

CEDERBERG MUNICIPALITY

ELECTRICAL MASTER PLANNING

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MUNICIPALITY**

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**STATEMENT OF THE
ELECTRICAL NETWORK OF
CEDERBERG MUNICIPALITY**

1. INTRODUCTION

The appointment covers the master planning of the different networks of all towns within the Cederberg municipal area.

The brief covers the following aspects.

- Advise on the impact of the RED (Regional Electrical Distributor).
- Investigate the new substation for Clanwilliam and the influence of the Hidro Power Station.
- The short term alterations to network capacity shortages.
- Investigate the options to computerise the electrical infrastructure.
- Integrate master plan into IDP and SDBIP.

The above aspects are covered in the reporting of every town individually.

2. CLANWILLIAM ELECTRICAL NETWORK

Eskom Supply Network

Clanwilliam substation is supplied from a single 22kV line from Eskom Graafwater Farmers 2 feeder onto a common 22kV busbar. The voltage is stepped down to 11kV via 3 transformers (2 x 2MVA and 1 x 1,5MVA)

Clanwilliam experienced serious voltage problems due to the overloading of the Eskom supply network and the lack of generation capacity from the Hidro Power Station.

The following proposals were made to improve the supply options.

- Application was made to Eskom for supply increase of 1MVA and to convert to Ruraflex tariffs. (interim solution). A new 1km line will be constructed from the Zandberg feeder to create 2 infeeds to Clanwilliam. It will divide the load between Zandberg substation (Farmers 3 feeder) and Graafwater substation (Farmers 2 feeder). This supply requires the internal Clanwilliam networks to be separated on a permanent basis. This interim requirement was requested from Eskom due to limited capacity on their 22kV network.
- The Hidro Power Station was upgraded to 2MVA and commissioned during March 2008. The maximum expected output with the existing water configuration is 1250kVA (When the dam is full). It will reduce during the summer when the water level drops. The expected summer capacity is 500kVA.
- Application was made for a further 2MVA from Eskom. This will require a new 66kV/11kV substation at Clanwilliam. It was stated that Clanwilliam requires an 11kV bulk supply point. This will eliminate the existing 22kV/11kV stepdown substation. It was suggested to Eskom that the most suitable position for the substation will be adjacent to the existing substation. This application is presently under design investigations.

It is proposed to install four 11kV feeders in the new configuration. The Hidro Power Station will feed onto the 11kV busbar.

Clanwilliam Supply Point Statistics

Clanwilliam is presently on the Nightsave (Rural) tariff with a contract value of 2MVA. The load statistics can be seen in Appendix A.

It is recommended that the contract be upgraded to 5MVA at Ruraflex (application has been made). This tariff structure will accommodate the additional Hidro Power Station infeed and buffer it against power station outages. (No maximum demand fluctuations).

The installed capacity of all transformers on the network is 14 355kVA.

The highest recorded maximum demand is 4220kVA The private Hidro Power Station was out of commission for the last 2 years due to upgrading and refurbishment. The demand should reduce with the power station in operation.

Internal Electrical Networks

Drawings

The following drawings were upgraded to accommodate the latest modifications.

CLAN 01	Rev 1	MV Reticulation	(previously LE CLAN 01/001)
CLAN 02	Rev 6	Clanwilliam Schematic Electrical Drawings	(previously R/0086/R-2)

Network Evaluation

It was found that the configuration of the internal network caused serious low voltages due to tap settings at the transformers and low incoming voltages. A load flow evaluation was done and the following network modification was implemented. (refer to CLAN 02)

- The LV side of the 22/11kV transformer No 2 was connected to a new conductor feeder to the load side of TS1. The normal open points are moved to SF2 and FOSTER RMU. This transformer was previously only a standby and never used on load.
- A tie-line was constructed between Anemoon M/S and the feeder to Crystal Waters for switching options between feeders. It was done in anticipation of an increase in the industrial load.
- The suggested tap settings in the local transformers can be seen in Appendix B.

