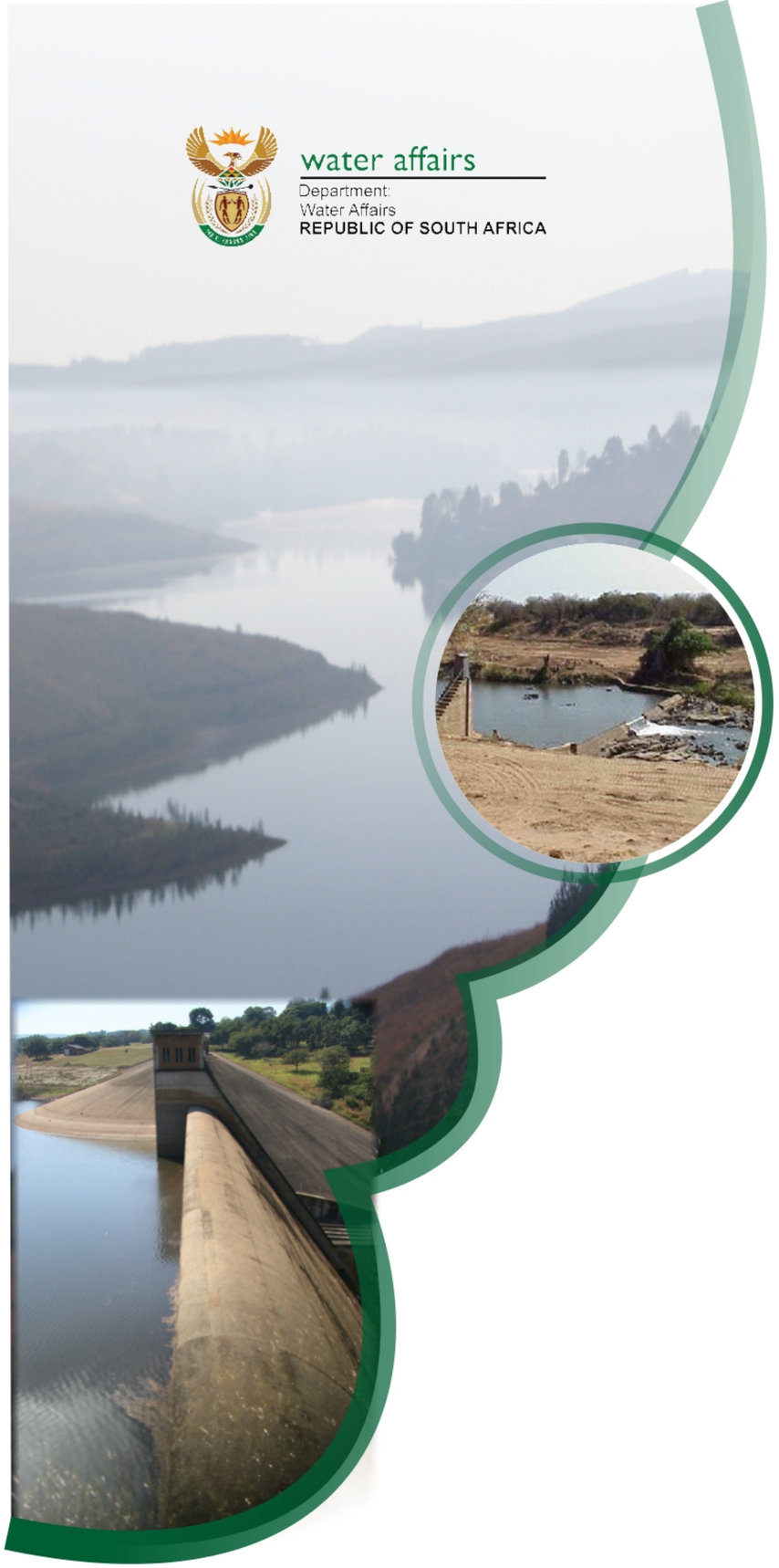
water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA



REPORT NO.: P WMA 02/B810/00/1110/4

GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP)

TECHNICAL STUDY MODULE:

Preliminary Design of Nwamitwa Dam

VOLUME 6

Annexure 4: Appendix H: Drawings

MAY 2010

aurecon

Aurecon (Pty) Ltd
PO Box 494
CAPE TOWN
South Africa 8000

in association with

Semenya Furumele Consulting
KLM Consulting Services
Urban-Econ Developmental Economics
Schoeman & Associates

W56_2010/H505701

LIST OF STUDY REPORTS IN GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (BRIDGING STUDIES)

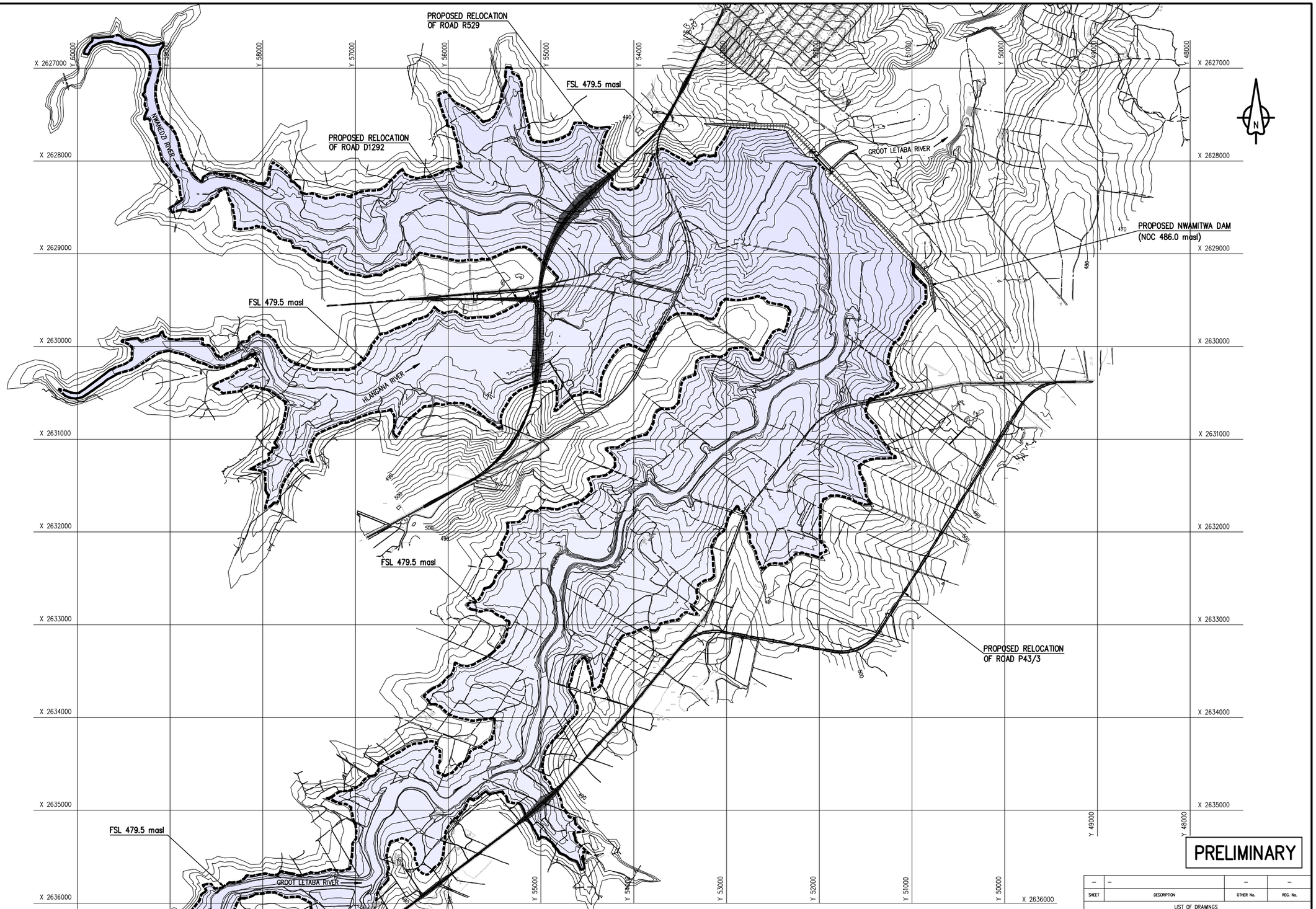
This report forms part of the series of reports, done for the bridging studies phase of the GLeWaP. All reports for the GLeWaP are listed below.

REPORT NUMBER	REPORT TITLE
P WMA 02/B810/00/0508	Project Coordination and Management Team
P WMA 02/B810/00/0508/1	Project Coordination and Management Team: Executive Summary Report: Vol 1
P WMA 02/B810/00/0508/2	Project Coordination and Management Team: Main Report: Vol 2
P WMA 02/B810/00/0508/3	Project Coordination and Management Team: Register of Decisions: Vol 3
P WMA 02/B810/00/0508/4	Project Coordination and Management Team
P WMA 02/B810/00/0508/5	Project Coordination and Management Team
P WMA 02/B810/00/0608	Technical Study Module
P WMA 02/B810/00/0608/1	Technical Study Module: Main Report: Vol 1
P WMA 02/B810/00/0608/2	Technical Study Module: Review of Water Requirements: Vol 2
P WMA 02/B810/00/0608/3	Technical Study Module: Groundwater: Vol 3
P WMA 02/B810/00/0608/4	Technical Study Module: Hydrology: Vol 4
P WMA 02/B810/00/0608/5	Technical Study Module: Water Resource Analysis: Vol 5
P WMA 02/B810/00/0608/6	Technical Study Module: Preliminary Design of Nwamitwa Dam: Vol 6
P WMA 02/B810/00/1110/1	Technical Study Module: Preliminary Design of Nwamitwa Dam: Vol 6 - Annexure 1: Appendices
P WMA 02/B810/00/1110/2	Technical Study Module: Preliminary Design of Nwamitwa Dam: Vol 6 - Annexure 2: Appendix B (Part 1): Geotechnical Investigations
P WMA 02/B810/00/1110/3	Technical Study Module: Preliminary Design of Nwamitwa Dam: Vol 6 - Annexure 3: Appendix B (Part 2): Geotechnical Investigations
P WMA 02/B810/00/1110/4	Technical Study Module: Preliminary Design of Nwamitwa Dam: Vol 6 - Annexure 4: Appendix H: Drawings
P WMA 02/B810/00/0608/7	Technical Study Module: Preliminary Design of the Raising of Tzaneen Dam: Vol 7
P WMA 02/B810/00/0608/8	Technical Study Module: Bulk Water Distribution Infrastructure: Vol 8
P WMA 02/B810/00/1110/5	Technical Study Module: Bulk Water Distribution Infrastructure: Vol 8 - Annexure 1 : Appendices
P WMA 02/B810/00/0708	Environmental Management Module
P WMA 02/B810/00/0708/1	Environmental Management Module: Scoping Report: Vol 1
P WMA 02/B810/00/0708/2	Environmental Management Module: Environmental Impact Assessment Report: Vol 2
P WMA 02/B810/00/0708/3	Environmental Management Module: Environmental Management Programme for Borrow Area 1 on the Farm Laborie 515: Vol 3
P WMA 02/B810/00/0708/4	Environmental Management Module: Environmental Management Programme for Borrow Area 2 on the Farm La Parisa 729 (Gubits Farm): Vol 4
P WMA 02/B810/00/0708/5	Environmental Management Module: Environmental Management Programme for Borrow Area 3 on the Farm Letaba Drift 727: Vol 5
P WMA 02/B810/00/0708/6	Environmental Management Module
P WMA 02/B810/00/0708/7	Environmental Management Module
P WMA 02/B810/00/0708/8	Environmental Management Module
P WMA 02/B810/00/0708/9	Environmental Management Module
P WMA 02/B810/00/0708/10	Environmental Management Module
P WMA 02/B810/00/0808	Public Involvement Program
P WMA 02/B810/00/0808/1	Public Involvement Program: Main Report: Vol 1
P WMA 02/B810/00/0808/2	Public Involvement Program
P WMA 02/B810/00/0808/3	Public Involvement Program
P WMA 02/B810/00/0808/4	Public Involvement Program
P WMA 02/B810/00/0808/5	Public Involvement Program

Appendix H.1 : Preliminary Dam Design

(Note: Electronic MS Word version excludes these drawings. Only available in pdf format.)

401775 CEN 200	Locality Plan
401775 CEN 210	General Arrangement
401775 CEN 211	Embankment Longitudinal Section
401775 CEN 212	Embankment Sections
401775 CEN 213	Proposed River Diversion Strategy – First Stage
401775 CEN 214	Proposed River Diversion Strategy – Second Stage
401775 CEN 215	Spillway Layout
401775 CEN 216	Spillway Elevation and Section
401775 CEN 217	Outlet Works Sections



PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

NOTES:

1. CO-ORDINATES IN CAPE DATUM (LO 31).
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.

LEGEND:

NOC = NON OVERSPILL CREST

FSL = FULL SUPPLY LEVEL

SCALE X 0 500 1 000 1 500 2 000m

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

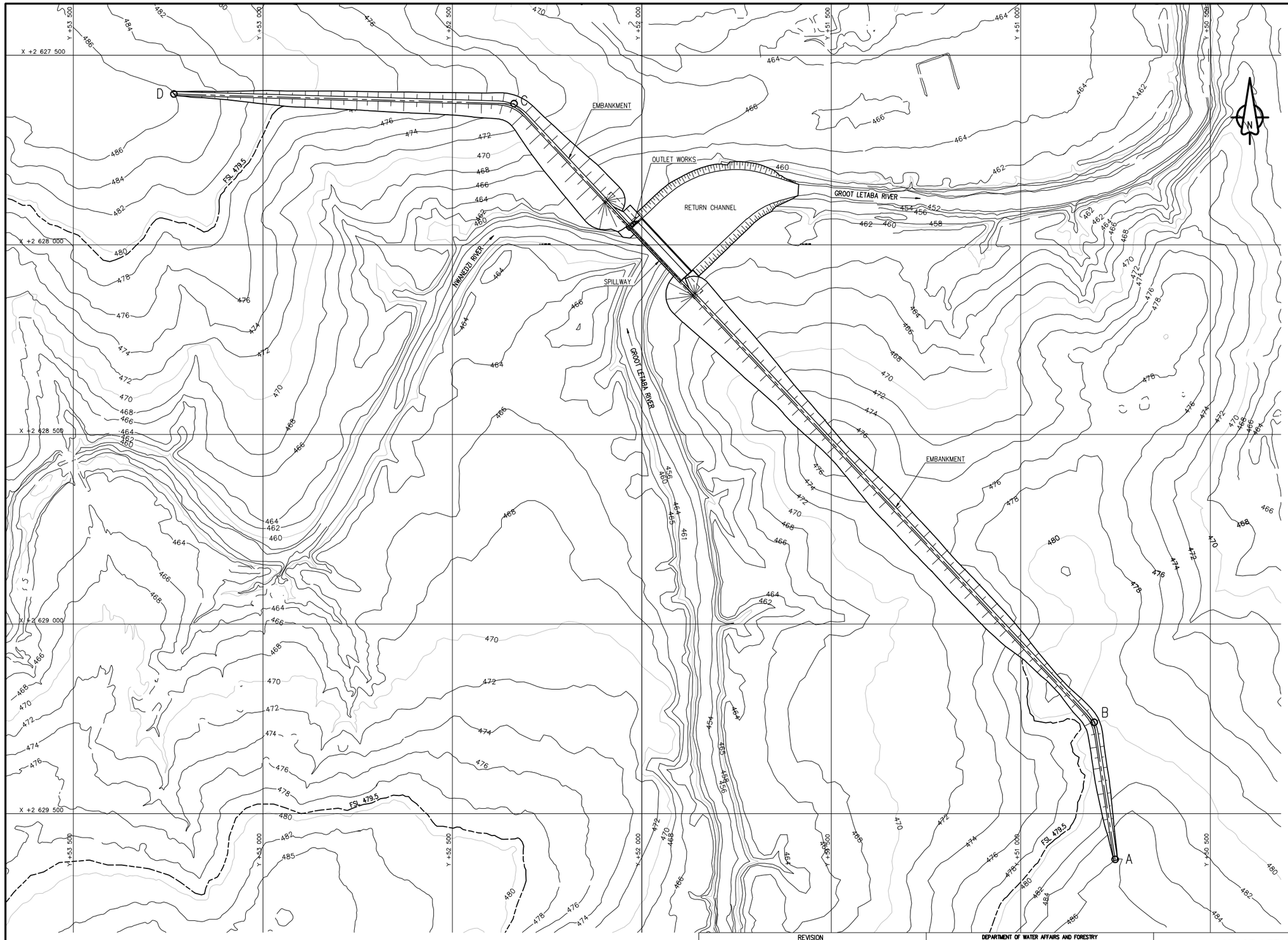
DESIGN: DI VAN WYK
DRAWN: R BOSHOFF
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

LOCALITY PLAN

PROVINCE: –
DISTRICT: –
KEYCODES: – – – – – –
OTHER NUMBER 401775 CEN 200
LOCALITY No.: –
TENDER/ CONTRACT No.
SHEET 1 OF 1
REG. No. –
REV. 00
CALCULATION FILE: –



CO-ORDINATES LO 31 (CAPE DATUM)		
POINT No	Y	X
A	50 751.10	2 629 620.50
B	50 806.44	2 629 258.81
C	52 336.94	2 627 627.54
D	53 235.00	2 627 602.01

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.
3. PRINCIPAL PARAMETERS OF LAYOUT:
   FSL 479.5 masl
   NOC 486.0 masl

LEGEND:

NOC = NON OVERSPILL CREST

FSL = FULL SUPPLY LEVEL

PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

SCALE U 0 50 100 200 300 400 500 1 000 m

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

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P. YAKO
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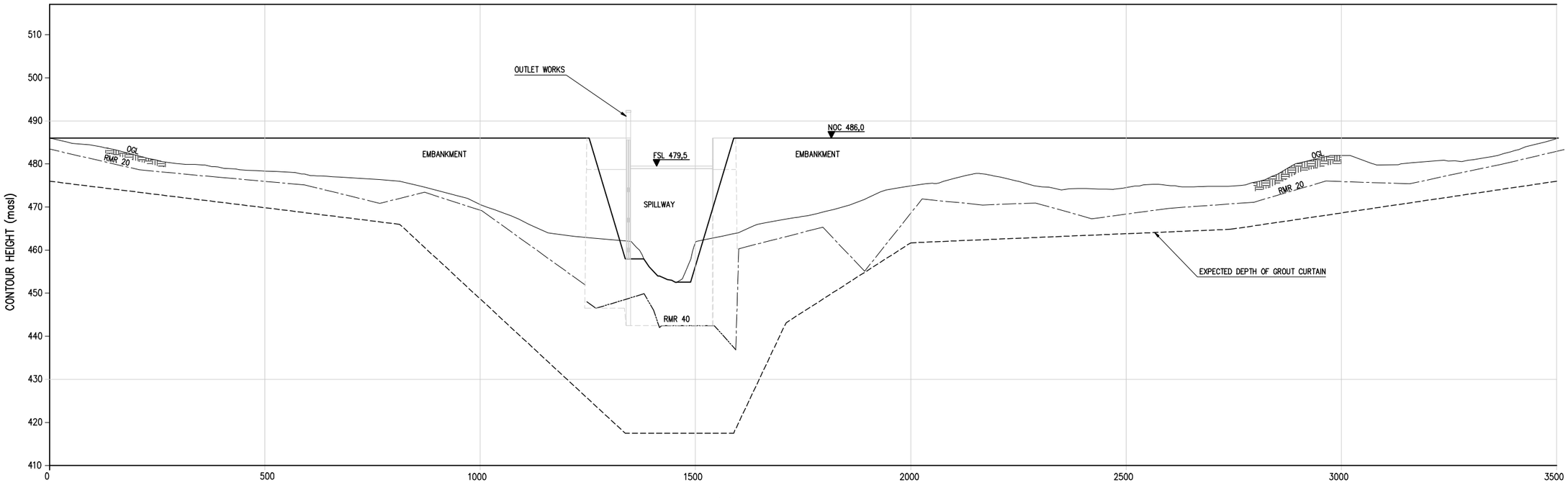
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

GENERAL ARRANGEMENT

PROVINCE: –
DISTRICT: –
KEYCODES: – – – – –
OTHER NUMBER 401775 CEN 210
LOCALITY No.: –
TENDER/ CONTRACT No.
SHEET 1 OF 1
REG. No. –
REV. 00
CALCULATION FILE: –



LONGITUDINAL SECTION ON CENTRLINE OF EMBANKMENT (VIEWED DOWNSTREAM)

HOR : N / VERT : U

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.

LEGEND:

OGL = ORIGINAL GROUND LEVEL
NOC = NON OVERSPILL CREST
FSL = FULL SUPPLY LEVEL
RMR 20 = ASSUMED FOUNDING LEVEL OF CUT-OFF TRENCH
RMR 40 = ASSUMED FOUNDING LEVEL OF SPILLWAY

PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

SCALE N 0 5 10 20 30 40 50 100 m

SCALE U 0 50 100 200 300 400 500 1 000 m

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

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P. YAKO
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DRAWN: R BOSHOFF
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ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

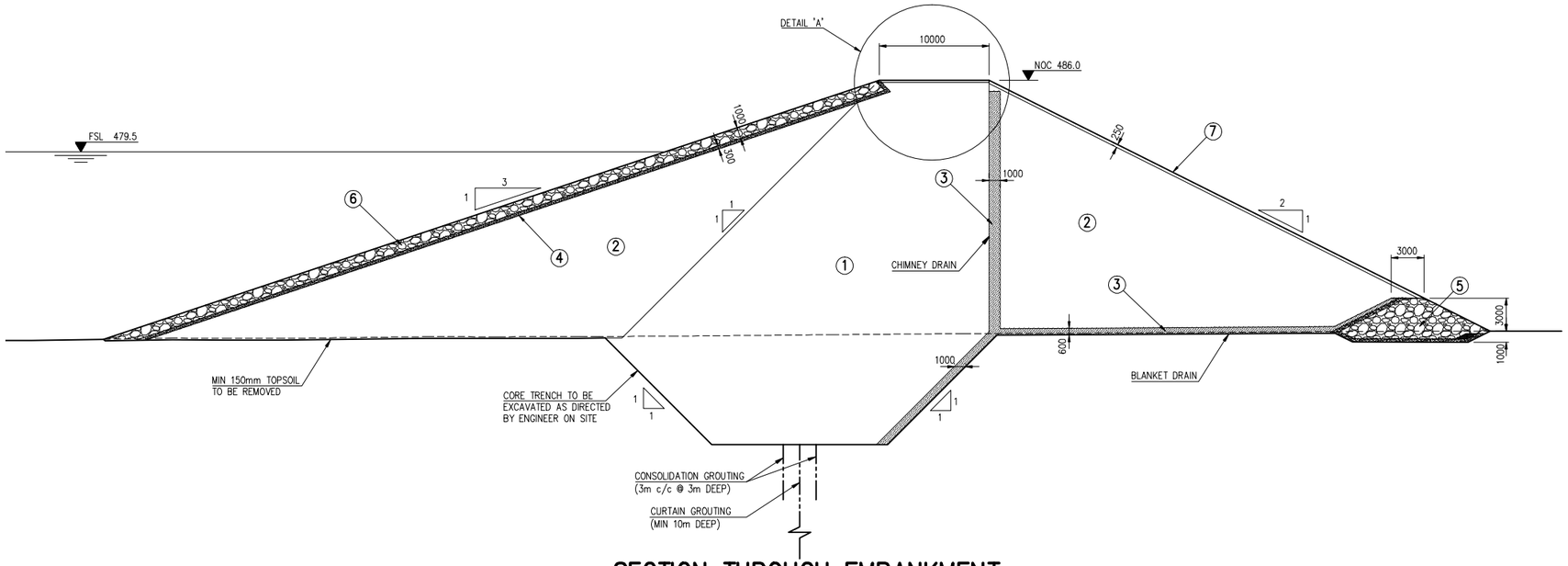
GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

EMBANKMENT
LONGITUDINAL SECTION

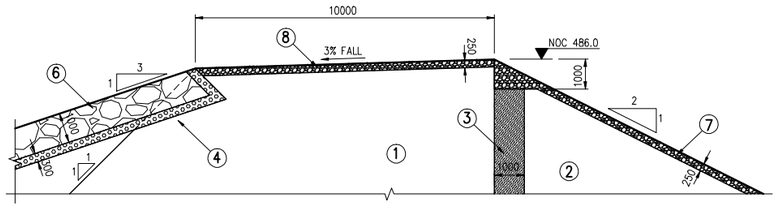
PROVINCE: – DISTRICT: –
LOCALITY No.: – TENDER/ CONTRACT No.
CALCULATION FILE: –
KEYCODES: – – – – – OTHER NUMBER 401775 CEN 211
SHEET 1 OF 1 REG. No. – REV. 00

ZONE	DESCRIPTION	MATERIAL
1	CORE	SELECTED IMPERVIOUS SILTY SAND (WEATHERED DOLERITE)
2	GENERAL FILL	UNSELECTED SILTY SAND AND GRAVEL (WEATHERED GRANITE)
3	CHIMNEY AND BLANKET DRAINS	COHESIONLESS SAND
4	TRANSITION	GRANITE GRAVEL
5	ROCK TOE	BROKEN GRANITE
6	RIP-RAP	BROKEN GRANITE
7	EROSION PROTECTION	250mm THICK LAYER OF CONTINUOUSLY GRADED AGGREGATE (6 TO 75mm)
8	GRAVEL CAPPING	GRANITE GRAVEL



SECTION THROUGH EMBANKMENT

SCALE M



DETAIL 'A'

SCALE J

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.

