Kenya Electricity Transmission Co. Ltd.

"Building a World Class National Grid"

Kenya Electricity Transmission Co. Ltd.

CLARIFICATION No. 02

COMPLETION OF 132KV SONDU-HOMABAY-AWENDO TRANSMISSION PROJECT - TRANSMISSION LINE

NATIONAL OPEN TENDER No.: **KETRACO/PT/030/2023**

The following clarifications are hereby issued as requested by interested firms.

Referred to as Clarification List no. 2 dated 21.11.2023 and associated attachments.

HEAD OF SUPPLY CHAIN MANAGEMENT

Kenya Electricity Transmission Co. Ltd.

"Building a World Class National Grid"

Our ref: KETRACO/PT/030/2023

21st November,2023

RE: TENDER CLARIFICATION No. 2

OPEN TENDER FOR COMPLETION OF 132KV SONDU-HOMABAY-AWENDO PROJECT – TRANSMISSION LINE.

Find herein CLARIFICATION No. **2**, consisting of four (4) pages into the Principal Tender Documents.

All other terms and conditions of the tender remain the same.

No.	Clause	Reference	Description	Clarification	KETRACO Response
1			Line Route for Transmission Line	Please Provide KMZ file for the transmission line so Contractor can go and visit every location to assess the minor improvement works on foundations as per item 2.9.2, it was not possible during the joint pre-tender site visit to check every location	We recommend the bidders to use the coordinates provided in the plan and profile drawings. In the meantime, an inspection report is provided with indicative conditions and work required in the existing foundations for information only
2			Tower Weight and Drawings	Kindly share the Tower Drawing and Weight so Bidder can provide the competitive price for tower erections. In the BOQ its mentioned per Tower and yet the tower materials are available on site for 132 kV Ndiwah – Sondu	Tower drawings are available for collection from KETRACO office 5th floor during working hours
3			Foundation Drawings	Kindly share the Foundation Drawing and volumes for each type of towers so Bidder can provide the competitive price for Tower Foundation. In the BOQ its mentioned per Tower and type of soil for single circuit Towers	Foundation drawings are available for collection from KETRACO office 5th floor during working hours
4			Foundation Locations	The Scope of work indicate to finish balance 6 Nos of Foundation and Demolish of 3 Nos of Foundations, kindly share the Location Number so	Refer to attached report for more details

				Bidder can visit the site for assessment of work	
5			Line clearance and payment for PAPs	BOQ Indicates the Line Clearance for the 69- route kM, please confirm the Way leaves/Right of ways / Evaluation of Property is already completed and paid to the PAP's. What will be the role of contractor on the Way leaves, any Payment to the PAP's will be paid by KETRACO if pending, please confirm	KETRACO has put considerable effort to acquire wayleave. Refer to Part 2- 'Procuring Entities Requirements 9.2 Obtaining Right of Way' for more details regarding KETRACO and Contractors responsibilities
6			Time for Completion	As per SCC 8 Time for Commencement and completion mentioned as 24 Months from effective date, please re confirm the duration	Duration is 24 months. Considering the entire scope including design, supply and installation of double circuit portion and possible commissioning
7			Reconducting the Conductor Drums	During Site visit it was informed to all bidders about the shifting of materials to contractor's store, it will be difficult to shift conductor drums before reconductoring on other drums based on its condition. Contractor request to shift it to the contractor's store after reconductoring and joint verifications with previous contractor & KETRACO	Bidders are encouraged to prepare and move material at commencement. The associated risk of securing the material shall be transferred at commencement date.
8			Reconducting the OPGW Drums	During Site visit it was informed to all bidders about the shifting of materials to contractor's store. OPGW is a sensitive item and based on the condition of the drums, during reconductoring OPGW can have a twist and damage the fibers, it is not possible to take over the OPGW before reconductoring and ODTR test after reconductoring, Contractor request to takeover materials after reconductoring and testing to avoid future issues which may arise during Testing and commissioning	Bidders to note that the OTDR tests shall be conducted before reconductoring and witnessed by KETRACO. Contractor shall ensure adequate care to avoid twist and damage of fibers during reconductoring. The associated risk of securing the material shall be transferred at commencement date
9			Transportation	Schedule 4, Item No 8 mentioned about transportation "Monthly rate for Employers Transport including but not limited to all operation, maintenance and	Recheck the quantities provided in schedule 1.1 and 2.1 including the note in schedule 2.1. Bidders are

					securely transport them following KETRACO procedures
14			Schedule 1, Materials Supplied from Abroad	Please confirm Who will bear the cost of Local Taxes such as Import Duties, RDL and IDF Cost and clearing charges.	Refer to relevant sections in the Bid documents. Take note of ITT 19.5

User Representative: Eng. Justin Muna

Designation: Project Manager, SHA

Signature: .....

Date:.....21/11/2023.....

Approved by: Peter M. Njehia

Designation: Senior Manager, SCM

Signature: .....

