

# GIS DATA GATHERING TENDER TECHNICAL SPECIFICATIONS



Kenya Power

KP1/10E-1/4/2-TSP-01

## SPECIFICATION

FOR

## PROVISION OF GIS DATA COLLECTION SERVICES

### REVISION RECORD

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## **PART B – SPECIFIC DETAILS OF SERVICE (SDS)**

The Specific Details of Service are as attached on the next page.

### **1. Scope of the Project**

In order to improve the Quality of its services, Kenya Power has launched a project to update its geo data base (GIS) with spatial information on all its utility starting from the distribution transformers all the way to customer location (PRN), this is to be overlaid on cadastre (land demarcation information). Also all the attributes of the spatial data.

All the spatial data must conform to the Kenya National Spatial Data Infrastructure standards.

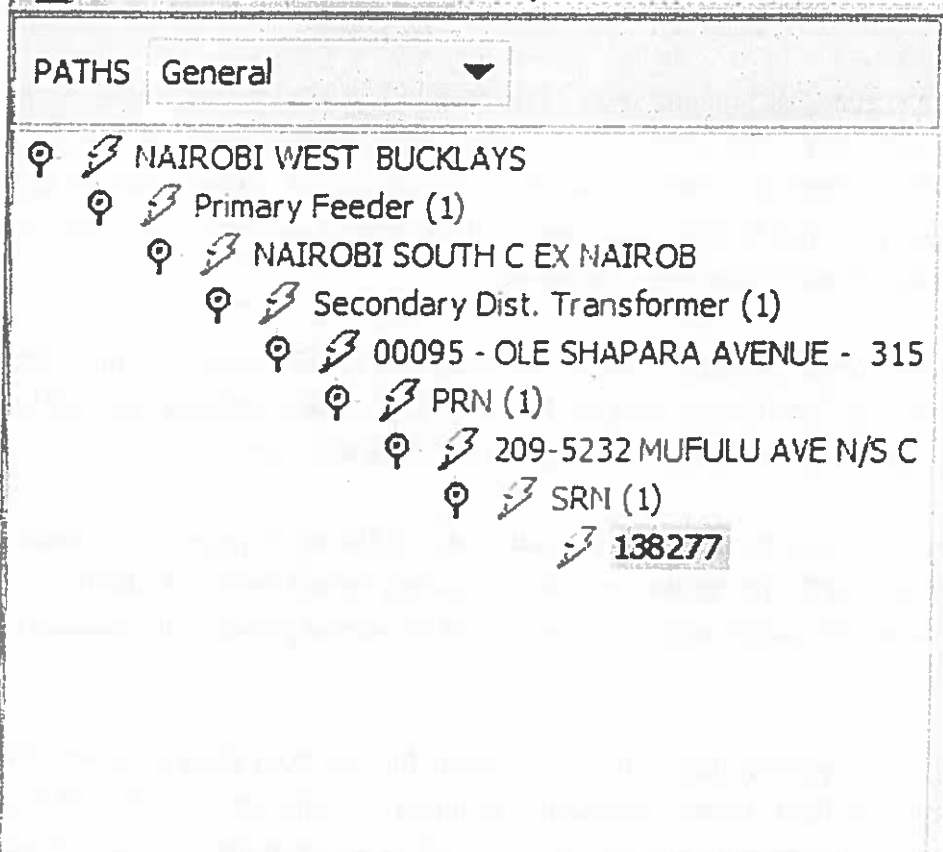
#### **NOTES:**

- 1. Kenya power will issue introduction letters to Survey of Kenya and all County land offices to all successful bidders.*
- 2. All Maps whose source is not mentioned above should be submitted to Kenya power for approval before the same is used for the exercise.*

### 1.1. Objectives of the project

Main objectives of the project are:

- Ensure accurate spatial and attribute data of all the electrical installations (Distribution transformers, low voltage network, existing/potential customers). This will ensure accurate analysis/query from the data base thus informed decision making.
- Link the customers and all the other installation to the correct hierarchy i.e. Customer to the right lv circuit, to the correct Distribution transformer, to the correct feeder, to the correct Primary substation. An example shown below



- Linking all the instalations and customers to the correct land information.
- To ensure all the Kenya power systems (FDB/GIS,IMS and ICS )are reading from the same line ie no contradicting data .
- Ensure seamless linkage of all the utilities which will enable upstream and down stream queries for energy balancing.

