

Raptor's View Wildlife Estate Electrical Grid Review

Information Meeting

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MOTLA 

Raptor's View Wildlife Estate Electrical Grid Review

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BACKGROUND

Initial Electrical Installation (<2006)

- ^ Electrical infrastructure inadequate for requirements
- ^ Unacceptable levels of voltage drop experienced
- ^ Litigation process followed by RV PTY LTD
- ^ Motla Consulting Engineers (Motla Engineering at the time) appointed by HOA for an investigation into the electrical infrastructure (report)

BACKGROUND

Rescue Plan (2009)

- ^ Investigation report identified 3 basic problems:
 - ^ Loading
 - ^ Eskom supply points (transformers)
 - ^ Voltage drop
 - ^ LV only installation – feeder lengths too long
 - ^ Long length of service connection cables
 - ^ Fault levels
 - ^ Long length of service connection cables

BACKGROUND

Rescue Plan (2009) - continued

- ^ 2006 Motla Investigation report tabled 3 options to rectify problems:
 - ^ 3.3kV system, with 3300/420V transformers shared by 2 properties
 - ^ ± R25mil (Excl VAT & Fees) (2006 prices)
 - ^ Traditional MV and LV network to Eskom standards
 - ^ ± R30mil (Excl VAT & Fees) (2006 prices)
 - ^ Installation of a new MV network and re-use existing LV network as far as possible
 - ^ ± R15mil (Excl VAT & Fees) (2006 prices)

- ^ None of these were accepted due to budget constraints

BACKGROUND

Rescue Plan (2009) - continued

- ^ Rescue plan was tabled by Eljon Electrical in conjunction with Motla:
 - ^ Basic concept of the Rescue plan was not the total solution, but to address the immediate electrical needs of the Estate.
 - ^ The primary network was addressed by adopting a combination of 3.3kV step-up and step-down transformers to reinforce the LV network
 - ^ ± R5.2mil (Incl VAT & Fees) (2010 prices)

- ^ The Rescue Plan Solution was accepted and implemented, knowing that the electrical reticulation will need to be revisited at some stage in the future

ELECTRICAL GRID REVIEW INVESTIGATION

Problem Statement

- ^ Dynamics of Estate has changed
 - ^ From a perceived holiday destination / weekend retreat to a more permanent occupation
 - ^ This has an effect on the diversity of electrical supply required
- ^ Development pace of Estate is increasing
 - ^ Creating more pressure on transformer / cable loading and resulting in more voltage drop problems
- ^ Phased approach is difficult to predict
 - ^ It is unknown which stands will be bought next, and therefore unknown which transformer zones are more critical
 - ^ A pro-active approach is recommended

ELECTRICAL GRID REVIEW INVESTIGATION

Problem Statement - continued

- ^ ADMD (after diversity maximum demand):
 - ^ Method used to estimate / calculate the end-user demand 15-20 years into the future.
 - ^ Determines voltage drop and loading along a cable
 - ^ Typical figures applicable to > 100 houses.

- ^ ADMD for a typical estate similar to Raptor's View:
 - ^ 7 – 9kVA ADMD per stand
 - ^ Initial Raptor's View design used much lower parameters

- ^ Existing ADMD of Raptor's View:
 - ^ 3 – 5kVA ADMD per stand (not fully developed yet)

- ^ Proposed final ADMD for Raptor's View:
 - ^ 5 – 7 kVA ADMD per stand (with estate fully developed)
 - ^ 2 options investigated

ELECTRICAL GRID REVIEW INVESTIGATION

Internal Electrical Reticulation

- ^ Grid review investigation identified issues regarding:
 - ^ Voltage drop
 - ^ Long lengths of service connection cables remains a problem
 - ^ Increased ADMD compounds volt drop problem (with estate fully developed)
 - ^ Cable loading
 - ^ Increased ADMD has the effect that some cables will operate outside their thermal limits (with estate fully developed)
 - ^ Loading of internal 3.3kV transformers
 - ^ Higher load requirement due to increased ADMD (with estate fully developed)

ELECTRICAL GRID REVIEW INVESTIGATION

Eskom Supply Points

- ^ Grid review investigation identified supply transformer capacity problems due to increased ADMD

| TX Zone | 2014 MD (kVA) | Stands (Developed / Total) | MD when fully developed (@ 5kVA) | MD when fully developed (@ 7kVA) | NMD (Installed capacity) |
|---------|---------------|----------------------------|----------------------------------|----------------------------------|--------------------------|
| MA | 75 kVA (38%) | 22 / 42 (52%) | 247 kVA (124%) | 332 kVA | 200 kVA |
| MB | 70 kVA (35%) | 19 / 46 (41%) | 275 kVA (138%) | 369 kVA | 200 kVA |
| MC | 30 kVA (30%) | 6 / 14 (42%) | 80 kVA (80%) | 108 kVA | 100 kVA |
| MD | 35 kVA (18%) | 8 / 24 (33%) | 144 kVA (72%) | 191 kVA | 200 kVA |
| ME | 36 kVA (36%) | 9 / 18 (50%) | 105 kVA (105%) | 140 kVA | 100 kVA |
| MF | 60 kVA (60%) | 20 / 26 (77%) | 177 kVA (177%) | 237 kVA | 100 kVA |
| MG | 70 kVA (70%) | 23 / 25 (92%) | 147 kVA (147%) | 197 kVA | 100 kVA |
| MH | 35 kVA (35%) | 11 / 20 (55%) | 110 kVA (110%) | 148 kVA | 100 kVA |
| MI | 50 kVA (50%) | 16 / 25 (64%) | 149 kVA (149%) | 199 kVA | 100 kVA |
| MJ | 35 kVA (35%) | 12 / 21 (57%) | 125 kVA (125%) | 167 kVA | 100 kVA |
| MK | 80 kVA (40%) | 27 / 42 (64%) | 257 kVA (129%) | 347 kVA | 200 kVA |

