	Trapezoidal 6' bottom	2H:1V	Riprap, D50 = 12"
Station 10+00 to 25+00	62.6	10.9	Trapezoidal 6' bottom	2H:1V	Riprap, D50 = 12"
Station 25+00 to 45+00	62.6	2.0	Trapezoidal 12' bottom	3H:1V	Riprap, D50 = 6"
Station 45+00 to 80+00	62.4	1.9	Trapezoidal 12' bottom	3H:1V	Vegetation
Station 80+00 to 91+00	98.11	3.8	Trapezoidal 15' bottom	3H:1V	Vegetation
Station 91+00 to 111+00	110.56	2.8	Trapezoidal 15' bottom	3H:1V	Vegetation
Station 111+00 to 125+00	127.95	2.6	Trapezoidal 15' bottom	3H:1V	Vegetation
Station 125+00 to 187+00	81.91	5.0	Trapezoidal 12' bottom	3H:1V	Vegetation

Buckskin Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
Station 0+00 to 35+00	39.2	25	Trapezoidal 12' bottom	3H:1V	Vegetation

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(Note: For hydrology information in the South Taylor Area, See Volume 13, Exhibit 7 Item 20 and for the Collom Area, See Volumes 18B through 18D.)

Appendix Exh. 7-14PP
Prospect Pond

The location of Prospect Pond is presented on Map 12, and the as-built configuration of the pond is presented on Figure Exh. 7-14PP-1. The profiles of the associated permanent channels associated with the Prospect Pond watershed are presented on Map 33. These channels consist of Prospect Ditch, North Tributary East Pit Ditch, EP3 Inlet and Outlet Ditch, and the Final East Pit Ditch. The design information for these post mine channels is presented in this appendix. The Prospect Pond watershed is also comprised of six post-mine stock ponds including PD1, PD2, NTEP1, EP1, EP2, and EP3. The design and as-built information for all these stock ponds can be found on Figure Exh. 7-14PP-3.

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^{TM}. For channels to be protected by a vegetative liner, the permissible velocities are also determined using SEDCAD^{TM} routines.

Prospect Pond

The following pages present the results of the SEDCAD^{TM} models for the post mining condition. At this stage the oldest reclamation is on the eastern extent of the reclaimed East Pit, and the younger (topsoil and seeded) reclamation is the far western reaches of the Prospect Pond watershed.

The SEDCAD^{TM} model herein provides the results of the 10-year, 24-hour and 25-year, 24-hour design storms and demonstrates the Prospect Pond can adequately handle both modeled storm events.

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. The six in-stream stock ponds are included in the permanent channels to decrease peak flows from the modeled storm event, and to provide a water source to support the post-mining land use.

On item to note, the curve numbers for sub-watersheds contributing the Section 16 Fill Ditch and Prospection Collection Ditch had to be artificially inflated to produce flows, since the approved curve numbers for the corresponding land conditions in those two watersheds did not produce enough flows for SEDCAD^{TM} to model them appropriately.

In summary, for the post mining condition, the 10-year, 24-hour storm produces 1.07 acre-feet of runoff into Prospect Pond, and the peak settleable solids concentration is 0.00 mg/l. For the 25-year, 24-hour storm event, the storm produces 11.9 acre-feet of runoff into Prospect Pond, and

the storm peaks at the 6,749.4' elevation which is below the emergency spillway elevation of 6,752'.

Temporary Ditches

The Prospection Collection Ditch and the South Collection Ditch route water from native, disturbed, and reclaimed areas to Prospect Pond. The location of both temporary ditches can be found on Map 12 and Figure Exh. 7-14PP-2. Design information for the temporary ditches are as follows:

Prospect Collection Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Total Depth	Erosion Protection
0+00 to 16+50	0.57	3.0	V Ditch 2' Bottom Width	1H:1V Left 7H:1V Right	0.5	Vegetation

South Collection Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Total Depth	Erosion Protection
0+00 to 30+00	6.23	5.0	V Ditch 2' Bottom Width	1H:1V Left 7H:1V Right	1.2	Vegetation
30+00 to 90+00	1.32	4.0	V Ditch 2' Bottom Width	1H:1V Left 7H:1V Right	0.5	Vegetation
90+00 to 92+68	0.64	3.0	V Ditch 2' Bottom Width	1H:1V Left 7H:1V Right	0.5	Vegetation

Permanent Post Mine Channels

The Prospect Pond watershed is comprised of five post-mining channels. The locations of these channels are presented on Map 12 and Figure Exh. 7-14PP-2, and the channel profiles are presented on Map 33.

By Rule these channels are required to be designed in accordance with Rule 4.05.4(2)(b) for the 10-year, 24-hour storm event as the watershed reporting to the Prospect Pond is less than one square mile. However, for built in conservatism, all these channels have been designed to the 25-year, 24-hour storm event.

A road traverses across the Section 16 Fill Ditch near station 1+85, which provides access to maintain power line infrastructure in the area. A culvert is installed and maintained in the Section 16 Fill Ditch, but it is not a Colowyo mining related structure. Please see Volume 1,

Section 4.12 for a further discussion. The culvert is modeled even though it is not a Colowyo culvert, to ensure it is sized appropriately. Given that, the peak storm discharge of 0.13 cfs requires a minimum of one 4" culvert is necessary in the Section 16 Fill Ditch. However, one 24" culvert is installed, which will more than suffice for the flows generated by the Section 16 Fill Ditch.

For the Final East Pit Ditch, Reach 2, structures will be placed approximately every 200 feet to create a stability wall to ensure riprap lining is

A SEDCAD™ model has been included which evaluates the peak flow and total runoff volume for each of the channel segments for the 25 year, 24-hour storm event. The channel configurations are summarized below.

Prospect Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
Reach 1	3.93	23.6	Trapezoidal 12' bottom	2H:1V	Riprap, D50 = 6"
Reach 2	1.45	13.0	Trapezoidal 12' bottom	2H:1V	Vegetation
Reach 3	1.23	12.4	Trapezoidal 15' bottom	2H:1V	Vegetation

North Tributary East Pit Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
Reach 1 Station 0+00 to 6.1+00	1.48	21.5	Trapezoidal 12' bottom	2H:1V	Riprap, D50 = 6"
Reach 1 Station 6.1+00 to 10+41	0.88	7.2	Trapezoidal 12' bottom	2H:1V	Riprap, D50 = 3"
Reach 2	1.28	12.2	Trapezoidal 12' bottom	2H:1V	Riprap, D50 = 3"

EP3 Inlet and Outlet Ditches

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
EP3 Inlet Ditch	0.68	4.8	Trapezoidal 12' bottom	2H:1V	Riprap, D50 = 3"
EP3 Outlet Ditch	0.34	3.6	Trapezoidal 12' bottom	2H:1V	Riprap, D50 = 9"

Final East Pit Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
Reach 1	2.24	21.1	Trapezoidal 12' bottom	2H:1V	Shotcrete
Reach 2*	3.47	10.0	Trapezoidal 12' bottom	2H:1V	Riprap, D50 = 3"
Reach 3	5.43	6.4	Trapezoidal 12' bottom	3H:1V	Riprap, D50 = 3"

***** Within Reach 2, at about 200-foot intervals, four to six stability structures will be constructed within the this reach of the Final East Pit Ditch to ensure riprap lining within Reach 2 remains in place and the ditch functions as designed.

Section 16 Fill Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
0+00 to 8+60	0.64	17.8	Trapezoidal 12' bottom	3H:1V	Riprap, D50 = 6"

Appendix Exh. 7-14PP
Prospect Pond

10- Year 24-Hour Storm Event

Effluent Deomonstration

General Information

Storm Information:

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

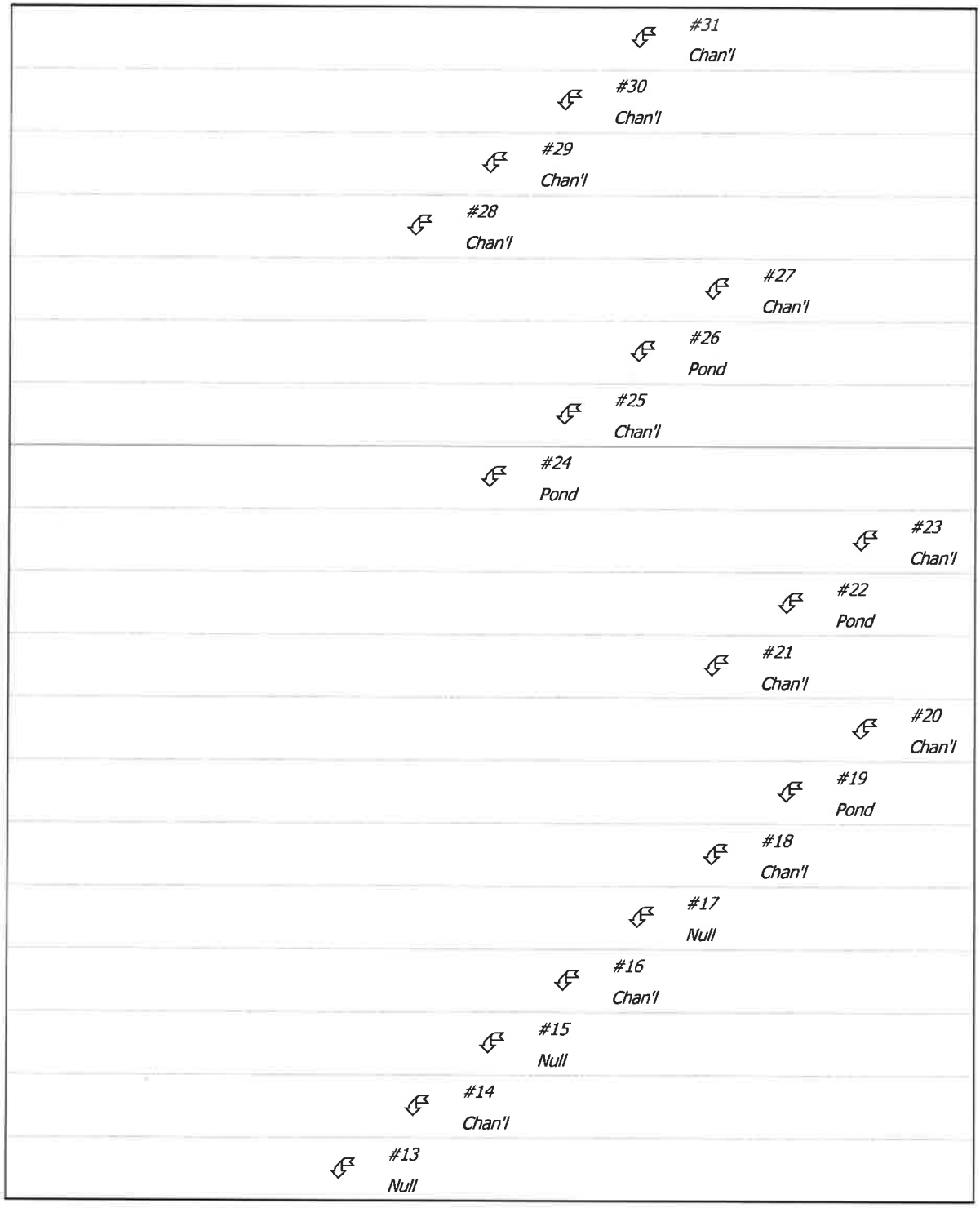
Particle Size Distribution:

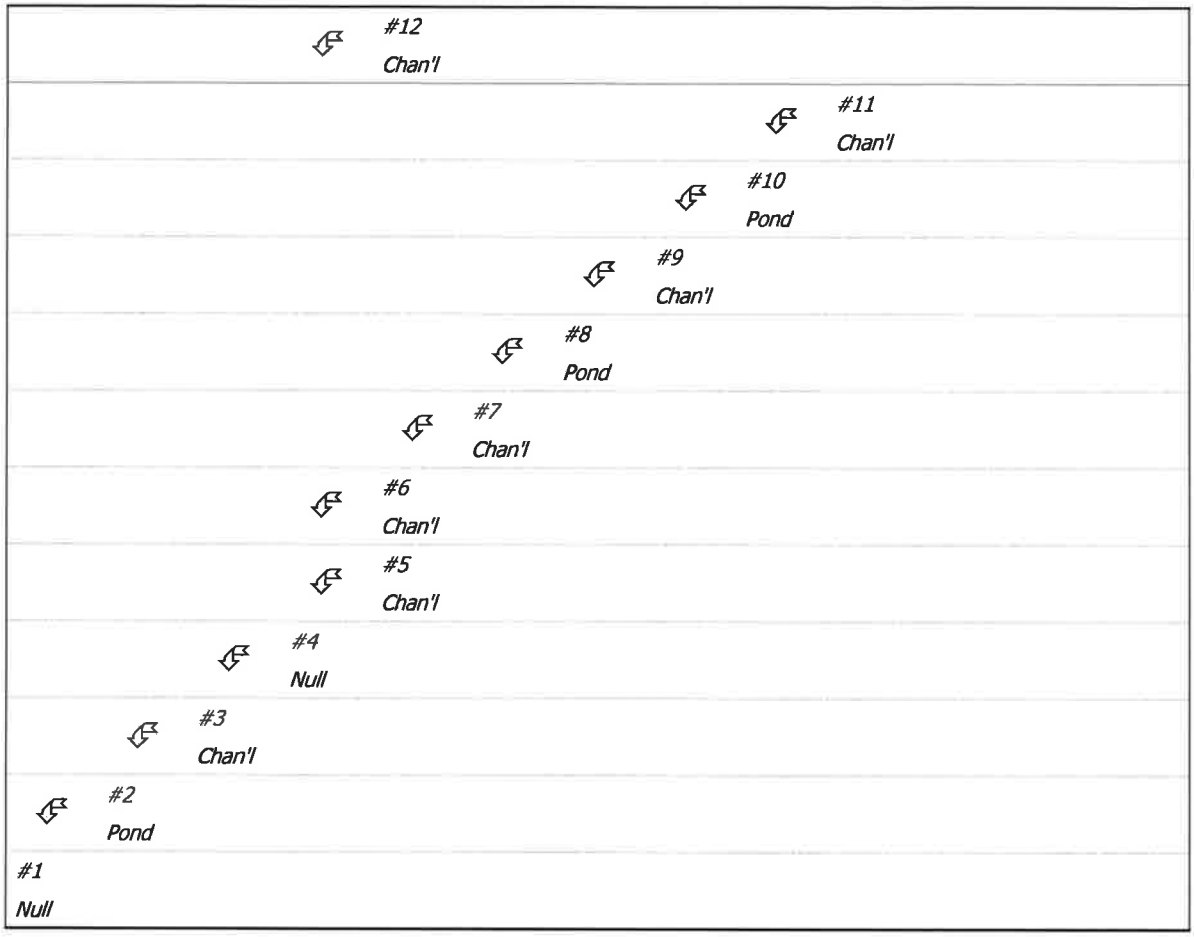
Size (mm)	Colowyo Particle Size
4.7500	100.000%
0.0750	73.000%
0.0400	33.000%
0.0010	20.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Null Below Prospect Pond
Pond	#2	==>	#1	0.000	0.000	Prospect Pond
Channel	#3	==>	#2	0.000	0.000	Natural Channel Above Prospect Pond
Null	#4	==>	#3	0.000	0.000	Confluence Prospect & South Collection Ditches
Channel	#5	==>	#4	0.000	0.000	Prospect Collection Ditch
Channel	#6	==>	#4	0.000	0.000	Natural Channel Below Reach 1 Prospect Ditch
Channel	#7	==>	#6	0.000	0.000	Prospect Ditch Reach 1
Pond	#8	==>	#7	0.000	0.000	PD1 Stockpond
Channel	#9	==>	#8	0.000	0.000	Prospect Ditch Reach 2
Pond	#10	==>	#9	0.000	0.000	PD2 Stockpond
Channel	#11	==>	#10	0.000	0.000	Prospect Ditch Reach 3
Channel	#12	==>	#4	0.000	0.000	South Collection Ditch Station 0+00 to 30+00
Null	#13	==>	#12	0.000	0.000	Confluence of Final East Pit Ditch & South Collection Ditch at Station 30+00
Channel	#14	==>	#13	0.000	0.000	Final East Pit Ditch Station 0+00 to Confluence w/North Trib Final East Pit Ditch
Null	#15	==>	#14	0.000	0.000	Confluence Final East Pit Ditch and North Tributary East Pit Ditch
Channel	#16	==>	#15	0.000	0.000	North Tributary Final East Pit Ditch Reach 1 to Confluence w/EP3 Outlet Ditch
Null	#17	==>	#16	0.000	0.000	Confluence North Tributary East Pit Ditch and EP3 Outlet Ditch
Channel	#18	==>	#17	0.000	0.000	North Tributary Final East Pit Ditch Reach 1 from Confluence of EP3 Outlet to NTEP1
Pond	#19	==>	#18	0.000	0.000	NTEP1 Stockpond
Channel	#20	==>	#19	0.000	0.000	North Tributary Final East Pit Ditch Reach 2
Channel	#21	==>	#17	0.000	0.000	EP3 Stockpond Outlet Ditch
Pond	#22	==>	#21	0.000	0.000	EP3 Stockpond
Channel	#23	==>	#22	0.000	0.000	EP3 Stockpond Inlet Ditch
Pond	#24	==>	#14	0.000	0.000	EP1 Stockpond
Channel	#25	==>	#24	0.000	0.000	Final East Pit Ditch Reach 2
Pond	#26	==>	#25	0.000	0.000	EP2 Stockpond
Channel	#27	==>	#26	0.000	0.000	Final East Pit Ditch Reach 3
Channel	#28	==>	#13	0.000	0.000	South Collection Ditch 30+00 to 90+00
Channel	#29	==>	#28	0.000	0.000	South Collection Ditch 90+00 to 92+68