Date:.....21/11/2023

				attendant costs as specified in the specification but excluding purchase price in schedule 1 or 2 as applicable." As per Schedule 1, we don't need to supply vehicles, please clarify if its only operation and maintenance cost means driver, fuel, maintenance etc. also confirm the duration as its mentioned as 24 Months	required to supply vehicles. The duration is 24 months
10			Schedule 4, item 11 Lot Amount for the Provision of the smooth handover of all existing line materials	What is this amount for please clarify	Details of utilisation will be discussed with the winning bidder and minuted at negotiation stage.
11			Schedule 4 , Item 12	"Provision for clearing and transport to site of containers numbers WECC1930EMB1091, WECC1930EMB1002, the amount to be paid at cost upon release and delivery of Goods to site." What will be the scope of contractor on this work, does this amount includes demurrage charges, Clarance and Transport to the site, what if the amount exceed after assessment, will it be paid by KETRACO, please confirm	Details will be discussed with the winning bidder and minuted at negotiation stage
12			Stub for Supply of Tower	Kindly share the Stub Drawing/Details for the Existing towers so contractor can Quote and supply the same in order to match with existing towers.	Stub drawings are available for collection from KETRACO office 5th floor during working hours
13			List of the available materials	Kindly share the list of available materials from the precious contractor in order to verify any shortage during later stage.	Provisional list attached to this clarification. Bidders allow for verification and joint audit of existing material and transfer of verified material to Contractor's yard/erection site. Note it shall be the responsibility of the winning bidder to confirm quantities of existing materials and

INTRODUCTION

The completion works for 132kV Sondu-Homabay- Awendo transmission line project are in the process of being re-tendered. The contractor, M/s CG Holdings (Belgium) had procured and supplied most of the materials for the transmission line and substation at Thurdibuoro. These materials were stored at Ndhiwa yard.

The material verification exercise was necessary in order to ascertain the actual quantities of the materials at site before a new contractor mobilizes.

The following officers conducted the verification exercise between 28th August and 9th September 2023;

1. Eng. Justin Muna –Overall Project coordinator
2. Timothy Murithi – Electrical Engineer, D&C
3. Isaac Rotich –Supply Chain Officer
4. Eng. Eliud Chepkoech –Electrical Engineer, O&M
5. Diana Matasero – Civil Engineer, D&C
6. Tobias Waswa – Technician, O&M
7. Silvanus Omollo –Technician, O&M

OBJECTIVES

i. The main objectives of the exercise was to:

ii. Verify all quantities of the transmission tower materials available at site.

iii. Verify all conductor and OPGW materials available at site.

iv. Verify the insulators, hardware fittings and accessories for the conductors and OPGW available at site.

MATERIAL VERIFICATION OUTCOME

The team identified the following towers as being available at site.

S/N	Tower Type	Counted (Nos)	Erected (Nos)	Required (Nos)
1	**KNS**	122	26	
2	KNL	9	2	
3	KNLS	5	0	
5	KNM	3	0	
6	KNH	4	0	

7	KNHS	4	0	
8	T	1	0	
	TOTALS	**148**	**28**	

The team counted the gusset plates for towers L, LS, M and HTS as shown in the below table;

S/N	Gusset Plates	Counted (Nos)
2	KNL	2418
3	KNLS	402
4	KNM	800
5	KNHT	1271
6	KNHTS	955

Though some gusset plates were incomplete but actual numbers shall be confirmed jointly by KETRACO and the new contractor at handover. There were a substantial number of tower type S gusset plates which were available and which would allow the contractor start the work though the team did not manage to count all the plates due to the limited time assigned for the whole exercise.

3.1 Conductor

The conductor drums counted were 63 drums (approx.3000m per drum) in number with 7 other half drums each taken as 2.5 km for the half drum,

(63X3)=189km + (7X2.5) = 206.5km approx.

The actual length of each conductor drum shall be determined during installation.

3.2 OPGW

The number of drums counted were 14 complete drums with one half drum. With approximately 5 km for each drum of OPGW, then we have approximately 72km of OPGW available at site.

14.5 X 5=72.5 km

3.3 Insulators

The 120kN insulators were counted and recorded as 880 pieces available at site.

3.4 Hardware fittings & Accessories

The hardware fittings and accessories for conductor were counted and recorded as follows:

S/n	Item Description	Counted (Nos)
1	Clevis socket RH-16-11/15	477
2	Straight shackle GN-16	438
3	Ball eye ABC-16-P	344
4	Aluminium(Jumper) DC 226	465

5	Ball socket RC-16-P10-13	102
6	Arching horn 19 A06/15	684
7	Socket eye RC-16-P/15	286
8	Triangular Yoke plate Y16/400-14	376
9	Mid span joint	Aluminium 64 steel 46
10	Clevis eye HR-16/20	177
11	Vibration dampers	400
12	Compression clamp EC 226 (Steel)	473
13	Compression clamp (Aluminum) CH 226	482
14	Arching horn 11 A06/16	659
15	Ball clevis HBP-16	478
16.	Chain link ES-16/20	238
17.	Arching horn AU5/16	396
18.	Suspension clamp GS-5	439
19.	Arching horn AU6/16	430

