ELECTRICITY MASTER PLAN

7.0 ELECTRICITY MASTER PLAN

7.1 BACKGROUND

Consultants were appointed by Breede Valley Local Municipality to develop a master plan to facilitate the future growth and upgrading needs of the Municipality's 66/11kV electricity distribution network.

The Main objective of the study was to:

- Produce an electrical network master plan for the distribution networks for the Breede Valley Local Municipality.

Sub-objectives included:

- Have the distribution and reticulation networks assessed through a physical audit and data gathering exercise,
- Update all existing single line and lay-out drawings and provide detail electronic lay-out drawings,
- Build a network model for the distribution networks using NETGroup's PowerBase,
- Do a 20 year Geographical load forecast, based on structure plans, existing customer base and load characteristics,
- Analyse the existing networks and determine optimal switching arrangements,
- Develop the associated network strengthening and improvement programs and provide an associated capital plan (CAPEX),
- Provide all necessary documentation and processes used and results obtained, and
- Install the necessary software and data on the customer's computers and provide training as required.

The Electricity Master Plan reports on the above project objectives. The complete report is included in the accompanying CD.

7.2 LOAD FORECAST

7.2.1 DEMAND FORECAST

7.2.1.1 BACKGROUND

A comprehensive Demand - and Energy forecast was required to establish:

- The basis for the distribution system expansion plan.
- A basis for the future forecast purchases, and sales of Energy, and Maximum Demand per customer category.

A 20 year Demand and Energy forecast was developed based on international best practice techniques.

7.2.1.2 RESULTS

Data from the Eskom billing spreadsheet were used to calculate the historical growth. The 2024 load values are the calculated forecast value due to the land

use change forecast. The calculated value corresponds to an average yearly growth of 4.0% from year 2003 to 2023 for all three regions. Graphs showing the yearly demand growth are shown below, note that demand values are given in kW and MW.