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#30	==>	#29	0.000	0.000	Natural Channel from Section 16 Fill Ditch to South Collection Ditch
Channel	#31	==>	#30	0.000	0.000	Section 16 Fill Ditch




#12
Chan'l
#11
Chan'l
#10
Pond
#9
Chan'l
#8
Pond
#7
Chan'l
#6
Chan'l
#5
Chan'l
#4
Null
#3
Chan'l
#2
Pond
#1
Null

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#31		21.500	21.500	0.08	0.06	0.3	4,344	2.01	1.73
#30		19.300	40.800	0.08	0.06	0.3	4,344	2.01	1.73
#29		2.400	43.200	0.08	0.06	0.3	4,344	2.01	1.73
#28		181.400	224.600	0.13	0.08	0.3	3,438	1.60	1.26
#27		69.700	69.700	3.09	0.43	9.4	65,396	37.25	8.98
#26	In	0.000	69.700	3.09	0.43	9.4	65,396	37.25	8.98
	Out			0.38	0.43	0.0	97	0.00	0.00
#25		22.300	92.000	0.49	0.52	0.1	250	0.09	0.05
#24	In	0.000	92.000	0.49	0.52	0.1	250	0.09	0.05
	Out			0.47	0.52	0.0	25	0.00	0.00
#23		4.900	4.900	0.04	0.02	0.0	436	0.25	0.19
#22	In	0.000	4.900	0.04	0.02	0.0	436	0.25	0.19
	Out			0.03	0.02	0.0	0	0.00	0.00
#21		1.300	6.200	0.03	0.02	0.0	0	0.00	0.00
#20		44.500	44.500	0.14	0.09	0.0	365	0.18	0.16
#19	In	0.000	44.500	0.14	0.09	0.0	365	0.18	0.16
	Out			0.00	0.00	0.0	0	0.00	0.00
#18		11.200	55.700	0.05	0.03	0.0	353	0.27	0.20
#17		0.000	61.900	0.07	0.05	0.0	266	0.20	0.11
#16		1.900	63.800	0.08	0.05	0.1	451	0.34	0.14
#15		0.000	63.800	0.08	0.05	0.1	451	0.34	0.14
#14		6.100	161.900	0.54	0.59	0.1	230	0.15	0.02
#13		0.000	386.500	0.64	0.67	0.4	839	0.42	0.19
#12		56.600	443.100	0.74	0.75	0.4	752	0.38	0.19
#11		18.300	18.300	0.07	0.04	0.0	182	0.10	0.08
#10	In	0.000	18.300	0.07	0.04	0.0	182	0.10	0.08
	Out			0.06	0.04	0.0	0	0.00	0.00
#9		21.400	39.700	0.09	0.06	0.0	131	0.07	0.05
#8	In	0.000	39.700	0.09	0.06	0.0	131	0.07	0.05
	Out			0.09	0.06	0.0	0	0.00	0.00
#7		59.200	98.900	0.24	0.15	0.1	397	0.23	0.15
#6		56.600	155.500	0.26	0.16	0.3	1,343	0.77	0.67
#5		28.300	28.300	0.08	0.06	0.2	2,687	1.34	1.19
#4		0.000	626.900	1.03	0.98	0.9	978	0.51	0.33
#3		16.300	643.200	1.07	1.01	1.4	1,523	0.82	0.53
#2	In	0.000	643.200	1.07	1.01	1.4	1,523	0.82	0.53
	Out			0.28	0.69	0.0	49	0.00	0.00
#1		0.000	643.200	0.28	0.69	0.0	49	0.00	0.00

Particle Size Distribution(s) at Each Structure

Structure #31 (Section 16 Fill Ditch):

Size (mm)	In/Out
4.7500	100.000%
0.0750	100.000%
0.0400	48.495%
0.0010	29.391%

Structure #30 (Natural Channel from Section 16 Fill Ditch to South Collection Ditch):

Size (mm)	In/Out
4.7500	100.000%
0.0750	100.000%
0.0400	48.495%
0.0010	29.391%

Structure #29 (South Collection Ditch 90+00 to 92+68):

Size (mm)	In/Out
4.7500	100.000%
0.0750	100.000%
0.0400	48.495%
0.0010	29.391%

Structure #28 (South Collection Ditch 30+00 to 90+00):

Size (mm)	In/Out
4.7500	100.000%
0.0750	99.373%
0.0400	48.135%
0.0010	29.173%

Structure #27 (Final East Pit Ditch Reach 3):

Size (mm)	In/Out
4.7500	100.000%
0.0750	73.116%
0.0400	33.052%
0.0010	20.032%

Structure #26 (EP2 Stockpond):

Size (mm)	In	Out
4.7500	100.000%	100.000%
0.0750	73.116%	100.000%
0.0400	33.052%	100.000%
0.0010	20.032%	100.000%

Structure #25 (Final East Pit Ditch Reach 2):

Size (mm)	In/Out
4.7500	100.000%
0.0750	83.263%
0.0400	58.469%
0.0010	50.410%

Structure #24 (EP1 Stockpond):

Size (mm)	In	Out
4.7500	100.000%	100.000%
0.0750	83.263%	100.000%
0.0400	58.469%	100.000%
0.0010	50.410%	100.000%

Structure #23 (EP3 Stockpond Inlet Ditch):

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

Structure #22 (EP3 Stockpond):

Size (mm)	In	Out
4.7500	100.000%	100.000%

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

Structure #21 (EP3 Stockpond Outlet Ditch):

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

Structure #20 (North Tributary Final East Pit Ditch Reach 2):

Size (mm)	In/Out
4.7500	100.000%
0.0750	94.485%
0.0400	42.712%
0.0010	25.886%

Structure #19 (NTEP1 Stockpond):

Size (mm)	In	Out
4.7500	100.000%	0.000%
0.0750	94.485%	0.000%
0.0400	42.712%	0.000%
0.0010	25.886%	0.000%

Structure #18 (North Tributary Final East Pit Ditch Reach 1 from Confluence of EP3 Outlet to NTEP1):

Size (mm)	In/Out
4.7500	19.243%
0.0750	14.048%
0.0400	6.350%
0.0010	3.849%

Structure #17 (Confluence North Tributary East Pit Ditch and EP3 Outlet Ditch):

Size (mm)	In/Out
4.7500	19.244%
0.0750	14.048%
0.0400	6.350%
0.0010	3.849%

Structure #16 (North Tributary Final East Pit Ditch Reach 1 to Confluence w/EP3 Outlet Ditch):

Size (mm)	In/Out
4.7500	22.986%
0.0750	16.779%
0.0400	7.585%
0.0010	4.597%

Structure #15 (Confluence Final East Pit Ditch and North Tributary East Pit Ditch):

Size (mm)	In/Out
4.7500	22.986%
0.0750	16.779%
0.0400	7.585%
0.0010	4.597%

Structure #14 (Final East Pit Ditch Station 0+00 to Confluence w/North Trib Final East Pit Ditch):

Size (mm)	In/Out
4.7500	41.940%
0.0750	33.952%
0.0400	22.118%
0.0010	18.272%

Structure #13 (Confluence of Final East Pit Ditch & South Collection Ditch at Station 30+00):

Size (mm)	In/Out
4.7500	89.468%
0.0750	87.506%
0.0400	43.415%
0.0010	27.195%

Structure #12 (South Collection Ditch Station 0+00 to 30+00):

Size (mm)	In/Out
4.7500	90.414%
0.0750	86.203%
0.0400	42.480%
0.0010	26.549%

Structure #11 (Prospect Ditch Reach 3):

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

Structure #10 (PD2 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 #9 (Prospect Ditch Reach 2):

Size (mm)	In/Out
4.7500	100.000%
0.0750	73.002%
0.0400	33.005%
0.0010	20.006%

Structure #8 (PD1 Stockpond):

Size (mm)	In	Out
4.7500	100.000%	100.000%
0.0750	73.002%	100.000%
0.0400	33.005%	100.000%
0.0010	20.006%	100.000%

Structure #7 (Prospect Ditch Reach 1):

Size (mm)	In/Out
4.7500	100.000%
0.0750	73.002%
0.0400	33.005%
0.0010	20.005%

Structure #6 (Natural Channel Below Reach 1 Prospect Ditch):

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

Structure #5 (Prospect Collection Ditch):

Size (mm)	In/Out
4.7500	100.000%
0.0750	95.850%
0.0400	43.329%
0.0010	26.260%

Structure #4 (Confluence Prospect & South Collection Ditches):

Size (mm)	In/Out
4.7500	95.468%
0.0750	84.437%
0.0400	39.830%
0.0010	24.520%

Structure #3 (Natural Channel Above Prospect Pond):

Size (mm)	In/Out
4.7500	97.076%
0.0750	80.380%
0.0400	37.407%
0.0010	22.916%

Structure #2 (Prospect Pond):

Size (mm)	In	Out
4.7500	97.076%	100.000%

Size (mm)	In	Out
0.0750	80.380%	100.000%
0.0400	37.407%	100.000%
0.0010	22.916%	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)

Section 16 Fill 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	3.0:1	3.0:1	17.8	2.98		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.08 cfs	
Depth:	0.02 ft	3.00 ft
Top Width:	12.09 ft	29.97 ft
Velocity:	0.45 fps	
X-Section Area:	0.18 sq ft	
Hydraulic Radius:	0.015 ft	
Froude Number:	0.65	
Manning's n:	0.0327	
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Structure #30 (Erodible Channel)

Natural Channel from Section 16 Fill Ditch to South Collection Ditch

Parabolic Erodible Channel Inputs:

Material: Shales and hardpans

Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
22.0	0.0250				6.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.08 cfs	
Depth:	0.09 ft	

	w/o Freeboard	w/ Freeboard
Top Width:	0.35 ft	
Velocity:	3.77 fps	
X-Section Area:	0.02 sq ft	
Hydraulic Radius:	0.049 ft	
Froude Number:	2.76	

Structure #29 (Vegetated Channel)

South Collection Ditch 90+00 to 92+68

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)
2.00	1.0:1	7.0:1	3.0	D, B				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:	0.08 cfs		0.08 cfs	
Depth:	0.11 ft		0.33 ft	
Top Width:	2.89 ft		4.61 ft	
Velocity:	0.30 fps		0.08 fps	
X-Section Area:	0.27 sq ft		1.08 sq ft	
Hydraulic Radius:	0.093 ft		0.230 ft	
Froude Number:	0.17		0.03	
Roughness Coefficient:	0.1737		1.2727	

Structure #28 (Vegetated Channel)

South Collection Ditch 30+00 to 90+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)
2.00	1.0:1	7.0:1	4.0	D, B				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:	0.13 cfs		0.13 cfs	
Depth:	0.12 ft		0.34 ft	
Top Width:	2.97 ft		4.70 ft	
Velocity:	0.42 fps		0.11 fps	
X-Section Area:	0.30 sq ft		1.13 sq ft	
Hydraulic Radius:	0.100 ft		0.237 ft	
Froude Number:	0.23		0.04	
Roughness Coefficient:	0.1538		1.0282	

Structure #27 (Riprap Channel)

Final East Pit Ditch Reach 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)
12.00	2.0:1	2.0:1	6.4	2.93		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.09 cfs	
Depth:	0.07 ft	3.00 ft
Top Width:	12.28 ft	24.00 ft
Velocity*:		
X-Section Area:	0.86 sq ft	
Hydraulic Radius:	0.070 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 #26 (Pond)

EP2 Stockpond

Pond Inputs:

Initial Pool Elev:	7,500.00 ft
Initial Pool:	4.26 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)
7,505.00	60.00	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	160.00	9.00	0.0150	7,500.00	0.50	0.00

Pond Results:

Peak Elevation:	7,500.18 ft
H'graph Detention Time:	4.13 hrs
Pond Model:	CSTRS
Dewater Time:	1.05 days
Trap Efficiency:	99.62 %

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)	
7,492.00	0.385	0.000	0.000		Top of Sed. Storage
7,493.00	0.419	0.402	0.000		
7,494.00	0.454	0.839	0.000		
7,495.00	0.491	1.311	0.000		
7,496.00	0.529	1.821	0.000		
7,497.00	0.568	2.370	0.000		
7,498.00	0.609	2.958	0.000		
7,499.00	0.651	3.588	0.000		
7,500.00	0.694	4.260	0.000		Spillway #2
7,500.18	0.704	4.390	0.378	25.10	Peak Stage
7,501.00	0.741	4.978	2.094		
7,502.00	0.787	5.741	4.414		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
7,503.00	0.834	6.552	5.883		
7,504.00	0.884	7.411	7.060		
7,505.00	0.932	8.319	8.069		Spillway #1
7,506.00	0.933	9.251	45.188		
7,507.00	0.934	10.185	151.737		
7,508.00	0.935	11.119	305.349		
7,509.00	0.936	12.055	524.315		
7,510.00	0.937	12.991	798.632		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
7,492.00	0.000	0.000	0.000
7,493.00	0.000	0.000	0.000
7,494.00	0.000	0.000	0.000
7,495.00	0.000	0.000	0.000
7,496.00	0.000	0.000	0.000
7,497.00	0.000	0.000	0.000
7,498.00	0.000	0.000	0.000
7,499.00	0.000	0.000	0.000
7,500.00	0.000	0.000	0.000
7,501.00	0.000	(3)>2.094	2.094
7,502.00	0.000	(5)>4.414	4.414
7,503.00	0.000	(5)>5.883	5.883
7,504.00	0.000	(5)>7.060	7.060
7,505.00	0.000	(5)>8.069	8.069
7,506.00	36.222	(5)>8.966	45.188
7,507.00	142.050	(5)>9.687	151.737
7,508.00	295.305	(5)>10.045	305.349
7,509.00	513.913	(6)>10.402	524.315
7,510.00	787.934	(6)>10.698	798.632