The hardware fittings and accessories for the OPGW were counted and recorded as follows:

S/n	Item Description	Counted (Nos)
1.	Earth bond	Not found at site
2	Armour rods	Available, not counted
3	Vibration dampers	161
4	Parallel Groove clamp GCSAL-14-18	194
5	Joint box	Not found at site
6	AGS clamp with neoprene cushions OF 28960-GA-S-3	148
7	Protection rods	Not counted
8	Anchor shackle	

9	Retaining rod	Not found, not counted
10.	Extension link	Not found, not counted
11	Thimble clevis	Not found, Not counted
12	Dead end rod	Not found, Not counted

Report Prepared by

Date: 14/09/2023

Timothy M. Murithi
TEAM MEMBER

Report Approved by

Date: 14/09/2023

Eng. Justin Muna
PROJECT COORDINATOR

INTRODUCTION

132Kv Sondu-Ndhiwa transmission line is being retendered and there was need to inspect the already constructed tower foundations and the erected towers before a new contractor comes onboard.

The inspection was carried out from 9th to 28th October 2023 by the following officers:

1. Diana Matasero-Civil Engineer, D&C
2. Silvanus Omollo-Technician, O&M
3. James Ojijo- Technician/Driver-O&M

OBJECTIVE

The objective of the field assignment was:

i. Inspect all the constructed tower foundations and obtain their current status
ii. Inspect all erected towers and obtain the status
iii. Prepare an inspection report

SITE INSPECTION

Foundations

The team began their inspection from Ndhiwa substation towards Thurdibuoro substation. Sondu-Ndhiwa transmission line had a total of 184 foundations.

The contractor (CG Holdings) had managed to construct 178/184 before they left site.

The team managed to inspect all foundations though some had challenges of access. The team managed to inspect the following:

1. Taking the diagonal profiles for the ready foundations,
2. Checking the status of the stub, whether they had been damaged or not.
3. Checking the status of the chimney.
4. Checking the backfill.
5. Accessibility of the foundations
6. Earthing
7. Tower Coordinates (whether the tower position changed or not as compared to the original coordinates)

All foundations had been constructed apart from Tw 1, 2, 3, 56, 92 and 93. Towers 1, 2, 3 are under the LILO design for Thurdibuoro substation. Tw 93 has a house constructed on the foundation point. Tw 56 had been excavated but the pits have filled up with soil.

The diagonal profiles were ok. The stubs were all ok apart from Tw 47 and 65 which had one stub each deformed. Tw 47 had stub A deformed and cut. Tw 65 had stub C twisted as a result of nearby construction work involving heavy machinery.

Towers

A total of 27 towers had been erected. These are: 4, 5, 40, 44, 73, 74, 75, 76, 77, 79, 80, 81, 82, 83, 85, 86, 87, 89, 90, 91, 94, 95, 96, 97, 98, 99 and 100.

Challenges

Various challenges were experienced. These were:

1. Accessibility was a problem in some areas. Tw 108 was constructed within a rice plantation which was surrounded by irrigation water.
2. Heavy vegetation and trees had grown on tower foundations like for tw 53, 146 which required heavy bush clearing in order to measure the stub diagonals.
3. Huge gulleys had formed in some locations and this made access to such locations very difficult and walking was now an option. Tw 29, 41, 27 were near developing gulleys.
4. Hilly and rocky terrain where some foundations had been constructed. Access to locations 145, 144, 143, 142, 141, 140 and 139 was a real challenge.

The summary of the inspection for the line is as provided in the table below:

Tower No	stubs	foundation/ chimney	Earthing	Diagonal profiles (m)		Remarks
				AC	BD	
182	OK	OK	yes	7.76	7.77	bush clearing needed
181	OK	OK	yes	7.46	7.44	
180	OK	OK	yes	5.59	5.57	
179	OK	OK	yes	5.59	5.57	
178A	OK	OK	yes	5.58	5.58	New tower introduced on rerouted section.
178	OK	OK	yes	5.57	5.56	
177	OK	OK	yes	5.56	5.57	
176	OK	OK	yes	6.22	6.23	
175	OK	OK	yes	6.86	6.88	
174	OK	OK	yes	5.57	5.57	
173	OK	OK	yes	5.57	5.56	
172	OK	OK	yes	5.57	5.56	
171	OK	OK	yes	5.57	5.57	
170	OK	OK	yes	6.19	6.18	
169	OK	OK	yes	5.55	5.59	
168	OK	OK	yes	6.22	6.21	
167	OK	OK	yes	6.85	6.88	
166	OK	OK	yes	6.86	6.87	
165	OK	OK	yes	5.55	5.57	
164	OK	OK	yes	6.86	6.85	bush clearing needed
163	OK	OK	yes	6.86	6.87	backfill required
162	OK	OK	yes	5.58	5.56	
161	OK	OK	yes	6.87	6.87	
160	OK	OK	yes	6.21	6.22	
159	OK	OK	yes	7.53	7.53	
158	OK	OK	yes	6.87	6.87	
157	OK	OK	yes	6.87	6.87	
156	OK	OK	yes	7.82	7.88	backfill required
155	OK	OK	yes	6.22	6.22	bush clearing needed
154	OK	OK	yes	6.22	6.21	
153	OK	OK	yes	6.23	6.23	
152	OK	OK	yes	6.87	6.88	
151	OK	OK	yes	5.56	5.57	
150	OK	OK	yes	5.56	5.57	
149	OK	OK	yes	6.24	6.25	
148	OK	OK	yes	6.84	6.84	
147	OK	OK	yes	7.77	7.75	
146	OK	OK	yes	6.67	6.69	bush clearing needed
145	OK	OK	yes	6.87	6.88	
144	OK	OK	yes	5.57	5.58	
143	OK	OK	yes	6.87	6.86	bush clearing needed,
142	OK	OK	yes	5.57	5.56	
141	OK	OK	yes	5.57	5.57	