Rooibos decided to consolidate their 3 points into one 11kV supply point. This will be supplied from Munic 1 feeder. Due to the nature of the Rooibos demand it is suggested that the Hidro Power Station supply feeds into Munic Feeder 1.

Recommendations

1. The conductor from AB8 to T-off 1 must be upgraded to HARE conductor. (Priority – High)
2. The conductor from T-off 1 to Parkstraat RMU must be upgraded to minimum MINK conductor. (Priority – High)
3. Upgrade the feeder to the houses next to the school on the eastern side of the river to MV (suggested 3.3kV). (Priority – High)
4. Replace the Kragstasie S/S with a 300kVA minisubstations and remove the equipment out of the building. (Priority – Medium)
5. The new Supply Substation will determine the new configuration of the 11kV feeders. This will be clarified with Eskom and other affected parties.

3. CITRUSDAL ELECTRICAL NETWORK

Eskom Supply Network

Citrusdal is supplied from the Eskom Substation via two dedicated overhead lines feeding Citrusdal Switching Station.

Citrusdal Supply point Statistics

Citrusdal is on Nightsave (Rural) tariff with a contract value of 7MVA. The load statistics can be seen in Appendix A. The maximum recorded load over the last 28 months is 4660kVA.

It is suggested to reduce the contract value to 5MVA. The installed capacity of all transformers is 11290.

Internal Electrical Networks

Drawings

The following drawings were updated to accommodate the latest modifications.

CITRUS 01 Rev 1 Citrusdal MV Reticulation
CITRUS 02 Rev 0 Citrusdal Schematic Electrical drawing

Network Evaluation

The network was found in a good condition and well maintained.

The spare capacity under normal conditions on the supply feeders are as follows.

Oewer Straat Suid feeder 4000.kVA (existing simulated load 1300 kVA)
Oewer Straat Noord feeder 2600 kVA (existing maximum load 1800 kVA)
Harry Straat feeders 4000 kVA (existing simulated load 1600kVA)

The main ring between the Oewer Straat Suid and Harry Straat feeders were found to be Mink cable and 70mm² Cu conductor except for the section between Voortrekker s/s and Droogbane. (35mm² Cu cable) It will limit the capacity to 2,6 MVA if alternative switching options are considered.

The maximum recorded load on the transformers can be seen in Appendix C.

Recommendations

1. It is proposed to move the metering point of the Citrus Co-op to the T-off point within the premises. It will free the main feeder for alternative switching options. (to GHSK)

4. ELANDSBAAI ELECTRICAL NETWORK

Eskom Supply Network

Elandsbaai is supplied from an overhead Eskom Graafwater 1feeder. The municipal supply breaker was recently upgraded.

Elandsbaai Supply point Statistics

Elandsbaai is on Nightsave (Rural) tariff with a contract value of 1000kVA. The load statistics can be seen in Appendix A.

The maximum recorded load over the last 28 months was 696kVA.

The total installed capacity of all transformers is 3295kVA.

Internal Electrical Networks

Drawings

The following drawings were updated to accommodate the latest modifications.

ELAND 01	Rev 1	Elandsbaai 11kV Network layout
ELAND 02	Rev 0	Elandsbaai Schematic Electrical drawing

Network Evaluation

The load on the Elandsbaai networks did not show any significant growth in the past 4 years. The factories closed down which indicate a growth in the residential component.

The whole network is only protected at the supply breaker.

The spare capacity under normal conditions on the supply feeders are as follows.

Supply feeder 2860 kVA (existing maximum load 692 kVA)

Side feeder (existing simulated load 228kVA)

The maximum recorded load on the transformers can be seen in Appendix C.

Recommendations

1. If it is required, section isolators could be installed on the main feeder for operating purposes.

5. LAMBERTSBAAI ELECTRICAL NETWORK

Eskom Supply Network

Lambertsbaai is supplied directly from the Eskom Lambertsbaai Substation with a single 11kV feeder.

