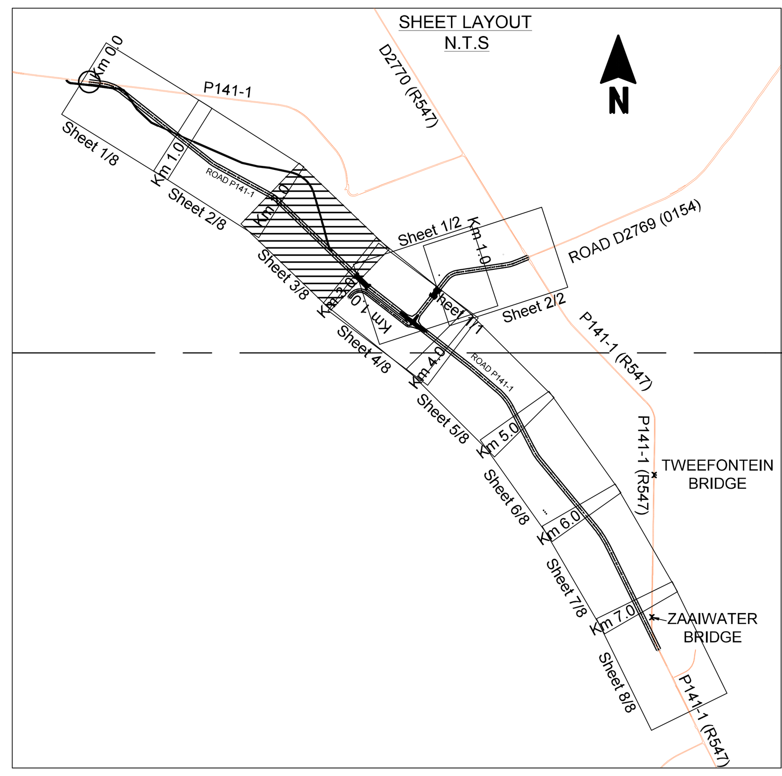
REFERENCE DRAWINGS		TITLE	SIGNATURE	TITLE	SIGNATURE
DRG No.	DESCRIPTION	MECHANICAL		DRAWN BY	
		PROCESS		CHECK BY	
		PIPING		MANAGER ENGINEERING	
		CIVIL		TECHNICAL PROJECT MANAGER	
		STRUCTURAL		AREA MANAGER	
		ELECTRICAL/INSTRUMENTATION		CLIENT	

SETTING OUT DATA AND REFERENCE PEGS



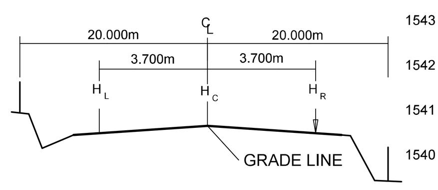
DESIGN SPEED = 100 Km/h

CENTRE LINE

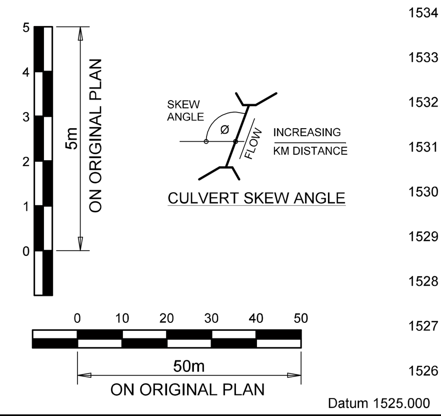
4m 8m

"AS BUILT" NOTE

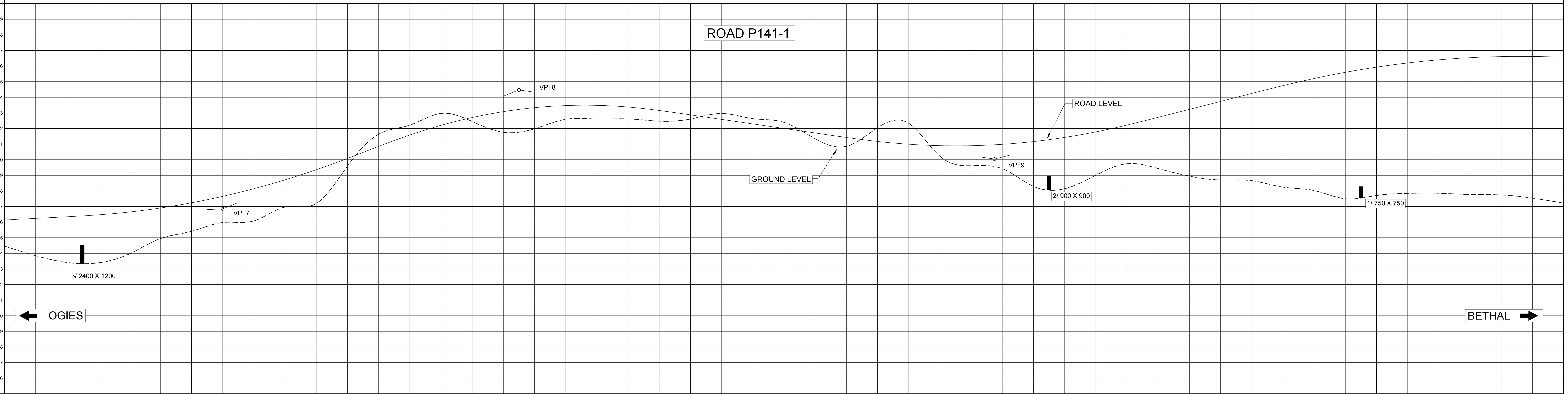
DESIGN SPEED
100 km/h



PROFILE OF GRADE LINE



Datum 1525.000



VERTICAL CURVES: BVC 2050.0 — 180.0m VC, K = 51.4 — BVC 2230.0 / 2240.0 EVC — 180.0m VC, K = 32.9 — 2420.0 EVC — BVC 2545.0 — 180.0m VC, K = 45.0 — 2725.0 EVC — BVC 2815.0 — 500.0m VC, K = 61.8

GRADE: 0.510 % — 2140.000 | 1536.852 — 4.011 % — 2330.000 | 1544.473 — -1.452 % — 2635.000 | 1540.043 — 2.548 % — 3000.000 1551.000

FINAL ROAD LEVELS (H_L 3.7 m LEFT; H_C ON ℄; H_R 3.7 m RIGHT), GROUND LEVELS ON CENTRE LINE, CHAINAGE m

CHAINAGE m	H_L 3.7 m LEFT	H_C ON ℄	H_R 3.7 m RIGHT	GROUND LEVELS ON CENTRE LINE
2000	1536.344	1536.138	1535.932	1534.468
2020	1536.362	1536.240	1536.118	1533.811
2040	1536.363	1536.342	1536.268	1533.325
2060	1536.380	1536.454	1536.380	1533.297
2080	1536.559	1536.634	1536.559	1533.827
2100	1536.817	1536.891	1536.817	1535.140
2120	1537.153	1537.227	1537.153	1535.279
2140	1537.566	1537.640	1537.566	1536.216
2160	1538.057	1538.131	1538.057	1535.718
2180	1538.626	1538.700	1538.626	1537.393
2200	1539.272	1539.346	1539.272	1536.508
2220	1539.997	1540.071	1539.997	1539.754
2240	1540.789	1540.863	1540.789	1542.019
2260	1541.531	1541.605	1541.531	1541.983
2280	1542.151	1542.225	1542.151	1543.343
2300	1542.649	1542.723	1542.649	1542.452
2320	1543.027	1543.101	1543.027	1541.557
2340	1543.282	1543.356	1543.282	1541.894
2360	1543.417	1543.491	1543.417	1542.775
2380	1543.430	1543.504	1543.430	1542.548
2400	1543.322	1543.396	1543.322	1542.684
2420	1543.092	1543.166	1543.092	1542.406
2440	1542.801	1542.875	1542.801	1542.513
2460	1542.511	1542.585	1542.511	1543.191
2480	1542.220	1542.294	1542.220	1542.486
2500	1541.930	1542.004	1541.930	1542.659
2520	1541.639	1541.713	1541.639	1541.242
2540	1541.349	1541.423	1541.349	1540.426
2560	1541.083	1541.157	1541.083	1542.216
2580	1540.904	1540.978	1540.904	1543.024
2600	1540.814	1540.888	1540.814	1539.691
2620	1540.812	1540.886	1540.812	1539.560
2640	1540.899	1540.973	1540.899	1539.747
2660	1541.075	1541.150	1541.075	1538.015
2680	1541.341	1541.415	1541.341	1537.953
2700	1541.695	1541.769	1541.695	1539.021
2720	1542.138	1542.212	1542.138	1540.005
2740	1542.644	1542.719	1542.644	1539.425
2760	1543.154	1543.228	1543.154	1538.909
2780	1543.664	1543.738	1543.664	1538.625
2800	1544.173	1544.247	1544.173	1538.801
2820	1544.681	1544.755	1544.681	1538.118
2840	1545.142	1545.216	1545.142	1538.197
2860	1545.538	1545.612	1545.538	1537.254
2880	1545.870	1545.944	1545.870	1537.781
2900	1546.137	1546.211	1546.137	1537.854
2920	1546.339	1546.413	1546.339	1537.881
2940	1546.476	1546.550	1546.476	1537.737
2960	1546.548	1546.622	1546.548	1537.801
2980	1546.556	1546.630	1546.556	1537.568
3000	1546.499	1546.573	1546.499	1537.218

