MICHAEL B. ERP, P.E.
116 WILDWOOD DRIVE
SOMERSET, KENTUCKY 42503
PHONE: (606) 875-4271

February 28, 2022

Office of Surface Mining.
Reclamation and Enforcement
710 Locust Street, Second Floor
Knoxville, TN 37902
Attn: Mr. Mark Snyder

RE: Alden Resources, LLC., Area #6, Campbell County, Tennessee
OSM #3340 REVISION #2 APPLICATION-As Built Certification RE-SBUBMITTAL

Mr. Snyder;

The attached materials are to propose a revision to the above referenced permit. This revision is to document the "as built" configuration of Pond #100 on this site. The pond has been built within engineering tolerances and these revision materials document its compliance with design.

Feel free to contact me at (606)875-4271 or via email at Michael.b.erp@gmail.com with any questions that arise. An electronic copy of this application was sent to your office prior to this mailing.

Respectfully Submitted;

Michael B. Erp, P.E.
On behalf of Alden Resources, LLC.

me:ME
cc: file
G. Adams, Alden

OFFICE OF SURFACE MINING (OSM)

CONSTRUCTION INSPECTION CERTIFICATE

This certification and any revision applications stemming from this certification shall be submitted to the OSM, Inspection Group, promptly after inspection.

1. The construction inspection herein certified was made (check one)

   _____ during construction.

   ___X__ upon completion of construction.

2. I, hereby certify, in accordance with 30 CFR 942.816.49(a)(10)(ii) and others as applicable, that with respect to the following facility:

   Name of Permittee ___Alden Resources, LLC._____ Permit No. ___3340_____
   Mine Name _____Area #6_____ Facility No._Pond #100_____
   Which is a (check one)

   _____ primary road
   __X__ sedimentation pond
   _____ permanent water impoundment
   _____ temporary water impoundment
   _____ *refuse pile
   _____ *excess spoil disposal fill
   _____ *coal processing waste dam
   _____ *processing waste impoundment

   a. I, or persons under my supervision, have conducted adequate inspection of the construction of the structure; and

   b. This certification is in accordance with the rules of professional conduct promulgated by the Tennessee Board of Examiners for Architects and Engineers; and

   c. The construction has been performed in accordance with accepted construction practices; and (check one)

   _____ The facility HAS BEEN constructed in accordance with the design approved in this permit; and actual location and dimensions ARE within accepted engineering tolerances for such facilities.

   __X___ The facility HAS NOT BEEN constructed in accordance with the design approved in this permit; or actual location or dimensions ARE NOT within accepted engineering tolerances for such facilities. (In this instance, submit 5 copies of a revision application with this certification).

Affix seal of engineer making this certification. All data on the seal must be legible:

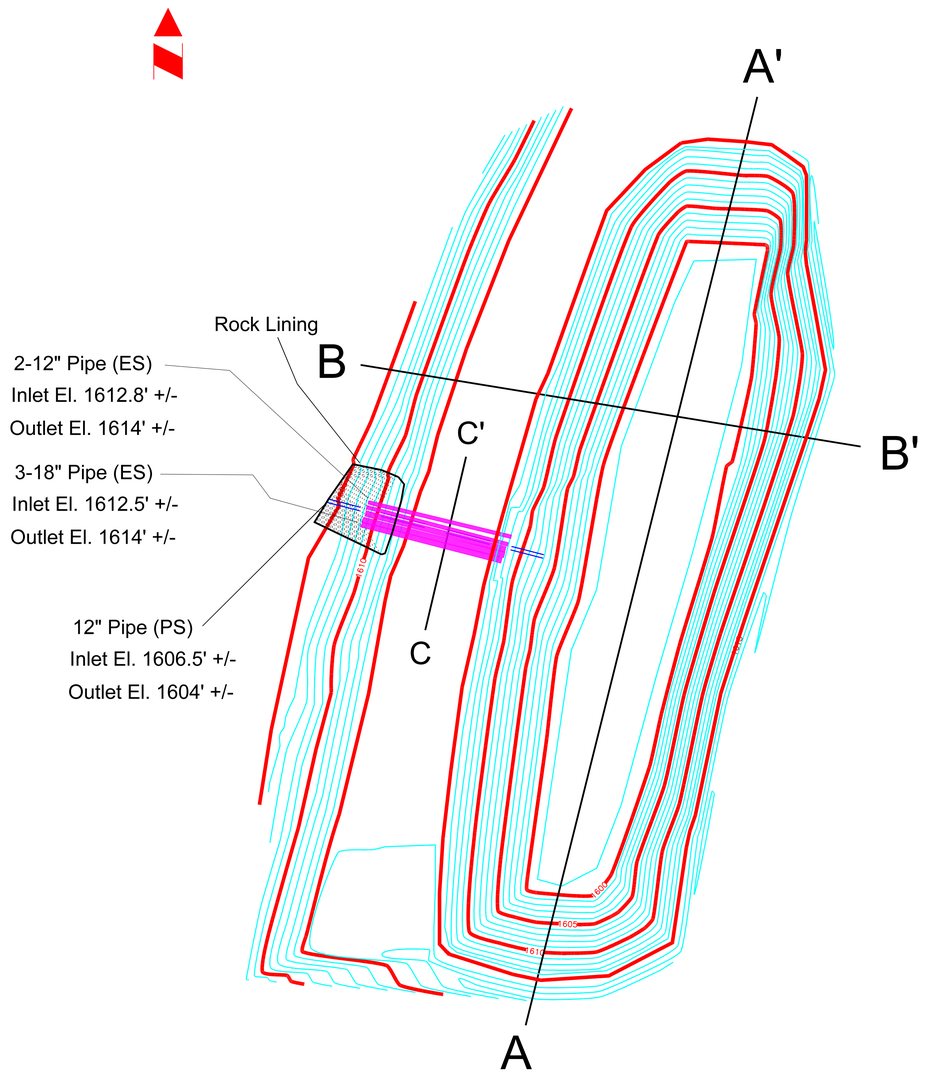
Seal

*ADuring construction reports are required@ *Certific.con*

Michael B.Erp,P.E.

Digitally signed by Michael B.Erp,P.E.
Date: 2022.02.28 09:53:16 -05'00'
Adobe Acrobat version: 2017.011.30207

Pond #100
Plan View



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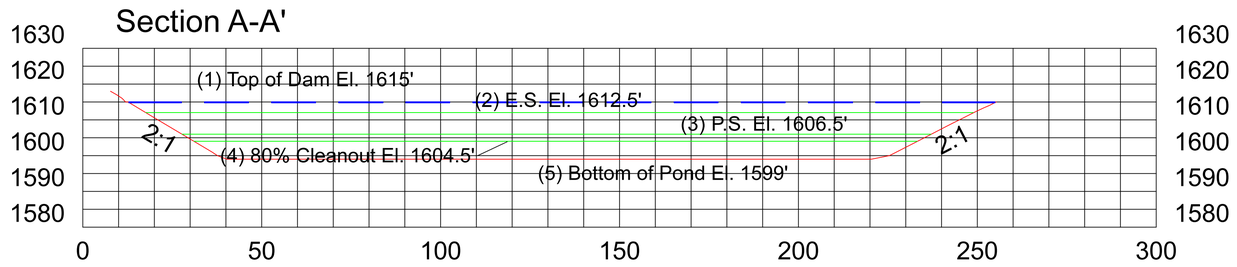

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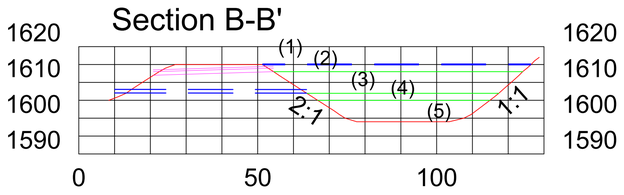

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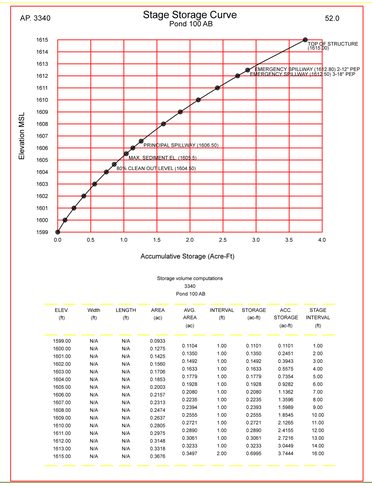
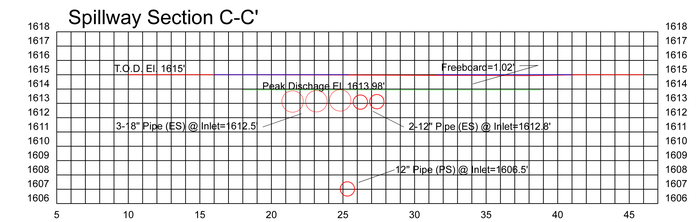