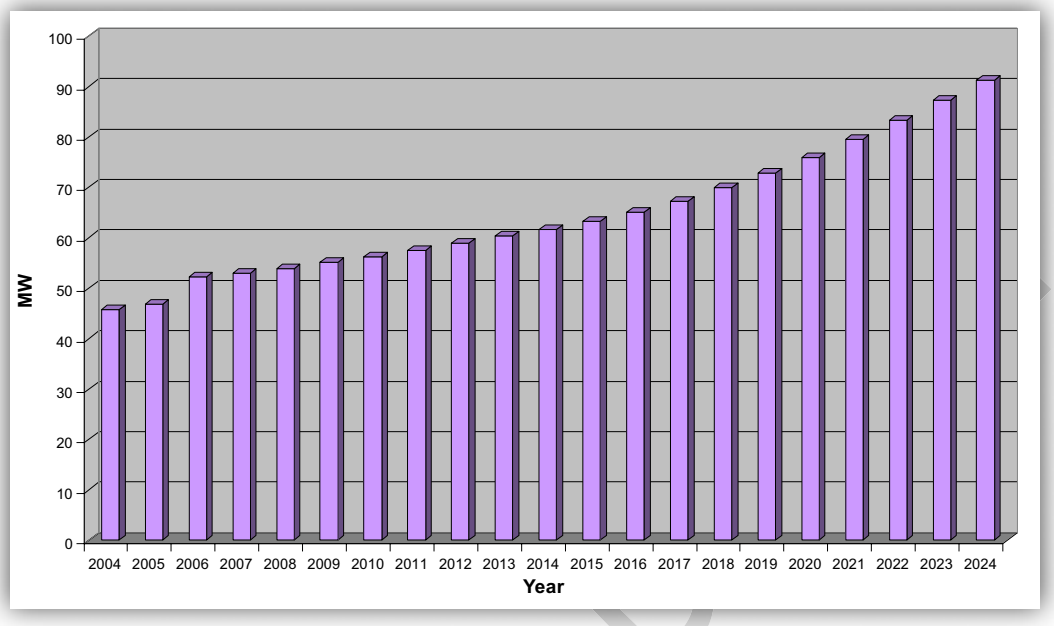

FIGURE 46: WORCESTER EXPECTED YEARLY DEMAND GROWTH

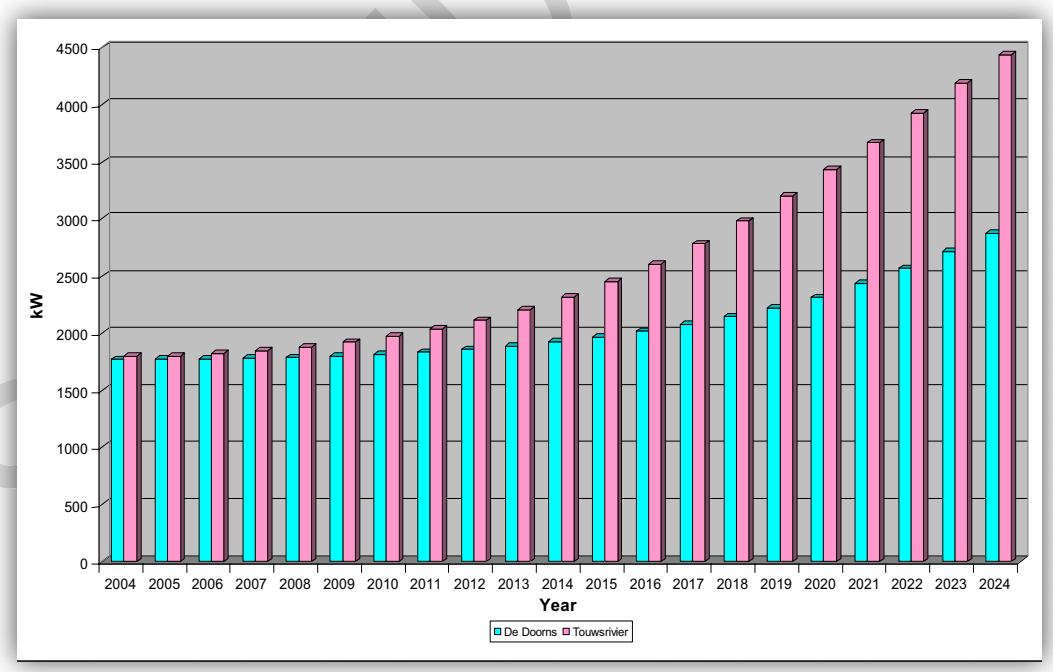

FIGURE 47: DE DOORNS & TOUWS RIVER EXPECTED YEARLY DEMAND GROWTH

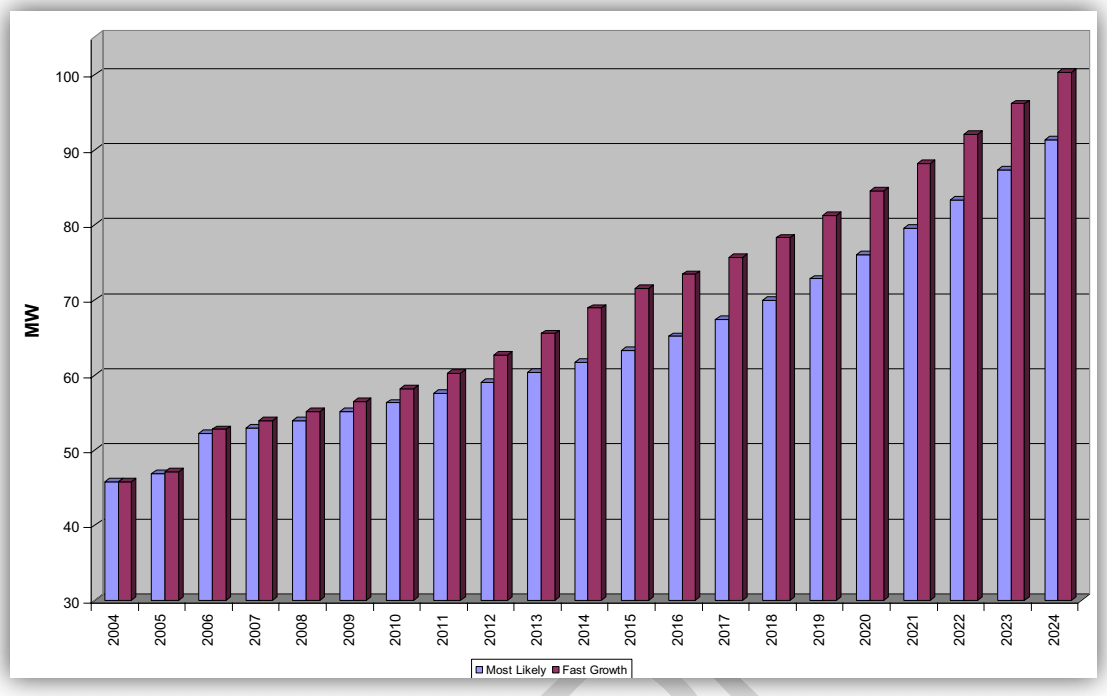

FIGURE 48: WORCESTER LOAD GROWTH SCENARIOS

7.3 DISTRIBUTION NETWORK ASSESSMENT

The following sections present aspects of the technical evaluation which include network analysis as well as operational considerations and results for Worcester, De Doorns and Touwsrivier.

Two network scenarios were developed, in line with the load growth scenarios, to review the expected performance of the Breede Valley network. These scenarios accounted for:

- High growth, and
- Most Likely growth.

Network simulations were conducted on the existing and future 66kV and 11kV networks for the above scenarios. Network simulations included:

- System Intact analysis. Analyses were conducted on future network load level and configurations to identify thermal and voltage violations.
- Selective Contingency analysis was further carried out where a specific network element was taken out of service and the result thereof tested through a load flow. In order to relieve voltage and flow violations identified during the Contingency analysis, the addition or upgrade of network facilities was identified and tested technically.

The following sections provides some background and project descriptions for each of the studied regions.

7.3.1 WORCESTER DISTRIBUTION REGION

Figure 49 provides an aerial view of the distribution network as well as development initiatives within Worcester.

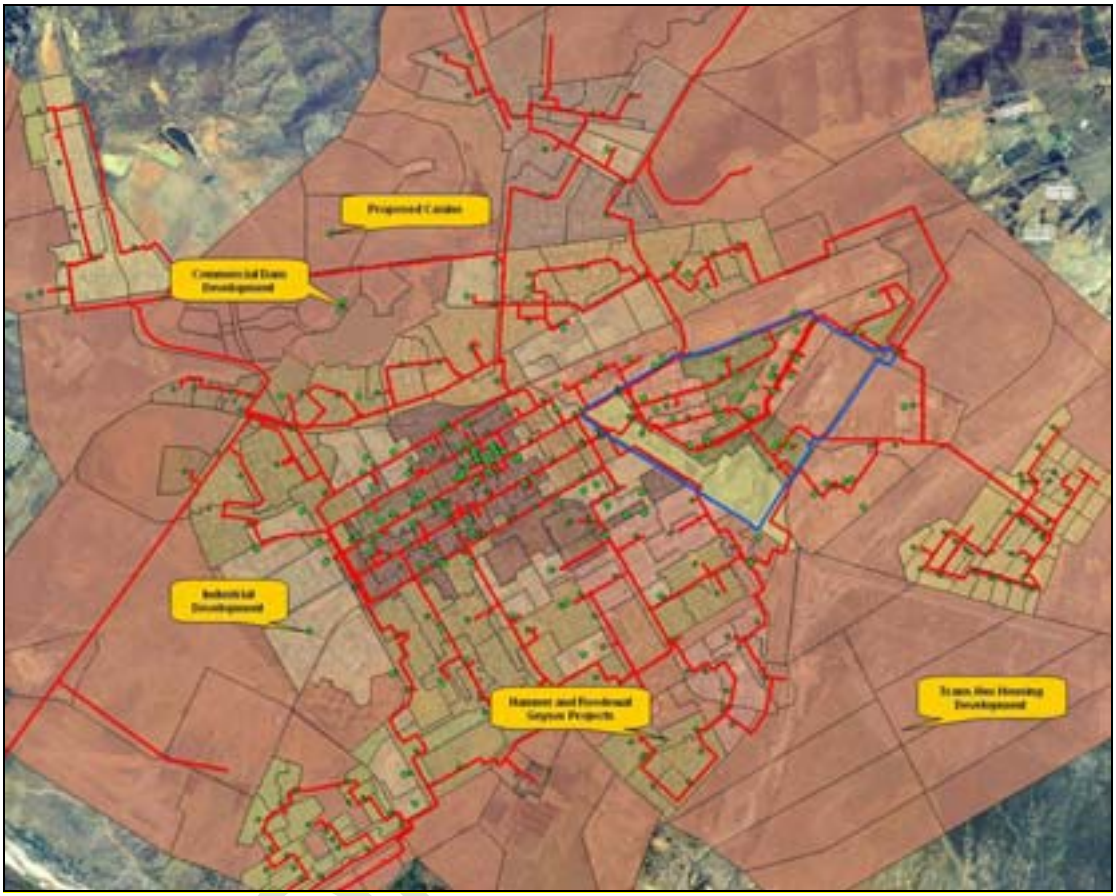

FIGURE 49: WORCESTER SUPPLY AREA AND DISTRIBUTION NETWORK

7.3.1.1 DISTRIBUTION NETWORK

The main electricity supply to Worcester is through two 66/11kV, 40MVA (Firm) substations; Industrial and Russel. The Industrial 66/11kV substation is being supplied from Eskom at 66kV which in turn supplies the Russel substation via two 66kV cables. The majority of the distribution networks consist of 11kV underground cable networks with some network on the outskirts of the town being overhead lines.