SUPERELEVATION: 5.570 / -5.570 — -2.000

GUARD RAIL LEFT
KERB OR PAVING LEFT
SURFACED SHOULDER LEFT
SURFACED SHOULDER RIGHT
KERB OR PAVING RIGHT
GUARD RAIL RIGHT

HORIZONTAL ALIGNMENT: ECC 2021.904 — Curve 3 Right, Radius=350.000, Angle=15° — Direction 314°

DRAINAGE — KILOMETRE DISTANCE SIZE AND ANGLE Ø

- (4) km 2.050 000, 3 / 2400 x 1200 BC, θ = 90 Deg
- (5) km 2.670 000, 2 / 900 x 900 BC, θ = 90 Deg
- (6) km 2.870 000, 1 / 750 x 750 BC, θ = 90 Deg

FOR INFORMATION ONLY

No	DATUM DATE	WYSIGINGS / AMENDMENTS	nms Hoof v. Dept. for Head of Dept.	DATUM DATE
AA	18/12/2012	For Approval		

SURVEYED BY: Lidar Survey, Received 25/10/2011, From Xstrata
HANDTEK / SIGNTR. DATUM / DATE

ONTWERP VIR / DESIGNED FOR: TWEEFONTEIN PROJECT, XSTRATA COAL SA

ONTWERP DEUR / DESIGNED BY: JEFFARES & GREEN PTY (Ltd), ENGINEERING AND ENVIRONMENTAL CONSULTING
TEL. (012) 349-7900, FAX. (012) 349-7979, E-MAIL jgipta@jgi.co.za, P.O. BOX 2973 PRETORIA 0001

ONTWERP GOEDGEKEUR DESIGN APPROVED — PR 980444 — nms Raadgewende Ingenieur for Consulting Engineers — DATUM/DATE:

GOEDGEKEUR DEUR APPROVED BY — nms Hoof van Departement for Head of Department — DATUM/DATE:

ONTWERP DEUR DESIGNED BY	JN
NAGESIEN DEUR CHECKED BY	CCLR
GETEKEN DEUR DRAWN BY	RR
NAGESIEN DEUR CHECKED BY	CCLR

MPUMALANGA REGERING OPENBARE WERKE, PAAIE EN VERVOER — MPUMALANGA — MPUMALANGA GOVERNMENT PUBLIC WORKS, ROADS AND TRANSPORT

REALIGNMENT OF PROVINCIAL ROADS

LONGITUDINAL SECTION km 2.000 TO km 3.000 (SHEET 3 of 8)

SKAAL / SCALE: H 1:1000, V 1:100

LÊER Nr / FILE No: --

TIPE ONTWERP / TYPE OF PLANNING: PRELIMINARY DESIGN

DISTRIK / DISTRICT: NKANGALA

PAD Nr / ROAD No: P141/1 & D2769

PROVINSIE PLAN Nr / PROVINCE PLAN No: MRS 06/--/03Ls

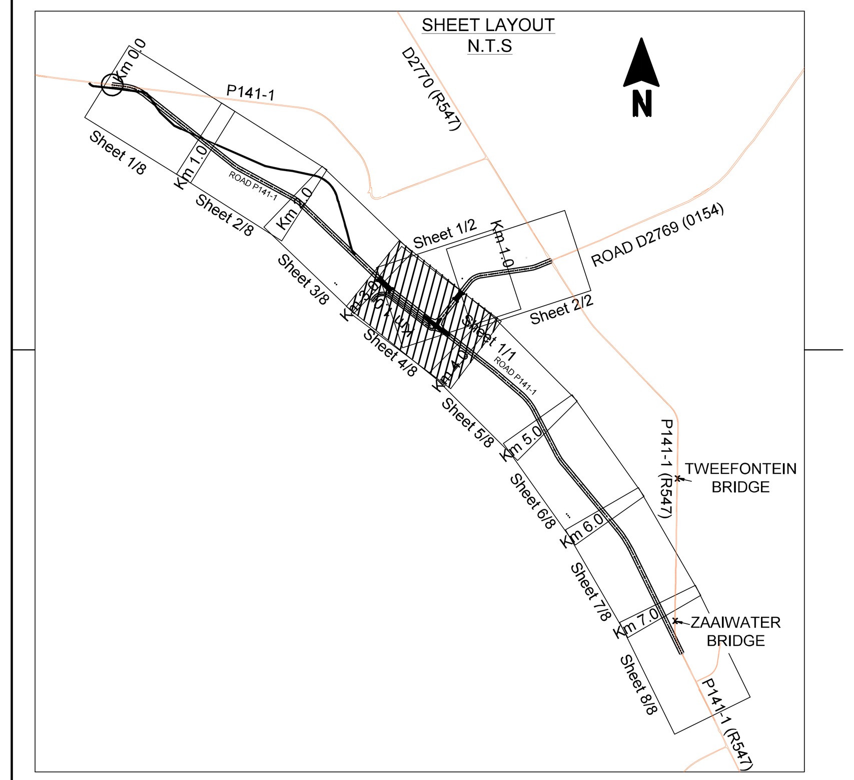
XSTRATA COAL PLAN Nr / PLAN No: TOP-J&G-5003-CV-1110

PROVINCE PLAN No MRS 06/--/03Ls
XSTRATA COAL PLAN No TOP-J&G-5003-CV-01-1110

W:\002398 - Tweefontein Re-alignment (CC le Roux)\03 Drawings\Working Drawings\Alternative 2012\Preliminary Design\Rev AB/2398JN_TOP-J&G-5003-CV-01-1110.dr4

REFERENCE DRAWINGS		TITLE	SIGNATURE	TITLE	SIGNATURE
DRG No.	DESCRIPTION	MECHANICAL		DRAWN BY	
		PROCESS		CHECK BY	
		PIPING		MANAGER ENGINEERING	
		CIVIL		TECHNICAL PROJECT MANAGER	
		STRUCTURAL		AREA MANAGER	
		ELECTRICAL/INSTRUMENTATION		CLIENT	

SETTING OUT DATA AND REFERENCE PEGS



℄ ROAD P141-1 INTERSECTION
km 3.642 460 (ROAD P141-1)
km 0.000 000 (ROAD D2769)

GRAVEL SHOULDER SIGHT DISTANCE > 300m
GRAVEL SHOULDER SIGHT DISTANCE > 310m

℄ ROAD P141-1 INTERSECTION
km 3.642 460 (ROAD P141-1)
km 0.000 000 (MIA ACCESS RD)