### 1.2. Project Scope

The Data Collection Project consists on the execution of field campaigns for collecting spatial data and attributes of the following features. The information about the Low Voltage network (LV overhead lines, LV poles and Service Cable) as well all the Customer Premises and Customer Meters. This should be over laid on base maps (topographical maps and the

cadastre). Labelling the Distribution Transformers and taking photography of all gathered elements is also part of the field work.

Project will involve spatial and attributes data collection for all the electrical network entities from the distribution transformers to the cable entry point i.e. PRN and Meter data for the whole country. The project is divided into areas for better execution and administration. The binder will demonstrate the capability of offering the services in the chosen areas.

Two kind of information are required for the feeders: the collecting spatial data and attributes of the Commercial entities i.e. meters information and their respective phases; and the second for collecting spatial data and attributes of the Network assets i.e. low voltage feeders, supply cables and cable entry point (PRN). Both kind of information are part of this tender and will be performed by the same Bidder and must be overlaid on a topographical layer and the cadastral layer prepared by the consultant. All the spatial data must conform to the Kenya National Spatial Data Infrastructure standards.

The Bidder also must consider office activities as part of the Project i.e. the scheduling and preparation of field activities as well all the processes for data reception and off load; quality control, reporting and management of progress for these activities.

Kenya power will provide successful bidders with GPSs upon payment of insurance worth *Ksh 300,000* per GPS for the data gathering this will be subject to availability .A bidder is free to use own GPS which have to be approved by Kenya power and loaded with the data dictionary.

Kenya Power will provide the Software required for the Data Gathering activities (GPS's Software) and the Back Office application required for interact with the GPS and Kenya Power main systems (desktop application). The bidder also can use its own Software for edit or manipulate the gathered data but will have to upload the data to the back office application for delivery.

Each bidder should prepare the necessary schedules and work flows in their technical proposal.

### 1.3. Data Gathering Scope

Data gathering scope includes, collecting spatial and attribute data for the following, Distribution transformers, LV network, Customer Premises and Customer Meter this should overlaid in topographical base maps and cadastre. Any distribution transformer customer premises covered should be labelled (labels to be provided by Kenya Power).

The mandatory attributes for each entity are shown in the table below:

<u>Item</u>	<u>Specification</u>	<u>Bidders Statement of Compliance</u>
<u>Distribution Transformer (DT)</u>	<ul style="list-style-type: none"> <li>▪ <u>Substation Number(Where it exist in the field)</u></li> <li>▪ <u>Transformer Name</u></li> <li>▪ <u>Manufacturer of transformer</u></li> <li>▪ <u>Manufacturers model</u></li> <li>▪ <u>Serial number of element</u></li> <li>▪ <u>Year of manufacture</u></li> <li>▪ <u>Rating (KVA)</u></li> <li>▪ <u>G Number</u></li> <li>▪ <u>Mounting Structure</u></li> <li>▪ <u>Road/Street</u></li> <li>▪ <u>Physical Location</u></li> <li>▪ <u>Photograph</u></li> </ul>	
<u>LV lines (415V and 240V)</u>	<ul style="list-style-type: none"> <li>▪ <u>Origin Of The Element</u></li> <li>▪ <u>Father Installation of Element</u></li> <li>▪ <u>Feeder Of The Element</u></li> <li>▪ <u>Type Of Section</u></li> <li>▪ <u>Utilization</u></li> <li>▪ <u>Lv Leads Phases</u></li> <li>▪ <u>Conductor(Type/Size)</u></li> <li>▪ <u>Presence Of Street Lighting Conductor</u></li> <li>▪ <u>Availability Of Earthing Conductor</u></li> <li>▪ <u>DT phases connected</u></li> </ul>	
<u>LV (240/415v) line poles</u>	<ul style="list-style-type: none"> <li>▪ <u>Size</u></li> <li>▪ <u>Type</u></li> <li>▪ <u>Height</u></li> <li>▪ <u>Shared voltage</u></li> <li>▪ <u>Presence of PME</u></li> </ul>	