7.3.1.2 LOAD GROWTH

The existing load on the Worcester network is in the order of 45MW and is expected to grow to between 90 and 100MW by 2024.

The expected load growth is shown in Figure 50.

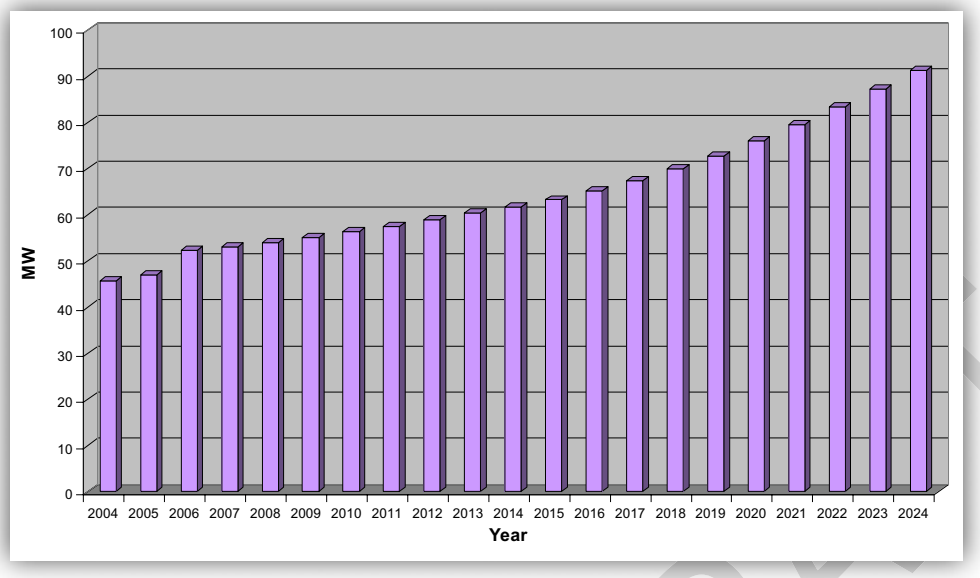

FIGURE 50: WORCHESTER EXPECTED LOAD GROWTH

The most prominent development initiatives within Worcester are shown in Figure 49 and include:

- The Trans-Hex Housing development to the North-East of Worcester,
- The industrial development near the Airport,
- The new Dam development consisting of large commercial and residential development. Construction on this development has started during the course of this study, and

7.3.1.3 DISTRIBUTION NETWORK DEFICIENCIES

Analysis of the Worcester distribution network has shown the following:

7.3.1.3.1 Short-term Deficiencies

In the short-term, with the existing network configuration, the Worcester distribution network experiences thermal overloads between Mc Allister and Field, Russell and Civic as well as Russell and Somerset.

The network further requires strengthening to improve adequacy during contingency conditions. The main concern lies with networks between Roodewal and Merindal, supply to Somerset and between Industrial and Zwellentemba.

7.3.1.3.2 Longer-term Deficiencies

With the expected load growth in the future, the above deficiencies will be more prominent. Voltages, just below steady-state criteria are also expected within the Avion Park as well as the Roodewal networks.

These are further worsened by the large development expected at the dam as well as the additional growth in the Somerset and Avion Park areas.

7.3.1.4 WORCESTER PROJECTS

7.3.1.4.1 Central Network Development and Strengthening

The following projects are required to develop and strengthen the central Worcester networks. (The progressive development of these projects is shown geographically in Volume B of the report);

- 2006: Russell Substation,
- 2006: Russell – Worcester Dam 66kV Feeders,
- 2007: SAD 1 – KWV 2 11kV Feeder,
- 2008: Russell – Santam 11kV Feeder,
- 2010: T Point – Somerset 66kV Feeders,
- 2010: Worcester Dam – Klue 11kV Feeder,
- 2010: Klue – Roux 11kV Feeder,
- 2010: Roux Substation,
- 2010: Roux – Rose Gardens 11kV Feeder, and
- 2010: Rose Gardens Substation.

7.3.1.5 WORCESTER DAM NETWORK DEVELOPMENT AND STRENGTHENING

The following projects relate to the New Worcester Dam and Casino development.

- 2006: Worcester Dam Distribution,
- 2007: Worcester Dam Substation,
- 2007: Worcester Dam – Monta Vista 11kV Feeders,
- 2007: New Casino Substation and 11kV Incomers,
- 2008: Worcester Dam HV Substation,
- 2009: Casino – Golf Estate 11kV Feeder, and
- 2009: Worcester Dam – Springbok T 11kV Feeder.

7.3.1.6 SOMERSET NETWORK DEVELOPMENT AND STRENGTHENING

The following projects relate to the network strengthening and development around the existing Somerset substation.

- 2007: Somerset – De Wet 11kV Feeder,
- 2008: Villiers Dorp Road Substation,
- 2008: Villiers Dorp Road – Boland College 11kV Feeder,
- 2008: T 18 – T 20 11kV Feeder,
- 2009: Villiers Dorp Road – J 5025 11kV Feeder,
- 2009: Villiers Dorp Road – Albetros 11kV Feeder,
- 2009: Somerset – Villiers Dorp Road 11kV Feeder,
- 2010: New Somerset Substation,
- 2010: Somerset Substation, and

- 2011: New Somerset Distribution.

7.3.1.7 Field Network Development and Strengthening

The following projects are required for strengthening and development of the networks in the Field – Mc Allister region.

- 2006: Field 11kV Substation,
- 2007: Roodewal 11kV Substation,
- 2007: Russell – Roodewal 11kV Feeder,
- 2008: Mc Allister – Field via N Yard 11kV Feeder,
- 2008: Mc Allister – Field via GRW 11kV Feeder,
- 2008: Smith – Escom 11kV Feeder,
- 2009: Escom – Mc Allister 11kV Feeder,
- 2010: Mc Allister – Protea via RUM 11kV Feeder,
- 2010: Protea 11kV Substation, and
- 2020: Mc Allister – APLC 11kV Feeder.

7.3.1.8 Industrial Network Development

The following projects relate to development and strengthening in the vicinity of the existing Industrial substation.

- 2007: Industrial – Roodewal 11kV Feeder, and
- 2011: Industrial Development.

7.3.1.9 Zwelethemba Network Development

The following projects will strengthen and support the Zwelethemba and Trans-Hex housing developments.

- 2006: Zwelethemba – T37 11kV Feeder,
- 2008: Zwelethemba T18 – T34 11kV Feeder,
- 2020: Trans Hex 11kV Substation,
- 2020: Roodewal – Trans Hex 11kV Feeder, and
- 2020: Trans Hex – Zwelethemba 11kV Feeder.