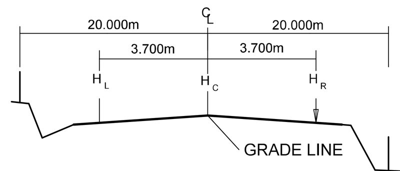
DESIGN SPEED = 100 Km/h

CENTRE LINE

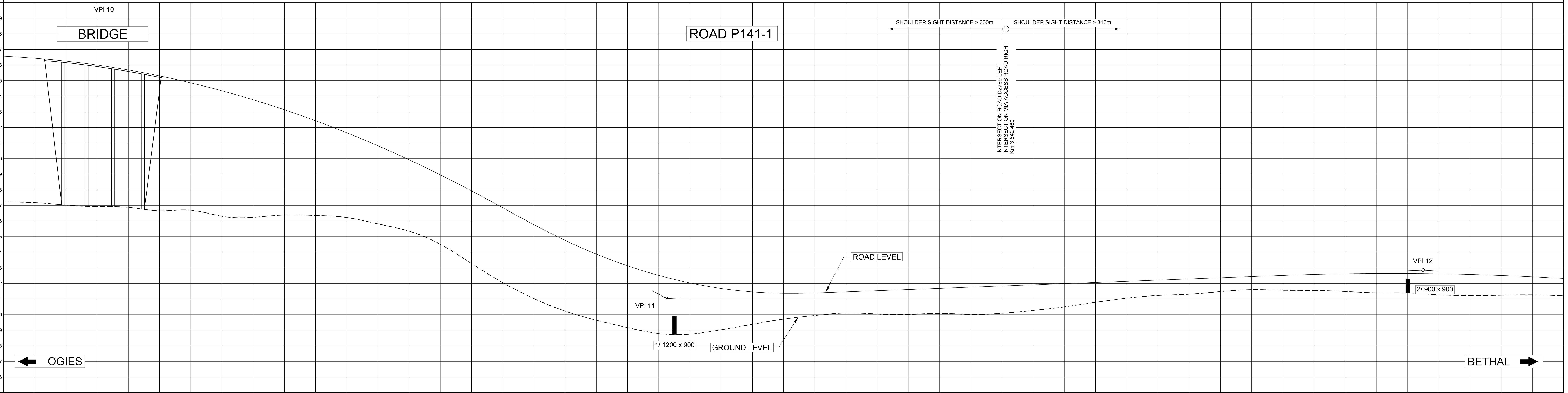
4m 8m

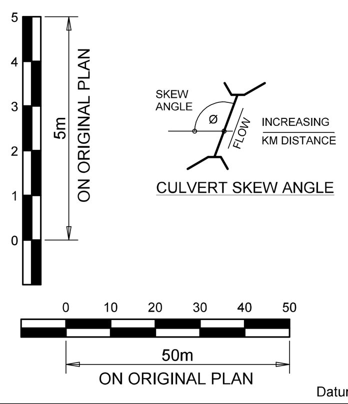
"AS BUILT" NOTE

DESIGN SPEED
100 km/h



PROFILE OF GRADE LINE





Datum 1525.000

VERTICAL CURVES: 500.0m VC, K = 61.8; 3315.0 EVC; BVC 3335.0; 180.0m VC, K = 30.4; 3515.0 EVC; BVC 3820.0; 180.0m VC, K = 185.6

GRADE: 2.548 %; 3065.000 | 1551.000; -5.548 %; 3425.000 | 1531.028; 0.376 %; 3910.000 | 1532.853; -0.594 %; 4000.000 1530.063

FINAL ROAD LEVELS: H_L 3.7 m LEFT; H_C ON ℄; H_R 3.7 m RIGHT

CHAINAGE m	H_L 3.7 m LEFT	H_C ON ℄	H_R 3.7 m RIGHT	GROUND LEVELS ON CENTRE LINE
3000	1546.499	1546.573	1546.499	1537.218
3020	1546.377	1546.451	1546.377	1537.244
3040	1546.190	1546.264	1546.190	1536.971
3060	1545.939	1546.013	1545.939	1536.925
3080	1545.623	1545.697	1545.705	1536.955
3100	1545.206	1545.316	1545.426	1536.527
3120	1544.670	1544.870	1545.070	1536.873
3140	1544.262	1544.360	1544.457	1536.186
3160	1543.710	1543.785	1543.779	1536.201
3180	1543.070	1543.145	1543.070	1536.442
3200	1542.366	1542.440	1542.366	1536.348
3220	1541.596	1541.670	1541.596	1536.306
3240	1540.762	1540.836	1540.762	1535.788
3260	1539.863	1539.937	1539.863	1535.434
3280	1538.899	1538.973	1538.899	1534.585
3300	1537.870	1537.944	1537.870	1533.266
3320	1536.779	1536.853	1536.779	1532.011
3340	1535.674	1535.748	1535.674	1530.997
3360	1534.663	1534.737	1534.663	1530.178
3380	1533.784	1533.858	1533.784	1529.634
3400	1533.036	1533.110	1533.036	1529.157
3420	1532.420	1532.494	1532.420	1528.729
3440	1531.936	1532.010	1531.936	1528.687
3460	1531.583	1531.657	1531.583	1529.030
3480	1531.362	1531.437	1531.362	1529.370
3500	1531.273	1531.347	1531.273	1529.750
3520	1531.311	1531.385	1531.311	1529.935
3540	1531.387	1531.461	1531.387	1530.167
3560	1531.462	1531.536	1531.462	1530.022
3580	1531.537	1531.611	1531.537	1529.986
3600	1531.612	1531.687	1531.612	1530.129
3620	1531.688	1531.762	1531.688	1529.977
3640	1531.763	1531.837	1531.763	1530.070
3660	1531.838	1531.912	1531.838	1530.265
3680	1531.914	1531.988	1531.914	1530.477
3700	1531.989	1532.063	1531.989	1530.800
3720	1532.064	1532.138	1532.064	1531.064
3740	1532.139	1532.213	1532.139	1531.258
3760	1532.215	1532.289	1532.215	1531.280
3780	1532.290	1532.364	1532.290	1531.486
3800	1532.365	1532.439	1532.365	1531.645
3820	1532.440	1532.514	1532.440	1531.545
3840	1532.505	1532.579	1532.505	1531.566
3860	1532.548	1532.622	1532.548	1531.495
3880	1532.569	1532.643	1532.569	1531.363
3900	1532.569	1532.643	1532.569	1531.438
3920	1532.547	1532.621	1532.547	1531.236
3940	1532.504	1532.578	1532.504	1531.223
3960	1532.439	1532.513	1532.439	1531.228
3980	1532.353	1532.427	1532.353	1531.305
4000	1532.245	1532.319	1532.245	1531.202

SUPERELEVATION: -2.000 ... -2.000

GUARD RAIL LEFT — BRIDGE
KERB OR PAVING LEFT
SURFACED SHOULDER LEFT
SURFACED SHOULDER RIGHT
KERB OR PAVING RIGHT
GUARD RAIL RIGHT — BRIDGE

HORIZONTAL ALIGNMENT: Direction 314°; 3100.519 BCC; ECC 3136.688; Curve 4 Left, Angle=6°, Radius=350.000; Direction 308°

FOR INFORMATION ONLY

DRAINAGE — KILOMETRE DISTANCE SIZE AND ANGLE Ø:
(7) km 3.430 000, 1 / 1200 x 900 BC, θ = 90 Deg
(8) km 3.900 000, 2 /900 x 900 BC, θ = 90 Deg

No	DATUM DATE	WYSIGINGS / AMENDMENTS	nms Hoof v. Dept. for Head of Dept.	DATUM DATE
AA	18/12/2012	For Approval		

SURVEYED BY: Lidar Survey, Received 25/10/2011, From Xstrata
HANDTEK / SIGNTR. DATUM / DATE

ONTWERP VIR / DESIGNED FOR: TWEEFONTEIN PROJECT, XSTRATA COAL SA

ONTWERP DEUR / DESIGNED BY: JEFFARES & GREEN PTY (Ltd)
ENGINEERING AND ENVIRONMENTAL CONSULTING
TEL. (012) 349-7900
FAX. (012) 349-7979
E-MAIL jgipta@jgi.co.za
P.O. BOX 2973
PRETORIA
0001

ONTWERP GOEDGEKEUR / DESIGN APPROVED: PR 980444, nms Raadgewende Ingenieur for Consulting Engineers, DATUM/DATE:

GOEDGEKEUR DEUR / APPROVED BY: nms Hoof van Departement for Head of Department, DATUM/DATE:

ONTWERP DEUR / DESIGNED BY	JN
NAGESIEN DEUR / CHECKED BY	CCLR
GETEKEN DEUR / DRAWN BY	RR
NAGESIEN DEUR / CHECKED BY	CCLR

MPUMALANGA REGERING, OPENBARE WERKE, PAAIE EN VERVOER — MPUMALANGA — MPUMALANGA GOVERNMENT, PUBLIC WORKS, ROADS AND TRANSPORT

REALIGNMENT OF PROVINCIAL ROADS

LONGITUDINAL SECTION km 3.000 TO km 4.000 (SHEET 4 of 8)

SKAAL / SCALE: H 1:1000, V 1:100
LÊER Nr / FILE No: --
TIPE ONTWERP / TYPE OF PLANNING: PRELIMINARY DESIGN
DISTRIK / DISTRICT: NKANGALA
PAD Nr / ROAD No: P141/1 & D2769
PROVINSIE PLAN Nr / PROVINCE PLAN No: MRS 06/--/04Ls
XSTRATA COAL PLAN Nr / PLAN No: TOP-J&G-5003-CV-1111

