

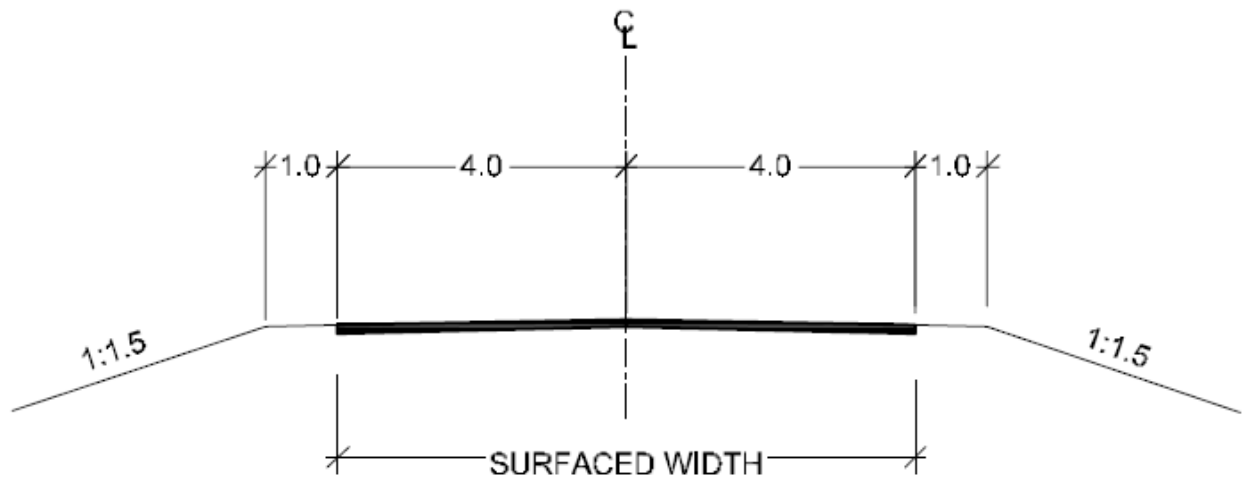
# APPENDIX D

- **Figure 1: Facility illustrations**
- **Table 1: Access road alternative 1 drainage primary design parameters**

**Figure 1: Facility illustrations**



## Typical cross section of road



## TYPICAL CROSS SECTION

SCALE 1:100

**Table 1: Access road alternative 1 drainage primary design parameters****Vele Colliery: Access Road Drainage Design****Primary design parameters**

Design flood return period: 1: 20 year  
 Mean annual precipitation: 342mm/year  
 Average rainfall intensity: 62mm/hr  
 Terrain type: Rural, flat (<2% slopes), 100% permeable, 100% grassland