Structure #25 (Riprap Channel)

Final East Pit Ditch Reach 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)
12.00	2.0:1	2.0:1	10.0	2.97		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.49 cfs	
Depth:	0.03 ft	3.00 ft
Top Width:	12.12 ft	24.00 ft
Velocity*:		
X-Section Area:	0.36 sq ft	
Hydraulic Radius:	0.030 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 #24 (Pond)

EP1 Stockpond

Pond Inputs:

Initial Pool Elev:	7,376.00 ft
Initial Pool:	0.78 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)
7,379.00	20.00	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	90.00	6.80	0.0150	7,376.00	0.50	0.00

Pond Results:

Peak Elevation:	7,376.22 ft
H'graph Detention Time:	1.28 hrs
Pond Model:	CSTRS
Dewater Time:	1.04 days
Trap Efficiency:	90.98 %

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)	
7,370.00	0.000	0.000	0.000		Top of Sed. Storage
7,371.00	0.092	0.031	0.000		
7,372.00	0.118	0.135	0.000		
7,373.00	0.140	0.264	0.000		
7,374.00	0.161	0.415	0.000		
7,375.00	0.184	0.588	0.000		
7,376.00	0.209	0.784	0.000		Spillway #2
7,376.22	0.216	0.834	0.470	24.90	Peak Stage
7,377.00	0.236	1.006	2.094		
7,378.00	0.281	1.264	4.414		
7,379.00	0.330	1.569	5.883		Spillway #1
7,380.00	0.330	1.899	55.460		
7,381.00	0.331	2.229	175.467		
7,382.00	0.332	2.561	353.735		
7,383.00	0.333	2.893	586.810		
7,384.00	0.334	3.227	875.260		
7,385.00	0.335	3.561	1,220.990		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
7,370.00	0.000	0.000	0.000
7,371.00	0.000	0.000	0.000
7,372.00	0.000	0.000	0.000
7,373.00	0.000	0.000	0.000
7,374.00	0.000	0.000	0.000
7,375.00	0.000	0.000	0.000
7,376.00	0.000	0.000	0.000
7,377.00	0.000	(3)>2.094	2.094
7,378.00	0.000	(5)>4.414	4.414
7,379.00	0.000	(5)>5.883	5.883
7,380.00	48.400	(5)>7.060	55.460
7,381.00	167.398	(5)>8.069	175.467
7,382.00	344.812	(5)>8.923	353.735
7,383.00	577.178	(6)>9.632	586.810
7,384.00	865.254	(6)>10.007	875.260
7,385.00	1,210.609	(6)>10.381	1,220.990

Structure #23 (Riprap Channel)

EP3 Stockpond Inlet 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	4.8	2.99		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.04 cfs	
Depth:	0.01 ft	3.00 ft
Top Width:	12.03 ft	23.99 ft
Velocity:	0.34 fps	
X-Section Area:	0.09 sq ft	
Hydraulic Radius:	0.008 ft	
Froude Number:	0.68	
Manning's n:	0.0377	
Dmin:	2.00 in	
D50:	9.00 in	

	w/o Freeboard	w/ Freeboard
Dmax:	12.00 in	

Structure #22 (Pond)

EP3 Stockpond

Pond Inputs:

Initial Pool Elev:	7,357.00 ft
Initial Pool:	2.90 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)
7,357.00	216.00	2.00:1	2.00:1	12.00

Pond Results:

Peak Elevation:	7,357.00 ft
H'graph Detention Time:	0.38 hrs
Pond Model:	CSTRS
Dewater Time:	0.45 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)	
7,340.00	0.032	0.000	0.000		Top of Sed. Storage
7,341.00	0.045	0.038	0.000		
7,342.00	0.060	0.091	0.000		
7,343.00	0.077	0.159	0.000		
7,344.00	0.095	0.245	0.000		
7,345.00	0.115	0.350	0.000		
7,346.00	0.129	0.472	0.000		
7,347.00	0.144	0.608	0.000		
7,348.00	0.160	0.760	0.000		
7,349.00	0.176	0.928	0.000		
7,350.00	0.192	1.112	0.000		
7,351.00	0.210	1.313	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
7,352.00	0.227	1.531	0.000		
7,353.00	0.246	1.768	0.000		
7,354.00	0.264	2.023	0.000		
7,355.00	0.284	2.297	0.000		
7,356.00	0.304	2.591	0.000		
7,357.00	0.322	2.904	0.000		Spillway #1
7,357.00	0.313	2.905	0.029	10.80	Peak Stage
7,358.00	0.322	3.226	14.150		
7,359.00	0.323	3.549	61.776		
7,360.00	0.324	3.873	147.685		
7,361.00	0.325	4.197	264.762		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,340.00	0.000	0.000
7,341.00	0.000	0.000
7,342.00	0.000	0.000
7,343.00	0.000	0.000
7,344.00	0.000	0.000
7,345.00	0.000	0.000
7,346.00	0.000	0.000
7,347.00	0.000	0.000
7,348.00	0.000	0.000
7,349.00	0.000	0.000
7,350.00	0.000	0.000
7,351.00	0.000	0.000
7,352.00	0.000	0.000
7,353.00	0.000	0.000
7,354.00	0.000	0.000
7,355.00	0.000	0.000
7,356.00	0.000	0.000
7,357.00	0.000	0.000
7,358.00	14.150	14.150
7,359.00	61.776	61.776
7,360.00	147.685	147.685
7,361.00	264.762	264.762

Structure #21 (Riprap Channel)

EP3 Stockpond Outlet 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	3.6	2.99		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.03 cfs	
Depth:	0.01 ft	3.00 ft
Top Width:	12.03 ft	23.99 ft
Velocity:	0.27 fps	
X-Section Area:	0.08 sq ft	
Hydraulic Radius:	0.007 ft	
Froude Number:	0.58	
Manning's n:	0.0377	
Dmin:	2.00 in	
D50:	9.00 in	
Dmax:	12.00 in	

Structure #20 (Riprap Channel)

North Tributary Final East Pit Ditch Reach 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)
12.00	2.0:1	2.0:1	12.2	2.98		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.14 cfs	
Depth:	0.02 ft	3.00 ft
Top Width:	12.10 ft	24.02 ft
Velocity:	0.48 fps	
X-Section Area:	0.29 sq ft	
Hydraulic Radius:	0.024 ft	

	w/o Freeboard	w/ Freeboard
Froude Number:	0.55	
Manning's n:	0.0309	
Dmin:	0.00 in	
D50:	3.00 in	
Dmax:	0.00 in	

Structure #19 (Pond)

NTEP1 Stockpond

Pond Inputs:

Initial Pool Elev:	7,385.00 ft
Initial Pool:	0.92 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)
7,389.00	20.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	7,385.41 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)	
7,378.00	0.041	0.000	0.000		Top of Sed. Storage
7,379.00	0.071	0.055	0.000		
7,380.00	0.096	0.138	0.000		
7,381.00	0.119	0.245	0.000		
7,382.00	0.143	0.376	0.000		
7,383.00	0.168	0.531	0.000		
7,384.00	0.194	0.712	0.000		
7,385.00	0.220	0.919	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
7,385.41	0.231	1.013	0.000	0.00	Peak Stage
7,386.00	0.247	1.152	0.000		
7,387.00	0.275	1.413	0.000		
7,388.00	0.304	1.702	0.000		
7,389.00	0.338	2.023	0.000		Spillway #1
7,390.00	0.400	2.392	48.400		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,378.00	0.000	0.000
7,379.00	0.000	0.000
7,380.00	0.000	0.000
7,381.00	0.000	0.000
7,382.00	0.000	0.000
7,383.00	0.000	0.000
7,384.00	0.000	0.000
7,385.00	0.000	0.000
7,386.00	0.000	0.000
7,387.00	0.000	0.000
7,388.00	0.000	0.000
7,389.00	0.000	0.000
7,390.00	48.400	48.400

Structure #18 (Riprap Channel)

North Tributary Final East Pit Ditch Reach 1 from Confluence of EP3 Outlet to NTEP1

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	7.2	2.96		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.05 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.04 ft	3.00 ft
Top Width:	12.16 ft	24.00 ft
Velocity:	0.10 fps	
X-Section Area:	0.47 sq ft	
Hydraulic Radius:	0.038 ft	
Froude Number:	0.09	
Manning's n:	0.0289	
Dmin:	0.00 in	
D50:	3.00 in	
Dmax:	0.00 in	

Structure #17 (Null)

Confluence North Tributary East Pit Ditch and EP3 Outlet Ditch

Structure #16 (Riprap Channel)

North Tributary Final East Pit Ditch Reach 1 to Confluence w/EP3 Outlet 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	21.5	2.99		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.08 cfs	
Depth:	0.01 ft	3.00 ft
Top Width:	12.04 ft	24.00 ft
Velocity*:		
X-Section Area:	0.12 sq ft	
Hydraulic Radius:	0.010 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 #15 (Null)

Confluence Final East Pit Ditch and North Tributary East Pit Ditch

Structure #14 (Nonerodible Channel)

Final East Pit Ditch Station 0+00 to Confluence w/North Trib Final East Pit Ditch

Trapezoidal Nonerodible Channel Inputs:

Material: Shotcrete

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	21.1	0.0170	4.00		

Nonerodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.54 cfs	
Depth:	0.02 ft	4.02 ft
Top Width:	12.07 ft	28.07 ft
Velocity:	2.64 fps	
X-Section Area:	0.20 sq ft	
Hydraulic Radius:	0.017 ft	
Froude Number:	3.59	

Structure #13 (Null)

Confluence of Final East Pit Ditch & South Collection Ditch at Station 30+00

Structure #12 (Vegetated Channel)

South Collection Ditch Station 0+00 to 30+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)
2.00	1.0:1	7.0:1	5.0	D, B	0.87			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:	0.74 cfs		0.74 cfs	
Depth:	0.24 ft	1.11 ft	0.52 ft	1.39 ft
Top Width:	3.88 ft	10.84 ft	6.18 ft	13.14 ft
Velocity:	1.07 fps		0.35 fps	

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
X-Section Area:	0.69 sq ft		2.13 sq ft	
Hydraulic Radius:	0.175 ft		0.338 ft	
Froude Number:	0.45		0.10	
Roughness Coefficient:	0.0972		0.4675	

Structure #11 (Vegetated Channel)

Prospect Ditch Reach 3

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)
12.00	2.0:1	2.0:1	12.0	D, B				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:	0.07 cfs		0.07 cfs	
Depth:	0.03 ft		0.11 ft	
Top Width:	12.13 ft		12.44 ft	
Velocity:	0.17 fps		0.05 fps	
X-Section Area:	0.39 sq ft		1.36 sq ft	
Hydraulic Radius:	0.032 ft		0.109 ft	
Froude Number:	0.17		0.03	
Roughness Coefficient:	0.2849		2.3618	

Structure #10 (Pond)

PD2 Stockpond

Pond Inputs:

Initial Pool Elev:	7,565.00 ft
Initial Pool:	1.49 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)
7,565.00	20.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	7,565.00 ft
H'graph Detention Time:	0.12 hrs
Pond Model:	CSTRS
Dewater Time:	0.46 days
Trap Efficiency:	99.99 %

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)	
7,556.00	0.054	0.000	0.000		Top of Sed. Storage
7,557.00	0.086	0.069	0.000		
7,558.00	0.106	0.165	0.000		
7,559.00	0.127	0.282	0.000		
7,560.00	0.150	0.420	0.000		
7,561.00	0.175	0.582	0.000		
7,562.00	0.200	0.770	0.000		
7,563.00	0.227	0.983	0.000		
7,564.00	0.253	1.222	0.000		
7,565.00	0.280	1.489	0.000		Spillway #1
7,565.00	0.277	1.489	0.057	11.10	Peak Stage
7,566.00	0.300	1.779	48.400		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,556.00	0.000	0.000
7,557.00	0.000	0.000
7,558.00	0.000	0.000
7,559.00	0.000	0.000
7,560.00	0.000	0.000
7,561.00	0.000	0.000
7,562.00	0.000	0.000
7,563.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,564.00	0.000	0.000
7,565.00	0.000	0.000
7,566.00	48.400	48.400

Structure #9 (Vegetated Channel)

Prospect Ditch Reach 2

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)
12.00	2.0:1	2.0:1	13.0	D, B				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:	0.09 cfs		0.09 cfs	
Depth:	0.04 ft		0.12 ft	
Top Width:	12.14 ft		12.48 ft	
Velocity:	0.22 fps		0.06 fps	
X-Section Area:	0.43 sq ft		1.47 sq ft	
Hydraulic Radius:	0.036 ft		0.117 ft	
Froude Number:	0.20		0.03	
Roughness Coefficient:	0.2571		1.9805	

Structure #8 (Pond)

PD1 Stockpond

Pond Inputs:

Initial Pool Elev:	7,355.00 ft
Initial Pool:	0.88 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)
7,355.00	20.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	7,355.00 ft
H'graph Detention Time:	0.05 hrs
Pond Model:	CSTRS
Dewater Time:	0.46 days
Trap Efficiency:	99.95 %

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)	
7,348.00	0.031	0.000	0.000		Top of Sed. Storage
7,349.00	0.074	0.051	0.000		
7,350.00	0.097	0.136	0.000		
7,351.00	0.120	0.244	0.000		
7,352.00	0.140	0.374	0.000		
7,353.00	0.159	0.523	0.000		
7,354.00	0.180	0.692	0.000		
7,355.00	0.201	0.882	0.000		Spillway #1
7,355.00	0.201	0.883	0.089	11.15	Peak Stage
7,356.00	0.223	1.094	48.400		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,348.00	0.000	0.000
7,349.00	0.000	0.000
7,350.00	0.000	0.000
7,351.00	0.000	0.000
7,352.00	0.000	0.000
7,353.00	0.000	0.000
7,354.00	0.000	0.000
7,355.00	0.000	0.000
7,356.00	48.400	48.400

Structure #7 (Riprap Channel)

Prospect Ditch Reach 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	2.0:1	2.0:1	23.6			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.24 cfs	
Depth:	0.01 ft	
Top Width:	12.03 ft	
Velocity*:		
X-Section Area:	0.09 sq ft	
Hydraulic Radius:	0.007 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 #6 (Erodible Channel)

Natural Channel Below Reach 1 Prospect Ditch

Parabolic Erodible Channel Inputs:

Material: Coarse gravel noncolloidal

Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
21.0	0.0250				6.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.26 cfs	
Depth:	0.14 ft	
Top Width:	0.55 ft	
Velocity:	5.03 fps	
X-Section Area:	0.05 sq ft	

	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	0.079 ft	
Froude Number:	2.92	

Structure #5 (Vegetated Channel)

Prospect Collection 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)
12.00	2.0:1	2.0:1	11.9	D, B				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:	0.08 cfs		0.08 cfs	
Depth:	0.03 ft		0.12 ft	
Top Width:	12.14 ft		12.47 ft	
Velocity:	0.19 fps		0.06 fps	
X-Section Area:	0.41 sq ft		1.43 sq ft	
Hydraulic Radius:	0.034 ft		0.114 ft	
Froude Number:	0.19		0.03	
Roughness Coefficient:	0.2710		2.1684	

Structure #4 (Null)

Confluence Prospect & South Collection Ditches

Structure #3 (Erodible Channel)

Natural Channel Above Prospect Pond

Parabolic Erodible Channel Inputs:

Material: Asphaltic Concrete, Machine Placed

Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
20.0	0.0140				6.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.07 cfs	
Depth:	0.19 ft	
Top Width:	0.77 ft	
Velocity:	10.91 fps	
X-Section Area:	0.10 sq ft	
Hydraulic Radius:	0.110 ft	
Froude Number:	5.37	

Structure #2 (Pond)

Prospect Pond

Pond Inputs:

Initial Pool Elev:	6,744.00 ft
Initial Pool:	2.18 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
12.00	8.70	12.00	129.00	9.70	0.0150	6,750.30	2

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
6,752.00	20.00	1.50:1	1.50:1	12.00

Pond Results:

Peak Elevation:	6,745.79 ft
H'graph Detention Time:	12.51 hrs
Pond Model:	CSTRS
Dewater Time:	1.75 days
Trap Efficiency:	97.73 %

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)	
6,734.00	0.029	0.000	0.000		Top of Sed. Storage
6,735.00	0.088	0.056	0.000		
6,736.00	0.117	0.158	0.000		
6,737.00	0.149	0.291	0.000		
6,738.00	0.185	0.457	0.000		
6,739.00	0.225	0.662	0.000		
6,740.00	0.269	0.909	0.000		
6,741.00	0.293	1.190	0.000		
6,742.00	0.317	1.495	0.000		
6,743.00	0.341	1.823	0.000		
6,744.00	0.365	2.176	0.000		Low hole SPW #1
6,745.00	0.390	2.554	0.210	21.74*	
6,745.79	0.412	2.872	0.279	20.25	Peak Stage
6,746.00	0.418	2.958	0.297		
6,747.00	0.448	3.391	0.364		
6,748.00	0.478	3.854	0.420		
6,749.00	0.509	4.347	0.470		
6,750.00	0.542	4.872	0.515		
6,750.30	0.551	5.036	0.527		Spillway #1
6,751.00	0.572	5.429	3.164		
6,752.00	0.604	6.017	4.931		Spillway #2
6,753.00	0.633	6.636	35.637		
6,754.00	0.664	7.284	110.493		
6,755.00	0.695	7.964	223.581		

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

Detailed Discharge Table

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
6,734.00	0.000	0.000	0.000
6,735.00	0.000	0.000	0.000
6,736.00	0.000	0.000	0.000
6,737.00	0.000	0.000	0.000
6,738.00	0.000	0.000	0.000
6,739.00	0.000	0.000	0.000
6,740.00	0.000	0.000	0.000
6,741.00	0.000	0.000	0.000
6,742.00	0.000	0.000	0.000
6,743.00	0.000	0.000	0.000

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
6,744.00	2.00>0.000	0.000	0.000
6,745.00	0.210	0.000	0.210
6,746.00	0.297	0.000	0.297
6,747.00	0.364	0.000	0.364
6,748.00	0.420	0.000	0.420
6,749.00	0.470	0.000	0.470
6,750.00	0.515	0.000	0.515
6,750.30	0.527	0.000	0.527
6,751.00	3.164	0.000	3.164
6,752.00	4.931	0.000	4.931
6,753.00	6.214	29.423	35.637
6,754.00	7.274	103.218	110.493
6,755.00	8.199	215.382	223.581

Structure #1 (Null)

Null Below Prospect 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	21.500	0.135	0.000	0.000	62.000	S	0.08	0.059
	Σ	**21.500**						**0.08**	**0.059**
#30	1	12.500	0.089	0.000	0.000	47.000	S	0.00	0.000
	2	6.800	0.030	0.000	0.000	47.000	S	0.00	0.000
	Σ	**40.800**						**0.08**	**0.059**
#29	1	2.400	0.041	0.000	0.000	47.000	S	0.00	0.000
	Σ	**43.200**						**0.08**	**0.059**
#28	1	2.200	0.112	0.000	0.000	62.000	M	0.02	0.004
	2	1.400	0.039	0.000	0.000	62.000	M	0.01	0.000
	3	23.000	0.222	0.000	0.000	47.000	S	0.00	0.000
	4	5.100	0.024	0.000	0.000	62.000	M	0.04	0.021
	5	149.700	0.146	0.000	0.000	47.000	S	0.00	0.000
	Σ	**224.600**						**0.13**	**0.084**
#27	1	6.000	0.014	0.000	0.000	80.000	F	3.09	0.222
	2	63.700	0.237	0.000	0.000	62.000	M	0.30	0.210
	Σ	**69.700**						**3.09**	**0.432**
#26	**Σ**	**69.700**						**3.09**	**0.432**
#25	1	22.300	0.107	0.000	0.000	62.000	M	0.17	0.091
	Σ	**92.000**						**0.49**	**0.523**
#24	**Σ**	**92.000**						**0.49**	**0.523**
#23	1	4.900	0.074	0.000	0.000	62.000	M	0.04	0.020
	Σ	**4.900**						**0.04**	**0.020**
#22	**Σ**	**4.900**						**0.04**	**0.020**
#21	1	1.300	0.050	0.000	0.000	62.000	M	0.00	0.000
	Σ	**6.200**						**0.03**	**0.020**
#20	1	28.800	0.232	0.000	0.000	62.000	M	0.14	0.095
	2	15.700	0.120	0.000	0.000	47.000	S	0.00	0.000
	Σ	**44.500**						**0.14**	**0.095**
#19	**Σ**	**44.500**						**0.14**	**0.095**
#18	1	6.400	0.073	0.000	0.000	62.000	M	0.05	0.026
	2	4.800	0.057	0.000	0.000	47.000	S	0.00	0.000
	Σ	**55.700**						**0.05**	**0.026**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#17	**Σ**	**61.900**						**0.07**	**0.046**
#16	1	1.900	0.035	0.000	0.000	62.000	M	0.01	0.002
	Σ	**63.800**						**0.08**	**0.048**
#15	**Σ**	**63.800**						**0.08**	**0.048**
#14	1	2.300	0.025	0.000	0.000	47.000	S	0.00	0.000
	2	3.800	0.038	0.000	0.000	62.000	M	0.03	0.015
	Σ	**161.900**						**0.54**	**0.586**
#13	**Σ**	**386.500**						**0.64**	**0.670**
#12	1	36.000	0.073	0.000	0.000	47.000	S	0.00	0.000
	2	19.400	0.121	0.000	0.000	62.000	M	0.15	0.079
	3	1.200	0.018	0.000	0.000	47.000	S	0.00	0.000
	Σ	**443.100**						**0.74**	**0.750**
#11	1	2.600	0.032	0.000	0.000	47.000	S	0.00	0.000
	2	8.900	0.041	0.000	0.000	62.000	M	0.07	0.036
	3	5.900	0.125	0.000	0.000	47.000	S	0.00	0.000
	4	0.900	0.065	0.000	0.000	47.000	S	0.00	0.000
	Σ	**18.300**						**0.07**	**0.036**
#10	**Σ**	**18.300**						**0.07**	**0.036**
#9	1	5.400	0.042	0.000	0.000	62.000	M	0.04	0.022
	2	16.000	0.080	0.000	0.000	47.000	S	0.00	0.000
	Σ	**39.700**						**0.09**	**0.058**
#8	**Σ**	**39.700**						**0.09**	**0.058**
#7	1	12.100	0.093	0.000	0.000	62.000	M	0.09	0.049
	2	34.400	0.192	0.000	0.000	47.000	S	0.00	0.000
	3	9.800	0.062	0.000	0.000	62.000	M	0.07	0.040
	4	2.900	0.061	0.000	0.000	47.000	S	0.00	0.000
	Σ	**98.900**						**0.24**	**0.148**
#6	1	1.200	0.019	0.000	0.000	62.000	M	0.00	0.000
	2	1.100	0.029	0.000	0.000	47.000	S	0.00	0.000
	3	5.200	0.047	0.000	0.000	61.000	S	0.02	0.017
	4	4.800	0.025	0.000	0.000	47.000	S	0.00	0.000
	5	17.400	0.134	0.000	0.000	47.000	S	0.00	0.000
	6	26.900	0.234	0.000	0.000	47.000	S	0.00	0.000
	Σ	**155.500**						**0.26**	**0.165**
#5	1	27.800	0.150	0.000	0.000	61.000	S	0.08	0.061
	2	0.500	0.010	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)
	Σ	**28.300**						**0.08**	**0.061**
#4	**Σ**	**626.900**						**1.03**	**0.976**
#3	1	7.200	0.036	0.000	0.000	47.000	S	0.00	0.000
	2	9.100	0.012	0.000	0.000	61.000	S	0.04	0.030
	Σ	**643.200**						**1.07**	**1.005**
#2	**Σ**	**643.200**						**1.07**	**1.005**
#1	**Σ**	**643.200**						**0.28**	**0.693**

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	400.00	16.00	0.0310	0.9000	1	0.3	4,344	2.01	1.73
	Σ							**0.3**	**4,344**	**2.01**	**1.73**
#30	1	0.300	400.00	18.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	2	0.300	100.00	37.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.3**	**4,344**	**2.01**	**1.73**
#29	1	0.300	100.00	33.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.3**	**4,344**	**2.01**	**1.73**
#28	1	0.300	100.00	4.00	0.0100	0.3800	1	0.0	81	0.05	0.04
	2	0.300	75.00	8.00	0.0100	0.3800	1	0.0	6,620	3.77	3.77
	3	0.300	400.00	10.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	4	0.300	75.00	22.00	0.0100	0.3800	1	0.0	300	0.17	0.13
	5	0.300	400.00	16.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.3**	**3,438**	**1.60**	**1.26**
#27	1	0.300	50.00	13.00	0.8000	0.3800	1	9.4	65,396	37.27	17.37
	2	0.300	400.00	8.00	0.0100	0.3800	1	0.1	210	0.11	0.09
	Σ							**9.4**	**65,396**	**37.25**	**8.98**
#26	**Σ**							**9.4**	**65,396**	**37.25**	**8.98**
#25	1	0.300	400.00	15.00	0.0100	0.3800	1	0.1	621	0.35	0.27
	Σ							**0.1**	**250**	**0.09**	**0.05**
#24	**Σ**							**0.1**	**250**	**0.09**	**0.05**
#23	1	0.300	300.00	15.00	0.0100	0.3800	1	0.0	436	0.25	0.19
	Σ							**0.0**	**436**	**0.25**	**0.19**

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)
#22	Σ							**0.0**	**436**	**0.25**	**0.19**
#21	1	0.300	50.00	3.00	0.0100	0.3800	1	0.0	1	0.00	0.00
	Σ							**0.0**	**0**	**0.00**	**0.00**
#20	1	0.300	400.00	11.00	0.0100	0.3800	1	0.0	365	0.18	0.16
	2	0.300	400.00	11.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.0**	**365**	**0.18**	**0.16**
#19	Σ							**0.0**	**365**	**0.18**	**0.16**
#18	1	0.300	200.00	15.00	0.0100	0.3800	1	0.0	353	0.20	0.15
	2	0.300	200.00	13.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.0**	**353**	**0.27**	**0.20**
#17	Σ							**0.0**	**266**	**0.20**	**0.11**
#16	1	0.300	100.00	21.00	0.0100	0.3800	1	0.0	1,274	0.73	0.68
	Σ							**0.1**	**451**	**0.34**	**0.14**
#15	Σ							**0.1**	**451**	**0.34**	**0.14**
#14	1	0.300	100.00	39.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	2	0.300	150.00	26.00	0.0100	0.3800	1	0.0	528	0.30	0.23
	Σ							**0.1**	**230**	**0.15**	**0.02**
#13	Σ							**0.4**	**839**	**0.42**	**0.19**
#12	1	0.300	300.00	19.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	2	0.300	400.00	12.00	0.0100	0.3800	1	0.0	458	0.26	0.20
	3	0.300	50.00	13.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.4**	**752**	**0.38**	**0.19**
#11	1	0.300	50.00	14.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	2	0.300	100.00	12.00	0.0100	0.3800	1	0.0	182	0.10	0.08
	3	0.300	100.00	1.50	0.0310	0.9000	1	0.0	1	0.00	0.00
	4	0.300	50.00	1.50	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.0**	**182**	**0.10**	**0.08**
#10	Σ							**0.0**	**182**	**0.10**	**0.08**
#9	1	0.300	100.00	19.00	0.0100	0.3800	1	0.0	304	0.17	0.13
	2	0.300	200.00	14.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.0**	**131**	**0.07**	**0.05**
#8	Σ							**0.0**	**131**	**0.07**	**0.05**
#7	1	0.300	400.00	22.00	0.0100	0.3800	1	0.0	907	0.52	0.39
	2	0.300	400.00	16.00	0.0310	0.9000	1	0.0	1	0.00	0.00

