Scope of work

Description of the *services*

Executive overview

LANDS & RIGHTS
Negotiation - Signed Options (as per L & R)
Negotiation - Signed Way leaves
Tribal consent / resolution (for Option)
Tribal consent / resolution (for Way leave)
Public participation
Project handover
Regional or provincial tender committee process
Property valuation appointment
Cadastral survey appointment
Expropriation

HIGH VOLTAGE LINE SURVEYS
Route selection & fixing
Obtaining signed option agreements
Profiling + ASCII files
Optimizing + spanning sheets (.dgn format)
Bill of Structures (.xls format)
Pegging

MEDIUM & LOW VOLTAGE LINE SURVEYS
Route selection & fixing
Signed way leave & Distr. Enviro. screening document(DESD)
Profiling + ASCII files
Optimizing + spanning sheets (.dgn format)
Bill of Structures (.xls format)
Pegging
Survey - Fix Bends, T/Offs, TRF positions in WGS84

TOPOGRAPHICAL SURVEYS
Site identification & selection (includes access road)
Obtaining of signed Option
Topographical survey , control & generation of ASCII files
Generation of contour plans & .dxf file
Placing of site boundary pegs , X & Y axis and bench mark

MISCELLANEOUS CHARGES
Crossing profiles of services
Statutory approvals (Telkom , Roads and Spoornet)
Mapping of Stands (3 points per dwelling plus boundary positions)
contractor’s team (hour rate)

penalty clause

Travelling time surveyor & assistant/s

Transport cost (Office where the contract is issued to site & return , base to site & return daily)

Accommodation cost per surveyor per night

Accommodation cost per surveyor and assistant/s per night
plato registration
re-survey existing hv/mv/lv power-lines-profile, conductor, points of attachment and sags
preparation costs, investigation, deeds, tel-compensation for small projects

Specification and description of the *service*s

SUB-TRANSMISSION ENGINEERING

SPECIFICATION No. HV 01/2013 Rev 0

33/44/66/88/132 kV HV LINE & SUB STATION SURVEYS SCOPE OF WORK

DETAIL SCOPE

This specification covers aspects of survey related work required for sub-transmission lines, sub-stations and their access roads as well as the refurbishment thereof. Sub- transmission projects may comprise all or all of the following aspects. All work is to be done in accordance with specific technical parameters as stipulated within Eskom's Overhead Power Line Design notes which cover terrain, structure and conductor aspects.

INTRODUCTION

As far as possible the surveyor is to follow the process as laid out in this documentation so as to avoid un-necessary or futile work. For the duration of the project the Survey Contractor will be expected to attend project meetings with the Project Team. At these meetings the surveyor will gather information, provide feedback & be part of the project time scheduling. There are specified "Hold Points" throughout the process where the contract surveyor must expect delays awaiting approval before being permitted to continue with the next steps in the process.

33/44/66/88/132 kV HV LINE SURVEYS

1. PRELIMINARY ROUTE SELECTION

A preliminary line route is selected on topographical, aerial photographs and/or orthophoto plans at a scale suited to the required level of detail. (e.g.1:250 000, 1:50 000, 1:10 000) Cadastral information and plans are to be obtained from the Surveyor Generals and Deeds offices.

The Objective of a preliminary route is, taking into account obstacles and restrictions, to achieve the most direct, cost effective, accessible route possible. The route should be mutually acceptable to Eskom and all interested and affected parties. The line is to be as straight and direct and as short as restrictions will practically allow.

Accessibility has to be considered for construction and maintenance.
Aeroplane landing strips no part of the power line may protrude from a 3048m long & 768m wide approach surface measured at a slope of 1:50 at a distance of 60 from the end of any runway.
Building restrictions as per half servitude width.
Civil aviation spans higher than 60m above the ground need approval.
Crop Compensation Eskom has to reimburse owners for damages and the loss of trees and crops.
Explosive magazines dependent on span lengths, power lines must be more than 30 m away.
Flood lines try to locate structures above 50 year flood plains.
Graves and cemeteries can be crossed but should be avoided due to public objection.

