

Option 3 & Option 7

PRELIMINARY

KIF Wet Ash in Pond & Gypsum in Pond (Wet ash in Dredge Cell/Ph1. Wet gypsum in Phase 2. Phase 3 is dry stack ash)

ITEM	DESCRIPTION	UNITS	QUANTITY	T-1 Spec	Comments/Assumptions
1.000	Erosion Controls/ Sediment Pond				
1.010	Erect silt fence	lf	1000	571	Place at NE Corner of Dredge Cell
1.020					
1.030	Geotextile Erosion Protection Channel	sy	4300		Non woven
1.040	D50 9" Riprap	ton	5215		18" Riprap Layer Stage A & B
1.050	3" stone, 1' thick to prevent erosion (assume 105 pcf)	ton	2004		Erosion protection channel for Gypsum
1.060	Stage 1-6 CMP Metal Spillway	ea	4		2 Gypsum ponds @ 2 per pond
1.070	Cut	bcy	43		Excavation for placement of 48" half-pipe
1.080	Fill with 1032 crushed stone	ton	93		Compacted until a stable base is achieved.
1.090	1/2 of 48" riser stand pipe	lf	512		Fully bituminous coated & 14 gage thickness
1.100	30" dia CMP	lf	1000		Fully bituminous coated & 14 gage thickness
1.110	Bedding for 30" CMP	ton	135		6" Thick up to half pipe dia.
1.120	30" dia CMP stand pipe	lf	720		4 pipes at 6 stages with 30' per stage
1.130	D50 9" riprap outlet for metal spillway	ton	53		Minimum
1.140					
1.150	Galvanized corrugated metal anti-seep collar	ea	16		Min. 2 per dike
2.000	Seed/Mulch				
2.001	Seed/Mulch disturbed areas	ac	26		5600 ft x 200 ft (wide swale between toe of new earthen dike and existing dike)
3.000	South Access Road (gravel)				assume existing road upgrade
3.010	1032 crushed stone base 6" depth	ton	3520	305	Assume 1.5 miles of roadway (8000 lf); road is 16 ft wide
4.000	Perimeter Road				
4.010	1032 crushed stone	ton	6885		Add 6" crushed stone base & compact
4.020	Roller compact	sy	22667		
5.000	Install Drains for Swan Pond Road				Incorporate in Dredge Cell Cost
5.001	6" dia Pipe Bollards	ea	24		Four for each monitoring well
5.002	PVC Monitoring Wells	ea	6		Outer steel casing w/ latch & padlock concrete pad
5.003	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 772)	lf	474		
5.004	Crushed stone, bedding 6" depth	ton	16		1081
5.005	6" dia Non-Perforated HDPE Corrugated Tubing Lateral	lf	520		

5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000
5.006	outlet pipes @ 200' O.C. (EL. 780)	ton	18			1081	
5.007	Crushed stone, bedding 6" depth	if	491				
5.008	6" dia Non-Perforated HDPE Corrugated Tubing Lateral	ton	17			1081	
5.009	outlet pipes @ 200' O.C. (EL. 792)	if	1282				
5.010	Crushed stone, bedding 6" depth	ton	43			1081	
5.011	6" dia Non-Perforated HDPE Corrugated Tubing Lateral	if	1218				
5.012	outlet pipes @ 200' O.C. (EL. 817)	ton	41			1081	
5.013	Crushed stone, bedding 6" depth	if	1180				
5.014	6" dia Non-Perforated HDPE Corrugated Tubing Lateral	ton	40			1081	
5.015	outlet pipes @ 200' O.C. (EL. 825)	if	1160				
5.016	Crushed stone, bedding 6" depth	ton	39			1081	
5.017	6" dia Non-Perforated HDPE Corrugated Tubing Lateral	bcy	17658			El. 763, 772, 780, 792, 810, 817, 825, 832	
5.018	outlet pipes @ 200' O.C. (EL. 832)	bcy	12361			El. 763, 772, 780, 792, 810, 817, 825, 832	
5.019	Crushed stone, bedding 6" depth	bcy	18186			El. 763, 772, 780, 792, 810, 817, 825, 832	
5.020	6" dia Non-Perforated HDPE Corrugated Tubing Lateral	bcy	12730			El. 763, 772, 780, 792, 810, 817, 825, 832	
5.021	Backfill for 6" dia Perforated HDPE	if	2000				
5.022	Backfill for 6" dia Perforated HDPE	ton	378				
5.023	6" dia Perforated HDPE perimeter underdrain (El. 763)	sy	1556			Trench, Mirafi HP 370	
5.024	1081 crushed stone	if	3790				
5.025	Geotextile woven monofilament	ton	716				
5.026	6" dia Perforated HDPE perimeter underdrain (El. 772)	sy	2948			Trench, Mirafi HP 370	
5.027	1081 crushed stone	if	4160				
5.028	Geotextile woven monofilament	ton	786				
5.029	6" dia Perforated HDPE perimeter underdrain (El. 780)	sy	3236			Trench, Mirafi HP 370	
5.030	1081 crushed stone	if	3925				
5.031	Geotextile woven monofilament	ton	742				
5.032	6" dia Perforated HDPE perimeter underdrain (El. 792)	sy	3053			Trench, Mirafi HP 370	
5.033	1081 crushed stone	if	6410				
5.034	Geotextile woven monofilament	ton	1211				
	6" dia Perforated HDPE perimeter underdrain (El. 810)	if					
	1081 crushed stone	ton					