Access Road Culvert Data					WGS 31		GPS	
No.	Chainage	Qty	Type	Size	Y	X	Lat. D M S	Long. D M S
1	0+020	2	Pipe	Ø900	-70177.027	2460587.889	22 14 35.43037	29 40 49.90995
2	0+200	1	Pipe	Ø600	-70200.453	2460411.86	22 14 29.70453	29 40 50.70040
3	0+400	1	Pipe	Ø600	-70077.783	2460260.524	22 14 24.80276	29 40 46.39309
4	0+500	1	Pipe	Ø600	-69998.475	2460199.612	22 14 22.83421	29 40 43.61415
5	0+800	1	Pipe	Ø600	-69854.239	2459957.994	22 14 15.00067	29 40 38.53976
6	1+020	1	Box	1800 x 900	-69904.914	2459743.928	22 14 08.03441	29 40 40.27583
7	1+400	1	Pipe	Ø600	-69993.596	2459374.421	22 13 56.00952	29 40 43.31465
8	1+800	1	Pipe	Ø600	-70086.945	2458985.466	22 13 43.35168	29 40 46.51328
9	2+200	1	Pipe	Ø600	-70180.294	2458596.511	22 13 30.69374	29 40 49.71181
10	2+900	1	Pipe	Ø600	-70190.06	2457914.316	22 13 08.51527	29 40 49.94596
11	3+200	1	Pipe	Ø600	-70086.877	2457632.619	22 12 59.37283	29 40 46.29930
12	3+560	4	Box	1800 x 900	-69963.056	2457294.583	22 12 48.40184	29 40 41.92349
13	4+000	1	Pipe	Ø600	-69811.719	2456881.427	22 12 34.99274	29 40 36.57564
14	4+500	1	Pipe	Ø600	-69640.162	2456411.787	22 12 19.75025	29 40 30.51356
15	4+900	1	Pipe	Ø600	-69665.204	2456020.201	22 12 07.01670	29 40 31.32723
16	5+450	2	Box	1800 x 900	-69812.107	2455490.49	22 11 49.77518	29 40 36.37362
17	5+700	1	Pipe	Ø600	-69768.089	2455248.043	22 11 41.89993	29 40 34.79938
18	6+050	1	Pipe	Ø600	-69504.706	2455032.728	22 11 34.93841	29 40 25.57177
19	6+400	1	Pipe	Ø600	-69156.834	2455034.353	22 11 35.04132	29 40 13.42842
20	6+700	1	Pipe	Ø600	-68886.757	2454929.335	22 11 31.66599	29 40 03.98455
21	7+000	1	Pipe	Ø600	-68803.658	2454651.73	22 11 22.65325	29 40 01.04137
22	7+400	4	Box	1800 x 900	-68976.639	2454292.809	22 11 10.96048	29 40 07.02453
23	7+700	1	Pipe	Ø600	-69031.742	2454010.256	22 11 01.76717	29 40 08.90456
24	8+000	1	Pipe	Ø600	-68971.42	2453716.383	22 10 52.22238	29 40 06.75387
25	8+250	1	Pipe	Ø600	-68921.069	2453471.088	22 10 44.25536	29 40 04.95874
26	8+600	1	Pipe	Ø600	-68803.995	2453142.24	22 10 33.58166	29 40 00.82198
27	8+800	1	Pipe	Ø600	-68730.104	2452956.391	22 10 27.55048	29 39 58.21448

## Vele Colliery: Access Road Drainage Design

### Primary design parameters

Design flood return period: 1: 20 year  
 Mean annual percipitation: 342mm/year  
 Average rainfall intensity: 62mm/hr  
 Terrain type: Rural, flat (<2% slopes), 100% permeable, 100% grassland

### Access Road Culvert Data

Chainage	Qty	Type	Size	Slope of culvert (%)	Discharge rate (m3/s)	Outlet velocity (m/s)	Inlet information			Outlet information			Remarks
							Concrete apron slab length (m)	Type of erosion protection	Erosion protection length (m)	Apron slab length (m)	Type of erosion protection	Erosion protection length (m)	
0+020	2	Pipe	Ø900	2	3.4	2.1	1.35	300mm gabion mattress	2	1.35	300mm gabion mattress	2	Major
0+200	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
0+500	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
0+800	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
0+400	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
1+020	1	Box	1800 x 900	2	3.7	2	1.35	300mm gabion mattress	2	1.35	300mm gabion mattress	2	Major
1+400	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
1+800	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
2+200	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
2+900	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
3+200	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
3+560	4	Box	1800 x 900	2	14.8	2	1.35	300mm gabion mattress	2	1.35	300mm gabion mattress	2	Major
4+000	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
4+500	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
4+900	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
5+450	2	Box	1800 x 900	2	7.4	2	1.35	300mm gabion mattress	2	1.35	300mm gabion mattress	2	Major
5+700	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
6+050	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
6+400	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
6+700	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
7+000	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal

7+400	4	Box	1800 x 900	2	14.8	2	1.35	300mm gabion mattress	2	1.35	300mm gabion mattress	2	Major
7+700	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
8+000	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
8+250	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
8+600	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal
8+800	1	Pipe	Ø600	2	0.6	1.2	0.9	None required	n/a	0.9	None required	n/a	Nominal

Gert Rautenbach [gertr@raubex.co.za]:

- The preliminary drainage design for the Vele Access Road: We are not diverting any storm water from its original flood path. Major culverts are located where the road crosses seasonal streams.
- The reason for us not using a 1:50 year design return flood is because the norm for the design of provincial standard roads is 1:20 year.
- All the culverts will be 10m in length.