140	OK	OK	yes	5.57	5.56	
139	OK	OK	yes	5.58	5.58	bush clearing needed
138	OK	OK	yes	7.75	7.77	Angle point, A14
137	OK	OK	yes	6.88	6.88	
136	OK	OK	yes	8.71	8.72	
135	OK	OK	yes	7.45	7.45	
134	OK	OK	yes	6.22	6.22	
133	OK	OK	yes	8.42	8.43	Angle A12
132	OK	OK	yes	5.95	5.93	Surveyor to pick coordinates & update kmz file
131A	OK	OK	yes	5.58	5.59	New tower. Surveyor to pick coordinates & update
131	OK	OK	yes	7.78	7.75	backfill required
130	OK	OK	yes	5.92	5.92	backfill required
129	OK	OK	yes	6.23	6.22	
128	OK	OK	yes	5.56	5.57	
127	OK	OK	yes	5.93	5.93	On hill
126	OK	OK	yes	6.69	6.68	On hill
125	OK	OK	yes	5.92	5.93	
124	OK	OK	yes	6.87	6.85	
123	OK	OK	yes	6.88	6.86	
122	OK	OK	yes	6.23	6.23	
121	OK	OK	yes	5.58	5.57	
120	OK	OK	yes	6.85	6.84	
119	OK	OK	yes	6.42	6.41	
118	OK	OK	yes	6.67	6.73	
117	OK	OK	yes	6.21	6.21	backfill required
116	OK	OK	yes	5.57	5.56	
115	OK	OK	yes	6.92	6.91	
114	OK	OK	yes	6.87	6.88	
113	OK	OK	yes	5.92	5.93	
112	OK	OK	yes	5.57	5.59	
111	OK	OK	yes	7.52	7.52	
110	OK	OK	yes	6.69	6.88	
109	OK	OK	yes	6.69	6.69	
108	OK	OK	yes	5.58	5.58	diagonals estimated for S+0m tower, foundation not accessible
107	OK	OK	yes	5.56	5.57	bush clearing required
106	OK	OK	yes	6.22	6.22	
105	OK	OK	yes	5.57	5.56	
104	OK	OK	yes	5.58	5.57	backfill required
102	OK	OK	yes	6.19	6.24	
101	OK	OK	yes	6.22	6.22	
100	OK	OK	yes	0	0	tower erected, diagonals not taken
99	OK	OK	yes	0	0	tower erected, diagonals not taken

98	OK	OK	yes	0	0	tower erected, diagonals not taken
97	OK	OK	yes	0	0	tower erected, diagonals not taken
96	OK	OK	yes	0	0	tower erected, diagonals not taken
95	OK	OK	yes	0	0	tower erected, diagonals not taken
94	OK	OK	yes	0	0	tower erected, diagonals not taken
93	OK	OK	yes	0	0	Foundation not done
92	OK	OK	yes	0	0	Foundation not done
91	OK	OK	yes	0	0	tower erected, diagonals not taken
90	OK	OK	yes	0	0	tower erected, diagonals not taken
89	OK	OK	yes	0	0	tower erected, diagonals not taken
88	OK	OK	yes	6.22	6.23	
87	OK	OK	yes	0	0	tower erected, diagonals not taken
86	OK	OK	yes	0	0	tower erected, diagonals not taken
85	OK	OK	yes	0	0	tower erected, diagonals not taken
84	OK	OK	yes	6.87	6.87	backfill required
83	OK	OK	yes	0	0	tower erected, diagonals not taken, backfill required
82	OK	OK	yes	0	0	tower erected, diagonals not taken, backfill required
81	OK	OK	yes	0	0	tower erected, diagonals not taken
80	OK	OK	yes	0	0	tower erected, diagonals not taken
79	OK	OK	yes	0	0	tower erected, diagonals not taken
78	OK	OK	yes	6.85	6.86	backfill required, water pooling at base
77	OK	OK	yes	0	0	tower erected, diagonals not taken, backfill required
76	OK	OK	yes	0	0	tower erected, diagonals not taken
75	OK	OK	yes	0	0	tower erected, diagonals not taken, backfill required
74	OK	OK	yes	0	0	tower erected, diagonals not taken
73	OK	OK	yes	0	0	tower erected, diagonals not taken
72	OK	OK	yes	5.56	5.57	
71	OK	OK	yes	6.85	6.87	
70	OK	OK	yes	6.22	6.23	
69	OK	OK	yes	6.87	6.87	
68	OK	OK	yes	6.22	6.22	
67	OK	OK	yes	6.23	6.21	
66	OK	OK	yes	5.57	5.56	
65	OK	OK	yes	7.97	7.76	Stub Leg C interfered with, twisted by a heavy machinery working nearby the foundation. HT stub required for replacement
64	OK	OK	yes	6.21	6.23	Position shifted on site. Surveyor to update new position and kmz file
63	OK	OK	yes	6.88	6.88	
62	OK	OK	yes	5.92	5.92	
61	OK	OK	yes	6.91	6.89	