<u>Item</u>	<u>Specification</u>	<u>Bidders Statement of Compliance</u>
	<ul style="list-style-type: none"> <li>▪ <u>Pole Formation</u></li> <li>▪ <u>Stay</u></li> </ul>	
<u>Customer Premises (PRN)(existing</u>	<ul style="list-style-type: none"> <li>▪ <u>Premises user type</u></li> <li>▪ <u>Service Type</u></li> <li>▪ <u>DT Phases connected per Line Section</u></li> <li>▪ <u>GPS coordinates</u></li> <li>▪ <u>Photograph</u></li> </ul>	

Table I

The survey includes the identification, spatial information and attributes register. All spatial information is to be overlaid on cadastre information included. The work of data Gathering includes the taking of photography of the element gathered and linked to the building or plot being serviced, sequentially numbered in a standard GIS format. Each bidder should demonstrate the entire workflow in the technical proposal.

The work includes updating of Distribution Transformers not existing in the Kenya Power database. In case this situation appears on field, the “new” Distribution Transformer must be captured with all its attributes.

The survey of the lines of Medium and High Voltage (11kV, 33kV, 66kV and 132 kV) are not part of the Data Gathering project.

The data management consultant will provide the upper hierarchy network data to the consultants

**Commercial alpha numerical data (non –graphical)**

This all the data about Meters for both the normal and large power customers, that cannot be mapped graphically. The attributes will be as shown in the table below.

<u>Item</u>	<u>Specification</u>	<u>Bidders Statement of Compliance</u>
<u>Customer Meter</u>	<ul style="list-style-type: none"> <li>▪ <u>Meter Serial Number</u></li> <li>▪ <u>Meter Manufacturer / Make</u></li> <li>▪ <u>Meter Model</u></li> <li>▪ <u>Type of Meter (Active / Water Heater)</u></li> </ul>	

	<ul style="list-style-type: none"> <li>▪ <u>Meter's No. of Phases</u></li> <li>▪ <u>Meter type- Electro-mechanical, Electronic</u></li> <li>▪ <u>Number of Digits</u></li> <li>▪ <u>Transformation factor or constant</u></li> <li>▪ <u>Tension (Voltage)</u></li> <li>▪ <u>Multiplying factor or constant</u></li> <li>▪ <u>DT Phases connected</u></li> <li>▪ <u>Prepaid / Post paid</u></li> <li>▪ <u>Actual Reading (for Post-paid)</u></li> <li>▪ <u>Secured (prepaid)</u></li> <li>▪ <u>GPS coordinates</u></li> </ul>	
<p>LargePower customers</p>	<ul style="list-style-type: none"> <li>▪ Distribution transformer number</li> <li>▪ Distribution transformer rating</li> <li>▪ Service line connection type</li> <li>▪ Phase</li> <li>▪ Supply voltage</li> <li>▪ Supply configuration</li> <li>▪ Nature /Type of business</li> <li>▪ Type of metering</li> <li>▪ CT ratio</li> <li>▪ Meter board location</li> </ul>	

## 2. Tender Areas

The data collection tender is divided into ten areas as per Kenya power existing sub regions and 1 special Area as shown in the table below.

NO	Area NAME	Tick preferred Area
1	Nairobi South	
2	Nairobi North	
3	Nairobi West	
4	Coast	
5	North Rift	
6	Central Rift	
7	West Kenya	
8	Mt Kenya North	
9	Mt Kenya South	
10	Off Grid stations	

A bidder to indicate the preferred areas and demonstrate their capacity to successfully complete the area they prefer to work in.

The unit of allocation to the successful bidders shall be the feeders; the number of feeders to be allocated to a contractor will be based on the contractor's demonstrated capacity.

## 3. Quality Control

The quality of the surveyed data is critical in this project, and Kenya Power will establish the procedures to ensure the data received meets the laid standards and recommendations established in the project. The procedure of quality control will be as follows:

- a) The binder will submit the data collected using an acceptable geo database or the Back Office Application provided by Kenya Power.
- b) The job will be subjected to field and office quality control. If the job is not okay the consultant will reject the job back to data collection consultant. If it's okay it will be forwarded to data management consultant who will validate the data and issue a completion certificate for invoicing.
- c) The approved job will be maintained/entered in the system and requested.
- d) Upon request Kenya power quality control team will check the job and either approves and reject.
- e) If approved the data will be availed in the FDB production layer
- f) If rejected it will be taken back to the data management consultant for rectification

Below are the acceptable standards for approval:

### Network data collection



Item	Items considered	Acceptable deviation	Bidder statement of compliance
Distribution Transformer	All DT in the feeder	2%	
LV lines	All lines in the feeder	5%	
Poles	All poles in the feeder	5%	
Service Cables	All cables in the feeder	5%	

Table II

If any Pole of the Batch is missing in the field survey, it will cause the rejection of the Batch.