7.3.1.10 Other Network Development

The following projects are required to support new developments.

- 2007: Eagle – De Koppen T 11kV Feeder,
- 2015: VC – ARUM 11kV Feeder, and
- 2015: WD House – R Village 11kV Feeder.

7.3.2 DE DOORNS DISTRIBUTION REGION

Figure 51 provides a geographical view of the De Doorns supply area and Distribution network.

FIGURE 51: DE DOORNS SUPPLY AREA AND DISTRIBUTION NETWORK

7.3.2.1 DISTRIBUTION NETWORK

The main electricity supply to De Doorns is on 11kV from the Eskom De Doorns substation. The majority of the distribution network is through both 11kV underground cable and overhead lines.

7.3.2.2 LOAD GROWTH

The existing load on the De Doorns network is in the order of 1.8MW and is expected to grow to between 2.8 and 3.0MW by 2024. This represents an optimistic scenario. (Fast Growth)
The expected load growth is shown in Figure 5-13.

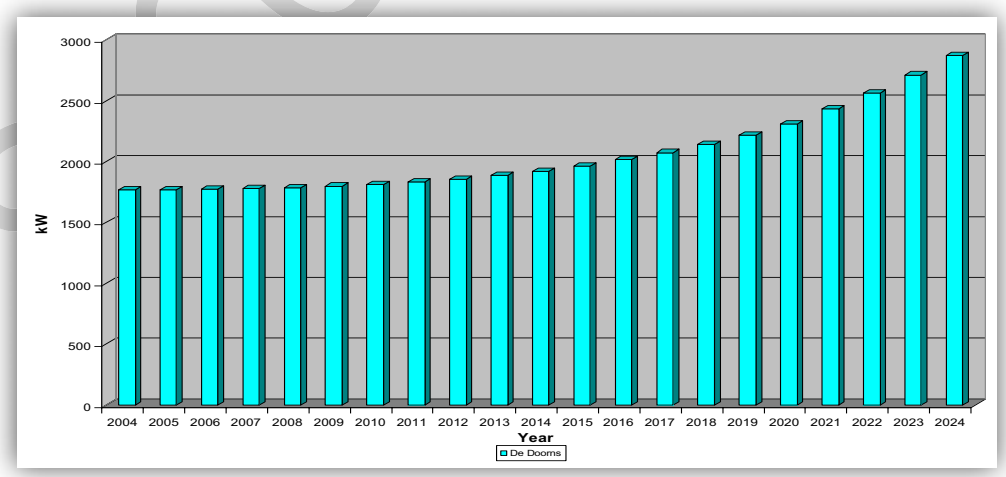

FIGURE 52: DE DOORNS EXPECTED LOAD GROWTH

The most prominent development initiative is the proposed residential development in De Doorns.

7.3.2.3 Distribution Network Deficiencies

The De Doorns distribution network has shown to be adequate under both steady-state and contingency conditions.

7.3.2.4 De Doorns Projects

7.3.2.4.1 General Network Development and Strengthening

The following projects are required on the De Doorns network.

- 2006: Eskom – Rumosa 11kV Feeders, and
- 2006: De Doorns – CP 11 11kV Feeder.

7.3.3 TOUWS RIVER DISTRIBUTION REGION

Figure 5-15 provides a geographical view of the Touws River supply area and Distribution network.

Figure 53: Touws River Supply Area and Distribution Network

7.3.3.1 Distribution Network

The main electricity supply to Touws River is on 11kV from Eskom. The majority of the distribution network is through 11kV underground cable with some network on the outskirts of the town being overhead lines.

7.3.3.2 Load Growth

The existing load on the Touws River network is in the order of 1.8MW and is expected to grow to between 4.5 and 3.0MW by 2024. This represents an optimistic scenario (Fast Growth).

The expected load growth is shown in Figure 54.

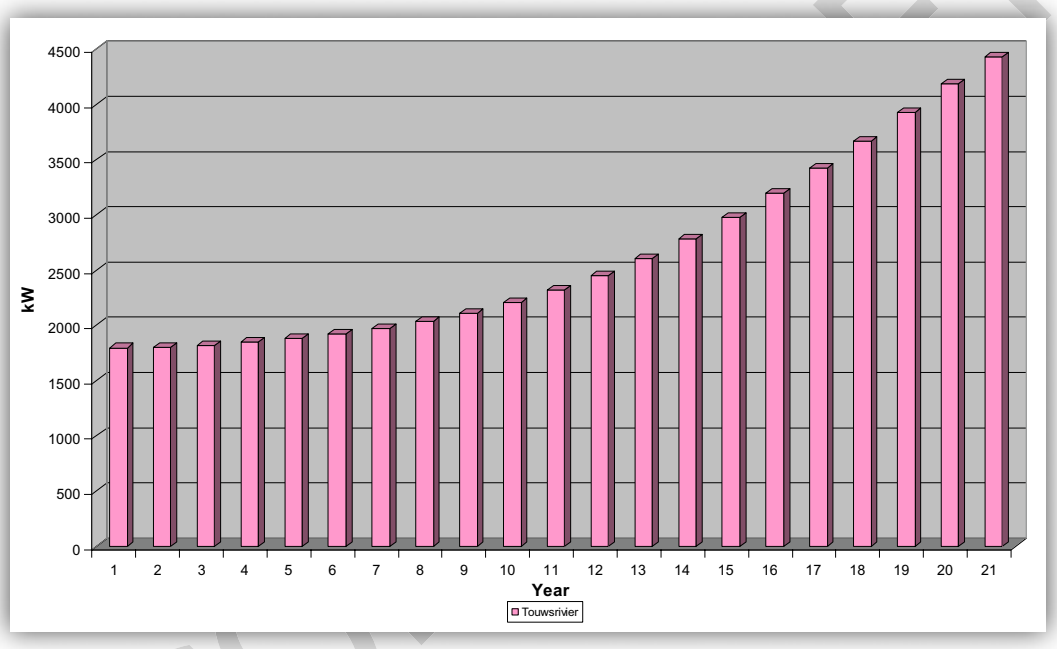

Figure 54: Touws River expected Load Growth

7.3.3.3 Distribution Network Deficiencies

The Touws River distribution network has shown to be adequate under both steady-state and contingency conditions.

7.3.3.4 Touws River Projects

7.3.3.4.1 General Network Development and Strengthening

The following projects are required on the Touws River network.

- 2009: Steenvliedt – Skool straat 11kV Feeder, and
- 2010: Crescent – Industrial 11kV Feeder.