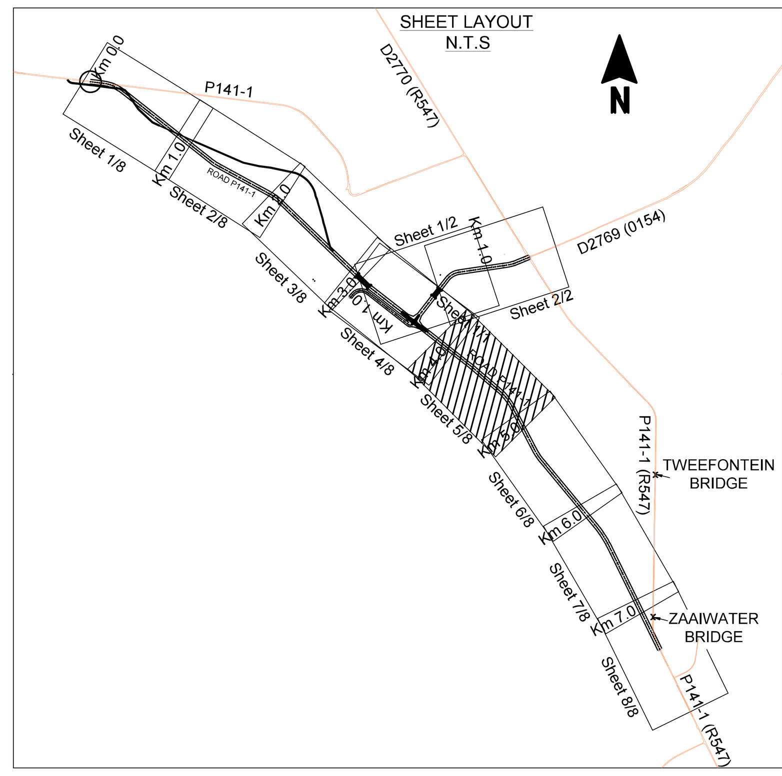
PROVINCE PLAN No MRS 06/--/04Ls
XSTRATA COAL PLAN No TOP-J&G-5003-CV-01-1111

W:\002398 - Tweefontein Re-alignment (CC le Roux)\03 Drawings\Working Drawings\Alternative 2012\Rev AB\2398JN_TOP-J&G-5003-CV-01-1111.dr4

REFERENCE DRAWINGS		TITLE	SIGNATURE	TITLE	SIGNATURE
DRG No.	DESCRIPTION	MECHANICAL		DRAWN BY	
		PROCESS		CHECK BY	
		PIPING		MANAGER ENGINEERING	
		CIVIL		TECHNICAL PROJECT MANAGER	
		STRUCTURAL		AREA MANAGER	
		ELECTRICAL/INSTRUMENTATION		CLIENT	

UITPENDATA EN VERWYSINGSPENNE

SETTING OUT DATA AND REFERENCE PEGS



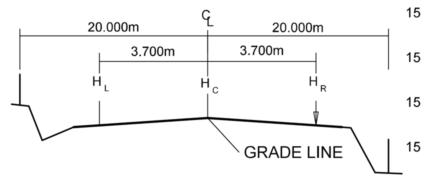
DESIGN SPEED = 100 Km/h

CENTRE LINE

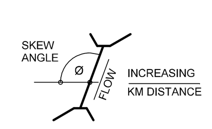
4m 8m

"AS BUILT" NOTE

DESIGN SPEED 100 km/h



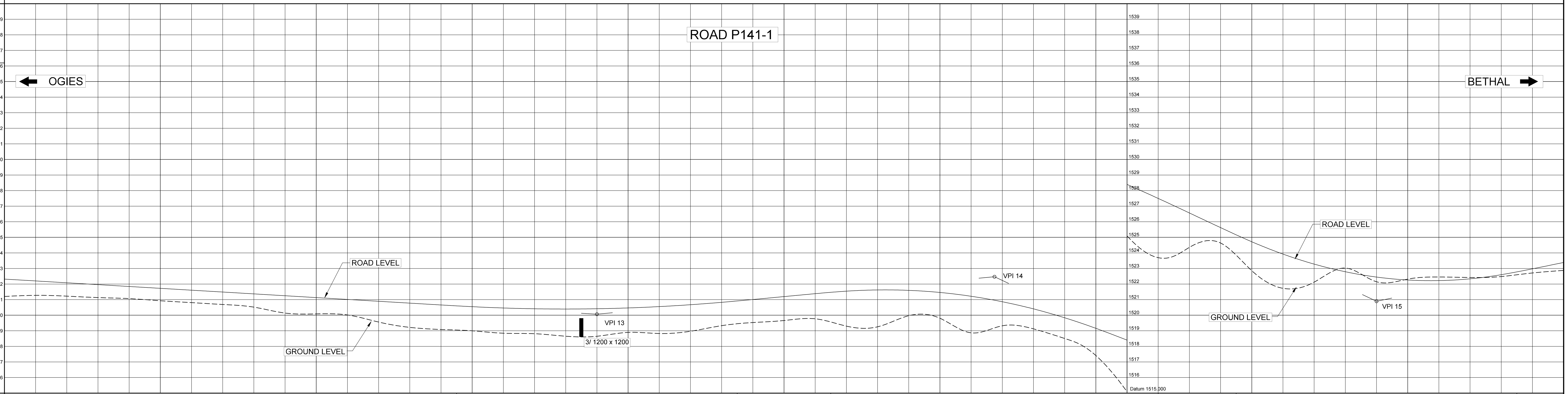
PROFILE OF GRADE LINE



5m ON ORIGINAL PLAN

50m ON ORIGINAL PLAN

Datum 1525.000



VERTICAL CURVES: BVC 4290.0 — 180.0m VC, K = 117.1 — 4470.0 EVC; BVC 4530.0 — 210.0m VC, K = 37.0 — 4740.0 EVC; BVC 4790.0 — 180.0m VC, K = 26.5 — 4970.0 EVC

GRADE: -0.594 %; 4380.000 | 1530.063; 0.944 %; 4635.000 | 1532.469; -4.724 %; 4880.000 | 1520.894; 2.077 %; 5000.000 1540.000

FINAL ROAD LEVELS (H_L 3.7 m LEFT; H_C ON ℄; H_R 3.7 m RIGHT)

CHAINAGE m	4000	4020	4040	4060	4080	4100	4120	4140	4160	4180	4200	4220	4240	4260	4280	4300	4320
H_L 3.7 m LEFT	1532.245	1532.126	1532.007	1531.888	1531.770	1531.651	1531.532	1531.414	1531.295	1531.176	1531.057	1530.939	1530.820	1530.773	1530.747	1530.724	1530.558
H_C ON ℄	1532.319	1532.200	1532.081	1531.963	1531.844	1531.725	1531.606	1531.488	1531.369	1531.250	1531.131	1531.013	1530.894	1530.775	1530.657	1530.542	1530.458
H_R 3.7 m RIGHT	1532.245	1532.126	1532.007	1531.888	1531.770	1531.651	1531.532	1531.414	1531.295	1531.176	1531.057	1530.939	1530.820	1530.701	1530.566	1530.360	1530.358
GROUND LEVELS ON CENTRE LINE	1531.202	1531.317	1531.227	1531.119	1531.089	1530.918	1530.812	1530.681	1530.598	1530.034	1530.088	1530.122	1529.516	1529.180	1529.072	1529.031	1528.791

CHAINAGE m	4340	4360	4380	4400	4420	4440	4460	4480	4500	4520	4540	4560	4580	4600	4620	4640	4660
H_L 3.7 m LEFT	1530.414	1530.317	1530.335	1530.387	1530.473	1530.594	1530.748	1530.932	1531.121	1531.310	1531.485	1531.566	1531.539	1531.471	1531.334	1531.090	1530.644
H_C ON ℄	1530.407	1530.391	1530.409	1530.461	1530.547	1530.668	1530.822	1531.006	1531.195	1531.384	1531.559	1531.640	1531.613	1531.478	1531.234	1530.883	1530.424
H_R 3.7 m RIGHT	1530.333	1530.317	1530.335	1530.387	1530.473	1530.594	1530.748	1530.932	1531.121	1531.310	1531.485	1531.566	1531.539	1531.403	1531.134	1530.676	1530.204
GROUND LEVELS ON CENTRE LINE	1528.865	1528.618	1528.564	1529.016	1528.752	1528.923	1529.376	1529.546	1529.614	1529.951	1529.202	1529.037	1530.175	1530.068	1528.386	1529.595	1529.159

CHAINAGE m	4680	4700	4720	4740	4760	4780	4800	4820	4840	4860	4880	4900	4920	4940	4960	4980	5000
H_L 3.7 m LEFT	1530.077	1529.402	1528.619	1527.728	1526.784	1525.839	1524.895	1523.994	1523.245	1522.691	1522.350	1522.161	1522.123	1522.236	1522.500	1522.897	1523.312
H_C ON ℄	1529.857	1529.182	1528.399	1527.508	1526.563	1525.619	1524.693	1523.899	1523.256	1522.765	1522.424	1522.235	1522.197	1522.310	1522.574	1522.971	1523.386
H_R 3.7 m RIGHT	1529.637	1528.962	1528.179	1527.288	1526.343	1525.398	1524.490	1523.803	1523.182	1522.691	1522.350	1522.161	1522.123	1522.236	1522.500	1522.897	1523.312
GROUND LEVELS ON CENTRE LINE	1528.506	1527.855	1525.092	1522.890	1524.589	1525.145	1522.637	1521.451	1521.911	1523.635	1521.703	1522.434	1522.469	1522.411	1522.412	1522.754	1522.872