Storage volume computations
3340
Pond 100 AB

ELEV. (ft)	Width (ft)	LENGTH (ft)	AREA (ac)	AVG. AREA (ac)	INTERVAL (ft)	STORAGE (ac-ft)	ACC. STORAGE (ac-ft)	STAGE INTERVAL (ft)
1599.00	N/A	N/A	0.0933					
1600.00	N/A	N/A	0.1275	0.1104	1.00	0.1101	0.1101	1.00
1601.00	N/A	N/A	0.1425	0.1350	1.00	0.1350	0.2451	2.00
1602.00	N/A	N/A	0.1560	0.1492	1.00	0.1492	0.3943	3.00
1603.00	N/A	N/A	0.1706	0.1633	1.00	0.1633	0.5575	4.00
1604.00	N/A	N/A	0.1853	0.1779	1.00	0.1779	0.7354	5.00
1605.00	N/A	N/A	0.2003	0.1928	1.00	0.1928	0.9282	6.00
1606.00	N/A	N/A	0.2157	0.2080	1.00	0.2080	1.1362	7.00
1607.00	N/A	N/A	0.2313	0.2235	1.00	0.2235	1.3596	8.00
1608.00	N/A	N/A	0.2474	0.2394	1.00	0.2393	1.5989	9.00
1609.00	N/A	N/A	0.2637	0.2555	1.00	0.2555	1.8545	10.00
1610.00	N/A	N/A	0.2805	0.2721	1.00	0.2721	2.1265	11.00
1611.00	N/A	N/A	0.2975	0.2890	1.00	0.2890	2.4155	12.00
1612.00	N/A	N/A	0.3148	0.3061	1.00	0.3061	2.7216	13.00
1613.00	N/A	N/A	0.3318	0.3233	1.00	0.3233	3.0449	14.00
1615.00	N/A	N/A	0.3676	0.3497	2.00	0.6995	3.7444	16.00



Scale:1"=5' H & V

DATE	DESCRIPTION OF REVISION	FILENAME: POND_100_AB	DRAWN BY: MBE
02/01/22	POND_100_CERT	STA NO: STANO	CHECKED BY: MBE
2/28/22	POND_100_CERT_RESUBMIT	PLOT DATE: 02/28/22	APPROVED BY: MBE
DATE3	DESCRIPT3		PER. NO: 3340
DATE4	DESCRIPT4		

Alden Resources, LLC.
Area #6 OSM #3340

Pd 100 As Built

Prepared By:

MBE, P.E.

Michael, B. Erp, P.E.
110 Wildwood Drive
Somerset, Kentucky 42503
Voice: (606) 875-4271
Email: Michael.b.erp@gmail.com

SCALE: AS_SHOWN
DATE: 02/28/22
ATTACHMENT: 52
SHEET: 1 OF: 1

Alden Resources , LLC.
Area #6

Pond #100 10yr-24hrEvent

As Built Analysis

W/Pipe ES 2-18-22

Michael B. Erp

Michael B. Erp, P.E.
116 Wildwood Drive
Somerset, KY 42503

Phone: 606-875-4271
Email: Michael.b.erp@gmail.com

General Information

Storm Information:

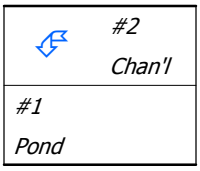
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	4.800 inches

Particle Size Distribution:

Size (mm)	Disturbed	Undisturbed
3.0000	100.000%	100.000%
2.0000	93.000%	99.900%
1.0000	86.000%	98.000%
0.5000	78.000%	92.000%
0.3000	73.000%	87.000%
0.2000	67.000%	80.000%
0.1000	55.000%	70.000%
0.0500	44.000%	60.000%
0.0300	35.000%	50.000%
0.0200	27.000%	42.000%
0.0100	18.000%	32.000%
0.0050	14.000%	21.000%
0.0030	9.000%	15.000%
0.0010	3.000%	4.000%
0.0001	0.000%	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Pond 100
Channel	#2	==>	#1	0.229	0.236	DD 100-1



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	6. Grassed waterway	1.03	13.00	1,258.00	1.52	0.229
#2	**Muskingum K:**					**0.229**

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)
#2		8.400	8.400	24.73	2.08	339.7	196,461	125.61	71.81
#1	In	39.100	47.500	54.67	9.18	364.0	122,587	78.08	23.21
	Out			30.93	9.18	67.6	18,691	0.49	0.18

The 24 hour Arithmetic Average (24AA) is under review. It is anticipated that the 24AA will be replaced by the peak settleable solids concentration (ml/l) with the addition of new sediment input factor values.