7.4 CAPITAL AND FINANCIAL EVALUATION

7.4.1 BACKGROUND

One of the main criteria in evaluating system alternatives is the extent of capital outlay. Not only must the solutions to network problems be technically viable, but they must also be financially sound. The capital and financial analysis conducted on the Breede Valley network aims to set-up a Short- and Long-term capital program which offers Breede Valley Local Municipality an acceptable return on investment. The following aspects apply:

- In order to perform a financial analysis, a basic capital program is compiled containing capital requirements for each proposed project ,
- Financial analysis tests the viability of the capital expenditure in terms of:
  - The impact on future cash flows,
  - Net present worth of the investments, and
  - The Internal Rate of Return (IRR).

The financial analysis should ensure that the envisaged capital expenditure program is affordable to Breede Valley Local Municipality.

7.4.2 COSTING OF CAPITAL PROJECTS

Capital projects were identified through analysis and assessment of the following aspects:

- Expansion requirements, and
- Network security requirements.

The costing of capital projects were done by using standard equipment cost, contained in an equipment library. The output from the various evaluation systems was used to set-up three capital program scenarios.

These scenarios evaluate:

- The Most Likely capital expenditure,
- A scenario where the Minimum Investment on infrastructure is simulated (low road), and
- A scenario where the area experiences high growth, which in return requires the fast-track of infrastructure development (High Road).

These scenarios are shown in the figures below: (the CAPEX covers Worcester, De Doorns and Touws River)

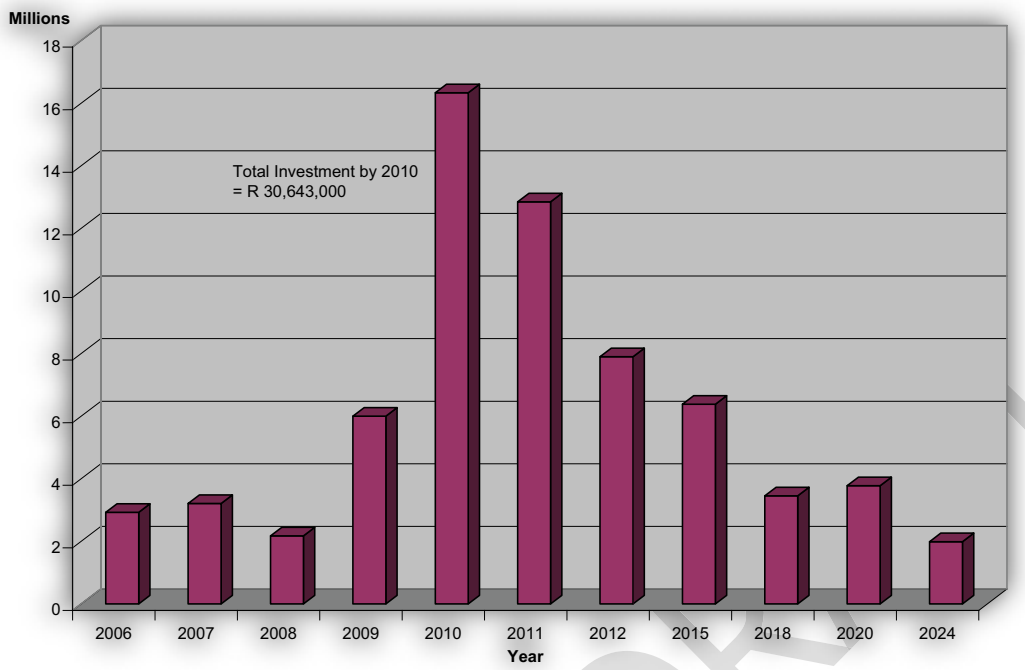

FIGURE 55: MINIMUM INVESTMENT CAPITAL FORECAST

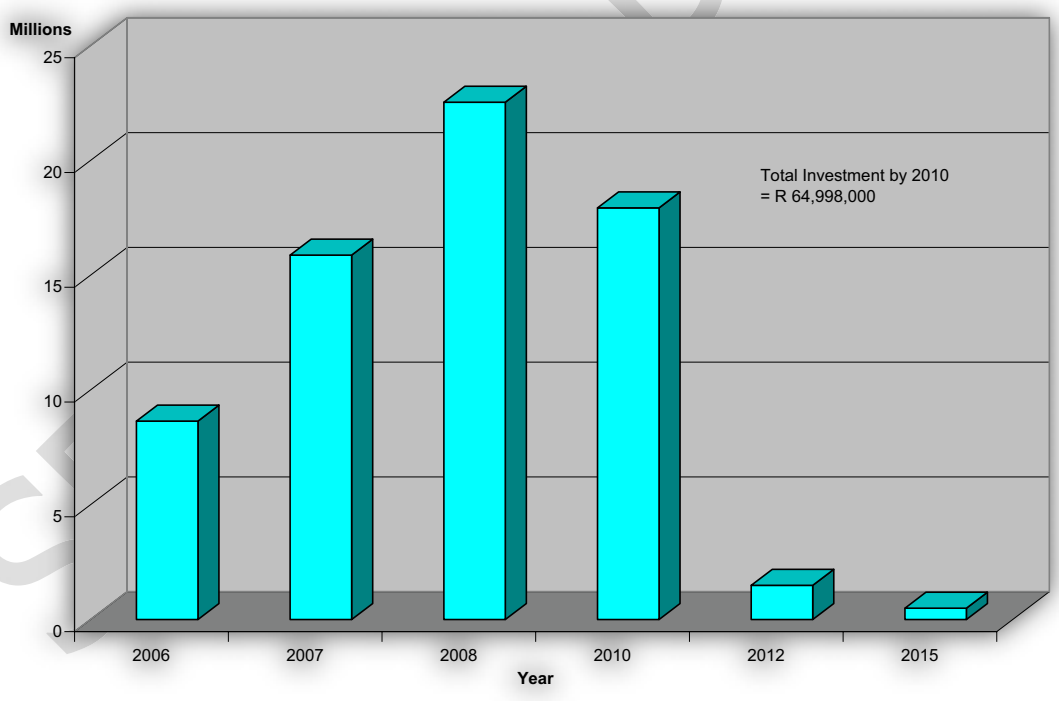

FIGURE 56: HIGH INVESTMENT CAPITAL FORECAST

7.4.3 LINKING WITH LOAD FORECAST MODEL

The load forecast model developed during this study provides vital input for the financial evaluation. Per unit purchase and selling rates are calculated and extrapolated according to the load growth of the study area. The load zones and their corresponding load parameters as defined in the Load Forecast model are used to calculate expected energy consumption and subsequent revenue.

7.4.4 FINANCIAL PARAMETERS

The financial parameters used for the financial analysis are shown below. Average purchase and selling rates where determined from account information.