SUPERELEVATION: -2.000; 4.920 / -4.920; -2.000; 5.950 / -5.950; -2.000

GUARD RAIL LEFT
KERB OR PAVING LEFT
SURFACED SHOULDER LEFT
SURFACED SHOULDER RIGHT
KERB OR PAVING RIGHT
GUARD RAIL RIGHT

HORIZONTAL ALIGNMENT: Direction 308°; 4281.345 BCC Curve 5 Right Radius=800.000 Angle=3° 4320.725 ECC; Direction 311°; 4624.132 BCC Curve 6 Right Radius=500.000 Angle=22° ECC 4815.063; Direction 333°

DRAINAGE — KILOMETRE DISTANCE SIZE AND ANGLE Ø: (9) km 4.370 000, 3 / 1200 x 1200 BC, θ = 90 Deg

FOR INFORMATION ONLY

No	DATUM DATE	WYSIGINGS / AMENDMENTS	nms Hoof v. Dept. for Head of Dept.	DATUM DATE
AA	18/12/2012	For Approval		

SURVEYED BY: Lidar Survey, Received 25/10/2011, From Xstrata. HANDTEK / SIGNTR. DATUM / DATE

ONTWERP VIR / DESIGNED FOR: TWEEFONTEIN PROJECT, XSTRATA COAL SA

ONTWERP DEUR / DESIGNED BY: JEFFARES & GREEN PTY (Ltd), ENGINEERING AND ENVIRONMENTAL CONSULTING. TEL. (012) 349-7900, FAX. (012) 349-7979, E-MAIL jgipta@jgi.co.za, P.O. BOX 2973 PRETORIA 0001

ONTWERP GOEDGEKEUR / DESIGN APPROVED: PR 980444, nms Raadgewende Ingenieur for Consulting Engineers, DATUM/DATE:

GOEDGEKEUR DEUR / APPROVED BY: nms Hoof van Departement for Head of Department, DATUM/DATE:

ONTWERP DEUR / DESIGNED BY	JN
NAGESIEN DEUR / CHECKED BY	CCLR
GETEKEN DEUR / DRAWN BY	RR
NAGESIEN DEUR / CHECKED BY	CCLR

MPUMALANGA REGERING OPENBARE WERKE, PAAIE EN VERVOER — MPUMALANGA — MPUMALANGA GOVERNMENT PUBLIC WORKS, ROADS AND TRANSPORT

REALIGNMENT OF PROVINCIAL ROADS

LONGITUDINAL SECTION km 4.000 TO km 5.000 (SHEET 5 of 8)

SKAAL / SCALE: H 1:1000, V 1:100

LÊER Nr / FILE No: --

TIPE ONTWERP / TYPE OF PLANNING: PRELIMINARY DESIGN

DISTRIK / DISTRICT: NKANGALA

PAD Nr / ROAD No: P141/1 & D2769

PROVINSIE PLAN Nr / PROVINCE PLAN No: MRS 06/--/05Ls

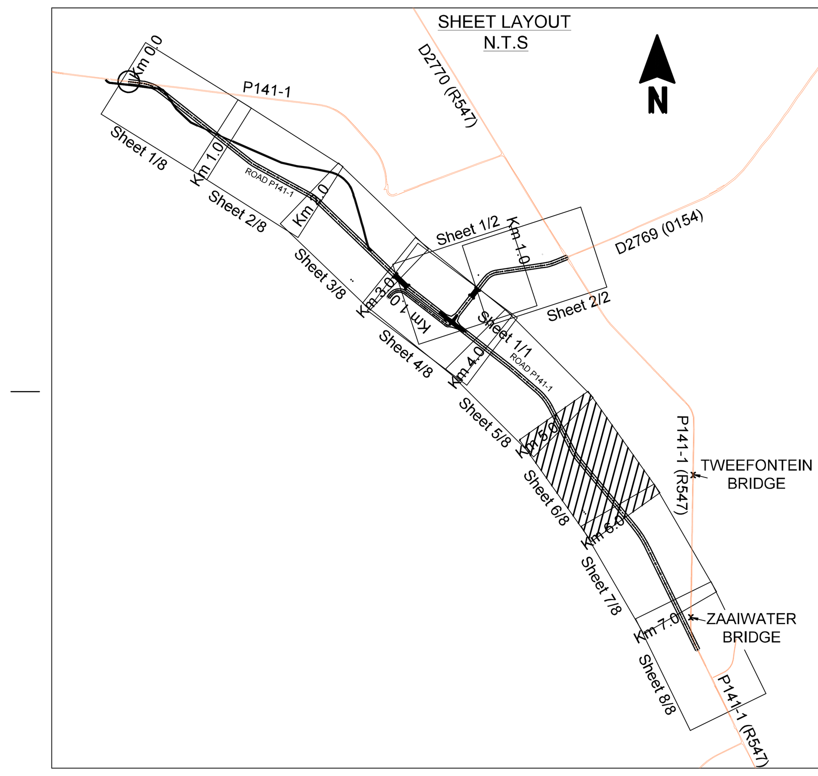
XSTRATA COAL PLAN Nr / PLAN No: TOP-J&G-5003-CV-1112

PROVINCE PLAN No MRS 06/--/05Ls
XSTRATA COAL PLAN No TOP-J&G-5003-CV-01-1112

W:\002398 - Tweefontein Re-alignment (CC le Roux)\03 Drawings\Working Drawings\Alternative 2012\Preliminary Design\Rev AB/2398JN_TOP-J&G-5003-CV-01-1112.dr4

REFERENCE DRAWINGS		TITLE	SIGNATURE	TITLE	SIGNATURE
DRG No.	DESCRIPTION	MECHANICAL		DRAWN BY	
		PROCESS		CHECK BY	
		PIPING		MANAGER ENGINEERING	
		CIVIL		TECHNICAL PROJECT MANAGER	
		STRUCTURAL		AREA MANAGER	
		ELECTRICAL/INSTRUMENTATION		CLIENT	