The 24AA is provided for your convenience during this transition period.

		24AA (ml/l)
#2		19.55
#1	In	7.89
	Out	0.07

Particle Size Distribution(s) at Each Structure

Structure #2 (DD 100-1):

Size (mm)	In/Out
3.0000	100.000%
2.0000	93.010%
1.0000	86.017%
0.5000	78.019%
0.3000	73.019%
0.2000	67.018%
0.1000	55.021%
0.0500	44.022%
0.0300	35.021%
0.0200	27.021%
0.0100	18.019%
0.0050	14.010%
0.0030	9.008%
0.0010	3.001%
0.0001	0.000%

Structure #1:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	93.122%	100.000%
1.0000	86.183%	100.000%
0.5000	78.248%	100.000%
0.3000	73.288%	100.000%
0.2000	67.333%	100.000%
0.1000	55.430%	100.000%
0.0500	44.518%	100.000%
0.0300	35.474%	100.000%
0.0200	27.420%	100.000%
0.0100	18.343%	98.773%
0.0050	14.205%	76.491%
0.0030	9.156%	49.301%
0.0010	3.036%	16.348%
0.0001	0.000%	0.000%

Structure Detail:

Structure #2 (Vegetated Channel)

DD 100-1

Triangular Vegetated Channel Inputs:

Material: Grass mixture

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.0:1	3.0:1	1.0	D, B	0.30			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:	24.73 cfs		24.73 cfs	
Depth:	1.81 ft	2.11 ft	2.56 ft	2.86 ft
Top Width:	9.05 ft	10.55 ft	12.82 ft	14.32 ft
Velocity:	3.02 fps		1.50 fps	
X-Section Area:	8.18 sq ft		16.45 sq ft	
Hydraulic Radius:	0.840		1.191	
Froude Number:	0.56		0.23	
Roughness Coefficient:	0.0439		0.1113	

Structure #1 (Pond)

Pond 100

Pond Inputs:

Initial Pool Elev:	1,606.50
Initial Pool:	0.22 ac-ft
*Sediment Storage:	1.03 ac-ft
Dead Space:	40.00 %

**Sediment capacity calculated from 0.100 times disturbed acres*

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	60.00	2.00	0.0140	1,606.50	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
18.00	40.00	2.00	0.0140	1,612.50	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
18.00	40.00	2.00	0.0140	1,612.50	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
18.00	40.00	2.00	0.0140	1,612.50	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	40.00	2.00	0.0140	1,612.80	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	40.00	2.00	0.0140	1,612.80	0.90	0.00

Pond Results:

Peak Elevation:	1,613.98
H'graph Detention Time:	1.68 hrs
Pond Model:	CSTRS
Dewater Time:	1.13 days
Trap Efficiency:	81.43 %

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)	
1,605.50	0.209	0.000	0.000		Top of Sed. Storage
1,605.50	0.209	0.000	0.000		
1,606.00	0.219	0.107	0.000		
1,606.50	0.228	0.219	0.000		Spillway #1
1,606.60	0.230	0.242	0.076	9.95	
1,606.80	0.240	0.289	0.378	3.05	
1,607.00	0.242	0.337	0.751	1.25	
1,607.50	0.249	0.460	2.094	3.65	
1,608.00	0.255	0.586	3.443	1.70	
1,608.50	0.261	0.715	4.414	0.85	
1,609.00	0.268	0.847	5.115	0.65	
1,609.50	0.274	0.983	5.703	0.55	
1,610.00	0.281	1.121	6.102	0.55	
1,610.50	0.289	1.264	6.501	0.50	
1,611.00	0.297	1.411	6.858	0.55	
1,611.50	0.306	1.561	7.201	0.50	
1,612.00	0.314	1.716	7.543	0.60	
1,612.40	0.321	1.844	7.791	0.65	
1,612.50	0.323	1.876	7.851	0.20	Spillway #2 Spillway #3 Spillway #4
1,612.70	0.326	1.941	8.916	0.45	
1,612.80	0.328	1.973	9.626	0.20	Spillway #5 Spillway #6
1,613.00	0.332	2.039	11.910	0.45	
1,613.50	0.340	2.207	20.341	0.50	
1,613.98	0.349	2.371	30.931	0.35	Peak Stage
1,614.00	0.349	2.380	31.487		
1,614.50	0.358	2.557	41.998		
1,615.00	0.368	2.738	50.169		