TABLE 9: FINANCIAL PARAMETERS

PARAMETER	SHORT TERM	LONG TERM
Escalation rate (%)	6.0%	8.0%
Interest rate on capital (Discount Rate) (%)	10%	10%
% Distribution Losses	7%	7%
% Operating and Maintenance Cost	5%	5%
Average PF	0.7	0.7
System Load Factor	0.65	0.65
Purchase Rate c/kWh	13	15
Selling Rate c/kWh	26	30
% Non payment	5%	5%

7.4.4.1 ESCALATION RATE

The escalation rate has been chosen as 6% that is comparable to the current inflation rate. This parameter is highly dependent on economic prosperity and the South African exchange rate to stronger currencies.

7.4.4.2 INTEREST RATE

This parameter has been fixed at the current interest rate but in real terms is dependent on economic factors.

7.4.4.3 % LOSSES

Losses for Distribution have been set at 7%. This value is representative of similar networks and can be modified should better information become available.

7.5 CAPITAL AND FINANCIAL EVALUATION

All three capital programs scenarios were found to be feasible. The financial evaluation results for the Most Likely capital program are provided in Figure 57.
The associated project list is provided in Table 6-2.

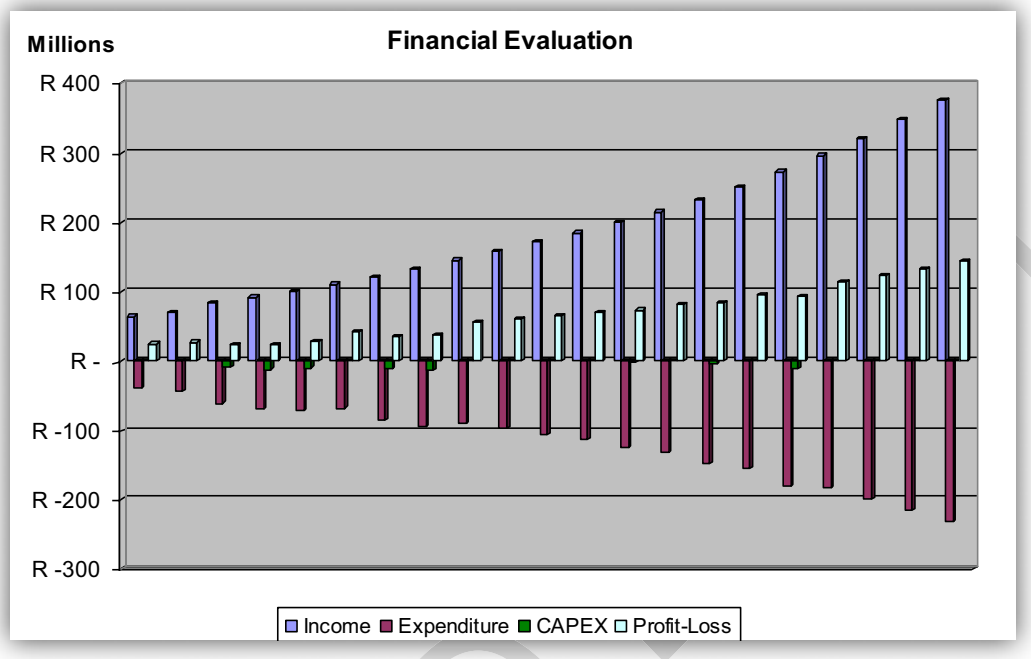

FIGURE 57: MOST LIKELY SCENARIO FINANCIAL EVALUATION

TABLE 10: MOST LIKELY PROJECT LIST AND COSTING

Year	Load Centre	Type	Project Name	Project description	Project Cost
2006	Worcester	Expansion	Field 11kV Substation	Add 1 x 11kV CB panel, move Cable.	R 186,340.00
2006	Worcester	Expansion	Russell - Worcester Dam 66kV Feeder	Add 2 x 3.5km, 300mm² 1C Cu XLPE 66kV Cables.	R -
2006	Worcester	Expansion	Russell Substation	2 x 66kV Feeder Bays and Busbar Extension.	R 2,740,249.77
2006	Worcester	Expansion	Worcester Dam Distribution	New Distribution Network Development - Worcester Dam.	R -
2006	Worcester	Expansion	Zwelethemba - T37 11kV Feeder	Add 1 x 11kV CB panel, add 2.0km 35ABC OH 11kV Al Line and 1 x 315kVA M/S	R 967,840.00
2007	Worcester	Expansion	Eagle - De koppen T 11kV Feeder	Add 0.4km 70mm² Cu XLPE 11kV Cable.	R 160,000.00
2007	Worcester	Expansion	Industrial - Roodewal 11kV Feeder	Add 2.2km 240mm² Cu XLPE 11kV Cable.	R 1,262,800.00
2007	Worcester	Expansion	New Casino Substation and 11kV Incomers	New 11kV Substation and 9 x 11kV CB panels.	R -
2007	Worcester	Expansion	Roodewal 11kV Substation	Add 2 x 11kV CB panels at Roodewal Substation.	R 480,680.00
2007	Worcester	Expansion	Russell - Roodewal 11kV Feeder	Add 1.8km 240mm² Cu XLPE 11kV Cable.	R 1,033,200.00
2007	Worcester	Expansion	SAD 1 - KWV 2 11kV Feeder	Upgrade 0.77km to 185mm² Al XLPE 11kV Cable.	R 344,190.00
2007	Worcester	Expansion	Somerset - De Wet 11kV Feeder	Add 1.5km 240mm² Cu XLPE 11kV Cable.	R 861,000.00
2007	Worcester	Expansion	Worcester Dam - Monta Vista 11kV Feeder	Add 2 x 0.55km 240mm² Cu XLPE 11kV Cables.	R 631,400.00
2007	Worcester	Expansion	Worcester Dam Substation	New 11kV Substation and 13 x 11kV CB panels.	R -
2008	Worcester	Contingency	Mc Allister - Field via GRW 11kV Feeder	Upgrade 1.48km to 185mm² Cu XLPE 11kV Cable.	R 778,480.00
2008	Worcester	Contingency	Mc Allister - Field via N Yard 11kV Feeder	Upgrade 1.84km to 185mm² Cu XLPE 11kV Cable.	R 967,840.00
2008	Worcester	Expansion	Russell - Santam 11kV Feeder	Upgrade 1.05km to 240mm² Cu XLPE 11kV Cable.	R 598,108.00
2008	Worcester	Contingency	Smith - Escom 11kV Feeder	Upgrade 1.1km to 185mm² Al XLPE 11kV Cable.	R 491,700.00
2008	Worcester	Expansion	T 18 - T 20 11kV Feeder	Add 0.2km 35mm OH 11kV Line.	R 60,000.00
2008	Worcester	Expansion	Villiers Dorp Road - Boland College 11kV Fee	Add 1.5km 185mm² Cu XLPE 11kV Cable.	R 789,000.00
2008	Worcester	Expansion	Villiers Dorp Road Substation	New 11kV Substation and 8 x 11kV CB panels.	R 2,787,060.00
2008	Worcester	Expansion	Worcester Dam HV Substation	New 66/11kV, 2 x 20MVA Substation.	R -
2008	Worcester	Expansion	Zwelt T18 - T34 11kV Feeder	Add 1.1km 35ABC OH 11kV Al Line and 1 x 315kVA M/S.	R 511,500.00
2009	Worcester	Expansion	Casino - Golf Estate 11kV Feeder	Add 1.1km 185mm² Cu XLPE 11kV Cable.	R 578,600.00
2009	Worcester	Contingency	Escom - Mc Allister 11kV Feeder	Upgrade 0.67km to 185mm² Al XLPE 11kV Cable.	R 299,490.00
2009	Worcester	Expansion	Somerset - Villiers Dorp Road 11kV Feeder	Add 1.25km 240mm² Cu XLPE 11kV Cable.	R 717,500.00