SETTING OUT DATA AND REFERENCE PEGS



DESIGN SPEED = 100 Km/h

CENTRE LINE

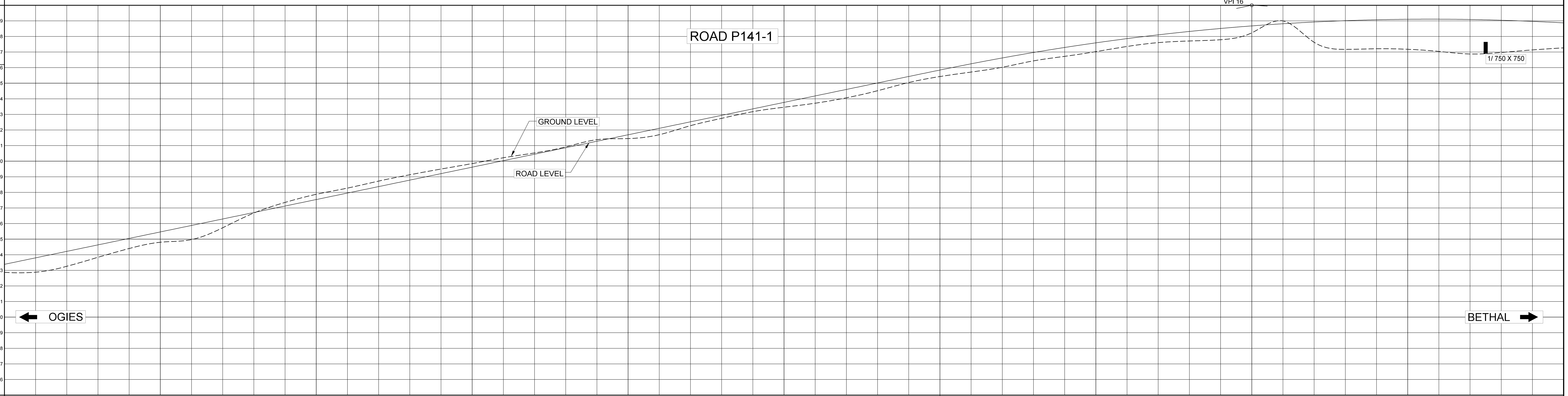
4m 8m

"AS BUILT" NOTE

DESIGN SPEED
100 km/h

20.000m | 20.000m | 3.700m | 3.700m | H_L | H_C | H_R | C_L | GRADE LINE

PROFILE OF GRADE LINE



5m ON ORIGINAL PLAN

SKEW ANGLE Ø FLOW INCREASING KM DISTANCE

CULVERT SKEW ANGLE

0 10 20 30 40 50

50m ON ORIGINAL PLAN

VERTICAL CURVES: BVC 5600.0 — 400.0m VC, K = 151.4

GRADE: 2.077 % — 5800.000 1540.000 — -0.564 % — 6000.000 1536.077

SUPERELEVATION: -2.000 / 5.950 / -5.950 / -2.000

FINAL ROAD LEVELS: H_L 3.7 m LEFT; H_C ON ℄; H_R 3.7 m RIGHT

CHAINAGE m	H_L 3.7 m LEFT	H_C ON ℄	H_R 3.7 m RIGHT	GROUND LEVELS ON CENTRE LINE
5000	1523.312	1523.386	1523.312	1522.872
5020	1523.727	1523.801	1523.727	1522.758
5040	1524.143	1524.217	1524.143	1523.232
5060	1524.558	1524.632	1524.558	1523.842
5080	1524.973	1525.047	1524.973	1524.414
5100	1525.389	1525.463	1525.389	1524.898
5120	1525.804	1525.878	1525.804	1524.806
5140	1526.220	1526.294	1526.220	1525.708
5160	1526.635	1526.709	1526.635	1526.746
5180	1527.050	1527.124	1527.050	1527.369
5200	1527.465	1527.540	1527.465	1527.910
5220	1527.881	1527.955	1527.932	1528.247
5240	1528.286	1528.370	1528.454	1528.741
5260	1528.594	1528.786	1528.977	1529.133
5280	1528.981	1529.201	1529.421	1529.503
5300	1529.396	1529.616	1529.836	1529.834
5320	1529.811	1530.032	1530.252	1530.243
5340	1530.246	1530.447	1530.648	1530.513
5360	1530.769	1530.862	1530.956	1530.871
5380	1531.204	1531.278	1531.264	1531.504
5400	1531.619	1531.693	1531.619	1531.391
5420	1532.034	1532.108	1532.034	1531.620
5440	1532.450	1532.524	1532.450	1532.324
5460	1532.865	1532.939	1532.865	1532.736
5480	1533.280	1533.354	1533.280	1533.212
5500	1533.696	1533.770	1533.696	1533.464
5520	1534.111	1534.185	1534.111	1533.699
5540	1534.526	1534.600	1534.526	1534.047
5560	1534.942	1535.016	1534.942	1534.494
5580	1535.357	1535.431	1535.357	1535.083
5600	1535.773	1535.847	1535.773	1535.442
5620	1536.175	1536.249	1536.175	1535.716
5640	1536.550	1536.624	1536.550	1535.988
5660	1536.900	1536.974	1536.900	1536.475
5680	1537.223	1537.297	1537.223	1536.710
5700	1537.519	1537.593	1537.519	1537.019
5720	1537.789	1537.863	1537.789	1537.371
5740	1538.033	1538.107	1538.033	1537.634
5760	1538.250	1538.324	1538.250	1537.714
5780	1538.441	1538.515	1538.441	1537.758
5800	1538.605	1538.679	1538.605	1537.985
5820	1538.743	1538.817	1538.743	1539.690
5840	1538.855	1538.929	1538.855	1537.229
5860	1538.940	1539.014	1538.940	1537.141
5880	1538.999	1539.073	1538.999	1537.232
5900	1539.031	1539.105	1539.031	1537.191
5920	1539.037	1539.111	1539.037	1537.060
5940	1539.017	1539.091	1539.017	1536.806
5960	1538.970	1539.044	1538.970	1536.966
5980	1538.897	1538.971	1538.897	1537.148
6000	1538.797	1538.871	1538.797	1537.266

GUARD RAIL LEFT
KERB OR PAVING LEFT
SURFACED SHOULDER LEFT
SURFACED SHOULDER RIGHT
KERB OR PAVING RIGHT
GUARD RAIL RIGHT

HORIZONTAL ALIGNMENT: Direction 333° — 5247.079 BCC — Curve 7 Left, Radius=500.000, Angle=12° — ECC 5354.685 — Direction 320°

DRAINAGE — KILOMETRE DISTANCE SIZE AND ANGLE Ø: (10) km 5.950 000, 1 / 750 x 750 BC, θ = 90 Deg

FOR INFORMATION ONLY

No	DATUM DATE	WYSIGINGS / AMENDMENTS	nms Hoof v. Dept. for Head of Dept.	DATUM DATE
AA	18/12/2012	For Approval		

SURVEYED BY: Lidar Survey, Received 25/10/2011, From Xstrata — HANDTEK / SIGNTR. — DATUM / DATE

ONTWERP VIR / DESIGNED FOR: TWEEFONTEIN PROJECT, XSTRATA COAL SA — xstrata coal

ONTWERP DEUR / DESIGNED BY: JEFFARES & GREEN PTY (Ltd), ENGINEERING AND ENVIRONMENTAL CONSULTING — TEL. (012) 349-7900, FAX. (012) 349-7979, E-MAIL jgipta@jgi.co.za — P.O. BOX 2973, PRETORIA, 0001 — Jeffares & Green ENGINEERING AND ENVIRONMENTAL CONSULTING

ONTWERP GOEDGEKEUR / DESIGN APPROVED — PR 980444 — nms Raadgewende Ingenieur for Consulting Engineers — DATUM/DATE:

GOEDGEKEUR DEUR / APPROVED BY — nms Hoof van Departement for Head of Department — DATUM/DATE:

ONTWERP DEUR / DESIGNED BY	JN
NAGESIEN DEUR / CHECKED BY	CCLR
GETEKEN DEUR / DRAWN BY	RR
NAGESIEN DEUR / CHECKED BY	CCLR

MPUMALANGA REGERING, OPENBARE WERKE, PAAIE EN VERVOER — MPUMALANGA — MPUMALANGA GOVERNMENT, PUBLIC WORKS, ROADS AND TRANSPORT

REALIGNMENT OF PROVINCIAL ROADS

LONGITUDINAL SECTION km 5.000 TO km 6.000 (SHEET 6 of 8)

SKAAL / SCALE: H 1:1000, V 1:100

LÊER Nr / FILE No: --

TIPE ONTWERP / TYPE OF PLANNING: PRELIMINARY DESIGN

DISTRIK / DISTRICT: NKANGALA

PAD Nr / ROAD No: P141/1 & D2769

PROVINSIE PLAN Nr / PROVINCE PLAN No: MRS 06/--/06Ls

XSTRATA COAL PLAN Nr / PLAN No: TOP-J&G-5003-CV-1113

PROVINCE PLAN No MRS 06/--/06Ls
XSTRATA COAL PLAN No TOP-J&G-5003-CV-01-1113

W:\002398 - Tweefontein Re-alignment (CC le Roux)\03 Drawings\Working Drawings\Alternative 2012\Preliminary Design\Rev AB\2398JN_TOP-J&G-5003-CV-01-1113.dr4

REFERENCE DRAWINGS		TITLE	SIGNATURE	TITLE	SIGNATURE
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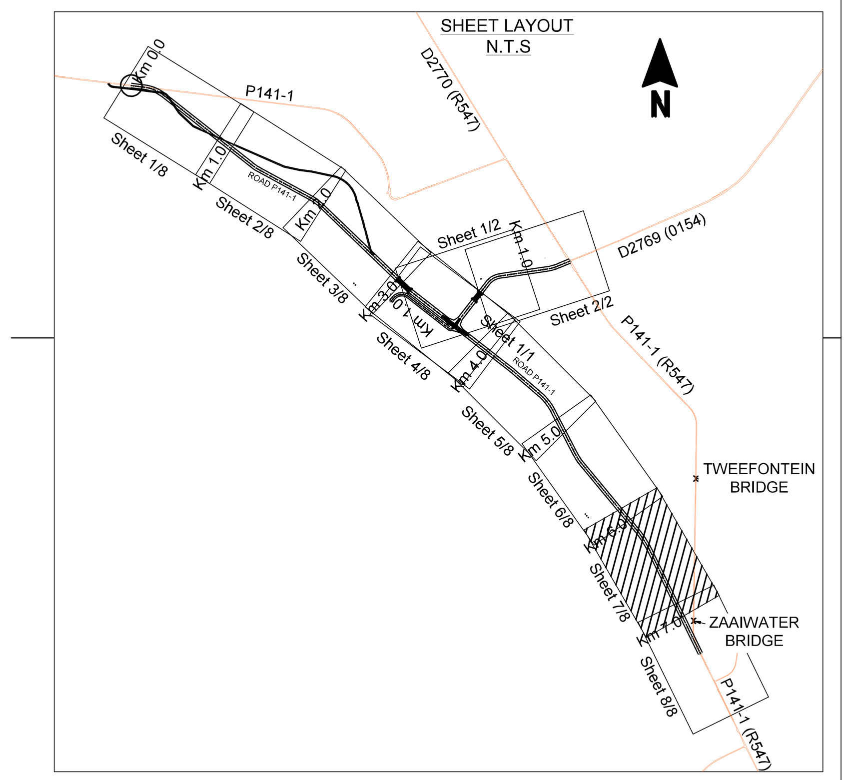
		PROCESS		CHECK BY	
		PIPING		MANAGER ENGINEERING	
		CIVIL		TECHNICAL PROJECT MANAGER	
		STRUCTURAL		AREA MANAGER	
		ELECTRICAL/INSTRUMENTATION		CLIENT	