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)
	3	0.300	100.00	12.00	0.0100	0.3800	1	0.0	184	0.10	0.08
	4	0.300	100.00	6.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.1**	**397**	**0.23**	**0.15**
#6	1	0.300	50.00	26.00	0.0100	0.3800	1	0.0	1	0.00	0.00
	2	0.300	75.00	10.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	3	0.300	200.00	30.00	0.0800	0.9000	1	0.2	10,504	5.99	5.18
	4	0.300	75.00	38.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	5	0.300	400.00	18.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	6	0.300	400.00	12.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.3**	**1,343**	**0.77**	**0.67**
#5	1	0.300	200.00	16.00	0.0310	0.9000	1	0.2	2,687	1.34	1.19
	2	0.300	50.00	19.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	Σ							**0.2**	**2,687**	**1.34**	**1.19**
#4	**Σ**							**0.9**	**978**	**0.51**	**0.33**
#3	1	0.300	200.00	45.00	0.0310	0.9000	1	0.0	1	0.00	0.00
	2	0.300	100.00	59.00	0.0800	0.9000	1	0.5	13,801	7.87	6.81
	Σ							**1.4**	**1,523**	**0.82**	**0.53**
#2	**Σ**							**1.4**	**1,523**	**0.82**	**0.53**
#1	**Σ**							**0.0**	**49**	**0.00**	**0.00**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	1	2. Minimum tillage cultivation	45.00	198.90	442.00	3.350	0.036
#3	**1**	**Time of Concentration:**					**0.036**
#3	2	4. Cultivated, straight row	59.00	176.40	299.00	6.860	0.012
#3	**2**	**Time of Concentration:**					**0.012**
#5	1	3. Short grass pasture	16.00	276.63	1,729.00	3.200	0.150
#5	**1**	**Time of Concentration:**					**0.150**
#5	2	3. Short grass pasture	19.00	25.46	134.00	3.480	0.010
#5	**2**	**Time of Concentration:**					**0.010**
#6	1	3. Short grass pasture	26.00	76.18	293.00	4.070	0.019
#6	**1**	**Time of Concentration:**					**0.019**
#6	2	3. Short grass pasture	10.00	26.40	264.00	2.520	0.029
#6	**2**	**Time of Concentration:**					**0.029**
#6	3	3. Short grass pasture	30.00	226.20	754.00	4.380	0.047
#6	**3**	**Time of Concentration:**					**0.047**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#6	4	3. Short grass pasture	38.00	174.04	458.00	4.930	0.025
#6	**4**	**Time of Concentration:**					**0.025**
#6	5	3. Short grass pasture	18.00	296.28	1,646.00	3.390	0.134
#6	**5**	**Time of Concentration:**					**0.134**
#6	6	3. Short grass pasture	12.00	280.07	2,334.00	2.770	0.234
#6	**6**	**Time of Concentration:**					**0.234**
#7	1	3. Short grass pasture	22.00	277.63	1,262.00	3.750	0.093
#7	**1**	**Time of Concentration:**					**0.093**
#7	2	3. Short grass pasture	16.00	355.52	2,222.00	3.200	0.192
#7	**2**	**Time of Concentration:**					**0.192**
#7	3	3. Short grass pasture	12.00	75.24	627.00	2.770	0.062
#7	**3**	**Time of Concentration:**					**0.062**
#7	4	3. Short grass pasture	6.00	25.85	431.00	1.950	0.061
#7	**4**	**Time of Concentration:**					**0.061**
#9	2	3. Short grass pasture	14.00	121.38	867.00	2.990	0.080
#9	**2**	**Time of Concentration:**					**0.080**
#11	1	3. Short grass pasture	14.00	48.58	347.00	2.990	0.032
#11	**1**	**Time of Concentration:**					**0.032**
#11	2	3. Short grass pasture	12.00	49.44	412.00	2.770	0.041
#11	**2**	**Time of Concentration:**					**0.041**
#11	3	3. Short grass pasture	1.50	6.57	438.00	0.970	0.125
#11	**3**	**Time of Concentration:**					**0.125**
#11	4	3. Short grass pasture	1.50	3.44	230.00	0.970	0.065
#11	**4**	**Time of Concentration:**					**0.065**
#12	1	3. Short grass pasture	19.00	174.04	916.00	3.480	0.073
#12	**1**	**Time of Concentration:**					**0.073**
#12	2	3. Short grass pasture	12.00	145.08	1,209.00	2.770	0.121
#12	**2**	**Time of Concentration:**					**0.121**
#12	3	3. Short grass pasture	13.00	24.31	187.00	2.880	0.018
#12	**3**	**Time of Concentration:**					**0.018**
#14	1	3. Short grass pasture	39.00	176.67	453.00	4.990	0.025
#14	**1**	**Time of Concentration:**					**0.025**
#14	2	3. Short grass pasture	26.00	148.20	570.00	4.070	0.038
#14	**2**	**Time of Concentration:**					**0.038**
#16	1	3. Short grass pasture	21.00	99.32	473.00	3.660	0.035
#16	**1**	**Time of Concentration:**					**0.035**
#18	1	3. Short grass pasture	15.00	122.70	818.00	3.090	0.073
#18	**1**	**Time of Concentration:**					**0.073**
#18	2	3. Short grass pasture	13.00	77.35	595.00	2.880	0.057
#18	**2**	**Time of Concentration:**					**0.057**
#20	1	3. Short grass pasture	11.00	243.87	2,217.00	2.650	0.232
#20	**1**	**Time of Concentration:**					**0.232**
#20	2	3. Short grass pasture	11.00	126.61	1,151.00	2.650	0.120
#20	**2**	**Time of Concentration:**					**0.120**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#21	1	3. Short grass pasture	3.00	7.58	253.00	1.380	0.050
#21	**1**	**Time of Concentration:**					**0.050**
#23	1	3. Short grass pasture	15.00	123.90	826.00	3.090	0.074
#23	**1**	**Time of Concentration:**					**0.074**
#25	1	3. Short grass pasture	15.00	179.85	1,199.00	3.090	0.107
#25	**1**	**Time of Concentration:**					**0.107**
#27	1	5. Nearly bare and untilled, and alluvial valley fans	13.00	24.96	192.00	3.600	0.014
#27	**1**	**Time of Concentration:**					**0.014**
#27	2	3. Short grass pasture	8.00	154.39	1,930.00	2.260	0.237
#27	**2**	**Time of Concentration:**					**0.237**
#28	1	3. Short grass pasture	4.00	26.00	650.00	1.600	0.112
#28	**1**	**Time of Concentration:**					**0.112**
#28	2	3. Short grass pasture	8.00	25.43	318.00	2.260	0.039
#28	**2**	**Time of Concentration:**					**0.039**
#28	3	3. Short grass pasture	10.00	201.90	2,019.00	2.520	0.222
#28	**3**	**Time of Concentration:**					**0.222**
#28	4	3. Short grass pasture	22.00	74.14	337.00	3.750	0.024
#28	**4**	**Time of Concentration:**					**0.024**
#28	5	3. Short grass pasture	16.00	269.12	1,682.00	3.200	0.146
#28	**5**	**Time of Concentration:**					**0.146**
#29	1	3. Short grass pasture	33.00	225.39	683.00	4.590	0.041
#29	**1**	**Time of Concentration:**					**0.041**
#30	1	3. Short grass pasture	18.00	197.46	1,097.00	3.390	0.089
#30	**1**	**Time of Concentration:**					**0.089**
#30	2	3. Short grass pasture	37.00	200.17	541.00	4.860	0.030
#30	**2**	**Time of Concentration:**					**0.030**
#31	1	3. Short grass pasture	16.00	249.60	1,560.00	3.200	0.135
#31	**1**	**Time of Concentration:**					**0.135**

Appendix Exh. 7-14PP
Prospect Pond

25- Year 24-Hour Storm Event

Emergency Spillway Demonstration

General Information

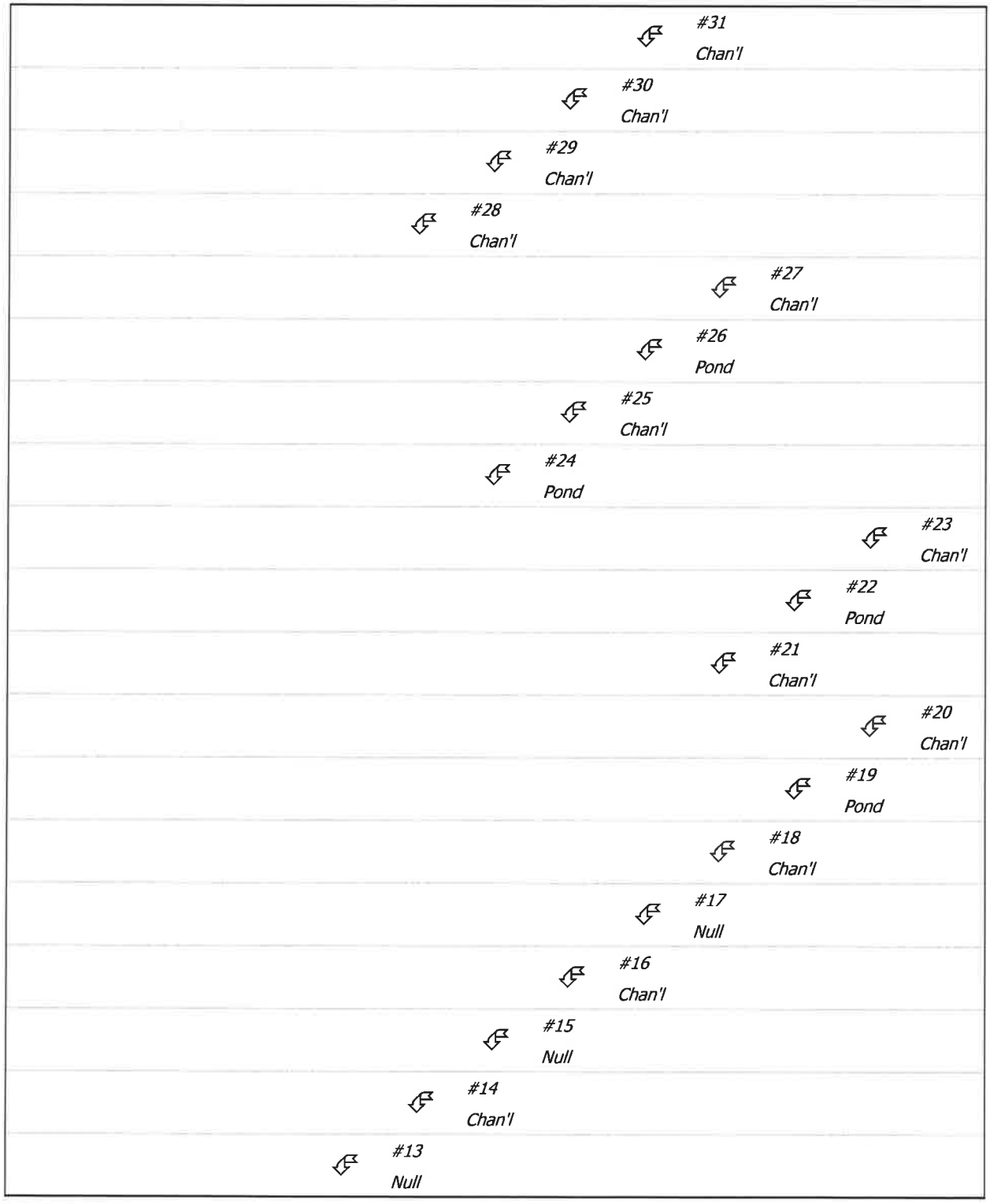
Storm Information:

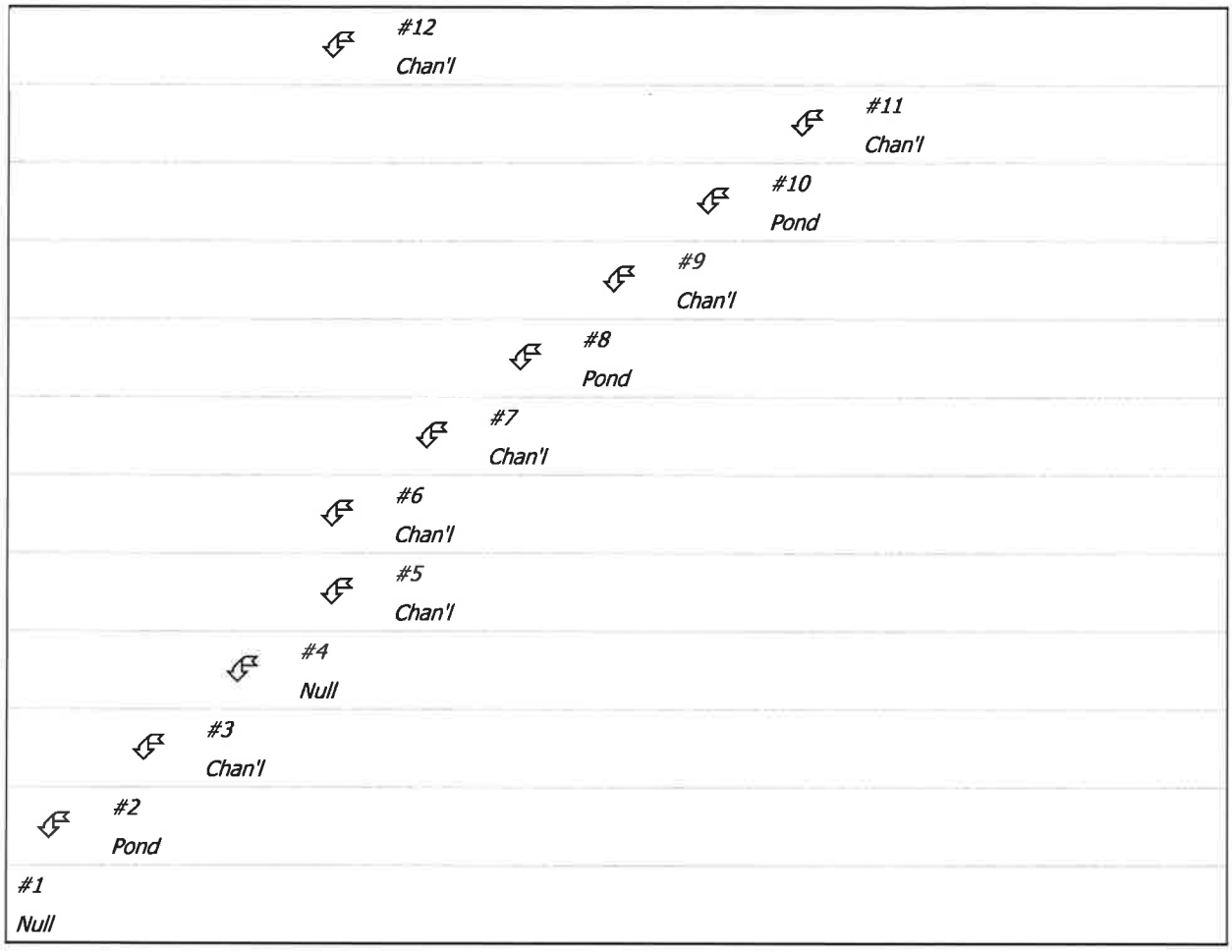
Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	2.300 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Null Below Prospect Pond
Pond	#2	==>	#1	0.000	0.000	Prospect Pond
Channel	#3	==>	#2	0.000	0.000	Natural Channel Above Prospect Pond
Null	#4	==>	#3	0.000	0.000	Confluence Prospect & South Collection Ditches
Channel	#5	==>	#4	0.000	0.000	Prospect Collection Ditch
Channel	#6	==>	#4	0.000	0.000	Natural Channel Below Reach 1 Prospect Ditch
Channel	#7	==>	#6	0.000	0.000	Prospect Ditch Reach 1
Pond	#8	==>	#7	0.000	0.000	PD1 Stockpond
Channel	#9	==>	#8	0.000	0.000	Prospect Ditch Reach 2
Pond	#10	==>	#9	0.000	0.000	PD2 Stockpond
Channel	#11	==>	#10	0.000	0.000	Prospect Ditch Reach 3
Channel	#12	==>	#4	0.000	0.000	South Collection Ditch Station 0+00 to 30+00
Null	#13	==>	#12	0.000	0.000	Confluence of Final East Pit Ditch & South Collection Ditch at Station 30+00
Channel	#14	==>	#13	0.000	0.000	Final East Pit Ditch Station 0+00 to Confluence w/North Trib Final East Pit Ditch
Null	#15	==>	#14	0.000	0.000	Confluence Final East Pit Ditch and North Tributary East Pit Ditch
Channel	#16	==>	#15	0.000	0.000	North Tributary Final East Pit Ditch Reach 1 to Confluence w/EP3 Outlet Ditch
Null	#17	==>	#16	0.000	0.000	Confluence North Tributary East Pit Ditch and EP3 Outlet Ditch
Channel	#18	==>	#17	0.000	0.000	North Tributary Final East Pit Ditch Reach 1 from Confluence of EP3 Outlet to NTEP1
Pond	#19	==>	#18	0.000	0.000	NTEP1 Stockpond
Channel	#20	==>	#19	0.000	0.000	North Tributary Final East Pit Ditch Reach 2
Channel	#21	==>	#17	0.000	0.000	EP3 Stockpond Outlet Ditch
Pond	#22	==>	#21	0.000	0.000	EP3 Stockpond
Channel	#23	==>	#22	0.000	0.000	EP3 Stockpond Inlet Ditch
Pond	#24	==>	#14	0.000	0.000	EP1 Stockpond
Channel	#25	==>	#24	0.000	0.000	Final East Pit Ditch Reach 2
Pond	#26	==>	#25	0.000	0.000	EP2 Stockpond
Channel	#27	==>	#26	0.000	0.000	Final East Pit Ditch Reach 3
Channel	#28	==>	#13	0.000	0.000	South Collection Ditch 30+00 to 90+00
Channel	#29	==>	#28	0.000	0.000	South Collection Ditch 90+00 to 92+68

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#30	==>	#29	0.000	0.000	Natural Channel from Section 16 Fill Ditch to South Collection Ditch
Channel	#31	==>	#30	0.000	0.000	Section 16 Fill Ditch




#12
Chan'l
#11
Chan'l
#10
Pond
#9
Chan'l
#8
Pond
#7
Chan'l
#6
Chan'l
#5
Chan'l
#4
Null
#3
Chan'l
#2
Pond
#1
Null

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#31		21.500	21.500	0.64	0.19
#30		19.300	40.800	0.64	0.19
#29		2.400	43.200	0.64	0.19
#28		181.400	224.600	1.32	0.31
#27		69.700	69.700	5.43	1.06
#26	In	0.000	69.700	5.43	1.06
	Out			1.05	1.06
#25		22.300	92.000	3.47	1.36
#24	In	0.000	92.000	3.47	1.36
	Out			1.30	1.36
#23		4.900	4.900	0.68	0.07
#22	In	0.000	4.900	0.68	0.07
	Out			0.20	0.07
#21		1.300	6.200	0.34	0.08
#20		44.500	44.500	1.28	0.31
#19	In	0.000	44.500	1.28	0.31
	Out			0.00	0.00
#18		11.200	55.700	0.88	0.09
#17		0.000	61.900	1.22	0.16
#16		1.900	63.800	1.48	0.19
#15		0.000	63.800	1.48	0.19
#14		6.100	161.900	2.24	1.60
#13		0.000	386.500	3.55	1.91
#12		56.600	443.100	6.23	2.17
#11		18.300	18.300	1.23	0.12
#10	In	0.000	18.300	1.23	0.12
	Out			0.73	0.12
#9		21.400	39.700	1.45	0.19
#8	In	0.000	39.700	1.45	0.19
	Out			1.08	0.19
#7		59.200	98.900	3.93	0.48
#6		56.600	155.500	4.65	0.56
#5		28.300	28.300	0.59	0.22
#4		0.000	626.900	10.95	2.94
#3		16.300	643.200	11.91	3.05
#2	In	0.000	643.200	11.91	3.05
	Out			0.49	1.37