Detailed Discharge Table

Elevation	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
1,605.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,605.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,606.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,606.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,606.60	(2)>0.076	0.000	0.000	0.000	0.000	0.000	0.076
1,606.80	(3)>0.378	0.000	0.000	0.000	0.000	0.000	0.378

Elevation	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
1,607.00	(3)>0.751	0.000	0.000	0.000	0.000	0.000	0.751
1,607.50	(3)>2.094	0.000	0.000	0.000	0.000	0.000	2.094
1,608.00	(5)>3.443	0.000	0.000	0.000	0.000	0.000	3.443
1,608.50	(5)>4.414	0.000	0.000	0.000	0.000	0.000	4.414
1,609.00	(6)>5.115	0.000	0.000	0.000	0.000	0.000	5.115
1,609.50	(6)>5.703	0.000	0.000	0.000	0.000	0.000	5.703
1,610.00	(6)>6.102	0.000	0.000	0.000	0.000	0.000	6.102
1,610.50	(6)>6.501	0.000	0.000	0.000	0.000	0.000	6.501
1,611.00	(6)>6.858	0.000	0.000	0.000	0.000	0.000	6.858
1,611.50	(6)>7.201	0.000	0.000	0.000	0.000	0.000	7.201
1,612.00	(6)>7.543	0.000	0.000	0.000	0.000	0.000	7.543
1,612.40	(6)>7.791	0.000	0.000	0.000	0.000	0.000	7.791
1,612.50	(6)>7.851	0.000	0.000	0.000	0.000	0.000	7.851
1,612.70	(6)>7.971	(3)>0.315	(3)>0.315	(3)>0.315	0.000	0.000	8.916
1,612.80	(6)>8.031	(3)>0.532	(3)>0.532	(3)>0.532	0.000	0.000	9.626
1,613.00	(6)>8.151	(3)>1.111	(3)>1.111	(3)>1.111	(3)>0.213	(3)>0.213	11.910
1,613.50	(6)>8.452	(3)>3.142	(3)>3.142	(3)>3.142	(3)>1.232	(3)>1.232	20.341
1,614.00	(6)>8.736	(3)>5.774	(3)>5.774	(3)>5.774	(3)>2.715	(3)>2.715	31.487
1,614.50	(6)>9.003	(5)>8.425	(5)>8.425	(5)>8.425	(5)>3.860	(5)>3.860	41.998
1,615.00	(6)>9.271	(5)>10.472	(5)>10.472	(5)>10.472	(5)>4.741	(5)>4.741	50.169

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	2.200	0.009	0.000	0.000	86.000	F	6.98	0.601
	2	1.400	0.009	0.009	0.393	73.000	S	3.22	0.248
	3	2.300	0.019	0.000	0.000	86.000	F	7.30	0.629
	4	0.500	0.008	0.019	0.336	73.000	S	1.15	0.089
	5	1.700	0.034	0.000	0.000	86.000	F	5.39	0.465
	6	0.300	0.000	0.034	0.242	73.000	S	0.69	0.053
	Σ	**8.400**						**24.73**	**2.085**
#1	1	4.100	0.048	0.000	0.000	79.000	F	11.16	0.899
	2	35.000	0.320	0.048	0.256	73.000	S	30.25	6.197
	Σ	**47.500**						**54.67**	**9.181**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.220	100.00	39.00	0.8000	1.0000	1	257.8	466,423	298.29	171.51
	2	0.170	50.00	71.00	0.0030	1.0000	2	0.3	1,835	0.99	0.51
	3	0.220	100.00	12.00	0.8000	1.0000	1	71.3	142,989	91.44	50.95
	4	0.170	50.00	73.00	0.0030	1.0000	2	0.1	1,654	0.89	0.46
	5	0.220	100.00	3.00	0.8000	1.0000	1	10.1	28,636	18.31	10.10
	6	0.170	40.00	67.00	0.0030	1.0000	2	0.0	1,281	0.69	0.36
	Σ							**339.7**	**196,461**	**125.61**	**71.81**
#1	1	0.220	100.00	13.00	0.1400	1.0000	1	21.5	32,393	20.72	11.15
	2	0.170	120.00	18.00	0.0030	1.0000	2	3.1	984	0.35	0.19
	Σ							**364.0**	**122,587**	**78.08**	**23.21**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	12.90	40.00	310.00	1.790	0.048
#1	**1**	**Time of Concentration:**					**0.048**
#1	2	1. Forest with heavy ground litter	19.53	250.00	1,280.00	1.110	0.320
#1	**2**	**Time of Concentration:**					**0.320**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	38.65	80.00	207.00	6.210	0.009