60	OK	OK	yes	6.87	6.86	
59	OK	OK	yes	6.24	6.22	
58	OK	OK	yes	8.72	8.69	
57	OK	OK	yes	6.87	6.91	
56	XX	X	yes	0	0	Excavated and Not constructed.
55	OK	OK	yes	6.22	6.22	
54	OK	OK	yes	5.57	5.55	
53	OK	OK	yes	5.57	5.56	sides AB-3.95m, BC-3.95m
52	OK	OK	yes	6.88	6.88	Surveyor to pick location coordinates & update kmz file
51	OK	OK	yes	5.57	5.54	On hill side
50	OK	OK	yes	7.77	7.77	backfill required
49	OK	OK	yes	5.58	5.56	
48	OK	OK	yes	5.56	5.57	bush clearing required,
47	B,C,D-OK	B,C,D-OK	yes	Not measured	6.85	Stub @Leg A cut off. Tower collapsed, chimney A affected. Sides CD-4.88, BC-4.81, stub B interfered by the tower collapse
46	OK	OK	yes	5.58	5.58	sides AB-3.995m, AD-3.995m
45	OK	OK	yes	6.23	6.21	backfill required
44	OK	OK	yes			tower erected, bolts tightened, no anti climbing installed, Bolt missing on members KNS 217 & KNS 225
43	OK	OK	yes	6.23	6.23	
42	OK	OK	yes	6.23	6.22	
41	OK	OK	yes	6.68	6.69	bush clearing required, sides AB-4.774m, BC-4.773m
40	OK	OK	yes	6.81	6.83	tower erected, bolts tightened, no anti climbing installed
39	OK	OK	yes	6.23	6.22	backfill required
38	OK	OK	yes	7.53	7.52	sides AB-5.32m, AD-5.32m
37	OK	OK	yes	5.95	5.93	sides CD-4.222m, BC-4.221m
36	OK	OK	yes	6.88	6.87	
35	OK	OK	yes	6.87	6.88	
34	OK	OK	yes	6.23	6.21	
33	OK	OK	yes	6.22	6.21	
32	OK	OK	yes	6.88	6.87	
31	OK	OK	yes	6.22	6.22	bush clearing needed, sides BC-4.40m, CD-4.40 m
30	OK	OK	yes	5.58	5.56	
29	OK	OK	yes	7.53	7.54	gulley nearby
28	OK	OK	yes	5.57	5.56	
27	OK	OK	yes	6.22	6.23	
26	OK	OK	yes	6.88	6.87	
25	OK	OK	yes	5.56	5.57	
24	OK	OK	yes	7.52	7.51	

23	OK	OK	yes	6.69	6.69	Angle Point A5
22	OK	OK	yes	5.57	5.57	
21	OK	OK	yes	5.57	5.57	backfill required
20	OK	OK	yes	5.58	5.58	
19	OK	OK	yes	5.57	5.57	
18	OK	OK	yes	5.58	5.58	
17	OK	OK	yes	7.47	7.53	backfill required, AB-5.30, BC-5.33, CD-5.33, DA-5.26,
16	OK	OK	yes	7.55	7.54	
15	OK	OK	yes	6.88	6.89	
14	OK	OK	yes	5.57	5.56	
13	OK	OK	yes	5.92	5.93	
12	OK	OK	yes	6.22	6.22	
11	OK	OK	yes	5.58	5.58	
10	OK	OK	yes	7.57	7.55	Position shifted on site. Surveyor to update new position.
9	OK	OK	yes	6.87	6.87	
8	OK	OK	yes	6.71	6.72	
7	OK	OK	yes	6.22	6.21	
6	OK	OK	yes	5.57	5.58	
5	OK	OK	yes	0	0	erected & bolts tightened, diagonals not taken gulley nearby
4	OK	OK	yes	0	0	erected & bolts tightened, diagonals not taken
3	NO	NO	NO	0	0	Not constructed
2	NO	NO	NO	0	0	Not constructed
1	NO	NO	NO	0	0	Not constructed

SITE PHOTOS

Tower 131

Tower 47, stub A deformed and cut

Tower 51

Tower 65, Stub twisted and deformed

Tw 93, house built at exact tower position

T 92, excavated but not constructed

Tw 146, heavy vegetation at foundation

Tw 144, taking stub diagonals, hilly terrain

CONCLUSION

The foundations are ok and ready apart from the small repairs that are required. The erected towers ok and the bolts had been fully tightened.