Irrigated lands avoid crossing lands irrigated with pipes. Wheel move and centre pivot systems may not have structures placed where their operation would be limited.
Land usage impacts on the value of property and is a price factor in the route selection.
Landowners the route has to be mutually acceptable.
Other power line crossings lower voltages are built below higher voltage lines. Test clearance with higher conductor at hot design template 50 or 80ºC and lower conductor at cold template design template -5ºC. Crossings should be close to structures but further than overturning distance. Surveyors must be aware of blow out conditions and the proximity to stay wires.
Parallel power lines create induced currents; separation distances must be applied to maintain acceptable voltages.
Petronet pipe lines structures or parts thereof are not permitted within than 15m of pipelines.
Quarries only single shot blasting permitted within 500m of a power line.
Road crossings as per clearance chart conditions differ for National, District & Abnormal load routes.
Rocky areas can present clearance and access problems. Foundations are also more costly.
Servitude widths & building restrictions of power lines must be known before a route can be selected (as per Eskom clearance chart).
Shooting ranges no power lines within a 824m wide strip (wider if more than 12 targets) & 2500m behind range.
Side slope areas of excessive side slope are to be avoided.
Spoornet crossings not less than 80 degrees to Eskom centre line. Clearances for each conductor type and structures as per clearance chart.
Structure dimensions of the particular power line must be known before a route can be selected this will indicate the expected 'foot print' area of towers and the conductor spacing for side slope considerations.
Sub-tropical fruit trees require special clearances.
Sugar cane lands must be avoided where possible as fires interfere with the performance of power lines.
Telkom separation distance is to be applied when paralleling with power lines. Optic fibre lines are not affected by interference or induced currents. Crossings as per specified crossing angles and the clearance of a structure on which a man can stand unsupported is to be applied over telephone poles.
Township developments existing and proposed have to be considered and routes planned in accordance with the cadastral layout.
Tree plantations allow 28m overturning distance to pine and gum or similar trees.
Orchids allow additional clearance of 3m above estimated height of fruit trees.
Trust land must be identified as way leaves for all properties traversed are required from the occupants (e.g. Tribal Trust land) as well as servitude from the trustees.
Water features normal ground clearance is applied but over navigable waters a 15m mast height plus 2,5m plus minimum safety clearance is above the high watermark.
Wetlands and adjacent areas should be avoided as they are environmentally sensitive.
Windmills bore holes & overhead water tanks over turning distance.

2. ASSIST ENVIRONMENTAL DEPARTMENT

Act in an advisory capacity regarding clearances and restrictions to produce an EIA. Investigate each corridor to finalise route selection with the environmentalist. Compile a DESD form. Should it be necessary to clear trace lines through trees for survey purposes, the survey contractor shall give prior notification to the property owner. Application is made to the Department of Environmental Affairs for approval. The owner has to give his consent to cut or trim indigenous trees and a permit must be granted by Provincial office of Wildlife before proceeding with the survey.

3. ROUTE APPROVAL

Customer relations It is essential that good relations with Eskom's customers be maintained. Every reasonable consideration to Property Owners must be given by the contractor and his staff. The contractor shall ensure that the Property Owner and other interested persons are aware of the activities to take place. He shall also ensure that all gates are kept closed and particular care shall be taken to avoid damage to livestock, crops, fences or farm roads. Environmental awareness shall be maintained at all times. Care shall also be given to avoid littering and the causing fires.
It is an express part of this contract that the contractor shall be held liable for all damage arising from negligence on the part of himself and/or his employees.

Show the route to construction, engineering and maintenance and get an Eskom preferred solution.
Await the Environmental Authorization (EA) & Provincial Wildlife permit.

HOLD POINT

4. FIX AND CO-ORDINATE ANGLES

Angles (bend points) are to be alphabetically numbered A, B, C ….. Through the alphabet and starting again at AA, AB,AC….etc. All fixing is to be done by recognised survey methods. Where GPS is used for fixing survey class units of high accuracy must be used. For long lines it is absolutely essential that the surveyor is competent in the adjustment of a geoidal model to achieve a compatible seamless WGS84 model particularly in the Z height values. 20mm x 500mm round steel pegs are to be used to mark the angles and a 1m fencing standard is to be placed near the peg. The grass around all pegs is to be cleared so as to improve relocation of pegs.

Eskom peg colour codes: Depending on OU's

Suspension – blue
Strain – red
Stay wires and line pegs - white
Centre pegs – 12mm x 500mm steel
Angle centre pegs – 20mm x 500 mm steel

5. UPDATE ROUTE PLANS

Plot bend points and provide a proposed route plan for the Land and Rights for valuation purposes. Routes through tree plantations, cane etc. that may result in claims for compensation must be brought to the attention of Eskom's representative so that the issue can be resolved without causing construction delays.

