

SITE 1

CLEAN WATER DIVERSION TRENCHES

Site No.	Channel Base Width (m)	Channel Height (m)	Channel Top Width (m)	Channel Length (m)	Channel Excavate Vol (m)	Concrete Liner (m)	Volume Concrete Liner (m ³)	Mesh Ref 500 (m ²)
A	1	0.5	2.5	528	462	3.40	180	1 797
B	1	0.48	2.4	679	554	3.33	226	2 263
D	1	0.26	1.8	528	192	2.54	134	1 340
E	1	0.3	1.9	291	126	2.68	78	780
F	1	0.3	1.9	297	129	2.68	80	796
G	1	0.3	1.9	956	416	2.68	256	2 563
Totals						1 880	954	9 538

SOLUTION (DIRTY WATER) TRENCHES

Channel No.	Channel Base Width (m)	Channel Height (m)	Channel Top Width (m)	Channel Length (m)	Channel Excavate Vol (m)	Concrete Liner (m)	Volume Concrete Liner (m ³)	Mesh Ref 500 (m ²)
A	1	1.8	6.4	528	3 516	8.09	427	4 271
B	1	1.5	5.5	600	2 923	7.01	420	4 203
C	1	1.9	6.7	1050	7 684	8.45	888	8 877
D	1	1.6	5.8	528	2 872	7.37	389	3 891
E	1	1.8	6.4	291	1 936	8.09	235	2 352
F	1	1.8	6.4	297	1 978	8.09	240	2 403
G	1	1.6	5.8	716	3 897	7.37	528	5 278
H	1	2.3	7.9	427	4 370	9.89	422	4 224
Totals						29 177	3 550	35 498

SITE CLEARANCE

12 765 173.32

	Area m ²	RATE	AMOUNT
ADF Footprint	988 000	R 10.00	R 9 880 000.00
Clean Water Channels	6 833	R 10.00	R 68 334.00
Dirty Water Channels	28 066	R 10.00	R 280 664.14
Pipeline routes	65 159	R 10.00	R 651 592.60
Return Water Dam	97 452	R 10.00	R 974 524.08
Roads	91 006	R 10.00	R 910 058.50
Totals			
	1 276 517		

EARTHWORKS

218 799 326.20

	Area m ²	Depth/Length (m)	Volume m ³	RATE	AMOUNT
Excavation for ADF Liner	988 000	0.450	470 109	R 80.00	R 37 608 758.40
Extra over for Hard Rock (assume 10%)	604 669	10%	60 467	R 305.00	R 18 442 401.67
Importation of material	625 248	20%	125 050	R 290.00	R 36 264 412.59
Construction of ADF starter wall			364 405	R 150.00	R 54 660 750.00
Stockpile topsoil			303 809	R 65.00	R 19 747 585.00
Excavation for New AWRD Liner	97 452	0.450	46 259	R 80.00	R 3 700 743.81
Construction of new AWRD wall			260 843	R 150.00	R 39 126 523.95
Clean water channels (from above)			1 880	R 80.00	R 150 394.66
Dirty water channels (from above)			29 177	R 80.00	R 2 334 134.92
Excavation for penstock outlet pipe	1.8	1 500	2 640	R 80.00	R 211 200.00
Box-cut for roads	91 006	0.6	54 604	R 120.00	R 6 552 421.20
Totals			1 719 243		

LINER SYSTEM

408 227 913.04

	Area m ²	Volume m ³	Length m	Totals	RATE	AMOUNT
Grade A4 Bidim for ADF	1 124 060			1 124 060	R 60.00	R 67 443 600.00
Grade A4 Bidim for AWRD	110 292			110 292	R 60.00	R 6 617 544.48
750 Micron HDPE Cuspatated Sheet for ADF	988 000			988 000	R 50.00	R 49 400 000.00
750 Micron HDPE Cuspatated Sheet for AWRD	97 452			97 452	R 50.00	R 4 872 620.40
2mm Double Texture HDPE Lining for ADF	988 000			988 000	R 120.00	R 118 560 000.00
2mm Double Texture HDPE Lining for AWRD	97 452			97 452	R 120.00	R 11 694 288.96
Clay for ADF	988 000	296400		296 400	R 250.00	R 74 100 000.00
Clay for AWRD	97 452	29236		29 236	R 250.00	R 7 308 930.60
Rip & Recompact In-situ Material for ADF	988 000			988 000	R 50.00	R 49 400 000.00
Rip & Recompact In-situ Material for AWRD	97 452			97 452	R 50.00	R 4 872 620.40
Geopipes for Leachate for ADF			34015	34015	R 150.00	R 5 102 250.00
Geopipes for Leachate for AWRD			3210	3210	R 150.00	R 481 500.00
Leak detection stone 19mm for ADF		25 509		25 509	R 300.00	R 7 652 844.00
Leak detection stone 19mm for AWRD		2 406		2 406	R 300.00	R 721 714.20
River Sand for ADF	0			0	R 130.00	R 0.00
River Sand for New AWRD	0			0	R 130.00	R 0.00

Liner rate R/m² R 376.09

STRUCTURAL CONCRETE

33 402 330.39

	Area m ²	Volume t or m ³	Length m	Totals	RATE	AMOUNT
New AWRD Silt Trap Concrete		300		300	R 1 800.00	R 540 000.00
New AWRD Silt Trap Rebar		45		45	R 18 000.00	R 810 000.00
Pipe plinths Concrete		3 500		3 500	R 1 800.00	R 6 300 000.00
Pipe plinths Rebar		350		350	R 18 000.00	R 6 300 000.00
Clean Water Channels Concrete		954		954	R 1 800.00	R 1 716 866.84
Clean Water Channels Mesh	9 538			9 538	R 100.00	R 953 814.91

Dirty Water Channels Concrete		3 550	3 550	R 1 800.00	R 6 389 683.74
Dirty Water Channels Mesh	35 498		35 498	R 100.00	R 3 549 824.30
Penstock Outlet Encasing Concrete	1.01	1 520	1 520	R 1 800.00	R 2 736 856.24
Penstock Outlet Encasing Rebar		228	228	R 18 000.00	R 4 105 284.36

PENSTOCKS AND PIPES 13 875 000.00

Area m ²	Volume t or m ³	Length m	No
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Precast concrete penstock rings 750mm dia Outlet pipe 450 mm diameter			4050	R 2 500.00	R 10 125 000.00
		1 500		R 2 500.00	R 3 750 000.00

PUMP STATION AND PIPEWORK 20 925 000.00
(same for all three options)

Area or Number m ² / Number

Return Water Pump Station	100			R 20 000.00	R 2 000 000.00
Return Water Pumps	7			R 750 000.00	R 5 250 000.00
Return water pump valves	21			R 75 000.00	R 1 575 000.00
Return water pump pipes	100			R 5 000.00	R 500 000.00
Other valves	20			R 75 000.00	R 1 500 000.00
Booster pump station	100			R 20 000.00	R 2 000 000.00
Booster pumps	8			R 750 000.00	R 6 000 000.00
Booster pumps valves	24			R 75 000.00	R 1 800 000.00
Booster pumps pipes	100			R 3 000.00	R 300 000.00

ROADS 19 566 257.75

Area m ²	Depth/ Length (m)	Volume m ³	Totals
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Rip and recompact in-situ	91 006		91 006	R 50.00	R 4 550 292.50
G9 lower sub-grade	91 006	0.15	13650.88	R 200.00	R 2 730 175.50
G7 upper sub-grade	91 006	0.15	13650.88	R 250.00	R 3 412 719.38
C4 sub-base	91 006	0.15	13650.88	R 300.00	R 4 095 263.25
G2 base	91 006	0.15	13650.88	R 350.00	R 4 777 807.13

PIPELINES 170 710 028.80

Slurry pipelines (350NB steel)	43264			R 1 800.00	R 77 875 992.00
Return water (600NB Steel)	21895			R 4 240.00	R 92 834 036.80

FENCING 19 868 636.56

Around New ADF and New AWRD	6149			R 1 800.00	R 11 068 351.20
Around Topsoil Stockpile	2076			R 4 240.00	R 8 800 285.36

CULVERTS 22 563 000.00

At pipe crossings, 4000 x 3000 x 1220mm Portal Culverts	120			R 25 000.00	R 3 000 000.00
At Transmission Line crossings, 4000 x 3000 x 1220mm Portal Culverts	534			R 25 000.00	R 13 350 000.00
Culvert Bases	654			R 9 500.00	R 6 213 000.00

ELECTRICAL 13 440 000.00

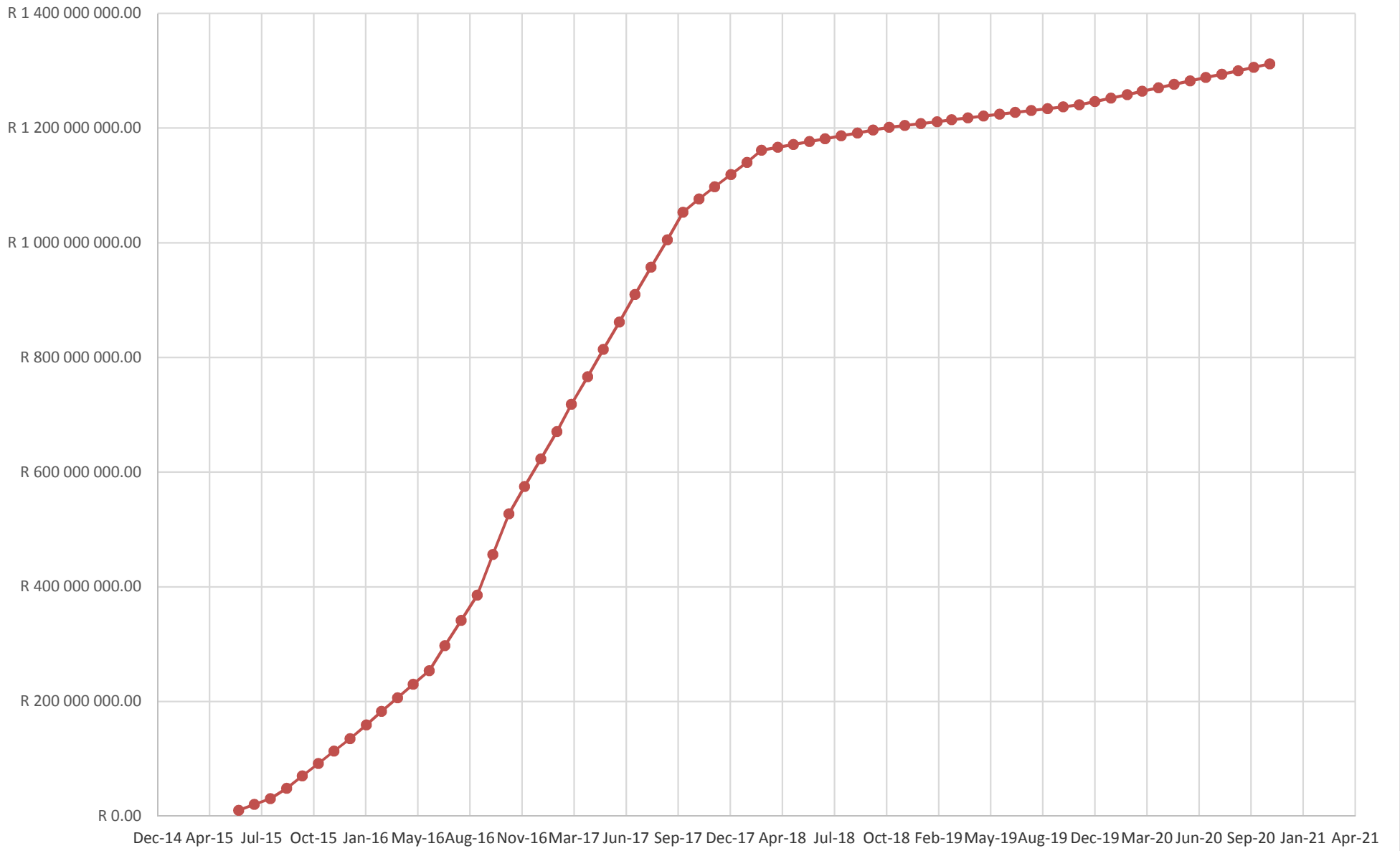
Number	Length (m)	Totals
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Overhead powerlines to Contractor's Camp and Pump Stations	4000	4 000	R 360.00	R 1 440 000.00
Mini Substations	3	3	R 1 000 000.00	R 3 000 000.00
MCCs	3	3	R 3 000 000.00	R 9 000 000.00