The Lambertsbaai Canning Factory is directly supplied from Eskom on a dedicated feeder in the substation.

Lambertsbaai Supply point Statistics

Lambertsbaai is on Miniflex tariff with a contract value of 2700kVA. The load statistics can be seen in Appendix C. The maximum recorded load over the last 28 months was 3043kVA. (During January Holiday)

The total installed capacity of all transformers is 6855kVA.

It is suggested that the contract be increased to 3500kVA.

There are suggestions that the Canning Factory at the harbour be incorporated into the municipal supply network. The Eskom supply contract will be adjusted accordingly.

Internal Electrical Networks

Drawings

The following drawings were updated to accommodate the latest modifications.

LAMBERT 01 Rev 1 Lambertsbaai MV Reticulation
LAMBERT 02 Rev 0 Lambertsbaai Schematic Electrical drawing

Network Evaluation

The networks were found to be in a good condition.

The spare capacity under normal conditions on the supply feeders are as follows.

Supply feeder 2600 kVA (existing maximum load 3050 kVA)
Overhead line (Ouetehuis, Lollies, Quickfall) 2600kVA (existing simulated load 2500 kVA)
Minisub Cable (Kerk, Sleephelling) 2600kVA (existing simulated load 561 kVA)
Van Niekerk (Leipoldt - Streetlights) 2600 kVA (existing simulated load 565 kVA)

The feeder to Ouetehuis is not protected. The only protection is at the main breaker in the substation.

The Ouetehuis Feeder is limited to 1,4MVA due to 16mm² CU O/H conductor. The installed capacity on the particular feeder is 2295kVA.

Recommendations

1. It is recommended to remove the RMU that feeds Kerk M/S and Sleep Helling M/S. The supply cable must be through jointed at the RMU onto the cable to Kerk M/S. A new cable must be installed from Kerk M/S to join onto the supply to Sleep Helling.
2. Install the RMU at the substation to feed Lollies M/S feeder and Ouetehuis feeder with the necessary fused protection. It will improve the switching options to the 4 different feeders.
3. The transformer tap settings should adjust for proper voltage regulation. This can be seen in Appendix C.

6. GRAAFWATER ELECTRICAL NETWORK

Eskom Supply Network

Graafwater is supplied from a dedicated feeder in the Eskom Graafwater Substation with a metering point inside the town.

Graafwater Supply point Statistics

Graafwater is on the Nightsave (Rural) tariff with a contract value of 750kVA. The load statistics can be seen in Appendix C.

The maximum recorded load over the last 28 months was 795kVA.

The total installed capacity of all transformers is 2350kVA.

It is suggested that the contract be increased to 1000kVA. There are developers presently investigation the development of large erven in the town. It will have an impact on the demand of Graafwater.

Internal Electrical Networks

Drawings

The following drawings were updated to accommodate the latest modifications.

GRAAF 01	Rev 1	Graafwater MV Reticulation
GRAAF 02	Rev 0	Graafwater Schematic Electrical drawing

Network Evaluation

The networks were found to be in a good condition.

The spare capacity under normal conditions on the supply feeders are as follows.
Supply feeder 3500 kVA (existing maximum load 795 kVA)

The LV feeder from Compion Substation feeds a large portion of the residential area and the commercial centre. It limits the upgrading in the business centre and possible developments on erven 55 and 65.

Recommendations

1. It is recommended to upgrade the KOOP transformer to a 500kVA minisubstation and move the 315kVA KOOP transformer to the corner of Erasmus van Zyl Street and Van der Stel Street. A new 22kV line must be constructed along Van der Stel Street to join into the Van der Stel Substation.

The LV feeders can be re-arranged to relieve the pressure on Compion Substation.