PROPOSED SOLUTIONS

Internal Reticulation

- ^ Re-use existing electrical network as far as possible to minimize costs
- ^ 3.3kV transformers:
 - ^ Upgrade transformer size where required
 - ^ Addition of new transformers where required
- ^ Cable:
 - ^ Upgrade some cable sizes where required – LV, SC (volt-drop)
 - ^ Add new sections of cable where required – LV, MV (new TX's)
- ^ Metering kiosks
 - ^ Add new kiosks where required to shorten SC cables
 - ^ 40A circuit breakers

PROPOSED SOLUTIONS

Eskom Supply Points

- ^ To accommodate load growth (as Estate is further developed), the Eskom supply points (transformer sizes) will need to be upgraded.
 - ^ 5kVA ADMD solution:
 - ^ Upgrade 9 of 11 points
 - ^ From 1600kVA to 2295kVA installed base
 - ^ 7kVA ADMD solution:
 - ^ Upgrade 10 of 11 points
 - ^ From 1600kVA to 3395kVA installed base
- ^ Application to Eskom has been made for 5kVA solution
- ^ Phased approach recommended

COSTS

Internal Reticulation

- ^ Study is at Preliminary Design Stage, and costs are 85% accurate:
 - ^ 5kVA ADMD solution:
 - ^ R1,752,678.18 (Incl 14% VAT and Incl 10% Contingencies)
 - ^ 85% accuracy risk: Add R262,901.73
 - ^ Total: **R2,015,579.91** (Incl 14% VAT, Incl 10% Contingencies and Incl 15% accuracy risk)
 - ^ 7kVA ADMD solution:
 - ^ R3,705,324.22 (Incl 14% VAT and Incl 10% Contingencies)
 - ^ 85% accuracy risk: Add R555,798.63
 - ^ Total: **R4,261,122.85** (Incl 14% VAT, Incl 10% Contingencies and Incl 15% accuracy risk)

COSTS

Eskom Supply Points

- ^ 5kVA ADMD solution (phased):
 - ^ Budget quote received for 6 of 9 points (other 3 points estimated)
 - ^ Quote is 85% accurate and is valid for 30 days
 - ^ R1,394,536.57 (Incl 14% VAT)
 - ^ 85% accuracy risk: Add R209,180.48
 - ^ Total: **R1,603,717.05** (Incl 14% VAT and Incl 15% accuracy risk)

- ^ 7kVA ADMD solution (phased):
 - ^ Quote not requested from Eskom, and costs are estimated based on quote received for 5kVA ADMD solution
 - ^ R3,069,900.00 (Incl 14% VAT)
 - ^ 85% accuracy risk: Add R524,952.90
 - ^ Total: **R4,024,638.90** (Incl 14% VAT and Incl 15% accuracy risk)

COSTS

Summary

^ All costs have a 85% accuracy level at this stage

| Item | 5kVA ADMD Solution | 7kVA ADMD Solution | Comments |
|------------------------------|--------------------|--------------------|---|
| Internal Reticulation | R2,015,580 | R4,261,123 | Incl 14% VAT, Incl 10% contingency and 15% accuracy risk |
| Eskom supply points (phased) | R1,518,343 | R4,024,639 | Incl 14% VAT and Incl 15% accuracy risk |
| Professional Fees | R428,589 | R788,187 | Incl VAT and Incl disbursements Based on ECSA (Eng Council of South Africa) fees as per Govt Gazette 37102 (4 Dec 2013) |
| Total | R3,962,512 | R9,073,949 | Incl 14% VAT |

PROPOSED WAY FORWARD

Solution Implications

- ^ 5kVA ADMD solution
 - ^ Less expensive
 - ^ Energy efficiency measures will need to be imposed, which may result in some household appliances to be changed (i.e. gas cooking)
 - ^ Main supply to each house to be downgraded to 40A

- ^ 7kVA ADMD solution
 - ^ More expensive
 - ^ Energy efficiency measures may also be required
 - ^ Consumption history indicate that 7kVA solution is possibly not required

PROPOSED WAY FORWARD

Recommendation

- ^ 5kVA ADMD solution recommended

- ^ If accepted:
 - ^ Motla to conclude detail design stage
 - ^ Contractor to be appointed
 - ^ Long lead material items (transformers and cable) to be ordered
 - ^ Construction period estimated at 4 – 6 months
 - ^ Monitor Eskom supply points on a regular basis to trigger timeous applications to Eskom

Thank you

Questions?

MOTLA