6. APPOINT REGISTERED VALUATOR – Land and Rights Section

An approved valuator is appointed by a specific mandate to value properties and trees if necessary.

7. NEGOTIATE ROUTE

Preliminary negotiations with property owners are started to gather owner details & discuss the route in detail (as per EA) - in rural trust areas get tribal resolution consent letters from each Nkosi as per Land and rural Department's princeplesi. Keep a note book for each project where you can record all route discussions (including environmental issues) and dates. It is not recommended to make agreements contrary to what is in the option document as it is impossible to implement differing conditions for each property. Make sketches to clarify decisions. Flag bends and terminals for the route approval above before proceeding to profiling and designing.

8. DRAW UP OPTIONS

Compensation is calculated the options are then checked by Sub Tx Survey & Land and Rights (before owner signature).

HOLD POINT

9. OBTAIN SIGNED OPTIONS

a) The options showing compensation are now presented to the land owners for signature. In rural settlement areas a way-leave is obtained from each occupant as well as an option from the property custodian/trustees (registered owner).
b) An option schedule is prepared and a route plan is marked up with the option item numbers.
c) Make a copy of the Valuation.
d) Copy any other correspondence, resolutions etc.
Finalize the negotiation package - see check list - submit 10 a-d with covering letter to Eskom Land Development.

10. TREE CLEARING AREAS AND SPECIAL CONDITIONS

Mark-up tree clearing areas on route plans and document any special conditions. Note that special conditions should not be contrary to what is in the option form. These conditions should also not be in perpetuity or transferable to others. Examples of these conditions could be: Construction to drive behind the back of the house, the dogs bite or big trucks to use the gate & not the cattle grid.

11. **ROUTE PLANS SUBMITTED TO PROJECT CONTROLLER OR PROJECT ENGINEERING depending on the OU'**
The project controller arranges to have trees and bush cleared.

12. PROFILE LINE- OU's to specify
Line pegs are number in straight AB - A1, A2, A3, in straight BC - B1, B2, B3, B4 etc.
Profile readings are taken at a maximum 25m apart and at every change of grade, side slope is to be read 7-15.5m off the centre line on both sides of the line.
Sufficient detail and overhead readings are to be taken to produce a strip plan and crossing drawings. Readings must be taken on detail at least 50m away so as to produce good intersecting angles. The surveying of the route shall not only be restricted to the centreline but shall effectively be a strip survey that includes any other physical features that may affect the line.
Field data must be WGS 84 co-ordinates in excel format with description, Y, X, Z values, height above ground, feature code, plan comment & profile comment.

13. TEMPLATE LINE
Compile a preliminary detailed design on a suitable software package with the intent to carry the design over to Eskom's PLS CADD software (assisted by the contractor).
A strip plan drawing of each straight separately is compiled 1:1 for PLS CADD & Micro Station (.dgn format).

Strip plan to include; Centre line
Bends and deviation angles
Property description and owners
All detail drawn and "no go" zones
Spot shots on level 6 (switched off)

Obtain Engineering Department approval for the designed line. Note that this can require the testing of various structure and conductor combination solutions as requested by Engineering to optimize the design.

HOLD POINT
Prepare construction drawing (converted to1:7500) & Bill of materials (BOM)/tower schedule.

14. PHASE 1 PEGGING
Set out the tower centres line pegs only and read levels for foundation schedules.
a) Start at angle to tower to line peg to tower etc. as the case may be. Set out in one direction only and always record peg positions and closing check distances.
b) Do spot checks of profile at minimum clearance and to overhead services.
c) Report back on suitability of tower positions & make adjustments if necessary (plans & BOM).
d) Move pegs as required and assist Civil Engineering with soil nominations.
e) Surveyors to do a peg walk with environmentalist, construction, design, maintenance and interested and affected parties.
f) Eskom to prepare foundation and stub level schedule.