7. GENERAL

7.1. Comment on the REDS

The following extract was taken from the ENERGY SECURITY MASTER PLAN – ELECTRICITY 2007- 2025 of the DME

“10.1.8 EDI Restructuring

Cabinet approved the proposal to create six Regional Electricity Distributors (REDs) which will be established as public entities. Whilst priorities will be the migration of the Distribution business into the 6 Reds and ensuring fair value compensation for migrated assets, details of the roadmap to achieve EDI restructuring will unfold over the planning period. “

This restructuring is in process and still a national priority.

7.2. Computerisation of the electrical network.

APPENDIX A

CUSTOMER ACCOUNT LEDGER
AT DIFFERENT ESKOM POINTS OF CEDERBERG MUNICIPALTY

APPENDIX B

**CLANWILLIAM VOLTAGE PROFILE
AND PROPOSED TRANSFORMER TAP SETTINGS**

Clanwilliam Elektriese Netwerk
11kV Gesimuleerde Spanningsvalle teen las van 4.2MVA

Aannames

Substasie Transformators is gestel op 100% (mid tap)

Hierdie is gebaser op 'n aanname dat die sekondêre spanning van minisubstasies en transformators standaard 400V is.

Indien die sekondere spanning 380V is moet 'n verdere 3.2% bygevoeg word.

Mini-Sub Naam	Grootte	Normale Toevoer (huidig)	Byvoeging van derde voerder
		Spanningsval (%)	Spanningsval (%)
Reenblom	300	0	0
Mark	315	0	0
Ouetehuis	100	0	0
Hoerskool	160	0	0
Skoolstraat	315	0	0
De_Vlei	315	2	2
Clanwilliam_Lodge	200	2.5	2.5
Parkstraat	300	2.5	2.5
Pleinstraat	500	2.5	2.5
Spar	1000	2.5	2.5
Hotel	300	3	3
Fosterstraat	315	3	3
Rioolpompe	200	3	0
Bosasa	315	3	0
Pomp	200	3	0
Slagpale	160	3	0
Passage	315	3	0
Rugbyclub	50	3	0
Landbouskool	250	3	0
BAKKERY	315	2.5	2.5
Teebaan	315	0	0
Indus	315	0	0
Chalet	160	0	0
Schus	200	0	0
Plettenberg	160	0	0
Reservoir	100	0	0
Caleta_Cove	315	1	0
Caleta_Pomp	50	1	0
Hills	315	2	0
Crystal_Waters	315	0	0
Crystal_Waters_MS_A	160	0	0
Crystal_Waters_MS_B	160	0	0
Old Cape	200	0	0
Koop	100	1	0
Saagmeule	160	1	0
Hopland_2	315	1.5	0
Suiwerwerke	150	1.5	0
Gholfbaan	50	1.5	0
Hopland_1	315	1.5	0
Bloekom	500	1.5	0
Anemoon	500	1.5	0
Sipres	500	1.5	0
Oranje	500	1.5	0
Denne	315	1.5	0
Jubelee_Park	300	1.5	0
Tee_Beheerraad	1000	1.5	0
Hospitaal	315	1	0
Kragstasie	500	1	0

Deur toe te laat vir bostaande spanningsvalle in die netwerk kan die spanning by die substasie gereguleer word indien die toevoerspanning wissel.

Die toevoerspanning moet bepaal word om die spanningsvalle te bereken.