Report Prepared by:

	Sign	Date
Diana Matasero:		7th Nov 2023

Approved by:

Eng. Justin Muna

Project Manager

INTRODUCTION

132Kv Sondu-Ndhiwa transmission line is being retendered and there was need to inspect the already constructed tower foundations and the erected towers before a new contractor comes onboard.

The inspection was carried out from 9th to 28th October 2023 by the following officers:

1. Diana Matasero-Civil Engineer, D&C
2. Silvanus Omollo-Technician, O&M
3. James Ojijo- Technician/Driver-O&M

OBJECTIVE

The objective of the field assignment was:

i. Inspect all the constructed tower foundations and obtain their current status
ii. Inspect all erected towers and obtain the status
iii. Prepare an inspection report

SITE INSPECTION

Foundations

The team began their inspection from Ndhiwa substation towards Thurdibuoro substation. Sondu-Ndhiwa transmission line had a total of 184 foundations.

The contractor (CG Holdings) had managed to construct 178/184 before they left site.

The team managed to inspect all foundations though some had challenges of access. The team managed to inspect the following:

1. Taking the diagonal profiles for the ready foundations,
2. Checking the status of the stub, whether they had been damaged or not.
3. Checking the status of the chimney.
4. Checking the backfill.
5. Accessibility of the foundations
6. Earthing
7. Tower Coordinates (whether the tower position changed or not as compared to the original coordinates)

All foundations had been constructed apart from Tw 1, 2, 3, 56, 92 and 93. Towers 1, 2, 3 are under the LILO design for Thurdibuoro substation. Tw 93 has a house constructed on the foundation point. Tw 56 had been excavated but the pits have filled up with soil.

The diagonal profiles were ok. The stubs were all ok apart from Tw 47 and 65 which had one stub each deformed. Tw 47 had stub A deformed and cut. Tw 65 had stub C twisted as a result of nearby construction work involving heavy machinery.

Towers

A total of 27 towers had been erected. These are: 4, 5, 40, 44, 73, 74, 75, 76, 77, 79, 80, 81, 82, 83, 85, 86, 87, 89, 90, 91, 94, 95, 96, 97, 98, 99 and 100.

Challenges

Various challenges were experienced. These were:

1. Accessibility was a problem in some areas. Tw 108 was constructed within a rice plantation which was surrounded by irrigation water.
2. Heavy vegetation and trees had grown on tower foundations like for tw 53, 146 which required heavy bush clearing in order to measure the stub diagonals.
3. Huge gulleys had formed in some locations and this made access to such locations very difficult and walking was now an option. Tw 29, 41, 27 were near developing gulleys.
4. Hilly and rocky terrain where some foundations had been constructed. Access to locations 145, 144, 143, 142, 141, 140 and 139 was a real challenge.

The summary of the inspection for the line is as provided in the table below:

Tower No	stubs	foundation/ chimney	Earthing	Diagonal profiles (m)		Remarks
				AC	BD	
182	OK	OK	yes	7.76	7.77	bush clearing needed
181	OK	OK	yes	7.46	7.44	
180	OK	OK	yes	5.59	5.57	
179	OK	OK	yes	5.59	5.57	
178A	OK	OK	yes	5.58	5.58	New tower introduced on rerouted section.
178	OK	OK	yes	5.57	5.56	
177	OK	OK	yes	5.56	5.57	
176	OK	OK	yes	6.22	6.23	
175	OK	OK	yes	6.86	6.88	
174	OK	OK	yes	5.57	5.57	
173	OK	OK	yes	5.57	5.56	
172	OK	OK	yes	5.57	5.56	
171	OK	OK	yes	5.57	5.57	
170	OK	OK	yes	6.19	6.18	
169	OK	OK	yes	5.55	5.59	
168	OK	OK	yes	6.22	6.21	
167	OK	OK	yes	6.85	6.88	
166	OK	OK	yes	6.86	6.87	
165	OK	OK	yes	5.55	5.57	
164	OK	OK	yes	6.86	6.85	bush clearing needed
163	OK	OK	yes	6.86	6.87	backfill required
162	OK	OK	yes	5.58	5.56	
161	OK	OK	yes	6.87	6.87	
160	OK	OK	yes	6.21	6.22	
159	OK	OK	yes	7.53	7.53	
158	OK	OK	yes	6.87	6.87	
157	OK	OK	yes	6.87	6.87	
156	OK	OK	yes	7.82	7.88	backfill required
155	OK	OK	yes	6.22	6.22	bush clearing needed
154	OK	OK	yes	6.22	6.21	
153	OK	OK	yes	6.23	6.23	
152	OK	OK	yes	6.87	6.88	
151	OK	OK	yes	5.56	5.57	
150	OK	OK	yes	5.56	5.57	
149	OK	OK	yes	6.24	6.25	
148	OK	OK	yes	6.84	6.84	
147	OK	OK	yes	7.77	7.75	
146	OK	OK	yes	6.67	6.69	bush clearing needed
145	OK	OK	yes	6.87	6.88	
144	OK	OK	yes	5.57	5.58	
143	OK	OK	yes	6.87	6.86	bush clearing needed,
142	OK	OK	yes	5.57	5.56	
141	OK	OK	yes	5.57	5.57	