15. APPLY FOR APPROVALS – OU preferences

Road crossings prepare a referenced letter and the relevant form and 3 Dept. of Transport plans. On receipt of return correspondence Eskom sign conditions & initial each page. Eskom then apply for a cheque by invoice the original is posted and a copy is filed.
A copy of the approval is added to the package for the Project Controller/ Engineer.
National roads prepare a referenced letter and 7 drawings. Ensure that structures are more than 40m from roads fences.
Rail crossings prepare a referenced letter with an occupation and works order number from the Eskom register and 5 drawings, on return sign conditions & drawings. Eskom then apply for a cheque by invoice the original is posted and a copy is filed. Add the addendum No to the Rail crossing drawing.
Telkom prepare a standard letter referenced letter and 3 hi-lighted route plans. Check the conductor & earth wire details on the letter. On return a copy of the approval is added to the package for the Project Controller/ Engineer and the original is filed.
Tribal Trust prepares 4 referenced letters and 8 hi-lighted route plans. These are posted to Local Govt. & Housing, Forestry & the local Magistrate. The reply's from these and letter from the Tribal Authority submitted to Ulundi. Ensure that the information on letter is correct. A copy of the Permission to Occupy

(P.T.O.) is added to the package for Project Controller. The original is sent to New Germany for payment.
Oil pipe lines prepare a referenced letter and 5 drawings for Petronet. On return a copy of the approval is added to the package for the Project Controller and the original is filed.
Civil aviation prepares a referenced letter and 2 hi-lighted drawings for submission to their offices in Pretoria.
Transmission Lines prepare a referenced letter and a crossing plan in the prescribed format for submission to Eskom Megawatt Park.

16. PREPARE FINAL PACKAGE

17. CO-ORDINATES TO ESKOM SURVEY OFFICE
These are used to update route plans and Graphic Information Systems (GIS).

18. FILE ALL DOCUMENTS IN SURVEY FILE- OU preference
Documents are grouped in colour coded folders - green for calculations, pink for negotiations, yellow for correspondence and approvals and blue for the package.

HOLD POINT

19. PHASE 2 PEGGING
Peg tower legs and reference pegs.

20. PHASE 3 PEGGING
Tower stub setting.

33/44/66/88/132 SUB STATION SURVEYS

1. SITE SELECTION
Select site & access road (ensure 230m sight distance at 1.3 m above ground depending on Provincial Road office requirements)

2. TURN IN LINES
Surveyors & planner to assist in re-linking lines.

3. ASSIST ENVIRONMENTAL DEPARTMENT
Assist Environmental Dept. to produce an EIA. Compile a DESD form. Should it be necessary to clear trees for survey purposes, the survey contractor shall give prior notification to the property owner. Application to Department of Environmental Affairs or Forestry for a permit to cut natural bush or cut or trim indigenous trees must be approved before proceeding to survey even if owner has given his consent.

4. SOIL TEST BY PROJECT ENGINEER
Assist Civil Engineering with soil nominations.

5. APPOINT REGISTERED VALUATOR
An approved valuator is appointed by a specific mandate to value properties and trees if necessary. Trees are to be brought to the attention of the Project Coordinator.

6. NEGOTIATE SITE & ACCESS ROAD
Preliminary negotiations with property owners are started to gather owner details & discuss the site in detail (as per EA) - in rural trust areas get tribal resolution consent letters from each Nkosi/Chief.

7. CONSULT ROAD ENGINEER
Consult for access road specifications.

8. DRAW UP OPTION
Compensation is calculated the options are then checked by Sub Tx Survey & Land and Rights (before owner signature)

HOLD POINT

9. OBTAIN SIGNED OPTION
a) The option showing compensation is now presented to the land owner for signature.
b) An option schedule is prepared and a route plan is marked up with the option item numbers.
c) Make a copy of the Valuation- depending on OU's
d) Copy any other correspondence, resolutions etc.
Finalise the negotiation package - see check list - submit 10 a-d with covering letter to Eskom Land Development.

10. PLACE CONTROL BEACONS
Place control beacons (in cement) fix & level.

11. TACHY SURVEY SITE
A contour plan of the site and the access road is produced and is submitted to the Survey Department to plan the layout of the substation.

12. CO-ORDINATES TO ESKOM SURVEY OFFICE
These are used to update route plans and Graphic Information Systems (GIS).

13. APPLY FOR APPROVALS
Apply for approvals to Local Government and Housing and as above

14. CALCULATE VOLUMES – OU Dependent
The soil cut & fill volumes are calculated on suitable software for the creation of the substation platform. This is done in conjunction with the Civil Engineers to the required slope (normally 1:100) and ModAasto compaction rates.

15. PHASE 1 PEGGING
Preliminary pegs are placed for earthworks.

16. PHASE 2 PEGGING
After compaction tests by design, place setting out pegs & check earth work & drainage levels.

17. TURN IN LINES
Profile & design Turn-in & -out lines and peg terminal towers in their correct positions. Add new detail & S/S on profile & strip plans to include closing spans.