LEGEND:

- ROCK TOE AND RIP-RAP MATERIAL
- TRANSITION MATERIAL
- EROSION PROTECTION AND GRAVEL CAPPING
- CHIMNEY & BLANKET DRAIN MATERIAL

OGL = ORIGINAL GROUND LEVEL
NOC = NON OVERSPILL CREST
FSL = FULL SUPPLY LEVEL

SCALE J 0 1 2 3 4 5 10 20 m

SCALE M 0 5 10 15 20 25 50 m

PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

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PRIVATE BAG X313
PRETORIA 0001

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185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

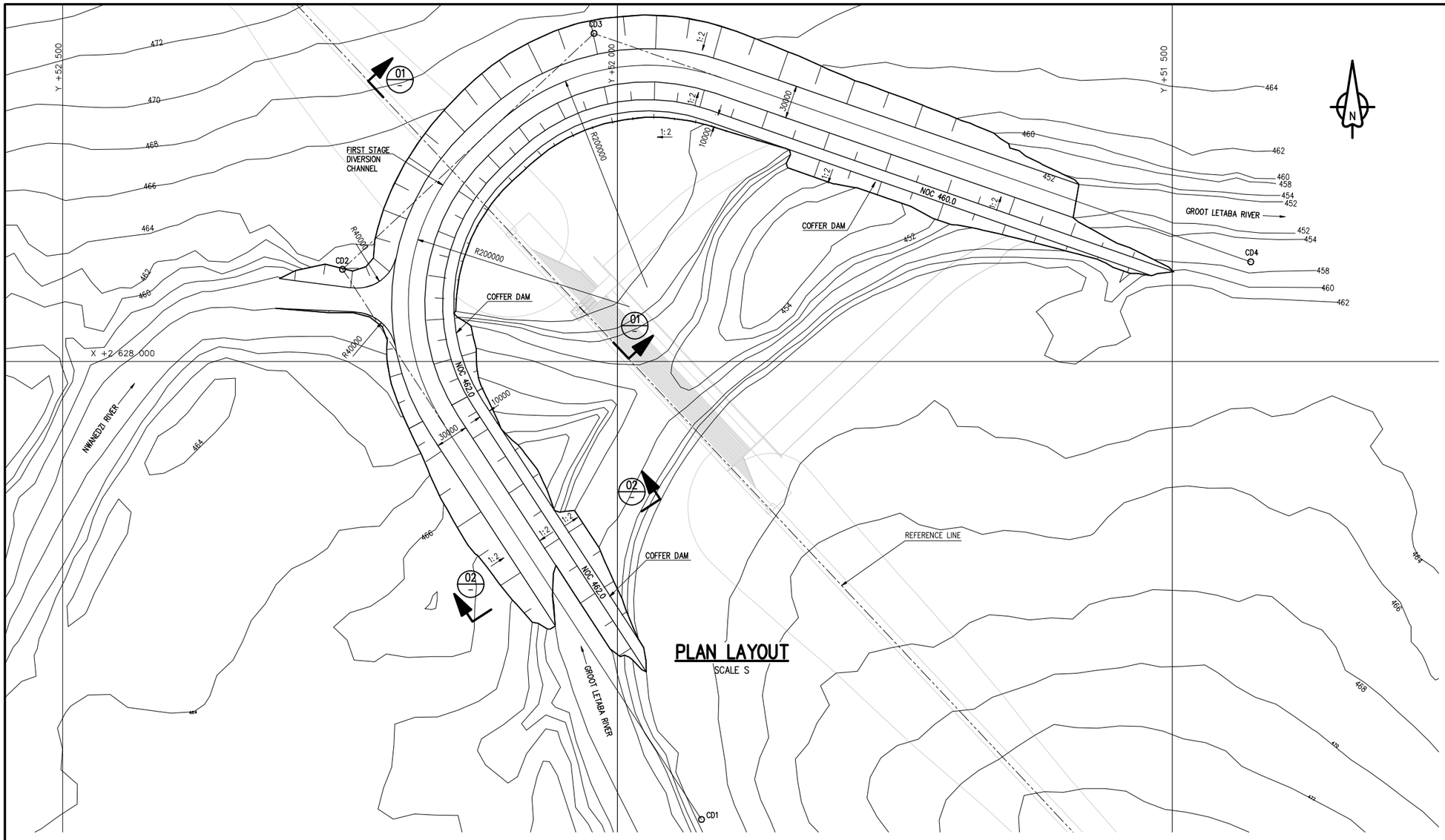
DESIGN: DI VAN WYK
DRAWN: R BOSHOFF
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

EMBANKMENT
SECTIONS

PROVINCE: – DISTRICT: –
LOCALITY No.: – TENDER/ CONTRACT No.
CALCULATION FILE: –
KEYCODES: – – – – – OTHER NUMBER 401775 CEN 212
SHEET 1 OF 1 REG. No. – REV. 00



PLAN LAYOUT

SCALE S

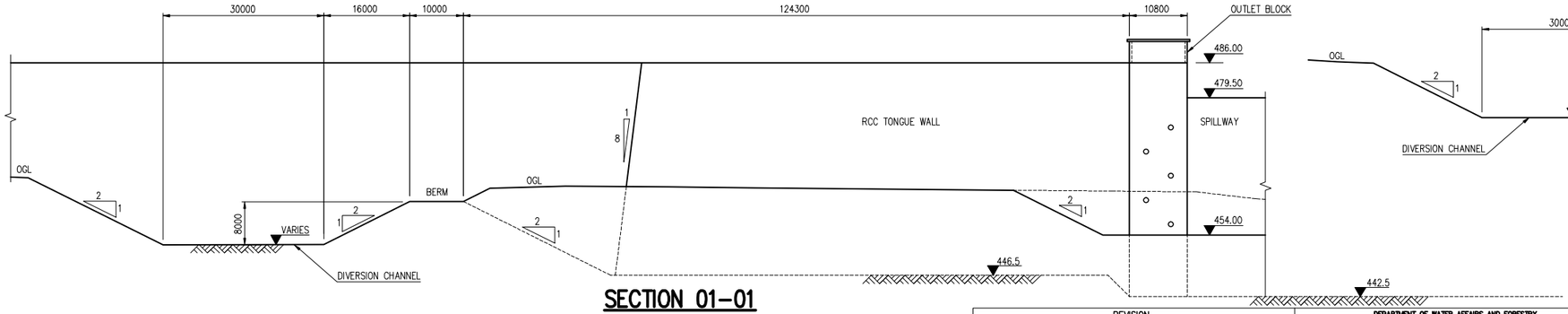
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.

LEGEND:

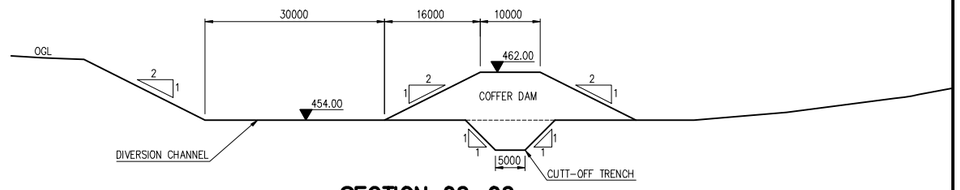
NOC = NON OVERSPILL CREST

FSL = FULL SUPPLY LEVEL



SECTION 01–01

SCALE N



SECTION 02–02

SCALE N

PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

SCALE N 0 5 10 20 30 40 50 100 m

SCALE S 0 50 100 150 200 400 m

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

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(012) 336–7500

P. YAKO
DIRECTOR GENERAL

DESIGN: DI VAN WYK
DRAWN: R BOSHOFF
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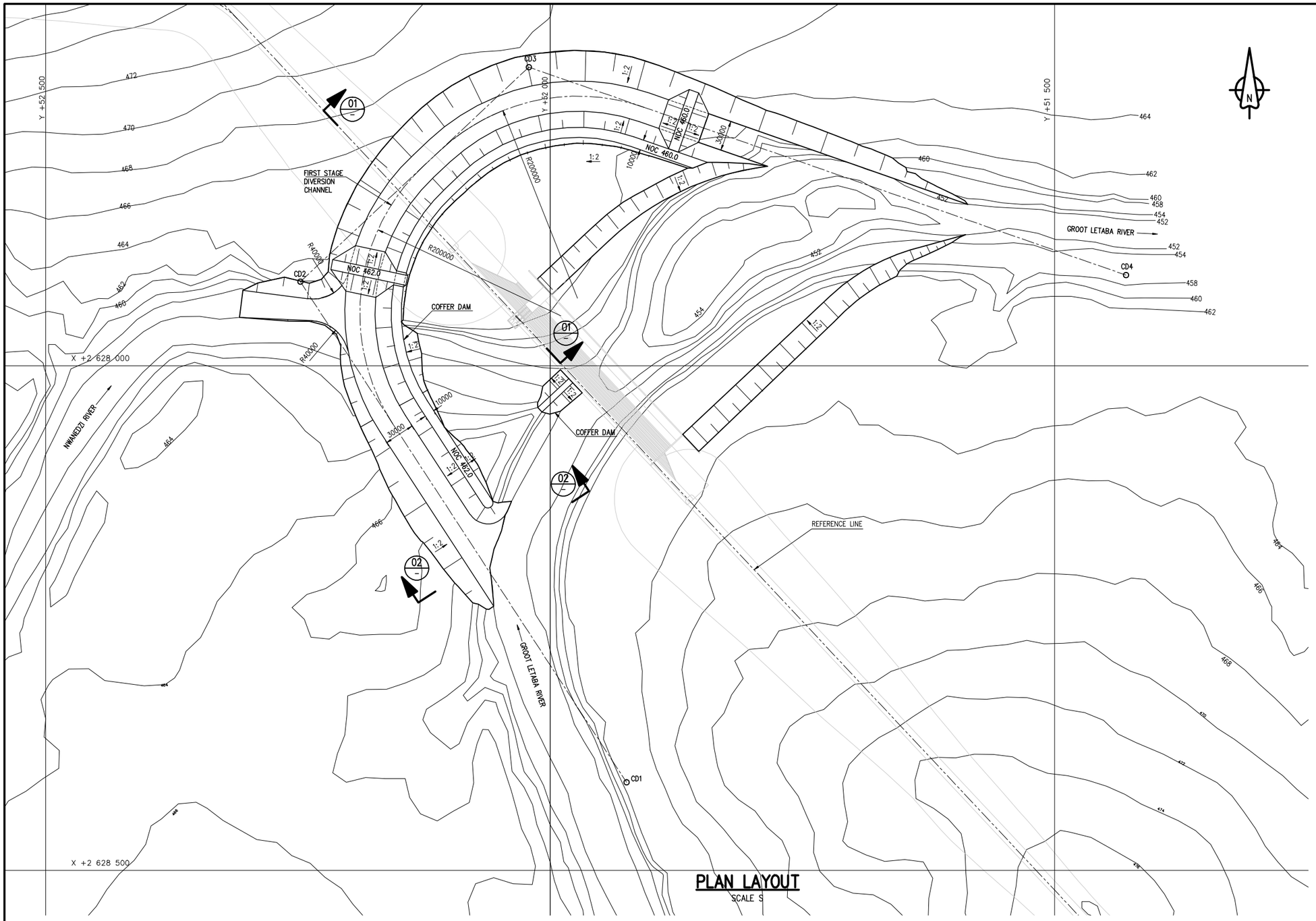
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

PROPOSED RIVER DIVERSION STRATEGY – FIRST STAGE

PROVINCE: –	DISTRICT: –	KEYCODES: – – – – – –	OTHER NUMBER 401775 CEN 213
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET 1 OF 1	REG. No. –	REV. 00
CALCULATION FILE: –			



PLAN LAYOUT

SCALE S

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.
3. PRINCIPAL PARAMETERS OF LAYOUT:
   FSL 479.5 masl
   NOC 486.0 masl

LEGEND:

NOC = NON OVERSPILL CREST

FSL = FULL SUPPLY LEVEL

PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

SCALE S 0 50 100 150 200 400 m

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

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185 SCHOEMAN STREET
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P. YAKO
DIRECTOR GENERAL

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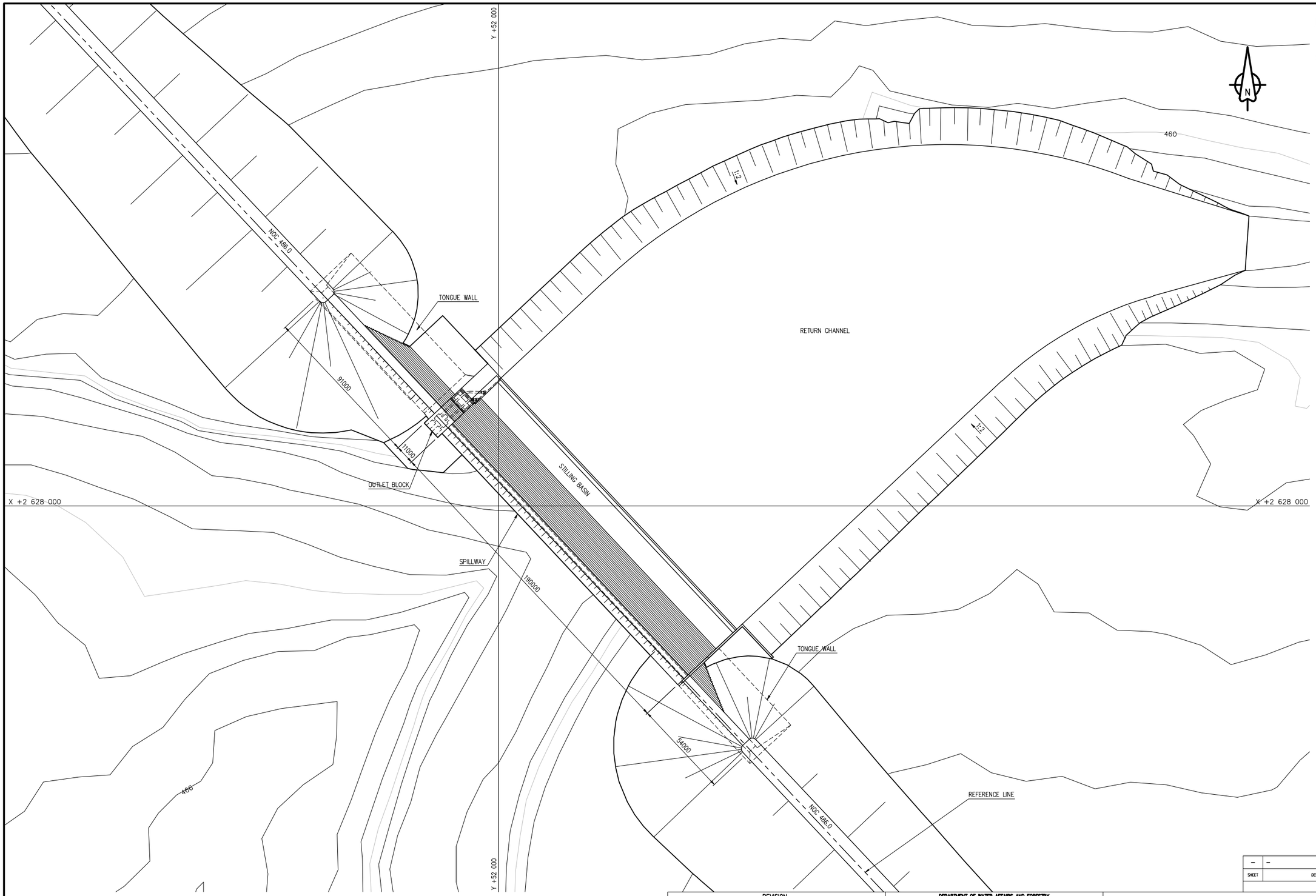
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

PROPOSED RIVER DIVERSION STRATEGY – SECOND STAGE

PROVINCE: –	DISTRICT: –	KEYCODES:	–	–	–	–	–	OTHER NUMBER	401775 CEN 214		
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET	REG. No.							REV.	
CALCULATION FILE: –		1 OF 1	–							00	



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.

LEGEND:

OGL = ORIGINAL GROUND LEVEL
ARL = ASSUMED ROCK LEVEL
NOC = NON OVERSPILL CREST
FSL = FULL SUPPLY LEVEL

PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

SCALE Q 0 5 10 20 30 40 50 100 200 m

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

DESIGN: DI VAN WYK
DRAWN: R BOSHOFF
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

SPILLWAY
LAYOUT

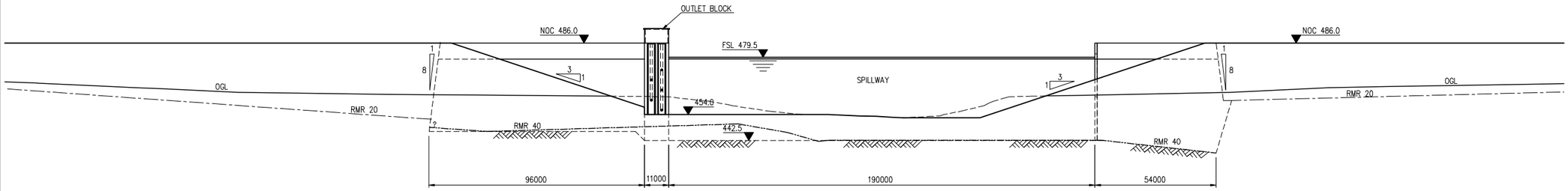
PROVINCE: –
DISTRICT: –
KEYCODES: – – – – – –
OTHER NUMBER 401775 CEN 215
LOCALITY No.: –
TENDER/ CONTRACT No.
SHEET 1 OF 1
REG. No. –
REV. 00
CALCULATION FILE: –

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.

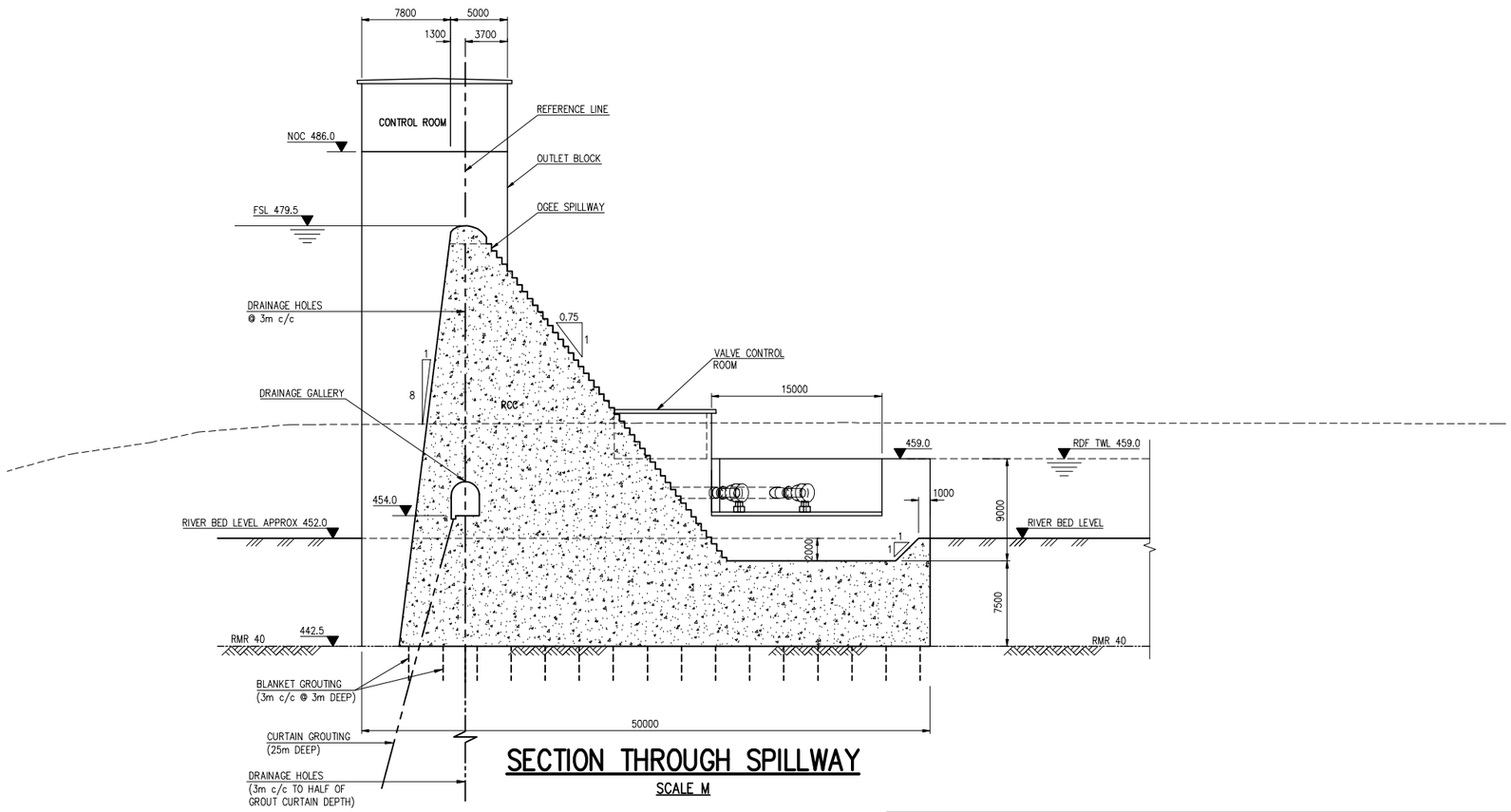
LEGEND:

OGL = ORIGINAL GROUND LEVEL
NOC = NON OVERSPILL CREST
FSL = FULL SUPPLY LEVEL
TWL = TAIL WATER LEVEL
RDF = RECOMMENDED DESIGN FLOOD
RMR 20 = ASSUMED FOUNDING LEVEL OF CUT-OFF TRENCH
RMR 40 = ASSUMED FOUNDING LEVEL OF SPILLWAY



UPSTREAM ELEVATION

SCALE Q



SECTION THROUGH SPILLWAY

SCALE M

PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
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PRIVATE BAG X313
PRETORIA 0001

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(012) 336-7500

P. YAKO
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CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

SPILLWAY
ELEVATION AND SECTION

PROVINCE: –
DISTRICT: –
KEYCODES: – – – – – –
OTHER NUMBER 401775 CEN 216
LOCALITY No.: –
TENDER/ CONTRACT No.
SHEET 1 OF 1
REG. No. –
REV. 00
CALCULATION FILE: –

SCALE M 0 5 10 15 20 25 50 m

SCALE Q 0 5 10 20 30 40 50 100 200 m

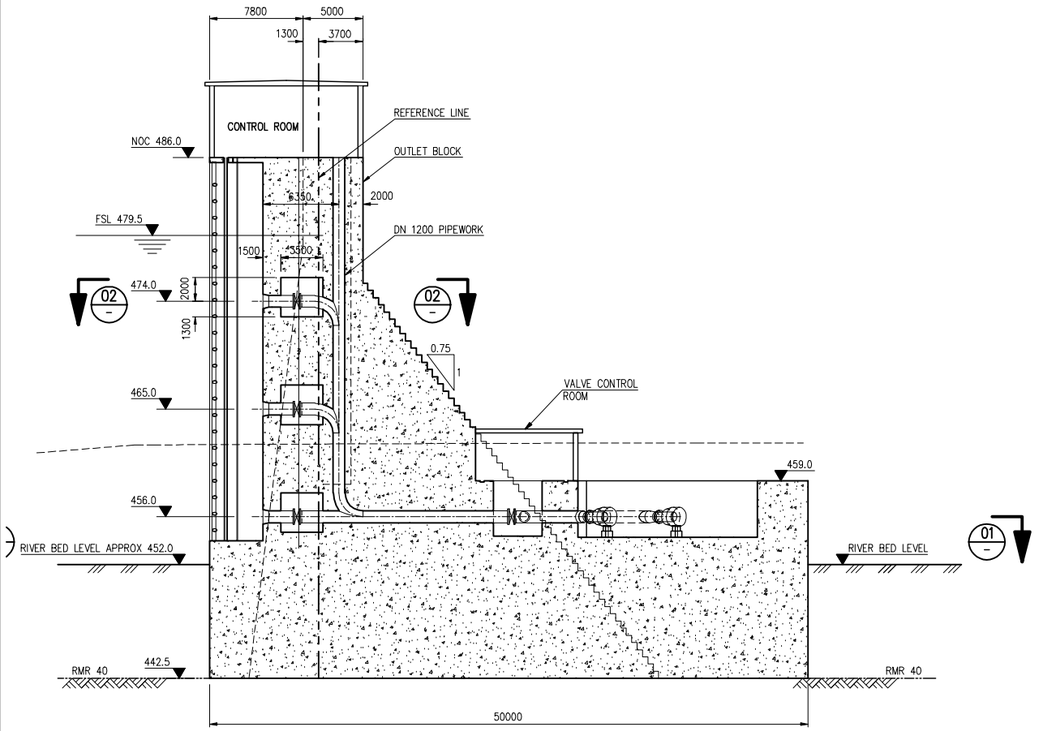
FOR TENDER PURPOSES ONLY

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ALL LEVELS ARE IN METRES ABOVE SEA LEVEL.
3. PIPEWORK TO WATER TREATMENT WORKS NOT SHOWN.

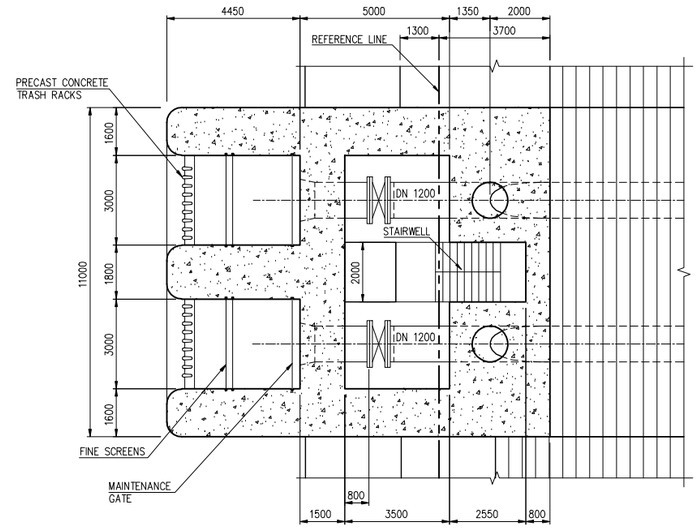
LEGEND:

OGL = ORIGINAL GROUND LEVEL
ARL = ASSUMED ROCK LEVEL
NOC = NON OVERSPILL CREST
FSL = FULL SUPPLY LEVEL
TWL = TAIL WATER LEVEL
RDF = RECOMMENDED DESIGN FLOOD



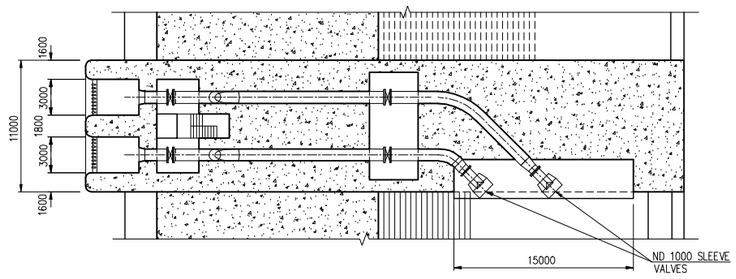
DEVELOPED SECTION THROUGH OUTLET WORKS

SCALE M



SECTION 02–02

SCALE J



SECTION 01–01

SCALE M

PRELIMINARY

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

DESIGN: DI VAN WYK
DRAWN: R BOSHOFF
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

OUTLET WORKS
SECTIONS

PROVINCE: –
DISTRICT: –
KEYCODES: – – – – – –
OTHER NUMBER 401775 CEN 217
LOCALITY No.: –
TENDER/ CONTRACT No.
SHEET 1 OF 1
REG. No. –
REV. 00
CALCULATION FILE: –

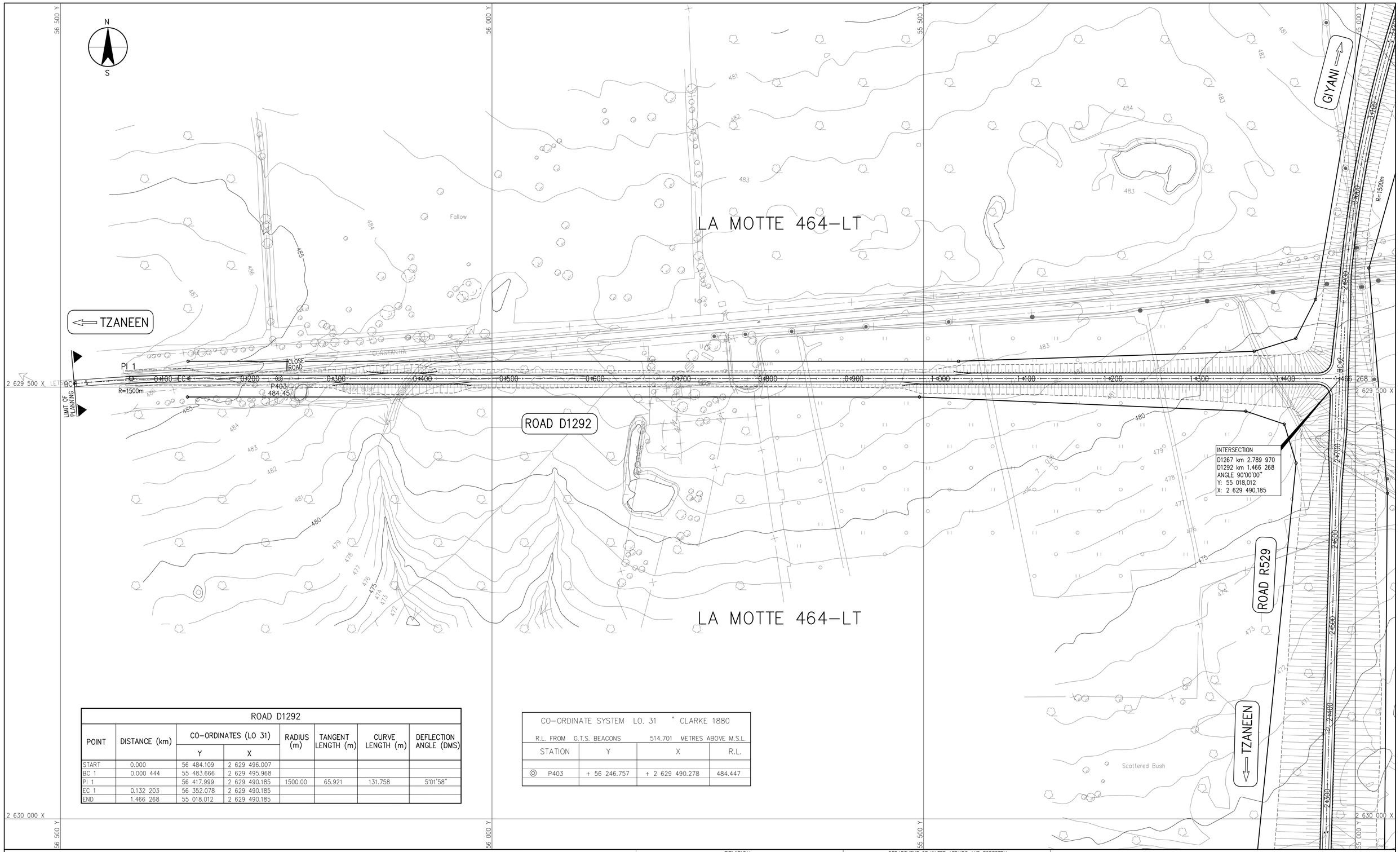
SCALE J 0 1 2 3 4 5 10 20 m

SCALE M 0 5 10 15 20 25 50 m

Appendix H.2 : Preliminary Road Design

(Note: Electronic MS Word version excludes these drawings. Only available in pdf format.)