SETTING OUT DATA AND REFERENCE PEGS



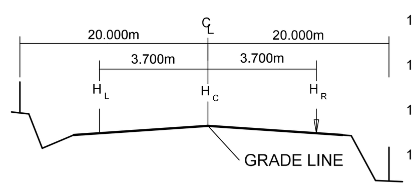
DESIGN SPEED = 100 Km/h

CENTRE LINE

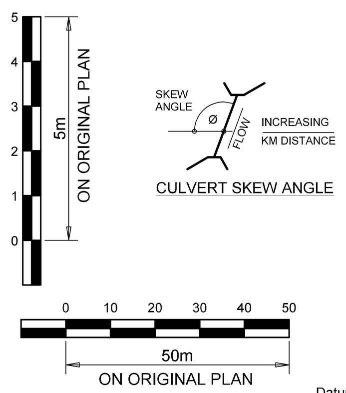
4m 8m

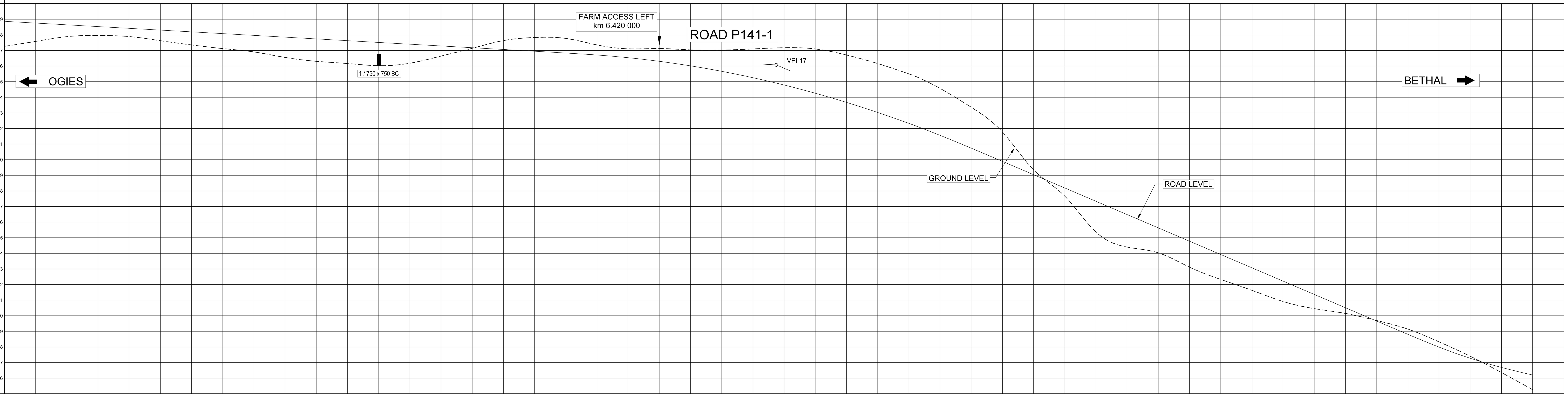
"AS BUILT" NOTE

DESIGN SPEED
100 km/h



PROFILE OF GRADE LINE





VERTICAL CURVES: BVC 6370.0 — 250.0m VC, K = 67.6 — 6620.0 EVC; BVC 6910.0 — 180.0m VC, K = 30.4

GRADE: -0.564 % — 6495.000 | 1536.077 — -4.264 % — 7000.000 1514.545

SUPERELEVATION: -2.000; 5.320; -5.320; -2.000

CHAINAGE m	FINAL ROAD LEVELS H_L 3.7 m LEFT	FINAL ROAD LEVELS H_C ON ℄	FINAL ROAD LEVELS H_R 3.7 m RIGHT	GROUND LEVELS ON CENTRE LINE
6000	1538.797	1538.871	1538.797	1537.266
6020	1538.684	1538.758	1538.684	1537.566
6040	1538.571	1538.645	1538.571	1537.970
6060	1538.458	1538.532	1538.458	1537.961
6080	1538.360	1538.420	1538.346	1537.945
6100	1538.346	1538.307	1538.233	1537.617
6120	1538.332	1538.194	1538.056	1537.353
6140	1538.278	1538.081	1537.884	1537.108
6160	1538.165	1537.968	1537.771	1536.956
6180	1538.052	1537.855	1537.658	1536.521
6200	1537.939	1537.742	1537.545	1536.284
6220	1537.826	1537.629	1537.432	1536.184
6240	1537.713	1537.516	1537.320	1535.965
6260	1537.600	1537.403	1537.207	1536.120
6280	1537.487	1537.291	1537.094	1536.654
6300	1537.375	1537.178	1536.981	1537.118
6320	1537.262	1537.065	1536.868	1537.710
6340	1537.108	1536.952	1536.796	1537.855
6360	1536.896	1536.839	1536.765	1537.870
6380	1536.678	1536.719	1536.645	1537.306
6400	1536.473	1536.547	1536.473	1537.041
6420	1536.241	1536.315	1536.241	1537.173
6440	1535.951	1536.025	1535.951	1537.012
6460	1535.601	1535.675	1535.601	1537.012
6480	1535.192	1535.266	1535.192	1537.097
6500	1534.724	1534.798	1534.724	1537.201
6520	1534.197	1534.271	1534.197	1537.167
6540	1533.611	1533.685	1533.611	1536.727
6560	1532.965	1533.039	1532.965	1536.191
6580	1532.260	1532.334	1532.260	1535.502
6600	1531.496	1531.570	1531.496	1534.613
6620	1530.673	1530.747	1530.673	1533.370
6640	1529.820	1529.895	1529.820	1532.078
6660	1528.968	1529.042	1528.968	1529.001
6680	1528.115	1528.189	1528.115	1528.007
6700	1527.262	1527.336	1527.262	1524.967
6720	1526.409	1526.484	1526.409	1524.307
6740	1525.557	1525.631	1525.557	1524.211
6760	1524.704	1524.778	1524.704	1523.039
6780	1523.851	1523.925	1523.851	1522.319
6800	1522.998	1523.073	1522.998	1521.652
6820	1522.146	1522.220	1522.146	1520.853
6840	1521.293	1521.367	1521.293	1520.424
6860	1520.440	1520.514	1520.440	1520.195
6880	1519.587	1519.661	1519.587	1519.690
6900	1518.735	1518.809	1518.735	1519.215
6920	1517.898	1517.972	1517.898	1518.326
6940	1517.177	1517.251	1517.177	1517.445
6960	1516.588	1516.662	1516.588	1516.373
6980	1516.130	1516.204	1516.130	1515.264

GUARD RAIL LEFT
KERB OR PAVING LEFT
SURFACED SHOULDER LEFT
SURFACED SHOULDER RIGHT
KERB OR PAVING RIGHT
GUARD RAIL RIGHT

HORIZONTAL ALIGNMENT: Direction 320° — 6113.640 BCC — Curve 8 Right, Radius=1000.000, Angle=14° — ECC 6350.000 — Direction 334°

DRAINAGE — KILOMETRE DISTANCE SIZE AND ANGLE Ø: (11) km 6.240, 1 / 750 x 750 BC, θ = 90 Deg

FOR INFORMATION ONLY

No	DATUM DATE	WYSIGINGS / AMENDMENTS	nms Hoof v. Dept. for Head of Dept.	DATUM DATE
AA	18/12/2012	For Approval		

SURVEYED BY: Lidar Survey, Received 25/10/2011, From Xstrata
HANDTEK / SIGNTR. DATUM / DATE

ONTWERP VIR / DESIGNED FOR: TWEEFONTEIN PROJECT, XSTRATA COAL SA
xstrata coal

ONTWERP DEUR / DESIGNED BY: JEFFARES & GREEN PTY (Ltd)
ENGINEERING AND ENVIRONMENTAL CONSULTING
TEL. (012) 349-7900
FAX. (012) 349-7979
E-MAIL jgipta@jgi.co.za
P.O. BOX 2973
PRETORIA
0001
Jeffares & Green
ENGINEERING AND ENVIRONMENTAL CONSULTING

ONTWERP GOEDGEKEUR / DESIGN APPROVED
PR 980444
nms Raadgewende Ingenieur / for Consulting Engineers
DATUM/DATE:

GOEDGEKEUR DEUR / APPROVED BY
nms Hoof van Departement / for Head of Department
DATUM/DATE:

ONTWERP DEUR / DESIGNED BY	JN
NAGESIEN DEUR / CHECKED BY	CCLR
GETEKEN DEUR / DRAWN BY	RR
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MPUMALANGA REGERING / OPENBARE WERKE, PAAIE EN VERVOER
MPUMALANGA
MPUMALANGA GOVERNMENT / PUBLIC WORKS, ROADS AND TRANSPORT