140	OK	OK	yes	5.57	5.56	
139	OK	OK	yes	5.58	5.58	bush clearing needed
138	OK	OK	yes	7.75	7.77	Angle point, A14
137	OK	OK	yes	6.88	6.88	
136	OK	OK	yes	8.71	8.72	
135	OK	OK	yes	7.45	7.45	
134	OK	OK	yes	6.22	6.22	
133	OK	OK	yes	8.42	8.43	Angle A12
132	OK	OK	yes	5.95	5.93	Surveyor to pick coordinates & update kmz file
131A	OK	OK	yes	5.58	5.59	New tower. Surveyor to pick coordinates & update
131	OK	OK	yes	7.78	7.75	backfill required
130	OK	OK	yes	5.92	5.92	backfill required
129	OK	OK	yes	6.23	6.22	
128	OK	OK	yes	5.56	5.57	
127	OK	OK	yes	5.93	5.93	On hill
126	OK	OK	yes	6.69	6.68	On hill
125	OK	OK	yes	5.92	5.93	
124	OK	OK	yes	6.87	6.85	
123	OK	OK	yes	6.88	6.86	
122	OK	OK	yes	6.23	6.23	
121	OK	OK	yes	5.58	5.57	
120	OK	OK	yes	6.85	6.84	
119	OK	OK	yes	6.42	6.41	
118	OK	OK	yes	6.67	6.73	
117	OK	OK	yes	6.21	6.21	backfill required
116	OK	OK	yes	5.57	5.56	
115	OK	OK	yes	6.92	6.91	
114	OK	OK	yes	6.87	6.88	
113	OK	OK	yes	5.92	5.93	
112	OK	OK	yes	5.57	5.59	
111	OK	OK	yes	7.52	7.52	
110	OK	OK	yes	6.69	6.88	
109	OK	OK	yes	6.69	6.69	
108	OK	OK	yes	5.58	5.58	diagonals estimated for S+0m tower, foundation not accessible
107	OK	OK	yes	5.56	5.57	bush clearing required
106	OK	OK	yes	6.22	6.22	
105	OK	OK	yes	5.57	5.56	
104	OK	OK	yes	5.58	5.57	backfill required
102	OK	OK	yes	6.19	6.24	
101	OK	OK	yes	6.22	6.22	
100	OK	OK	yes	0	0	tower erected, diagonals not taken
99	OK	OK	yes	0	0	tower erected, diagonals not taken

98	OK	OK	yes	0	0	tower erected, diagonals not taken
97	OK	OK	yes	0	0	tower erected, diagonals not taken
96	OK	OK	yes	0	0	tower erected, diagonals not taken
95	OK	OK	yes	0	0	tower erected, diagonals not taken
94	OK	OK	yes	0	0	tower erected, diagonals not taken
93	OK	OK	yes	0	0	Foundation not done
92	OK	OK	yes	0	0	Foundation not done
91	OK	OK	yes	0	0	tower erected, diagonals not taken
90	OK	OK	yes	0	0	tower erected, diagonals not taken
89	OK	OK	yes	0	0	tower erected, diagonals not taken
88	OK	OK	yes	6.22	6.23	
87	OK	OK	yes	0	0	tower erected, diagonals not taken
86	OK	OK	yes	0	0	tower erected, diagonals not taken
85	OK	OK	yes	0	0	tower erected, diagonals not taken
84	OK	OK	yes	6.87	6.87	backfill required
83	OK	OK	yes	0	0	tower erected, diagonals not taken, backfill required
82	OK	OK	yes	0	0	tower erected, diagonals not taken, backfill required
81	OK	OK	yes	0	0	tower erected, diagonals not taken
80	OK	OK	yes	0	0	tower erected, diagonals not taken
79	OK	OK	yes	0	0	tower erected, diagonals not taken
78	OK	OK	yes	6.85	6.86	backfill required, water pooling at base
77	OK	OK	yes	0	0	tower erected, diagonals not taken, backfill required
76	OK	OK	yes	0	0	tower erected, diagonals not taken
75	OK	OK	yes	0	0	tower erected, diagonals not taken, backfill required
74	OK	OK	yes	0	0	tower erected, diagonals not taken
73	OK	OK	yes	0	0	tower erected, diagonals not taken
72	OK	OK	yes	5.56	5.57	
71	OK	OK	yes	6.85	6.87	
70	OK	OK	yes	6.22	6.23	
69	OK	OK	yes	6.87	6.87	
68	OK	OK	yes	6.22	6.22	
67	OK	OK	yes	6.23	6.21	
66	OK	OK	yes	5.57	5.56	
65	OK	OK	yes	7.97	7.76	Stub Leg C interfered with, twisted by a heavy machinery working nearby the foundation. HT stub required for replacement
64	OK	OK	yes	6.21	6.23	Position shifted on site. Surveyor to update new position and kmz file
63	OK	OK	yes	6.88	6.88	
62	OK	OK	yes	5.92	5.92	
61	OK	OK	yes	6.91	6.89	