18. CO-ORDINATES TO SERVEY OFFICE
These are used to update route plans and Graphic Information Systems (GIS).

19. FILE ALL DOCUMENTS IN SURVEY FILE
Documents are grouped in colour coded folders - green for calculations, pink for negotiations, yellow for correspondence and approvals and blue for the package.

Available from Engineering Survey office
Clearance chart
Rifle range detail
Airstrip plan detail
Civil Aviation Approval details
Valuators letter
Option Forms
Check lists
Power line crossing drawing
Railway line crossing drawing
Profile drawing example
Damage compensation form
Land Survey manual chapter 12 - profiling notes
Tower Schedule
Abnormal load routes

ELECTRIFICATION AND ENGINEERING

SPECIFICATION No. E 01/2013 Rev 0

22/11 kV MV AND LV LINE SURVEYS SCOPE OF WORK

SCOPE

This specification covers all possible aspects of survey related work required for the construction of Electrification, Reticulation and System Improvement projects.

Refer to Eskom Overhead Power Line Design Manual covering Terrain, Structure and Conductor aspects as well as the Survey Manuals Volume 1 & 2.

Any contract for survey work may comprise some or all of the following:-

SURVEYING OF RETICULATION LINES AND CABLES

1. ROUTE SELECTION

The **Objective** of route selection is, taking into account obstacles and restrictions, to achieve the most long term cost effective, efficient and accessible route possible. The route should be mutually acceptable to Eskom and all interested and affected parties.

Accessibility has to be considered for construction and maintenance.
Aeroplane landing strips no part of the power line may protrude from a 3048m long & 768m wide approach surface measured at a slope of 1:50 at a distance of 60 from the end of any runway.
Building restrictions either side of centre line; Rural MV = 9m LV = 3m, Urban MV & LV = 3m and underground cables 1,5m. (Depending on OU's)
Civil aviation spans higher than 60m above the ground need approval.
Crop Compensation Eskom has to reimburse owners for damages and the loss of trees and crops.
Explosive magazines dependent on span lengths, power lines must be more than 30 m away.
Flood lines try to locate structures above 50 year flood plains.
Graves and cemeteries can be crossed but should be avoided due to public objection.
Irrigated lands avoid crossing lands irrigated with pipes. Wheel move and centre pivot systems may not have structures placed where their operation would be limited.
Land usage impacts on the value of property and is a price factor in the route selection.
Landowners the route has to be mutually acceptable.
Other power line crossings lower voltages are built below higher voltage lines. Test clearance with higher conductor at hot design template 50 or 80ºC and lower conductor at cold template design template -5ºC. Crossings should be close to structures but further than overturning distance. Surveyors must be aware of blow out conditions and the proximity to stay wires.
Parallel power lines create induced currents; separation distances must be applied to maintain acceptable voltages.
Petronet pipe lines structures or parts thereof are not permitted within than 15m of pipelines.
Quarries only single shot blasting permitted within 500m of a power line.
Road crossings as per clearance chart conditions differ for National, Provincial, District & Abnormal load routes.
Rocky areas can present clearance and access problems. Foundations are also more costly.
Servitude widths & building restrictions of power lines must be known before a route can be selected (as per Eskom clearance chart).
Shooting ranges no power lines within a 824m wide strip (wider if more than 12 targets) & 2500m behind range.
Side slope areas of excessive side slope are to be avoided.
Spoornet crossings not less than 80 degrees to Eskom centre line. Clearances for each conductor type and structures as per clearance chart.
Structure dimensions of the particular power line must be known before a route can be selected this will indicate the expected 'foot print' area of towers and the conductor spacing for side slope considerations.
Sub-tropical fruit trees require special clearances.
Sugar cane lands must be avoided where possible as fires interfere with the performance of power lines.
Telkom separation distance is to be applied when paralleling with power lines. Optic fibre lines are not affected by interference or induced currents. Crossings as per specified crossing angles and the clearance of a structure on which a man can stand unsupported is to be applied over telephone poles.
Township developments existing and proposed have to be considered and routes planned in accordance with the cadastral layout.
Tree plantations allow 25m overturning distance to pine and gum or similar trees.

Orchids allow additional clearance of 3m above estimated height of fruit trees.
Trust land must be identified as way-leaves for all properties traversed are required from the occupants (e.g. Tribal Trust land) as well as servitude from the trustees.
Water features normal ground clearance is applied but over navigable waters a 15m mast height plus 2,5m plus minimum safety clearance is above the high watermark.
Wetlands and adjacent areas should be avoided as they are environmentally sensitive.
Windmills bore holes & overhead water tanks over turning distance.

