Emma's Pond
100 yr - 6 hr Event

The location and watershed area are presented on Exhibit 11-13B. The pond design is presented on Exhibit 11-33.

UPDATED JUNE 2010

LR

BHP Navajo Coal Company
P.O. Box 1717
Fruitland, NM 87416

Phone: 505-598-4200

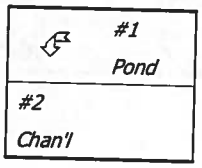
General Information

Storm Information:

Storm Type:	NM TYPE II 70
Design Storm:	100 yr - 6 hr
Rainfall Depth:	1.960 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	Emma's Pond
Channel	#2	==>	End	0.000	0.000	Spillway/Outflow chan



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	91.500	91.500	76.22	3.34
	Out			13.70	3.34
#2		0.000	91.500	13.70	3.34

Structure Detail:

Structure #1 (Pond)

Emma's Pond

Pond Inputs:

Initial Pool Elev:	5,359.80 ft
Initial Pool:	9.53 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,359.80	25.00	3.10:1	4.10:1	9.00

Pond Results:

Peak Elevation:	5,360.44 ft
Dewater Time:	0.60 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)	
5,354.70	0.000	0.000	0.000		
5,355.00	0.160	0.016	0.000		
5,355.70	0.894	0.350	0.000		
5,356.00	1.330	0.682	0.000		
5,356.70	1.789	1.770	0.000		
5,357.00	2.000	2.337	0.000		
5,357.70	2.346	3.857	0.000		
5,358.00	2.500	4.583	0.000		
5,358.70	2.702	6.404	0.000		
5,359.00	2.790	7.227	0.000		
5,359.70	2.957	9.239	0.000		
5,359.80	2.981	9.535	0.000		Spillway #1
5,360.00	3.030	10.137	4.312	11.40	
5,360.44	3.149	11.498	13.698	2.90	Peak Stage
5,360.70	3.218	12.324	19.396		
5,361.00	3.300	13.301	34.907		
5,361.70	3.544	15.696	87.462		
5,362.00	3.650	16.775	117.724		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,354.70	0.000	0.000
5,355.00	0.000	0.000
5,355.70	0.000	0.000
5,356.00	0.000	0.000
5,356.70	0.000	0.000
5,357.00	0.000	0.000
5,357.70	0.000	0.000
5,358.00	0.000	0.000
5,358.70	0.000	0.000
5,359.00	0.000	0.000
5,359.70	0.000	0.000
5,359.80	0.000	0.000
5,360.00	4.312	4.312
5,360.70	19.396	19.396
5,361.00	34.907	34.907
5,361.70	87.462	87.462
5,362.00	117.724	117.724

Structure #2 (Riprap Channel)

Spillway/Outflow chan

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)
9.00	3.0:1	3.0:1	5.6	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	13.70 cfs	
Depth:	0.18 ft	1.18 ft
Top Width:	10.09 ft	16.09 ft
Velocity*:		
X-Section Area:	1.73 sq ft	
Hydraulic Radius:	0.170 ft	
Froude Number*:		
Manning's n*:		
Dmin:	1.00 in	

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

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

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	91.500	0.156	0.000	0.000	80.000	M	76.22	3.335
	Σ	**91.500**						**76.22**	**3.335**
#2	Σ	**91.500**						**13.70**	**3.336**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	5.79	25.00	432.00	2.400	0.050
		8. Large gullies, diversions, and low flowing streams	3.33	70.00	2,103.00	5.470	0.106
#1	**1**	**Time of Concentration:**					**0.156**

Emma's Pond
25 yr - 6 hr Event

The location and watershed area are presented on Exhibit 11-13B. The pond design is presented on Exhibit 11-33.

UPDATED JUNE 2010

LR

BHP Navajo Coal Company
P.O. Box 1717
Fruitland, NM 87416

Phone: 505-598-4200

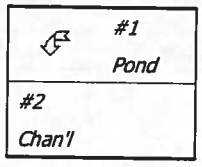
General Information

Storm Information:

Storm Type:	NM TYPE II 70
Design Storm:	25 yr - 6 hr
Rainfall Depth:	1.500 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	Emma's Pond
Channel	#2	==>	End	0.000	0.000	Spillway/Outflow chan



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	91.500	91.500	41.25	1.77
	Out			7.14	1.77
#2		0.000	91.500	7.14	1.77

Structure Detail:

Structure #1 (Pond)

Emma's Pond

Pond Inputs:

Initial Pool Elev:	5,359.80 ft
Initial Pool:	9.53 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,359.80	25.00	3.10:1	4.10:1	9.00

Pond Results:

Peak Elevation:	5,360.13 ft
Dewater Time:	0.55 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)	
5,354.70	0.000	0.000	0.000		
5,355.00	0.160	0.016	0.000		
5,355.70	0.894	0.350	0.000		
5,356.00	1.330	0.682	0.000		
5,356.70	1.789	1.770	0.000		
5,357.00	2.000	2.337	0.000		
5,357.70	2.346	3.857	0.000		
5,358.00	2.500	4.583	0.000		
5,358.70	2.702	6.404	0.000		
5,359.00	2.790	7.227	0.000		
5,359.70	2.957	9.239	0.000		
5,359.80	2.981	9.535	0.000		Spillway #1
5,360.00	3.030	10.137	4.312	11.75	
5,360.13	3.069	10.546	7.136	1.50	Peak Stage
5,360.70	3.218	12.324	19.396		
5,361.00	3.300	13.301	34.907		
5,361.70	3.544	15.696	87.462		
5,362.00	3.650	16.775	117.724		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,354.70	0.000	0.000
5,355.00	0.000	0.000
5,355.70	0.000	0.000
5,356.00	0.000	0.000
5,356.70	0.000	0.000
5,357.00	0.000	0.000
5,357.70	0.000	0.000
5,358.00	0.000	0.000
5,358.70	0.000	0.000
5,359.00	0.000	0.000
5,359.70	0.000	0.000
5,359.80	0.000	0.000
5,360.00	4.312	4.312
5,360.70	19.396	19.396
5,361.00	34.907	34.907
5,361.70	87.462	87.462
5,362.00	117.724	117.724