SUMMARY

1.1	SITE CLEARANCE	R 12 765 173.32
1.2	EARTHWORKS	R 218 799 326.20
1.3	LINER SYSTEM	R 408 227 913.04
1.4	STRUCTURAL CONCRETE	R 33 402 330.39
1.5	PENSTOCKS AND PIPES	R 13 875 000.00
1.6	PUMP STATION AND PIPEWORK	R 191 635 028.80
1.7	ROADS	R 19 566 257.75
1.8	FENCING	R 19 868 636.56
1.9	CULVERTS	R 22 563 000.00
2	ELECTRICAL	R 13 440 000.00
SUB-TOTAL		R 954 142 666.07
1.8	ALLOW FOR PRELIMINARY AND GENERAL ITEMS AT 25%	R 238 535 666.52
SUB-TOTAL		R 1 192 678 332.58
1.9	ALLOW FOR 10% CONTINGENCIES	R 119 267 833.26
TOTAL ESTIMATED CAPITAL COST		R 1 311 946 165.84

CAPEX Estimated Cumulative Cashflow



Date	ADF Liner	Other Works	Total Estimated Cashflow	Cumulative Estimated Cashflow
Jun-15	R 0.00	R 10 146 923.28	R 10 146 923.28	R 10 146 923.28
Jul-15	R 0.00	R 10 146 923.28	R 10 146 923.28	R 20 293 846.57
Aug-15	R 0.00	R 10 146 923.28	R 10 146 923.28	R 30 440 769.85
Sep-15	R 8 103 115.31	R 10 146 923.28	R 18 250 038.59	R 48 690 808.45
Oct-15	R 8 103 115.31	R 13 529 231.05	R 21 632 346.36	R 70 323 154.80
Nov-15	R 8 103 115.31	R 13 529 231.05	R 21 632 346.36	R 91 955 501.16
Dec-15	R 8 103 115.31	R 13 529 231.05	R 21 632 346.36	R 113 587 847.52
Jan-16	R 8 103 115.31	R 13 529 231.05	R 21 632 346.36	R 135 220 193.87
Feb-16	R 10 128 894.14	R 13 529 231.05	R 23 658 125.18	R 158 878 319.06
Mar-16	R 10 128 894.14	R 13 529 231.05	R 23 658 125.18	R 182 536 444.24
Apr-16	R 10 128 894.14	R 13 529 231.05	R 23 658 125.18	R 206 194 569.42
May-16	R 10 128 894.14	R 13 529 231.05	R 23 658 125.18	R 229 852 694.61
Jun-16	R 10 128 894.14	R 13 529 231.05	R 23 658 125.18	R 253 510 819.79
Jul-16	R 30 386 682.41	R 13 529 231.05	R 43 915 913.46	R 297 426 733.25
Aug-16	R 30 386 682.41	R 13 529 231.05	R 43 915 913.46	R 341 342 646.70
Sep-16	R 30 386 682.41	R 13 529 231.05	R 43 915 913.46	R 385 258 560.16
Oct-16	R 30 386 682.41	R 40 587 693.14	R 70 974 375.55	R 456 232 935.71
Nov-16	R 30 386 682.41	R 40 587 693.14	R 70 974 375.55	R 527 207 311.26
Dec-16	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 575 006 110.10
Jan-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 622 804 908.94
Feb-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 670 603 707.78
Mar-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 718 402 506.63
Apr-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 766 201 305.47
May-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 814 000 104.31
Jun-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 861 798 903.15
Jul-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 909 597 701.99
Aug-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 957 396 500.84
Sep-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 1 005 195 299.68
Oct-17	R 7 211 105.70	R 40 587 693.14	R 47 798 798.84	R 1 052 994 098.52
Nov-17	R 7 211 105.70	R 16 235 077.26	R 23 446 182.96	R 1 076 440 281.48
Dec-17	R 5 001 923.03	R 16 235 077.26	R 21 237 000.29	R 1 097 677 281.76
Jan-18	R 5 001 923.03	R 16 235 077.26	R 21 237 000.29	R 1 118 914 282.05
Feb-18	R 5 001 923.03	R 16 235 077.26	R 21 237 000.29	R 1 140 151 282.34
Mar-18	R 5 001 923.03	R 16 235 077.26	R 21 237 000.29	R 1 161 388 282.62
Apr-18	R 5 001 923.03	R 0.00	R 5 001 923.03	R 1 166 390 205.65
May-18	R 5 001 923.03	R 0.00	R 5 001 923.03	R 1 171 392 128.68
Jun-18	R 5 001 923.03	R 0.00	R 5 001 923.03	R 1 176 394 051.71
Jul-18	R 5 001 923.03	R 0.00	R 5 001 923.03	R 1 181 395 974.74
Aug-18	R 5 001 923.03	R 0.00	R 5 001 923.03	R 1 186 397 897.77
Sep-18	R 5 001 923.03	R 0.00	R 5 001 923.03	R 1 191 399 820.81
Oct-18	R 5 001 923.03	R 0.00	R 5 001 923.03	R 1 196 401 743.84
Nov-18	R 5 001 923.03	R 0.00	R 5 001 923.03	R 1 201 403 666.87
Dec-18	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 204 654 916.84
Jan-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 207 906 166.81
Feb-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 211 157 416.78
Mar-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 214 408 666.75
Apr-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 217 659 916.72
May-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 220 911 166.69
Jun-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 224 162 416.65
Jul-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 227 413 666.62
Aug-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 230 664 916.59
Sep-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 233 916 166.56
Oct-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 237 167 416.53
Nov-19	R 3 251 249.97	R 0.00	R 3 251 249.97	R 1 240 418 666.50
Dec-19	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 246 379 291.45
Jan-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 252 339 916.39
Feb-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 258 300 541.34
Mar-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 264 261 166.28
Apr-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 270 221 791.23
May-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 276 182 416.17
Jun-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 282 143 041.12
Jul-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 288 103 666.06
Aug-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 294 064 291.01
Sep-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 300 024 915.95
Oct-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 305 985 540.90
Nov-20	R 5 960 624.94	R 0.00	R 5 960 624.94	R 1 311 946 165.84

APPENDIX A: LIFE CYCLE COST ASSESSMENT SPREADSHEET

Table 10: Costing Assessment Site 1 CAPEX

CAPEX GTE	R 211 849 521.12
ELEC	R 74 000 000.00
C&I	R 12 944 528.38
CIVIL	0
BMH	R 60 204 892.74
LPS	R 64 282 800.00
CHEMICAL	417300
Contingency factor	1.50
Liner Contingency	1.25

Discount Rate (Nominal After Tax)

10.40%

NB. Civil Engineering CAPEX costs are included as Phased Liner Installation and AWR/Roads as seen below.

CONTROLLED DISCLOSURE

Desktop Assessment Camden New Ash Dam project - Accuracy Level 30%	0		1		2		3		4		5		6		7		
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
CPI	10%	5.7%	6.2%	0	0	0	0	0	0	0	0	0	0	0	0	0	
PPI		6.0%	6.2%	0	0	0	0	0	0	0	0	0	0	0	0	0	
Energy Inflation index	100%	106.00%	112.52%	1	1	1	1	1	1	1	1	1	1	1	1	1	
index inflation	100.00%	105.70%	112.25%	1	1	1	1	1	1	1	1	1	1	1	1	1	
CAPEX CIVIL																	
CAPEX BMH					113473250												
CAPEX LPS					121159227												
CAPEX ELEC					75364919												
CAPEX C&I					24397646												
CAPEX CHEMICAL					788521												
Energy Cost BMH						4038759					3847570				4209158		
Energy Cost LPS						3643443					3470967				3672593		
Ash Dam yearly Maintenance						28097860					29783732				31570756		
Transmission line/s relocation																	
Phased Liner installation						702082240											
AWR /roads etc					314130756												
Chemical Dosing Station											661440			701126		743194	
Ash Pumps																7622502	
Ash Booster pumps																	
CDPH Mechanical seal (ash booster pump)																	
Ash pipelines																	
Hydrovacs																	
Ash Crushers											1272000			1348320		1429219	
Electrical Substation (ash booster station)																1191016	
SCADA system (with HMI)																	
Total	0.0000000	0.0000000	0.0000000	0	1351394557	0	37713503	39151716									50438439
PV Factor	1	0.905797101	0.820468389	0.743177889	1	0.905797101	0.820468389	0.743177889	0.658379732	0.583797101	0.513177889	0.44797101	0.38797101	0.33297101	0.28297101	0.23797101	0.19797101
NPV			1 972 740 123														

Table 11: LCC Costing Site 1

CONTROLLED DISCLOSURE

Desktop Assessment Camden New Ash Dam project - Accuracy Level 30%	2020	2021	2022	2023	2024	2025	2025	2025
CR	0	0	0	0	0	0	0	0
PR	0	0	0	0	0	0	0	0
Energy Inflation index	2	2	2	2	2	2	2	2
index inflation	1	1	1	2	2	2	2	2
Energy Cost B/M	4575922	4968305	5409783	5807132	6293154	6677604	7213160	
Energy Cost LPS	3883766	4136259	4436022	4691247	5003061	5200092	5538224	
Ash Dam yearly Maintenance	33465001	35472901	37601275	39857352	42248793	44783721	47470744	
Phased Liner installation				143446327				
Chemical Dosing Station	787766	835053	885156	938265	994561	1054235	1117489	
Ash Pumps			9078622			10812665		
Ash Booster pumps			2269631			2703166		
CDPH Mechanical seal (ash booster pump)			1021334	1082614	1147571	1216425	1289410	
Belt Pump (ash Booster Station)	908983	963622	113482			136158		
AWS pumps				4811617				
Suicide pumps				12029042				
Hopper cooling pumps				1202904				
Ash pipelines			51705022					
Suicide pump pipelines								5157641
Hopper cooling pump pipelines								1575946
Hydrolocks	1514972	1605871	1702223	1804356	1912618	2027375	2149017	
Ash Crushers		268504		3007261				
SCADA system (with HMI)			11605994				359319	
LOSS_BV1_Plant/Material			196938					
LOSS_OV1_Plant/Material			2742138					
LOSS_FV1_Plant/Material			89586					
LOSS_LV6_Plant/Material			699701					
LOSS_MVD2_Plant/Material			2772807					
LOSS_PV1_Plant/Material			704268					
LOSS_TV1_Plant/Material			28475					
LOSS_LV54_Plant/Material								
Total	45136430	48250415	133032358	218678116	57604757	74610440	71870950	
FV Factor	0.673168377	0.609753965	0.562313374	0.500283853	0.453155664	0.410467087	0.371799898	
	30384417	29420882	73475650	109401131	26103922	30625130	26721612	