2. **ENVIRONMENTAL ASSESSMENT**

Compile a DESD form and escalate it to the relevant Area Surveyor where required.
The Area Surveyor will appoint / refer to Environmental Section a Botanist to investigate and apply for the necessary permits.
NB: It however remains the contract surveyors responsibility to follow up and to ensure that the necessary permits are applied for and obtained before any construction takes place (**OU dependent).**
Should it be necessary to clear trace lines through trees for survey purposes, the survey contractor shall give prior notification to the property owner. Application is made to the Department of Environmental Affairs / Forestry for approval. The owner has to give his consent to cut or trim indigenous trees and a permit must be granted by Provincial Wildlife before proceeding with the survey. Act in an advisory capacity regarding clearances and restrictions to produce an EIA if required. Investigate any alternative corridors to finalize route selection with the environmentalist.

3. **ROUTE APPROVAL AND OBTAINING SIGNED WAYLEAVE**.

Two types of rights of servitude;
In "**general terms**" - Way leave Owner and Eskom Agreement.
In "**Specific terms'** –servitude diagram and Title Deed endorsement and involve consideration payment.
Customer relations It is essential that good relations with Eskom's customers be maintained. Every reasonable consideration to Property Owner's requests must be given by the contractor and his staff. The contractor shall ensure that the Property Owner and other interested persons are aware of the activities to take place. When Property Owner and Eskom agree on final route a way-leave must be completed and signed but the Registered Property Owner as confirmed by Deed Search. If property is occupied by someone other than the Registered Property Owner then this person is also required to sign the Way-leave. Surveyors shall also ensure that all gates are kept closed and particular care shall be taken to avoid damage to livestock, crops, fences or farm roads. Environmental awareness shall be maintained at all times. Care shall also be given to avoid littering and the causing of fires.
It is an express part of this contract that the contractor shall be held liable for all damage arising from negligence on the part of himself and/or his employees.

4. **RECORDING OF LINE ROUTES**

All bend, tee-off and terminal points must be co-ordinated by use of GPS to 2 - 5 metre accuracy, and these points must be loaded on to plan with Topographic or photographic background for printing and attaching to Way-leave with printed Co-ordinate list.

5. **PROFILING OF LINE ROUTE – OU dependent**

MV Line route is to be profiled as per Eskom Overhead Power Line Design manual. All detail is to be recorded to allow for correct placing of structures when doing the line design. LV Line route is to be profiled **only** where services are crossed.

6. **LINE DESIGN – OU dependent**

Line design is to be done as per Eskom Overhead Power Line Design Manual and Survey Guide Manual Volume 1 & 2. Line design is to be done using Model maker Software package and a printed final profile to be submitted with package.

7. **PEGGING OF STRUCTURES**

All structures are to be pegged in field as per Survey Guide Manual Volume 1 & 2. All Structure positions, Stay/Strut positions and centre line of H-poles are to be pegged. All bends, RMU and Mini sub positions on Underground Cable Routes are to pegged.

8. **BILL OF STRUCTURES**

All structures details are to be shown on the Survey CAD drawing by use to CAD Codes as per Survey Guide Manual Volume 1 & 2.

9. **CROSSING CLEARANCE PROFILES**

All work to be done as per Eskom Overhead Power Line Design Manual and Survey Guide Manual Volume 1 & 2. Detail Service Crossing drawings to be produced as per Eskom Drawing standard.

10. **CLEARANCE CHECKS**

Clearance checks to be done using Total Station and standard survey methods and compared to Eskom Clearance Chart in Survey Guide Manual Volume 2.

<u>OTHER SURVEY TASKS</u>

1. **TOPOGRAPHIC SURVEYS**

Site Identification, selection and detail survey by Standard Survey Methods as per Eskom requirements and Sub Station Design.

2. **DATA CAPTURE**

Capture of data for various requirements by use of GPS to obtain co-ordinates and detail of point.

3. **CAD WORK**

Produce CAD drawings to Eskom Drawing Standard contained within Survey Guide Manual Volume 1. Only Legally Licensed Micro Station Software Packages to be used for producing CAD Drawings.

Signed by: Neo Khonkhobe  Snr Sup Eng Survey

Signed by: Debbie Harding  Land Development Manager:NCOU