401775 CEN 220	Road D1292 – Layout Drawing – Sheet 1 of 1
401775 CEN 221	Relocation of Road D1292 – Longitudinal Section Km 0.0 – Km 1.400 - Sheet 1 of 2
401775 CEN 222	Relocation of Road D1292 – Longitudinal Section Km 1.400 – Km 1.46628 - Sheet 2 of 2
401775 CEN 223	Relocation of Road P43/3 – Layout Drawing – Sheet 1 of 8
401775 CEN 224	Relocation of Road P43/3 – Layout Drawing – Sheet 2 of 8
401775 CEN 225	Relocation of Road P43/3 – Layout Drawing – Sheet 3 of 8
401775 CEN 226	Relocation of Road P43/3 – Layout Drawing – Sheet 4 of 8
401775 CEN 227	Relocation of Road P43/3 – Layout Drawing – Sheet 5 of 8
401775 CEN 228	Relocation of Road P43/3 – Layout Drawing – Sheet 6 of 8
401775 CEN 229	Relocation of Road P43/3 – Layout Drawing – Sheet 7 of 8
401775 CEN 230	Relocation of Road P43/3 – Layout Drawing – Sheet 8 of 8
401775 CEN 231	Relocation of Road P43/3 – Longitudinal Section Km 0.000 – Km 1.400 – Sheet 1 of 9
401775 CEN 232	Relocation of Road P43/3 – Longitudinal Section Km 1.400 – Km 2.800 – Sheet 2 of 9
401775 CEN 233	Relocation of Road P43/3 – Longitudinal Section Km 2.800 – Km 4.200 – Sheet 3 of 9
401775 CEN 234	Relocation of Road P43/3 – Longitudinal Section Km 4.200 – Km 5.600 – Sheet 4 of 9
401775 CEN 235	Relocation of Road P43/3 – Longitudinal Section Km 5.600 – Km 7.000 – Sheet 5 of 9
401775 CEN 236	Relocation of Road P43/3 – Longitudinal Section Km 7.000 – Km 8.400 – Sheet 6 of 9
401775 CEN 237	Relocation of Road P43/3 – Longitudinal Section Km 8.400 – Km 9.800 – Sheet 7 of 9
401775 CEN 238	Relocation of Road P43/3 – Longitudinal Section Km 9.800 – Km 11.200 – Sheet 8 of 9
401775 CEN 239	Relocation of Road P43/3 – Longitudinal Section Km 11.200 – Km 11.460 – Sheet 9 of 9
401775 CEN 240	Relocation of Road R529 – Layout Drawing – Sheet 1 of 5
401775 CEN 241	Relocation of Road R529 – Layout Drawing – Sheet 2 of 5
401775 CEN 242	Relocation of Road R529 – Layout Drawing – Sheet 3 of 5
401775 CEN 243	Relocation of Road R529 – Layout Drawing – Sheet 4 of 5
401775 CEN 244	Relocation of Road R529 – Layout Drawing – Sheet 5 of 5
401775 CEN 245	Relocation of Road R529 – Longitudinal Section Km 0.000 – Km 1.400 – Sheet 1 of 5
401775 CEN 246	Relocation of Road R529 – Longitudinal Section Km 1.400 – Km 2.800 – Sheet 2 of 5
401775 CEN 247	Relocation of Road R529 – Longitudinal Section Km 2.800 – Km 4.200 – Sheet 3 of 5
401775 CEN 248	Relocation of Road R529 – Longitudinal Section Km 4.200 – Km 5.600 – Sheet 4 of 5
401775 CEN 249	Relocation of Road R529 – Longitudinal Section Km 5.600 – Km 6.100 – Sheet 5 of 5
401775 CEN 250	Relocation of Roads – Typical Pavement – Sheet 1 of 1
401775 CEN 251	Relocation of Roads – Typical Road Cross Sections – Sheet 1 of 1



ROAD D1292							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.000	56 484.109	2 629 496.007				
BC 1	0.000 444	55 483.666	2 629 495.968				
PI 1		56 417.999	2 629 490.185	1500.00	65.921	131.758	5°01'58"
EC 1	0.132 203	56 352.078	2 629 490.185				
END	1.466 268	55 018.012	2 629 490.185				

CO-ORDINATE SYSTEM LO. 31 ° CLARKE 1880			
R.L. FROM G.T.S. BEACONS 514.701 METRES ABOVE M.S.L.			
STATION	Y	X	R.L.
◎ P403	+ 56 246.757	+ 2 629 490.278	484.447

PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07
	LIST OF DRAWINGS		

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
DRAWN: R STEENKAMP
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

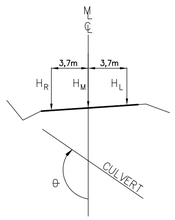
NWAMITWA DAM

ROAD D1292 – LAYOUT DRAWING
SHEET 1 OF 1

PROVINCE: –	DISTRICT: –	KEYCODES: – – – – – –	OTHER NUMBER 401775 CEN 220
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET 1 OF 1	REG. No. –	REV. 00
CALCULATION FILE: –			

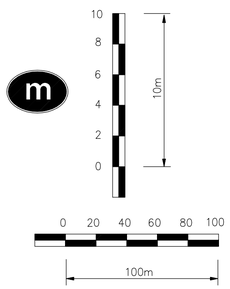
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h

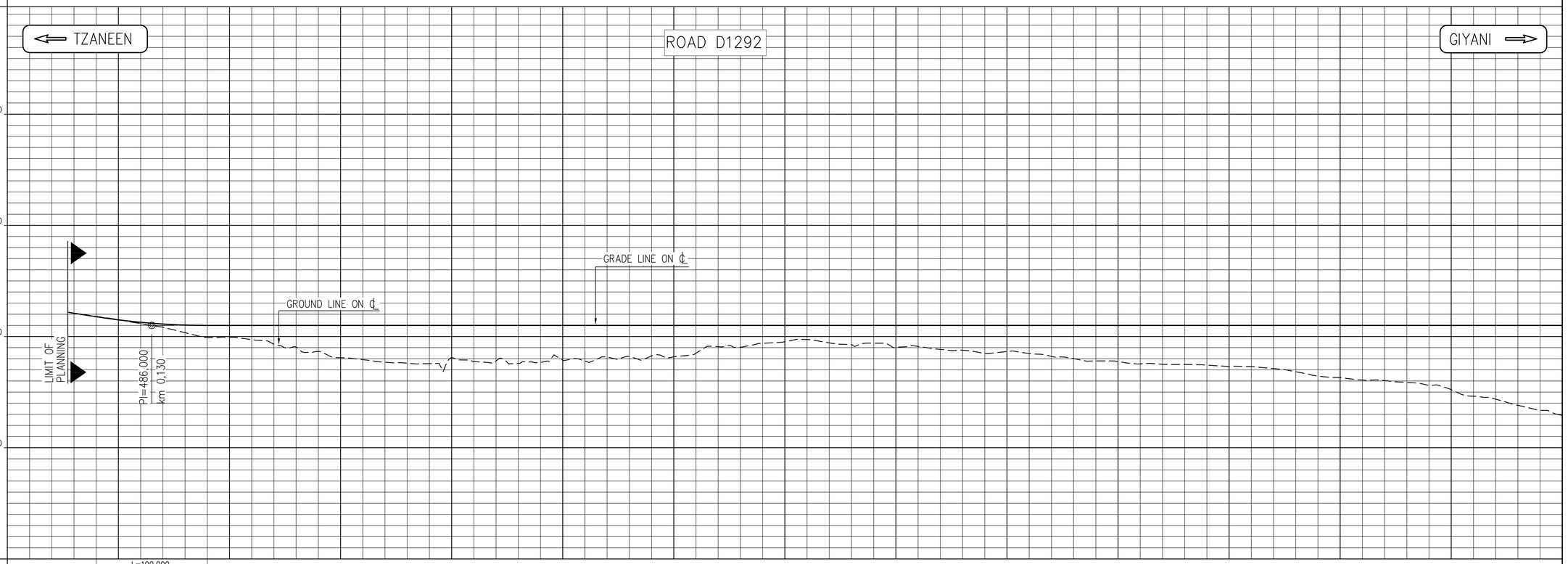


PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



DATUM : 465.00

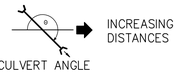


VERTICAL CURVE	V-cl	L=100,000
	K-val	K=64,088
GRADE		−1,560% / −0,000%

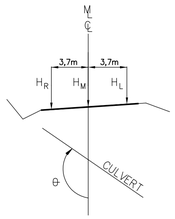
| | | |

GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	

DRAINAGE

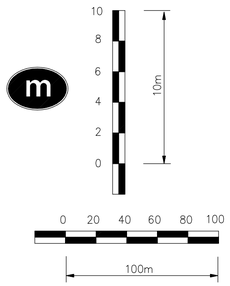


DESIGN SPEED = 100km/h

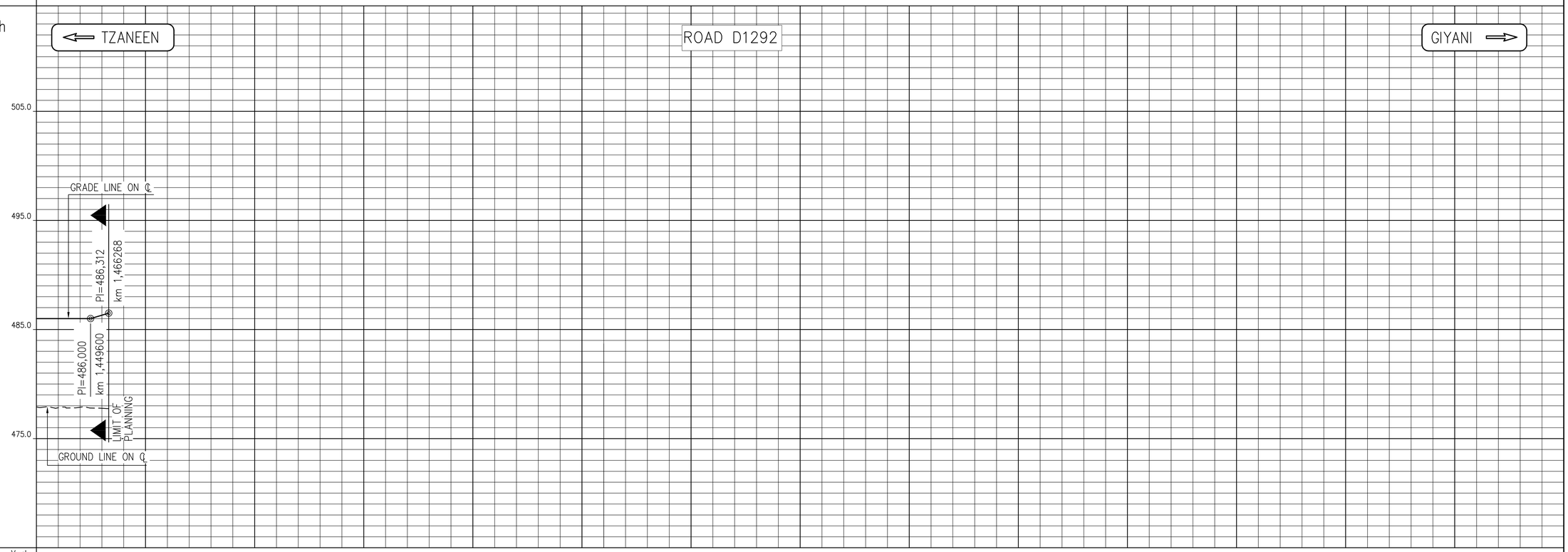


PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



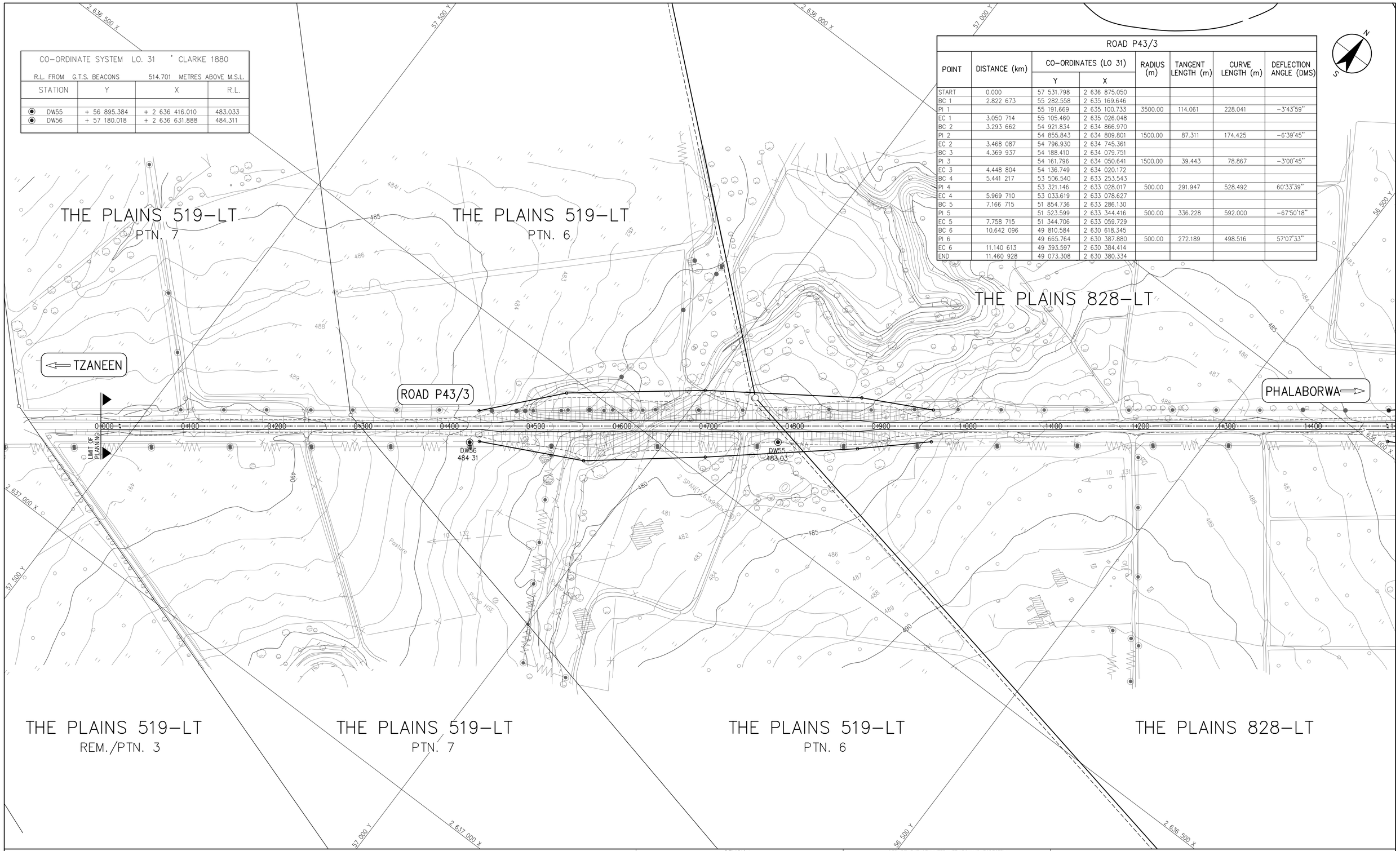
DATUM : 465.00



| | | |

CO-ORDINATE SYSTEM LO. 31 ° CLARKE 1880			
R.L. FROM G.T.S. BEACONS		514.701 METRES ABOVE M.S.L.	
STATION	Y	X	R.L.
DW55	+ 56 895.384	+ 2 636 416.010	483.033
DW56	+ 57 180.018	+ 2 636 631.888	484.311

ROAD P43/3							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.000	57 531.798	2 636 875.050				
BC 1	2.822 673	55 282.558	2 635 169.646				
PI 1		55 191.669	2 635 100.733	3500.00	114.061	228.041	−3°43'59"
EC 1	3.050 714	55 105.460	2 635 026.048				
BC 2	3.293 662	54 921.834	2 634 866.970				
PI 2		54 855.843	2 634 809.801	1500.00	87.311	174.425	−6°39'45"
EC 2	3.468 087	54 796.930	2 634 745.361				
BC 3	4.369 937	54 188.410	2 634 079.751				
PI 3		54 161.796	2 634 050.641	1500.00	39.443	78.867	−3°00'45"
EC 3	4.448 804	54 136.749	2 634 020.172				
BC 4	5.441 217	53 506.540	2 633 253.543				
PI 4		53 321.146	2 633 028.017	500.00	291.947	528.492	60°33'39"
EC 4	5.969 710	53 033.619	2 633 078.627				
BC 5	7.166 715	51 854.736	2 633 286.130				
PI 5		51 523.599	2 633 344.416	500.00	336.228	592.000	−67°50'18"
EC 5	7.758 715	51 344.706	2 633 059.729				
BC 6	10.642 096	49 810.584	2 630 618.345				
PI 6		49 665.764	2 630 387.880	500.00	272.189	498.516	57°07'33"
EC 6	11.140 613	49 393.597	2 630 384.414				
END	11.460 928	49 073.308	2 630 380.334				



PRELIMINARY

SCALE 1:2000

1/5	LIST OF DRAWINGS	DHP0001	152 863/07
SHEET	DESCRIPTION	OTHER No.	REG. No.
LIST OF DRAWINGS			

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336–7500

P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

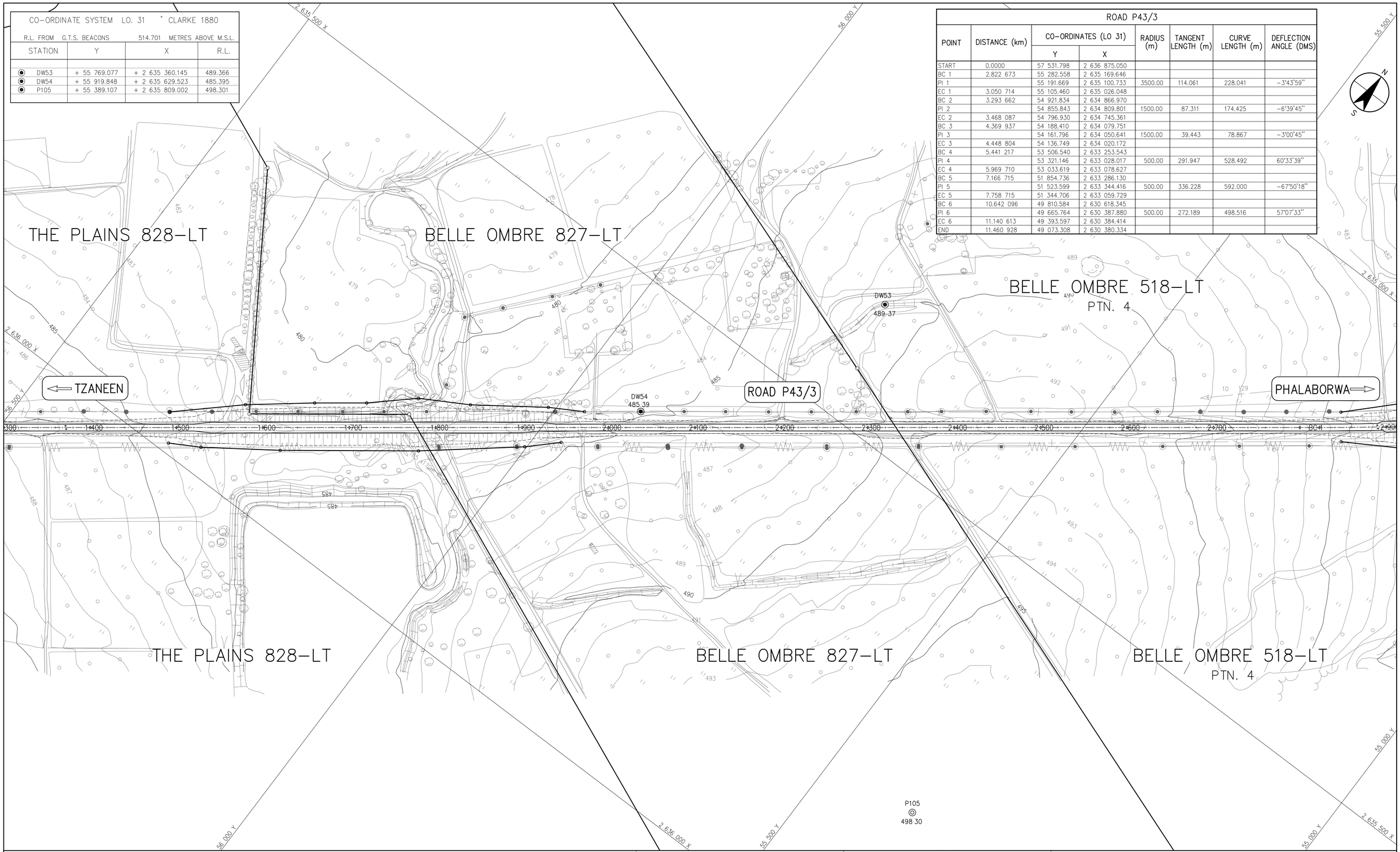
NWAMITWA DAM

RELOCATION OF ROAD P43/3
LAYOUT DRAWING
SHEET 1 OF 8

PROVINCE: –	DISTRICT: –	KEYCODES:	–	–	–	–	–	OTHER NUMBER 401775 CEN 223
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET 1 OF 8	REG. No. –					REV. 00
CALCULATION FILE: –								

CO-ORDINATE SYSTEM LO. 31 ° CLARKE 1880			
R.L. FROM G.T.S. BEACONS		514.701 METRES ABOVE M.S.L.	
STATION	Y	X	R.L.
DW53	+ 55 769.077	+ 2 635 360.145	489.366
DW54	+ 55 919.848	+ 2 635 629.523	485.395
P105	+ 55 389.107	+ 2 635 809.002	498.301

ROAD P43/3							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.0000	57 531.798	2 636 875.050				
BC 1	2.822 673	55 282.558	2 635 169.646				
PI 1		55 191.669	2 635 100.733	3500.00	114.061	228.041	−3°43'59"
EC 1	3.050 714	55 105.460	2 635 026.048				
BC 2	3.293 662	54 921.834	2 634 866.970				
PI 2		54 855.843	2 634 809.801	1500.00	87.311	174.425	−6°39'45"
EC 2	3.468 087	54 796.930	2 634 745.361				
BC 3	4.369 937	54 188.410	2 634 079.751				
PI 3		54 161.796	2 634 050.641	1500.00	39.443	78.867	−3°00'45"
EC 3	4.448 804	54 136.749	2 634 020.172				
BC 4	5.441 217	53 506.540	2 633 253.543				
PI 4		53 321.146	2 633 028.017	500.00	291.947	528.492	60°33'39"
EC 4	5.969 710	53 033.619	2 633 078.627				
BC 5	7.166 715	51 854.736	2 633 286.130				
PI 5		51 523.599	2 633 344.416	500.00	336.228	592.000	−67°50'18"
EC 5	7.758 715	51 344.706	2 633 059.729				
BC 6	10.642 096	49 810.584	2 630 618.345				
PI 6		49 665.764	2 630 387.880	500.00	272.189	498.516	57°07'33"
EC 6	11.140 613	49 393.597	2 630 384.414				
END	11.460 928	49 073.308	2 630 380.334				



PRELIMINARY

SCALE 1:2000

1/5	LIST OF DRAWINGS	DHP0001	152 863/07
SHEET	DESCRIPTION	OTHER No.	REG. No.
	LIST OF DRAWINGS		

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

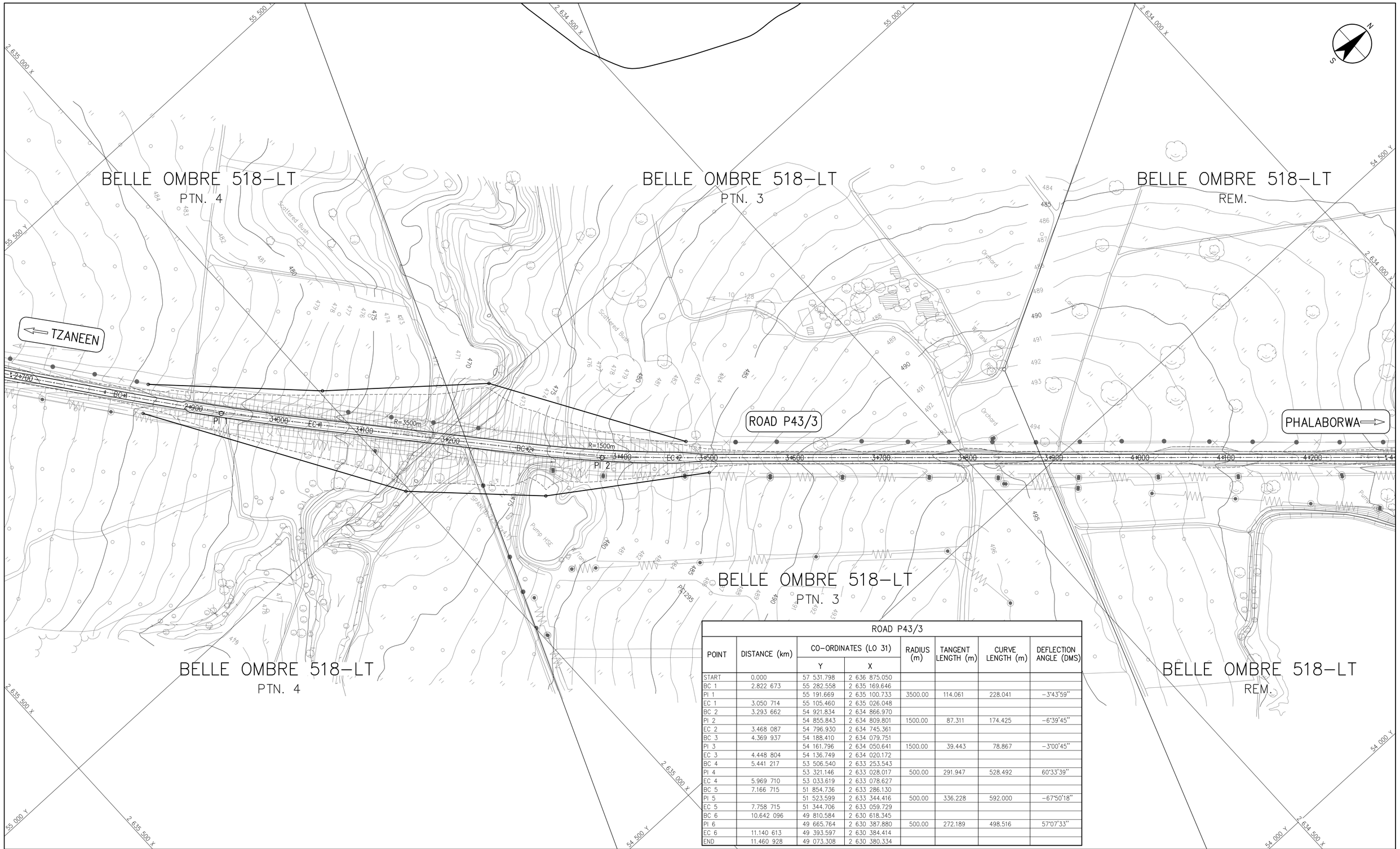
DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD P43/3
LAYOUT DRAWING
SHEET 2 OF 8

PROVINCE: –	DISTRICT: –	KEYCODES:	–	–	–	–	–	OTHER NUMBER 401775 CEN 224
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET 2 OF 8	REG. No. –					REV. 00
CALCULATION FILE: –								



ROAD P43/3							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.000	57 531.798	2 636 875.050				
BC 1	2.822 673	55 282.558	2 635 169.646				
PI 1		55 191.669	2 635 100.733	3500.00	114.061	228.041	−3°43'59"
EC 1	3.050 714	55 105.460	2 635 026.048				
BC 2	3.293 662	54 921.834	2 634 866.970				
PI 2		54 855.843	2 634 809.801	1500.00	87.311	174.425	−6°39'45"
EC 2	3.468 087	54 796.930	2 634 745.361				
BC 3	4.369 937	54 188.410	2 634 079.751				
PI 3		54 161.796	2 634 050.641	1500.00	39.443	78.867	−3°00'45"
EC 3	4.448 804	54 136.749	2 634 020.172				
BC 4	5.441 217	53 506.540	2 633 253.543				
PI 4		53 321.146	2 633 028.017	500.00	291.947	528.492	60°33'39"
EC 4	5.969 710	53 033.619	2 633 078.627				
BC 5	7.166 715	51 854.736	2 633 286.130				
PI 5		51 523.599	2 633 344.416	500.00	336.228	592.000	−67°50'18"
EC 5	7.758 715	51 344.706	2 633 059.729				
BC 6	10.642 096	49 810.584	2 630 618.345				
PI 6		49 665.764	2 630 387.880	500.00	272.189	498.516	57°07'33"
EC 6	11.140 613	49 393.597	2 630 384.414				
END	11.460 928	49 073.308	2 630 380.334				

PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
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P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD P43/3
LAYOUT DRAWING
SHEET 3 OF 8

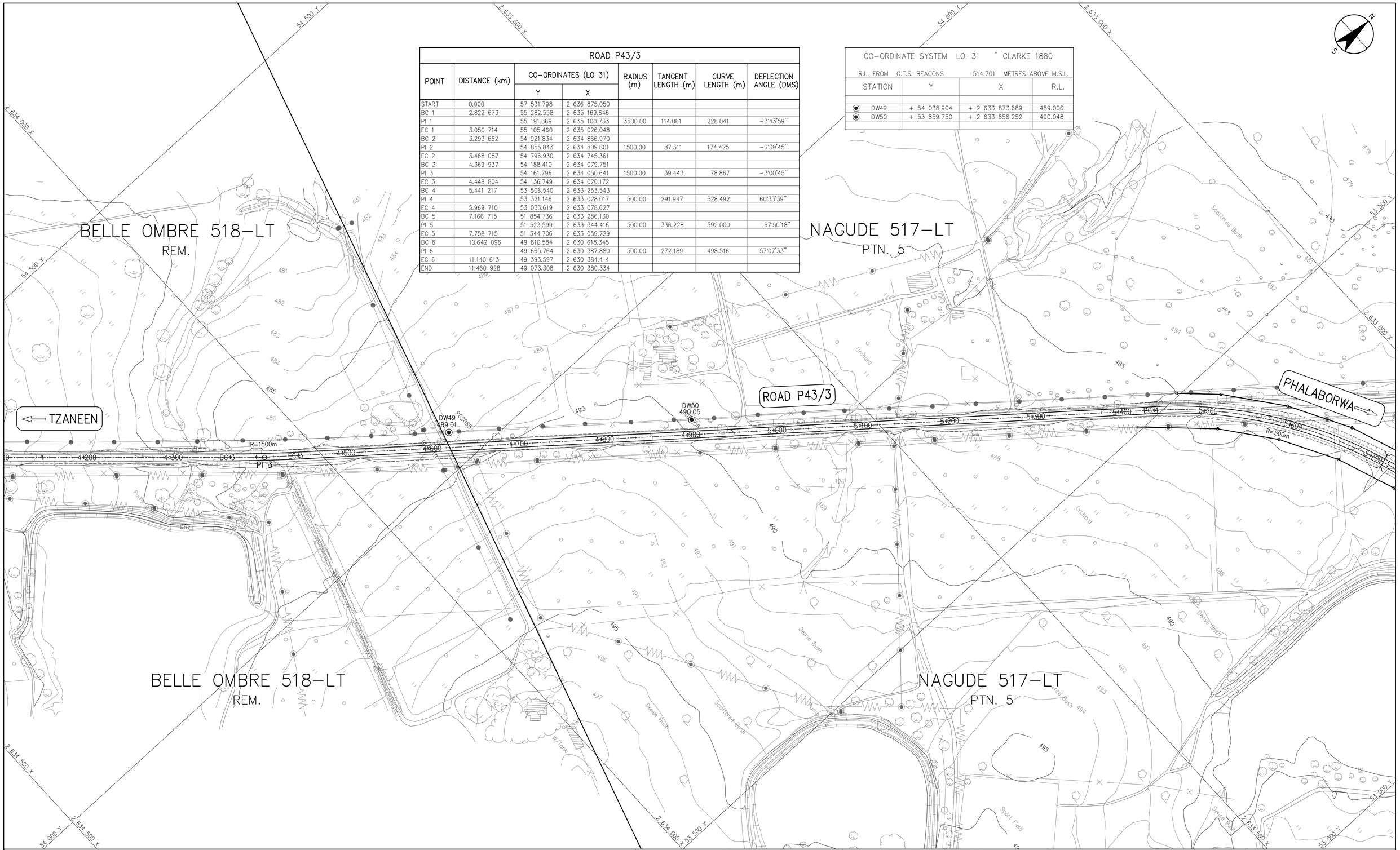
PROVINCE: – DISTRICT: – KEYCODES: – – – – – OTHER NUMBER 401775 CEN 225
LOCALITY No.: – TENDER/ CONTRACT No. SHEET 3 OF 8 REG. No. – REV. 00
CALCULATION FILE: –

ROAD P43/3							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.000	57 531.798	2 636 875.050				
BC 1	2.822 673	55 282.558	2 635 169.646				
PI 1		55 191.669	2 635 100.733	3500.00	114.061	228.041	−3°43'59"
EC 1	3.050 714	55 105.460	2 635 026.048				
BC 2	3.293 662	54 921.834	2 634 866.970				
PI 2		54 855.843	2 634 809.801	1500.00	87.311	174.425	−6°39'45"
EC 2	3.468 087	54 796.930	2 634 745.361				
BC 3	4.369 937	54 188.410	2 634 079.751				
PI 3		54 161.796	2 634 050.641	1500.00	39.443	78.867	−3°00'45"
EC 3	4.448 804	54 136.749	2 634 020.172				
BC 4	5.441 217	53 506.540	2 633 253.543				
PI 4		53 321.146	2 633 028.017	500.00	291.947	528.492	60°33'39"
EC 4	5.969 710	53 033.619	2 633 078.627				
BC 5	7.166 715	51 854.736	2 633 286.130				
PI 5		51 523.599	2 633 344.416	500.00	336.228	592.000	−67°50'18"
EC 5	7.758 715	51 344.706	2 633 059.729				
BC 6	10.642 096	49 810.584	2 630 618.345				
PI 6		49 665.764	2 630 387.880	500.00	272.189	498.516	57°07'33"
EC 6	11.140 613	49 393.597	2 630 384.414				
END	11.460 928	49 073.308	2 630 380.334				

CO-ORDINATE SYSTEM LO. 31 ° CLARKE 1880

R.L. FROM G.T.S. BEACONS 514.701 METRES ABOVE M.S.L.

STATION	Y	X	R.L.
DW49	+ 54 038.904	+ 2 633 873.689	489.006
DW50	+ 53 859.750	+ 2 633 656.252	490.048



PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336–7500

P. YAKO
DIRECTOR GENERAL

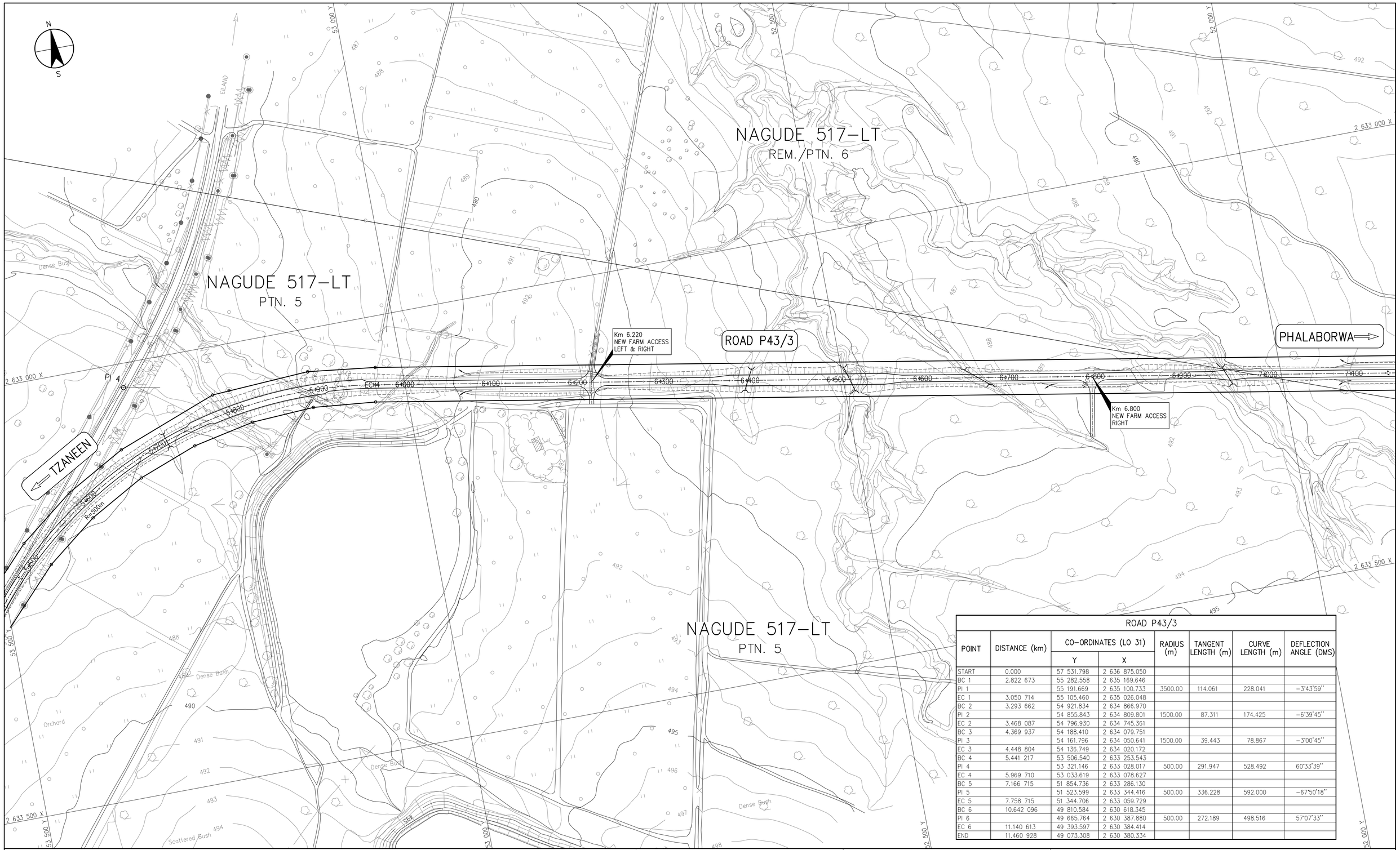
DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD P43/3
LAYOUT DRAWING
SHEET 4 OF 8

PROVINCE: –	DISTRICT: –	KEYCODES:	–	–	–	–	–
LOCALITY No.: –	TENDER/ CONTRACT No.	OTHER NUMBER	401775 CEN 226				
CALCULATION FILE: –		SHEET 4 OF 8	REG. No. –				REV. 00



ROAD P43/3							
POINT	DISTANCE (km)	CO–ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.000	57 531.798	2 636 875.050				
BC 1	2.822 673	55 282.558	2 635 169.646				
PI 1		55 191.669	2 635 100.733	3500.00	114.061	228.041	–3°43'59"
EC 1	3.050 714	55 105.460	2 635 026.048				
BC 2	3.293 662	54 921.834	2 634 866.970				
PI 2		54 855.843	2 634 809.801	1500.00	87.311	174.425	–6°39'45"
EC 2	3.468 087	54 796.930	2 634 745.361				
BC 3	4.369 937	54 188.410	2 634 079.751				
PI 3		54 161.796	2 634 050.641	1500.00	39.443	78.867	–3°00'45"
EC 3	4.448 804	54 136.749	2 634 020.172				
BC 4	5.441 217	53 506.540	2 633 253.543				
PI 4		53 321.146	2 633 028.017	500.00	291.947	528.492	60°33'39"
EC 4	5.969 710	53 033.619	2 633 078.627				
BC 5	7.166 715	51 854.736	2 633 286.130				
PI 5		51 523.599	2 633 344.416	500.00	336.228	592.000	–67°50'18"
EC 5	7.758 715	51 344.706	2 633 059.729				
BC 6	10.642 096	49 810.584	2 630 618.345				
PI 6		49 665.764	2 630 387.880	500.00	272.189	498.516	57°07'33"
EC 6	11.140 613	49 393.597	2 630 384.414				
END	11.460 928	49 073.308	2 630 380.334				

PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

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PRETORIA 0001

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P. YAKO
DIRECTOR GENERAL

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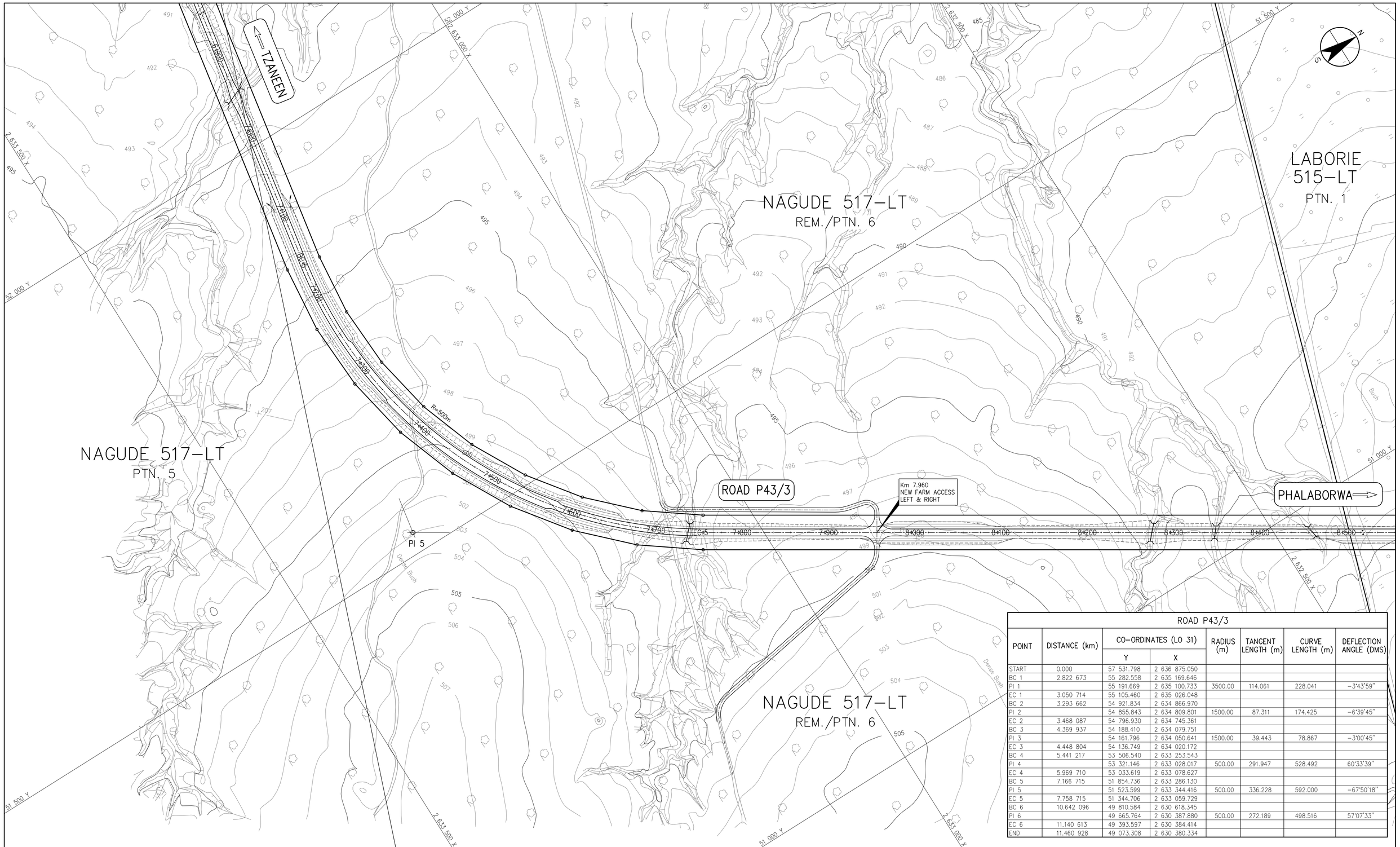
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD P43/3
LAYOUT DRAWING
SHEET 5 OF 8

PROVINCE: – DISTRICT: – KEYCODES: – – – – – – OTHER NUMBER 401775 CEN 227
LOCALITY No.: – TENDER/ CONTRACT No. SHEET 5 OF 8 REG. No. – REV. 00
CALCULATION FILE: –



ROAD P43/3							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.000	57 531.798	2 636 875.050				
BC 1	2.822 673	55 282.558	2 635 169.646				
PI 1		55 191.669	2 635 100.733	3500.00	114.061	228.041	−3°43'59"
EC 1	3.050 714	55 105.460	2 635 026.048				
BC 2	3.293 662	54 921.834	2 634 866.970				
PI 2		54 855.843	2 634 809.801	1500.00	87.311	174.425	−6°39'45"
EC 2	3.468 087	54 796.930	2 634 745.361				
BC 3	4.369 937	54 188.410	2 634 079.751				
PI 3		54 161.796	2 634 050.641	1500.00	39.443	78.867	−3°00'45"
EC 3	4.448 804	54 136.749	2 634 020.172				
BC 4	5.441 217	53 506.540	2 633 253.543				
PI 4		53 321.146	2 633 028.017	500.00	291.947	528.492	60°33'39"
EC 4	5.969 710	53 033.619	2 633 078.627				
BC 5	7.166 715	51 854.736	2 633 286.130				
PI 5		51 523.599	2 633 344.416	500.00	336.228	592.000	−67°50'18"
EC 5	7.758 715	51 344.706	2 633 059.729				
BC 6	10.642 096	49 810.584	2 630 618.345				
PI 6		49 665.764	2 630 387.880	500.00	272.189	498.516	57°07'33"
EC 6	11.140 613	49 393.597	2 630 384.414				
END	11.460 928	49 073.308	2 630 380.334				

PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

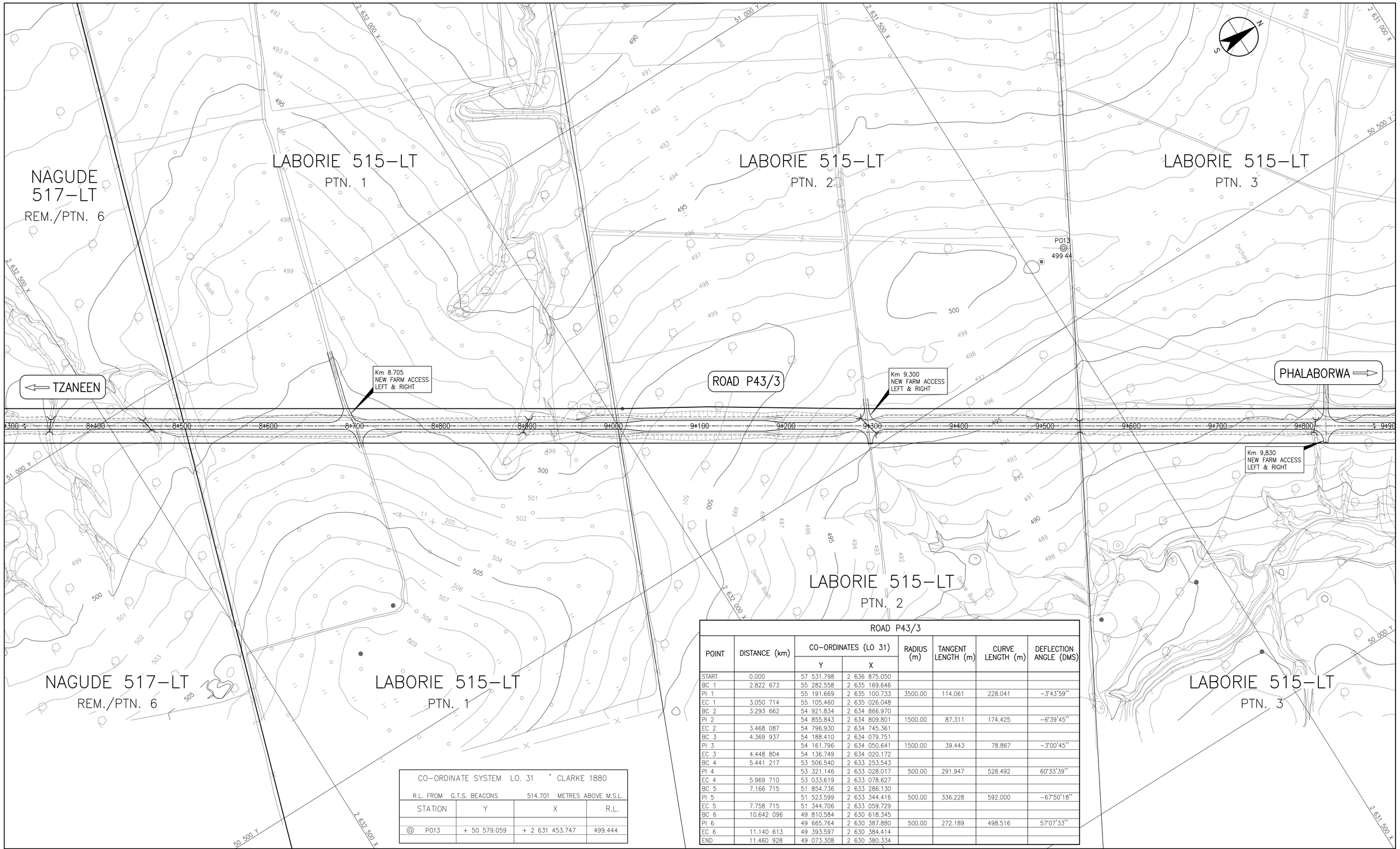
DESIGN: T vd WALT
DRAWN: R STEENKAMP
CHECKED: DATE:
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD P43/3
LAYOUT DRAWING
SHEET 6 OF 8

PROVINCE: – DISTRICT: –
LOCALITY No.: – TENDER/ CONTRACT No.
CALCULATION FILE: –
KEYCODES: – – – – – – OTHER NUMBER 401775 CEN 228
SHEET 6 OF 8 REG. No. – REV. 00



CO-ORDINATE SYSTEM LO. 31 ° CLARKE 1880			
R.L. FROM G.T.S. BEACONS		514.701 METRES ABOVE M.S.L.	
STATION	Y	X	R.L.
◎ P013	+ 50 579.059	+ 2 631 453.747	499.444

ROAD P43/3							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.000	57 531.798	2 636 875.050				
BC 1	2.822 673	55 282.558	2 635 169.646				
PI 1		55 191.669	2 635 100.733	3500.00	114.061	228.041	−3°43'59"
EC 1	3.050 714	55 105.460	2 635 026.048				
BC 2	3.293 662	54 921.834	2 634 866.970				
PI 2		54 855.843	2 634 809.801	1500.00	87.311	174.425	−6°39'45"
EC 2	3.468 087	54 796.930	2 634 745.361				
BC 3	4.369 937	54 188.410	2 634 079.751				
PI 3		54 161.796	2 634 050.641	1500.00	39.443	78.867	−3°00'45"
EC 3	4.448 804	54 136.749	2 634 020.172				
BC 4	5.441 217	53 506.540	2 633 253.543				
PI 4		53 321.146	2 633 028.017	500.00	291.947	528.492	60°33'39"
EC 4	5.969 710	53 033.619	2 633 078.627				
BC 5	7.166 715	51 854.736	2 633 286.130				
PI 5		51 523.599	2 633 344.416	500.00	336.228	592.000	−67°50'18"
EC 5	7.758 715	51 344.706	2 633 059.729				
BC 6	10.642 096	49 810.584	2 630 618.345				
PI 6		49 665.764	2 630 387.880	500.00	272.189	498.516	57°07'33"
EC 6	11.140 613	49 393.597	2 630 384.414				
END	11.460 928	49 073.308	2 630 380.334				

PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

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CHIEF ENGINEER / APP (Pr. Eng): DATE:
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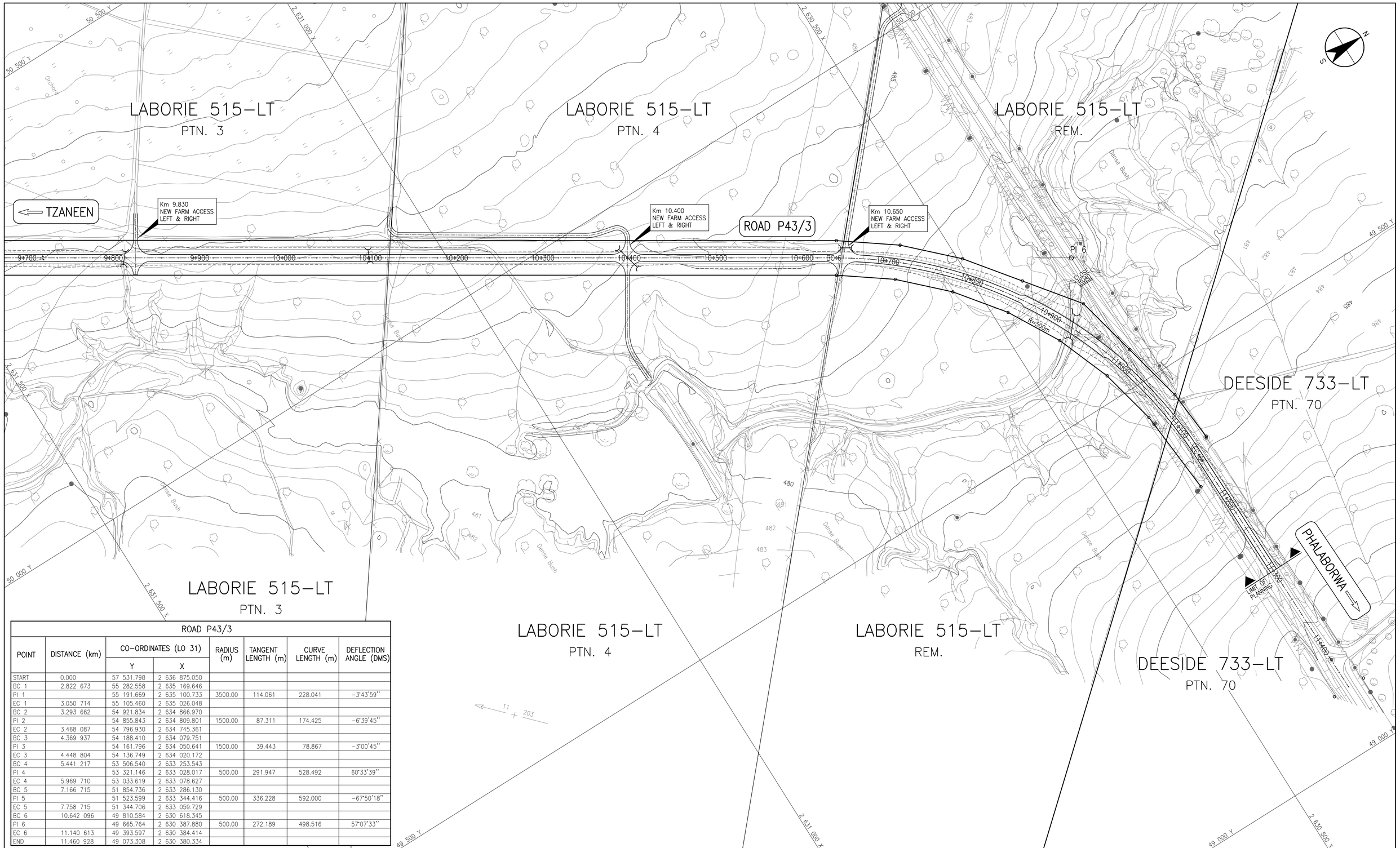
GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD P43/3
LAYOUT DRAWING
SHEET 7 OF 8

PROVINCE: –	DISTRICT: –	KEYCODES:	– – – – –	OTHER NUMBER	401775 CEN 229
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET	REG. No.		REV.
CALCULATION FILE: –		7 OF 8	–		00



ROAD P43/3							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0.000	57 531.798	2 636 875.050				
BC 1	2.822 673	55 282.558	2 635 169.646				
PI 1		55 191.669	2 635 100.733	3500.00	114.061	228.041	–3°43'59"
EC 1	3.050 714	55 105.460	2 635 026.048				
BC 2	3.293 662	54 921.834	2 634 866.970				
PI 2		54 855.843	2 634 809.801	1500.00	87.311	174.425	–6°39'45"
EC 2	3.468 087	54 796.930	2 634 745.361				
BC 3	4.369 937	54 188.410	2 634 079.751				
PI 3		54 161.796	2 634 050.641	1500.00	39.443	78.867	–3°00'45"
EC 3	4.448 804	54 136.749	2 634 020.172				
BC 4	5.441 217	53 506.540	2 633 253.543				
PI 4		53 321.146	2 633 028.017	500.00	291.947	528.492	60°33'39"
EC 4	5.969 710	53 033.619	2 633 078.627				
BC 5	7.166 715	51 854.736	2 633 286.130				
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EC 5	7.758 715	51 344.706	2 633 059.729				
BC 6	10.642 096	49 810.584	2 630 618.345				
PI 6		49 665.764	2 630 387.880	500.00	272.189	498.516	57°07'33"
EC 6	11.140 613	49 393.597	2 630 384.414				
END	11.460 928	49 073.308	2 630 380.334				

PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
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PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
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P. YAKO
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DESIGN: T vd WALT
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CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