NPV 1 697 844 796

Table 12: LCC Costing Site 1

CONTROLLED DISCLOSURE

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Desktop Assessment Camden New Ash Dam project - Accuracy Level 30%		15	16	17	18	19	20	21
		2027	2028	2029	2030	2031	2032	2033
CFI		0	0	0	0	0	0	0
PII		0	0	0	0	0	0	0
Energy Inflation Index		2	3	3	3	3	3	3
Index Inflation		2	2	2	2	2	2	2
Energy Cost/BtH		7817649	8403443	8999249	9762353	7937572	5682586	3049304
Energy Cost/LPS		5939754	6296139	6673908	7093080	6050683	4832782	3448980
Ash Dam yearly Maintenance		50318989	53338128	56538416	59930720	63526564	67338157	71378447
Transmission line relocation				7507907				
Chemicals Dosing Station		1184538	1255611	1330947	1410804	1485452	1565179	1680290
Ash Pumps		12878057	12878057			15337972		
Ash Booster pumps		3219514	3219514			3834493		
CDPH Machine case (ash booster pump)		1366775	1448781	1535708	1627851	1725622	1829053	1938796
Large Pump/ash Booster Station			160976			191726		
ANP pumps					7234893			
Suction pumps					18087232			
Mobility coding pumps					1808723			
Adipolines			73344561					
Hydrojets		2277958	2414636	2559514	2713086	2875870	3040422	3231327
Ash Crushers					4521808			
SCADA system (with HMI)						480849		
LOSS_Bulk_Plant/Material			16463325					
LOSS_Civil_Plant/Material			279361					
LOSS_FMI_Plant/Material			3847219					
LOSS_LMS_Plant/Material			127080					
LOSS_MVD2_Plant/Material			992539					
LOSS_PM_Plant/Material			3933280					
LOSS_Tal_Plant/Material			999018					
LOSS_IVD4_Plant/Material			40392					
PLC Cabinet						6940620		
Network Cabinet						256039		
OS/MS						806325		
Total		68905663	189442061	85145649	114190549	111459687	84316181	84727144
PV Factor		0.33677527	0.305050063	0.276313463	0.250283934	0.226706462	0.205350056	0.186005486
		23205723	57789313	23526889	28580060	25268631	17314332	15759714
NPV			1862290496					1972740123

Table 13: LCC Costing Site 1

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Table 14: Costing Assessment Site 3A CAPEX

CAPEX GTE	225285428.4
CIVIL	0
BMH	72897600
LPS	72026000
ELEC	67000000
C&I	R 12 944 528.38
CHEMICAL	417300
Contingency factor	1.50
Liner Contingency	1.25

NB. Civil Engineering CAPEX costs are included as Phased Liner Installation and AWR/Roads as seen below.

Desktop Assessment Camden New Ash Dam project - Accuracy Level 30%		15	16	17	18	19	20	21
		2027	2028	2029	2030	2031	2032	2033
OPI		6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
PPI		6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Energy Inflation index		239.32%	253.68%	268.90%	285.03%	302.13%	320.26%	339.47%
index Inflation		189.83%	201.22%	213.29%	226.09%	239.66%	254.04%	269.28%
CAPEX CIVIL			0					
CAPEX BMH			146684294					
CAPEX LPS			144930463					
CAPEX ELEC			134817164					
CAPEX C&I			26046934					
CAPEX CHEMICAL			839690					
Energy Cost BMH				11774553	12481027	13229888	14023682	14865102
Energy Cost LPS				12009177	12729727	13483511	14303122	15161309
Ash Dam yearly Maintenance				56538416	59930720	63526564	67338157	71378447
Phased Liner Installation		861447886				265778304		
AWR/Roads etc		379659712						
Chemical Dosing Station				1330947	1410804	1495452	1565179	1680290
Ash Pumps						15337972		
Ash Booster Pumps						3834493		
CDPH Mechanical seal (ash booster pump)				1535708	1627851	1725522	1829053	1938796
Blige pump (ash booster station)						191725		
Hydrovacs				2559514	2713085	2875870	3048422	3231327
SCADA system (with HM)								540282
Total		861447886	45318544	85748315	90893214	381489301	102127615	108795555
PV Factor		0.3367527	0.305050063	0.276313463	0.250283934	0.226706462	0.205350056	0.186005486
		290 114 344	138 284 851	23 693 414	22 749 111	86 486 090	20 971 912	20 236 570
NPV								602 536 291

Table 15: LCC Costing Site 3A

CONTROLLED DISCLOSURE

Table 16: Costing Assessment Site 3B CAPEX

CAPEX GTE	187405961.1
CIVIL	0
BMH	57181532.74
LPS	42862600
ELEC	74000000
C&I	R 12 944 528.38
CHEMICAL	417300
Contingency factor	1.50
Liner Contingency	1.25

Discount Rate (Nominal After Tax)

10.40%

NB. Civil Engineering CAPEX costs are included as Phased Liner Installation and AWR/Roads as seen below.

CONTROLLED DISCLOSURE

	0	1	2	3	4	5	6	7
	2012	2013	2014	2015	2016	2017	2018	2019
Desktop Assessment Camden New Ash Dam project - Accuracy Level 30%								
OP	10%	5.7%	6.2%	5.7%	5.9%	6.0%	6.0%	6.0%
PF		6.0%	6.2%	5.9%	5.8%	6.0%	6.0%	6.0%
Energy Inflation Index	100.00%	106.00%	112.52%	119.16%	126.07%	133.63%	141.65%	150.15%
Index Inflation	100.00%	105.70%	112.25%	118.65%	100.00%	106.00%	112.36%	119.10%
CAPEX CIVL					0			
CAPEX BMH					107774868			
CAPEX OPS					80786765			
CAPEX ELEC					53262050			
CAPEX C&I					24397646			
CAPEX CHEM CAL					786621			
Energy Cost: BMH						5179707	4934507	5206018
Energy Cost: OPS						1428611	1360882	1436868
Ash Dam yearly Maintenance						28097860	20763732	31570756
Transmission line's relocation								
Phased Liner Installation					7727617			
AWR/roads etc					620408244			
Bridge over Richards Bay Railway Line					314130756			
Chemical Dosing Station					150762763			
Ash Pumps						661440	701126	743194
Ash Booster Pumps								7622502
CDH Mechanical Seal (ash booster pump)								1905626
Biject pump (ash booster station)						763200	806992	657582
Hydrovalve								95261
Total	0	0	0	0	1360057228	1272000	1348320	1429219
						37402616	38937660	50865995
PV Factor	1	0.905797101	0.820468389	0.743177689	1	0.905797101	0.820468389	0.743177689
	0	0	0	0	1360057228	33879364	31947119	37802483
NPV								1806583125

Table 17: LCC Costing Site 3B

CONTROLLED DISCLOSURE

	2020	8	9	10	11	12	13	14
Desktop Assessment Camden New Ash Dam project - Accuracy Level 30%								
CR		6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
PI		6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Energy Inflation Index		159.16%	168.71%	178.83%	189.56%	200.93%	212.99%	225.77%
Index Inflation		126.25%	133.82%	141.85%	150.36%	159.38%	168.95%	179.08%
Energy Cost:BNH	5505382	5863279	6288203	6649993	7032559	7445159	7892833	8382633
Energy Cost:LPS	1518429	1617146	1734344	1834129	1939644	2027197	2159014	2315014
Ash Dam yearly Maintenance	33465001	35472901	37801275	39857352	42248793	44783721	47470744	
Phased Line Installation								
AWR /roads etc								
Chemical Dosing Station								
Ash pumps	787786	835053	885156	938265	994561	1054235	1117489	
Ash Booster pumps								
CDH Mechanical Seal (ash booster pump)								
Bulge pump (ash booster station)	908983	963522	1021334	1082614	1147571	1218425	1289410	
AWR pumps								
Sulice pumps								
Hopper cooling pumps								
Ash pipelines								
Sluice pump pipelines								
Hopper cooling pump pipelines								
Hydrovacs	1514972	1605871	1702223	1804356	1912618	2027375	2149017	
Ash crushers								
SCADA System (with HMU)								
LOSS_BVI_Plant/Material								
LOSS_CV1_Plant/Material								
LOSS_Fv_Plant/Material								
LOSS_Mf_Plant/Material								
LOSS_MVD2_Plant/Material								
LOSS_PM_Plant/Material								
LOSS_TV_Plant/Material								
LOSS_AV04_Plant/Material								
Total	43700534	46626276	49442988	52418081	55496604	58633604	61848101	65113604
PV Factor	0.673168377	0.609753965	0.552313374	0.500283853	0.453155664	0.410467087	0.371799898	0.337179898
	29 417 816	28 430 557	27 940 780	27 328 653	26 667 817	25 963 817	25 211 492	24 417 816
NPV								

1 628 804 001

Table 18: LCC Costing Site 3B

CONTROLLED DISCLOSURE

	15	16	17	18	19	20	21
	2027	2028	2029	2030	2031	2032	2033
Desktop Assessment Camden New Ash Dam project - Accuracy Level 30%							
CFI	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
PRI	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Energy Inflation index	239.32%	253.68%	268.90%	285.03%	302.13%	320.26%	339.47%
index inflation	189.83%	201.22%	213.29%	228.09%	239.66%	254.04%	269.28%
Energy Cost BMH	8831683	9534413					
Energy Cost LPS	2315546	2454479					
Ash Dam yearly Maintenance	50318989	53338128					
Chemical Dosing Station	1184538	1255611					
Ash Pumps		12878057					
Ash Booster Pumps		3219514					
CPH Mechanical seal (ash booster pump)	1366775	1448781					
Blige pump (ash booster station)		160976					
Ash pipelines		69420778					
Hydrovacs	2277958	2414636					
LOSS BV1 Plant/Material		16463325					
LOSS CV1 Plant/Material		279361					
LOSS FV Plant/Material		3847219					
LOSS AV6 Plant/Material		127080					
LOSS AV02 Plant/Material		992539					
LOSS FV Plant/Material		3933280					
LOSS TV Plant/Material		999018					
LOSS LV04 Plant/Material		40392					
Total	66295489	182807588					
PV Factor	0.33677527	0.305050063					
	22 326 681	55 765 466					
NPV							1 806 583 125

Table 19: LCC Costing Site 3B

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APPENDIX B: AWR PIPE ROUTE DRAWINGS