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	**1**	**Time of Concentration:**					**0.009**
#2	2	1. Forest with heavy ground litter	71.43	50.00	70.00	2.130	0.009
#2	**2**	**Time of Concentration:**					**0.009**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	12.10	30.00	248.00	3.470	0.019
#2	**3**	**Time of Concentration:**					**0.019**
#2	4	1. Forest with heavy ground litter	74.63	50.00	67.00	2.180	0.008
#2	**4**	**Time of Concentration:**					**0.008**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	2.54	5.00	197.00	1.590	0.034
#2	**5**	**Time of Concentration:**					**0.034**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	2. Minimum tillage cultivation	12.90	40.00	310.00	1.790	0.048
#1	**2**	**Muskingum K:**					**0.048**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	38.65	80.00	207.00	6.210	0.009
#2	**2**	**Muskingum K:**					**0.009**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	12.10	30.00	248.00	3.470	0.019
#2	**4**	**Muskingum K:**					**0.019**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	2.54	5.00	197.00	1.590	0.034
#2	**6**	**Muskingum K:**					**0.034**

Alden Resources , LLC.

Area #6

Pond #100 25yr-6hrEvent

As Built Analysis

W/Pipe ES 2-18-22

Michael B. Erp

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Somerset, KY 42503

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General Information

Storm Information:

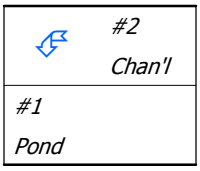
Storm Type:	NRCS Type II
Design Storm:	25 yr - 6 hr
Rainfall Depth:	3.900 inches

Particle Size Distribution:

Size (mm)	Disturbed	Undisturbed
3.0000	100.000%	100.000%
2.0000	93.000%	99.900%
1.0000	86.000%	98.000%
0.5000	78.000%	92.000%
0.3000	73.000%	87.000%
0.2000	67.000%	80.000%
0.1000	55.000%	70.000%
0.0500	44.000%	60.000%
0.0300	35.000%	50.000%
0.0200	27.000%	42.000%
0.0100	18.000%	32.000%
0.0050	14.000%	21.000%
0.0030	9.000%	15.000%
0.0010	3.000%	4.000%
0.0001	0.000%	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Pond 100
Channel	#2	==>	#1	0.229	0.236	DD 100-1



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	6. Grassed waterway	1.03	13.00	1,258.00	1.52	0.229
#2	**Muskingum K:**					**0.229**

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)
#2		8.400	8.400	27.34	1.54	307.2	196,374	125.56	88.04
#1	In	39.100	47.500	52.43	6.43	328.0	135,525	86.33	29.82
	Out			25.02	6.43	58.2	21,467	0.33	0.13

The 24 hour Arithmetic Average (24AA) is under review. It is anticipated that the 24AA will be replaced by the peak settleable solids concentration (ml/l) with the addition of new sediment input factor values.

The 24AA is provided for your convenience during this transition period.

		24AA (ml/l)
#2		27.60
#1	In	9.00
	Out	0.05

Particle Size Distribution(s) at Each Structure

Structure #2 (DD 100-1):

Size (mm)	In/Out
3.0000	100.000%
2.0000	93.009%
1.0000	86.015%
0.5000	78.018%
0.3000	73.018%
0.2000	67.017%
0.1000	55.019%
0.0500	44.021%
0.0300	35.019%
0.0200	27.019%
0.0100	18.018%
0.0050	14.009%
0.0030	9.008%
0.0010	3.001%
0.0001	0.000%

Structure #1:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	93.112%	100.000%
1.0000	86.164%	100.000%
0.5000	78.219%	100.000%
0.3000	73.252%	100.000%
0.2000	67.290%	100.000%
0.1000	55.371%	100.000%
0.0500	44.445%	100.000%
0.0300	35.466%	100.000%
0.0200	27.410%	100.000%
0.0100	18.332%	100.000%
0.0050	14.201%	80.066%
0.0030	9.151%	51.596%
0.0010	3.036%	17.115%
0.0001	0.000%	0.000%

Structure Detail:

Structure #2 (Vegetated Channel)

DD 100-1

Triangular Vegetated Channel Inputs:

Material: Grass mixture

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.0:1	3.0:1	1.0	D, B	0.30			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:	27.34 cfs		27.34 cfs	
Depth:	1.86 ft	2.16 ft	2.62 ft	2.92 ft
Top Width:	9.32 ft	10.82 ft	13.11 ft	14.61 ft
Velocity:	3.15 fps		1.59 fps	
X-Section Area:	8.68 sq ft		17.19 sq ft	
Hydraulic Radius:	0.865		1.217	
Froude Number:	0.58		0.24	
Roughness Coefficient:	0.0429		0.1068	

Structure #1 (Pond)

Pond 100

Pond Inputs:

Initial Pool Elev:	1,606.50
Initial Pool:	0.22 ac-ft
*Sediment Storage:	1.03 ac-ft
Dead Space:	40.00 %

**Sediment capacity calculated from 0.100 times disturbed acres*

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	60.00	2.00	0.0140	1,606.50	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
18.00	40.00	2.00	0.0140	1,612.50	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
18.00	40.00	2.00	0.0140	1,612.50	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
18.00	40.00	2.00	0.0140	1,612.50	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	40.00	2.00	0.0140	1,612.80	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	40.00	2.00	0.0140	1,612.80	0.90	0.00

Pond Results:

Peak Elevation:	1,613.71
H'graph Detention Time:	1.78 hrs
Pond Model:	CSTRS
Dewater Time:	0.88 days
Trap Efficiency:	82.26 %

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)	
1,605.50	0.209	0.000	0.000		Top of Sed. Storage
1,605.50	0.209	0.000	0.000		
1,606.00	0.219	0.107	0.000		
1,606.50	0.228	0.219	0.000		Spillway #1
1,606.60	0.230	0.242	0.076	9.90	
1,606.80	0.240	0.289	0.378	3.05	
1,607.00	0.242	0.337	0.751	1.05	
1,607.50	0.249	0.460	2.094	1.15	
1,608.00	0.255	0.586	3.443	0.55	
1,608.50	0.261	0.715	4.414	0.40	
1,609.00	0.268	0.847	5.115	0.35	
1,609.50	0.274	0.983	5.703	0.35	
1,610.00	0.281	1.121	6.102	0.30	
1,610.50	0.289	1.264	6.501	0.25	
1,611.00	0.297	1.411	6.858	0.30	
1,611.50	0.306	1.561	7.201	0.30	
1,612.00	0.314	1.716	7.543	0.35	
1,612.40	0.321	1.844	7.791	0.50	
1,612.50	0.323	1.876	7.851	0.20	Spillway #2 Spillway #3 Spillway #4
1,612.70	0.326	1.941	8.916	0.50	
1,612.80	0.328	1.973	9.626	0.25	Spillway #5 Spillway #6
1,613.00	0.332	2.039	11.910	0.45	
1,613.50	0.340	2.207	20.341	0.60	
1,613.71	0.344	2.280	25.021	0.25	Peak Stage
1,614.00	0.349	2.380	31.487		
1,614.50	0.358	2.557	41.998		
1,615.00	0.368	2.738	50.169		

Detailed Discharge Table

Elevation	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
1,605.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,605.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,606.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,606.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,606.60	(2)>0.076	0.000	0.000	0.000	0.000	0.000	0.076
1,606.80	(3)>0.378	0.000	0.000	0.000	0.000	0.000	0.378