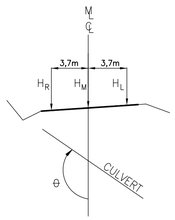
NWAMITWA DAM

RELOCATION OF ROAD P43/3
LAYOUT DRAWING
SHEET 8 OF 8

PROVINCE: –	DISTRICT: –	KEYCODES:	– – – – –	OTHER NUMBER	401775 CEN 230
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET	REG. No.		REV.
CALCULATION FILE: –		8 OF 8	–		00

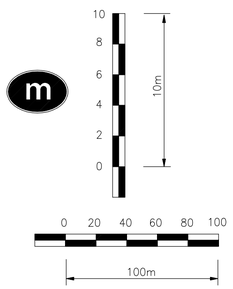
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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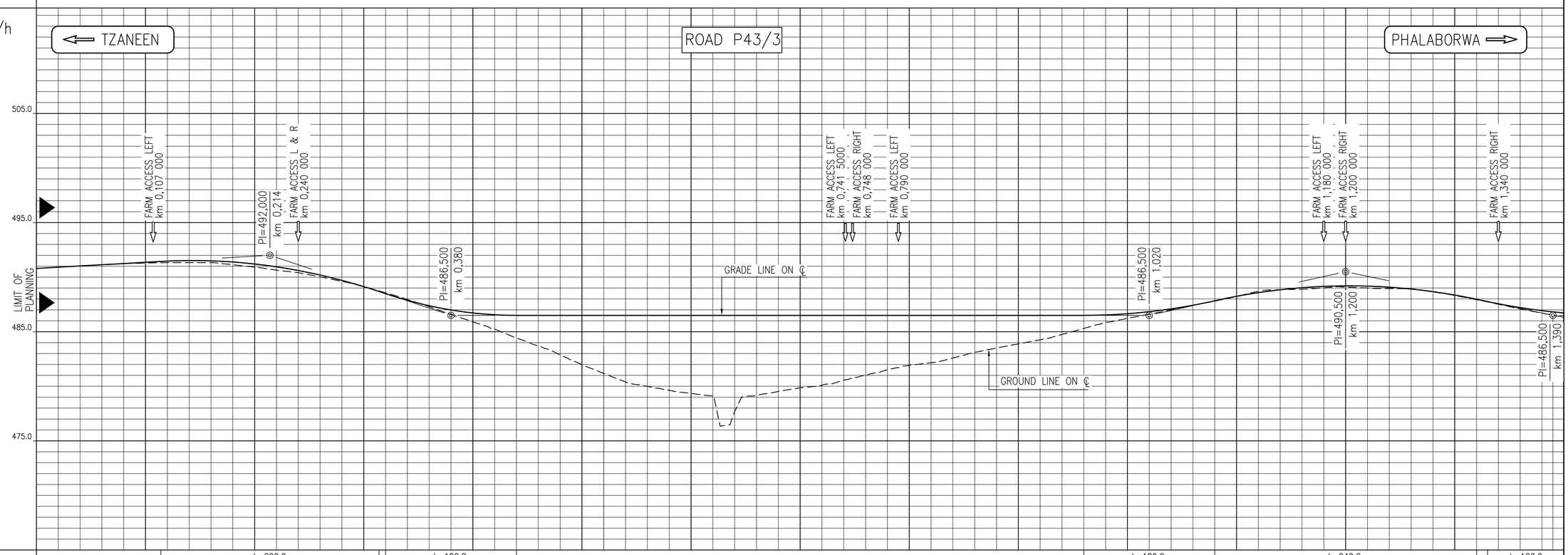
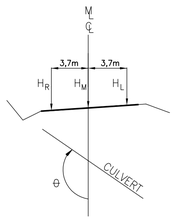


| | | |

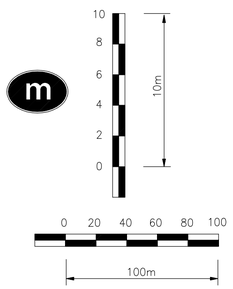
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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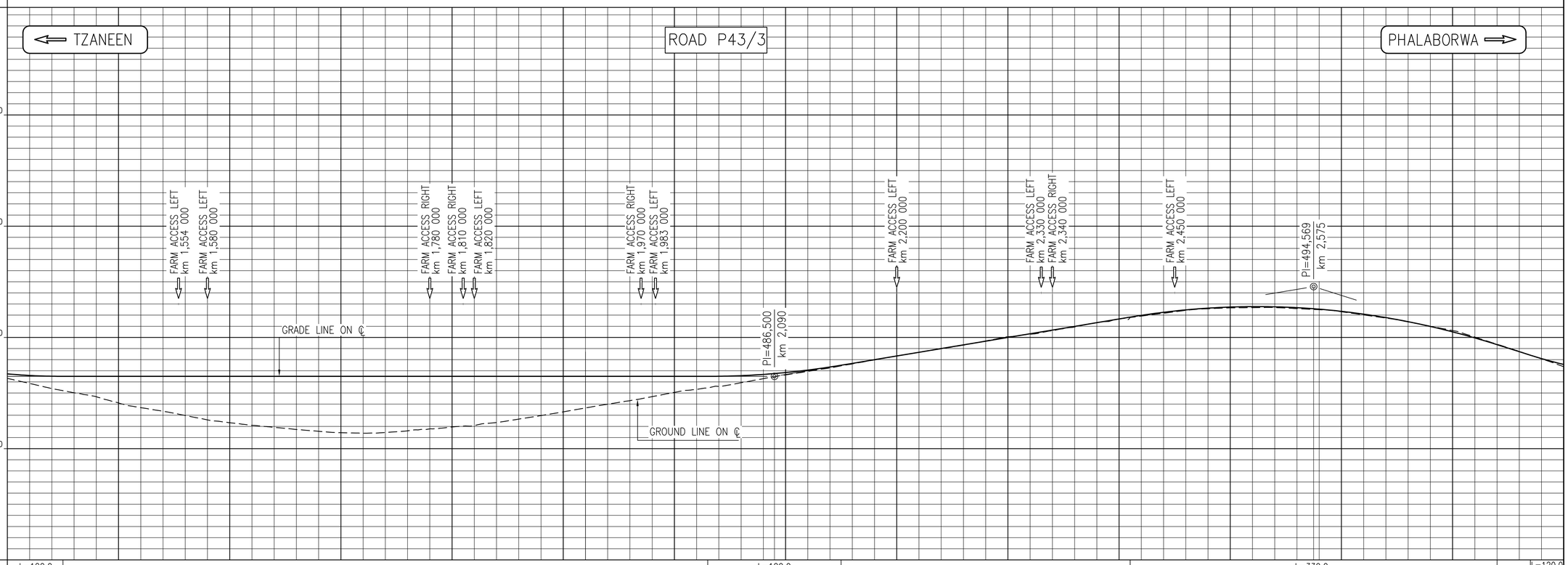

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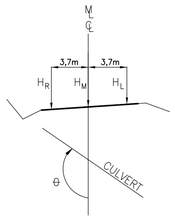
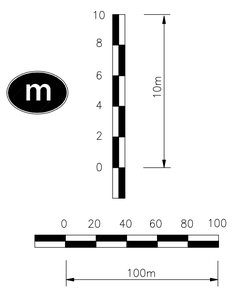
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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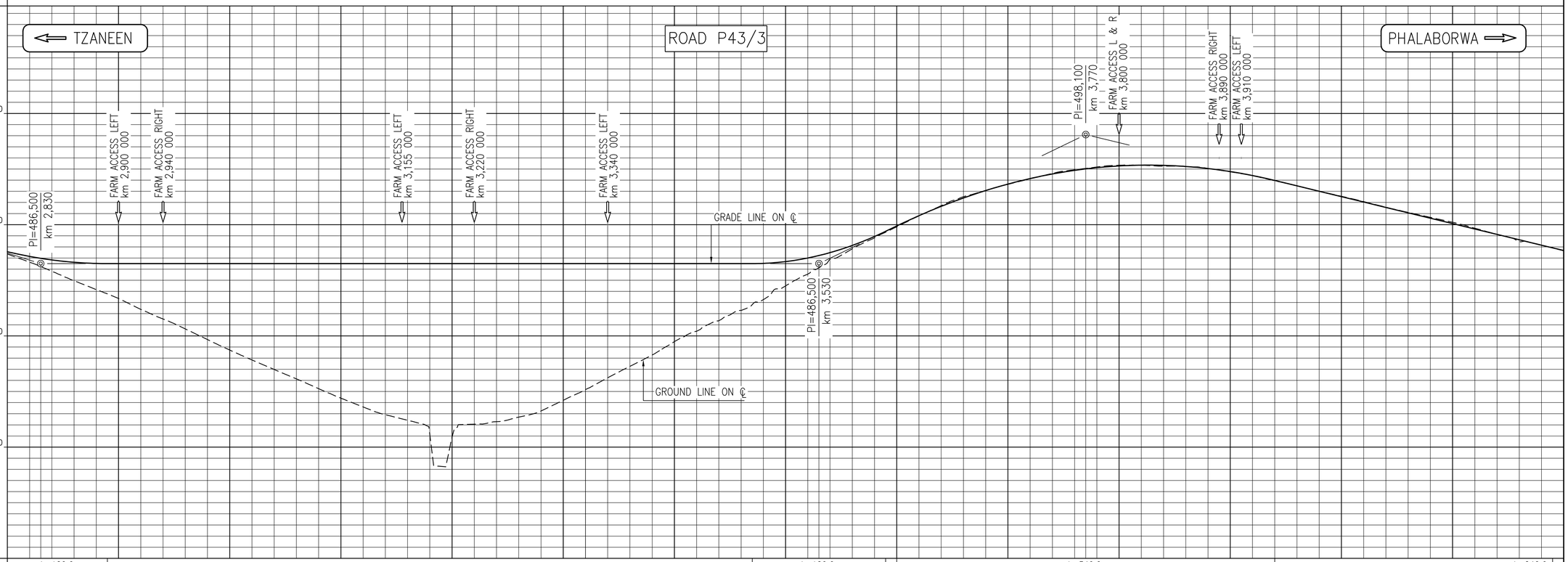
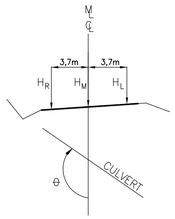


| | | |

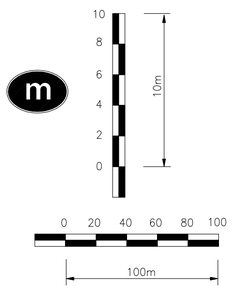
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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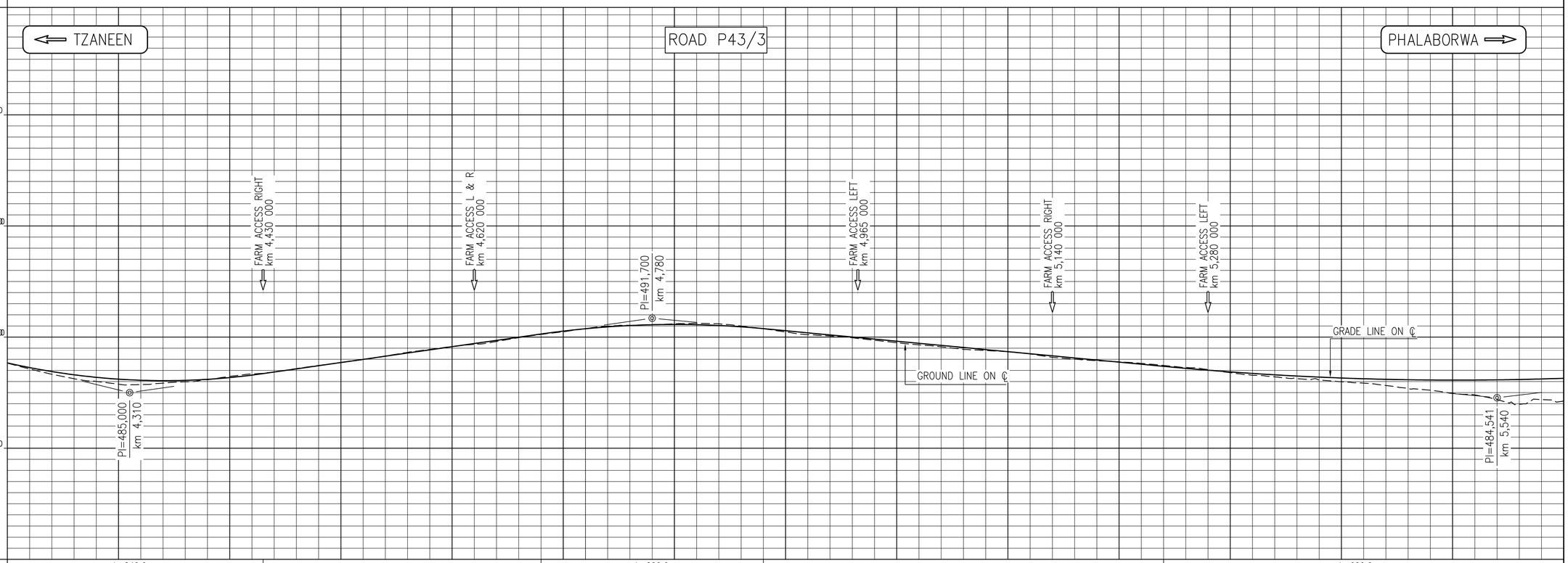

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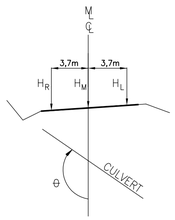
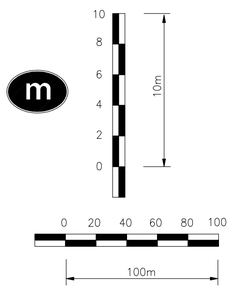
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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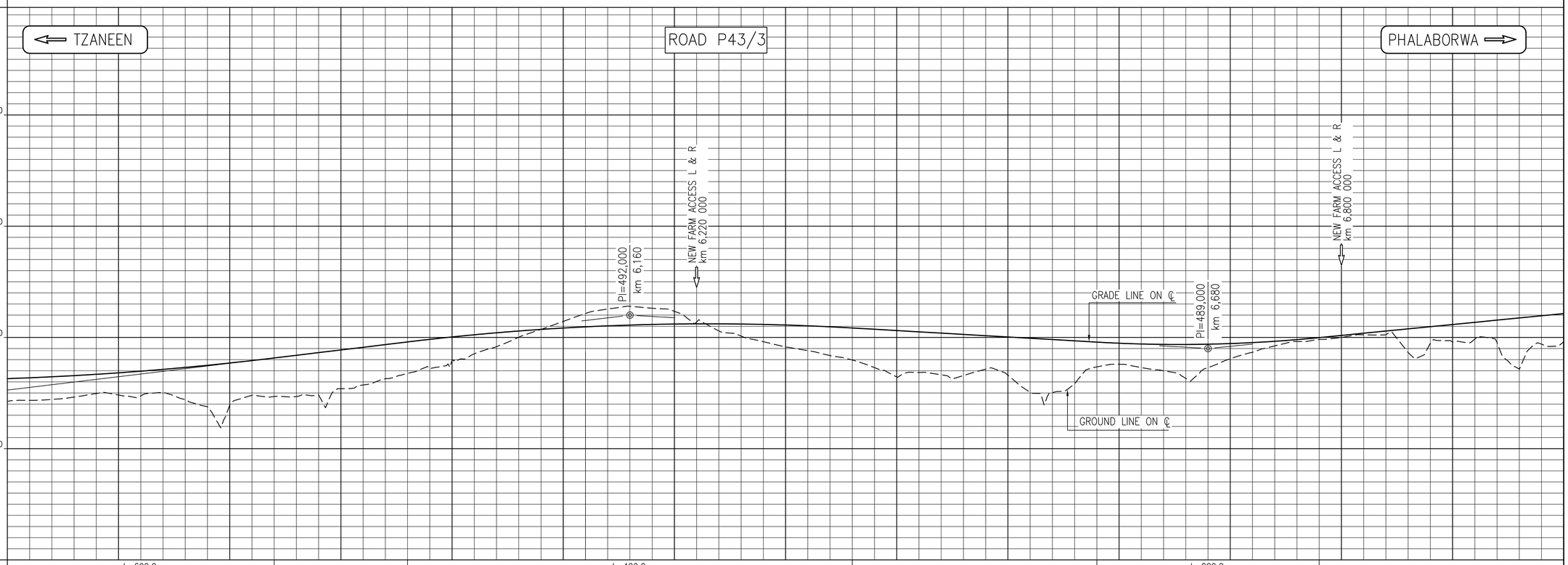
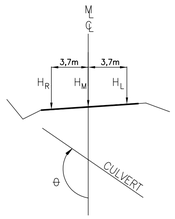


| | | |

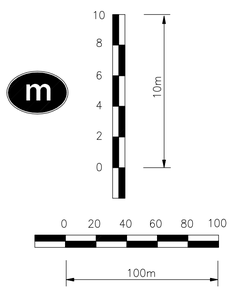
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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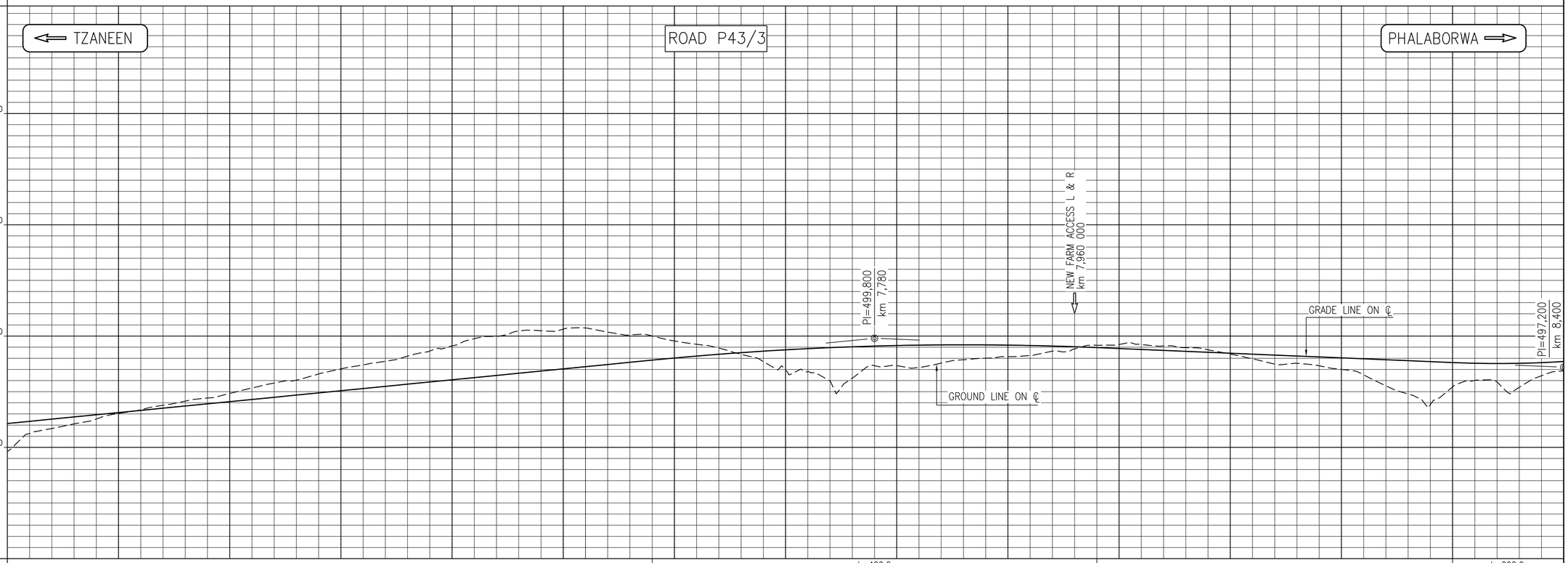
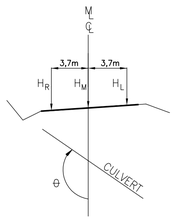


| | | |

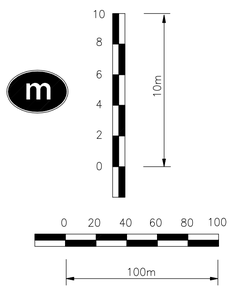
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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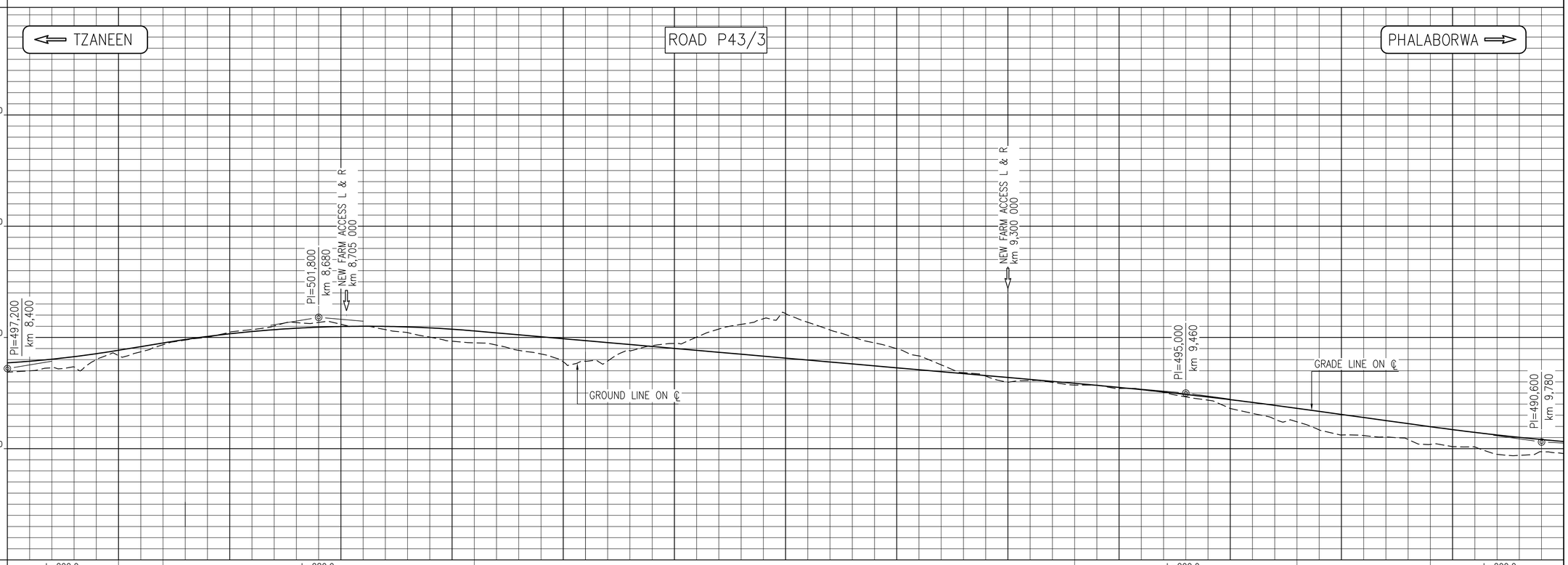
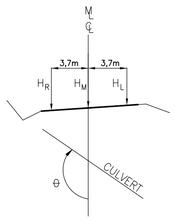


| | | |

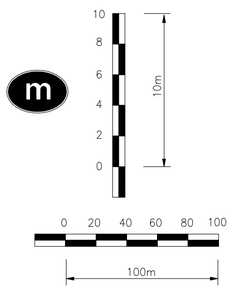
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h

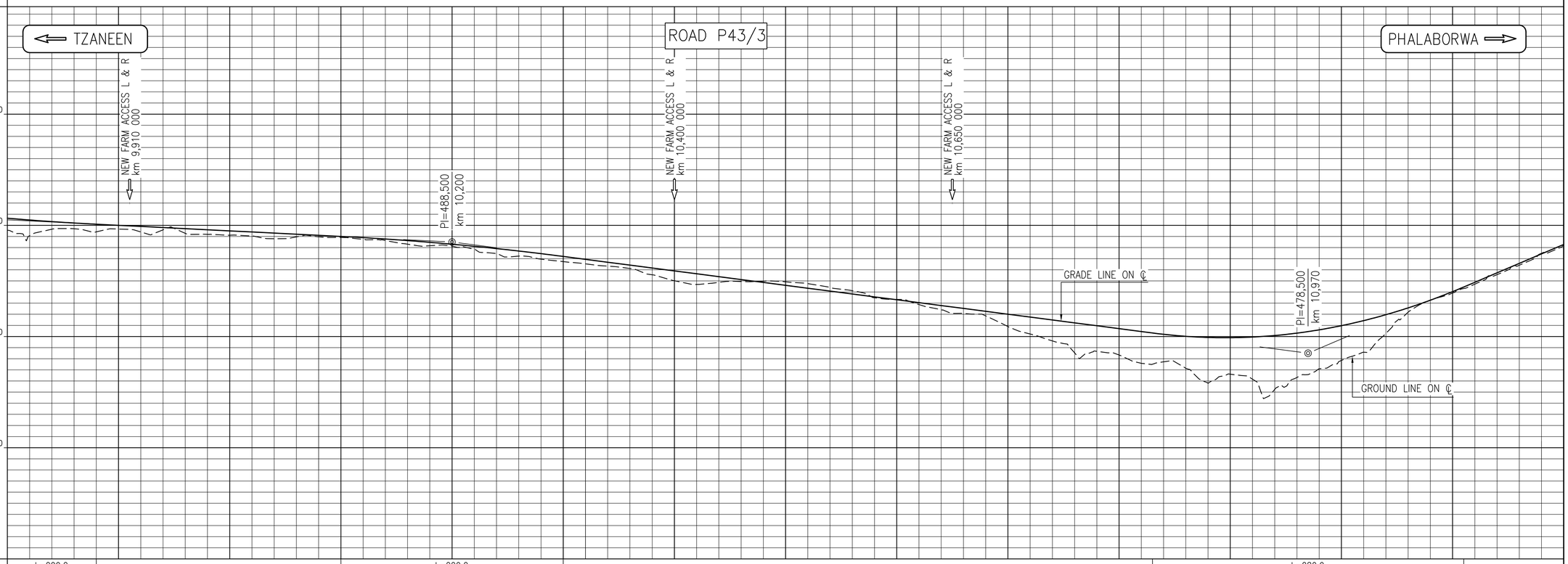


PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



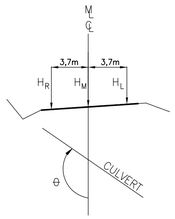
DATUM : 460.00



| | | |

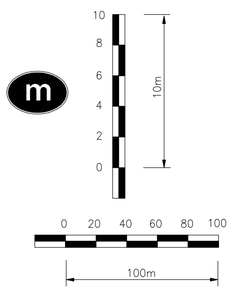
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	INCREASING DISTANCES / CULVERT ANGLE	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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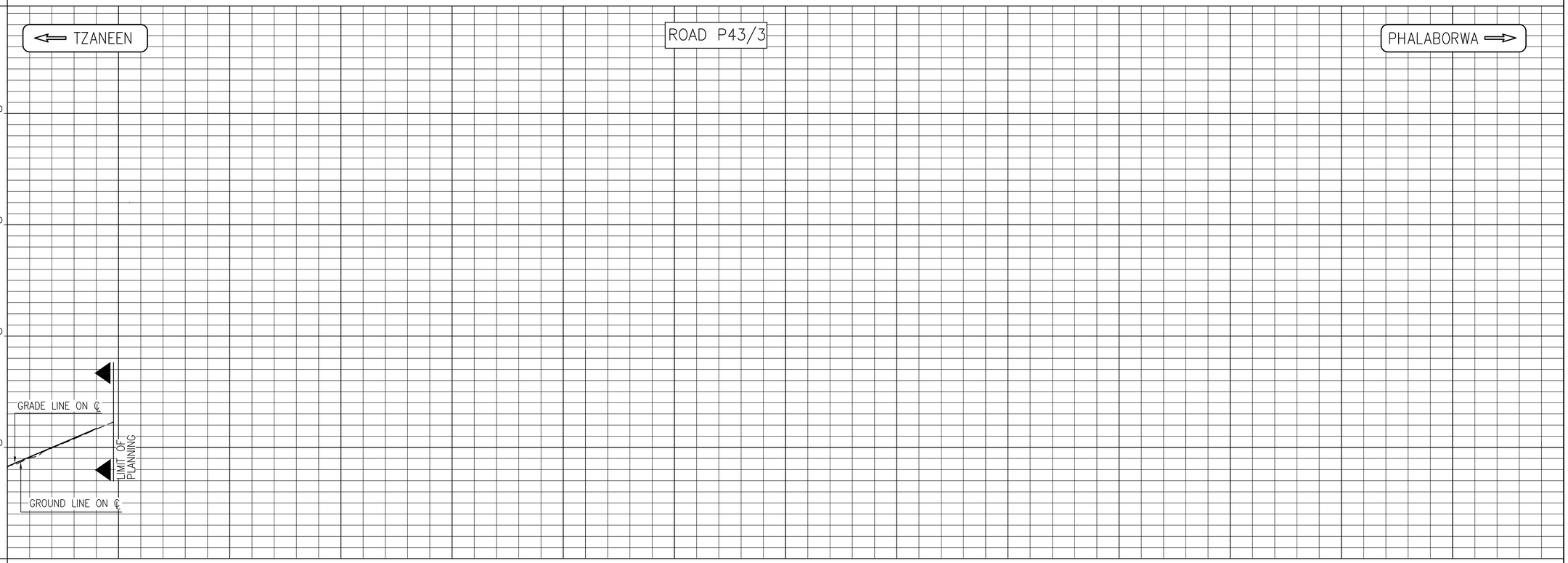