5.035	Geotextile woven monofilament	sy	4986	Trench, Mirafi HP 370
5.036	6" dia Perforated HDPE perimeter underdrain (El. 817)	lf	6090	
5.037	1081 crushed stone	ton	1151	
5.038	Geotextile woven monofilament	sy	4737	Trench, Mirafi HP 370
5.039	6" dia Perforated HDPE perimeter underdrain (El. 825)	lf	5900	
5.040	1081 crushed stone	ton	1115	
5.041	Geotextile woven monofilament	sy	4589	Trench, Mirafi HP 370
5.042	6" dia Perforated HDPE perimeter underdrain (El. 832)	lf	5800	
5.043	1081 crushed stone	ton	1096	
5.044	Geotextile woven monofilament	sy	4511	Trench, Mirafi HP 370
5.045	12" dia Force Main HDPE perimeter underdrain (El. 763)	lf	2580	
5.046	1081 crushed stone	ton	575	
5.047	Submersible pumping station equipment package	ls	5000	Delivered but not installed
5.048	48' Dia precast concrete manhole	ls	3000	
5.049	Geotextile woven monofilament	sy	2293	Trench, Mirafi HP 370
5.050	Grout seal SD - 24"	cy	54	Mixture of fly ash, cement, bentonite clay
5.051	1/4" thick A36 steel plate	ea	2	Seal weld
5.052	Grout seal SD - 24"	cy	53	Mixture of fly ash, cement, bentonite clay
5.053	1/4" thick A36 steel plate	ea	2	Seal weld
5.054				
5.055	Grout seal SD - 24"	cy	23	Mixture of fly ash, cement, bentonite clay
5.056	1/4" thick A36 steel plate	ea	2	Seal weld
5.057				
5.058	CMP SD - 24"	lf	38	10W425-43
5.059	Excavation for 24"	bcy	25	
5.060	Backfill for 24"	bcy	17	
5.061	Bedding for the 24" culvert	ton	4	
5.062				
5.063	CMP SD - 36"	lf	72	10W425-55
5.064	Excavation for 24"	bcy	67	
5.065	Backfill for 24"	bcy	47	
5.066	Bedding for the 24" culvert	ton	9	
5.067	Anchor Trench	bcy	8650	10W425-69 Excavate into Bottom Ash
5.068	Upper & Lower LLDPE Geomembrane	sy	110688	10W425-69
5.069	Sediment Trap	bcy	3630	For erosion controls intake area during installation of under drains and final closure