Elevation	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
1,607.00	(3)>0.751	0.000	0.000	0.000	0.000	0.000	0.751
1,607.50	(3)>2.094	0.000	0.000	0.000	0.000	0.000	2.094
1,608.00	(5)>3.443	0.000	0.000	0.000	0.000	0.000	3.443
1,608.50	(5)>4.414	0.000	0.000	0.000	0.000	0.000	4.414
1,609.00	(6)>5.115	0.000	0.000	0.000	0.000	0.000	5.115
1,609.50	(6)>5.703	0.000	0.000	0.000	0.000	0.000	5.703
1,610.00	(6)>6.102	0.000	0.000	0.000	0.000	0.000	6.102
1,610.50	(6)>6.501	0.000	0.000	0.000	0.000	0.000	6.501
1,611.00	(6)>6.858	0.000	0.000	0.000	0.000	0.000	6.858
1,611.50	(6)>7.201	0.000	0.000	0.000	0.000	0.000	7.201
1,612.00	(6)>7.543	0.000	0.000	0.000	0.000	0.000	7.543
1,612.40	(6)>7.791	0.000	0.000	0.000	0.000	0.000	7.791
1,612.50	(6)>7.851	0.000	0.000	0.000	0.000	0.000	7.851
1,612.70	(6)>7.971	(3)>0.315	(3)>0.315	(3)>0.315	0.000	0.000	8.916
1,612.80	(6)>8.031	(3)>0.532	(3)>0.532	(3)>0.532	0.000	0.000	9.626
1,613.00	(6)>8.151	(3)>1.111	(3)>1.111	(3)>1.111	(3)>0.213	(3)>0.213	11.910
1,613.50	(6)>8.452	(3)>3.142	(3)>3.142	(3)>3.142	(3)>1.232	(3)>1.232	20.341
1,614.00	(6)>8.736	(3)>5.774	(3)>5.774	(3)>5.774	(3)>2.715	(3)>2.715	31.487
1,614.50	(6)>9.003	(5)>8.425	(5)>8.425	(5)>8.425	(5)>3.860	(5)>3.860	41.998
1,615.00	(6)>9.271	(5)>10.472	(5)>10.472	(5)>10.472	(5)>4.741	(5)>4.741	50.169

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	2.200	0.009	0.000	0.000	86.000	F	7.79	0.450
	2	1.400	0.009	0.009	0.393	73.000	S	3.43	0.170
	3	2.300	0.019	0.000	0.000	86.000	F	8.14	0.471
	4	0.500	0.008	0.019	0.336	73.000	S	1.22	0.061
	5	1.700	0.034	0.000	0.000	86.000	F	6.02	0.348
	6	0.300	0.000	0.034	0.242	73.000	S	0.73	0.036
	Σ	**8.400**						**27.34**	**1.536**
#1	1	4.100	0.048	0.000	0.000	79.000	F	12.16	0.643
	2	35.000	0.320	0.048	0.256	73.000	S	27.32	4.247
	Σ	**47.500**						**52.43**	**6.426**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.220	100.00	39.00	0.8000	1.0000	1	233.2	462,495	295.77	206.69
	2	0.170	50.00	71.00	0.0030	1.0000	2	0.3	1,903	1.03	0.63
	3	0.220	100.00	12.00	0.8000	1.0000	1	64.5	141,595	90.55	61.61
	4	0.170	50.00	73.00	0.0030	1.0000	2	0.1	1,715	0.92	0.57
	5	0.220	100.00	3.00	0.8000	1.0000	1	9.1	28,343	18.13	12.23
	6	0.170	40.00	67.00	0.0030	1.0000	2	0.0	1,327	0.72	0.44
	Σ							**307.2**	**196,374**	**125.56**	**88.04**
#1	1	0.220	100.00	13.00	0.1400	1.0000	1	18.7	32,944	21.07	13.58
	2	0.170	120.00	18.00	0.0030	1.0000	2	2.3	903	0.29	0.19
	Σ							**328.0**	**135,525**	**86.33**	**29.82**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	12.90	40.00	310.00	1.790	0.048
#1	**1**	**Time of Concentration:**					**0.048**
#1	2	1. Forest with heavy ground litter	19.53	250.00	1,280.00	1.110	0.320
#1	**2**	**Time of Concentration:**					**0.320**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	38.65	80.00	207.00	6.210	0.009

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	**1**	**Time of Concentration:**					**0.009**
#2	2	1. Forest with heavy ground litter	71.43	50.00	70.00	2.130	0.009
#2	**2**	**Time of Concentration:**					**0.009**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	12.10	30.00	248.00	3.470	0.019
#2	**3**	**Time of Concentration:**					**0.019**
#2	4	1. Forest with heavy ground litter	74.63	50.00	67.00	2.180	0.008
#2	**4**	**Time of Concentration:**					**0.008**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	2.54	5.00	197.00	1.590	0.034
#2	**5**	**Time of Concentration:**					**0.034**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	2. Minimum tillage cultivation	12.90	40.00	310.00	1.790	0.048
#1	**2**	**Muskingum K:**					**0.048**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	38.65	80.00	207.00	6.210	0.009
#2	**2**	**Muskingum K:**					**0.009**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	12.10	30.00	248.00	3.470	0.019
#2	**4**	**Muskingum K:**					**0.019**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	2.54	5.00	197.00	1.590	0.034
#2	**6**	**Muskingum K:**					**0.034**