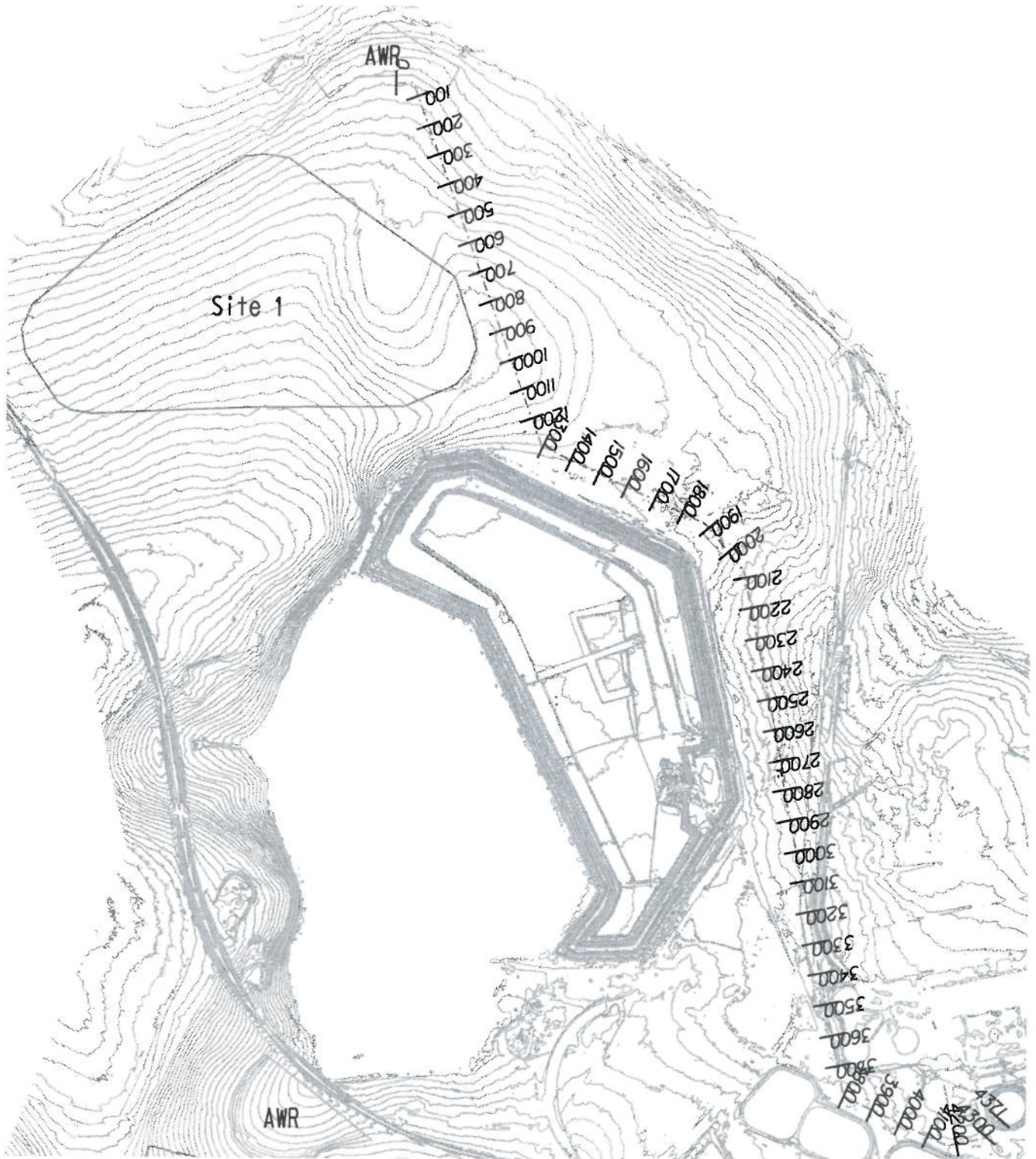


Figure 2: Site 1 AWR Pipeline Layout

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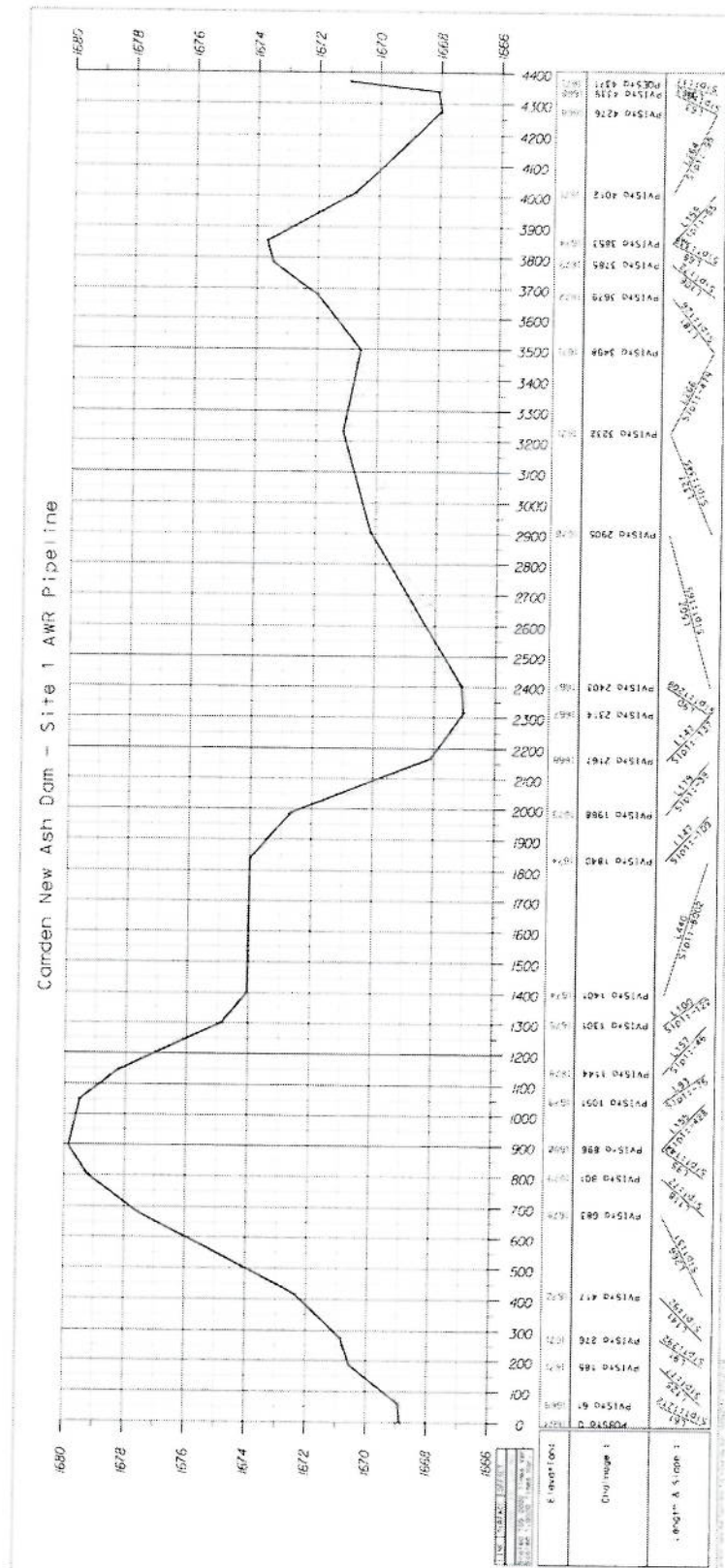


Figure 3: Site 1 AWR Pipeline Profile

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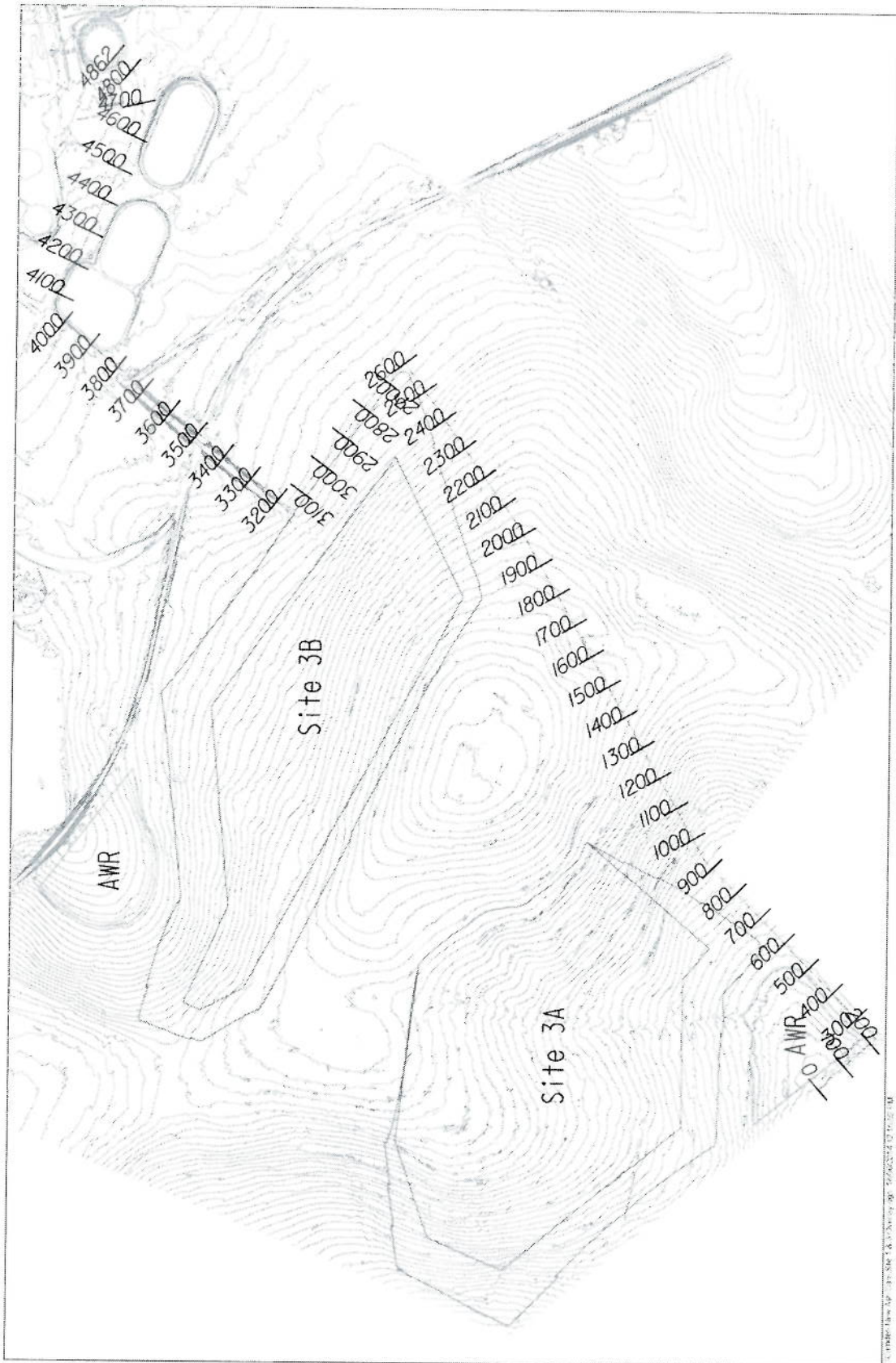