6.000	Dredge Cell/Phase 1 Operational Cost				
6.001	El. 810 to El. 844				
6.002	Bottom Ash Dike Fill	cy	622416		Dredge Cell/Phase 1 (EL. 810-844 in D.C.)
6.003	Dredge Quantities	cy	4853654		
6.004	Wet Dip and Stack	cy	678848		El. 844 to El. 866 in Dredge Cell
6.005	Disposal Life (Assume dike & dredge ash)	yr	12.9		Ash Production rate 475600 cy per year
7.000	Phase 2 & Phase 3 Base Construction				
7.001	Base Layers				
7.002	Cut for dredge cell	bcy	268500		Dredge for Pond for additional F.W.V.
7.003	Compacted Fly Ash base (Fill)	cy	910556		Added 2' for consolidation
7.004	Proofroll subgrade	sy	281111		Fill from stock pile soil for final cover
7.005	2.5' Thick Bottom Ash Layer	cy	242407		El. 767
7.006	0.5' Thick Fly Ash Filter Layer	cy	48481		El. 767
7.007	18" dia Coarse Bottom Ash Drain Columns (Haul 2 mi, 1100 bcy)	lf	16920		564 columns (3 rows) average of drilled depth to clay layer of 30'. \$20 per lf installed. (SUBCONTRACTED)
7.008	Roto till Fly Ash Layer	sy	281111		
7.009	Bottom Ash Dike Fill	cy	163614		
7.010	1' Layer of Bottom Ash	cy	96963		Omit for option 3 but include in option 7
7.011	Geosynthetic Clay Liner	sy	290889		Omit for option 3 but include in option 7
7.012	4" dia. Perforated PVC Pipe (underdrains) SDR 17.5	lf	41400		
7.013	Trenching for the drain system (4" dia. underdrains)	bcy	1533		
7.014	Strip existing 1' soil cover (Phase 1 expansion)	bcy	19133		Cut will be used as Fill
7.015	Anchor Trench Cut	cy	2073		El. 795, 810, & 845
7.016	Anchor Trench Fill & Compact	cy	1971		95% Standard Proctor Density
7.017					
7.018	2' Thick Bottom Ash Blanket Drain	cy	39111		
7.019	1' Thick Filter Drain Ash Layer	cy	19556		
7.020	Geomembrane	sy	58667		
7.021	Perforated Pipe ADS Drain Tube 6" Dia	lf	7850		
7.022	Geotextile for underdrain	sy	6542		
7.023	#57 Stone for underdrain pipe bedding (135 pcf)	ton	1590		
7.024	Solid Outlet Pipe ADS Drain 6" Dia	lf	1963		
7.025	#57 Stone for outlet pipe bedding (135 pcf)	ton	397		
7.026	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 760)	lf	480		10W425-29

7.027	1081 crushed stone, bedding 6" depth	ton	16		
7.028	6" dia Perforated HDPE Drain (El. 760)	lf	2400		10W425-68
7.029	1081 crushed stone	ton	454		
7.030	Geotextile woven monofilament	sy	1867		Trench
7.031	Cut for underdrain system	cy	356		
7.032	Back Fill for underdrain system	cy	267		
7.012	Certification	ls	50000		
7.013	QA/QC for construction of disposal facility	ls	726800		2 F.T.E. during construction at \$40,000 per year & 5 week each years of operation, 4 weeks a year for engineering, & 10000 per year for testing
8.000	Temporary slope protection (5' wide)				
8.001	Cut for ditch	bcy	5815		
8.002	9" D50 Riprap	ton	4239		
8.003	Seed ditch	sy	6978	581	
8.004	Jute Matting	sy	6978		North American Green S150 or Synthetic Industries Land
9.000	Riprap Stilling Basin				
9.001	Riprap D50 size 9"	ton	2344		
9.002	Cut for basin	bcy	3582		3' average depth of cut
10.000	Phase 2 Initial Construction				
10.001	Wet Sluice Sedimented Gypsum Quantities	cy	451295		Phase 2 only (prorated based on volumes)
10.002	Initial Disposal Life	yr	1.4		327360 cy gypsum annual rate (Disposal life excludes dikes, bottom layer, filter layer, etc)
10.003	Perforated Pipe ADS Drain Tube 6" Dia	lf	7370		Elevations 770, 780
10.004	Geotextile for underdrain	sy	6142		Woven Monofilament (Mirafi HP 370)
10.005	#57 Stone for underdrain pipe bedding (135 pcf)	ton	1492		
10.006	Solid Outlet Pipe ADS Drain 6" Dia	lf	1658		
10.007	#57 Stone for outlet pipe bedding (135 pcf)	ton	336		
11.000	Rim Ditches				
11.001	Cut	bcy	111899	130	Rim Ditching in Phase 2 only
12.000	Phase 2 Operational Cost				
12.001	Stage 1 (3 to 1 side slopes)				
12.002	Wet Cast Gypsum Dike Fill	cy	255189		Excavate gypsum from rim ditch & cast on outer & interior dikes
12.003	Wet Sluice Gypsum Quantities	cy	1334496		Phase 2 only
12.004	Stage 1 Disposal Life (Assume dike & sluice gyp)	yr	4.9		327360 cy gypsum annual rate
12.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	11495		Elevations 790, 800, 810
12.006	Geotextile for underdrain	sy	9579		Woven Monofilament