APPENDIX C
MINICIPAL MINISUBSTATION
AND TRANSFORMER DATA

TYPE: O/B = OPEN BUSHES; B/B = BOX/BOX; M.S. = MINISUB — CITRUSDAL TRANSFORMATORS

	SUBSTASIE	VERUAAKBAAR	TIP	REEKSNR	kVA	L.V. AMPS	OLIE	
⊗	HOSPITAAL	POWER ENGINEERS	B/B	P.E. 11385	315	454	773	✓
	M.S. SPORT	CENTRAL POWER TRANSFORMERS	M.S.	2772	315	433	?	✓
	RIVIER (PAAL)	POWER ENGINEERS	O/B	P.E. 11376	100	144	364	✓
	PAUL DE VILLIERS (BINNE GEBOU)	" "	B/B	P.E. 15135	200	289	430	✓
	AANJAER POMPE	ELEKTROMEK	O/B	E.L. 00140	100	144	218	✓
	KARAVAN PARK	N.E.I. TRANSFORMERS	M.S.	20276901/1	160	200	300	✓
	SWARTBAR	POWER ENGINEERS	M.S.	20466701/01	500	689	485	✓
	SPAR	CENTRAL POWER TRANSFORMERS	O/B.	?	160	230	?	✓
	TELKOM	" " "	B/B	M.S.E. 92	50	72	262	✓
⊗	DUNCKEARD	POWER ENGINEERS	B/B	P.E. 11386	200	289	636	
	BERGSTRAAT	" TRANSFORMERS	M.S.	J.M.S. 182	160	200	480	
	KERK (HOOPSTR)	" ENGINEERS	M.S.	P.E. 33815	500	700	530	✓
	PRINSLOO	N.E.I. TRANSFORMERS	M.S.	20397608/01	400	550	415	✓
⊗	HOTEL	LENING ELECTRIC	B/B	T. 1193/10	200	289	454	✓
	OLIE TEHUIS	POWER ENGINEERS	M.S.	P.E. 54903	200	289	310	✓
⊗	WERKSWINKEL	SOUTH WALKS	O.B.	10075	200	289	400	
	W/SUIWERINGSWERKE	POWER ENGINEERS	M.S.	P.E. AB 810	200	275	345	
	RIOOLWERKE (PAAL)	" "	O/B	63360	50	72	125	
	GOLFBAAN POMP EN W/STELLE	" TRANSFORMERS	M.S.	J.M.S. 315	315	455	?	
	O.K. / SENTRA	N.E.I. TRANSFORMERS	M.S.	20275401/1	400	550	410	
⊗	VOORTREKKER (BINNE GEBOU)	DONAR LONG	O/B	02A/66/204	200	287	386	
	WYNKELDER	N.E.I. TRANSFORMERS	B/B	20281601/1	1600	2309	1040	
⊗	KOELKAMERS	POWER TRANSFORMERS	B/B	J.P.T. 588	315	454	760	
	G.H.S. KANTORE	CENTRAL POWER TRANSFORMERS	M.S.	T. 10117	160	230	?	
	G.H.S. PAKSTOOR 1	POWER TRANSFORMERS	B/B	J.P.T. 828	1000	1443	915	
	G.H.S. PAKSTOOR 2	CENTRAL POWER TRANSFORMERS	B/B	2156	800	1152	?	
	G.H.S. PAKSTOOR DIVERSE	POWER ENGINEERS	B/B	P.E. AB 582	800	1152	785	
	G.H.S. PAKSTOOR (OU WINKEL)	" TRANSFORMERS	B/B	J.P.T. 978	500	722	850	
	G.H.S. HOSTEL (PAAL)	ASEA ELECTRIC	O/B	43134	100	144	250	