VERTICAL CURVE		
GRADE		+4,252%
FINAL LEVELS: HL −3,7m FROM ℄	488.212	492.422
FINAL LEVELS: Hm FROM ℄	488.281	492.533
FINAL LEVELS: HR 3,7m FROM ℄	488.169	492.422
GROUND LEVELS ON ℄	488.218	492.523 492.496
℄ KILOMETRE DISTANCE	11.200	11.300
SUPER ELEVATION		
HORIZONTAL CURVES		269°16'13"

PRELIMINARY

SCALE 1:200 VERT
SCALE 1:2000 HOR

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

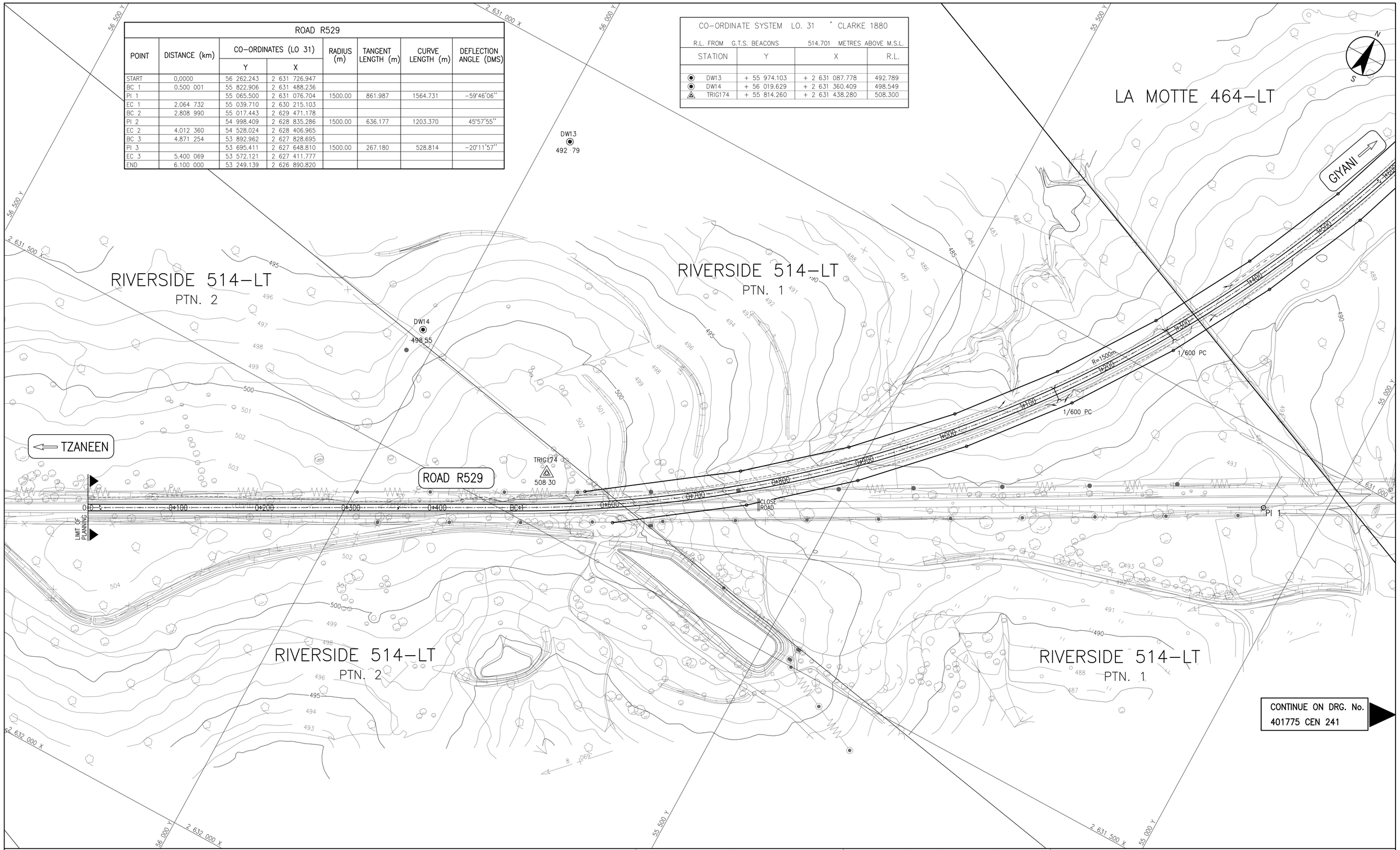
NWAMITWA DAM

RELOCATION OF ROAD P43/3
LONGITUDINAL SECTION Km 11.200 – Km 11.460 928
SHEET 9 OF 9

PROVINCE: –	DISTRICT: –	KEYCODES: – – – – – –	OTHER NUMBER 401775 CEN 239
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET 9 OF 9	REG. No. –
CALCULATION FILE: –			REV. 00

ROAD R529							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0,0000	56 262.243	2 631 726.947				
BC 1	0.500 001	55 822.906	2 631 488.236				
PI 1		55 065.500	2 631 076.704	1500.00	861.987	1564.731	−59°46'06"
EC 1	2.064 732	55 039.710	2 630 215.103				
BC 2	2.808 990	55 017.443	2 629 471.178				
PI 2		54 998.409	2 628 835.286	1500.00	636.177	1203.370	45°57'55"
EC 2	4.012 360	54 528.024	2 628 406.965				
BC 3	4.871 254	53 892.962	2 627 828.695				
PI 3		53 695.411	2 627 648.810	1500.00	267.180	528.814	−20°11'57"
EC 3	5.400 069	53 572.121	2 627 411.777				
END	6.100 000	53 249.139	2 626 890.820				

CO-ORDINATE SYSTEM LO. 31 ° CLARKE 1880			
R.L. FROM G.T.S. BEACONS 514.701 METRES ABOVE M.S.L.			
STATION	Y	X	R.L.
DW13	+ 55 974.103	+ 2 631 087.778	492.789
DW14	+ 56 019.629	+ 2 631 360.409	498.549
TRIG174	+ 55 814.260	+ 2 631 438.280	508.300



PRELIMINARY

SCALE 1:2000

1/5	LIST OF DRAWINGS	DHP0001	152 863/07
SHEET	DESCRIPTION	OTHER No.	REG. No.
LIST OF DRAWINGS			

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

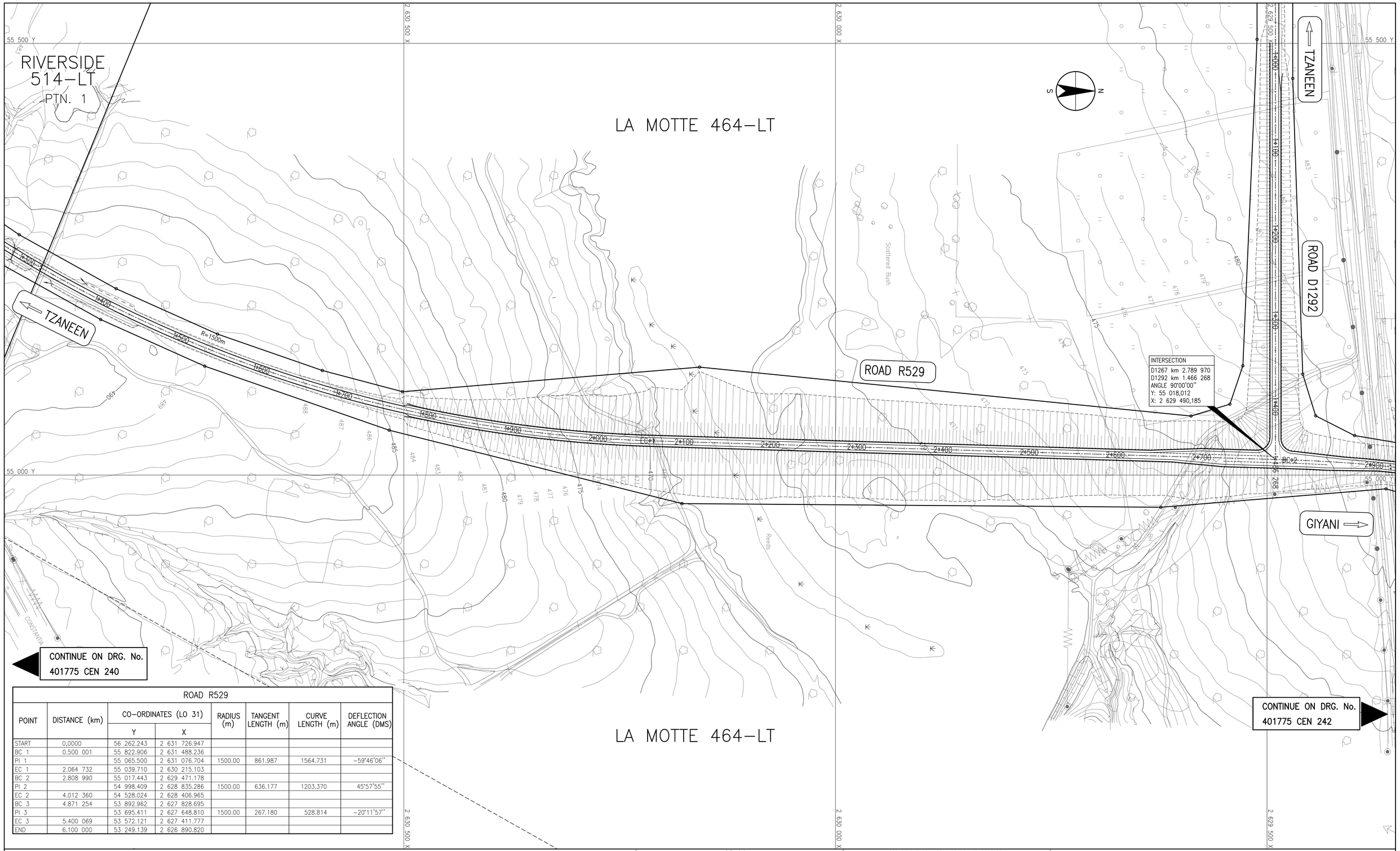
DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD R529
LAYOUT DRAWING
SHEET 1 OF 5

PROVINCE: –	DISTRICT: –	KEYCODES:	–	–	–	–	–	OTHER NUMBER 401775 CEN 240
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET 1 OF 5	REG. No. –				REV. 00
CALCULATION FILE: –							



ROAD R529							
POINT	DISTANCE (km)	CO–ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0,0000	56 262.243	2 631 726.947				
BC 1	0.500 001	55 822.906	2 631 488.236				
PI 1		55 065.500	2 631 076.704	1500.00	861.987	1564.731	–59°46'06"
EC 1	2.064 732	55 039.710	2 630 215.103				
BC 2	2.808 990	55 017.443	2 629 471.178				
PI 2		54 998.409	2 628 835.286	1500.00	636.177	1203.370	45°57'55"
EC 2	4.012 360	54 528.024	2 628 406.965				
BC 3	4.871 254	53 892.962	2 627 828.695				
PI 3		53 695.411	2 627 648.810	1500.00	267.180	528.814	–20°11'57"
EC 3	5.400 069	53 572.121	2 627 411.777				
END	6.100 000	53 249.139	2 626 890.820				

PRELIMINARY

SCALE 1:2000

1/5	LIST OF DRAWINGS	DHP0001	152 863/07
SHEET	DESCRIPTION	OTHER No.	REG. No.
LIST OF DRAWINGS			

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336–7500

P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

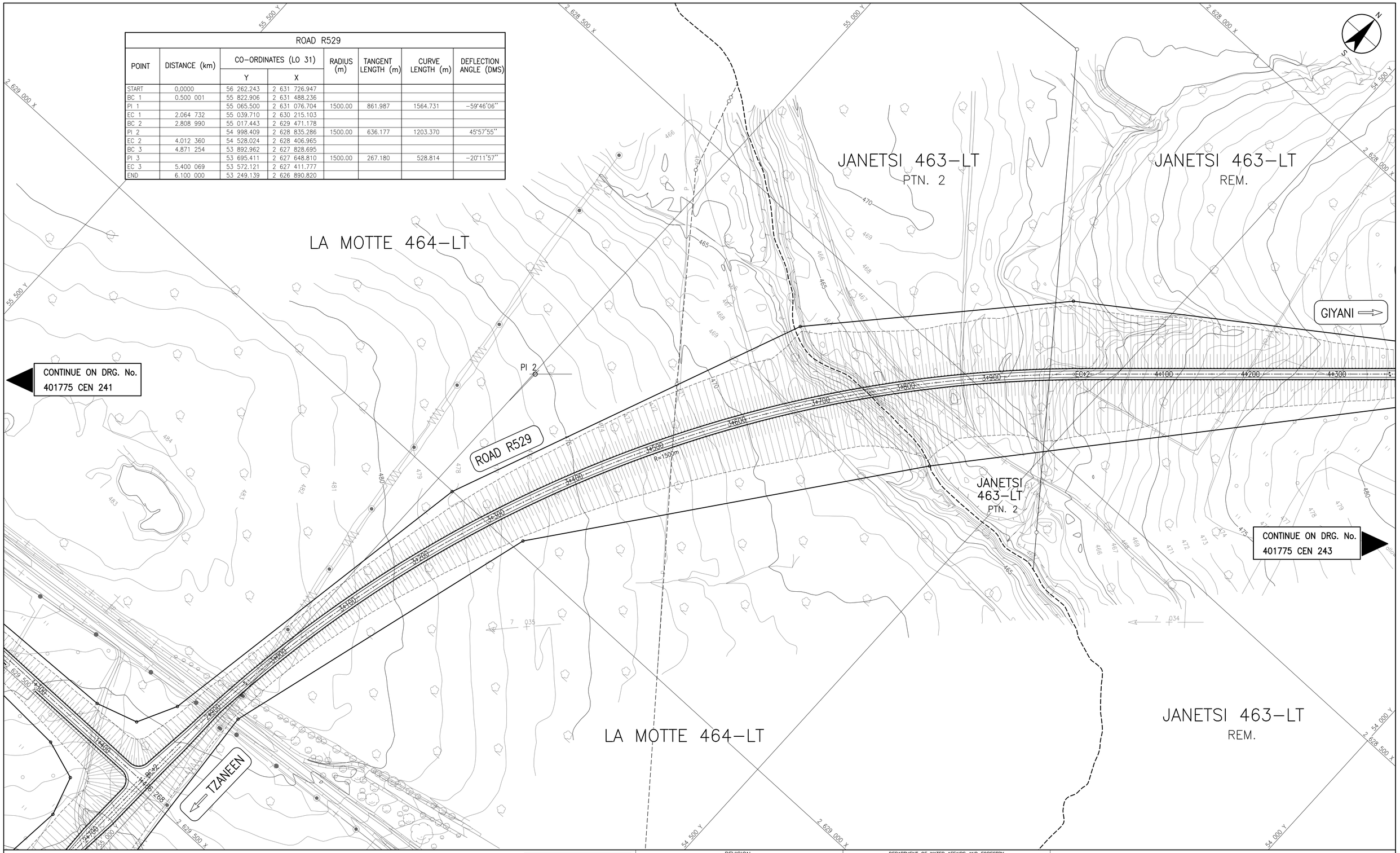
GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD R529
LAYOUT DRAWING
SHEET 2 OF 5

PROVINCE: – DISTRICT: – KEYCODES: – – – – – OTHER NUMBER 401775 CEN 241
LOCALITY No.: – TENDER/ CONTRACT No.. SHEET 2 OF 5 REG. No. – REV. 00
CALCULATION FILE: –

ROAD R529							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0,0000	56 262.243	2 631 726.947				
BC 1	0.500 001	55 822.906	2 631 488.236				
PI 1		55 065.500	2 631 076.704	1500.00	861.987	1564.731	−59°46'06"
EC 1	2.064 732	55 039.710	2 630 215.103				
BC 2	2.808 990	55 017.443	2 629 471.178				
PI 2		54 998.409	2 628 835.286	1500.00	636.177	1203.370	45°57'55"
EC 2	4.012 360	54 528.024	2 628 406.965				
BC 3	4.871 254	53 892.962	2 627 828.695				
PI 3		53 695.411	2 627 648.810	1500.00	267.180	528.814	−20°11'57"
EC 3	5.400 069	53 572.121	2 627 411.777				
END	6.100 000	53 249.139	2 626 890.820				



PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07
LIST OF DRAWINGS			

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336–7500

P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
DRAWN: R STEENKAMP
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

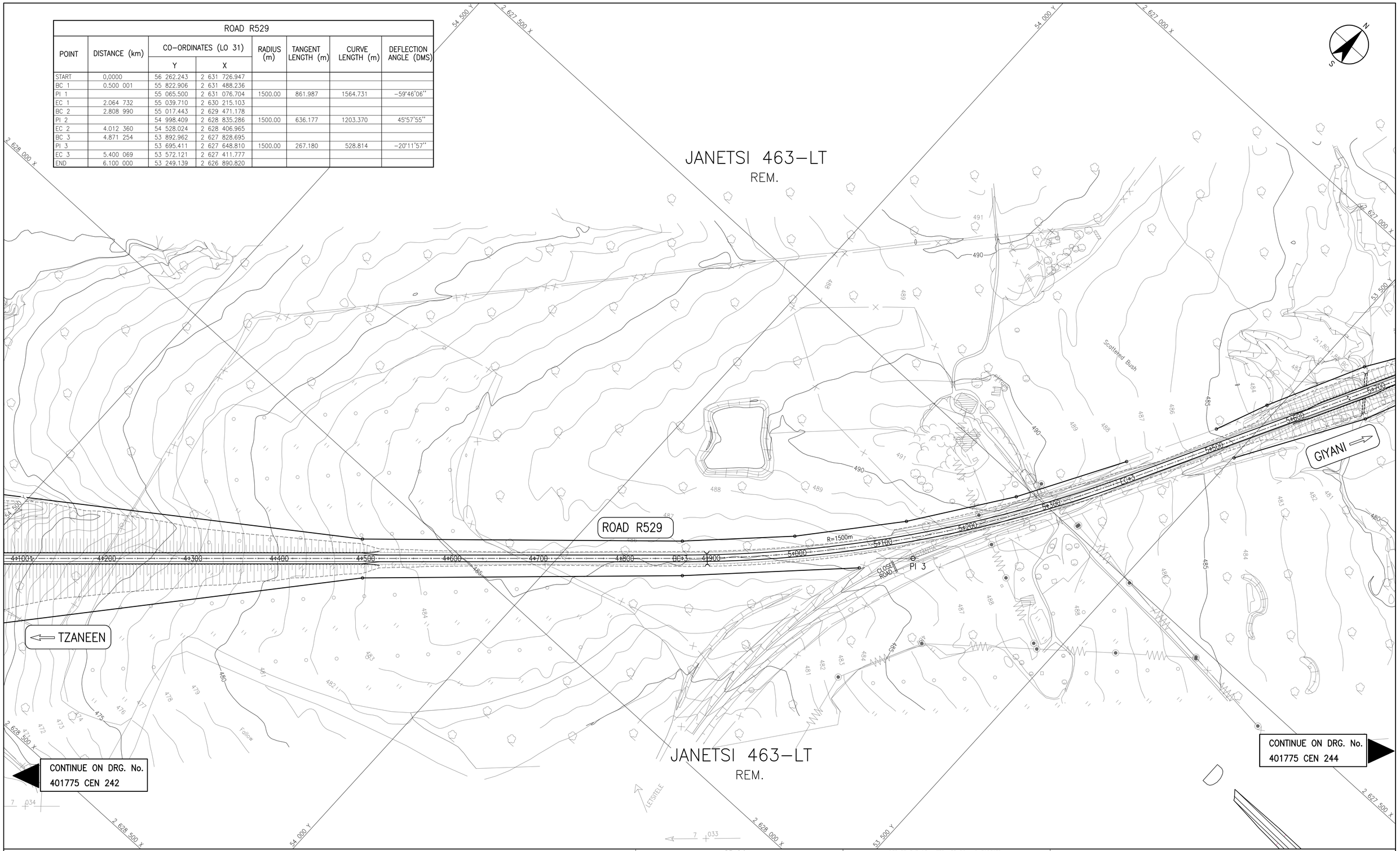
GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROAD R529
LAYOUT DRAWING
SHEET 3 OF 5

PROVINCE: –	DISTRICT: –	KEYCODES:	– – – – –	OTHER NUMBER	401775 CEN 242
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET	REG. No.		REV.
CALCULATION FILE: –		3 OF 5	–		00

ROAD R529							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0,0000	56 262.243	2 631 726.947				
BC 1	0.500 001	55 822.906	2 631 488.236				
PI 1		55 065.500	2 631 076.704	1500.00	861.987	1564.731	−59°46'06"
EC 1	2.064 732	55 039.710	2 630 215.103				
BC 2	2.808 990	55 017.443	2 629 471.178				
PI 2		54 998.409	2 628 835.286	1500.00	636.177	1203.370	45°57'55"
EC 2	4.012 360	54 528.024	2 628 406.965				
BC 3	4.871 254	53 892.962	2 627 828.695				
PI 3		53 695.411	2 627 648.810	1500.00	267.180	528.814	−20°11'57"
EC 3	5.400 069	53 572.121	2 627 411.777				
END	6.100 000	53 249.139	2 626 890.820				



PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07
	LIST OF DRAWINGS		

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

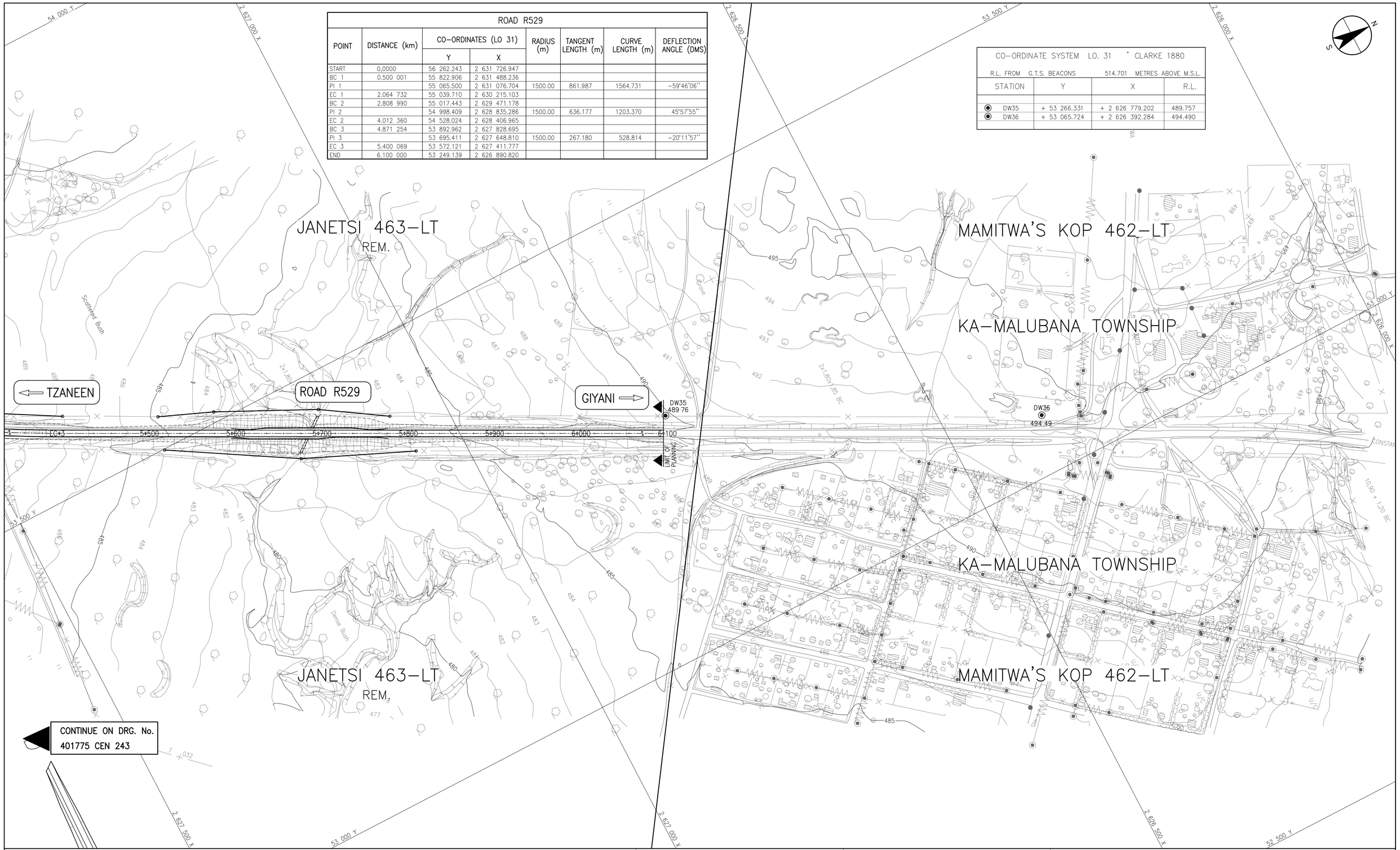
NWAMITWA DAM

RELOCATION OF ROAD R529
LAYOUT DRAWING
SHEET 4 OF 5

PROVINCE: –	DISTRICT: –	KEYCODES: – – – – –	OTHER NUMBER 401775 CEN 243
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET 4 OF 5	REG. No. –
CALCULATION FILE: –			REV. 00

ROAD R529							
POINT	DISTANCE (km)	CO-ORDINATES (LO 31)		RADIUS (m)	TANGENT LENGTH (m)	CURVE LENGTH (m)	DEFLECTION ANGLE (DMS)
		Y	X				
START	0,0000	56 262.243	2 631 726.947				
BC 1	0.500 001	55 822.906	2 631 488.236				
PI 1		55 065.500	2 631 076.704	1500.00	861.987	1564.731	−59°46'06"
EC 1	2.064 732	55 039.710	2 630 215.103				
BC 2	2.808 990	55 017.443	2 629 471.178				
PI 2		54 998.409	2 628 835.286	1500.00	636.177	1203.370	45°57'55"
EC 2	4.012 360	54 528.024	2 628 406.965				
BC 3	4.871 254	53 892.962	2 627 828.695				
PI 3		53 695.411	2 627 648.810	1500.00	267.180	528.814	−20°11'57"
EC 3	5.400 069	53 572.121	2 627 411.777				
END	6.100 000	53 249.139	2 626 890.820				

CO-ORDINATE SYSTEM LO. 31 * CLARKE 1880			
R.L. FROM G.T.S. BEACONS		514.701 METRES ABOVE M.S.L.	
STATION	Y	X	R.L.
DW35	+ 53 266.331	+ 2 626 779.202	489.757
DW36	+ 53 065.724	+ 2 626 392.284	494.490



PRELIMINARY

SCALE 1:2000

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

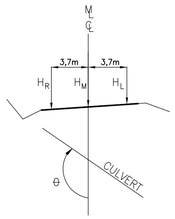
NWAMITWA DAM

RELOCATION OF ROAD R529
LAYOUT DRAWING
SHEET 5 OF 5

PROVINCE: –	DISTRICT: –	KEYCODES:	–	–	–	–	–
LOCALITY No.: –	TENDER/ CONTRACT No.	OTHER NUMBER 401775 CEN 244					
CALCULATION FILE: –		SHEET 5 OF 5	REG. No. –			REV. 00	

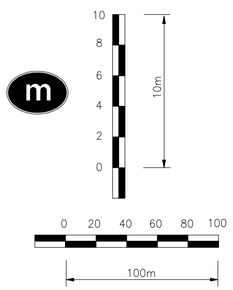
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	CULVERT ANGLE / INCREASING DISTANCES	90° 1/600 P.C. km 1.140; 80° 1/600 P.C. km 1.267