12.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	2328		
12.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	2586		
12.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	524		
13.000	Phase 2 Operational Cost				
13.001	Stage 2 (3 to 1 side slopes)				
13.002	Wet Cast Gypsum Dike Fill	cy	263403		Excavate gypsum from rim ditch & cast on outer & interior dikes
13.003	Wet Sluice Gypsum Quantities	cy	1509673		
13.004	Stage 2 Disposal Life (Assume dike & sluice gyp.)	yr	5.4		327360 cy gypsum ash annual rate
13.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	11865		Elevations 820, 830, 840
13.006	Geotextile for underdrain	sy	9888		Woven Monofilament
13.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	2403		
13.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	2670		
13.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	541		
14.000	Phase 3 Initial Construction				
14.001	Dry Stack Ash	cy	569783		Phase 3 only (prorated based on volumes)
14.002	Disposal Life (Assume Dry Stack Ash)	yr	1.2		475600 cy ash annual rate; Haul Distance .5 Miles
14.002	Perforated Pipe ADS Drain Tube 6" Dia	lf	0		Elevations 770, 780 (Not needed for Dry Stack)
14.003	Geotextile for underdrain	sy	0		Woven Monofilament (Mirafi HP 370)
14.004	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0		
14.005	Solid Outlet Pipe ADS Drain 6" Dia	lf	0		
14.006	#57 Stone for outlet pipe bedding (135 pcf)	ton	0		
15.000	Phase 3 Operational Cost				
15.001	Stage 1 (3 to 1 side slopes)				
15.002	Dry Stack Ash Quantities	cy	1349180		Phase 3 only
15.003	Stage 1 Disposal Life (Assume Dry Stack)	yr	2.8		475600 cy ash annual rate; Haul Distance .5 Miles
15.004	Perforated Pipe ADS Drain Tube 6" Dia	lf	0		Elevations 790, 800, 810 (Not needed for Dry Stack)
15.005	Geotextile for underdrain	sy	0		Woven Monofilament
15.006	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0		
15.007	Solid Outlet Pipe ADS Drain 6" Dia	lf	0		
15.008	#57 Stone for outlet pipe bedding (135 pcf)	ton	0		
16.000	Phase 3 Operational Cost				
16.001	Stage 2 (3 to 1 side slopes)				
16.002	Dry Stack Ash Quantities	cy	1504825		Phase 3 only

16.003	Stage 2 Disposal Life (Assume Dry Stack)	yr	3.2	475600 cy ash annual rate; Haul Distance .5 Miles
16.004	Perforated Pipe ADS Drain Tube 6" Dia	lf	0	Elevations 820, 830, 840 (Not needed for Dry Stack)
16.005	Geotextile for underdrain	sy	0	Woven Monofilament
16.006	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0	
16.007	Solid Outlet Pipe ADS Drain 6" Dia	lf	0	
16.008	#57 Stone for outlet pipe bedding (135 pcf)	ton	0	
17.000	Phase 3 Operational Cost			
17.001	Stage 3 (3 to 1 side slopes)			
17.002	Dry Stack Ash Quantities	cy	1334189	Phase 3 only
17.003	Stage 3 Disposal Life (Assume dry stack)	yr	2.8	475600 cy ash annual rate
17.004	Perforated Pipe ADS Drain Tube 6" Dia	lf	0	Elevations 850, 860, 870 (Not needed for Dry Stack)
17.005	Geotextile for underdrain	sy	0	Woven Monofilament
17.006	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0	
17.007	Solid Outlet Pipe ADS Drain 6" Dia	lf	0	
17.008	#57 Stone for outlet pipe bedding (135 pcf)	ton	0	
18.000	Phase 2 Operational Cost			
18.001	Stage 3 (3 to 1 side slopes)			
18.002	Wet Cast Gypsum Dike Fill	cy	227106	Excavate gyp. from rim ditch & cast on outer & interior dikes
18.003	Wet Sluice Gypsum Quantities	cy	1344916	
18.004	Stage 3 Disposal Life (Assume dike & sluice ash & gyp.)	yr	4.8	327360 cy gyp. annual rate
18.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	10230	Elevations 850, 860, 870
18.006	Geotextile for underdrain	sy	8525	Woven Monofilament
18.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	2072	
18.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	2302	
18.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	466	
19.000	Phase 2 Operational Cost			
19.001	Stage 4 (3 to 1 side slopes)			
19.002	Wet Cast Gypsum Dike Fill	cy	168831	Excavate gypsum from rim ditch & cast on outer & interior dikes
19.003	Wet Sluice Gypsum Quantities	cy	702654	
19.004	Stage 4 Disposal Life (Assume dike & sluice ash)	yr	2.7	327360 cy gypsum annual rate
19.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	7605	Elevations 880, 890, 900
19.006	Geotextile for underdrain	sy	6338	Woven Monofilament