TIPE: O/B = OPEN BUSHES; B/B = BOX/BOX; MS = MINISUB — CITRUSDAAL TRANSFORMATORS

	SUBSTASIE	VERVAARDIGER	TIPE	REEKS NR	kVA	L.V. AMPS	OLIE
⊗	NUWE VOORTREKKER (DROEGBANE)	VORILSHIRE TRANSFORMERS	B/B	YT 479	150	216	275
⊗	NUWE VOORTREKKER (DROEGBANE)	" "	B/B	YT 480	150	216	275
	EIKE STRAAT	CENTRAL POWER TRANSFORMERS	M.S.	2881	400	550	490
	KLINIEK (PAAL)	POWER TRANSFORMERS	O/B.	J.P.T. 242	200	288	230
	CHRP (PAAL)	POWER ENGINEERS	O/B	10374301/01	50	69	125
	TOP DOP (PAAL)	N.R.I. TRANSFORMERS	O/B	10392203/19	50	69	130
	INSEKTARIUM (PAAL)	POWER TRANSFORMERS	O/B	J.P.T. 1820	100	144	154
⊗	SAP AANLEG NR. 1	ADNAR LONG	B/B	81/30	500	720	250
⊗	SAP AANLEG NR. 2	ASEA ELECTRIC	B/B	40313	100	152	246
	OU HEUWELSIG	G.E.C. TRANSFORMERS	M.S.	9/5570/1/1	400	576	520
	NUWE HEUWELSIG NR. 1	M.E.I. TRANSFORMERS	M.S.	20285301/02	315	433	365
	NUWE HEUWELSIG NR. 2	" "	M.S.	20291302/01	200	275	295
	NUWE HEUWELSIG NR. 3	" "	M.S.	20295201/01	200	275	295

TRANSFORMATORS GEMERK ⊗ MOET (KAN) GEDIENS (PURIFY) WORD

LAMBERTSBAAI - TRANSFORMER LIST

03-Mar-08

M/S NAME	SIZE	Max kVA Drawn	VOLTAGE GROUP	TAP	LV MAIN BREAKER SIZE	OUTGOING BREAKERS LV SIZES							MAX CURRENT READINGS			VOLTAGE READING	
						1	2	3	4	5	6	7	R	W	B		
Nieuwoudia Indust	500 kVA	122 kVA	11/400V	3	800 A	250 A	250 A							150 A	220 A	160 A	420V ; 250V
DF Malan	315 kVA	169 kVA	11/400V		500 A	250 A	125 A	175 A						310 A	210 A	210 A	400V ; 240V
Quickfall	500 kVA	486 kVA	11/420V	3	800 A	300 A	250 A	250 A	200 A	175 A				625 A	780 A	700 A	440V
Leipoldt	315 kVA	300 kVA	11/400V		450 A	125 A	200 A	125 A	200 A					320 A	500 A	480 A	410V ; 240V
Pole Trf (Sybil)	200 kVA					200 A	250 A										
Pole Trf (Bird)	200 kVA					250 A											
Pole Trf (Streetlights)	100 kVA																
Ouetehuis	200 kVA				500 A												
Nuweland	250 kVA		11/380V			250 A	125 A										
St Peters	500 kVA	293 kVA			800 A	400 A	400 A							350 A	520 A	400 A	350V ; 190V
Mark Str	315 kVA	245 kVA	11/420V	1	500 A	150 A	100 A	125 A	150 A	125 A				380 A	300 A	380 A	410V ; 230V
Malgas	315 kVA	85 kVA	11/420V	1	500 A	175 A	175 A	175 A						220 A	150 A		430V ; 240V
Pole Trf (Res)	200 kVA																
Brakwater Boorgate	200 kVA	15 kVA	11/400V		60 A									22 A	22 A	22 A	
Sleep-Helling	315 kVA		11/400V	3	500 A	200 A	125 A	100 A	200 A								410V ; 240V
Kerk Str 1	500 kVA	492 kVA	11/400V	4	800 A	400 A	400 A	250 A	200 A					700 A	680 A	750 A	
Pole Trf (Lollies Str)	200 kVA					250 A	200 A										
Skool	500 kVA	97 kVA	11/400V			250 A	400 A	200 A	200 A					140 A	160 A	120 A	
Kerk Str 2	500 kVA	240 kVA	11/400V	3	1,000 A	200 A	200 A	200 A						390 A	300 A	350 A	410V ; 240V
Karavaan	500 kVA	329 kVA	11/400V	4	800 A	150 A	150 A	150 A	250 A	200 A	200 A			500 A	500 A	425 A	425V
v/d Stel	315 kVA	139 kVA	11/400V		450 A	125 A	250 A							200 A	200 A	200 A	
Uitbr 11	315 kVA	97 kVA	11/400V	3	450 A	250 A	200 A	200 A	200 A					260 A	50 A	110 A	