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	0.000	643.200	0.49	1.37

Structure Detail:

Structure #31 (Riprap Channel)

Section 16 Fill 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	3.0:1	3.0:1	17.8	2.98		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.64 cfs	
Depth:	0.02 ft	3.00 ft
Top Width:	12.11 ft	29.99 ft
Velocity*:		
X-Section Area:	0.23 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 #30 (Erodible Channel)

Natural Channel from Section 16 Fill Ditch to South Collection Ditch

Parabolic Erodible Channel Inputs:

Material: Shales and hardpans

Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
22.0	0.0250				6.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.64 cfs	
Depth:	0.20 ft	
Top Width:	0.78 ft	
Velocity:	6.48 fps	
X-Section Area:	0.10 sq ft	
Hydraulic Radius:	0.112 ft	
Froude Number:	3.17	

Structure #29 (Vegetated Channel)

South Collection Ditch 90+00 to 92+68

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)
2.00	1.0:1	7.0:1	3.0	D, B				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:	0.64 cfs		0.64 cfs	
Depth:	0.26 ft		0.58 ft	
Top Width:	4.06 ft		6.67 ft	
Velocity:	0.82 fps		0.25 fps	
X-Section Area:	0.78 sq ft		2.53 sq ft	
Hydraulic Radius:	0.190 ft		0.372 ft	
Froude Number:	0.33		0.07	
Roughness Coefficient:	0.1028		0.5231	

Structure #28 (Vegetated Channel)

South Collection Ditch 30+00 to 90+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)
2.00	1.0:1	7.0:1	4.0	D, B				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:	1.32 cfs		1.32 cfs	
Depth:	0.31 ft		0.65 ft	
Top Width:	4.52 ft		7.22 ft	
Velocity:	1.28 fps		0.44 fps	
X-Section Area:	1.03 sq ft		3.01 sq ft	
Hydraulic Radius:	0.223 ft		0.408 ft	
Froude Number:	0.47		0.12	
Roughness Coefficient:	0.0854		0.3747	

Structure #27 (Riprap Channel)

Final East Pit Ditch Reach 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)
12.00	2.0:1	2.0:1	6.4	2.91		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	5.43 cfs	
Depth:	0.09 ft	3.00 ft
Top Width:	12.37 ft	24.01 ft
Velocity*:		
X-Section Area:	1.12 sq ft	
Hydraulic Radius:	0.091 ft	
Froude Number*:		
Manning's n*:		
Dmin:	1.00 in	
D50:	3.00 in	

	w/o Freeboard	w/ Freeboard
Dmax:	3.75 in	

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

Structure #26 (Pond)

EP2 Stockpond

Pond Inputs:

Initial Pool Elev:	7,500.00 ft
Initial Pool:	4.26 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,505.00	60.00	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	160.00	9.00	0.0150	7,500.00	0.50	0.00

Pond Results:

Peak Elevation:	7,500.50 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)	
7,492.00	0.385	0.000	0.000		
7,493.00	0.419	0.402	0.000		
7,494.00	0.454	0.839	0.000		
7,495.00	0.491	1.311	0.000		
7,496.00	0.529	1.821	0.000		
7,497.00	0.568	2.370	0.000		
7,498.00	0.609	2.958	0.000		
7,499.00	0.651	3.588	0.000		
7,500.00	0.694	4.260	0.000		Spillway #2

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
7,500.50	0.718	4.618	1.045	29.25	Peak Stage
7,501.00	0.741	4.978	2.094		
7,502.00	0.787	5.741	4.414		
7,503.00	0.834	6.552	5.883		
7,504.00	0.884	7.411	7.060		
7,505.00	0.932	8.319	8.069		Spillway #1
7,506.00	0.933	9.251	45.188		
7,507.00	0.934	10.185	151.737		
7,508.00	0.935	11.119	305.349		
7,509.00	0.936	12.055	524.315		
7,510.00	0.937	12.991	798.632		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
7,492.00	0.000	0.000	0.000
7,493.00	0.000	0.000	0.000
7,494.00	0.000	0.000	0.000
7,495.00	0.000	0.000	0.000
7,496.00	0.000	0.000	0.000
7,497.00	0.000	0.000	0.000
7,498.00	0.000	0.000	0.000
7,499.00	0.000	0.000	0.000
7,500.00	0.000	0.000	0.000
7,501.00	0.000	(3)>2.094	2.094
7,502.00	0.000	(5)>4.414	4.414
7,503.00	0.000	(5)>5.883	5.883
7,504.00	0.000	(5)>7.060	7.060
7,505.00	0.000	(5)>8.069	8.069
7,506.00	36.222	(5)>8.966	45.188
7,507.00	142.050	(5)>9.687	151.737
7,508.00	295.305	(5)>10.045	305.349
7,509.00	513.913	(6)>10.402	524.315
7,510.00	787.934	(6)>10.698	798.632

Structure #25 (Riprap Channel)

Final East Pit Ditch Reach 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)
12.00	2.0:1	2.0:1	10.0	2.95		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.47 cfs	
Depth:	0.05 ft	3.00 ft
Top Width:	12.21 ft	24.01 ft
Velocity*:		
X-Section Area:	0.65 sq ft	
Hydraulic Radius:	0.053 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 #24 (Pond)

EP1 Stockpond

Pond Inputs:

Initial Pool Elev:	7,376.00 ft
Initial Pool:	0.78 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,379.00	20.00	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	90.00	6.80	0.0150	7,376.00	0.50	0.00

Pond Results:

Peak Elevation:	7,376.62 ft
Dewater Time:	1.25 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)	
7,370.00	0.000	0.000	0.000		
7,371.00	0.092	0.031	0.000		
7,372.00	0.118	0.135	0.000		
7,373.00	0.140	0.264	0.000		
7,374.00	0.161	0.415	0.000		
7,375.00	0.184	0.588	0.000		
7,376.00	0.209	0.784	0.000		Spillway #2
7,376.62	0.226	0.922	1.303	30.05	Peak Stage
7,377.00	0.236	1.006	2.094		
7,378.00	0.281	1.264	4.414		
7,379.00	0.330	1.569	5.883		Spillway #1
7,380.00	0.330	1.899	55.460		
7,381.00	0.331	2.229	175.467		
7,382.00	0.332	2.561	353.735		
7,383.00	0.333	2.893	586.810		
7,384.00	0.334	3.227	875.260		
7,385.00	0.335	3.561	1,220.990		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
7,370.00	0.000	0.000	0.000
7,371.00	0.000	0.000	0.000
7,372.00	0.000	0.000	0.000
7,373.00	0.000	0.000	0.000
7,374.00	0.000	0.000	0.000
7,375.00	0.000	0.000	0.000
7,376.00	0.000	0.000	0.000
7,377.00	0.000	(3)>2.094	2.094
7,378.00	0.000	(5)>4.414	4.414
7,379.00	0.000	(5)>5.883	5.883
7,380.00	48.400	(5)>7.060	55.460
7,381.00	167.398	(5)>8.069	175.467
7,382.00	344.812	(5)>8.923	353.735
7,383.00	577.178	(6)>9.632	586.810
7,384.00	865.254	(6)>10.007	875.260
7,385.00	1,210.609	(6)>10.381	1,220.990

Structure #23 (Riprap Channel)

EP3 Stockpond Inlet 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	4.8	2.95		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.68 cfs	
Depth:	0.05 ft	3.00 ft
Top Width:	12.22 ft	24.02 ft
Velocity:	1.02 fps	
X-Section Area:	0.66 sq ft	
Hydraulic Radius:	0.054 ft	
Froude Number:	0.77	
Manning's n:	0.0279	

	w/o Freeboard	w/ Freeboard
Dmin:	0.00 in	
D50:	3.00 in	
Dmax:	0.00 in	

Structure #22 (Pond)

EP3 Stockpond

Pond Inputs:

Initial Pool Elev:	7,357.00 ft
Initial Pool:	2.90 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,357.00	216.00	2.00:1	2.00:1	12.00

Pond Results:

Peak Elevation:	7,357.01 ft
Dewater Time:	0.52 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)
7,340.00	0.032	0.000	0.000	
7,341.00	0.045	0.038	0.000	
7,342.00	0.060	0.091	0.000	
7,343.00	0.077	0.159	0.000	
7,344.00	0.095	0.245	0.000	
7,345.00	0.115	0.350	0.000	
7,346.00	0.129	0.472	0.000	
7,347.00	0.144	0.608	0.000	
7,348.00	0.160	0.760	0.000	
7,349.00	0.176	0.928	0.000	
7,350.00	0.192	1.112	0.000	
7,351.00	0.210	1.313	0.000	
7,352.00	0.227	1.531	0.000	
7,353.00	0.246	1.768	0.000	
7,354.00	0.264	2.023	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
7,355.00	0.284	2.297	0.000		
7,356.00	0.304	2.591	0.000		
7,357.00	0.322	2.904	0.000		Spillway #1
7,357.01	0.314	2.909	0.199	12.45	Peak Stage
7,358.00	0.322	3.226	14.150		
7,359.00	0.323	3.549	61.776		
7,360.00	0.324	3.873	147.685		
7,361.00	0.325	4.197	264.762		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,340.00	0.000	0.000
7,341.00	0.000	0.000
7,342.00	0.000	0.000
7,343.00	0.000	0.000
7,344.00	0.000	0.000
7,345.00	0.000	0.000
7,346.00	0.000	0.000
7,347.00	0.000	0.000
7,348.00	0.000	0.000
7,349.00	0.000	0.000
7,350.00	0.000	0.000
7,351.00	0.000	0.000
7,352.00	0.000	0.000
7,353.00	0.000	0.000
7,354.00	0.000	0.000
7,355.00	0.000	0.000
7,356.00	0.000	0.000
7,357.00	0.000	0.000
7,358.00	14.150	14.150
7,359.00	61.776	61.776
7,360.00	147.685	147.685
7,361.00	264.762	264.762

Structure #21 (Riprap Channel)

EP3 Stockpond Outlet 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	3.6	2.96		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.34 cfs	
Depth:	0.04 ft	3.00 ft
Top Width:	12.14 ft	23.98 ft
Velocity:	0.80 fps	
X-Section Area:	0.42 sq ft	
Hydraulic Radius:	0.035 ft	
Froude Number:	0.76	
Manning's n:	0.0377	
Dmin:	2.00 in	
D50:	9.00 in	
Dmax:	12.00 in	

Structure #20 (Riprap Channel)

North Tributary Final East Pit Ditch Reach 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)
12.00	2.0:1	2.0:1	12.2	2.97		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.28 cfs	
Depth:	0.03 ft	3.00 ft
Top Width:	12.13 ft	24.01 ft
Velocity*:		

	w/o Freeboard	w/ Freeboard
X-Section Area:	0.39 sq ft	
Hydraulic Radius:	0.032 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 #19 (Pond)

NTEP1 Stockpond

Pond Inputs:

Initial Pool Elev:	7,385.00 ft
Initial Pool:	0.92 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,389.00	20.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	7,386.29 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)	
7,378.00	0.041	0.000	0.000		
7,379.00	0.071	0.055	0.000		
7,380.00	0.096	0.138	0.000		
7,381.00	0.119	0.245	0.000		
7,382.00	0.143	0.376	0.000		
7,383.00	0.168	0.531	0.000		
7,384.00	0.194	0.712	0.000		
7,385.00	0.220	0.919	0.000		
7,386.00	0.247	1.152	0.000		
7,386.29	0.255	1.228	0.000	0.00	Peak Stage

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
7,387.00	0.275	1.413	0.000		
7,388.00	0.304	1.702	0.000		
7,389.00	0.338	2.023	0.000		Spillway #1
7,390.00	0.400	2.392	48.400		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,378.00	0.000	0.000
7,379.00	0.000	0.000
7,380.00	0.000	0.000
7,381.00	0.000	0.000
7,382.00	0.000	0.000
7,383.00	0.000	0.000
7,384.00	0.000	0.000
7,385.00	0.000	0.000
7,386.00	0.000	0.000
7,387.00	0.000	0.000
7,388.00	0.000	0.000
7,389.00	0.000	0.000
7,390.00	48.400	48.400

Structure #18 (Riprap Channel)

North Tributary Final East Pit Ditch Reach 1 from Confluence of EP3 Outlet to NTEP1

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	7.2	2.95		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.88 cfs	
Depth:	0.05 ft	3.00 ft

	w/o Freeboard	w/ Freeboard
Top Width:	12.19 ft	23.99 ft
Velocity*:		
X-Section Area:	0.56 sq ft	
Hydraulic Radius:	0.046 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 #17 (Null)

Confluence North Tributary East Pit Ditch and EP3 Outlet Ditch

Structure #16 (Riprap Channel)

North Tributary Final East Pit Ditch Reach 1 to Confluence w/EP3 Outlet 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	21.5	2.98		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.48 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:	0.018 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 #15 (Null)

Confluence Final East Pit Ditch and North Tributary East Pit Ditch

Structure #14 (Nonerodible Channel)

Final East Pit Ditch Station 0+00 to Confluence w/North Trib Final East Pit Ditch

Trapezoidal Nonerodible Channel Inputs:

Material: Shotcrete

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	21.1	0.0170	2.96		

Nonerodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.24 cfs	
Depth:	0.04 ft	3.00 ft
Top Width:	12.16 ft	24.00 ft
Velocity:	4.66 fps	
X-Section Area:	0.48 sq ft	
Hydraulic Radius:	0.039 ft	
Froude Number:	4.14	

Structure #13 (Null)

Confluence of Final East Pit Ditch & South Collection Ditch at Station 30+00

Structure #12 (Vegetated Channel)

South Collection Ditch Station 0+00 to 30+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)
2.00	1.0:1	7.0:1	5.0	D, B	0.27			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:	6.23 cfs		6.23 cfs	
Depth:	0.54 ft	0.81 ft	0.93 ft	1.20 ft
Top Width:	6.30 ft	8.46 ft	9.43 ft	11.59 ft
Velocity:	2.79 fps		1.17 fps	
X-Section Area:	2.23 sq ft		5.31 sq ft	
Hydraulic Radius:	0.347 ft		0.550 ft	
Froude Number:	0.83		0.28	
Roughness Coefficient:	0.0589		0.1904	

Structure #11 (Vegetated Channel)

Prospect Ditch Reach 3

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)
12.00	2.0:1	2.0:1	12.0	D, B	2.74			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:	1.23 cfs		1.23 cfs	
Depth:	0.11 ft	2.85 ft	0.26 ft	3.00 ft
Top Width:	12.42 ft	23.38 ft	13.03 ft	23.99 ft
Velocity:	0.95 fps		0.38 fps	
X-Section Area:	1.29 sq ft		3.22 sq ft	
Hydraulic Radius:	0.104 ft		0.245 ft	
Froude Number:	0.52		0.14	
Roughness Coefficient:	0.1183		0.5263	

Structure #10 (Pond)

PD2 Stockpond

Pond Inputs:

Initial Pool Elev:	7,565.00 ft
Initial Pool:	1.49 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,565.00	20.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	7,565.02 ft
Dewater Time:	0.50 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)	
7,556.00	0.054	0.000	0.000		
7,557.00	0.086	0.069	0.000		
7,558.00	0.106	0.165	0.000		
7,559.00	0.127	0.282	0.000		
7,560.00	0.150	0.420	0.000		
7,561.00	0.175	0.582	0.000		
7,562.00	0.200	0.770	0.000		
7,563.00	0.227	0.983	0.000		
7,564.00	0.253	1.222	0.000		
7,565.00	0.280	1.489	0.000		Spillway #1
7,565.02	0.277	1.493	0.731	12.10	Peak Stage
7,566.00	0.300	1.779	48.400		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,556.00	0.000	0.000
7,557.00	0.000	0.000
7,558.00	0.000	0.000
7,559.00	0.000	0.000
7,560.00	0.000	0.000
7,561.00	0.000	0.000
7,562.00	0.000	0.000
7,563.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,564.00	0.000	0.000
7,565.00	0.000	0.000
7,566.00	48.400	48.400

Structure #9 (Vegetated Channel)

Prospect Ditch Reach 2

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)
12.00	2.0:1	2.0:1	13.0	D, B	2.74			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:	1.45 cfs		1.45 cfs	
Depth:	0.11 ft	2.85 ft	0.26 ft	3.00 ft
Top Width:	12.44 ft	23.40 ft	13.05 ft	24.01 ft
Velocity:	1.07 fps		0.44 fps	
X-Section Area:	1.36 sq ft		3.29 sq ft	
Hydraulic Radius:	0.109 ft		0.250 ft	
Froude Number:	0.57		0.15	
Roughness Coefficient:	0.1125		0.4823	

Structure #8 (Pond)

PD1 Stockpond

Pond Inputs:

Initial Pool Elev:	7,355.00 ft
Initial Pool:	0.88 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,355.00	20.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	7,355.02 ft
Dewater Time:	0.51 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)	
7,348.00	0.031	0.000	0.000		
7,349.00	0.074	0.051	0.000		
7,350.00	0.097	0.136	0.000		
7,351.00	0.120	0.244	0.000		
7,352.00	0.140	0.374	0.000		
7,353.00	0.159	0.523	0.000		
7,354.00	0.180	0.692	0.000		
7,355.00	0.201	0.882	0.000		Spillway #1
7,355.02	0.202	0.887	1.079	12.20	Peak Stage
7,356.00	0.223	1.094	48.400		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,348.00	0.000	0.000
7,349.00	0.000	0.000
7,350.00	0.000	0.000
7,351.00	0.000	0.000
7,352.00	0.000	0.000
7,353.00	0.000	0.000
7,354.00	0.000	0.000
7,355.00	0.000	0.000
7,356.00	48.400	48.400

Structure #7 (Riprap Channel)

Prospect Ditch Reach 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	2.0:1	2.0:1	23.6	2.97		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.93 cfs	
Depth:	0.03 ft	3.00 ft
Top Width:	12.11 ft	23.99 ft
Velocity*:		
X-Section Area:	0.34 sq ft	
Hydraulic Radius:	0.028 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 #6 (Erodible Channel)

Natural Channel Below Reach 1 Prospect Ditch

Parabolic Erodible Channel Inputs:

Material: Coarse gravel noncolloidal

Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
21.0	0.0250				6.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	4.65 cfs	
Depth:	0.41 ft	
Top Width:	1.64 ft	
Velocity:	10.38 fps	
X-Section Area:	0.45 sq ft	
Hydraulic Radius:	0.234 ft	
Froude Number:	3.50	

Structure #5 (Vegetated Channel)

Prospect Collection 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)
2.00	1.0:1	7.0:1	3.0	D, B				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:	0.59 cfs		0.59 cfs	
Depth:	0.25 ft		0.57 ft	
Top Width:	3.99 ft		6.56 ft	
Velocity:	0.79 fps		0.24 fps	
X-Section Area:	0.75 sq ft		2.44 sq ft	
Hydraulic Radius:	0.184 ft		0.364 ft	
Froude Number:	0.32		0.07	
Roughness Coefficient:	0.1050		0.5426	

Structure #4 (Null)

Confluence Prospect & South Collection Ditches

Structure #3 (Erodible Channel)

Natural Channel Above Prospect Pond

Parabolic Erodible Channel Inputs:

Material: Asphaltic Concrete, Machine Placed

Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
20.0	0.0140				6.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	11.91 cfs	
Depth:	0.47 ft	

	w/o Freeboard	w/ Freeboard
Top Width:	1.89 ft	
Velocity:	19.90 fps	
X-Section Area:	0.60 sq ft	
Hydraulic Radius:	0.270 ft	
Froude Number:	6.24	

Structure #2 (Pond)

Prospect Pond

Pond Inputs:

Initial Pool Elev:	6,744.00 ft
Initial Pool:	2.18 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
12.00	8.70	12.00	129.00	9.70	0.0150	6,750.30	2

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
6,752.00	20.00	1.50:1	1.50:1	12.00

Pond Results:

Peak Elevation:	6,749.43 ft
Dewater Time:	3.72 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)
6,734.00	0.029	0.000	0.000	
6,735.00	0.088	0.056	0.000	
6,736.00	0.117	0.158	0.000	
6,737.00	0.149	0.291	0.000	
6,738.00	0.185	0.457	0.000	
6,739.00	0.225	0.662	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
6,740.00	0.269	0.909	0.000		
6,741.00	0.293	1.190	0.000		
6,742.00	0.317	1.495	0.000		
6,743.00	0.341	1.823	0.000		
6,744.00	0.365	2.176	0.000		Low hole SPW #1
6,745.00	0.390	2.554	0.210	21.74*	
6,746.00	0.418	2.958	0.297	16.45*	
6,747.00	0.448	3.391	0.364	14.40*	
6,748.00	0.478	3.854	0.420	13.33*	
6,749.00	0.509	4.347	0.470	13.90	
6,749.43	0.524	4.572	0.489	9.50	Peak Stage
6,750.00	0.542	4.872	0.515		
6,750.30	0.551	5.036	0.527		Spillway #1
6,751.00	0.572	5.429	3.164		
6,752.00	0.604	6.017	4.931		Spillway #2
6,753.00	0.633	6.636	35.637		
6,754.00	0.664	7.284	110.493		
6,755.00	0.695	7.964	223.581		

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

Detailed Discharge Table

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
6,734.00	0.000	0.000	0.000
6,735.00	0.000	0.000	0.000
6,736.00	0.000	0.000	0.000
6,737.00	0.000	0.000	0.000
6,738.00	0.000	0.000	0.000
6,739.00	0.000	0.000	0.000
6,740.00	0.000	0.000	0.000
6,741.00	0.000	0.000	0.000
6,742.00	0.000	0.000	0.000
6,743.00	0.000	0.000	0.000
6,744.00	2.00>0.000	0.000	0.000
6,745.00	0.210	0.000	0.210
6,746.00	0.297	0.000	0.297
6,747.00	0.364	0.000	0.364

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
6,748.00	0.420	0.000	0.420
6,749.00	0.470	0.000	0.470
6,750.00	0.515	0.000	0.515
6,750.30	0.527	0.000	0.527
6,751.00	3.164	0.000	3.164
6,752.00	4.931	0.000	4.931
6,753.00	6.214	29.423	35.637
6,754.00	7.274	103.218	110.493
6,755.00	8.199	215.382	223.581

Structure #1 (Null)

Null Below Prospect 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	21.500	0.135	0.000	0.000	62.000	S	0.64	0.194
	Σ	**21.500**						**0.64**	**0.194**
#30	1	12.500	0.089	0.000	0.000	47.000	S	0.00	0.000
	2	6.800	0.030	0.000	0.000	47.000	S	0.00	0.000
	Σ	**40.800**						**0.64**	**0.194**
#29	1	2.400	0.041	0.000	0.000	47.000	S	0.00	0.000
	Σ	**43.200**						**0.64**	**0.194**
#28	1	2.200	0.112	0.000	0.000	62.000	M	0.30	0.029
	2	1.400	0.039	0.000	0.000	62.000	M	0.19	0.018
	3	23.000	0.222	0.000	0.000	47.000	S	0.00	0.000
	4	5.100	0.024	0.000	0.000	62.000	M	0.70	0.068
	5	149.700	0.146	0.000	0.000	47.000	S	0.02	0.001
	Σ	**224.600**						**1.32**	**0.310**
#27	1	6.000	0.014	0.000	0.000	80.000	F	5.12	0.376
	2	63.700	0.237	0.000	0.000	62.000	M	2.79	0.684
	Σ	**69.700**						**5.43**	**1.060**
#26	Σ	**69.700**						**5.43**	**1.060**
#25	1	22.300	0.107	0.000	0.000	62.000	M	3.08	0.297
	Σ	**92.000**						**3.47**	**1.357**
#24	Σ	**92.000**						**3.47**	**1.357**
#23	1	4.900	0.074	0.000	0.000	62.000	M	0.68	0.065
	Σ	**4.900**						**0.68**	**0.065**
#22	Σ	**4.900**						**0.68**	**0.065**
#21	1	1.300	0.050	0.000	0.000	62.000	M	0.18	0.014
	Σ	**6.200**						**0.34**	**0.080**
#20	1	28.800	0.232	0.000	0.000	62.000	M	1.28	0.309
	2	15.700	0.120	0.000	0.000	47.000	S	0.00	0.000
	Σ	**44.500**						**1.28**	**0.309**
#19	Σ	**44.500**						**1.28**	**0.309**
#18	1	6.400	0.073	0.000	0.000	62.000	M	0.88	0.085
	2	4.800	0.057	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)
	Σ	**55.700**						**0.88**	**0.085**
#17	**Σ**	**61.900**						**1.22**	**0.165**
#16	1	1.900	0.035	0.000	0.000	62.000	M	0.26	0.025
	Σ	**63.800**						**1.48**	**0.190**
#15	**Σ**	**63.800**						**1.48**	**0.190**
#14	1	2.300	0.025	0.000	0.000	47.000	S	0.00	0.000
	2	3.800	0.038	0.000	0.000	62.000	M	0.52	0.051
	Σ	**161.900**						**2.24**	**1.597**
#13	**Σ**	**386.500**						**3.55**	**1.907**
#12	1	36.000	0.073	0.000	0.000	47.000	S	0.00	0.000
	2	19.400	0.121	0.000	0.000	62.000	M	2.68	0.258
	3	1.200	0.018	0.000	0.000	47.000	S	0.00	0.000
	Σ	**443.100**						**6.23**	**2.166**
#11	1	2.600	0.032	0.000	0.000	47.000	S	0.00	0.000
	2	8.900	0.041	0.000	0.000	62.000	M	1.23	0.119
	3	5.900	0.125	0.000	0.000	47.000	S	0.00	0.000
	4	0.900	0.065	0.000	0.000	47.000	S	0.00	0.000
	Σ	**18.300**						**1.23**	**0.119**
#10	**Σ**	**18.300**						**1.23**	**0.119**
#9	1	5.400	0.042	0.000	0.000	62.000	M	0.75	0.072
	2	16.000	0.080	0.000	0.000	47.000	S	0.00	0.000
	Σ	**39.700**						**1.45**	**0.191**
#8	**Σ**	**39.700**						**1.45**	**0.191**
#7	1	12.100	0.093	0.000	0.000	62.000	M	1.67	0.161
	2	34.400	0.192	0.000	0.000	47.000	S	0.00	0.000
	3	9.800	0.062	0.000	0.000	62.000	M	1.35	0.131
	4	2.900	0.061	0.000	0.000	47.000	S	0.00	0.000
	Σ	**98.900**						**3.93**	**0.482**
#6	1	1.200	0.019	0.000	0.000	62.000	M	0.17	0.012
	2	1.100	0.029	0.000	0.000	47.000	S	0.00	0.000
	3	5.200	0.047	0.000	0.000	61.000	S	0.55	0.061
	4	4.800	0.025	0.000	0.000	47.000	S	0.00	0.000
	5	17.400	0.134	0.000	0.000	47.000	S	0.00	0.000
	6	26.900	0.234	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)
	Σ	**155.500**						**4.65**	**0.556**
#5	1	27.800	0.150	0.000	0.000	61.000	S	0.59	0.220
	2	0.500	0.010	0.000	0.000	47.000	S	0.00	0.000
	Σ	**28.300**						**0.59**	**0.220**
#4	**Σ**	**626.900**						**10.95**	**2.941**
#3	1	7.200	0.036	0.000	0.000	47.000	S	0.00	0.000
	2	9.100	0.012	0.000	0.000	61.000	S	0.97	0.106
	Σ	**643.200**						**11.91**	**3.048**
#2	**Σ**	**643.200**						**11.91**	**3.048**
#1	**Σ**	**643.200**						**0.49**	**1.370**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	1	2. Minimum tillage cultivation	45.00	198.90	442.00	3.350	0.036
#3	**1**	**Time of Concentration:**					**0.036**
#3	2	4. Cultivated, straight row	59.00	176.40	299.00	6.860	0.012
#3	**2**	**Time of Concentration:**					**0.012**
#5	1	3. Short grass pasture	16.00	276.63	1,729.00	3.200	0.150
#5	**1**	**Time of Concentration:**					**0.150**
#5	2	3. Short grass pasture	19.00	25.46	134.00	3.480	0.010
#5	**2**	**Time of Concentration:**					**0.010**
#6	1	3. Short grass pasture	26.00	76.18	293.00	4.070	0.019
#6	**1**	**Time of Concentration:**					**0.019**
#6	2	3. Short grass pasture	10.00	26.40	264.00	2.520	0.029
#6	**2**	**Time of Concentration:**					**0.029**
#6	3	3. Short grass pasture	30.00	226.20	754.00	4.380	0.047
#6	**3**	**Time of Concentration:**					**0.047**
#6	4	3. Short grass pasture	38.00	174.04	458.00	4.930	0.025
#6	**4**	**Time of Concentration:**					**0.025**
#6	5	3. Short grass pasture	18.00	296.28	1,646.00	3.390	0.134
#6	**5**	**Time of Concentration:**					**0.134**
#6	6	3. Short grass pasture	12.00	280.07	2,334.00	2.770	0.234
#6	**6**	**Time of Concentration:**					**0.234**
#7	1	3. Short grass pasture	22.00	277.63	1,262.00	3.750	0.093
#7	**1**	**Time of Concentration:**					**0.093**
#7	2	3. Short grass pasture	16.00	355.52	2,222.00	3.200	0.192