19.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	1540	
19.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	1711	
19.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	347	
20.000	Phase 3 Operational Cost			
20.001	Stage 4 (3 to 1 side slopes)			
20.002	Dry Stack Ash Quantities	cy	577613	
20.003	Stage 4 Disposal Life (Dry Stack Ash)	yr	1.2	475600 cy ash annual rate
20.004	Perforated Pipe ADS Drain Tube 6" Dia	lf	0	Elevations 880, 890 (Not needed for Dry Stack)
20.005	Geotextile for underdrain	sy	0	Woven Monofilament
20.006	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0	
20.007	Solid Outlet Pipe ADS Drain 6" Dia	lf	0	
20.008	#57 Stone for outlet pipe bedding (135 pcf)	ton	0	
21.000	Phase 2 Operational Cost			
21.001	Stage 5 (3 to 1 side slopes)			
21.002	Wet Cast Gypsum Pipe Fill	cy	28730	Extruded gypsum from the 100 & East on outside
21.003	Wet Sludge Gypsum Quantities	cy	370877	
21.004	Stage 5 Disposal Life (Assumed 3 to 1 side slopes)	yr	1.5	87661 cy over annual rate
21.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	2286	Elevations 810, 820
21.006	Geotextile for underdrain	sy	0	Woven Monofilament
21.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	2287	
21.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	2219	
21.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	55	
22.000	Phase 3 Operational Cost			
22.001	Stage 5 (3 to 1 side slopes)			
22.002	Dry Stack Ash Quantities	cy	662410	
22.003	Stage 5 Disposal Life (Dry Stack Ash)	yr	1.4	475600 cy ash 552760 cy gypsum annual rate
22.004	Perforated Pipe ADS Drain Tube 6" Dia	lf	2219	Elevations 810, 820
22.005	Geotextile for underdrain	sy	0	Woven Monofilament
22.006	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0	
22.007	Solid Outlet Pipe ADS Drain 6" Dia	lf	2219	
22.008	#57 Stone for outlet pipe bedding (135 pcf)	ton	3.2	
23.000	Phase 2 & Phase 3 Operational Cost			
23.001	Stage 5 (3 to 1 side slopes)			
23.002	Final Level & bottom ash drain height level 2. High	ft	10.27	
23.003	Dry Stack Quantities	cy	1558	1558 cy ash 1558 cy gypsum annual rate
23.004	Stage 4 Disposal Life (Assume 1 to 1 side slopes)	yr	1.5	

Assumptions

- (1) All earthwork quantities are in bank cubic yards (bcy) - no shrink or swell factors applied
- (2) Closure costs not included.
- (3) Liner is not required for option 3, but is required for option 7.
- (4) Bottom ash columns are subject to change with final design.
- (5) Engineering (inc. TVA over sight, subcontracts, and additional geotechnical investigation) - Assume 10% of construction costs.
- (6) Assuming a disposal rate of 475,000 cy annually (including bottom and fly ash) & Gypsum/Ash Generation 327,060 cy annually.
- (7) Single Phase power is assumed for pump installed for Dredge Cell seepage retrofit. 3-phase power is assumed to not be required.