Structure #2 (Riprap Channel)

Spillway/Outflow chan

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)
9.00	3.0:1	3.0:1	5.6	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	7.14 cfs	
Depth:	0.11 ft	1.11 ft
Top Width:	9.68 ft	15.68 ft
Velocity*:		
X-Section Area:	1.06 sq ft	
Hydraulic Radius:	0.109 ft	
Froude Number*:		
Manning's n*:		
Dmin:	1.00 in	

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

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

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	91.500	0.156	0.000	0.000	80.000	M	41.25	1.770
	Σ	**91.500**						**41.25**	**1.770**
#2	Σ	**91.500**						**7.14**	**1.771**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	5.79	25.00	432.00	2.400	0.050
		8. Large gullies, diversions, and low flowing streams	3.33	70.00	2,103.00	5.470	0.106
#1	**1**	**Time of Concentration:**					**0.156**

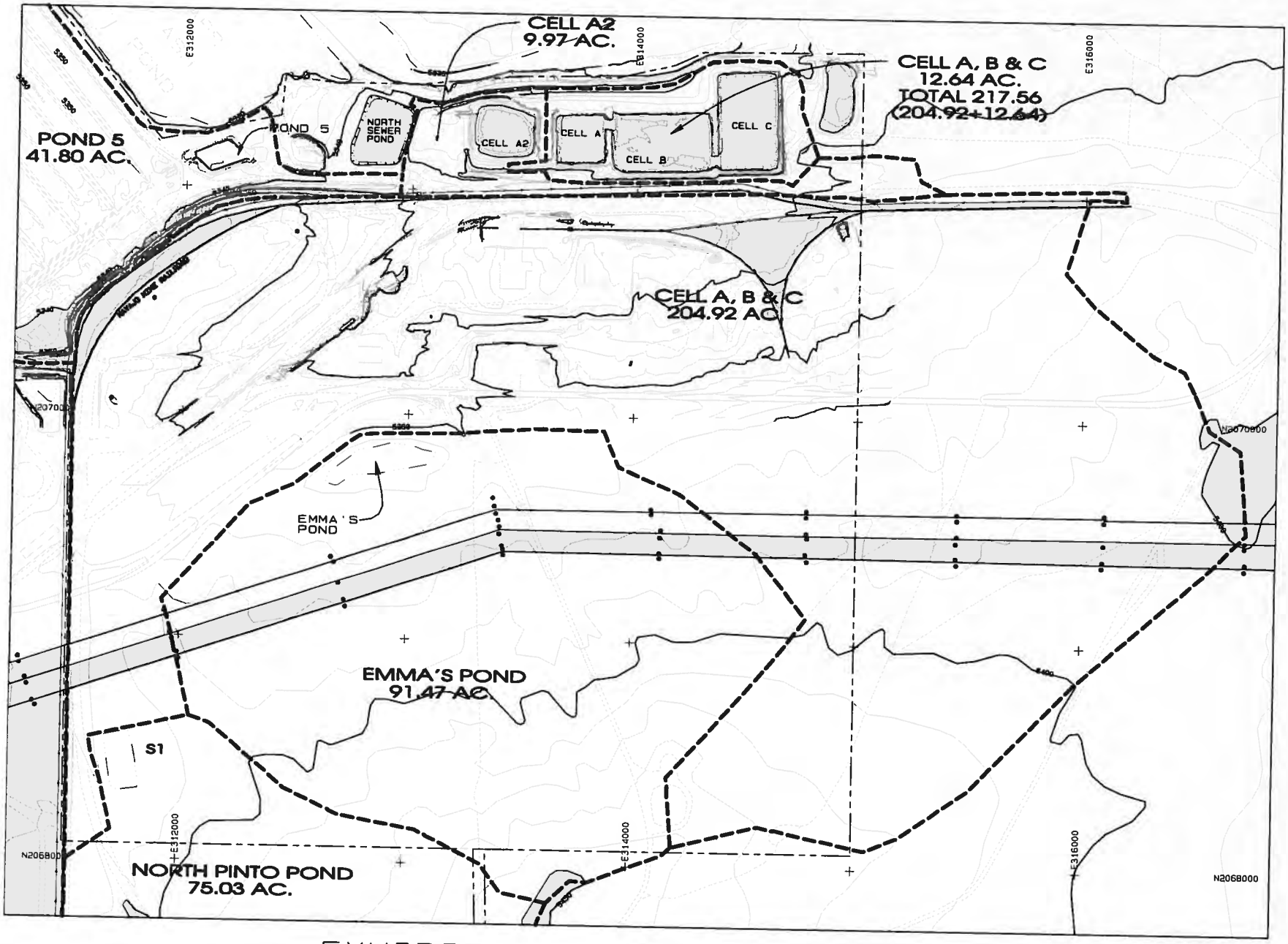


EXHIBIT 11-13B PARTIAL PLAN
EMMA'S POND WATERSHED
1" = 600'