REALIGNMENT OF PROVINCIAL ROADS

LONGITUDINAL SECTION km 6.000 TO km 7.000 (SHEET 7 of 8)

SKAAL / SCALE: H 1:1000, V 1:100
LÊER Nr / FILE No: --
TIPE ONTWERP / TYPE OF PLANNING: PRELIMINARY DESIGN
DISTRIK / DISTRICT: NKANGALA
PAD Nr / ROAD No: P141/1 & D2769
PROVINSIE PLAN Nr / PROVINCE PLAN No: MRS 06/--/07Ls
XSTRATA COAL PLAN Nr / PLAN No: TOP-J&G-5003-CV-1114

W:\002398 - Tweefontein Re-alignment (CC le Roux)\03 Drawings\Working Drawings\Alternative 2012\Preliminary Design\Rev AB2398JN_TOP-J&G-5003-CV-01-1114.dr4

PROVINCE PLAN No MRS 06/--/07Ls
XSTRATA COAL PLAN No TOP-J&G-5003-CV-01-1114

REFERENCE DRAWINGS		TITLE	SIGNATURE	TITLE	SIGNATURE
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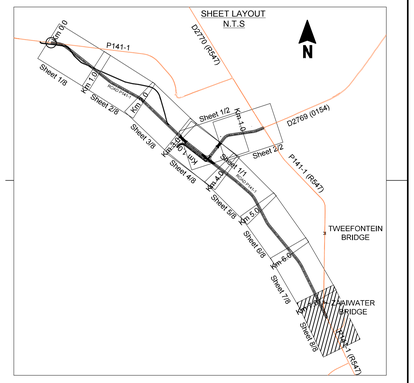
		PROCESS		CHECK BY	
		PIPING		MANAGER ENGINEERING	
		CIVIL		TECHNICAL PROJECT MANAGER	
		STRUCTURAL		AREA MANAGER	
		ELECTRICALINSTRUMENTATION		CLIENT	

SETTING OUT DATA AND REFERENCE PEGS



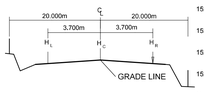
DESIGN SPEED = 100 Km/h

CENTRE LINE

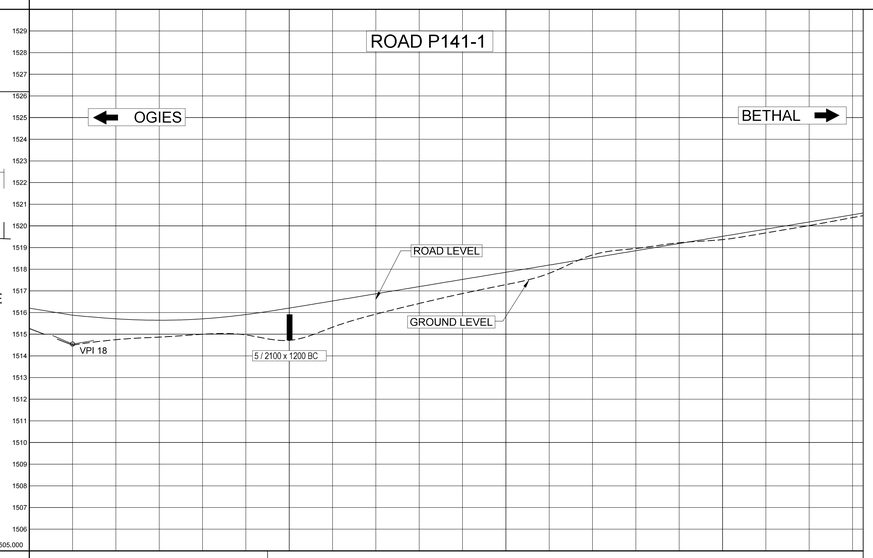
4m 8m

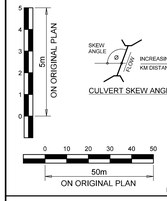
"AS BUILT" NOTE

DESIGN SPEED
100 km/h



PROFILE OF GRADE LINE





VERTICAL CURVES: 180.0m VC, K = 30,4 | 7060.0 EVC

GRADE: 7000.000 | 1514.545 | 1.658 %

FINAL ROAD LEVELS																							
			1516,130	1515,803	1515,608	1515,545	1515,614	1515,814	1516,129	1516,460	1516,792	1517,123	1517,455	1517,786	1518,118	1518,449	1518,781	1519,112	1519,444	1519,775	1520,107	1520,438	1520,820
H_L	3.7 m	LEFT	1516,130	1515,803	1515,608	1515,545	1515,614	1515,814	1516,129	1516,460	1516,792	1517,123	1517,455	1517,786	1518,118	1518,449	1518,781	1519,112	1519,444	1519,775	1520,107	1520,438	1520,820
H_C		ON ℄	1516,204	1515,877	1515,682	1515,619	1515,688	1515,888	1516,203	1516,534	1516,866	1517,197	1517,529	1517,860	1518,192	1518,523	1518,855	1519,186	1519,518	1519,849	1520,181	1520,512	1520,894
H_R	3.7 m	RIGHT	1516,130	1515,803	1515,608	1515,545	1515,614	1515,814	1516,129	1516,460	1516,792	1517,123	1517,455	1517,786	1518,118	1518,449	1518,781	1519,112	1519,444	1519,775	1520,107	1520,438	1520,820

SUPERELEVATION: -2.000

GROUND LEVELS ON CENTRE LINE	1515,264	1514,498	1514,803	1514,835	1515,018	1515,083	1514,455	1515,388	1515,937	1516,423	1516,889	1517,289	1517,685	1518,840	1518,908	1519,278	1519,309	1519,669	1519,999	1520,388	1520,479
CHAINAGE m	6980	7000	7020	7040	7060	7080	7100	7120	7140	7160	7180	7200	7220	7240	7260	7280	7300	7320	7340	7360	7365

GUARD RAIL LEFT
KERB OR PAVING LEFT
SURFACED SHOULDER LEFT
SURFACED SHOULDER RIGHT
KERB OR PAVING RIGHT
GUARD RAIL RIGHT

HORIZONTAL ALIGNMENT: Direction 334°

DRAINAGE — KILOMETRE DISTANCE SIZE AND ANGLE Ø: (12) km 7,100 4 / 2100 x 1200 BC 0 = 90 Deg

FOR INFORMATION ONLY

No	DATUM DATE	WYSIGINGS / AMENDMENTS	nms Hoof v. Dept. for Head of Dept.	DATUM DATE
AA	18/12/2012	For Approval		

SURVEYED BY: Lidar Survey, Received 25/10/2011, From Xstrata — HANDTEK / SIGNTR. DATUM / DATE

ONTWERP VIR / DESIGNED FOR: TWEEFONTEIN PROJECT, XSTRATA COAL SA

ONTWERP DEUR / DESIGNED BY: JEFFARES & GREEN PTY (Ltd), ENGINEERING AND ENVIRONMENTAL CONSULTING. TEL. (012) 349-7900, FAX. (012) 349-7979, E-MAIL gjpta@jg.co.za, P.O. BOX 2973 PRETORIA 0001

ONTWERP GOEDGEKEUR DESIGN APPROVED — PR 980444 nms Raadgewende Ingenieur for Consulting Engineers — DATUM/DATE: ___ ___ ___

GOEDGEKEUR DEUR APPROVED BY — nms Hoof van Departement for Head of Department — DATUM/DATE: ___ ___ ___

ONTWERP DEUR DESIGNED BY	JN
NAGESIEN DEUR CHECKED BY	CCLR
GETEKEN DEUR DRAWN BY	RR
NAGESIEN DEUR CHECKED BY	CCLR

MPUMALANGA REGERING / MPUMALANGA GOVERNMENT — OPENBARE WERKE, PAAIE EN VERVOER / PUBLIC WORKS, ROADS AND TRANSPORT — MPUMALANGA

REALIGNMENT OF PROVINCIAL ROADS

LONGITUDINAL SECTION km 7.000 TO km 7.364 (SHEET 8 of 8)

SKAAL / SCALE: H 1:1000, V 1:100

LÊER Nr / FILE No: --

TIPE ONTWERP / TYPE OF PLANNING: PRELIMINARY DESIGN

DISTRIK / DISTRICT: NKANGALA

PAD Nr / ROAD No: P141/1 & D2769

PROVINSIE PLAN Nr / PROVINCE PLAN No: MRS 06/--/08Ls

XSTRATA COAL PLAN Nr / PLAN No: TOP-J&G-5003-CV-1115

PROVINCE PLAN No: MRS 06/--/08Ls

XSTRATA COAL PLAN No: TOP-J&G-5003-CV-01-1115

W:\002398 - Tweefontein Re-alignment (CC le Roux)\03 Drawings\Working Drawings\Alternative 2012\Preliminary Design\Rev A\B2398JN_TOP-J&G-5003-CV-01-1115.dwg