Figure 4: Site 3A AWR Pipeline Layout

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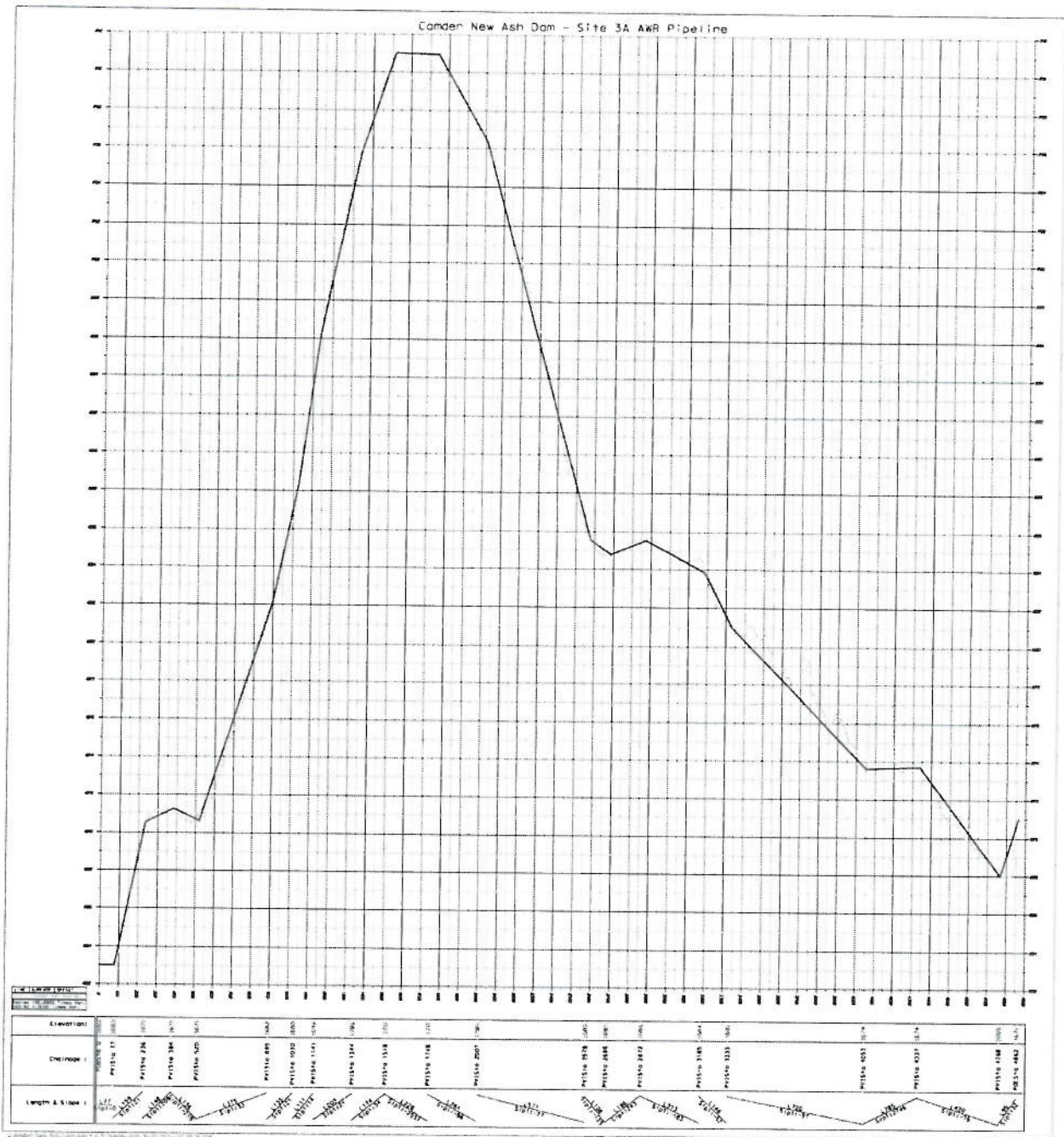


Figure 5: Site 3A AWR Pipeline Profile

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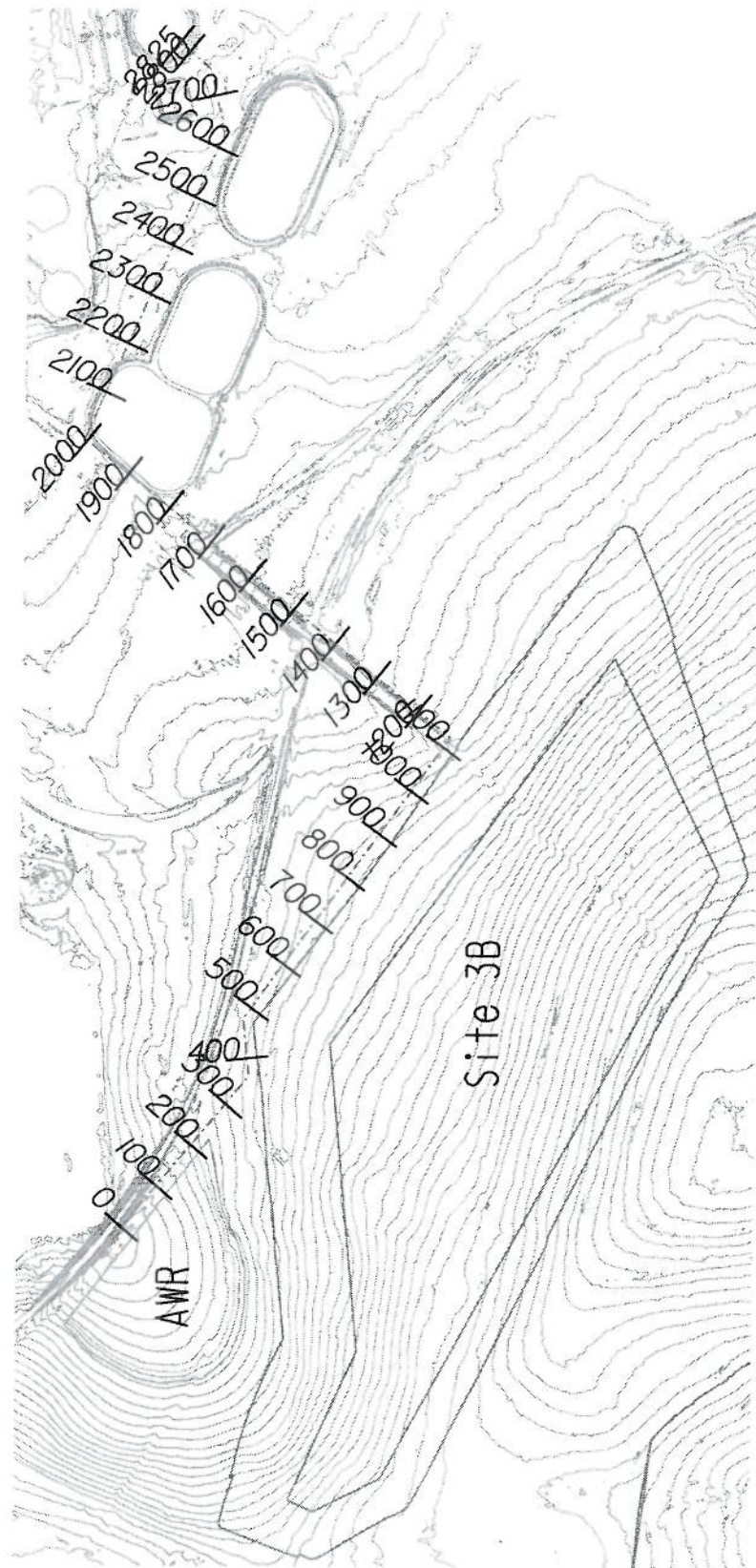


Figure 6: Site 3B AWR Pipeline Layout

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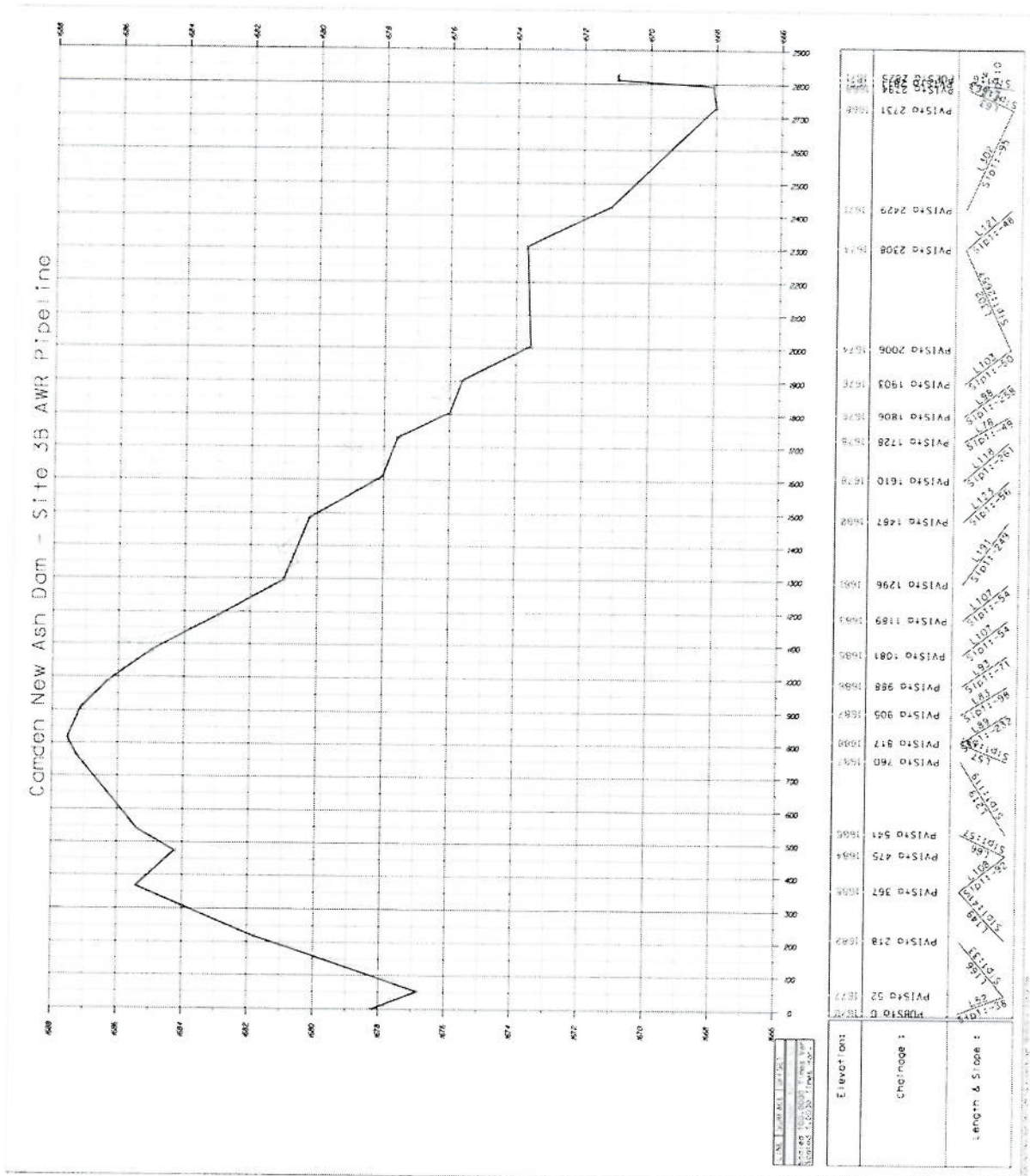


Figure 7: Site 3B AWR Pipeline Profile

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APPENDIX C: BOOSTER PUMP LAYOUT DRAWINGS