60	OK	OK	yes	6.87	6.86	
59	OK	OK	yes	6.24	6.22	
58	OK	OK	yes	8.72	8.69	
57	OK	OK	yes	6.87	6.91	
56	XX	X	yes	0	0	Excavated and Not constructed.
55	OK	OK	yes	6.22	6.22	
54	OK	OK	yes	5.57	5.55	
53	OK	OK	yes	5.57	5.56	sides AB-3.95m, BC-3.95m
52	OK	OK	yes	6.88	6.88	Surveyor to pick location coordinates & update kmz file
51	OK	OK	yes	5.57	5.54	On hill side
50	OK	OK	yes	7.77	7.77	backfill required
49	OK	OK	yes	5.58	5.56	
48	OK	OK	yes	5.56	5.57	bush clearing required,
47	B,C,D-OK	B,C,D-OK	yes	Not measured	6.85	Stub @Leg A cut off. Tower collapsed, chimney A affected. Sides CD-4.88, BC-4.81, stub B interfered by the tower collapse
46	OK	OK	yes	5.58	5.58	sides AB-3.995m, AD-3.995m
45	OK	OK	yes	6.23	6.21	backfill required
44	OK	OK	yes			tower erected, bolts tightened, no anti climbing installed, Bolt missing on members KNS 217 & KNS 225
43	OK	OK	yes	6.23	6.23	
42	OK	OK	yes	6.23	6.22	
41	OK	OK	yes	6.68	6.69	bush clearing required, sides AB-4.774m, BC-4.773m
40	OK	OK	yes	6.81	6.83	tower erected, bolts tightened, no anti climbing installed
39	OK	OK	yes	6.23	6.22	backfill required
38	OK	OK	yes	7.53	7.52	sides AB-5.32m, AD-5.32m
37	OK	OK	yes	5.95	5.93	sides CD-4.222m, BC-4.221m
36	OK	OK	yes	6.88	6.87	
35	OK	OK	yes	6.87	6.88	
34	OK	OK	yes	6.23	6.21	
33	OK	OK	yes	6.22	6.21	
32	OK	OK	yes	6.88	6.87	
31	OK	OK	yes	6.22	6.22	bush clearing needed, sides BC-4.40m, CD-4.40 m
30	OK	OK	yes	5.58	5.56	
29	OK	OK	yes	7.53	7.54	gulley nearby
28	OK	OK	yes	5.57	5.56	
27	OK	OK	yes	6.22	6.23	
26	OK	OK	yes	6.88	6.87	
25	OK	OK	yes	5.56	5.57	
24	OK	OK	yes	7.52	7.51	

23	OK	OK	yes	6.69	6.69	Angle Point A5
22	OK	OK	yes	5.57	5.57	
21	OK	OK	yes	5.57	5.57	backfill required
20	OK	OK	yes	5.58	5.58	
19	OK	OK	yes	5.57	5.57	
18	OK	OK	yes	5.58	5.58	
17	OK	OK	yes	7.47	7.53	backfill required, AB-5.30, BC-5.33, CD-5.33, DA-5.26,
16	OK	OK	yes	7.55	7.54	
15	OK	OK	yes	6.88	6.89	
14	OK	OK	yes	5.57	5.56	
13	OK	OK	yes	5.92	5.93	
12	OK	OK	yes	6.22	6.22	
11	OK	OK	yes	5.58	5.58	
10	OK	OK	yes	7.57	7.55	Position shifted on site. Surveyor to update new position.
9	OK	OK	yes	6.87	6.87	
8	OK	OK	yes	6.71	6.72	
7	OK	OK	yes	6.22	6.21	
6	OK	OK	yes	5.57	5.58	
5	OK	OK	yes	0	0	erected & bolts tightened, diagonals not taken gulley nearby
4	OK	OK	yes	0	0	erected & bolts tightened, diagonals not taken
3	NO	NO	NO	0	0	Not constructed
2	NO	NO	NO	0	0	Not constructed
1	NO	NO	NO	0	0	Not constructed

SITE PHOTOS

Tower 131

Tower 47, stub A deformed and cut

Tower 51

Tower 65, Stub twisted and deformed

Tw 93, house built at exact tower position

T 92, excavated but not constructed

Tw 146, heavy vegetation at foundation

Tw 144, taking stub diagonals, hilly terrain

CONCLUSION

The foundations are ok and ready apart from the small repairs that are required. The erected towers ok and the bolts had been fully tightened.

Report Prepared by:

	Sign	Date
Diana Matasero:		7th Nov 2023

Approved by:

Eng. Justin Muna

Project Manager