### Comercial Campaign

Item	Items considered	Acceptable deviation	Bidder statement of compliance
Meter (Bulk Customer)	All meters in the feeder area	5%	
Meter (Large Customer)	All meters in the route-itinerary	2%	
Premises	All premises in the feeder area	5%	

Table III

When all the items are accepted, the Batch will be accepted. If one or more items are rejected, the Batch will be rejected and the Bidder will gather it again on field.

After performed the Quality Control, If not rejected (or in a period of 20 working days after the Preliminary Acceptance), the Batch will be accepted and the Completion Certificate for the Batch will be issued.

### **3.1. Accuracy of the Geospatial coordinates gathered**

The accuracy required for the data survey is compatible with the GPS requested. The gathered points shall not have a coordinate error of more than  $\pm 3$  meter on the ground. Kenya Power will provide standard GPS units to the ones who require, subject to availability of the same and provision of the necessary insurance bond as per the special conditions of contract provisions.

The procedure for the Geospatial Coordinates data capture will be communicated and detailed during the Training of the Bidder personnel.

#### **4. Project plan**

The Bidder must present a Preliminary Project Plan describing, among other things the methodology of the data gathering, its overall management and coordination responsibilities if awarded the Contract, human and other resources the Bidder proposes to use.

The Plan should include a detailed Contract Implementation Schedule in bar chart form, showing the estimated duration, sequence, and interrelationship of all key activities needed to complete the Contract. The Preliminary Project Plan must also address any other topics specified in this document.

The Preliminary Project plan includes:

- a) Description of methodology & work plan for performing the project.
- b) Task, Time, and Resource Schedules (include the effort estimation for the survey of the areas under the Bidder responsibility).
- c) Curriculum Vitae of the persons to be deputed as Project Manager, Specialists and other representative positions giving their name, the minimum professional experience and the details of the project handled by each.

The Bidder must carry out all activities in 6 months. This period considers the startup activities, the training of the personnel in the Kenya Power premises, and the complete survey of the assigned feeders.

##### **4.1. Service Level Agreement**

The Bidder must perform the project according to the approved Project Plan; a delay on the execution of the project will be penalized according the table below.

The delay will be computed using the Progress formula considering the real and the planned execution:

$$Delay = \frac{P_{real}}{P_{plan}} \times 100$$

Where

$P_{real}$  = Real Progress of the project

$P_{plan}$  = Expected progress according the approved work plan.

The penalties shall be applied in the Bidder's bills and shall not exceed the value of the performance bond (10%).

\*The value represents the discount in the amount to be included in the bill for the non-achievement of the Service Level established in the work plan

## **5. Training of the survey personnel**

The administrative and back office personnel (who will use the Back Office application), and the survey personnel (who will use the Data Gathering software provided by Kenya Power and label the assets) will require training before to start the activities.

Kenya Power will train selected Bidder trainers who will cascade the training for the rest of the bidder personnel.

Training will happen before the starting of the Data Gathering Campaign and will be during approximately 2 days (8 hours per day).

Training will be carried out in Nairobi. The cost of the Bidder staff travelling to Nairobi for the training must be considered in the scope of the current proposal.

A minimum of 2 personnel need to be assigned to the training; it is Bidder's responsibility the definition of the personnel who will receive the training. A maximum of 5 trainees are accepted per bidder; the number and the profile of the people to be trained must be included in the proposal.

At least one of the trainees must have Diploma / Certificate in Electrical / Electronics or superior qualification.

Training will cover following topics:

- Introduction to Network concepts.
- Overall Methodology of the Project.
- Data Collection Procedures, including
  - General Planning.
  - All the details about how to collect and identify information required per entity to be gather.
- DT Labeling procedures.
- Use of the Back Office Software. Theoretical and practical training.
- Use of the GPS Software for data campaigns. Theoretical and practical training.