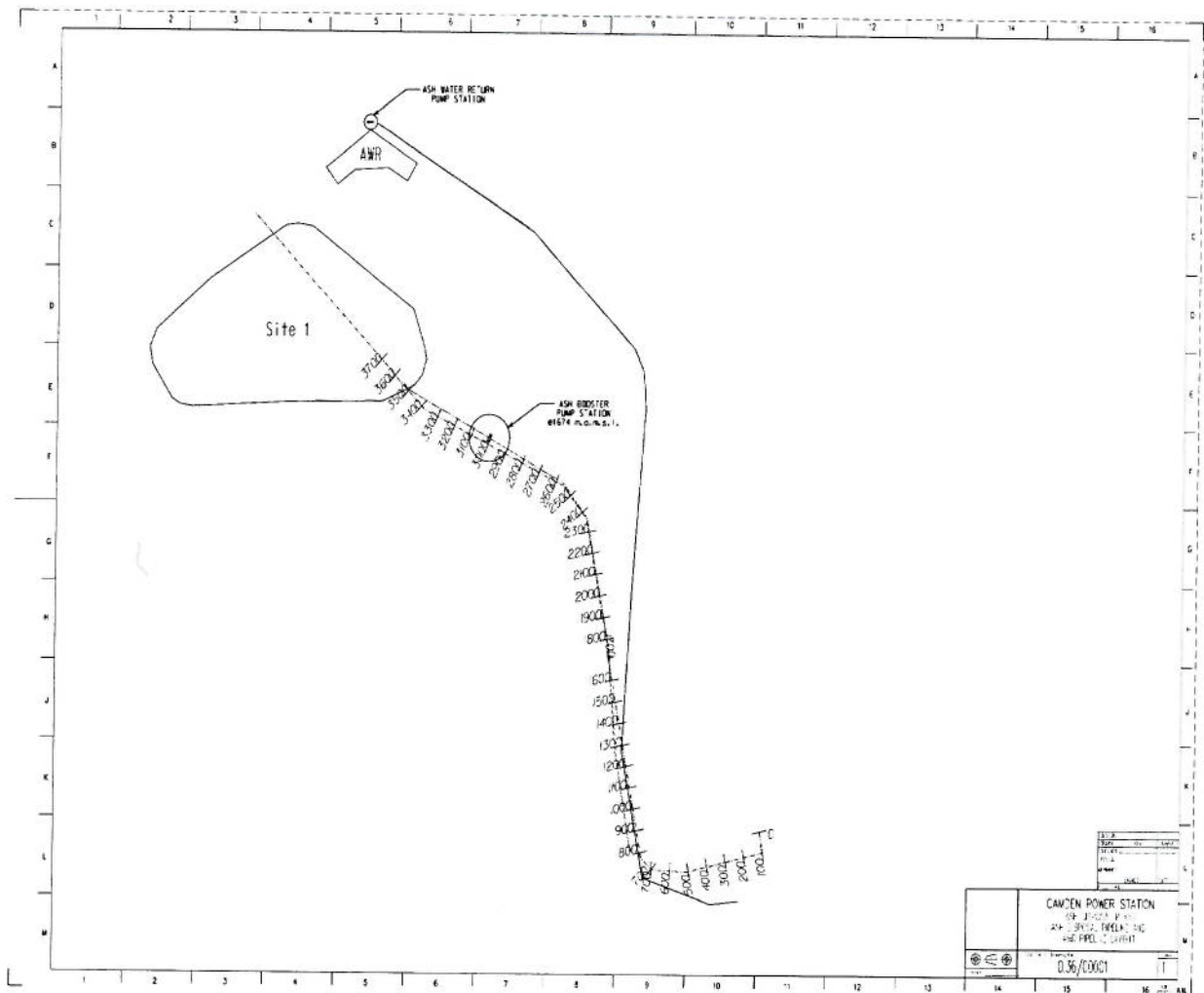


Figure 8: Site 1 Booster Pump Station location

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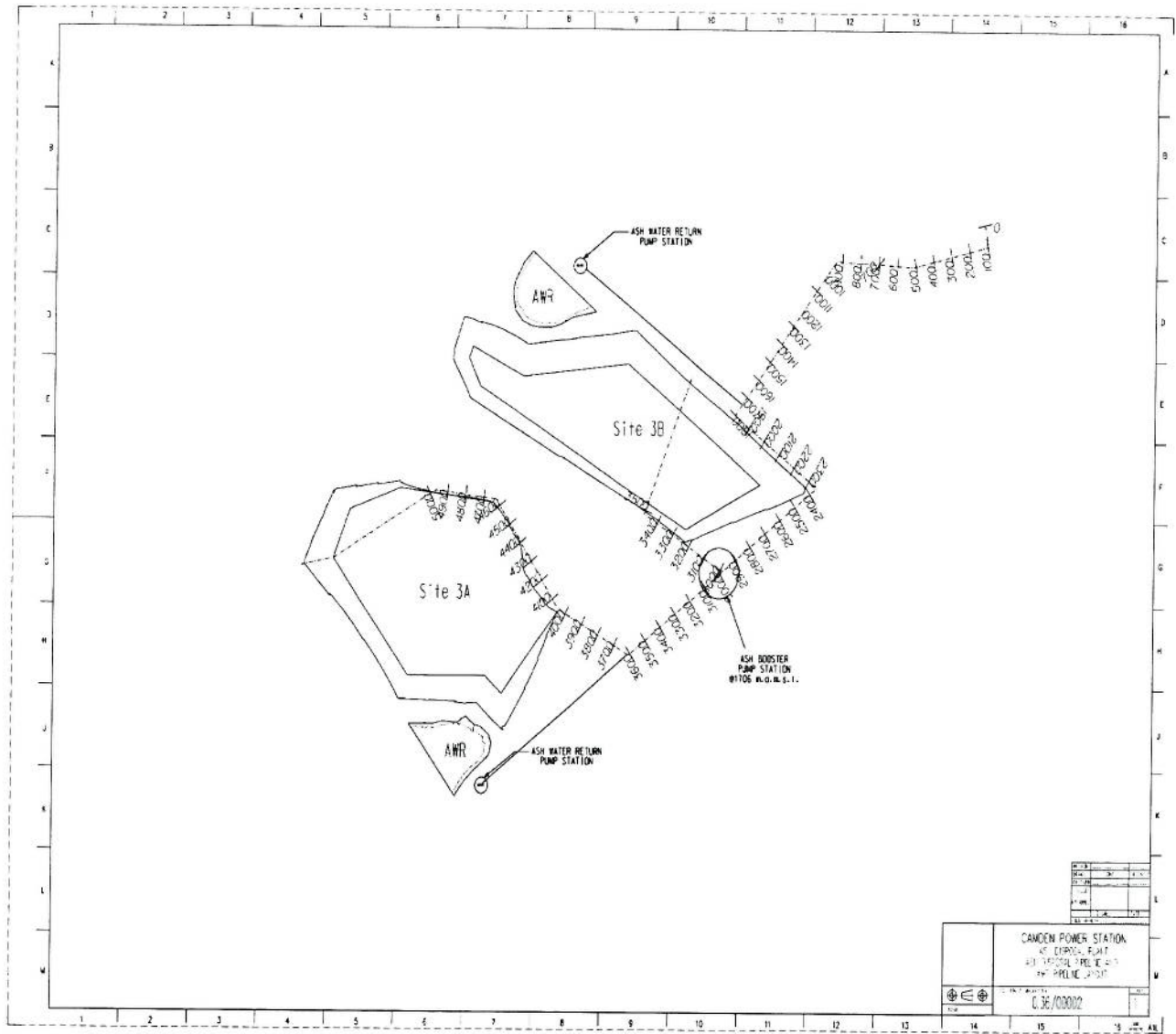


Figure 9: Site 3 Booster Pump Station location

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APPENDIX D: ASH PIPELINE LAYOUT DRAWINGS