2009	Worcester	Expansion	Villiers Dorp Road - Albetros 11kV Feeder	Add 0.74km 185mm² Cu XLPE 11kV Cable.	R 389,240.00
2009	Worcester	Expansion	Villiers Dorp Road - J 5025 11kV Feeder	Add 0.76km 185mm² Cu XLPE 11kV Cable.	R 399,760.00
2009	Worcester	Expansion	Worcester Dam - Springbok T 11kV Feeder	Add 0.78km 240mm² Cu XLPE 11kV Cable.	R 447,720.00
2010	Worcester	Expansion	Klue - Roux 11kV Feeder	Add 0.69km 240mm² Cu XLPE 11kV Cable.	R 396,060.00
2010	Worcester	Expansion	Mc Allister - Protea via RMU 11kV Feeder	Upgrade 1.85km to 240mm² Cu XLPE 11kV Cable.	R 1,059,030.00
2010	Worcester	Expansion	New Somerset Substation	New 66/11kV, 2 x 20MVA Substation and 11 x 11kV CB panels.	R 11,720,122.27
2010	Worcester	Expansion	Protea Substation	Add 5 x 11kV CB panels at Protea Substation.	R 1,039,700.00
2010	Worcester	Expansion	Rose Gardens Substation	New 11kV Substation and 10 x 11kV CB panels.	R 2,973,400.00
2010	Worcester	Expansion	Roux - Rose Gardens 11kV Feeder	Add 0.58km 240mm² Cu XLPE 11kV Cable.	R 332,920.00
2010	Worcester	Expansion	Roux Substation	New 11kV Substation and 9 x 11kV CB panels.	R 2,787,060.00
2010	Worcester	Expansion	Somerset Substation	Add 2 x 11kV CB panels at Somerset Substations and 0.4km 240mm² Cu XLPE 11kV C	R 710,280.00
2010	Worcester	Expansion	T Point - Somerset 66kV Feeder	Add 2 x 1.5km, 300mm² 1C Cu XLPE 66kV Cables.	R 6,000,000.00
2010	Worcester	Expansion	Worcester Dam - Klue 11kV Feeder	Add 2.05km 240mm² Cu XLPE 11kV Cable.	R 1,176,700.00
2011	Worcester	Expansion	Industrial Development	Add 2 x 11kV CB panels at Industrial Substation, add 3.5km 240mm² Cu XLPE 11kV Ca	R 3,407,680.00
2011	Worcester	Expansion	New Somerset Substation Distribution	New Distribution Network Development - Somerset.	R 2,788,382.00
2015	Worcester	Expansion	VC - ARUM 11kV Feeder	Add 1.2km 185mm² Cu XLPE 11kV Cable and 3 x 315kVA M/S.	R 1,175,700.00
2015	Worcester	Expansion	WD House - R Village 11kV Feeder	Add 1.6km 185mm² Cu XLPE 11kV Cable and 3 x 315kVA M/S.	R 1,386,100.00
2020	Worcester	Contingency	Mc Allister - APLC 11kV Feeder	Add 1 x 11kV CB panel at Mc Allister and 0.54km 240mm² Cu XLPE 11kV Cable.	R 496,300.00
2020	Worcester	Expansion	Roodewal - Trans Hex 11kV Feeder	Add 2.1km 240mm² Cu XLPE 11kV Cable.	R 1,205,400.00
2020	Worcester	Expansion	Trans Hex - Zwelethemba 11kV Feeder	Add 2.6km 240mm² Cu XLPE 11kV Cable.	R 1,492,400.00
2020	Worcester	Expansion	Trans Hex Substation	New 11kV Substation and 9 x 11kV CB panels.	R 2,571,060.00
2009	Touws River	Expansion	Steenvliedt - Skool straat 11kV Feeder	Add 0.43km 35ABC OH 11kV Al Line.	R 129,000.00
2010	Touws River	Expansion	Crescent - Industrial 11kV Feeder	Add 2.0km 35ABC OH 11kV Al Line and 2 x 315kVA M/S.	R 963,000.00
2006	De Doorns	Expansion	De Doorns - CP11 11kV Feeder	Add 1 x 11kV CB panel at De Doorns Substation, add 1 x 1.6km 95mm² Cu XLPE 11kV	R 1,484,440.00
2006	De Doorns	Expansion	Eskom - Rumosa 11kV Feeder	Add 2 x 11kV CB panels at Eskom and Rumosa Substations, add 2 x 2.5km 95mm² Cu	R 3,208,360.00

7.6 CONCLUSIONS AND RECOMMENDATIONS

All network projects were evaluated considering expansion due to anticipated load growth and network performance improvement.

The evaluation of the existing and future networks assumed specific network improvements that were performed through standard engineering practice. Network studies were performed for distinct system loads, developed from the geographical load forecast.

The time frames and load representation were for:

- Base year (2004),
- Short-term (2005, 2006 and 2007), and
- Longer-term (2009, 2010, 2011, 2014, 2019 and 2024).

7.6.1 NETWORK EXPANSION RECOMMENDATIONS

The study has identified and documented expansion and strengthening projects to ensure the adequate performance of the network within the Short- and Longer-term. These projects are documented in Section 5, and are shown geographically in Volume B of the main report. It is recommended that these projects be implemented in the phased manner as indicated in the project list.

The following sections provide an objective view of the priority of each project, should project funding be of concern.

7.6.1.1 PRIORITY PROJECTS

Priority projects are defined as projects, if not developed, will lead to the deterioration of the network.

Projects under this category are shown in Table 11.