DESIGN SPEED = 100km/h

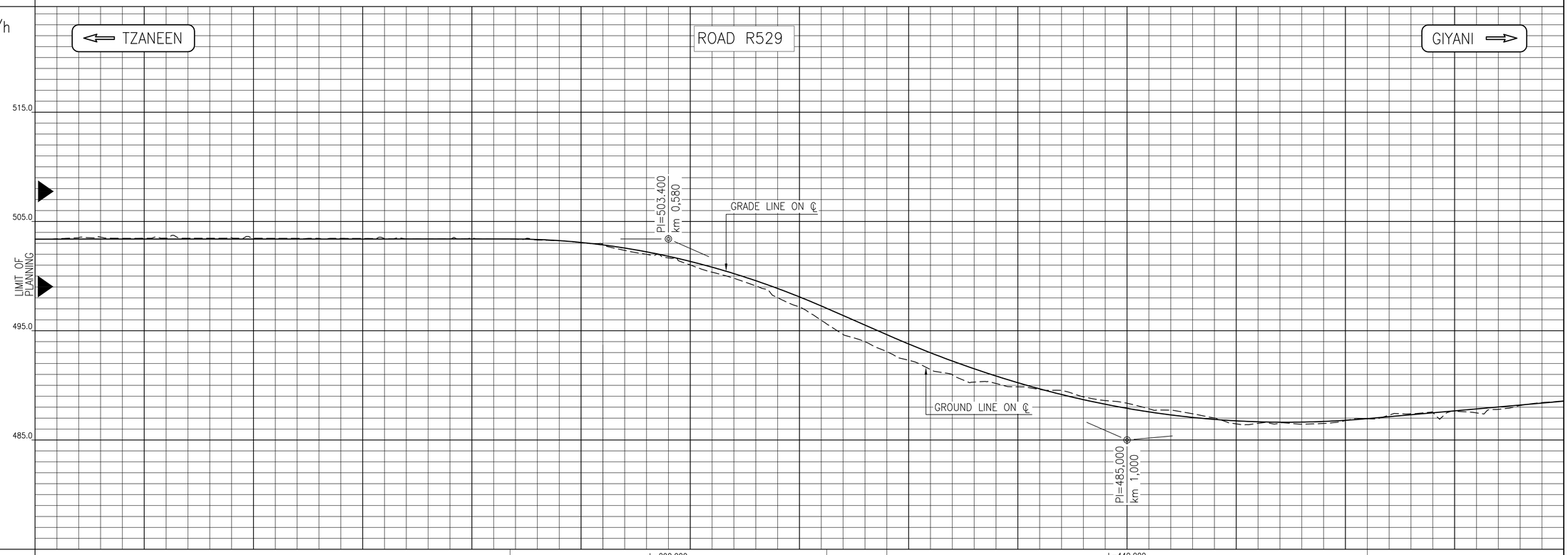


PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



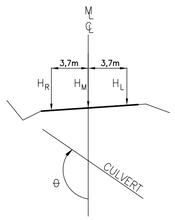
DATUM : 475.00



| | | |

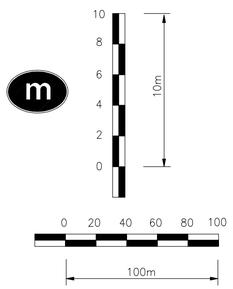
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	CULVERT ANGLE / INCREASING DISTANCES	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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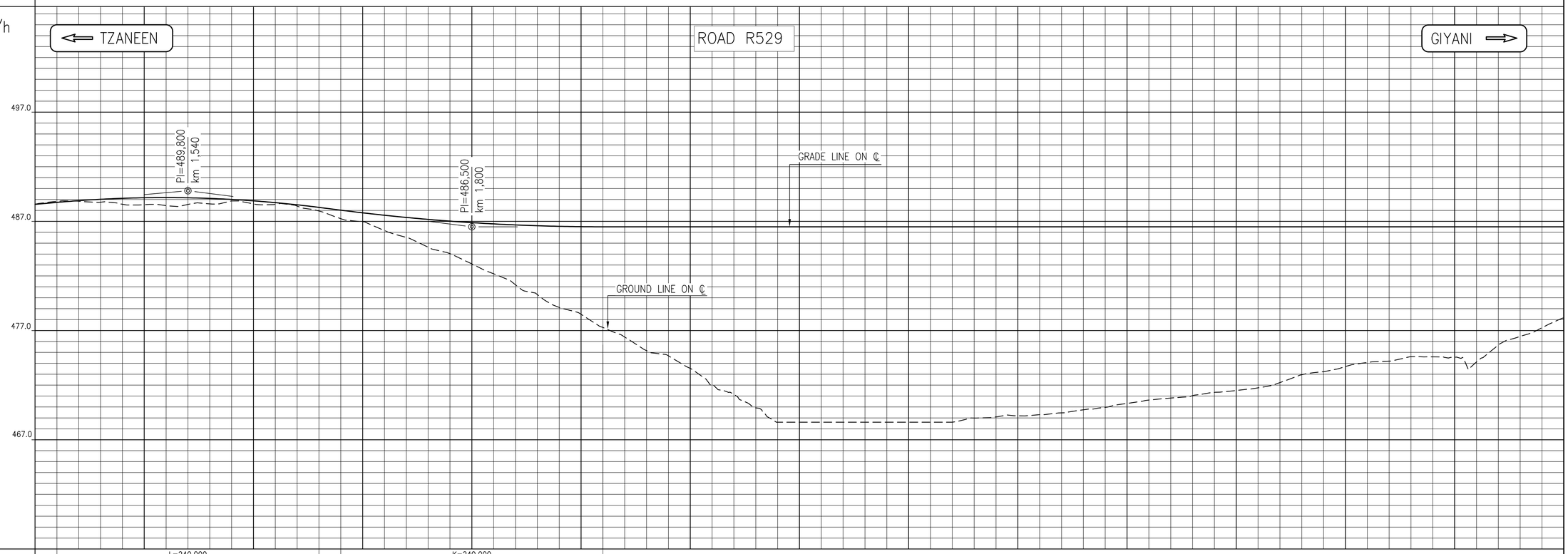
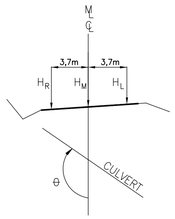


| | | |

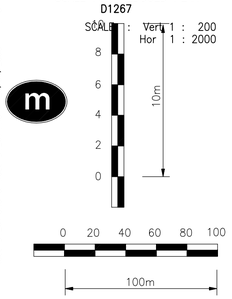
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	CULVERT ANGLE / INCREASING DISTANCES	

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN
D1267
SCALE : Vert 1 : 200
Hor 1 : 2000



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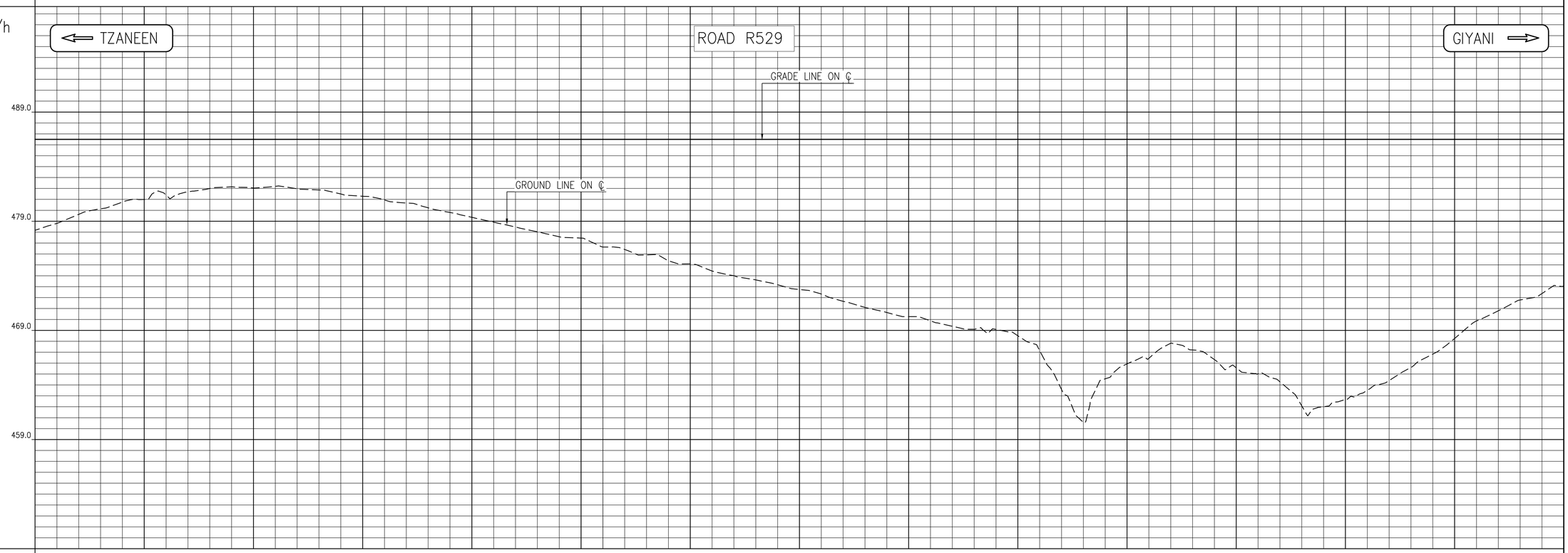


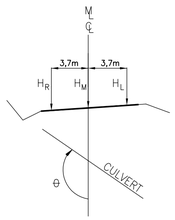
| | | |

GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	

DRAINAGE — CULVERT ANGLE — INCREASING DISTANCES

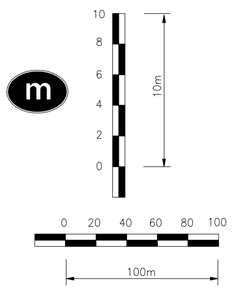
512.0

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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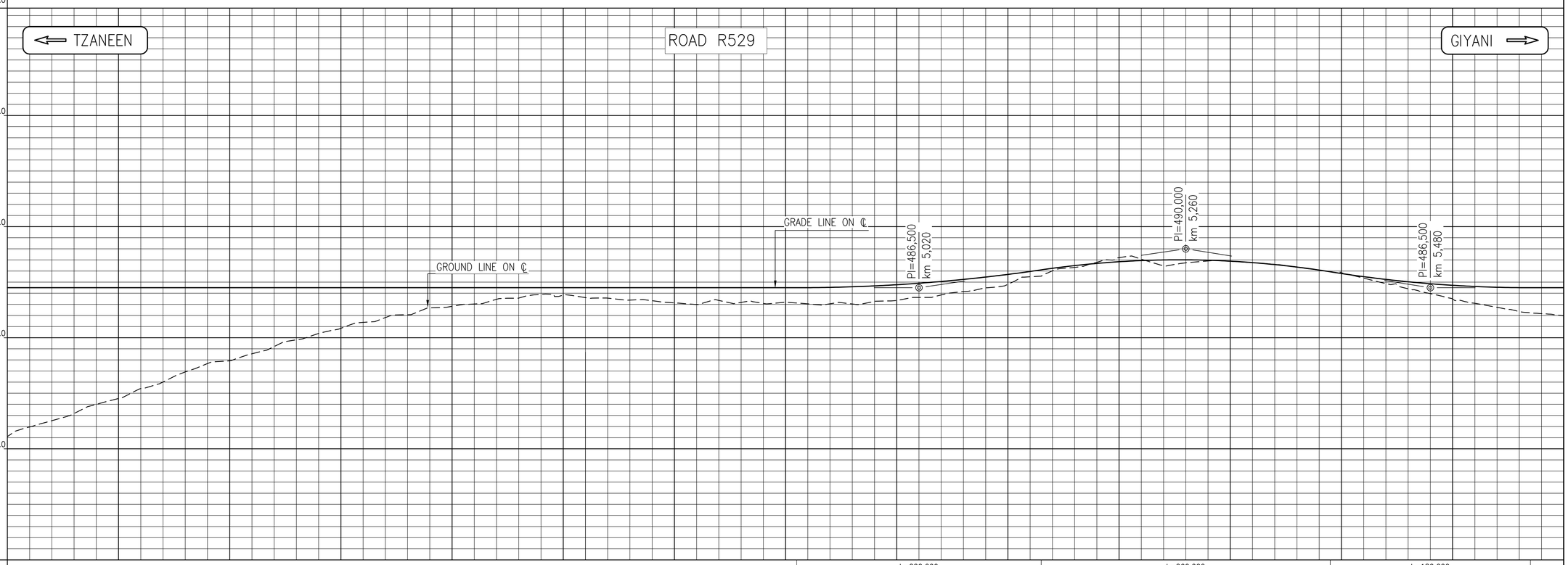
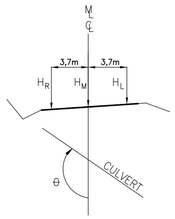


| | | |

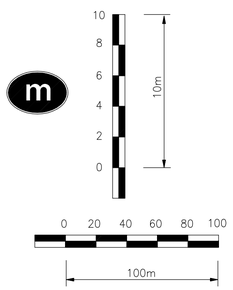
GUARDRAILS	LEFT	
	RIGHT	
SUBSOIL DRAIN	LEFT	
	RIGHT	
SIDE DRAIN	LEFT	
	RIGHT	
CLIMBING LANES	LEFT	
	RIGHT	
DRAINAGE	CULVERT ANGLE / INCREASING DISTANCES	522.0

DESIGN SPEED = 100km/h



PROFILE OF GRADE LINE

SCALE FOR REDUCED PLAN



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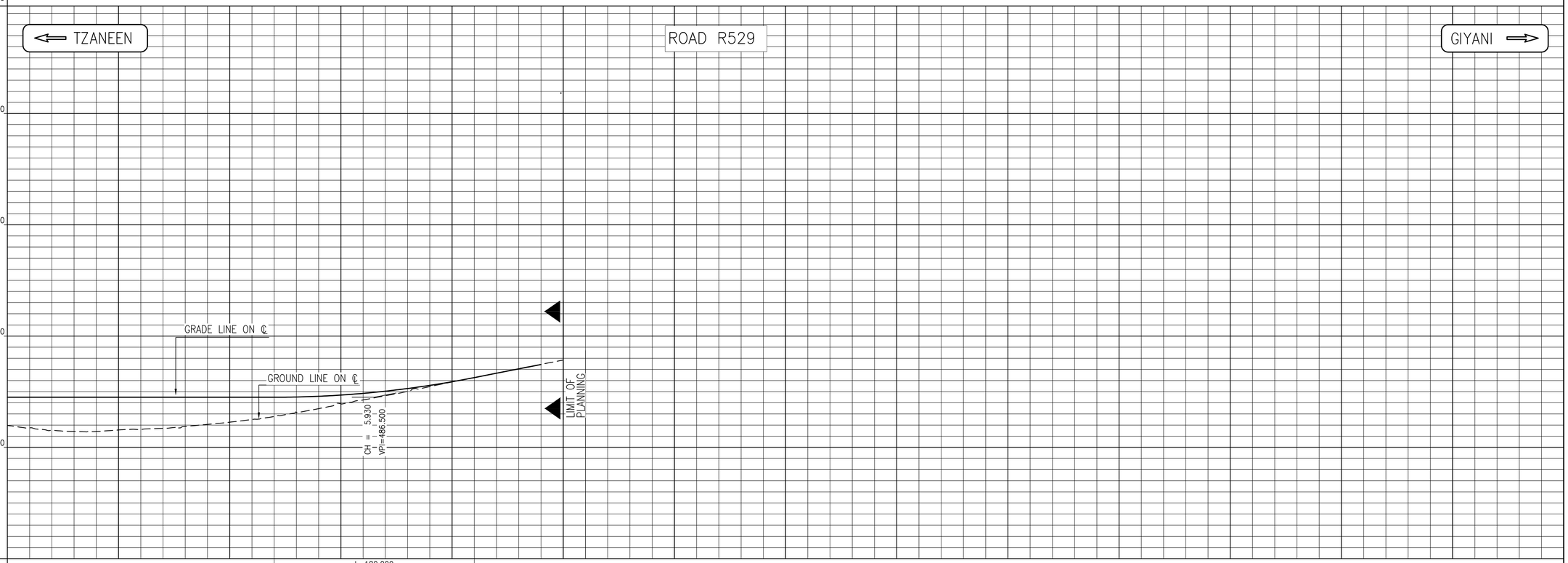
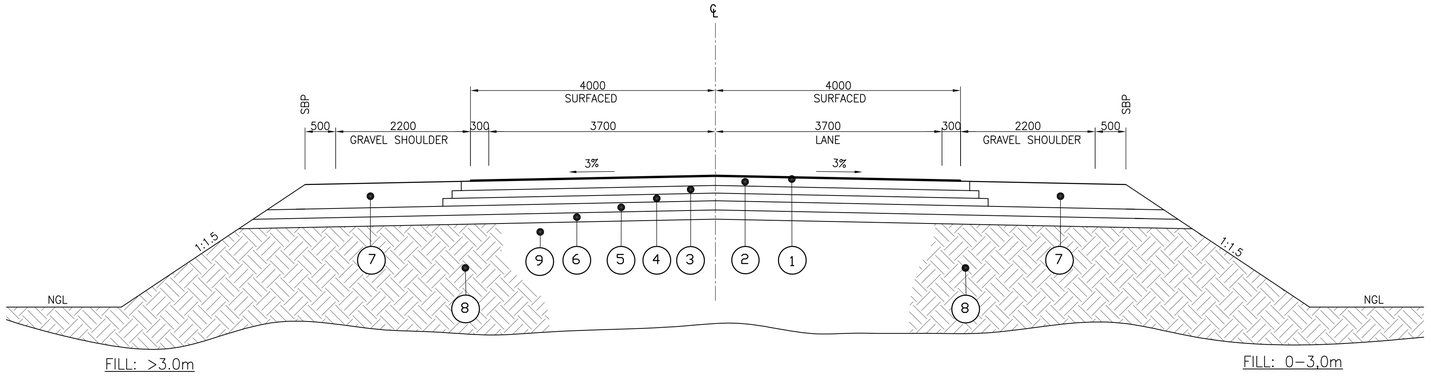
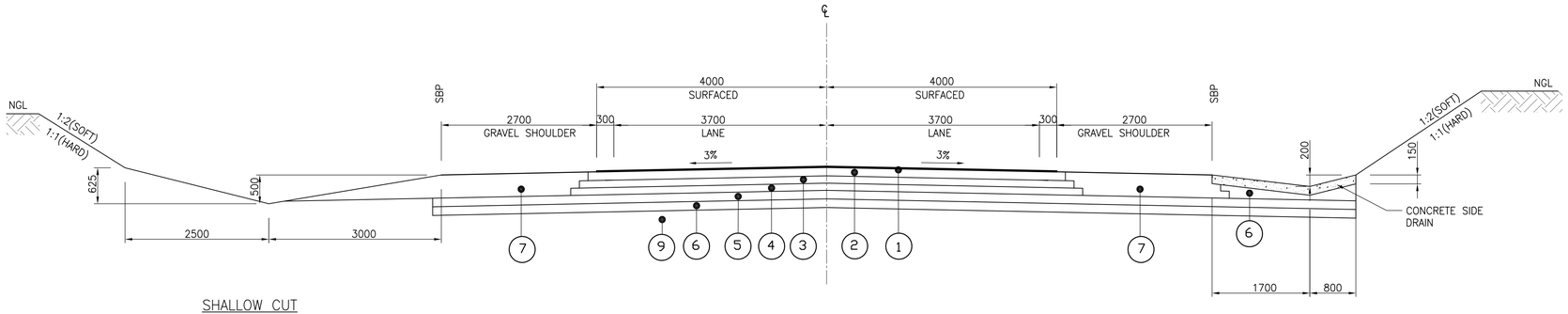


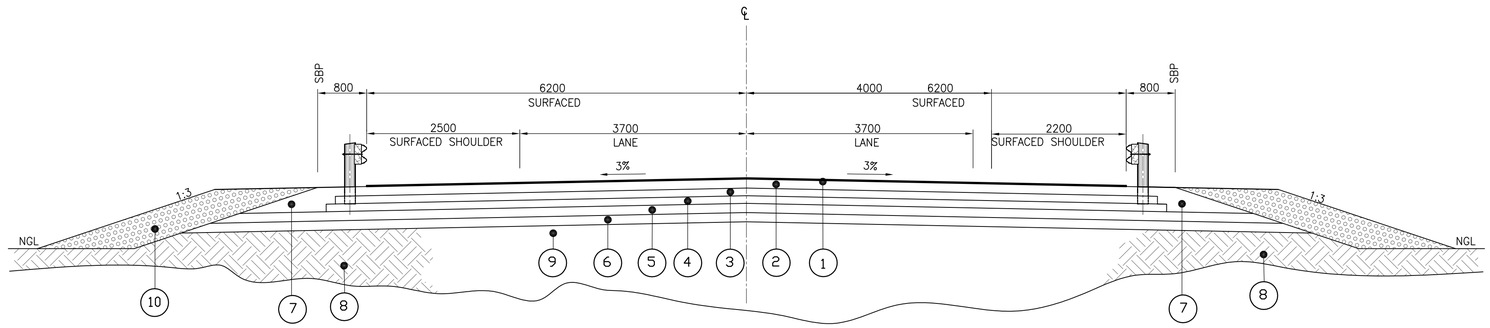
| | | |



PAVEMENT DESIGN – FILL



PAVEMENT DESIGN – CUT AREA



PAVEMENT DESIGN – WITHIN FUTURE DAM AREA

PAVEMENT LAYERS

1	SURFACING	:	13.2mm SINGLE SEAL
2	BASE	:	150mm CRUSHED STONE (G1) BASE, COMPACTED TO 88% ARD, PI < 6, COMMERCIAL.
3	UPPER SUBBASE	:	125mm CEMENT STABILIZED NATURAL GRAVEL LAYER (C4), G6 QUALITY, COMPACTED TO 97% MODIFIED AASHTO, UCS > 1,0 MPa @ 100% MODIFIED AASHTO, ITS > 250 kPa @ 95% MODIFIED AASHTO, PI < 6, COMMERCIAL.
4	LOWER SUBBASE	:	125mm CEMENT STABILIZED NATURAL GRAVEL LAYER (C4), G6 QUALITY, COMPACTED TO 96% MODIFIED AASHTO, UCS > 0.75 MPa @ 100% MODIFIED AASHTO, ITS > 250 kPa @ 95% MODIFIED AASHTO, PI < 6, COMMERCIAL.
5	UPPER SELECTED	:	150mm NATURAL GRAVEL (G7) LAYER COMPACTED TO 95% MODIFIED AASHTO, CBR > 15 @ 95% MODIFIED AASHTO, PI < 12, BORROWPIT OR IN–SITU.
6	LOWER SELECTED	:	150mm NATURAL GRAVEL (G8) LAYER COMPACTED TO 93% MODIFIED AASHTO, CBR > 10 @ 93% MODIFIED AASHTO, PI < 12, BORROWPIT OR
7	SHOULDER	:	APPROVED SHOULDER MATERIAL (G7 QUALITY) COMPACTED IN 150mm LAYERS TO AASHTO.
8	FILL	:	150mm THICK GRAVEL (G9) LAYERS, COMPACTED TO 93% MODIFIED AASHTO, CBR > 7 @ 93% MODIFIED AASHTO, PI <12, BORROWPIT OR IN–SITU.
9	ROADBED PREPARATION	:	MATERIAL DEPTH 1200mm. (DEPTH FROM FINAL ROAD LEVEL) SG2 (CBR 7 TO 15) : RIP AND RECOMPACT 150mm LAYER. SG3 (CBR 3 TO 7) : RIP AND RECOMPACT 150mm LAYER. SG4 (CBR < 3) : SPECIAL TREATMENT AS INSTRUCTED BY ENGINEER.
10	PIONEER LAYER	:	MINIMUM 500mm THICK DUMPROCK LAYER COMPACTED TO REFUSAL, COMMERCIAL.

NOTES:

1. REFER TO TYPICAL CROSS SECTIONS FOR DIMENSIONS OF CROSS SECTION OUTER EDGE CONDITIONS.
2. GUARDRAILS WILL BE ERECTED AT FILLS HIGHER THAN 3.0m.
3. PRIOR TO COMMENCING CONSTRUCTION ALL TOPSOIL IS TO BE REMOVED FROM THE ROAD PRISM. THE REMOVED TOPSOIL IS TO BE STOCKPILED OUTSIDE THE CONSTRUCTION AREA FOR LATER RE–USE OR LOADED AND TRANSPORTED TO THE BORROW PIT AS INSTRUCTED BY THE ENGINEER.
4. BENCHING IN LAYERWORKS TO BE 150mm EXCEPT IN SUBBASE LAYER.
5. 75mm TOPSOIL TO BE PLACED ON CUT AND FILL SLOPES AND IN SIDE DRAINS IF INSTRUCTED BY THE ENGINEER.

PRELIMINARY

SCALE 1:50

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336–7500

P. YAKO
DIRECTOR GENERAL

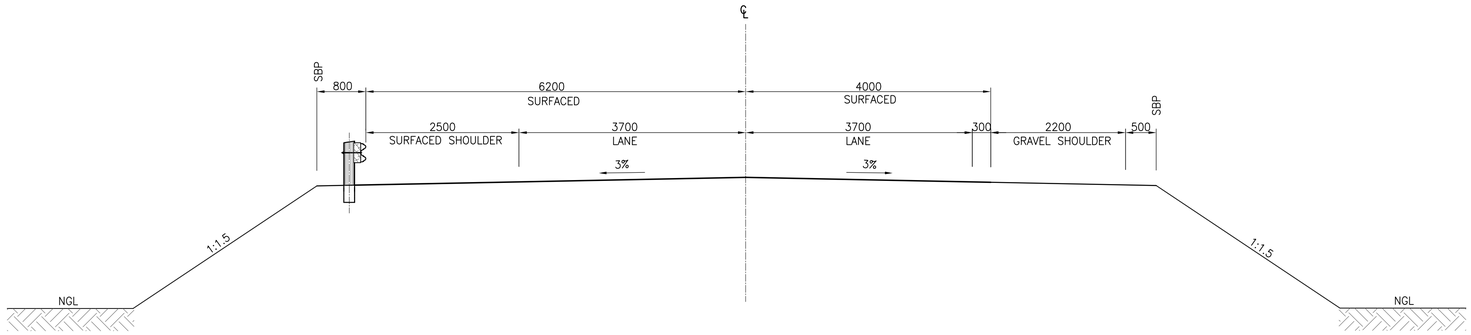
DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

RELOCATION OF ROADS
TYPICAL PAVEMENT
SHEET 1 OF 1

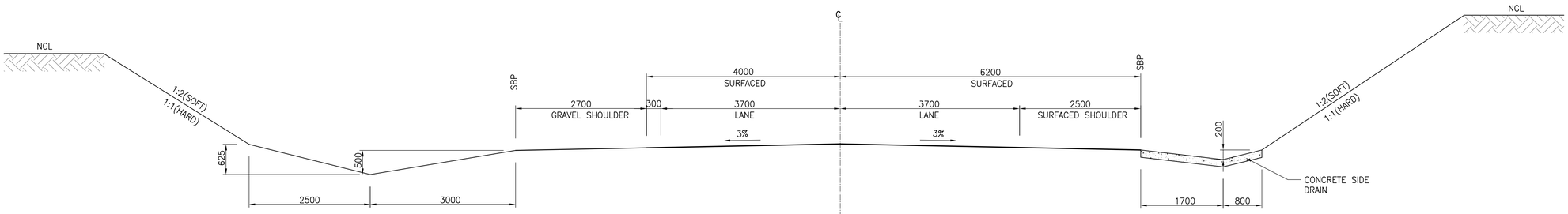
PROVINCE: –	DISTRICT: –	KEYCODES:	–	–	–	–	–	OTHER NUMBER	401775 CEN 250
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET 1 OF 1	REG. No. –						REV. 00
CALCULATION FILE: –									