After receiving the training, the Bidder must cascade it to all the personnel participating in the project. The Bidder will communicate to Kenya Power the list of the personnel trained and any other relevant detail of this activity prior to start the Field Activities.

Only trained personnel will be allowed to perform surveys on field.

## 6. Additional requirements for the project

- The personnel assigned to the field campaign must be identified with a Personal Identification provided by Kenya Power. The identification must be visible during the performance of the field activities. Only trained and authorized personnel can perform survey activities.
- The provision of the necessary transportation (vehicles, motorcycles, etc.) is also part of Bidder's responsibilities. The Bidder must include in the proposal all the transportation that will provide for the performance of the Data Gathering activities. The use of transportation must be detailed in the methodology definition.
- The Bidder must provide all necessary material for the execution of the field and office works (e.g. Cadastral maps, field materials, computers, bags, hats, etc.). Kenya Power will not provide any material for the project execution.

Item	Specification	Bidders Statement of Compliance
Identification	<ol style="list-style-type: none"><li>1. Staff identification cards</li><li>2. Protective clothing</li></ol>	
Transport	<ol style="list-style-type: none"><li>1. Field staff and general transport</li></ol>	
Provision of cadastral plans	<ol style="list-style-type: none"><li>1. Geo-referenced maps</li></ol>	

Table III A

## XX. TECHNICAL SPECIFICATIONS

### GIS DATA COLLECTION SPECIFICATIONS

#### 1. Spatial /Graphical and Attribute data specification

S/N	ITEM	SPECIFICATION	BIDDER STATEMENT OF COMPLIANCE
1	Entities	<ul style="list-style-type: none"><li>➤ Distribution transformers positions</li><li>➤ Low voltage network</li><li>➤ Low voltage poles and stays</li><li>➤ Cable entry points (PRN)</li><li>➤ Meter data.</li></ul>	
2	Accuracy	<ul style="list-style-type: none"><li>➤ Features shall not have a coordinate error of more than <math>\pm 3</math> meter on the ground.</li></ul>	
3	Post processing	<ul style="list-style-type: none"><li>➤ Post processing is required using the Back office software, other geo-referenced / satellites images.</li><li>➤ Proper alignment of the cadastral / geo referenced maps and the network must be achieved.</li></ul>	
4	Topological rules	<ul style="list-style-type: none"><li>➤ Linear and aerial entities should never overlap this is to ensure a seamless data base and must conform to KNSDI standards.</li></ul>	
5	Equipment, office and software	<ul style="list-style-type: none"><li>➤ GPS units will be used to be able to attain the centimetre accuracy.</li><li>➤ Field software (to be provided).</li><li>➤ Office software (to be provided).</li><li>➤ Mapping facilities for base maps preparation.</li><li>➤ Land surveyor licensing for cadastral data preparation.</li><li>➤ Office space for project staff operations.</li></ul>	
6	Cadastral geo-referenced maps	<ul style="list-style-type: none"><li>➤ Gathered Low Voltage network must overlaid with the cadastral geo-referenced maps.</li></ul>	
7	Spatial Parameters	<ul style="list-style-type: none"><li>➤ Coordinate system shall be <b>Transverse Mercator(UTM)</b>.</li><li>➤ Adopted Zone shall be zone <b>37°S</b> this is to ensure that our data base is seamless.</li><li>➤ Datum of use shall be Arc 1960.</li><li>➤ KNSDI standards.</li></ul>	
8	Personnel	<ul style="list-style-type: none"><li>➤ Degree in Geoinformatics</li></ul>	

	qualifications	<ul style="list-style-type: none"> <li>➤ Engineering( at least one).</li> <li>➤ Diploma in Geoinformatics /Survey (at least one per team).</li> <li>➤ Diploma/Certificate in Electrical Installation (at least one per team).</li> <li>➤ Diploma in Electrical and Electronics or craft certificate in line work (at least one per team).</li> </ul>	
9	Attribute data	<ul style="list-style-type: none"> <li>➤ Attributes data dictionary to be collected to be loaded in the GPS gadgets by the data management consultant.</li> </ul>	
10	Camera / Photography specifications	<ul style="list-style-type: none"> <li>➤ Photographs of all the Distribution transformers, meters and customer premises.</li> </ul>	

Table IV