TABLE 11: PRIORITY PROJECTS

Project Name	Description
Field 11kV Substation	Add 1 x 11kV CB panel, move Cable.
Eagle – De koppen T 11kV Feeder	Add 0.4km 70mm² Cu XLPE 11kV Cable.
Industrial - Roodewal 11kV Feeder	Add 2.2km 240mm² Cu XLPE 11kV Cable.
Roodewal 11kV Substation	Add 2 x 11kV CB panels at Roodewal Substation.
Russell - Roodewal 11kV Feeder	Add 1.8km 240mm² Cu XLPE 11kV Cable.
SAD 1 - KWV 2 11kV Feeder	Upgrade 0.77km to 185mm² Al XLPE 11kV Cable.
Worcester Dam - Monta Vista 11kV Feeder	Add 2 x 0.55km 240mm² Cu XLPE 11kV Cables.
Russell - Santam 11kV Feeder	Upgrade 1.05km to 240mm² Cu XLPE 11kV Cable.
Klue - Roux 11kV Feeder	Add 0.69km 240mm² Cu XLPE 11kV Cable.
Mc Allister - Protea via RMU 11kV Feeder	Upgrade 1.85km to 240mm² Cu XLPE 11kV Cable.

New Somerset Substation	New 66/11kV, 2 x 20MVA Substation and 11 x 11kV CB panels.
Protea Substation	Add 5 x 11kV CB panels at Protea Substation.
Rose Gardens Substation	New 11kV Substation and 10 x 11kV CB panels.
Roux - Rose Gardens 11kV Feeder	Add 0.58km 240mm² Cu XLPE 11kV Cable.
Roux Substation	New 11kV Substation and 9 x 11kV CB panels.
Somerset Substation	Add 2 x 11kV CB panels at Somerset Substations and 0.4km 240mm² Cu XLPE 11kV Cable.
T Point - Somerset 66kV Feeder	Add 2 x 1.5km, 300mm² 1C Cu XLPE 66kV Cables.
Worcester Dam - Klue 11kV Feeder	Add 2.05km 240mm² Cu XLPE 11kV Cable.
VC - ARUM 11kV Feeder	Add 1.2km 185mm² Cu XLPE 11kV Cable and 3 x 315kVA M/S.
WD House - R Village 11kV Feeder	Add 1.6km 185mm² Cu XLPE 11kV Cable and 3 x 315kVA M/S.
Steenvliedt - Skool straat 11kV Feeder	Add 0.43km 35ABC OH 11kV Al Line.
Crescent - Industrial 11kV Feeder	Add 2.0km 35ABC OH 11kV Al Line and 2 x 315kVA M/S.
De Doorns - CP11 11kV Feeder	Add 1 x 11kV CB panel at De Doorns Substation, add 1 x 1.6km 95mm² Cu XLPE 11kV Cable and 3 x 315kVA M/S's.
Eskom - Rumosa 11kV Feeder	Add 2 x 11kV CB panels at Eskom and Rumosa Substations, add 2 x 2.5km 95mm² Cu XLPE 11kV Cables.

7.6.1.2 Development Specific Projects

Development specific projects are defined as projects that do not necessary benefit the overall performance of the network, but are driven by specific development initiatives.

Projects under this category are shown in Table 12.

Table 12: Development Projects

Project Name	Description
Russell - Worcester Dam 66kV Feeder	Add 2 x 3.5km, 300mm² 1C Cu XLPE 66kV Cables.
Russell Substation	2 x 66kV Feeder Bays and Busbar Extension.
Worcester Dam Distribution	New Distribution Network Development - Worcester Dam.
Zwelethemba - T37 11kV Feeder	Add 1 x 11kV CB panel, add 2.0km 35ABC OH 11kV Al Line and 1 x 315kVA M/S.
New Casino Substation and 11kV Incomers	New 11kV Substation and 9 x 11kV CB panels.
Worcester Dam Substation	New 11kV Substation and 13 x 11kV CB panels.

T 18 - T 20 11kV Feeder	Add 0.2km 35mm OH 11kV Line.
Villiers Dorp Road - Boland College 11kV Feeder	Add 1.5km 185mm² Cu XLPE 11kV Cable.
Villiers Dorp Road Substation	New 11kV Substation and 8 x 11kV CB panels.
Worcester Dam HV Substation	New 66/11kV, 2 x 20MVA Substation.
Zwelt T18 - T34 11kV Feeder	Add 1.1km 35ABC OH 11kV Al Line and 1 x 315kVA M/S.
Casino - Golf Estate 11kV Feeder	Add 1.1km 185mm² Cu XLPE 11kV Cable.
Somerset - Villiers Dorp Road 11kV Feeder	Add 1.25km 240mm² Cu XLPE 11kV Cable.
Villiers Dorp Road - Albetros 11kV Feeder	Add 0.74km 185mm² Cu XLPE 11kV Cable.
Villiers Dorp Road - J 5025 11kV Feeder	Add 0.76km 185mm² Cu XLPE 11kV Cable.
Worcester Dam - Springbok T 11kV Feeder	Add 0.78km 240mm² Cu XLPE 11kV Cable.
Industrial Development	Add 2 x 11kV CB panels at Industrial Substation, add 3.5km 240mm² Cu XLPE 11kV Cable and 4 x 315kVA M/S.
New Somerset Substation Distribution	New Distribution Network Development - Somerset.
Roodewal - Trans Hex 11kV Feeder	Add 2.1km 240mm² Cu XLPE 11kV Cable.
Trans Hex - Zwelethemba 11kV Feeder	Add 2.6km 240mm² Cu XLPE 11kV Cable.
Trans Hex Substation	New 11kV Substation and 9 x 11kV CB panels.

7.6.1.3 CONTINGENCY PROJECTS

Contingency related projects are defined as those strengthening projects that do benefit the steady-state operation of the distribution network but provide back-up to specific areas of the network during contingency conditions.

Projects under this category are shown in Table 13.

TABLE 13: CONTINGENCY PROJECTS

Project Name	Description
Somerset - De Wet 11kV Feeder	Add 1.5km 240mm² Cu XLPE 11kV Cable
Mc Allister - Field via N Yard 11kV Feeder	Upgrade 1.84km to 185mm² Cu XLPE 11kV Cable
Mc Allister - Field via GRW 11kV Feeder	Upgrade 1.48km to 185mm² Cu XLPE 11kV Cable
Smith - Escom 11kV Feeder	Upgrade 1.1km to 185mm² Al XLPE 11kV Cable.
Escom - Mc Allister 11kV Feeder	Upgrade 0.67km to 185mm² Al XLPE 11kV Cable.

Mc Allister - APLC 11kV Feeder	Add 1 x 11kV CB panel at Mc Allister and 0.54km 240mm² Cu XLPE 11kV Cable

The above project scenarios and priorities were used as basis to develop the three capital program scenarios.

These scenarios are:

- The Most Likely capital expenditure,
- A scenario where the Minimum Investment on infrastructure is simulated (Low Road), and
- A scenario where the area experiences high growth, which in return requires the fast-track of infrastructure development (High Road).