FILL: >3.0m

FILL: 0–3,0m

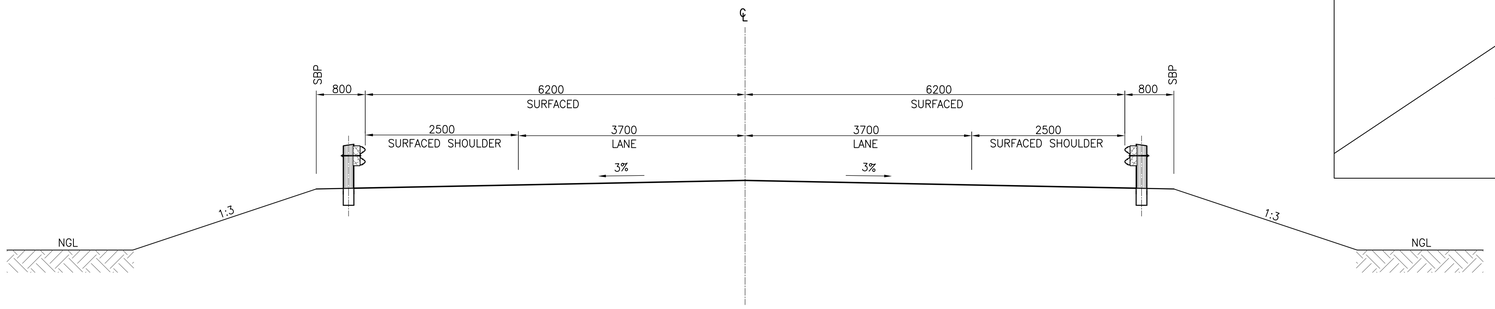
CROSS SECTION – FILL CONDITIONS



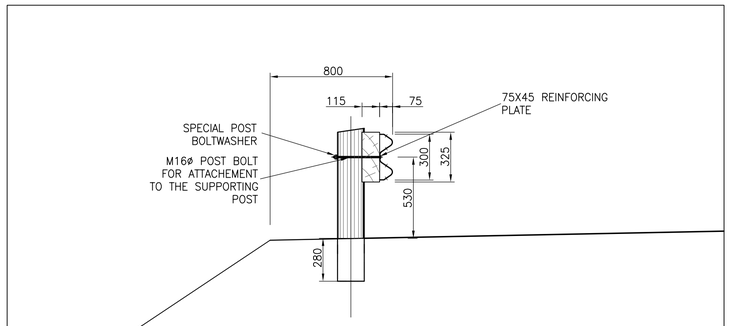
SHALLOW CUT

DEEP CUT WITH CONCRETE SIDE DRAIN

CROSS SECTION – CUT CONDITIONS



CROSS SECTION – FILL CONDITION OVER DAM



DETAIL OF GUARDRAIL AND CHANNEL

SCALE 1:20

PRELIMINARY

SCALE 1:50

SHEET	DESCRIPTION	OTHER No.	REG. No.
1/5	LIST OF DRAWINGS	DHP0001	152 863/07

LIST OF DRAWINGS

REVISION

MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336–7500

P. YAKO
DIRECTOR GENERAL

DESIGN: T vd WALT
CHECKED: DATE: DRAWN: R STEENKAMP
ENGINEER: DATE: EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE: ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

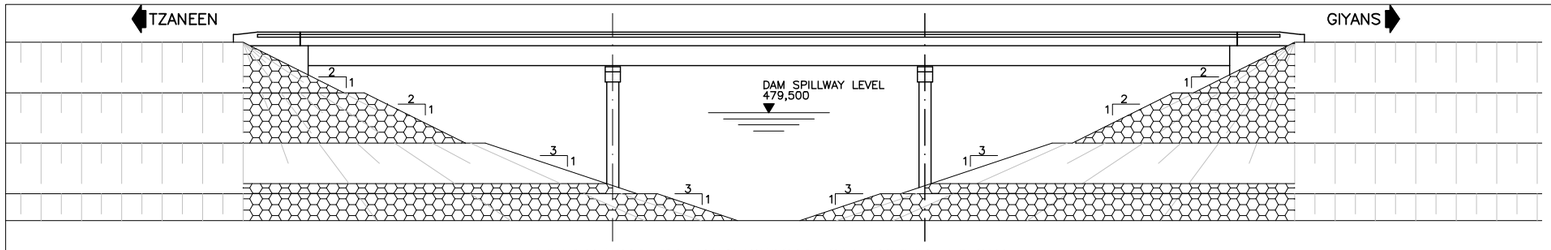
RELOCATION OF ROADS
TYPICAL ROAD CROSS SECTIONS
SHEET 1 OF 1

PROVINCE: –	DISTRICT: –	KEYCODES:	– – – – –	OTHER NUMBER	401775 CEN 251
LOCALITY No.: –	TENDER/ CONTRACT No.	SHEET	REG. No.		REV.
CALCULATION FILE: –		1 OF 1	–		00

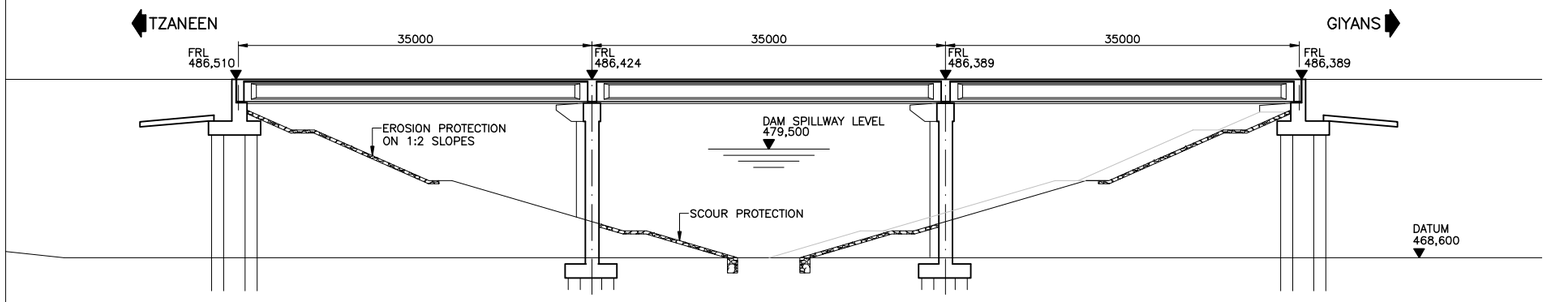
Appendix H.3 : Preliminary Bridge Design

(Note: Electronic MS Word version excludes these drawings. Only available in pdf format.)

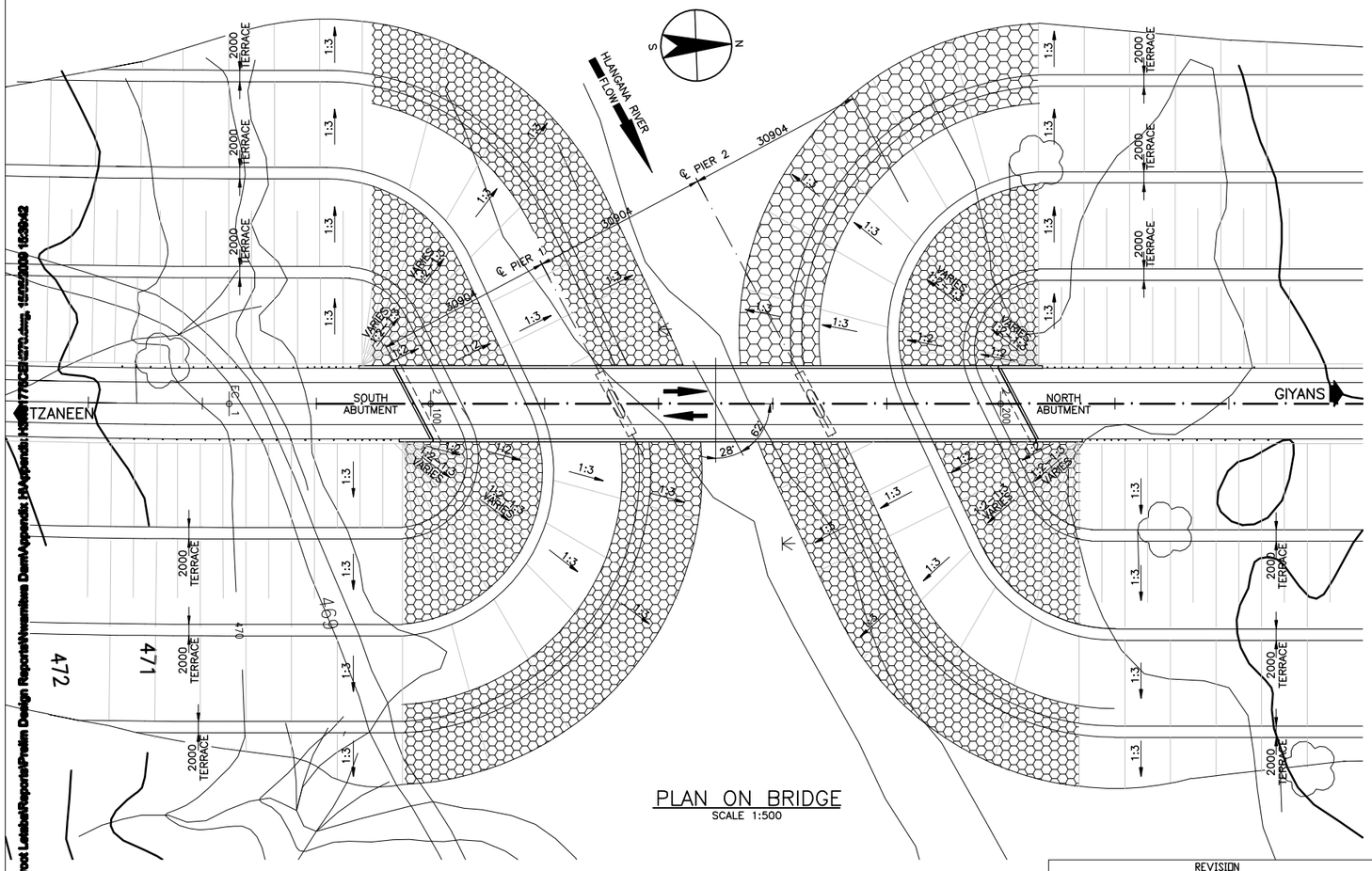
401775 CEN 270	Road D1267 – Proposed Bridge over the Hlangana River
401775 CEN 271	Road D1267 – Proposed Bridge over the Nwanedzi River



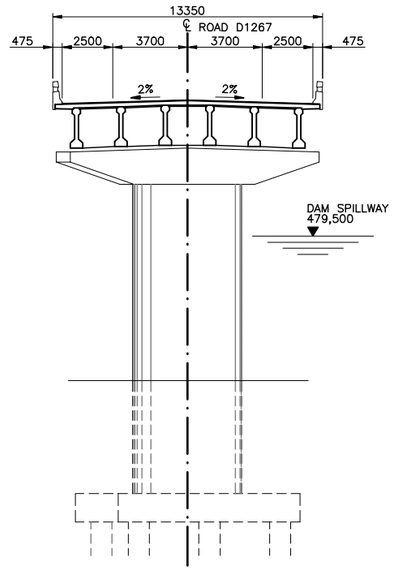
ELEVATON IN DIRECTION OF RIVER FLOW
SCALE 1:300



SECTION ALONG ℄ OF ROAD
SCALE 1:300



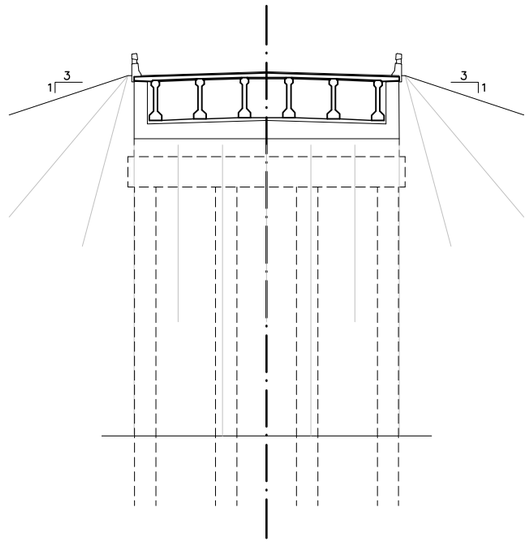
PLAN ON BRIDGE
SCALE 1:500



TYPICAL SECTION
PERPENDICULAR TO DECK
AT PIER
SCALE 1:150

NOTES

1. THE BRIDGE IS DESIGNED IN ACCORDANCE WITH THE CODE OF PRACTICE FOR THE DESIGN OF HIGHWAY BRIDGES AND CULVERTS IN SOUTH AFRICA : TMH7 PARTS 1, 2 AND 3.
2. THE BRIDGE IS DESIGNED FOR NA AND NB36 TRAFFIC LOADING.



TYPICAL SECTION
PERPENDICULAR TO DECK
AT ABUTMENT
SCALE 1:150

REDUCED DRAWING

0 — 100
100 millimetres on original drawing

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

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PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

DESIGN: P PHILOTHEOU
DRAWN: P PHILOTHEOU
CHECKED: DATE:
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

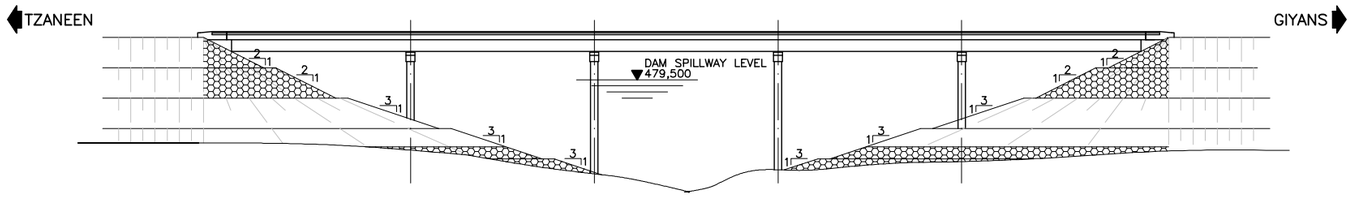
GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

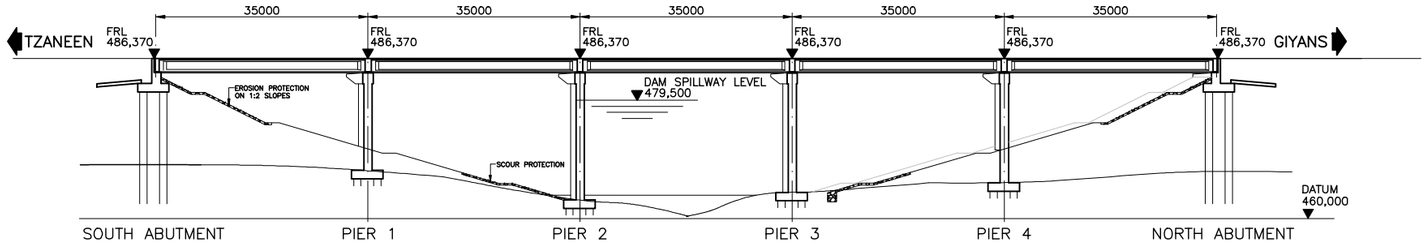
ROAD D1267 - PROPOSED BRIDGE OVER THE HLANGANA RIVER

PROVINCE: –
DISTRICT: –
KEYCODES: – – – – – –
OTHER NUMBER 401775 CEN 270
LOCALITY No: –
TENDER/ CONTRACT No.
CALCULATION FILE: –
SHEET 1 OF 1
REG. No. —
REV. 00

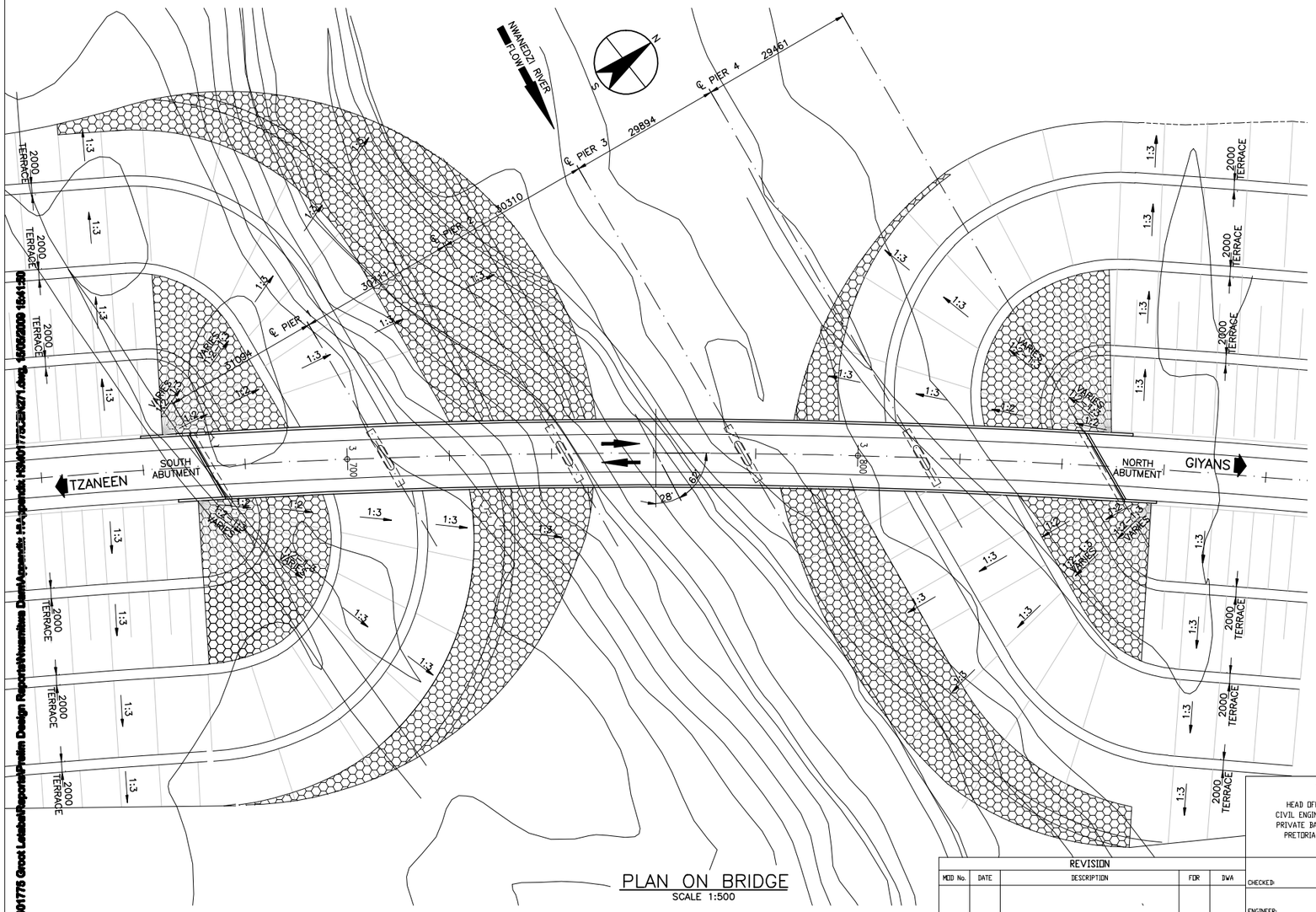
I:\HYDROM\401778 Groot Letaba\Reports\Preliminary Design Report\Numerical Data\Appendix H\Appendix H\401778CE\270.dwg, 18/12/2009 16:39:42



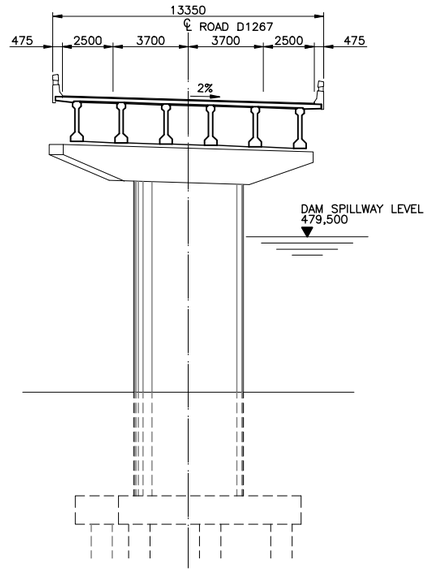
ELEVATON IN DIRECTION OF RIVER FLOW
SCALE 1:500



SECTION ALONG ℄ OF ROAD
SCALE 1:500



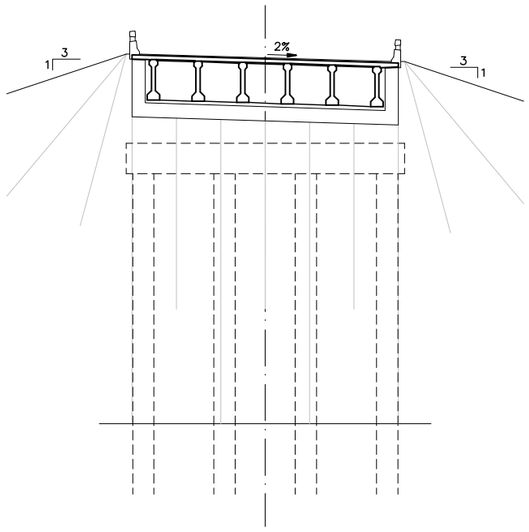
PLAN ON BRIDGE
SCALE 1:500



TYPICAL SECTION PERPENDICULAR TO DECK AT PIER
SCALE 1:150

NOTES

1. THE BRIDGE IS DESIGNED IN ACCORDANCE WITH THE CODE OF PRACTICE FOR THE DESIGN OF HIGHWAY BRIDGES AND CULVERTS IN SOUTH AFRICA : TMH7 PARTS 1, 2 AND 3.
2. THE BRIDGE IS DESIGNED FOR NA AND NB36 TRAFFIC LOADING.



TYPICAL SECTION PERPENDICULAR TO DECK AT ABUTMENT
SCALE 1:150

REDUCED DRAWING

0 — 100
100 millimetres on original drawing

SHEET	DESCRIPTION	OTHER No.	REG. No.
–	–	–	–

LIST OF DRAWINGS

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

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P. YAKO
DIRECTOR GENERAL

DESIGN: P PHILOTHEOU
DRAWN: P PHILOTHEOU
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ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

ROAD D1267 - PROPOSED BRIDGE OVER THE NWANEDZI RIVER

PROVINCE: –	DISTRICT: –	KEYCODES:	–	–	–	–	–	OTHER NUMBER	401775 CEN 271
LOCALITY No: –	TENDER/ CONTRACT No.	SHEET	REG. No.					REV.
CALCULATION FILE: –		1 OF 1	—					00

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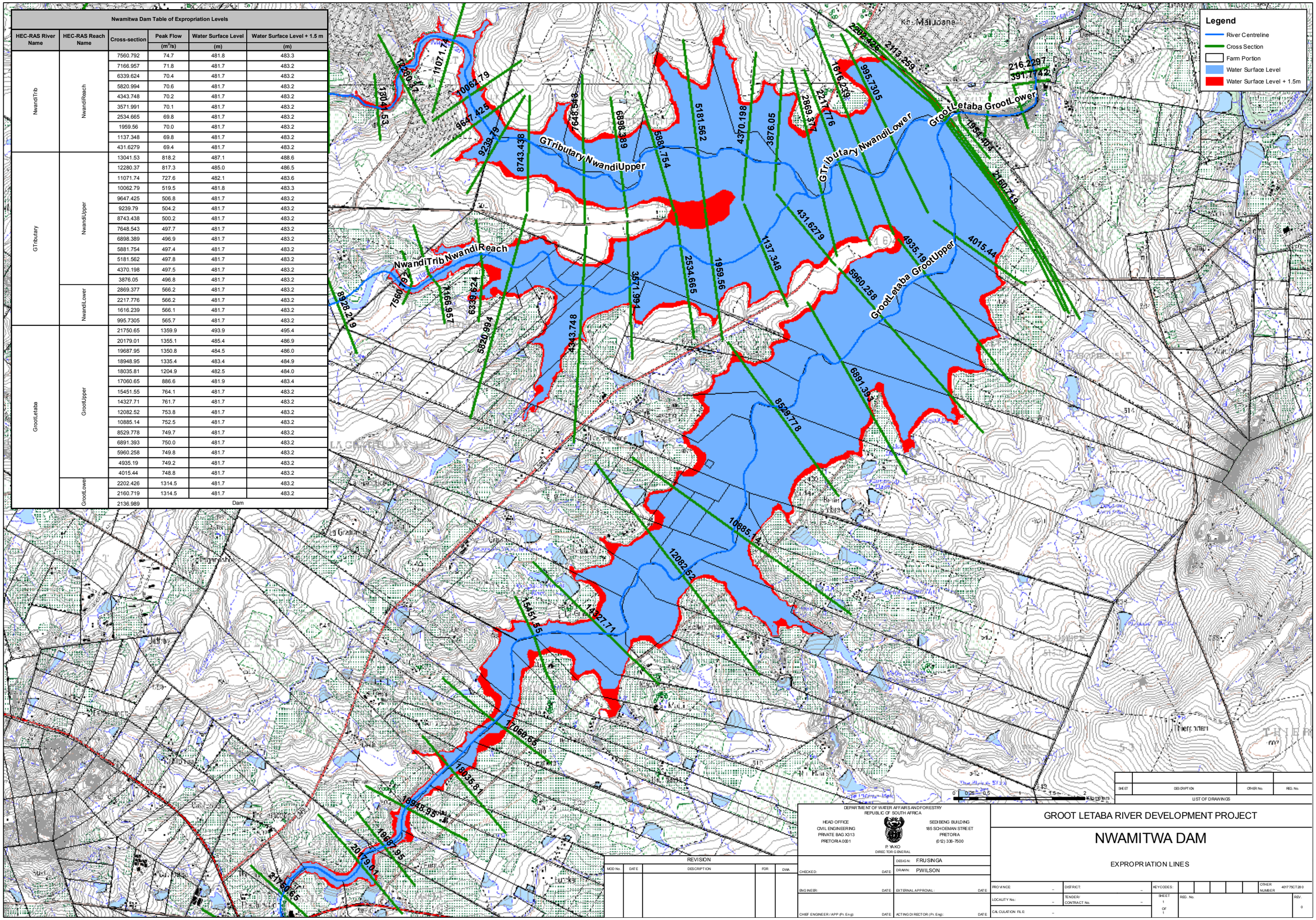
Appendix H.4 : Expropriation Plan

(Note: Electronic MS Word version excludes these drawings. Only available in pdf format.)

401775 CT 280 Expropriation Lines

Nwamitwa Dam Table of Expropriation Levels					
HEC-RAS River Name	HEC-RAS Reach Name	Cross-section	Peak Flow (m^3/s)	Water Surface Level (m)	Water Surface Level + 1.5 m (m)
NwandiTrib	NwandiReach	7560.792	74.7	481.8	483.3
		7166.957	71.8	481.7	483.2
		6339.624	70.4	481.7	483.2
		5820.994	70.6	481.7	483.2
		4343.748	70.2	481.7	483.2
		3571.991	70.1	481.7	483.2
		2534.665	69.8	481.7	483.2
		1959.56	70.0	481.7	483.2
		1137.348	69.8	481.7	483.2
		431.6279	69.4	481.7	483.2
GTributary	NwandiUpper	13041.53	818.2	487.1	488.6
		12280.37	817.3	485.0	486.5
		11071.74	727.6	482.1	483.6
		10062.79	519.5	481.8	483.3
		9647.425	506.8	481.7	483.2
		9239.79	504.2	481.7	483.2
		8743.438	500.2	481.7	483.2
		7648.543	497.7	481.7	483.2
		6898.389	496.9	481.7	483.2
		5881.754	497.4	481.7	483.2
		5181.562	497.8	481.7	483.2
		4370.198	497.5	481.7	483.2
		3876.05	496.8	481.7	483.2
	NwandiLower	2869.377	566.2	481.7	483.2
		2217.776	566.2	481.7	483.2
		1616.239	566.1	481.7	483.2
		995.7305	565.7	481.7	483.2
GrootLetaba	GrootUpper	21750.65	1359.9	493.9	495.4
		20179.01	1355.1	485.4	486.9
		19687.95	1350.8	484.5	486.0
		18948.95	1335.4	483.4	484.9
		18035.81	1204.9	482.5	484.0
		17060.65	886.6	481.9	483.4
		15451.55	764.1	481.7	483.2
		14327.71	761.7	481.7	483.2
		12082.52	753.8	481.7	483.2
		10885.14	752.5	481.7	483.2
		8529.778	749.7	481.7	483.2
		6891.393	750.0	481.7	483.2
		5960.258	749.8	481.7	483.2
		4935.19	749.2	481.7	483.2
		4015.44	748.8	481.7	483.2
	GrootLower	2202.426	1314.5	481.7	483.2
		2160.719	1314.5	481.7	483.2
		2136.989	Dam		



SHEET	DESCRIPTION	OTHER No.	REG. No.
	LIST OF DRAWINGS		

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

HEAD OFFICE
CIVIL ENGINEERING
PRIVATE BAG X313
PRETORIA 0001

SEDIBENG BUILDING
185 SCHOEMAN STREET
PRETORIA
(012) 336-7500

P. YAKO
DIRECTOR GENERAL

REVISION				
MOD No.	DATE	DESCRIPTION	FOR	DWA

DESIGN: F.RUSINGA
CHECKED: DATE:
DRAWN: P.WILSON
ENGINEER: DATE:
EXTERNAL APPROVAL: DATE:
CHIEF ENGINEER / APP (Pr. Eng): DATE:
ACTING DIRECTOR (Pr. Eng): DATE:

GROOT LETABA RIVER DEVELOPMENT PROJECT

NWAMITWA DAM

EXPROPRIATION LINES

PROVINCE	–	DISTRICT:	–	KEYCODES:						OTHER NUMBER	4017 75CT 28 0
LOCALITY No.:	–	TENDER/ CONTRACT No.	–	SHEET 1 OF 1	REG. No.						REV. 0
CALCULATION FILE	–										