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#7	**2**	**Time of Concentration:**					**0.192**
#7	3	3. Short grass pasture	12.00	75.24	627.00	2.770	0.062
#7	**3**	**Time of Concentration:**					**0.062**
#7	4	3. Short grass pasture	6.00	25.85	431.00	1.950	0.061
#7	**4**	**Time of Concentration:**					**0.061**
#9	2	3. Short grass pasture	14.00	121.38	867.00	2.990	0.080
#9	**2**	**Time of Concentration:**					**0.080**
#11	1	3. Short grass pasture	14.00	48.58	347.00	2.990	0.032
#11	**1**	**Time of Concentration:**					**0.032**
#11	2	3. Short grass pasture	12.00	49.44	412.00	2.770	0.041
#11	**2**	**Time of Concentration:**					**0.041**
#11	3	3. Short grass pasture	1.50	6.57	438.00	0.970	0.125
#11	**3**	**Time of Concentration:**					**0.125**
#11	4	3. Short grass pasture	1.50	3.44	230.00	0.970	0.065
#11	**4**	**Time of Concentration:**					**0.065**
#12	1	3. Short grass pasture	19.00	174.04	916.00	3.480	0.073
#12	**1**	**Time of Concentration:**					**0.073**
#12	2	3. Short grass pasture	12.00	145.08	1,209.00	2.770	0.121
#12	**2**	**Time of Concentration:**					**0.121**
#12	3	3. Short grass pasture	13.00	24.31	187.00	2.880	0.018
#12	**3**	**Time of Concentration:**					**0.018**
#14	1	3. Short grass pasture	39.00	176.67	453.00	4.990	0.025
#14	**1**	**Time of Concentration:**					**0.025**
#14	2	3. Short grass pasture	26.00	148.20	570.00	4.070	0.038
#14	**2**	**Time of Concentration:**					**0.038**
#16	1	3. Short grass pasture	21.00	99.32	473.00	3.660	0.035
#16	**1**	**Time of Concentration:**					**0.035**
#18	1	3. Short grass pasture	15.00	122.70	818.00	3.090	0.073
#18	**1**	**Time of Concentration:**					**0.073**
#18	2	3. Short grass pasture	13.00	77.35	595.00	2.880	0.057
#18	**2**	**Time of Concentration:**					**0.057**
#20	1	3. Short grass pasture	11.00	243.87	2,217.00	2.650	0.232
#20	**1**	**Time of Concentration:**					**0.232**
#20	2	3. Short grass pasture	11.00	126.61	1,151.00	2.650	0.120
#20	**2**	**Time of Concentration:**					**0.120**
#21	1	3. Short grass pasture	3.00	7.58	253.00	1.380	0.050
#21	**1**	**Time of Concentration:**					**0.050**
#23	1	3. Short grass pasture	15.00	123.90	826.00	3.090	0.074
#23	**1**	**Time of Concentration:**					**0.074**
#25	1	3. Short grass pasture	15.00	179.85	1,199.00	3.090	0.107
#25	**1**	**Time of Concentration:**					**0.107**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#27	1	5. Nearly bare and untilled, and alluvial valley fans	13.00	24.96	192.00	3.600	0.014
#27	**1**	**Time of Concentration:**					**0.014**
#27	2	3. Short grass pasture	8.00	154.39	1,930.00	2.260	0.237
#27	**2**	**Time of Concentration:**					**0.237**
#28	1	3. Short grass pasture	4.00	26.00	650.00	1.600	0.112
#28	**1**	**Time of Concentration:**					**0.112**
#28	2	3. Short grass pasture	8.00	25.43	318.00	2.260	0.039
#28	**2**	**Time of Concentration:**					**0.039**
#28	3	3. Short grass pasture	10.00	201.90	2,019.00	2.520	0.222
#28	**3**	**Time of Concentration:**					**0.222**
#28	4	3. Short grass pasture	22.00	74.14	337.00	3.750	0.024
#28	**4**	**Time of Concentration:**					**0.024**
#28	5	3. Short grass pasture	16.00	269.12	1,682.00	3.200	0.146
#28	**5**	**Time of Concentration:**					**0.146**
#29	1	3. Short grass pasture	33.00	225.39	683.00	4.590	0.041
#29	**1**	**Time of Concentration:**					**0.041**
#30	1	3. Short grass pasture	18.00	197.46	1,097.00	3.390	0.089
#30	**1**	**Time of Concentration:**					**0.089**
#30	2	3. Short grass pasture	37.00	200.17	541.00	4.860	0.030
#30	**2**	**Time of Concentration:**					**0.030**
#31	1	3. Short grass pasture	16.00	249.60	1,560.00	3.200	0.135
#31	**1**	**Time of Concentration:**					**0.135**

Setion 16 Fill Ditch Culvert

10-Year 24-Hour Storm Event

General Information

Storm Information:

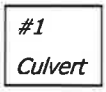
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.800 inches

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
Culvert	#1	==>	End	0.000	0.000	Culvert in Section 16 Fill Ditch



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	21.500	21.500	0.13	0.08	0.4	4,042	2.17	1.81

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In/Out
4.7500	100.000%
0.0750	83.422%
0.0400	37.711%
0.0010	22.855%

Structure Detail:

Structure #1 (Culvert)

Culvert in Section 16 Fill Ditch

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
50.00	18.00	0.0150	3.00	0.00	0.90

Culvert Results:

Design Discharge = 0.13 cfs

Minimum pipe diameter: 1 - 4 inch pipe(s) required

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	21.500	0.138	0.000	0.000	62.000	F	0.13	0.085
	Σ	**21.500**						**0.13**	**0.085**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.300	400.00	16.00	0.0310	0.9000	1	0.4	4,042	2.17	1.81
	Σ							**0.4**	**4,042**	**2.17**	**1.81**

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	16.00	256.00	1,600.00	3.200	0.138
#1	**1**	**Time of Concentration:**					**0.138**

Appendix Exh. 7-14S15
Section 15 Pond

The location of the Section 15 Pond is presented on Map 12, and the design configuration of the pond is presented on Figure Exh. 7-14Q-1. Figure Exh. 7-14Q-2 provides the breakdown of drainage areas and hydrologic conditions for this sediment pond. The profile of the associated permanent channel associated with the Section 15 Pond (Section 15 Ditch) is presented on Map 33. This design information for the Section 15 Ditch is presented in this appendix.

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^{TM}. For channels to be protected by a vegetative liner, the permissible velocities are also determined using SEDCAD^{TM} routines.

Section 15 Pond

The following pages present the results of the SEDCAD^{TM} models for the post mining condition. At this stage the oldest reclamation is on the eastern extent of the watershed, and the younger (topsoil and seeded) reclamation is the western portion of the Section 15 Pond watershed.

The SEDCAD^{TM} model herein provides the results of the 100-year, 24-hour design storm and demonstrates the Section 15 Pond will fully contain the modeled event.

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.

In summary, for the post mining case, the 100-year, 24-hour storm produces 35.46 acre-feet of runoff, and the storm is contained below the emergency spillway elevation 7,567'.

Section 15 Post Mine Channel

The Section 15 Pond watershed includes one post-mining channel. The location of channel is presented on Map 12, Figure Exh. 7-14Q-2, and the channel profile is presented on Map 33.

The Section 15 channel has been designed in accordance with Rule 4.05.4(2)(b) for the 100-year, 24-hour storm event even though the reporting watershed is less than one square mile.

A SEDCAD^{TM} model has been included which evaluates the peak flow and total runoff volume for the channel for the 100 year, 24-hour storm event. The channel configurations for the Section 15 Ditch is summarized below.

Section 15 Ditch

Station	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Erosion Protection
Station 0+00 to 30+18	35.46	3.0	Trapezoidal 12’ bottom	3H:1V (North) and 2H:1V (South)	Riprap D50 = 6”

Section 15 Pond
100-Year 24-Hour Storm Event

Full Containment Demonstration

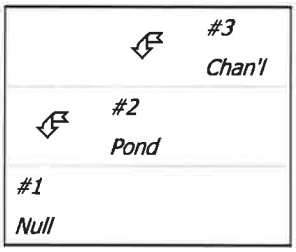
General Information

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 Emergency Spillway
Pond	#2	==>	#1	0.000	0.000	Section 15 Pond
Channel	#3	==>	#2	0.000	0.000	Section 15 Ditch



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3		106.700	106.700	35.46	3.90
#2	In	7.300	114.000	35.46	3.91
	Out			0.00	0.00
#1		0.000	114.000	0.00	0.00

Structure Detail:

Structure #3 (Riprap Channel)

Section 15 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	3.0:1	3.0	2.64		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	35.46 cfs	
Depth:	0.36 ft	3.00 ft
Top Width:	13.82 ft	27.02 ft
Velocity*:		
X-Section Area:	4.71 sq ft	
Hydraulic Radius:	0.337 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 (Pond)

Section 15 Pond

Pond Inputs:

Initial Pool Elev:	7,562.00 ft
Initial Pool:	4.30 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,567.00	25.00	2.00:1	2.00:1	18.00

Pond Results:

Peak Elevation:	7,566.38 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)	
7,555.00	0.459	0.000	0.000		
7,555.50	0.480	0.235	0.000		
7,556.00	0.501	0.480	0.000		
7,556.50	0.522	0.736	0.000		
7,557.00	0.544	1.002	0.000		
7,557.50	0.566	1.280	0.000		
7,558.00	0.589	1.569	0.000		
7,558.50	0.611	1.869	0.000		
7,559.00	0.634	2.180	0.000		
7,559.50	0.658	2.503	0.000		
7,560.00	0.681	2.838	0.000		
7,560.50	0.705	3.184	0.000		
7,561.00	0.729	3.543	0.000		
7,561.50	0.753	3.913	0.000		
7,562.00	0.778	4.296	0.000		
7,562.50	0.803	4.692	0.000		
7,563.00	0.828	5.099	0.000		
7,563.50	0.854	5.520	0.000		
7,564.00	0.880	5.953	0.000		
7,564.50	0.906	6.399	0.000		
7,565.00	0.932	6.859	0.000		
7,565.50	0.962	7.332	0.000		
7,566.00	0.992	7.821	0.000		
7,566.38	1.013	8.204	0.000	0.00	Peak Stage
7,566.50	1.020	8.324	0.000		
7,567.00	1.050	8.841	0.000		Spillway #1
7,567.50	1.050	9.366	1.148		
7,568.00	1.050	9.891	41.753		
7,568.50	1.050	10.416	88.805		
7,569.00	1.050	10.941	147.055		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,555.00	0.000	0.000
7,555.50	0.000	0.000
7,556.00	0.000	0.000
7,556.50	0.000	0.000
7,557.00	0.000	0.000
7,557.50	0.000	0.000
7,558.00	0.000	0.000
7,558.50	0.000	0.000
7,559.00	0.000	0.000
7,559.50	0.000	0.000
7,560.00	0.000	0.000
7,560.50	0.000	0.000
7,561.00	0.000	0.000
7,561.50	0.000	0.000
7,562.00	0.000	0.000
7,562.50	0.000	0.000
7,563.00	0.000	0.000
7,563.50	0.000	0.000
7,564.00	0.000	0.000
7,564.50	0.000	0.000
7,565.00	0.000	0.000
7,565.50	0.000	0.000
7,566.00	0.000	0.000
7,566.50	0.000	0.000
7,567.00	0.000	0.000
7,567.50	1.148	1.148
7,568.00	41.753	41.753
7,568.50	88.805	88.805
7,569.00	147.055	147.055

Structure #1 (Null)

Null Below Emergency Spillway

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)
#3	1	3.200	0.061	0.000	0.000	62.000	M	0.98	0.076
	2	10.800	0.102	0.000	0.000	47.000	S	0.03	0.015
	3	3.900	0.096	0.000	0.000	47.000	S	0.00	0.000
	4	34.400	0.184	0.000	0.000	80.000	F	31.96	2.826
	5	2.700	0.057	0.000	0.000	47.000	S	0.00	0.000
	6	51.700	0.333	0.000	0.000	62.000	M	5.30	0.985
	Σ	**106.700**						**35.46**	**3.902**
#2	1	1.100	0.011	0.000	0.000	47.000	S	0.00	0.000
	2	6.200	0.060	0.000	0.000	47.000	S	0.02	0.008
	Σ	**114.000**						**35.46**	**3.910**
#1	**Σ**	**114.000**						**0.00**	**0.000**

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	18.00	25.20	140.00	3.390	0.011
#2	**1**	**Time of Concentration:**					**0.011**
#2	2	3. Short grass pasture	12.00	72.36	603.00	2.770	0.060
#2	**2**	**Time of Concentration:**					**0.060**
#3	1	3. Short grass pasture	6.00	25.98	433.00	1.950	0.061
#3	**1**	**Time of Concentration:**					**0.061**
#3	2	3. Short grass pasture	12.00	123.00	1,025.00	2.770	0.102
#3	**2**	**Time of Concentration:**					**0.102**
#3	3	3. Short grass pasture	11.00	100.98	918.00	2.650	0.096
#3	**3**	**Time of Concentration:**					**0.096**
#3	4	5. Nearly bare and untilled, and alluvial valley fans	10.00	209.90	2,099.00	3.160	0.184
#3	**4**	**Time of Concentration:**					**0.184**
#3	5	3. Short grass pasture	6.00	24.18	403.00	1.950	0.057
#3	**5**	**Time of Concentration:**					**0.057**
#3	6	3. Short grass pasture	6.00	140.64	2,344.00	1.950	0.333
#3	**6**	**Time of Concentration:**					**0.333**

Appendix Exh. 7-14S
Section 16 Pond, Temporary, and Permanent Channels

The location of the Section 16 Pond is presented on Map 12. The profiles of the associated permanent channels associated with the Section 16 Pond watershed are presented on Map 33. These channels consist of the Trib A, B and Trib D, and their design information is presented in this appendix. The as-built configuration for the Section 16 Pond is presented on Figure Exh. 7-14S-1, and Figure Exh. 7-14S-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^{TM}. For channels to be protected by a vegetative liner, the permissible velocities are also determined using SEDCAD^{TM} routines.

Section 16 Pond

The following pages present the results of the SEDCAD^{TM} models for the hydrologic conditions under the post mining condition. At this stage the oldest reclamation (most Phase III released) is on the eastern extent of the reclaimed Section 16 Pit, and the younger (topsoil and seeded) reclamation is the western reaches of the Section 16 Pond watershed.

The SEDCAD^{TM} model herein provides the results of the 10 year 24 hour design storm and demonstrates the Section 16 Pond will meet the applicable settleable solids standard under this modeled storm event. The second SEDCAD^{TM} model demonstrates that the Section 16 Pond emergency spillway elevation is capable of containing the 25 year 24 hour storm.

For the post mining case at the Section 16 Pond, the 10 year 24 hour storm produces 1.6-acre feet of runoff, and the seattlable solids discharge is 0.0 ml/l. The 25 year 24 hour storm event peaks at the 7,751.4' elevation, which is below the emergency spillway elevation of 7,754.5.

West and East Section 16 Ditches (Temporary)

The East Section 16 Ditch is designed to be trapezoidal in cross section with a 2-foot bottom width, left side slope ratio of 1H:1V, a right side slopes ratio of 7H:1V, and depth of at least 0.5 feet. The West Section 16 Ditch is a vegetated channel.

The West Section 16 Ditch from station 0+00 to 45+00 is trapezoidal in cross section with a 2 foot bottom width, left side slope ratio of 1H:1V, a right side slopes ratio of 7H:1V, and depth of at least 0.5 feet. This segment is a vegetated channel.

The West Section 16 Ditch from station 45+00 to 63+57 is trapezoidal in cross section with a 10 foot bottom width, left side slope ratio of 4H:1V, right side slope ratio of 2H:1V, and a depth of at least 1.0 feet. This segment of the ditch is a vegetated channel.

The location of the East and West Section 16 Ditches can be found on Map 12.

Permanent Channels

The Section 16 Pond watershed is comprised of two post-mining channels. The locations of these channels are presented on Map 12 and Figure Exh. 7-14S3-2, and the channel profiles are presented on Map 33.

Trib A and B will be constructed in reclamation areas adjacent to the South Taylor Pit and the Section 16 reclamation areas. Originally, these channels were modeled in accordance with Rule 4.05.3(3) for the 10-year 24 hour event. However, the post-mining watershed contributing to the channels are so small that SEDCAD™ cannot calculate actual flows when inputted into the model, and errors are noted for insufficient flows. Therefore, there are not any SEDCAD™ outputs contained in this append for Trib's A and B.

The design configuration for all both channels are as follows:

Trib A and B

Name	Peak Flow (CFS)	Average Slope (%)	Channel Type	Side Slopes	Total Depth	Erosion Protection
Trib A	NA	16.3	Trapezoidal 6' bottom	2H:1V	3'	Riprap, D50 = 12"
Trib B	NA	12.8	Trapezoidal 12' bottom	2H:1V	4'	Riprap, D50 = 12"
Trib D	NA	7.9	Trapezoidal 12' bottom	2H:1V	4'	Riprap, D50 = 12"