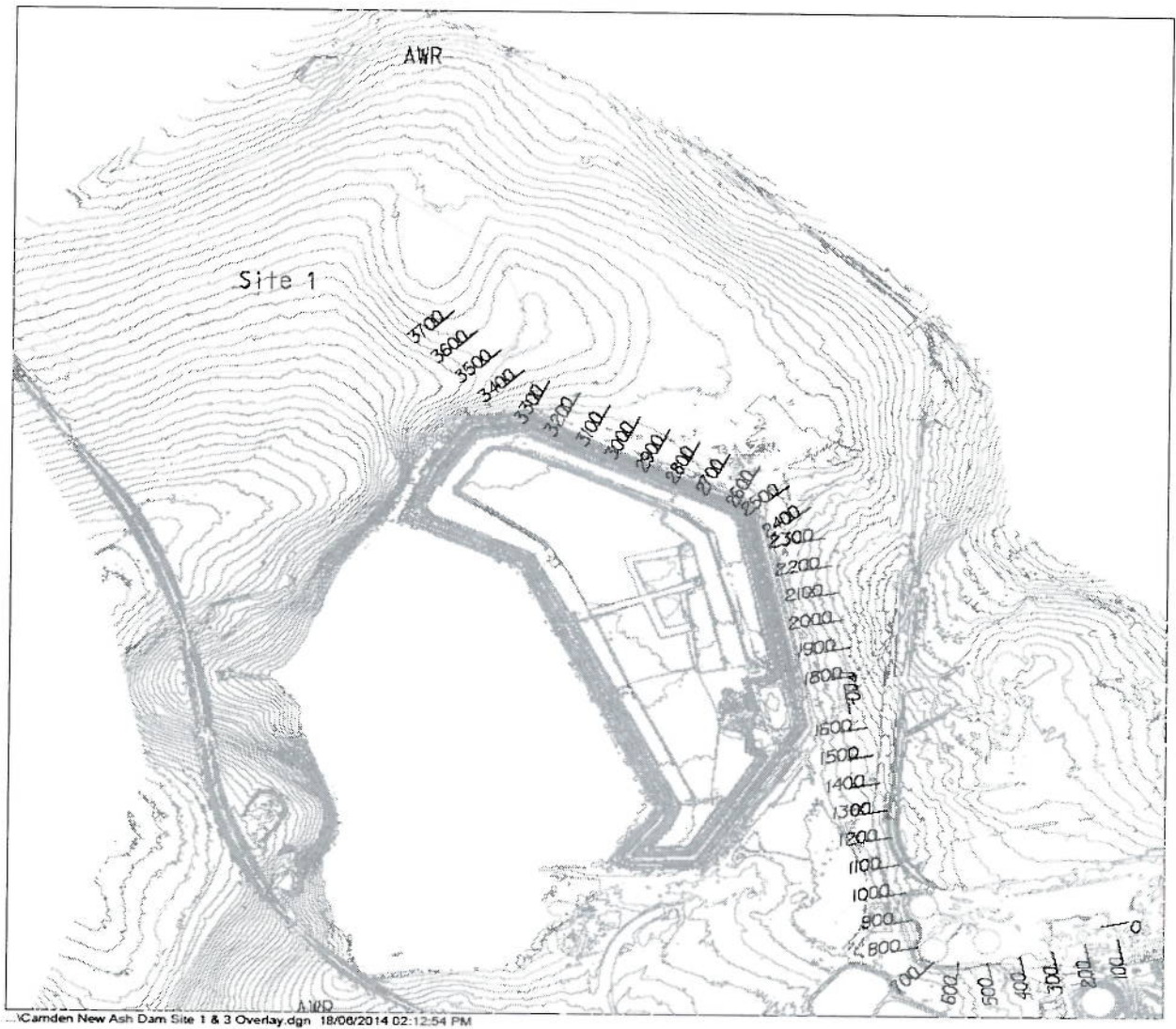


Figure 10: Site 1 Ash Pipeline Layout

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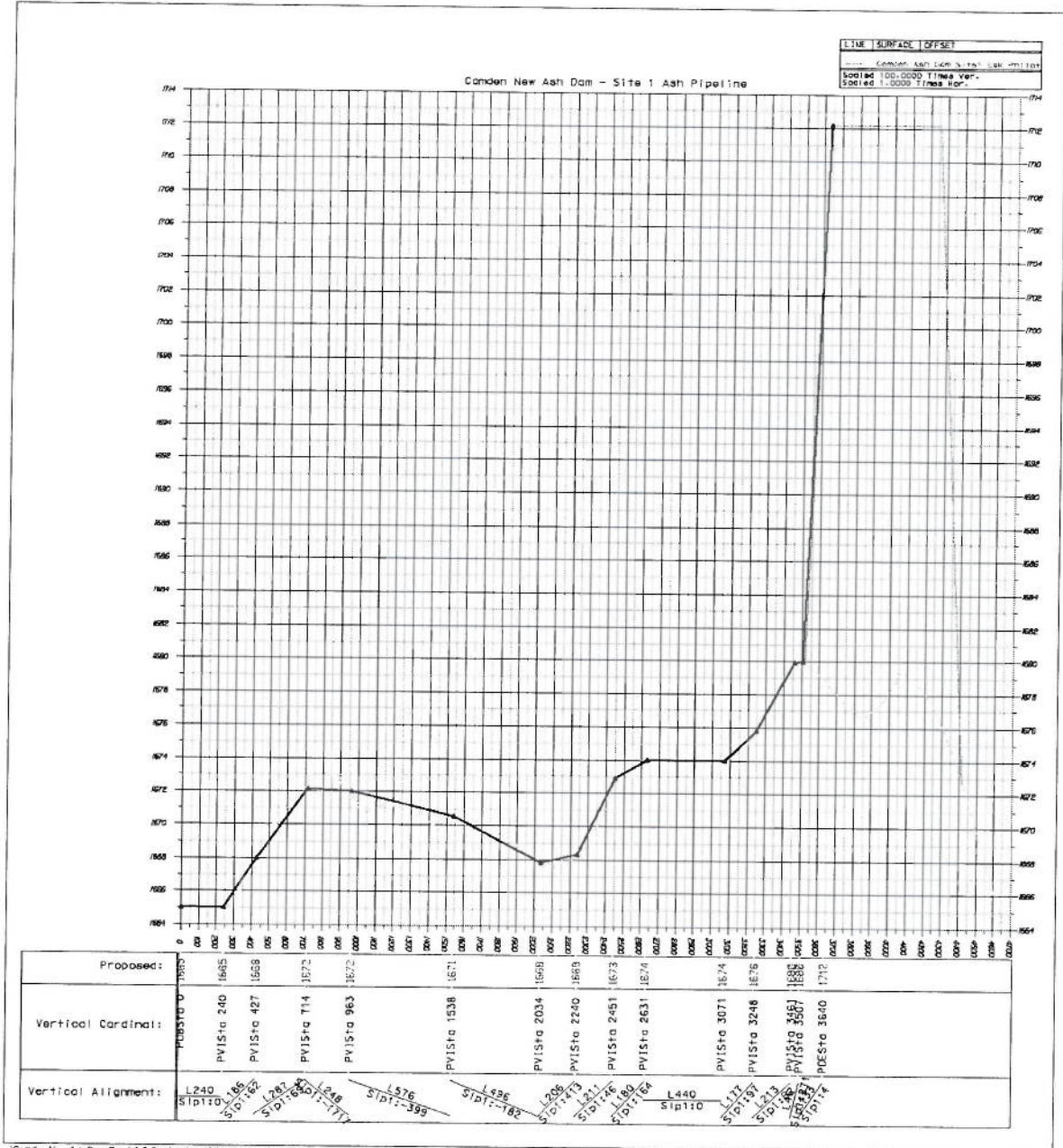
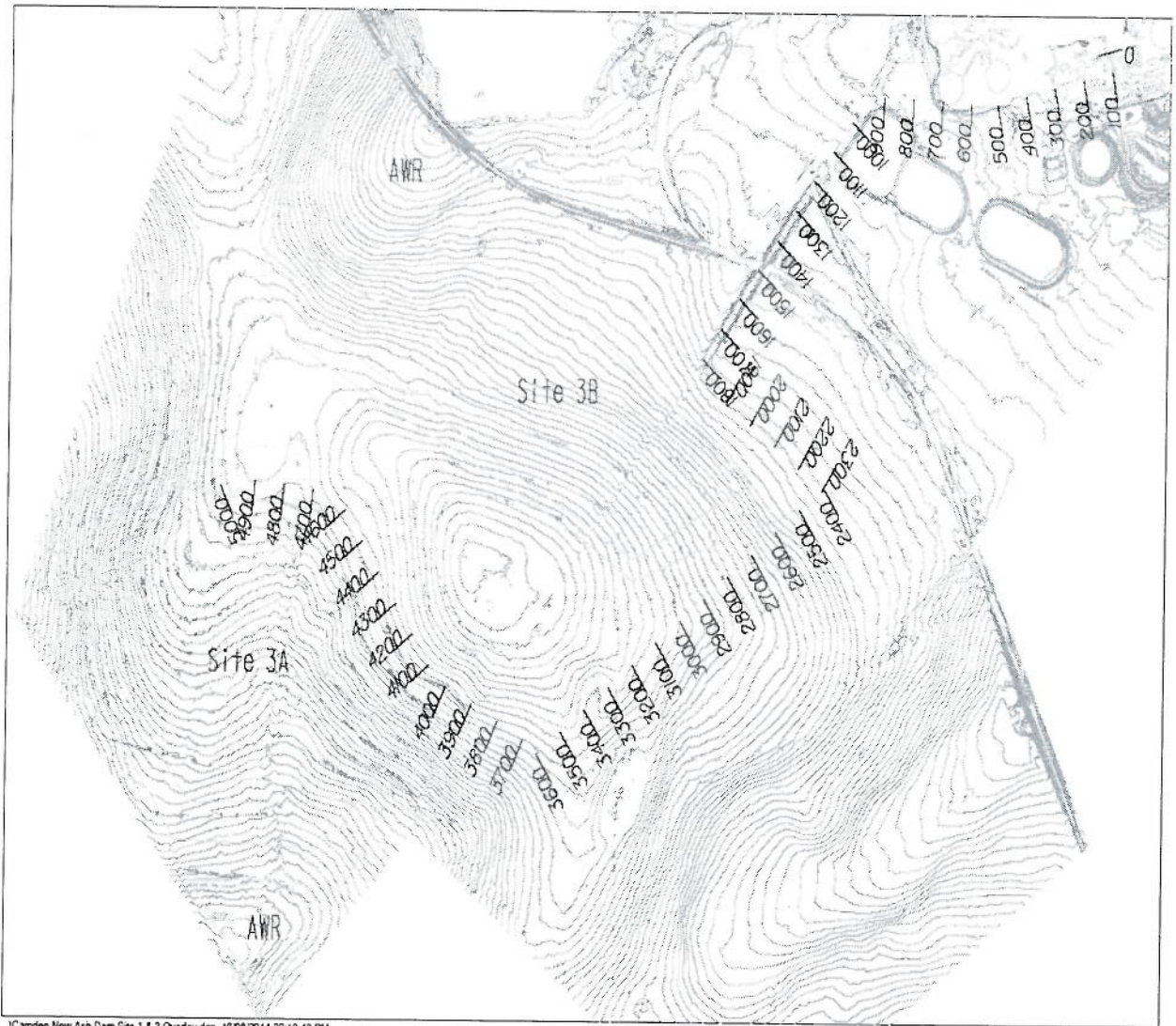


Figure 11: Site 1 Ash Pipeline Profile

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\\Camden New Ash Dam Site 1 & 3 Overlay.dgn 18/08/2014 02:13:42 PM

Figure 12: Site 3A Ash Pipeline Layout

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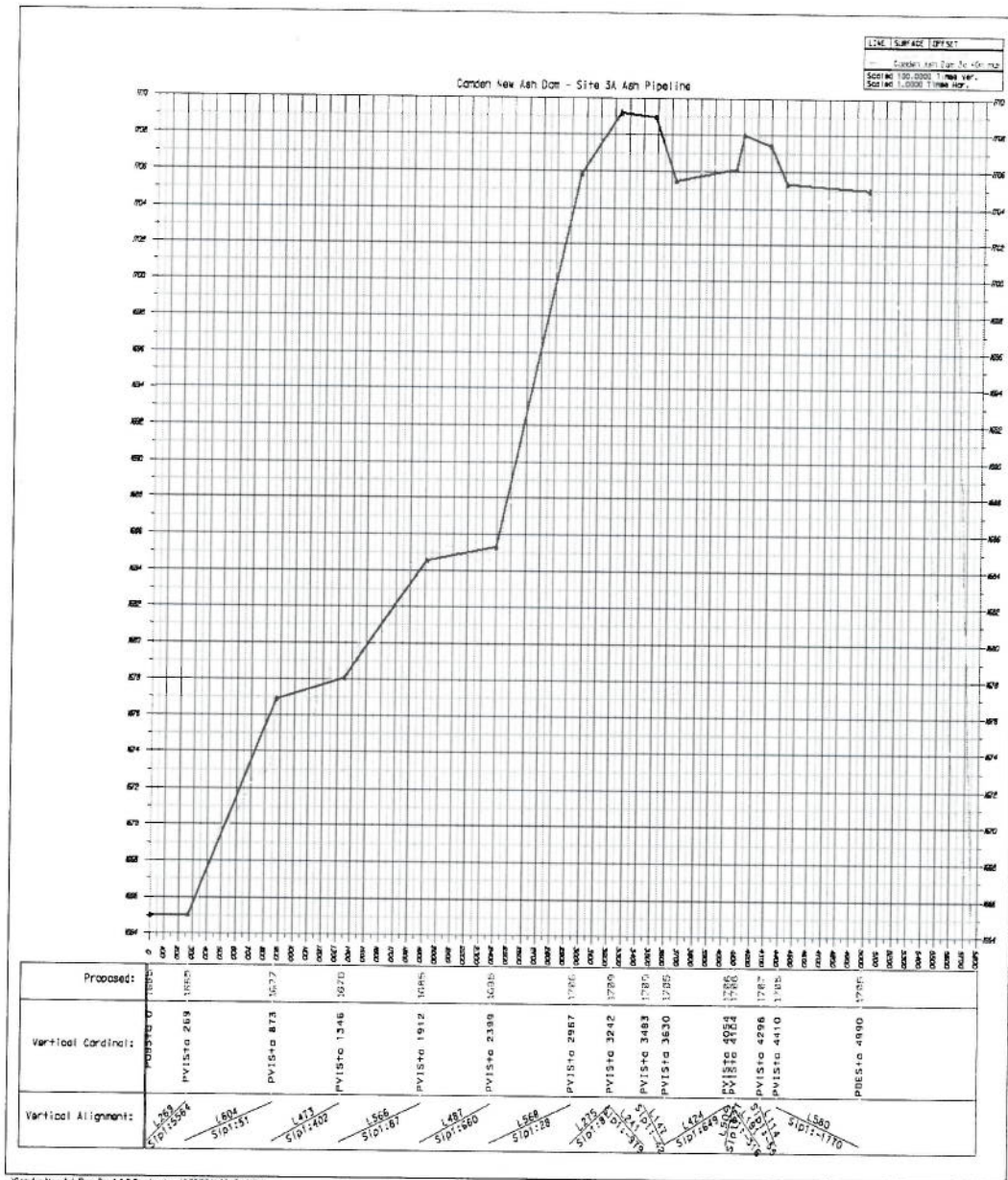
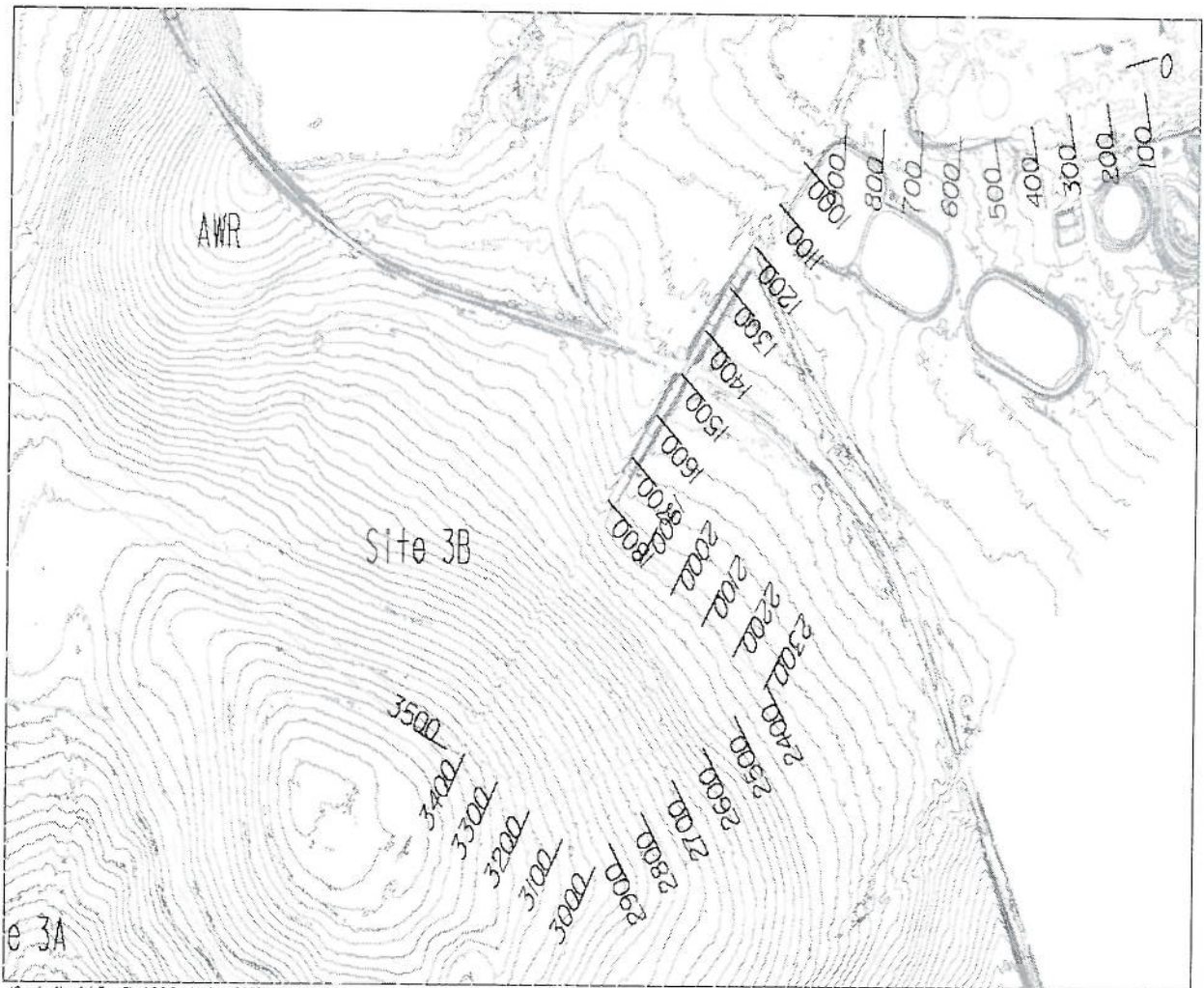


Figure 13: Site 3A Ash Pipeline Profile

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...Camden New Ash Dam Site 1 & 3 Overlay.dgn 18/09/2014 02:14:30 PM

Figure 14: Site 3B Ash Pipeline Layout

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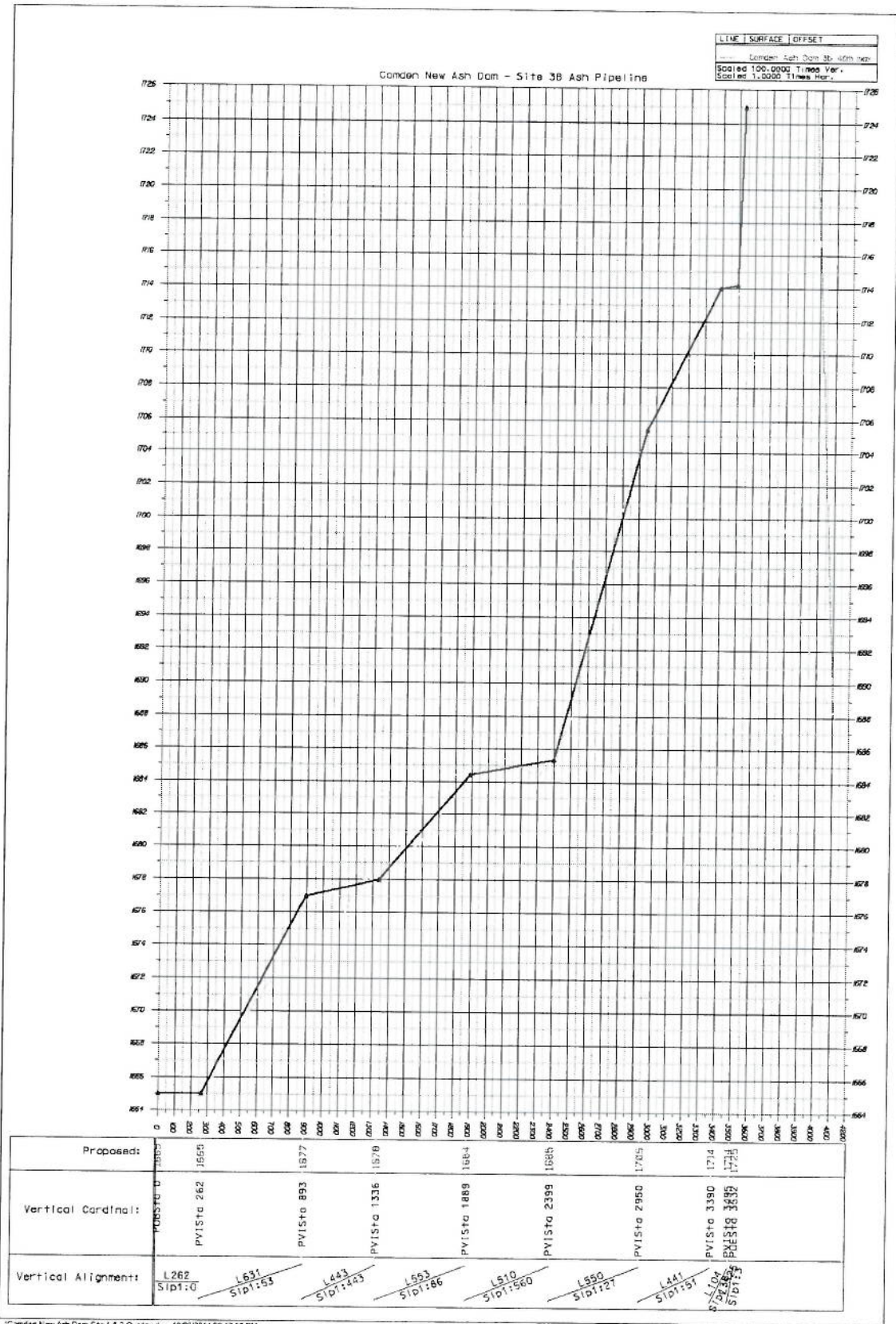


Figure 15: Site 3B Ash Pipeline Profile

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Ash content [%] - as received 28.03
Ash Pump centre line (m a.m.s.l.) 1 680 703
Ash Disposal pipeline diameter (mm) 300
Ash Disposal pipeline wall thickness (mm) 8
Suction velocity, V_s (m/s) 2
System resistance (hPa/m) 0.259
Siltation rate (m³/s) 12
Slurry mixture capacity, Q_m (m³/hr) 750.5
Ash throughput, M (Tph) 189.2
Water throughput, Q_w (m³/hr) 679.9
Density slurry (kg/m³) 1 208
Motor efficiency [%] 95
V-Belt efficiency [%] 95
Safety factor for worn pump impellers [%] 10

Masco HV600 C5
Max. Impeller tip speed (m/s) 33
Impeller dia. (m) 0.6
Speed (rpm) 1 050
Head (m) 68
Efficiency [%] 71.5
Energy cost - lost revenue (¢/kWh) 80.0
Escalation on energy costs (% per annum) 8

	2016	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Burn Plant [t/a]	2016	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Ash Production [t/a]	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000	5 400 000
Ash Pumping time [hrs]	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	2 021.8	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620	1 513 620
	8 948	8 948	8 948	8 948	8 948	8 948	12	8 948	8 948	8 948	8 948	8 948	8 948	8 948	8 948	8 948	8 948	8 948	8 948
Final height (m a.m.s.l.)	Site 1	Site 3A	Site 3B	Booster	Site 3A	Site 3B													
Static head (m)	1 650	1 708	1 725	1 674	1 706	1 706													
Pipe line length (m)	18.3	48.3	64.3	13.3	45.3	45.3													
Head lost due to friction (m)	3 520	5 000	3 520	3 020	3 000	3 000													
Total head required (m)	151	144	141	87	87	87													
No. of pumps	2	3	3	2	2	2													
SURRY PUMPING - Main Pumps																			
Required hydraulic power [kW]																			
Required motor power [kW] - absorbed power																			
Installed motor power [kW]																			
Booster Pumps																			
Head required (m)	20	61	33																
Required hydraulic power [kW]	50	180	82																
Required motor power [kW] - absorbed power	59	208	142																
Installed motor power [kW]	97	297	198																
Energy consumption [MWh]	4 577	5 495	6 299																
FLUSHING																			
Flushing time (hrs) - Total	2027.8	2886.8	2027.8	1 738.1	1 738.1	1 738.1													
Required hydraulic power [kW]	248.0																		
Required motor power [kW] - absorbed power	373.3																		
Installed motor power [kW]	757.0	0.0	0.0	0.0	0.0	0.0													
Energy consumption [MWh]	5 323.5	5 495	6 299	0.0	0.0	0.0													
ENERGY CONSUMPTION (MWh) - TOTAL	R 3 200 111.93	R 3 560 648.25	R 4 401 271.72	R 0.00	R 0.00	R 0.00													
ENERGY COST	47.1																		
ENERGY CONSUMPTION (GWh) - TOTAL	6.40 270.396																		
AWR PUMPING																			
Required motor power [kW] - absorbed power	10 120	8 966	10 120	9 830	8 830	9 830	11	8 082	8 082	8 082	8 082	8 082	8 082	8 082	8 082	8 082	8 082	8 082	
Installed motor power [kW]	409	680	180	850	830	830													
Energy consumption [MWh]	4 179	6 067	1 819																

Figure 16: Mechanical Engineering Design Input Parameters

Table 20: Mechanical Engineering Energy Consumption Site 1

YEAR	Energy Consumption [MWhr]		
	Ash Pumping	AWR Pumping	
2017	4 577	4 129	1
2018	4 577	4 129	2
2019	4 746	4 141	3
2020	4 879	4 141	4
2021	4 974	4 141	5
2022	5 050	4 141	6
2023	5 126	4 141	7
2024	5 257	4 176	8
2025	5 333	4 153	9
2026	5 409	4 153	10
2027	5 466	4 153	11
2028	5 543	4 153	12
2029	5 600	4 153	13
2030	5 731	4 164	14
2031	4 396	3 351	15
2032	2 969	2 525	16
2033	1 503	1 700	17

Table 21: Mechanical Engineering Energy Consumption Site 3A&3B

YEAR	Energy Consumption [MWhr]			
	Ash Pumping	AWR Pumping		
2017	5 870	1 619	1	3B
2018	5 870	1 619	2	3B
2019	5 870	1 619	3	3B
2020	5 870	1 619	4	3B
2021	5 870	1 619	5	3B
2022	5 870	1 619	6	3B
2023	5 870	1 619	7	3B
2024	5 870	1 619	8	3B
2025	5 946	1 619	9	3B
2026	6 061	1 619	10	3B
2027	6 175	1 619	11	3B
2028	6 289	1 619	12	3B
2029	7 327	7 473	13	3A
2030	7 327	7 473	14	3A
2031	7 327	7 473	15	3A
2032	7 327	7 473	16	3A
2033	7 327	7 473	17	3A
2034	5 495	6 097	18	3A
2035	3 663	4 721	19	3A
2036	1 831	3 345	20	3A

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